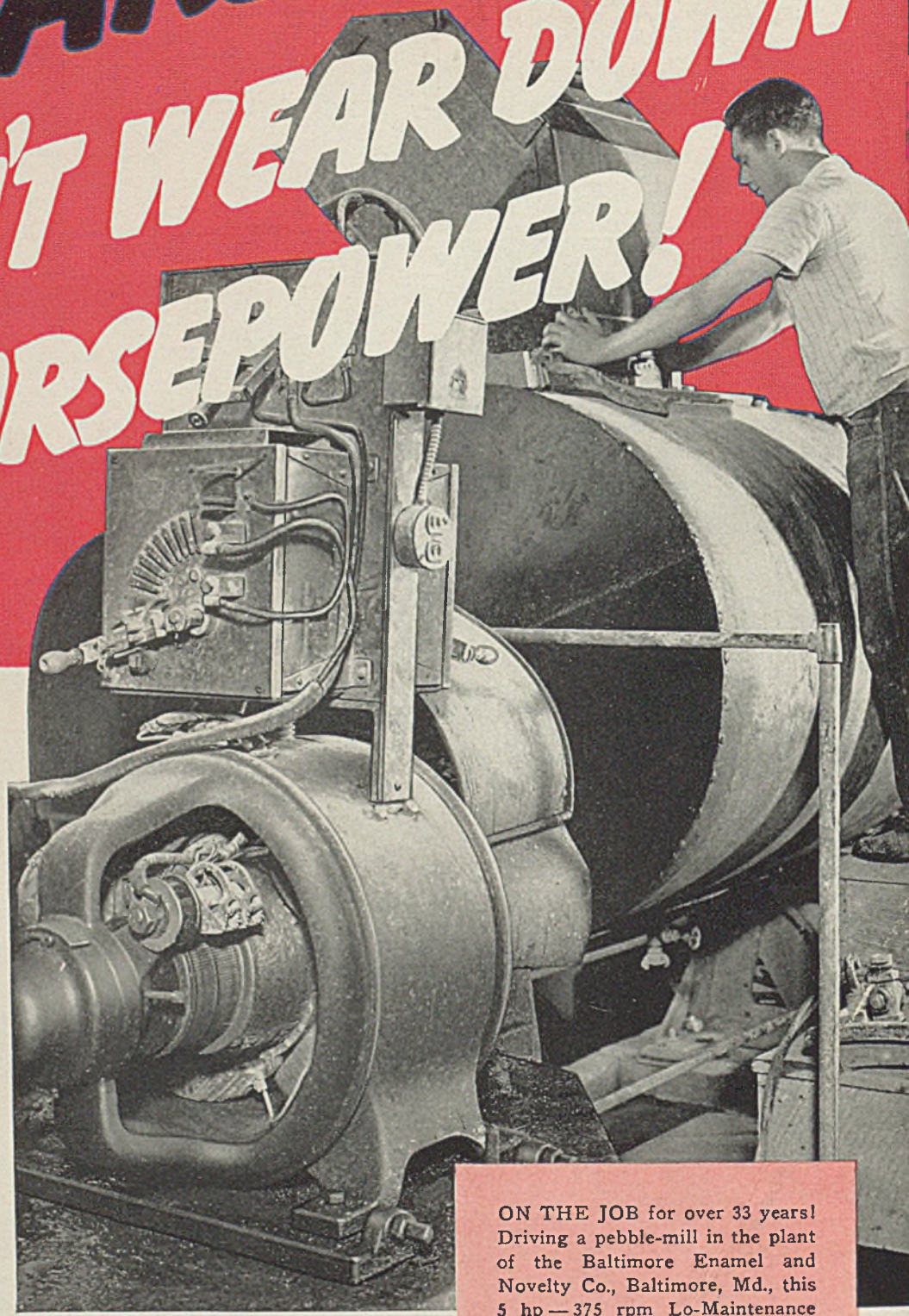
September 29, 1941

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

33 YEARS COULDN'T WEAR DOWN THIS HORSEPOWER!



ON THE JOB for over 33 years! Driving a pebble-mill in the plant of the Baltimore Enamel and Novelty Co., Baltimore, Md., this 5 hp — 375 rpm Lo-Maintenance Motor is still delivering dependable, trouble-free service.

Another Outstanding Case-History of the Dependable, Low Cost Performance of Allis-Chalmers Lo-Maintenance Motors. See How They Can Solve Your Power Problems Too . . .

SINCE 1908—for over 33 long years—this 5 hp — 375 rpm Allis-Chalmers Motor has been harnessed to a pebble-mill in the plant of the Baltimore Enamel and Novelty Co.

Day in and day out, water and abrasive enamel frit have worked to wear it down. But this motor is still on the job, in excellent condition, delivering uninterrupted, full-duty horsepower!

The value of quality construction and dependable operation is even more vital today. And when you buy Lo-Maintenance Motors, Allis-Chalmers engineering sees that you are getting *"more motor" for your money.*

Outstanding economy and operation are designed and built into Lo-Maintenance Motors. Their full-measure performance — more than just a rated horsepower — is based on such important features as indestructible rotor, distortionless stator, high carbon steel frame. *No stint or skimp in materials or workmanship means quality to the core.*

When you want motor performance like this in your plant, call the engineer in the district office near you. Or write Allis-Chalmers, Milwaukee, Wisconsin.

A-1438

ALLIS-CHALMERS LO-MAINTENANCE MOTORS

A COMPLETE LINE FOR EVERY PURPOSE

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

Published every Monday. Subscription in the United States, Cuba, Mexico and Canada, one year $4, two years $6; European and foreign countries, one year $10. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

STEEL

ESTABLISHED 1882

Contents

Volume 109—No. 1 **July 7, 1941**

PRODUCTION • PROCESSING • DISTRIBUTION • USE

Experience of Years

STORED UP

in Helpful Literature...

The pressing demands of the defense program call for the employment of every skill and facility at the disposal of the metal working industries.

Among the resources available is the experience of our technical staff in the solution of problems involving the use of Nickel and its alloys.

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Nickel

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HIGHLIGHTING
THIS ISSUE OF
STEEL

■ COMMENTING on federal price control policies, Leon Henderson (p. 23) holds that added wage costs up to now have been absorbed by savings resulting from production in huge volume. . . . On the other hand, STEEL'S study (p. 21) reveals that wide inequalities have resulted. In general, wages and agricultural products have advanced sharply while major manufactured products have been held down. The threat of inflation is upon us. Politics is seen as the dominant factor in applying price controls. . . . Mr. Henderson charges evasion of price ceilings (p. 22), particularly in the scrap and secondary aluminum and zinc trades. He describes the subterfuges employed.

• • •

Nondefense Out of Luck

Consumers find it increasingly difficult (p. 107) to buy steel for nondefense use. The situation is all the more difficult because so many of them have sharply depleted inventories and are confronted with the problem of keeping their plants in production. . . . On the other hand, steel companies carefully respect priorities, going even to greater lengths than compelled by the priorities system. Where consumers are engaged on defense work they are receiving the necessary steel whether or not they have obtained preference ratings. . . . Conferences are in progress at Washington (p. 23) to study the steel supply with reference to requirements of manufacturers of refrigerators, washing machines and other products.

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Grain Size And Toughness

Machine tool builders now enjoy (p. 25) a limited blanket preference rating. . . . Warehouse distributors (p. 27) are having difficulty in replenishing steel stocks. . . . There is no relation between grain size and toughness (p. 27), the National Bureau of Standards finds. . . . L. M. Lamm (p. 32) comments on the growing reliance of OPM on OPACS; he quotes Mr. Knudsen as warning that automobile production will be cut more sharply than previously envisioned. . . . Several modifications have been made (p. 34) in the zinc priorities system; secondary aluminum smelters now have scrap preference rating. . . . Repair and maintenance (p. 34) now are subject to priorities. . . . Aluminum capacity (p. 44) will be increased further.

• • •

Bomb Design, Manufacture

With the airplane bomb assuming increasing importance, Professor Macconochie's discussion (p. 52) of bomb design and manufacture this week carries more than usual interest. Here, too, will be found a series of illustrations showing steps in making cast steel bomb cases. . . . In setting up a welding school to train your own welders, Mr. Lawrence emphasizes (p. 60) the necessity of weeding out inept students and shows methods for doing this on a factual basis. . . . New continuous automatic line for electrogalvanizing pipe (p. 73) employs unusual conveyors. . . . A new turret-type press (p. 86) hydraulically tests sixty 75 to 155-millimeter shell cases per hour.

• • •

Practical Rubber Molds

Casting in rubber molds has important possibilities, says Frank K. Smith, (p. 50) as he details development of the method, procedure for designing and making the molds, range of application of the process. . . . Paul J. McKimm presents (p. 68) a most timely discussion on the manufacture of high-quality low-cost steel, utilizing available scrap. . . . Shortage of metal coating materials results in development of many new plastic coatings. One of these (p. 96) is said to form an effective protection in a thickness of only 0.00005-inch. . . . A machinery manufacturer installs radiant gas burners in his pack carburizing furnaces (p. 65) and obtains a 25 per cent increase in production.

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Topsy-Turvy Price-Fixing Policy Hits Snags, as "Honeymoon Is Over"

Farm produce and wage advances encouraged while steel and similar products are "frozen", resulting in inequalities . . . Higher foodstuffs soon will result in increased living costs

■ WIDE inequalities have resulted from the New Deal's price control policies, a survey of price movements of various commodities since the war's outbreak reveals.

In general, wages and agricultural products have advanced sharply, under the protection and encouragement of the government. Major basic manufactured materials, such as steel and metals generally, have shown but slight increases.

Finished steel, has advanced only $1 a ton, or 1.8 per cent, since August, 1939. STEEL's finished steel price composite stood at $55.60 on the eve of the war, now is $56.60.

Average hourly steel wages, on the other hand, have advanced 15.7 per cent from 84.7 cents in August, 1939, to 98.1 cents at present. Average weekly wages have risen even more sharply, 27 per cent from $30.66 in August, 1939, to $38.95.

Last major steel wage increase, effective April 1 this year, was followed almost immediately by a price "freezing" order on all steel products by Leon Henderson, administrator of the Office of Price Administration and Civilian Supply. The wage increase is estimated to have increased steelmaking costs from $2.50 to $5 a ton, depending on product. Additional cost increases resulted from higher prices for raw materials, caused by wage increases in other fields.

While steel is held to a 1.8 per cent increase since the war's start, the Bureau of Labor Statistics' index of basic commodity prices on June 26 was 49 per cent above the August, 1939, level. This reflects to large extent the government's efforts to place a floor under prices of farm products, and of wages, and to a certain extent the uncontrolled speculation in many commodities.

Spot wheat No. 2 dark hard at Kansas City has increased 46 per cent, from 67 cents in August, 1939, to 98 cents.

Spot cotton, New York, advanced 60 per cent from 9.1 to 14.6 cents.

Dun & Bradstreet's food index has advanced 38 per cent since the war began.

Retail Prices Rising

Further increases in retail prices of consumer goods are considered inevitable, despite any attempts by the OPACS or any other existing government agency to impose controls. Many economists believe the worst "is soon to come" and that the price situation rapidly is getting out of control.

Living costs have been increasing. Until recently, they had changed only slightly since war started. The National Industrial Conference Board's index advanced only 1.1 per cent from September, 1939, to March, 1941. Since March the index has gained 1.3 per cent, and still is headed up. Living costs have not yet reflected fully the tremendous increases in prices of certain foodstuffs. Bread, for example, has not responded in proportion to the trend in wheat prices and wage costs. In time, however, such primary necessities will be affected by underlying factors.

Living cost increases to date have been substantially below the hourly and weekly wage increases.

The obvious inconsistency of the policy of the New Deal in attempting to boost wages and farm staples prices and hold prices of a wide range of industrial products down became generally recognized when Mr. Henderson spoke out against the reluctance of Chrysler Corp. to rescind recent price increases.

Previously, the OPACS policy apparently had been successful because of the voluntary co-operation offered by manufacturers of steel and pig iron and the suppliers of scrap iron and steel, aluminum scrap, zinc scrap, nickel scrap, and others affected by the price ceiling orders or by "suggestions" to hold existing prices or withdraw increases.

Chrysler Corp. replied to the OPACS administrator's accusation of lack of co-operation with an effective statement showing the price increase effected had been offset by rising costs—principally

wages. In addition, the company recounted how it had produced $31,666,000 worth of military equipment on which it had made only 1/25 of 1 per cent profit.

The threat of inflation which has arisen as result of the extremely spotty price control program has brought forth demands for either a reasonable price control program, or some other means of averting serious inflation. Price, wage and rent control legislation soon will be outlined to Congress by the OPACS itself. It is doubtful that a law providing for price control would do more than give specific authority to the price-fixing agency —an authority which many believe it now lacks.

Difficulties of imposing price controls on a broad range of products are legion. First, there are too many prices and too many products. Second, effective price ceilings must also specify maintenance of quality. Third, the OPACS personnel still is disposed to play New Deal politics; this already has been illustrated not only in the "or else" technique used against business but in its favoring of the farmer and wage earner. Ironically, while durable goods prices have been fairly well maintained, the prices of foodstuffs and other necessities of life—which should be available to the civilian population in quantity—have advanced sharply, and threaten to continue to advance.

Substantial opposition to a broad price control law appears certain in Congress. The farm bloc will hold out against ceiling farm products. In fact a bill already has been introduced under the terms of which OPACS would not be permitted to fix upper limits on the price of agricultural produce. The labor representatives will oppose any ceiling over wages. Similarly other groups will seek exceptions which may make a full-measure price control law impossible.

Receiving serious consideration as a means of preventing runaway prices is a plan for absorbing enlarged income through broader and heavier taxes and sales of government savings bonds.

Price Controls Designed To Hold Profits at "Reasonable Levels"

"Neither the requirements of the defense program nor simple equity permits us deliberately to force manufacturers to operate at a loss. . . . Business must be asked to absorb cost increases up to the point where profits are at a resonable level."

This definition of policy is contained in an article in the *Harvard Business Review,* written jointly by Leon Henderson, OPACS administrator, and Donald M. Nelson, head of the purchases division of the Office of Production Management.

"Reasonable profit" the defense officials state, will be determined on the basis of average return on investment over a period of years. "This does not mean, of course, that all monopoly profits of the past should be preserved."

Acknowledging the difficulties and inequities that result from such a progam, Mr. Henderson and Mr. Nelson say: "It causes us to wrestle with the knotty problem of the prince and pauper industry—the industry which during most of the last ten years has been losing the accumulated profits of the preceding years. We are constantly beset by demands that our decisions permit at least the accumulation of 'a little fat.' The widespread belief that a serious deflation will follow the end of the rearmament effort gives sharp point to these requests."

Deflation is not likely to follow immediately after the defense program, they believe, because there will be an accumulated deficit of consumer goods. Satisfying this demand will occupy production facilities for a considerable period.

Full force of the forty billion dollar defense expenditure has not yet been felt. "To date, there has been some reflection of the program in upward price movements, and some price regulations have been issued, in addition to the controls exercised through the government's methods of procuring military and related supplies.

"The real problems of price control lie in the future—both the very immediate future and the longer run future. To deal effectively with those problems, the government must consider and is considering increases in production, procurement policies, fiscal policies, and specific price setting and regulating. Every proper effort must be made to prevent inflation.

"The test—the question of success or failure—will be answered not alone in terms of the wisdom of the policies and methods adopted by government but also, and we believe more importantly, in terms of the understanding and spirit of self-discipline exercised by businessmen, who are in the final analysis responsible for the management of the price structure. We have every confidence in the steadfast will and determination of our business community to understand this responsibility and to discharge it fully, to the end that the American way of living will survive."

Henderson Charges Ceiling Prices Are Being Evaded

Subterfuges and devices employed by a few members of the trade to evade ceiling price schedules, especially in the scrap and secondary aluminum and zinc trades, were charged last week by Leon Henderson, administrator, OPACS.

Specifically condemned in a statement which is being sent to all trade members were the following practices:

(1) Falsification of records or failure to record all transactions, with the object of completing sales at prices above the established maximums.

(2) Designation of the dealer as an "agent" or "employe" of the buyer, entitled as such to a "commission" or "salary" which brings the realized price above the ceiling. "Bonuses," "premiums" or "service charges" for locating, cleaning or classifying material.

(3) Unwarranted freight charges arrived at by computing haulage from some point other than the dealer's yard or actual and final place of shipment to the buyer.

(4) Sale of dirty or contaminated scrap at the maximum prices established for clean and dry scrap.

(5) Sale at maximum prices of admixtures of metals, for which ceiling prices have been established, and cheaper materials.

Erroneous and unwarranted interpretations of the price schedules have been used to cloak these evasions, Mr. Henderson said.

Manchuria To Increase Iron, Steel Production

■ Manchuria is setting out, through a new five-year plan, to become independent of the United States as a source of scrap iron. The plan, according to reports received by the Dpartment of Commerce, involves increasing the country's output of iron and steel and coal. Manchuria seeks to become self-sufficient in steel as well as some of the special steel alloys, particularly those not now furnished by Japan.

The department said it is understood the new program requires that Japan be furnished with large quantities of pig iron.

Steelmakers, OPACS Administrator Study Civilian Steel Requirements

■ STEELMAKERS last week discussed the adequacy of steel producing capacity to supply civilian needs with OPACS Administrator Henderson.

The first conference was held Wednesday, the steel men being represented by a committee from the American Iron and Steel Institute.

Information obtained at the meeting will be used by Mr. Henderson when he takes up with the refrigerator industry July 8 the problems of possible shortages of steel for that use.

Other large industrial consumers of steel and metals as automobile, washing machine, oil burner and steel furniture manufacturers will meet during July with Mr. Henderson.

They will attempt to work out civilian allocation programs that will enable the plants to keep in operation wherever possible and at the same time divert to military uses all necessary supplies of steel.

Mr. Henderson announced the steel meeting at a press conference in which he said the question of asking for formal, legislative price ceilings was in the hands of the President.

He said "business will go on as usual" despite the demands of some congressmen that he stop issuing price orders, because OPACS "gets its directions" from President Roosevelt.

Discussing factors that would cause him to revise price orders on steel and other commodities, Mr. Henderson said that added wage costs up to now have been absorbed by the savings made by industry through a lower cost per unit brought on by defense work.

Further increases, Mr. Henderson indicated, may not be capable of absorption by the steelmakers, and in this event they will have to be considered as materially affecting the cost basis.

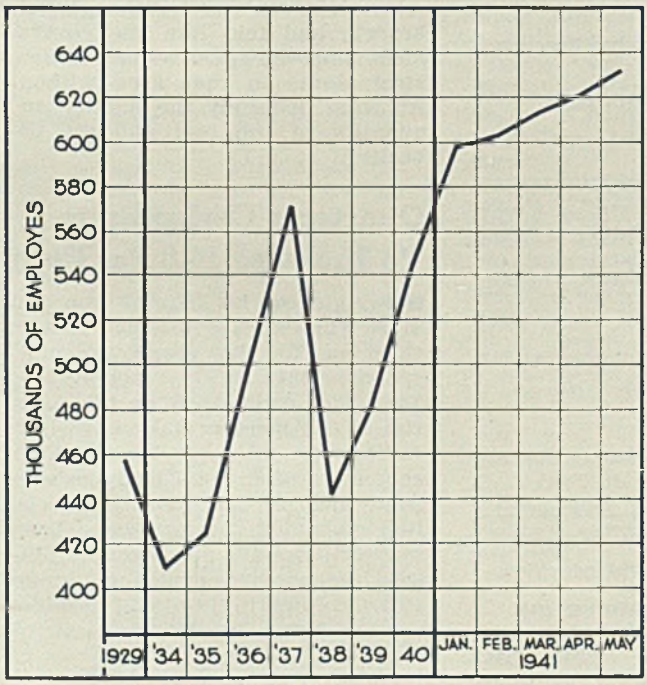
Consumer Goods Manufacturers Queried on Materials Needs

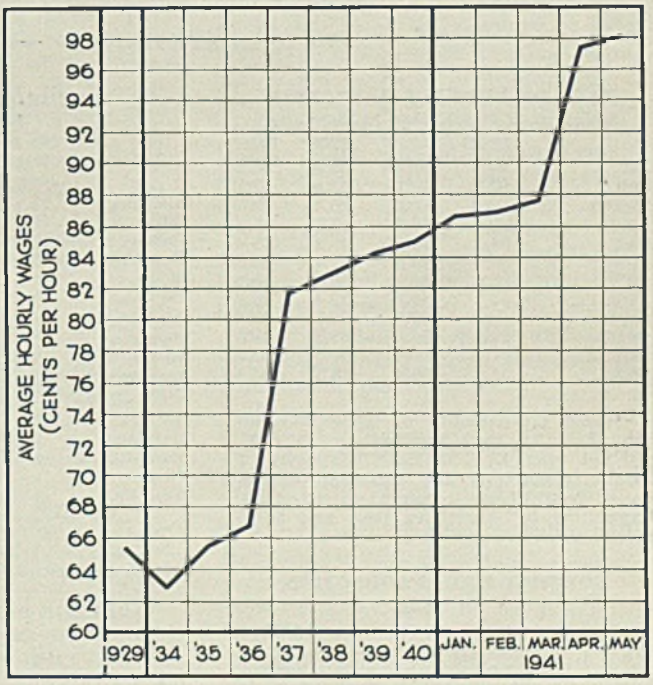
Conferences with representatives of leading consumers durable goods industries now faced in many cases with severe curtailment of essential raw materials will be started this week by the Civilian Supply Allocation Division of OPACS.

Purpose of the meetings will be to secure information from the industries involved on their raw material needs, and to work out methods of making civilian allocation consonant with defense.

It will be the policy of the Civilian Supply Allocation Division, once the amounts of scarce materials available for civilian use are ascertained, to allocate sufficient amounts if possible to take care of all essential public services such as transportation, power and health.

Steel Employment, Wages, Payrolls at All-Time High





■ Eleven thousand new employes were added to the steel industry's payrolls during May raising employment to a new peak of 632,000. Previous record was established in April this year, when 621,000 were employed. In May, 1940, the industry had 510,000 employes, according to the American Iron and Steel Institute.

Steel payrolls in May totaled $115,267,000, compared with $108,557,000 in April, and with $75,184,000 in May, 1940.

Wage-earning employes earned an average of 98.1 cents per hour, the highest wage in the steel industry's history. In April, the average wage was 97.4 cents; in May, 1940, it was 85.1 cents.

Average work-week in May was 39.7 hours, indicating the average week wage was $38.95. In April, wage earners worked 39.4 hours a week, and in May of last year, 35.7 hours.

Accompanying charts show the advances made in total employment and in average hourly wages during recent years.

June Pig Iron Rate 96.3 Per Cent; Daily Output Near All-Time Record

■ AVERAGE daily production of coke pig iron in United States in June increased 2.32 per cent over May to the near-record total of 151,701 net tons, as five more furnaces were put into blast. Operating rate was 96.3 per cent, up 2.2 points from the preceding month and equal to the rate in March, when total production was 4,702,905 tons, an all-time record, and daily average was 151,707 tons.

Aggregate production in June, according to reports from operators of the nation's 229 potential blast furnaces, was 4,551,040 tons. This was 45,073 tons or 0.98 per cent less than in the preceding month, and compared with 3,813,092 tons produced in June, 1940.

Total output for the first six months this year was 27,063,672 tons, nearly 30 per cent greater than 21,048,791 tons in the period last year. It was nearly double output in the first half of 1939, when the total was 14,023,668 tons. Daily average for the six months was 149,523 tons, against 115,618 in first half last year.

Rate of operations, 96.3 per cent, compared with 94.1 per cent in May, and 83.6 per cent in June, 1940. In the month in 1939, rate was 51.4 per cent, and 25.5 per cent in June, 1938.

Output of merchant iron in June was 677,703 tons, 14.9 per cent of the total. This compared with merchant production aggregating 16.7 per cent of the total in May and 17.8 per cent in March.

Stacks in blast June 30 totaled 211, against 206 at the end of May. Six furnaces were blown in and one was taken out of blast. One merchant furnace was added and none taken off. In the steelworks or nonmerchant classification, five stacks were put into blast and one was taken out.

Addition of the five furnaces last month increased the number active June 30 to the highest total since July, 1929. In that month 217 stacks were in blast and output was 4,236,412 tons. Furnaces active in May, 1941, totaled 206; in April, 191; and 205 in March. In June, 1940, total was 181, and 117 in the month in 1939.

Stacks put into blast during the month: In Ohio: Youngstown No. 4, Republic Steel Corp.; Campbell No. 1, Youngstown Sheet & Tube Co. In Pennsylvania: Cambria "L," Bethlehem Steel Co.; Swede No. 3, Alan Wood Steel Co.; Shenango No. 3, Shenango Furnace Co.; Clairton No. 3, Carnegie-Illinois Steel Corp.

Ensley No. 2, Tennessee Coal, Iron & Railroad Co., in Alabama, was blown out.

Tuscaloosa furnace of Central Iron & Coal Co., Holt, Ala., was recently purchased by the Tennessee Coal, Iron & Railroad Co., and is expected to be transferred to the steelworks or nonmerchant classification.

PIG IRON STATISTICS

RATE OF FURNACE OPERATION
(Relation of Production to Capacity)

	1941[1]	1940[2]	1939[3]	1938[4]
Jan.	95.5	85.4	51.0	33.6
Feb.	95.3	75.0	53.5	33.6
March	96.3	69.5	56.1	34.2
April	91.8	68.9	49.8	33.4
May	94.1	74.2	40.2	29.4
June	96.3	83.6	51.4	25.5
July	....	86.1	55.0	28.2
Aug.	....	89.9	62.4	34.8
Sept.	....	91.5	69.7	40.5
Oct.	....	94.2	85.2	48.0
Nov.	....	96.4	90.3	55.0
Dec.	....	96.4	88.5	51.4

[1] Based on capacity of 57,503,030 net tons, Dec. 31, 1940; [2] capacity of 55,628,060 net tons, Dec. 31, 1939; [3] capacity of 56,222,790 net tons, Dec. 31, 1938; [4] capacity of 56,679,168 net tons, Dec. 31, 1937. Capacities by American Iron and Steel Institute.

MONTHLY IRON PRODUCTION
Net Tons

	1941	1940	1939
Jan.	4,666,233	4,024,556	2,436,474
Feb.	4,206,826	3,304,368	2,307,405
March	4,702,905	3,270,575	2,680,446
April	4,340,555	3,139,043	2,301,965
May	4,596,113	3,497,157	1,923,625
June	4,551,040	3,813,092	2,373,753
Tot. 6 mo.	27,063,672	21,048,791	14,023,668
July	.....	4,070,513	2,638,760
Aug.	.....	4,234,576	2,979,774
Sept.	.....	4,172,551	3,218,940
Oct.	.....	4,437,725	4,062,670
Nov.	.....	4,397,656	4,166,512
Dec.	.....	4,542,864	4,219,718
Total	.....	46,894,676	35,310,047

JUNE IRON PRODUCTION
Net Tons

	No. in blast last day of June	No. in blast last day of May	—Total Tonnages— Merchant	Nonmerchant
Alabama	17	18	121,238	171,695
Illinois	18	18	111,919	324,963
Indiana	19	19	30,353	502,896
New York	15	15	82,678	221,459
Ohio	48	46	155,584	928,170
Penna.	70	66	128,640*	1,288,807*
Colorado	3	3		
Michigan	4	4		
Minnesota	2	2	27,995*	141,017
Tennessee	1	1		
Utah	1	1		
Kentucky	2	2		
Maryland	6	6		
Mass.	1	1	19,301*	294,325
Virginia	1	1		
West Va.	3	3		
Total	211	206	677,708*	3,873,332*

*Includes ferromanganese and spiegeleisen.

AVERAGE DAILY PRODUCTION
Net Tons

	1941	1940	1939	1938
Jan.	150,524	129,825	78,596	52,201
Feb.	150,244	113,943	82,407	52,254
March	151,707	105,502	86,465	53,117
April	144,685	104,635	76,732	51,819
May	148,262	112,811	62,052	45,556
June	151,701	127,103	79,125	39,601
July	.....	130,984	85,121	43,827
Aug.	.....	136,599	96,122	54,031
Sept.	.....	139,085	107,298	62,835
Oct.	.....	143,152	131,053	74,697
Nov.	.....	146,589	138,883	85,369
Dec.	.....	146,544	136,119	79,943
Ave.	149,523	128,128	96,740	57,962

$350,000 To Study Ore, Coal, Limestone

WASHINGTON

■ The House last week inserted a $350,000 appropriation in the Department of the Interior fund bill for 1942 to enable the Bureau of Mines to investigate the amount and quality of iron ore, limestone and coking coals in "California, Colorado, Utah, Wyoming and all other states in which such deposits may exist."

This was urged by Senator Murdock, Utah, who said the information was needed by the Office of Production Management before it could recommend expansion of steelmaking facilities in the West.

He declared that Samuel R. Fuller, when head of the OPM materials branch, had told him the government could not spend money on new steel plants in that area without knowing definitely the quality and quantity of the coal and ore deposits.

Quarter's Carloadings To Increase 14.8 Per Cent

■ Freight car loadings of iron and steel will increase 16.5 per cent in third quarter this year over corresponding 1940 period, reaching 566,743. This estimate is by the Association of American Railroads which forecast for third quarter a 14.8 per cent increase in total loadings over same quarter last year. Association estimated coal and coke loadings will rise 17 per cent to 2,138,622; ore and concentrates will go up 16.6 per cent to 1,020,962; machinery and boilers up 31.8 per cent to reach 42,347 cars.

CIO Wins TCI Election

■ United Mine Workers (CIO) last week won the right to act as exclusive bargaining agent for employes of the four captive mines operated by the Tennessee Coal, Iron & Railroad Co. Eighty-two per cent of eligible voters favored the CIO union.

Fisher Memphis Plant Begins Airplane Work

■ Fisher Body plant at Memphis, Tenn., now being converted for airplane work, has started production on some bomber parts. At least four other Fisher plants will work on the joint General Motors-North American Aviation bomber program. Defense contracts upon which Fisher now is engaged aggregate $100,000,000.

The Memphis plant will serve as the focal point for major assemblies which Fisher will produce for B25-C twin-engine bombers. Formerly a woodworking unit, the Memphis plant now is being doubled in size. Although construction work will not be completed until probably early in 1942, it has advanced sufficiently to begin production on some parts.

The plant when completed will work principally on flat sheet metal and assembly operations, and will produce parts on the basis of 100 bombers a month. All parts and subassemblies will be shipped to Kansas City, Kans., for final assembly in a new plant now under construction there by North American. To co-ordinate activities at the new plant, a new unit known as the Fisher Memphis Aircraft division has been established.

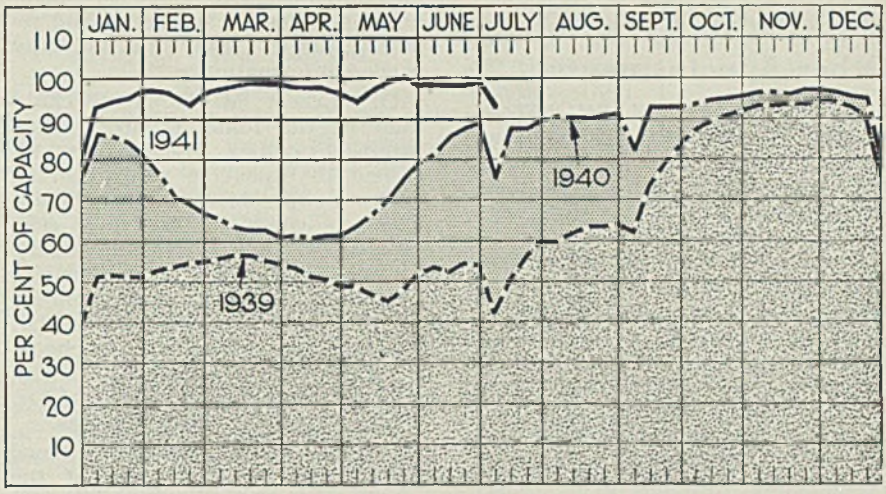
In addition to work at the Memphis plant, the Ternstedt Manufacturing division in Detroit will supply die castings for the bombers, and parts for other North American aircraft. Ternstedt will do machining on these die castings.

Of the three other plants, all in Detroit, engaged in defense work, one will do machine work on forgings for North American; a stamping unit, with revamped equipment, will make deep drawn pressings for North American, and the third has been set aside for welding and assembling of certain difficult parts for the B25-C bombers.

A fourth Fisher plant, the Grand Rapids Stamping division, currently is building 125 large planers under license, to relieve a bottleneck for this type of equipment in the machine tool industry.

The Chevrolet forge shop at Muncie, Ind., will devote a portion of its capacity to turning out aluminum forgings for the bomber program.

■ In this issue STEEL inaugurates publication of prices on tool steel scrap, tungsten and molybdenum types, for which see Page 124.



PRODUCTION . . . . Down

■ STEELWORKS operations last week declined 6 points to 93.5 per cent, a result of some plants suspending for 24 hours on Friday. Vote by workers at Chicago, Cleveland and some other points determined the question of operating or being idle. Some decisions were not complete late Thursday afternoon and the rate might be changed slightly. Ten districts showed lower rates, one was slightly higher and one was unchanged. A year ago rate was 75 per cent; two years ago, 42 per cent.

Pittsburgh—Fourth of July observance by some mills cut the rate 2½ points to 97½ per cent.

Wheeling — Return of repaired open hearths caused the rate to increase 3 points to 87 per cent.

Youngstown, O.—Shutdown by a leading interest for 24 hours Friday reduced the week's production to 90 per cent, a loss of 8 points.

Buffalo—Interruption of production for 24 hours Independence Day cut the rate 15 points, to 75.5 per cent.

Central eastern seaboard—Declined 5 points to 92 per cent, reflecting holiday suspensions at some plants. Part of this will be regained this week.

Chicago — Decline of 7 points to 95.5 per cent because of interruption by the holiday in some plants, others operating through. Decision on working Friday was by vote of the workers in some cases.

Detroit—Down 13 points to 83 per cent as all 16 open hearths at one plant were down for the holiday.

St. Louis—Unchanged at 98 per cent.

Birmingham, Ala.—Off 5 points to 90 per cent on account of the holiday. Active open hearths number 22 here and at Gadsden, Ala.

Cleveland—Drop of 5½ points to 92½ per cent resulted from one interest being idle 24 hours Friday and another taking off one open hearth.

Cincinnati—Partial holiday observance cut the rate 9½ points to 81½ per cent. One mill was idle over the week end.

New England—Repairs and holiday shutdowns reduced the rate 10 points to 90 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended July 5	Change	Same week 1940	Same week 1939
Pittsburgh	97.5	— 2.5	64	36
Chicago	95.5	— 7	77	44.5
Eastern Pa.	92	— 5	72	32
Youngstown	90	— 8	70	38
Wheeling	87	+ 3	75	62
Cleveland	92.5	— 5.5	69	27.5
Buffalo	75.5	—15	74	32.5
Birmingham	90	— 5	71	65
New England	90	—10	80	32
Cincinnati	81.5	— 9.5	54	28
St. Louis	98	None	52	31
Detroit	83	—13	79	56
Average	93.5	— 6	75	42

"Blanket Preference" for Machine Tool Builders

■ Four hundred fifty machine tool builders were given limited blanket preference ratings last week in a move to speed up production. Equipment to which the ratings can be extended is specifically listed by the Priorities Division as follows: Motors and other electrical equipment, alloy steels, iron and steel and aluminum castings, machine parts and equipment, cutting tools, abrasives, brass, copper and steel tubing, steel rail and other steel scrap, pig iron, silvery pig iron, ferrosilicon, ferromanganese, vanadium, nickel, chromium, molybdenum and coke.

Ship-Repair Chief, and Other Appointments

WASHINGTON

■ John E. Otterson has been appointed chief of the office of co-ordinator for ship repair and conversion, created jointly by the Navy and the Maritime Commission.

Section has been established to keep records of available facilities and capacities of shipyards and of work contemplated, in progress or completed. Mr. Otterson, as co-ordinator, will allocate vessels to yards available for repairing and converting, avoiding congestion and preventing overcrowding of some yards while others remain empty.

Mr. Otterson will make his headquarters at 11 Broadway, New York. The Navy and the Maritime Commission called on shipyards and repair plants to supply him with any needed information.

Dr. Ernest M. Hopkins, chairman of the minerals and metals group, Priorities Division, has resigned that post to return to his duties as president of Dartmouth College, where he has just celebrated his twenty-fifth anniversary as president. E. R. Stettinius Jr., Director of Priorities, and members of his executive staff, gave Dr. Hopkins a testimonial luncheon. Priorities Board adopted a resolution expressing appreciation of Dr. Hopkins' distinguished services.

Ben W. Lewis has been named price executive in charge of the rubber and rubber products section of OPACS.

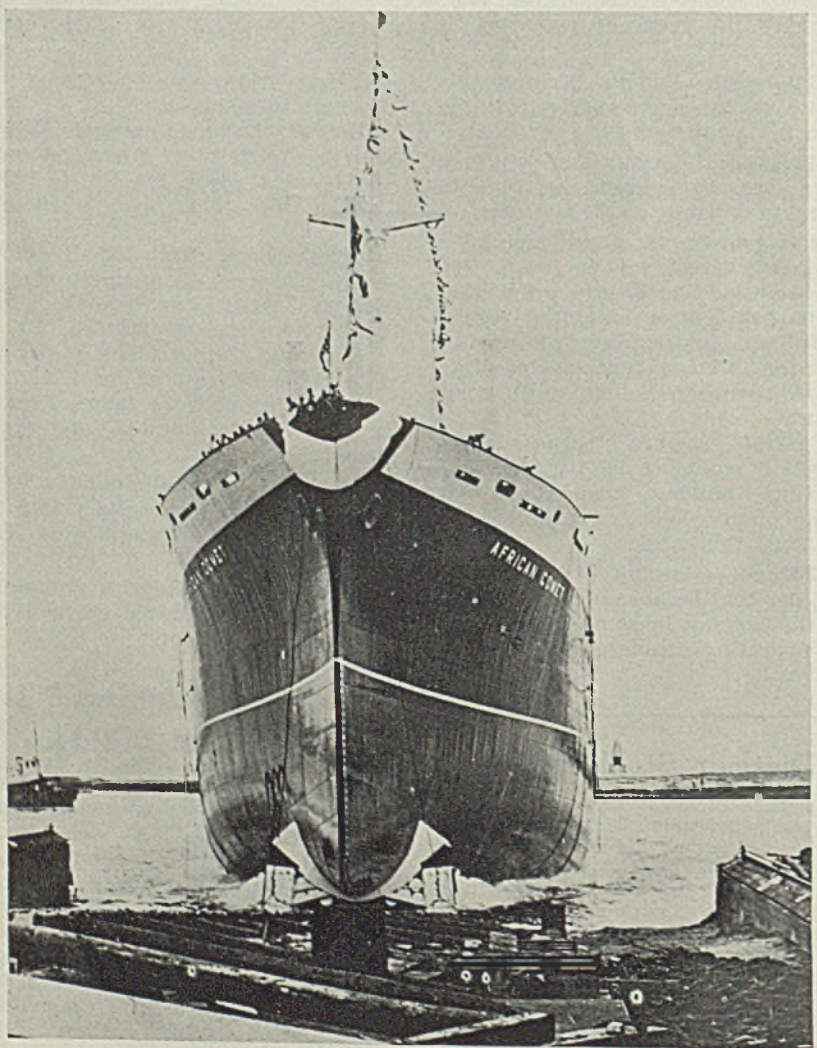
Herman H. Lind, who has been serving as manager of the Defense Contract Service in the Cleveland area, has been appointed deputy co-ordinator for the service in the same region. Charles R. Terry succeeds him as manager.

Charles B. Henderson has been elected chairman of the Reconstruction Finance Corp., succeeding Emil Schram who resigned to become head of the New York Stock Exchange. Mr. Henderson has been head of the Defense Plant Corp., RFC subsidiary.

Priorities division of OPM has opened six more field offices. Location of offices and the district managers:

St. Louis, Louis E. Crandall; Denver, V. L. Board; Detroit, Walter Hall; Cleveland, W. Thomas Walker; Dallas, Tex., J. Burke Crockett; Pittsburgh, Charles F. Cruciger. All the district offices may be reached through the Federal Reserve Banks in the cities named.

First All-Welded Passenger Ship Launched



■ S. S. AFRICAN COMET, first all-welded passenger ship ever built, slides down ways at Ingalls Shipbuilding Corp. yards, Pascagoula, Miss. Displacing 17,000 tons, she will be largest and fastest ship ever placed in regular service between the United States and South and East Africa when she enters the New York to Capetown run this fall. For structural details, see STEEL, May 19, p. 49. Acme photo

Meigs Will Visit Aircraft Plants in Great Britain

Merrill C. Meigs, chief of Aircraft Section, Office of Production Management, will leave shortly for England to visit aircraft plants and confer with British aircraft production officials.

He will make the trip at the invitation of J. T. C. Moore-Brabazon, British Minister of Aircraft Production.

Mr. Meigs' purpose is to exchange ideas and arrange for better co-ordination of aircraft output.

McKee Co. Pays Third Dividend This Year

■ Third dividend payment this year on its class B stock was recently made by Arthur G. McKee & Co., Cleveland, engineers and contractors. Dividend of 25 cents regular and 50 cents extra, total of 75 cents per share, was paid to stockholders of record June 20. Including this dividend, payments to date this year aggregate $2.25 per share.

Dollar volume of contracts taken in 1941, the company reports, is approximately the same as in the period in 1940. This was about one and one-half that of an average full year.

New business has been almost entirely in the company's iron and steel division. Considerable progress is reported in designing the $35,000,000 steel plant in Brazil for which Arthur G. McKee holds engineering contract. Purchase of equipment for that project will begin soon.

With minor exception, states the company, all new contracts taken this year have been for construction in United States and Canada.

"No Relation Between Grain Size, Toughness"

■ Experiments just concluded by metallurgists at the National Bureau of Standards indicate that there is no relation between grain size and toughness of steel, the Department of Commerce announced last week.

Knowing that it would be highly advantageous if the important property of toughness in steels could be correlated with some other easily ascertained characteristic, Samuel J. Rosenberg and Daniel H. Gagon made a series of notched bar tests of a medium-carbon forging steel at different degrees of heat. The tests were made so as to have different grain sizes in the specimens used.

The results show that each individual heat of a medium-carbon forging steel has an inherent resistance to impact peculiar to that particular heat, and that this impact resistance is dependent upon factors not at present recognized.

It was found that as the specimens were hot rolled no relation existed between grain size and toughness, and that all the steels were quite brittle. Normalizing—heating to 1600 degrees Fahr. and air cooling—caused some improvement in toughness. When so treated the fine-grained steels were tougher than the coarse-grained steels.

Proper heat treatment—hardening and tempering—resulted in a marked improvement in the toughness of the steels, but in this condition there was no relation between grain size and toughness, it is stated.

Thus, it is apparently not possible to correlate the effect of grain size and heat treatment with the impact-toughness of steel. However, it is known that most steels lose toughness, become brittle, rapidly as the temperature is decreased. The range of temperature wherein this change occurs is a reliable criterion of the relative toughness of steels, the lower the temperature at which toughness is lost, the better the steel.

Forms Closed Earlier

■ **Because of July Fourth holiday the final forms for this issue of STEEL went to press Thursday noon, July 3, instead of the customary time Friday night. All news, market information and price corrections, therefore, are as of Thursday noon.—The Editors.**

Defense "All-Out" for Warehouses Means All Out

■ Steel warehouses face a difficult situation in supplying the large section of the consuming market normally served from that source. Shipments of mill-size tonnages at the request of defense agencies frequently has depleted stocks and it has not been possible to obtain replacements, since warehouses have no priority rating in the present defense setup.

Mills have sought to maintain sufficient flow of steel to warehouses to keep stocks up to a point where the normal small orders can be filled, but under priorities they have found this difficult and often impossible.

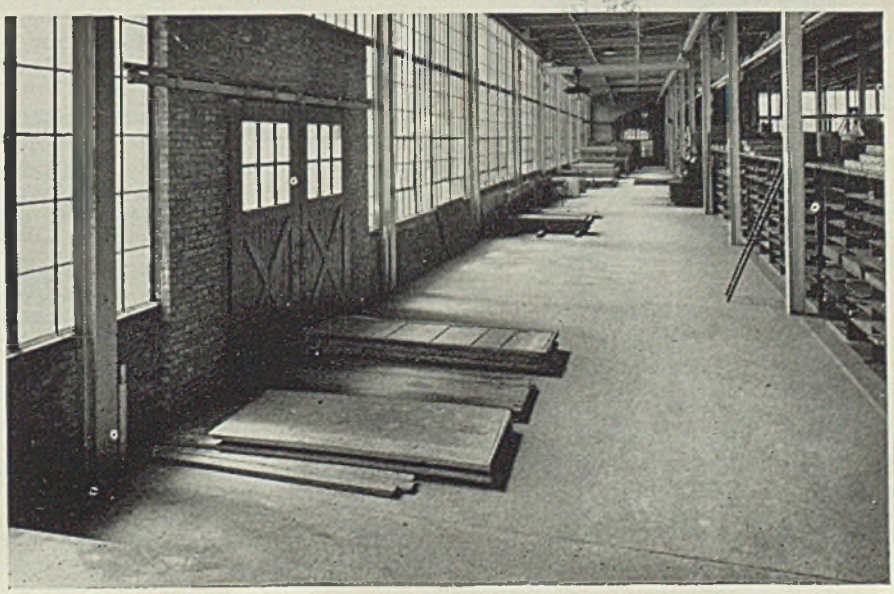
It is estimated 50 to 60 per cent of steel moving from warehouse is for primary or secondary defense use, in quantities too small for mills to handle.

Figures on steel distribution by the American Iron and Steel Institute show that in 1940 over 14 per cent of all steel was distributed by warehouses, indicating the large and important place they occupy in supplying demands of small users

Called to supply consumers in large lots, and unable to obtain replacements from mills, distributors report "a serious situation."

The Office of Production Management has been informed of this, and is expected to take action.

The accompanying illustrations were said to represent a typical warehouse bay "before and after." Upper photograph shows stocks as of Jan. 1; the lower one, as of June 1.



MEN of INDUSTRY

Harry B. Lose

Edwin C. Stout

C. G. Matthews

Samuel Dunlap

EDWIN C. STOUT has been appointed sales manager, wire department, Wickwire Spencer Steel Co., New York, and **C. G. Matthews** has been named assistant sales manager of that department. Mr. Stout has been associated with Wickwire Spencer since 1920 at which time and until 1924, he was sales representative in Ohio. In 1924 he was transferred to New York as sales manager, springs department, later holding positions of assistant sales manager of the combined wire and spring departments, and eastern district sales manager. Mr. Matthews has been identified with the wire sales department 18 years.

♦

Fred W. Ford, since September, 1940, sales engineer, Ryan Aeronautical Co., San Diego, Calif., has been named purchasing agent.

♦

Arch Warner has been promoted to assistant works manager, Mechanics Universal Joint division, Borg-Warner Corp., Rockford, Ill.

♦

Charles D. Dickey, a vice president, J. P. Morgan & Co. Inc., New York, has been elected a director, General Electric Co., Schenectady, N. Y.

♦

Charles B. Durgin, group leader in the research department, phosphate division, Monsanto Chemical Co., St. Louis, has been made assistant director of research.

♦

Samuel Dunlap, after 46 years' service with the United States Steel Corp. and predecessor companies, has retired as auditor and director of American Steel & Wire Co., Cleveland. Mr. Dunlap became associated with Illinois Steel Co., in May, 1895, and was elected auditor of American Steel & Wire in July, 1936.

♦

Harry B. Lose has been appointed superintendent of construction, Engineering and Construction division, Koppers Co., Pittsburgh. Formerly assistant superintendent, Mr. Lose succeeds the late Roy L. Smith. He joined Koppers in 1916 as a layout engineer. After leaving to become construction manager for Rust Engineering Co. from 1928 to 1930, he returned to Koppers as an erecting engineer. Later he went to Philadelphia Coke Co., Philadelphia, a Koppers affiliate, where he was manager of the wholesale coke sales department from 1934 to 1937.

♦

E. H. Wingate Jr. has been named purchasing agent, Birmingham Electric Co., Birmingham, Ala., succeeding **H. J. Belcher,** who has joined Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.

♦

Robert M. Reid has been appointed assistant manager, traffic department, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. Mr. Reid formerly was chief of the rate bureau, traffic department.

♦

William F. Crawford, vice president since 1937, Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has been elected president, to succeed the late W. W. Crawford. Mr. Crawford has been associated with the organization since 1931.

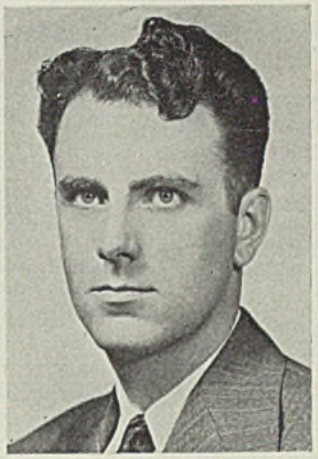
♦

Lewis W. Abbott, the past six years general manager, installation department, Western Electric Co., New York, has retired after more than 20 years' service. **Gustaf A. Johnson,** formerly personnel director, succeeds Mr. Abbott.

♦

Frank T. Sisco, the past 11 years editor, *Alloys of Iron Research* of the Engineering Foundation, has resigned to become assistant secretary, American Institute of Mining and Metallurgical Engineers, and secretary of its Iron and Steel and Institute of Metals Divisions. He succeeds **Louis Jordan,** who is now in the government service in Washington. Mr. Sisco was a national

A. J. Paddock



R. C. Robinson

J. C. Augsburger

H. B. Hill

director of the A.S.M. in 1929 and is the author of four books in addition to the direction and editorship of *Alloys of Iron Research Monographs*. He has long been active in the A.I.M.E., having served as secretary and subsequently chairman of the Iron and Steel division.

John S. Marsh, associated with *Alloys of Iron Research* since its inception in 1930, and since 1933 physical metallurgist and associate editor, succeeds Mr. Sisco as editor.

♦

Fred V. Gardner, consulting engineer, Smith Steel Foundry Co., Milwaukee, has been elected president, succeeding **Edward A. Bacon,** who has been named chairman. Mr. Bacon recently was made a lieutenant-commander in the Navy and is stationed at headquarters of the ninth naval district at Great Lakes, Ill.

♦

R. C. Robinson has been named manager, Elmira, N. Y., plant of American Bridge Co., United States Steel Corp. subsidiary. He succeeds **A. J. Paddock,** who has been transferred to Gary, Ind., as manager of operations there.

Mr. Robinson began his service with American Bridge in 1934 at the Minneapolis plant, in 1938 becoming assistant manager, Elmira plant. Mr. Paddock joined American Bridge in 1929 as a timekeeper. Subsequently he was transferred to the Ambridge, Pa., plant, and in 1936 to the Elmira plant as assistant to manager, becoming manager in 1937.

Other changes announced by American Bridge are: **G. K. Manzer,** assistant rate foreman, Gary plant, has been transferred to Elmira as assistant manager, succeeding Mr. Robinson. **P. W. Seyl,** the past 24 years manager, Gary plant, is retiring. **B. O. Bateman,** assistant to vice president in charge of manufacturing operations, is retiring after more than 39 years of service. He will be succeeded by **J. C. Augsburger,** formerly assistant manager at Gary. **J. M. Martin,** manager of the Shiffler plant, Pittsburgh, is retiring after more than 41 years of service. He is succeeded by **H. B. Hill,** plant engineer of the Shiffler plant.

♦

R. J. Minshall has resigned as a vice president and director, Boeing Aircraft Co., Seattle, to become president, Pump Engineering Service Corp., Cleveland, subsidiary of Borg-Warner Corp. Mr. Minshall succeeds **D. E. Gamble,** who has been president of Pump Engineering Service in addition to vice president and general manager, Borg & Beck division of Borg-Warner. Mr. Gamble will continue in the latter capacity and will remain a director of Pump Engineering.

♦

John C. Sprague, secretary and director, Acheson Colloids Corp., with offices in New York, has been transferred to the main office in Port Huron, Mich., and will be in charge of a new department to handle problems relating to taxes, priorities, patents, social security and administrative laws.

♦

C. E. Lauthner, Birmingham Sash & Door Co., Birmingham, Ala., has been elected president, Purchasing Agents Association of Birmingham for 1941-42. **L. C. Teague,** Tennessee Coal, Iron & Railroad Co., has been named first vice president, and **J. W. Sledge,** National Cast Iron Pipe Co., second vice president. Other officers: Treasurer, **George L. Wilson,** Jefferson County commission; secretary, **Clyde H. Porter,** Alabama By-Products Corp.; national director, **F. B. Shannon,** American Cast Iron Pipe Co.; alternate national director, **E. M. Evans,** National Coal & Coke Co.

♦

David Hoppenstand, president, Hopkan Rivet Co., Pittsburgh, has organized Latham Machine Co., 128 Latham street, Pittsburgh, to manufacture gages, and various types of hobs, cutters and machine tools for national defense work. The plant, newly equipped, is already in production. Mr. Hoppenstand will continue as president of Hopkan.

♦

Frank R. Pierce, general sales manager, Kelvinator division, Nash-Kelvinator Corp., Detroit, has been promoted to the newly created post of vice president in charge of sales. **Charles T. Lawson,** sales manager, Kelvinator household division, succeeds Mr. Pierce as general sales manager, while **W. A. Blees** continues as general sales manager, Nash Motors division.

♦

Joseph M. Marshall Jr. has been appointed district engineer, with headquarters at Atlanta, Ga., for American Institute of Steel Construction, New York. He will cover the territory embracing Virginia, eastern Kentucky, North Carolina, South Carolina, Tennessee, Georgia, Alabama and Florida. Mr. Marshall was formerly engineer inspector for PWA in Georgia.

♦

James A. Trail has joined Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J. For several years Mr. Trail has been an associate professor in mechanical engineering at A. & M. College of Texas. He will cover the southwest territory from Dallas, Tex. **A. J. Swisler,** who formerly handled this territory for Hyatt, will work from the western division headquarters in Chicago.

♦

W. E. Jominy, formerly research metallurgist with General Motors Research Laboratories, Detroit, and well known in metallurgical circles for his work in connection with hardenability tests on steel, is now associated with the engineering department of Chrysler Corp., Detroit, working as metallurgist under direction of **F. E. McCleary.**

DIED:

■ **Thomas J. Bray Jr.,** 43, sales manager of bar, strip and semifinished materials for Carnegie-Illinois Steel Corp., Pittsburgh, June 27. Mr. Bray had been identified with the steel industry since graduation from Lehigh University, and prior to joining Carnegie-Illinois had been associated with Republic Iron & Steel Corp., now Republic Steel Corp., and Koppers Co. in Chicago and Pittsburgh.

♦

Adolph C. Eckert, 77, until recently treasurer, Cleveland Punch & Shear Works Co., Cleveland, June 29, in that city. He had been associated with the company 50 years.

♦

Emil W. Wendt, 60, midwestern sales manager, Taylor Instrument Co., Rochester, N. Y., with offices in Chicago, in that city, June 27. He had been associated with the company 33 years.

♦

J. P. Murphy, 78, who retired in 1932 as assistant to vice president in charge of purchases and stores, New York Central railroad, at his home in Mentor, O., June 26.

♦

Arlington Bensel, 62, retired sales manager, Jelliff Mfg. Co., Westport, Conn., June 29, in East Orange, N. J.

♦

Thomas B. Morton, 81, president, Armored Car Corp., Louisville, Ky., June 30, in that city.

♦

William Guggenheim, 72, retired, June 28, in New York. Mr. Guggenheim at one time was superintendent, Philadelphia Smelting & Refining Co., Pueblo, Colo., and served a number of years as general manager of the various mining and smelting interests of M. Guggenheim's Sons in Mexico.

♦

Arthur H. Watson, 45, a patent attorney for Borg-Warner Corp., Chicago, at his home in Highland Park, Ill., June 29.

♦

B. H. Noelting, 89, president, Faultless Caster Corp., Evansville, Ind., in that city, June 28.

♦

George F. Hess, 69, superintendent of motive power, Wabash railroad, for 20 years prior to his retirement in May, 1940, in Martinsville, Ind., June 28.

♦

Albert C. Cornell, 62, secretary, National Carbon Co., New York, and of several of its affiliated companies, in Milford, Conn., June 29.

♦

Leslie C. Jacobson, 51, superintendent in charge of fabrication departments, Carboloy Co. Inc., Detroit, June 24, in Detroit. Mr. Jacobson had been associated with Carboloy as a production executive since 1937, and before that was with Union Wire Die Corp. 15 years.

♦

Stuart K. Knox, 62, consulting engineer specializing in hydraulic and sanitary engineering, June 28, in Montclair, N. J.

♦

C. J. G. Fischer, 82, founder Fischer Casting Co., North Plainfield, N. J., June 29.

Activities of Steel Users, Makers

■ INLAND STEEL CO., Chicago, has moved its Kansas City, Mo., district sales office to suite 906-7, Midland building, 1221 Baltimore avenue.

♦

Michigan Tool Co., Detroit, has changed the name of its Cone Worm Gear Division to Cone Drive Division.

♦

Hercules Powder Co., Wilmington, Del., has purchased the synthetic resin business of John D. Lewis Inc., Providence, R. I., which includes the land, buildings, equipment and processes of the Mansfield, Mass., and Brunswick, Ga., plants. The Lewis company's sales and manufacturing facilities will be joined with the synthetics department of Hercules.

John B. Lewis, president and treasurer of the Lewis company, will act as consultant during time required for consolidation, with headquarters at Providence. Howard Bates, vice president of the Lewis organization, will join the sales staff of Hercules synthetics department, with temporary headquarters at the Mansfield plant.

The Mansfield plant will be operated under direction of R. F. Schlaanstine, director of operations, synthetics department. Dr. R. Marx, technical director of the Mansfield plant, will continue in that capacity.

♦

Lyon Iron Works, Greene, N. Y., manufacturer of hydraulic material handling machinery, has recently increased production floor space 50 per cent.

♦

St. Louis district sales office of Republic Steel Corp., Cleveland, has been moved to 811 Shell building, Thirteenth and Locust streets. J. B. Beyer is district sales manager.

Canada Achieves New Record in Steel Output

■ Canadian production of steel ingots and direct steel castings in May reached a record total of 206,110 gross tons, according to the Dominion Bureau of Statistics. May pig iron production was higher than in April and was far larger than in May, 1940. Ferroalloy output was slightly lower than in April. Cumulative production of all three materials was the highest for any similar period in the past.

Nine of the ten blast furnaces in the country were operating through May, at 92.8 per cent of capacity. The one idle stack has not been in operation for several years. Production comparisons follow, in gross tons:

	Steel ingots, castings	Pig iron	Ferro-alloys
May, 1941 ...	206,110	113,624	15,117
April, 1941	200,680	103,326	16,161
May, 1940	174,417	93,254	10,272
5 mos., 1941...	961,272	513,238	73,181
5 mos., 1940...	792,033	460,971	48,116
5 mos., 1939...	472,239	243,716	20,889

Seeks Open Shop for Maximum Production

■ National Association of Manufacturers last week asked the federal government, for the sake of maximum national defense production, to "urge employers specifically not to discriminate against either union or nonunion workers," and to "protect the right of every free man who wants to work to do so, free from coercion or intimidation from any source."

A statement, issued by Walter D. Fuller, association president, said:

"Within the last week the country has been presented with the spectacle of American workers in defense industries being coerced by government agencies and employers into joining labor organizations not of their own choice as the price of a job. Denial by government, by employers, by other employes or by anyone, of the worker's right to work is un-American and a long step toward dictatorship. . . .

"The worker's right to work is certainly as great as his right to strike. We think the closed shop is inconsistent with the democratic principles we are arming to defend."

Reports Labor Shortages in Essential Defense Trades

Shortages in vital shipbuilding, aircraft and machine shop trades were reported by Federal Security Administrator Paul V. McNutt in a survey made by the Social Security Board. Measuring unfilled job openings and employers' anticipated needs during May and June against available workers regis-

tered at state employment offices, the board found the shortage was most critical in these occupations:

Tool designers, die designers, airplane woodworkers, aircraft detail assemblers, hull inspectors, loftsmen, ship fitters, template makers, boatbuilders, marine machinists, aeronautical engineers, aircraft final assemblers, aircraft riveters, tool and diemakers and various kinds of machinists and lathe operators.

Defense Work Stressed By Republic Officials

■ Necessity for industry to exert every ounce of energy toward the defense of democratic countries was emphasized last week by T. M. Girdler, chairman, and R. J. Wysor, president of Republic Steel Corp., Cleveland, in a letter sent to stockholders.

Enclosed with quarterly dividend checks of $1.50 per share on the corporation's preferred stocks, and 50 cents on common, the letter stated "Republic is doing, and will continue to do, its part in this direction."

Republic's steel ingot output in August, 1939, prior to declaration of war, was 409,811 tons. Its employment total was 49,127, and operating rate, 66.3 per cent. Ingot production in May, 1941, was 703,091 tons, employes numbered 67,656, and operating rate was 103.4 per cent.

Enough light armor plate fabricated for immediate assembly for 200 tanks per month is being produced by Republic at present. Capacity for light armor plate which must be fabricated by the tank producer is 7000 tons per month. Output of both types in increasing.

Soaking Pit Capacity Is Being Increased

■ In line with efforts to increase steel capacity, some mills are placing orders for new and improved soaking pits. The following orders for 1-way fired pits recently were received by Surface Combustion Corp., Toledo:

Jones & Laughlin Steel Corp., five holes at the Aliquippa plant heated with blast furnace and coke oven gas, and two 5-hole batteries at the South Side works heated with coke oven gas. All 15 will be equipped with automatic program heating control and individually operated covers.

Sharon Steel Corp., Lowellville, O., five oil-fired holes.

Republic Steel Corp., Canton, O., five holes for alloy ingots, heated with natural gas.

American Rolling Mill Co., Butler, Pa., five holes. These are in addition to the five holes placed in operation last year.

All of these pits will be equipped with completely automatic control of temperature, pressure and atmosphere. They represent a total investment of more than $1,000,000.

Carnegie-Illinois Buys Standard Tin Plate Co.

■ Tin plate manufacturing plant of the Standard Tin Plate Co. and the coal mining properties of the Canonsburg Coal Co., subsidiaries of the Continental Can Co., have been acquired by the Carnegie-Illinois Steel Corp., subsidiary of the United States Steel Corp., to supplement the Carnegie company's tin plate facilities.

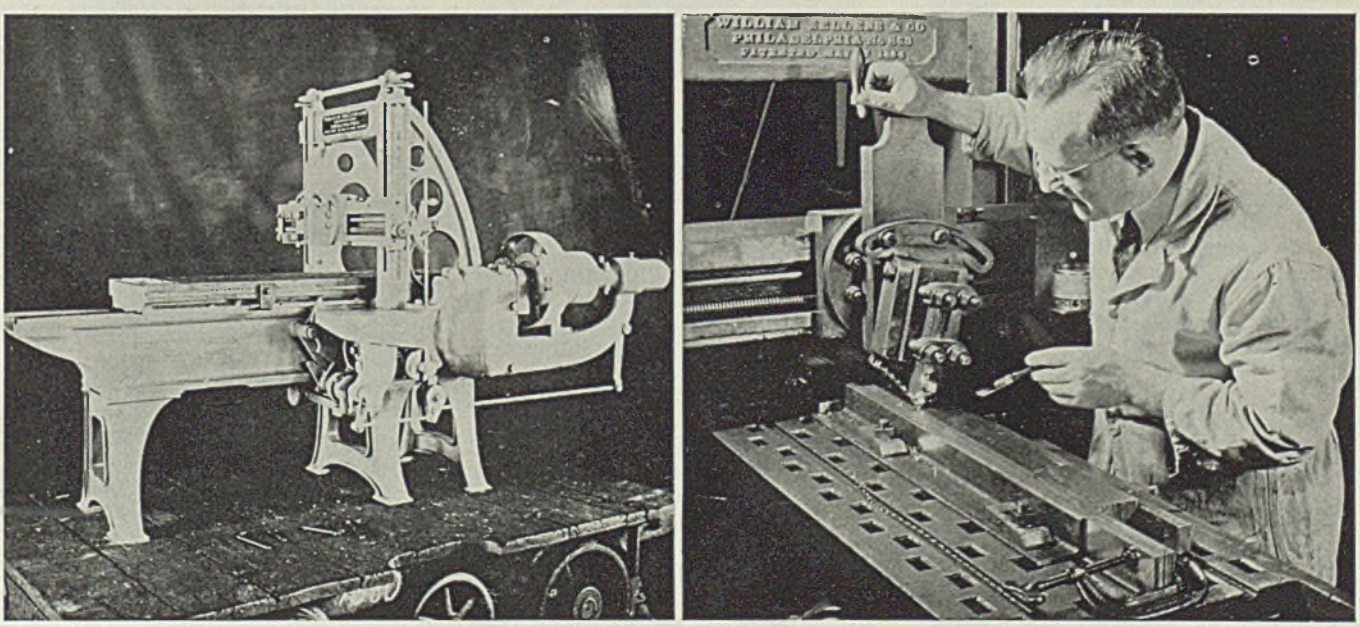
Former employes of both acquired companies, about 2000 in number, have become employes of the Carnegie-Illinois corporation.

This acquisition will add approximately 5,000,000 base boxes of tin plate to Carnegie's annual capacity.

Standard Tin Plate Co. has 24 hot tin mills, all of which have been running at capacity for the past several years. Annual capacity of the plant is placed at 116,600 net tons.

Since 1935 the Carnegie and predecessor companies have junked over 500,000 net tons of similar capacity, the most recent being the Laughlin works.

69-Year-Old Veteran Does Its Bit for Defense



■ In 1872, a 24-inch double-housing planer embodying the spiral gear drive invented by William Sellers in 1864, was manufactured by William Sellers & Co. Inc., Philadelphia. It was used in regular production from that time until 1923—through the Spanish-American War and World War I. Following 1923 the records show little activity.

In 1934 it was placed on exhibition in the Franklin Institute, Philadelphia. Recently the directors of the institute offered to help the government by handling defense work in their own well-equipped shops. The old planer was put into operation on a job requiring the planing of precision instrument parts, and is now doing its shift as regularly as in the days of President Grant, and as accurately as close toleranaces of the present day require.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

OPACS overlapping OPM functions. Reorganization of defense agency discourages some business men members . . . Knudsen warns automakers production may be curtailed further . . . Priority status of repair materials assured . . . Secondary aluminum smelters granted preference ratings . . . New revenue bill will be submitted to house soon

WASHINGTON

■ WHILE the reorganization of OPM into commodity sections and industrial advisory committees has not progressed far, businessmen serving in the OPM are already pointing to a number of defects expected to develop.

Chief of these is the growing reliance of the OPM on OPACS. Through his allocation orders, Administrator Leon Henderson is undertaking duties that appear to overlap those of the OPM priorities division. His insistence on expanded production to keep prices down is also said to overlap the functions of the OPM production division.

Confusion surrounding the reorganization has discouraged many of the industrialists in OPM. When revamped, the agency will consist of about 30 sections for important commodities, with the section heads under the general supervision of John D. Biggers, production director, or Donald M. Nelson, purchasing director, or E. R. Stettinius Jr., priorities director.

If the commodity's foremost problem involves expansion, as in the case of steel, Mr. Biggers will supervise the section. If priorities are the topmost question, as in copper and zinc, Mr. Stettinius will supervise the sections. Mr. Nelson will be in charge of those commodities involving important purchasing matters.

Each section will have a corresponding industrial advisory committee. These will make recommendations designed to facilitate procurement or production of the commodity, which will then be considered by the commodity section head and top OPM officials before being placed in effect.

The OPM reorganization has not affected OPACS, but there are reports here that OPACS will soon reorganize along similar lines. Commodity sections, possibly with accompanying industrial committees, will be set up in the price agency, according to this report.

Knudsen Predicts Trebling of Automakers' Defense Orders

Automotive industry's two billion-dollar defense contracts may soon be trebled, OPM Chief Knudsen told representatives of the industry at a Washington conference last week. The increase in defense orders will necessitate a corresponding reduction in civilian car output, he predicted.

The automobile manufacturers met in Washington to select a defense advisory committee to work with the OPM commodity section. They agreed to organize a committee of 19, of which 11 members will represent manufacturers of passenger cars, trucks, buses, taxicabs and fire equipment. General Motors, Ford and Chrysler will have one representative each. Four others will be selected by six companies, Crosley, Hudson, Nash, Studebaker, Willys-Overland and Packard. Eight representatives will be named after a meeting of partsmakers and suppliers this week.

Last week's conference was attended by about 100 representatives of the auto industry and spokesmen for a dozen government agencies. OPACS was not represented and officials could give no reason for the failure of an OPACS spokesman to appear.

Mr. Knudsen warned the manufacturers that the rapidly increasing defense demand for raw materials consumed by the auto industry may soon necessitate a reduction in production more drastic than the 20 per cent earlier indicated.

Propose New Magnesium Plant In Bonneville Power District

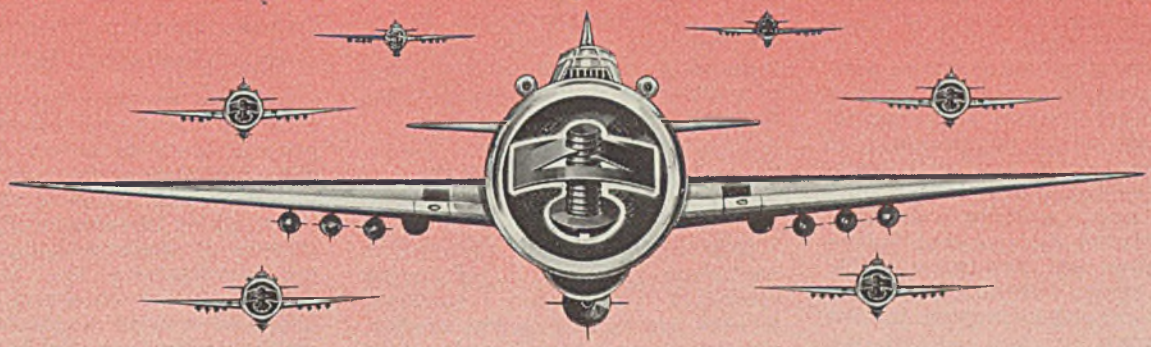
Todd-California Shipbuilding Corp.'s Chemical Engineering Division has applied to the Bonneville Power Administration for 40,000 kilowatts of power. Company proposes to construct a 12,000-ton magnesium plant in the Pacific Northwest. Construction of the plant, it was said, will be contingent on the successful operation of an initial unit of the magnesium plant which the company is erecting at Permanente, Calif., and which is scheduled to begin operations in August.

Paul J. Raver, Bonneville power administrator, informed the company that 35,000 kilowatts of power would be reserved for it until Sept. 30. This allocation would raise the power commitments to all types of wholesale customers to 360,855 kilowatts. To meet this demand the government is installing two new 54,000-kilowatt generators at Bonneville dam, and three new 108,000-kilowatt generators at Grand Coulee dam. All will be producing by April, 1942, and will raise power production of the system to 626,400 kilowatts.

New Tax Bill To Be Submitted Soon by House Committee

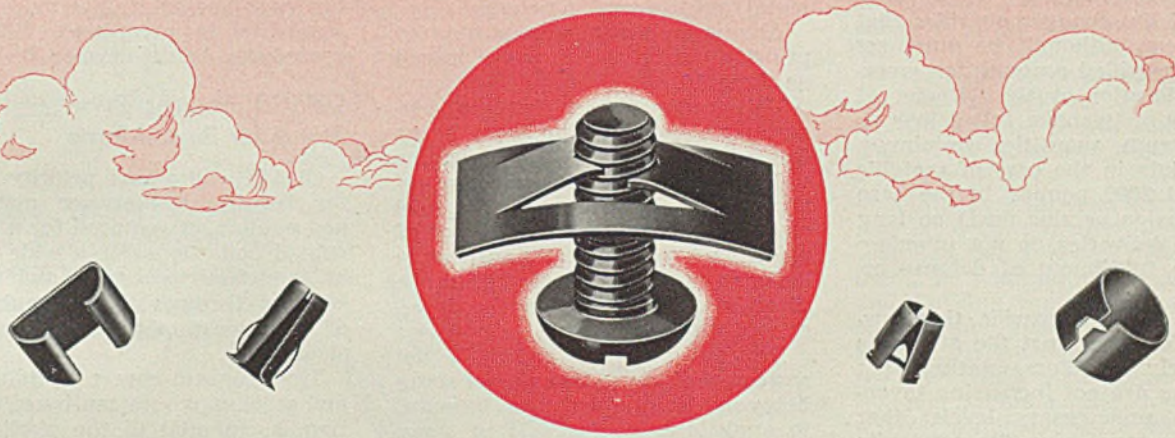
After nine weeks of public hearings and executive sessions, the House Ways and Means Commit-

SQUADRON LEADER *of the* ASSEMBLY LINES



Speed Nut System

(PATENTED)



The SPEED NUT is the squadron leader because it is setting a new pace. It outperforms conventional fastening devices. It does more, with less weight, and does it faster. It stops vibration loosening, cuts costs and breaks all previous speed records.

SPEED NUTS and Speed Clips are manufactured in over 700 shapes and sizes to hold bolts, screws, rivets and studs. Made for metal, wood, ceramic or plastic applications. In thousands of cases throughout mass production industries, the SPEED NUT has answered the call for a finer, faster assembly at about half the total net cost.

Simply send us your assembly details and we will furnish samples and engineering data promptly.

TINNERMAN PRODUCTS, INC. 2039 FULTON ROAD, CLEVELAND, OHIO

Manufacturers of Patented SPEED NUTS

IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario. IN ENGLAND: Simmonds Aerocessories, Ltd., London. IN FRANCE: Aerocessoires Simmonds, S. A., Paris

OVER A BILLION IN USE—OVER 700 SHAPES AND SIZES

tee is nearly ready to submit a tax bill to the house.

No statement has been issued by the committee regarding the revenue provisions that will be included in the bill. However, it is reported that the act intended to raise $3,500,000,000 in additional taxes hits heavily at corporation and upper income classifications.

The determination of excess profits taxes on gross income, rather than on net income after normal corporation taxes, is also said to have been decided upon in the committee's executive meetings.

In the excise sections, a doubling of the present 3½ per cent tax on automobiles and the current 2½ per cent tax on auto accessories and parts is reported accepted by the house group.

Zinc Control Order Amended By Division of Priorities

Several changes in the order imposing mandatory industry-wide control on zinc were announced last week by E. R. Stettinius Jr., Director of Priorities.

One of the changes provides that a producer, although he must set aside a specified amount for emergency allocation by the Director of Priorities, may make full deliveries of minimum quantities (minimum carload lots in the case of metallic zinc, and 2000 pounds in the case of zinc oxide or zinc dust) so long as these deliveries do not interfere with the fulfillment of defense orders.

Other changes provide that customers for zinc must file affidavits with their suppliers, stating that customers are not increasing inventories to unnecessary levels; that producers must also file affidavits with the Office of Production Management stating their intention to report non-observance of the order on the part of customers to the Priorities Division.

Zinc was put under full priority control in an order issued on June 10. (STEEL, June 16, p. 35).

Government Survey Seeks Reasons for Output Delay

Survey to determine the cause for the lag in defense materials production has been undertaken by unnamed government agencies. Study will be pointed at forming a pool of ideas to aid those plants and industries which are operating far below their potential rate.

While the study has not yet progressed far enough to reveal all causes, it has been suggested one reason for failure of industries to achieve 100 per cent output is the reluctance of workers to approve multishift operation. An example is cited in the case of a defense plant which normally works a full day shift of 40 hours with a small overnight shift to service machinery. Plant now is operating 60 hours a week with the original crew doing all the work at time and a half for overtime. The workers will fight any plan to cancel the overtime work.

The government's survey is being made on a realistic basis, and includes government self-searching of policies as well as study of industrial methods.

Secondary Aluminum Smelters Granted A-10 Preference Ratings

New priority order granting a preference rating to a number of secondary aluminum smelters, thereby permitting them to buy aluminum scrap for processing, was issued last week by Priorities Director Stettinius.

Rating given secondary smelters is A-10. This rating is being assigned only to those smelters who are doing substantial quantities of defense work and who have adequate facilities to handle the scrap metal quickly and efficiently.

Aluminum scrap was put under priority control in an order issued on June 10.

This order stated that no person may deliver aluminum scrap for melting or processing purposes unless such delivery has been assigned a preference rating of A-10 or higher, or unless the director of priorities has specifically authorized delivery of an order deemed to be directly or indirectly in the interests of defense.

Provisions of the order do not restrict the sale or transfer of scrap between dealers, but are intended to apply only to the sale of scrap to persons who will melt or otherwise process the material.

The order issued last week implements the June 10 order by assigning the A-10 rating to a limited initial list of smelters.

Smelters granted the rating include:

Aluminum Smelting & Refining Co., Maple Heights, O.
Apex Smelting Co., Chicago.
Aurora Refining Co., Aurora, Ill.
Barth Smelting Corp., New York.
Berg Metal Co., Los Angeles.
Cleveland Electro Metals Co., Cleveland.
L. A. Comb & Bros., Chicago.
Electric Refractories & Alloys, Lackawanna, N. Y.
Federated Metal Division of American Smelting & Refining Co., at Detroit, Perth Amboy, N. J., Los Angeles, St. Louis, San Francisco, and Whiting, Ind.
General Smelting Corp., Philadelphia.
Samuel Greenfield Co., Buffalo.
Hamden Smelting Co., Hamden, Conn.
Henning Bros., and Smith, Brooklyn, N. Y.
M. H. Holtzman Metal Co., St. Louis.
William F. Jobbins, Aurora, Ill.
H. Kramer, Chicago.
D. Lavin & Sons, Chicago.
Michigan Smelting & Refining, Detroit.
National Smelting Co., Cleveland.
Niagara Falls Smelting & Refining Co., Buffalo.
North American Smelting Co., Philadelphia.
Rochester Smelting & Refining Co., Rochester, N. Y.
Stanley Chemical Co., East Berlin, Conn.
U. S. Reduction Co., East Chicago, Ind.

Defense Housing Projects To Be Granted Preference Ratings

A broad program providing priority aid for defense housing projects, designed to assure the completion of such projects as promptly as possible has been announced by Priorities Director Stettinius and Charles F. Palmer, defense housing co-ordinator.

Program puts defense housing ahead of civilian housing projects and will assure a steady flow of necessary building materials to the projects deemed essential to the national defense program.

Agreement provides no priority aid will be granted for defense housing, whether publicly or privately financed, until these requests have been cleared through the co-ordinator or his field representatives in accordance with the procedures being developed.

OPACS Assures Priority Status for Repair Parts

OPACS will assure priority status for repair, maintenance materials and equipment required for uninterrupted operations for a wide range of industrial processes and public services through the promulgation of an allocation program covering such items.

The program covers 26 industries and services whose continued operation is essential to the public welfare and maintenance of civilian supplies.

Metallurgical plants producing raw materials were included in the list of 26 industries given priority status in the OPACS allocation.

Administrator Henderson said others will be given the same status when their problems are analyzed.

Covered in the OPACS allocation for essential industries are: Civilian transportation lines; commercial air lines, commercial motor buses, shipping, pipe lines, commercial communications, telegraph communications, all radio commercial communications, electrical energy production and distribution, gas production and distribution, water production and distribution, sewer service and petroleum production and refining, food processing and storing, farm equipment, mining and quarrying, and coke converting, metallurgical plant, chemicals production, fire and police service, industrial and academic research, hospitals and clinics, and public buildings, institutions, schools and parks.

GE Builds Two Ship Propulsion-Gear Plants

■ Two new plants for the manufacture of propulsion equipment for merchant ships, to be operated by General Electric Co., Schenectady, N. Y., and financed by the Defense Plant Corp., will be constructed at a cost of $20,000,000 to $25,000,000, according to Charles E. Wilson, president.

The plants will be built at Erie, Pa., and Lynn, Mass., and will employ a total of 2000. Turbines will be manufactured at the Erie plant and reduction gears at Lynn. Erie plant will manufacture 100 turbines a year for use in United States Maritime Commission C-2 and C-3 type cargo ships. Fifty gear equipments per year, starting in 1942, are to be produced at the Lynn plant.

Total floor space will be 475,000 square feet, making General Electric's floor space used in defense production 2,675,000 square feet.

General Electric last week was awarded a $70,000,000 letter of intent by the War Department, guaranteeing the company reimbursement to that amount for purchase of dies, jigs, tools, fixtures, materiel and equipment necessary for production of superchargers for army aircraft.

Superchargers are to be manufactured in plants at Ft. Wayne, Ind.; Everett and West Lynn, Mass.

Defense Corp. Finances More Plant Expansions

■ Defense Plant Corp. will expand Fisher Body Division plant of General Motors at Detroit and the division's plant at Muncie, Ind., at a total cost of $894,001, it was announced last week by Loan Administrator Jesse Jones. Aircraft parts will be manufactured.

Increase of $10,267,043 in the lease agreement with General Motors, Buick Motors Division, for plants at Melrose Park, Chicago and Flint, Mich., to be used for construction and machinery, was also made by DPC. Aircraft parts will be produced in these plants.

Other actions announced by Jones: $20,281,000 lease agreement to build and equip a scientific instruments plant at North Hempstead, N. Y., for Sperry Gyroscope Co.; $140,000 RFC loan to Babcock Printing Press Co., New London, Conn., to finance navy orders; $25,000 RFC loan to Covington Electrical Mechanical Co., Bowling Green, Ky., for manufacture of navy cranes; $100,000 RFC loan to Lear Avia Inc., Piqua, O., for machinery purchased and to pay for additional equipment.

Zone Labor Pacts for Plane Builders Proposed

■ Aircraft manufacturers will be asked to adopt zone wage and hour standards similar to those now in effect in the West Coast shipbuilding industry and soon to be adopted on the Atlantic Coast, Sidney Hillman, OPM associate director general, has announced.

Conferences between management and labor in the aircraft industry will be called soon. The agreement, in addition to fixing wages and working conditions, bans lockouts, strikes, and other impediments to production during the life of the pact, which is two years.

Mr. Hillman said more than 405,000 shipbuilding workers will be covered next year.

Chevrolet Division To Make Aircraft Engines

BUFFALO

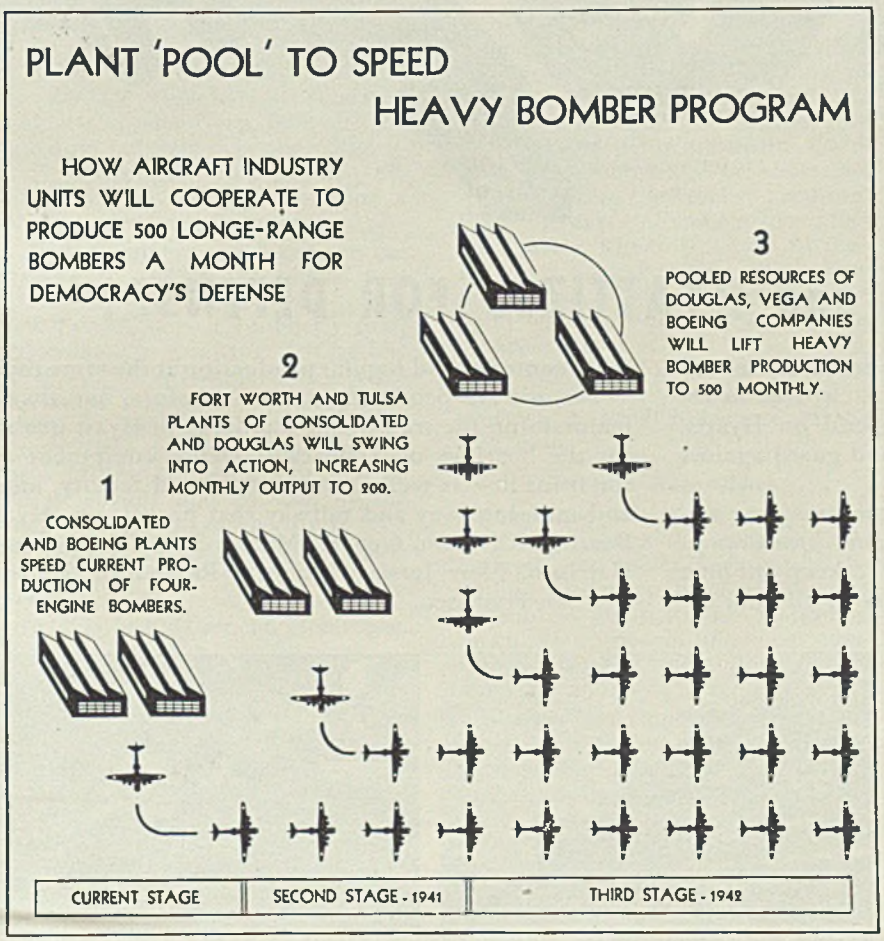
■ The three local plants of Chevrolet Motor Division, General Motors Corp., in this district will be shut down before the end of July and changed over for producing Pratt & Whitney aircraft engines. This was announced last week after receipt of an $89,075,000 contract from the War Department for engines and parts.

Production is expected to reach 1000 engines a month.

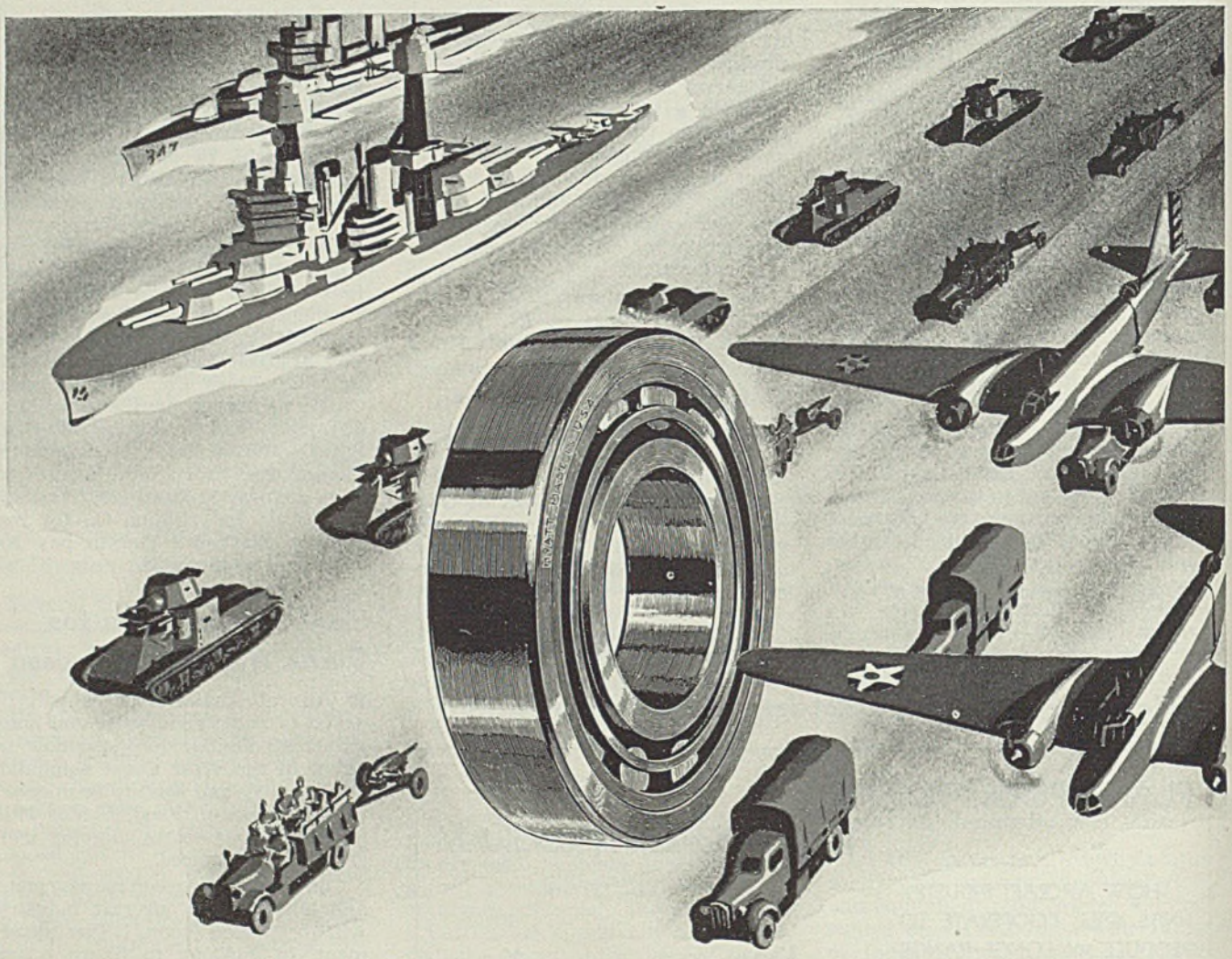
The three plants, now nearing the end of 1941 car models, are employing about 4700, but will increase this number to 10,000 in full swing on aircraft motors.

Millions of dollars worth of new equipment will be installed in the three plants, it was said, and a new building for engine-testing cells will be erected adjacent to the River Road plant.

How Aircraft Manufacturers Are Co-operating



■ The manner in which the co-operative effort of American aircraft manufacturers will increase production of long-range bombers is illustrated by this pictograph from Aeronautical Chamber of Commerce. Current production of Consolidated B-24s and Boeing Flying Fortresses will advance sharply when operations are started in Midwestern plants. Bomber output, it is said, "will take another tremendous spurt" with the inception of the Boeing-Douglas-Vega co-operation program for construction of Flying Fortresses

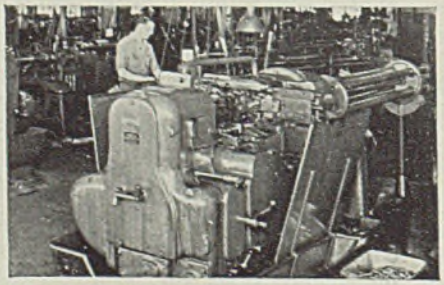


MECHANIZED and HYATTIZED FOR DEFENSE!

★ Tanks and trucks, airplanes and armored cars, gun mounts and gun carriages . . . *as well as the machines that help build them* . . . depend on Hyatts, and Hyatt Quality, to carry the load and guard against wear.

These many duties of Hyatts . . . in the basic raw material industries, *in the machines that make defense equipment, and in the defense equipment itself* . . . keep our men and our plant working at peak capacity to fill vital defense contracts and regular production at the same time.

Yes, we are producing as never before, but always maintaining the traditional standards of Hyatt quality for the bearings of America's defense equipment on the front line as well as in the field and factory, mine and mill, highway and railway that back it up. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.



HYATT ROLLER BEARINGS

Carry the Load!

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Starting gun being raised for 1942 model assemblies, with likelihood of still higher prices, OPACS notwithstanding. Higher labor costs, lower volume, more expensive materials, tools and equipment combine to force mark-ups on sales tags . . . Little curtailment seen in first months of model run, material and parts releases being set at high level

DETROIT

■ WHEN Mr. Leon Henderson of the OPACS released his diatribe against Chrysler Corp. in which he pulled no punches over the corporation's refusal to rescind price advances on new cars, he revealed a number of interesting things.

First, by giving the release to the press even before the victim was informed, he followed the usual New Deal policy of "publicity first, action later." Knowing that he has no delegated or authorized powers to control prices legally, he had to resort to veiled threats—"at the proper time I will report the full facts of the Chrysler situation to the President" and "refusal by the Chrysler Corp. to co-operate is forcing us to take the pricing of automobiles out of the hands of the industry."

By this last statement, Henderson displays either a woeful lack of knowledge on how the motor industry operates or a determination to take over motor company engineering departments. Establishment of price ceilings on cars, legal or otherwise, can mean only an adjustment of appearance, quality, accessories and other cost items to the point where they stay within the sales price and still leave a margin for administration and profit. Manufacturing companies are not yet to the point where they turn out products for the pure love of it.

If material and labor costs go up, either prices go up or quality goes down. This is one of the toughest nuts the industry is trying to crack now. Labor and material have gone up—$27.55 per car since the first of the year, according to Chrysler. In preparing for 1942 models another $25 to $50 per car must be added for substitute materials made necessary by shortages resulting from the defense program. Price increases already made range from about $10 to $60, and further increases appear certain unless new models can be stripped down to the point where the increased costs can be absorbed.

On top of this is the likelihood of sharply reduced volume of production which adds still more to the cost item.

Prefers Accessories

The American public preferring cars with plenty of accessories and gadgets and never seeming to be willing to buy stripped models, the wisdom of going too far in peeling down new models may be questioned. So the only alternative is a reasonable boost in retail prices.

Not only is Henderson proposing to set manufacturers' prices on 1942 models, but also to regulate dealers' mark-ups and trade-in values. Here he is really stepping into a hornets' nest. The annual sale of 4,000,000 new cars is accompanied by a movement of some 10,000,000 used cars, and for twenty years automotive merchandising experts have been trying to figure out some way to keep dealers solvent in sales of these used vehicles. If the price administrator has the formula he will be welcomed with open arms, but he is in for a lot of work in the small hours of the morning, and according to Washington reports he does plenty of this even now.

Closings for Changeovers To Be Briefest Ever

Plans are going forward rapidly for the start of 1942 model production and there is little evidence that any curtailment will be effected immediately. Plymouth, for example, will wind up its 1941 run about July 9 and has scheduled 11,000 new models for July, 23,000 for August and 32,000 for September. Dodge will run about 6000 in July and 12,000 in September. Ford will assemble the last 1941 models here about July 24 and will resume on 1942 models July 28, with no plant shutdown in prospect. Schedules at the Rouge call for 5000 cars a day for 50 days starting July 28, which would carry production through the first week of October.

Pontiac and Buick will begin assemblies about the fourth of August, it is understood, and will carry through 1941 models to the last week of this month. Packard already is producing nothing but Clipper models and shortly will extend this styling to other models in its line. Interruption to body supplies was occasioned last week as a result of the excessive heat. Paint operators in the Briggs Meldrum plant reported they could not stand the heat Monday, so the plant was closed. Next day they walked out in an unauthorized strike, claiming that the company refused to pay them for time lost because of the heat wave.

Temperatures the early part of last week in Detroit hovered around 95, but there were no incidents of plant closings other than the Briggs incident.

Apparently the motor companies are seeking to push assemblies of 1942 models just as far as the materials situation will permit, feeling that curtailment because of shortages is inevitable after the first of

the year. There would be little point to shutting off early 1942 assemblies, because labor so released could not be absorbed in defense plants as yet, and materials will be available for a start.

Some of the large producers have covered on enormous quantities of material and are even taking shipments as fast as the material is processed by suppliers. This will mean carrying heavy inventories of some items, in contrast to usual practice, but it is believed to be one sure way of guaranteeing receipt of material which later may become subject to defense priorities.

Marked changes in appearance of the new Ford lines is emphasized by those who have seen preliminary hand-built models. Apparently a more pronounced differentiation between the Ford, Mercury and Lincoln has been effected. Lincoln will be equipped with some form of fluid drive transmission, which will be optional on the Mercury but probably not available on the Ford series. Ford radiator grille is reported to be stainless steel, buffed and lacquer coated.

Double Buick Air Engine Contract—1000 a Month

Increased federal commitments for plant and expansion and aircraft engine production have boosted the defense job of Buick to virtually double its original size, as forecast here several weeks ago. Contracts now call for projected output of 1000 Pratt & Whitney 1400-horsepower engines a month. H. H. Curtice, president of Buick, says it is now proposed to manufacture aircraft parts at Flint plants, resulting in probable employment of an additional 5000 men on defense work, while better than 10,000 will be employed in the Chicago plant where machining, assembling and testing of engines will be centered.

The army air corps has increased its contract with Buick by $88,000,000 for engine production. The original contract was for $36,497,520 to cover engines and $31,975,150 to cover plant and equipment. This lease agreement has been increased by $10,276,043 to cover expansion in Flint and Melrose Park, Ill.

Under the new setup, one third of Buick aircraft division employment will be in Flint plants, and a number of plant buildings will be given over to this phase of operations, thereby cushioning any drop in employment resulting from curtailment of auto production.

Meanwhile Chevrolet has been awarded contract totaling $89,075,000 for production of Pratt & Whitney engines and parts at its motor and axle plant in Tonawanda, N. Y., production scheduled to start around October, 1942, or 15 months hence. (See also page 35).

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	*524,058
Feb.	317,520	422,225	*509,326
March	389,499	440,232	*533,849
April	354,266	452,433	*489,854
May	313,248	412,492	545,321
5 mos.	1,731,495	2,176,874	2,602,408
June	324,253	362,566	.....
July	218,600	246,171	.....
Aug.	103,343	89,866	.....
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

*Revised.

Estimated by Ward's Reports

Week ended:	1941	1940†
June 14	134,682	93,635
June 21	133,565	90,060
June 28	127,926	87,550
July 5	96,457	51,975

†Comparable week

Ford has received letter of intent for an additional $67,500,000 to cover purchase of tools and equipment to outfit its new Willow Run bomber plant at Ypsilanti, Mich., where prospects of eventual employment of some 60,000 are causing no little consternation among the local citizenry when they contemplate such mundane things as the traffic problem, sewers, water supply and housing.

Some figures on the Ford bomber plant give an idea as to the startling size of the structure. Total floor area, including hangars, will be 3,700,000 square feet, with factory floor area of 2,547,000 square feet. Located on a 975-acre tract of land, the plant will be 1280 feet wide in front and 3200 feet in length. The Consolidated B-24 bomber to be built there has a wingspread of 115 feet and costs $250,000. Now on order are 800, plus complete subassemblies and parts for 1200 more. Several thousand men will be at work on plant construction by the end of this month, but operations are not expected to start before next spring.

Last week the army took over completely the Wayne county airport here and will outfit and staff the field for installation of armament in warplanes. Vast numbers of machine guns, power turrets, bomb racks and cannon produced by plants in this area will be delivered to the airport for installation in new fighting planes. The army took a lease on the field, renewable yearly until 1966, at annual fee of $113,000.

Studebaker Army Trucks

Studebaker has received order for army trucks in excess of $15,000,000, calling for several thousand of a six-wheel drive 2½-ton cargo type of truck, samples of which were submitted for tests months ago. Order has been anticipated and new production and assembly lines installed at South Bend to permit a quick start on the contract.

Three Flint, Mich., executives of Chevrolet—Arnold Lenz, assistant general manufacturing manager, E. A. Hall, general superintendent of the sheet metal division, and E. R. Wilson, assistant resident engineer—have been granted a patent for design and manufacture of a stamped sheet steel piston, possibly suited at some future date to use in automobile engines.

Chrysler tank arsenal reports it is buying materials, supplies and finished goods directly from more than 700 individual companies located in 130 cities in 20 states, typical of widespread subcontracting required by defense jobs.

Factory Building Costs Advance 10 Per Cent

■ Factory building costs increased approximately 10 per cent during the second quarter of 1941, according to the quarterly index compiled by The Austin Co., Cleveland. The index, which advanced 10 points to 109 in the spring quarter, has charted labor and material costs in construction of a typical one-story steel frame, monitor type plant since 1913.

"Latest advance reflects record-breaking activity for the national defense program and unprecedented pressure for construction labor and material in certain areas which have felt the full impact of the defense building boom," George A. Bryant, Austin president, explained. "There are now so many special factors in almost every building project that average costs are significant only insofar as they indicate the general price trend. . . .

"The unparalleled need for speed in the completion of defense plants has likewise led to more overtime for engineers and field labor, all of which has increased costs proportionately. With construction workers getting time and a half and double time for overtime, and working six or seven days a week, the average hourly cost of labor in the building trades advances from one-sixth to one-third more than the established hourly rates."

■ Sales of mechanical coal-burning stokers in the first five months of 1941 were 70 per cent greater than in the corresponding period last year, according to the Stoker Manufacturers' Association. Record breaking sales total has been predicted for 1941.

90% of Army's $457,415,409 Defense Awards in Week for Aircraft, Parts

■ AIRCRAFT and aircraft parts awards reported last week by the War Department comprised nearly 90 per cent, in value, of the $457,415,409 total placed in the period. Glenn L. Martin Co. and North American Aviation Inc. received contracts totaling nearly $300,000,000 for assembly of medium bombers at government-owned plants under construction at Omaha, Nebr., and Kansas City, Kans. Major subcontractors for each award were designated.

General Motors Corp.'s Buick Motors Division and General Electric Co. also received large contracts for airplane engines and parts. Construction awards were placed for improvement and extension of airports throughout the nation. Contracts reported:

Callahan, W. E., Construction Co., Dallas, Tex., miscellaneous buildings, railroads, roads, fencing, miscellaneous utilities, runways and a construction camp at Southwestern Proving Ground, Hope, Ark., $7,056,933.

Cummings, Matthew, Co. Inc., maintenance shop, warehouses, barracks, mess, day room, office and storehouse and utilities at motor repair shops, Ft. Devens, Massachusetts, $1,181,814.

Eaton & Smith, and H. P. Moran, San Francisco, for ordnance storage depot at Benicia arsenal, California, including igloo magazines, asphaltic roads, railroad, loading platforms, drainage facilities, bridges, railroad underpass, underground storage magazine and warehouses, $3,089,779.

Hawaiian Contracting Co., Honolulu, T. H., and Pacific Bridge Co., San Francisco, $1,385,815 for construction of army pier terminal and chemical warfare service depot at Kapalama basin and extension of pier at Hickam field, Hawaii. Complete project to total $3,556,260, will include water supply improvements and sewage treatment plant at Wheeler field and Schofield barracks, Hawaii.

Martin, Glenn L., Nebraska Co., $166,261,527 for assembly of medium bombardment planes at government-owned plant in Omaha, Nebr. Chrysler Corp., Hudson Motor Car Co., and Goodyear Aircraft Corp. have been designated major subcontractors.

Mitchell, Russ, Inc.; T. B. Hubbard Construction Co.; Knutson Construction Co.; and Joseph F. Meyer Jr., all of Houston, Tex., $7,566,517 contract for shipping terminal, magazines, miscellaneous other buildings, roads, railroads and other utilities at San Jacinto Ordnance Depot, Houston.

North American Aviation Inc., Inglewood, Calif., assembly of medium bombardment planes at the government-owned plant in Kansas City, Kans., $127,440,000. General Motors Corp., Fisher Body Division, major subcontractor.

Sanderson & Porter, New York, supplemental agreement to original fixed fee contract for additional shell loading facilities at the Elwood Ordnance Plant, Joliet, Ill., $5,774,075.

Stevens Bros. and Miller-Hutchinson Co. Inc., New Orleans, pier and transit shed construction on existing piling, and necessary utilities at New Orleans port of embarkation.

Air Corps Awards

General Electric Co., Schenectady, N. Y., turbine supercharger assemblies, $21,776,000.

General Motors Corp., Buick Motor Division, Detroit, aircraft engines and spare parts, $88,000,000.

North American Aviation Inc., Inglewood, Calif., airplanes and spare parts, $6,352,650.

Ordnance Department Awards

Acme Pattern & Machine Co. Inc., Buffalo, gages, $1225.25.

Alloy Fabricators Inc., Perth Amboy, N. J., jacketed dissolving kettles, $2736.

Aluminum Seal Co., New Kensington, Pa., assembling machines, $10,000.

American Car & Foundry Co., Berwick, Pa., clutch plates, $13,105.50.

American Chain & Cable Co., Andrew C. Campbell Division, Bridgeport, Conn., abrasive cutting machines, $2637.

American Cutter & Engineering Co., Detroit, cartridge punches and ejecting stems, $72,350.

American Manganese Bronze Co., Philadelphia, manganese bronze bars, $3645.

American Smelting & Refining Co., Federated Metals Division, Newark, N. J., bismuth solder, $1965.50.

Apex Tool & Cutter Co. Inc., Shelton, Conn., inserted blade cutters, $2108.

Arens Controls Inc., Chicago, hand throttle cable assemblies, $1691.25.

Auto-Ordnance Corp., Bridgeport, Conn., guns, $416,655.

Baldwin Locomotive Works, Standard Steel Works Division, Philadelphia, castings, $205,104.72.

Barwood & Co., Philadelphia, gages, $6890.

Bay State Abrasive Products Co., Camden, N. J., grinding tools, $1667.82.

Bethlehem Steel Co., Bethlehem, Pa., steel parts and overhaul of light tanks, $1160.64.

Better Built Door Co. Inc., Jenkintown, Pa., furnish and install overhead electrically operated doors, $1615.

B. G. Corp., New York, parts for light tanks, $16,193.

Blakeslee, G. S., & Co., Cicero, Ill., washing machines, $2535.

Bliss & Laughlin Inc., Harvey, Ill., steel parts and overhaul of light tanks, $5078.94.

Borg-Warner Corp., Ingersoll Steel & Disc Division, Chicago, commercial pressed steel seats, $1054; Rockford Drilling Machine Division, Rockford, Ill., parts for tanks, $19,978.03.

Boyt Harness Co., Des Moines, Iowa, tool rolls, $4206.41.

Brockway Motor Co. Inc., Philadelphia, tractors, $3749.60.

Carpenter Steel Co., Reading, Pa., steel, $67,082.84.

Carnegie-Illinois Steel Corp., Chicago, steel, $27,588.18.

Carrier Corp., Syracuse, N. Y., drying equipment, $36,946.

Chandler & Price Co., Cleveland, power cutters, $5214.

Chase Brass & Copper Co. Inc., Cleveland, brass, $3481.99.

Colonial Electric Co., Philadelphia, stranded wire, $1313.33.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., gun components, $16,079.70.

Consolidated Packaging Machinery Corp., Buffalo, weighing equipment, $2725.

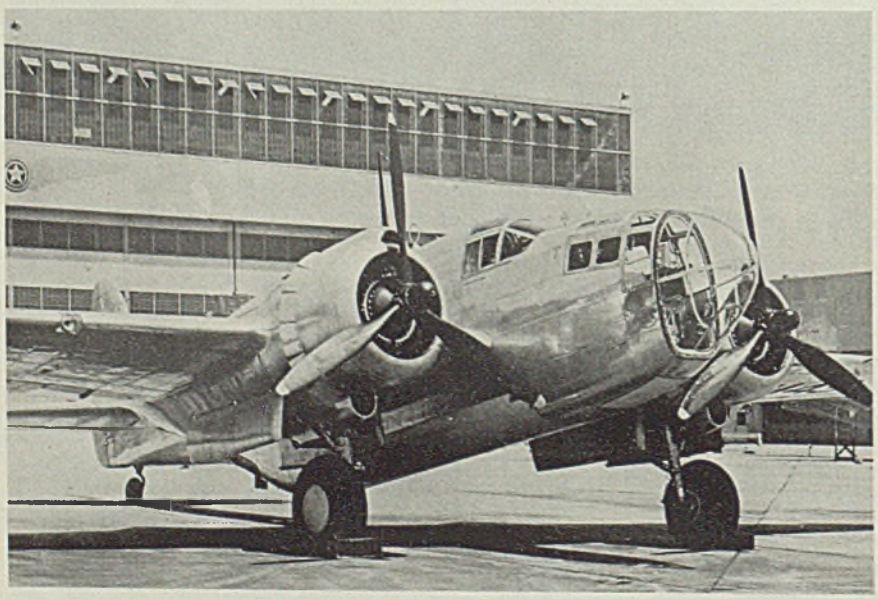
Continental Motors Corp., Muskegon, Mich., engine assemblies, parts for tanks, $372,967.

Disston, Henry, & Sons Inc., Tacony, Philadelphia, armor plates, $6019.30.

Doehler Die Casting Co., Pottstown, Pa., die castings, $2129.58.

Eastman Kodak Co., Rochester, N. Y.,

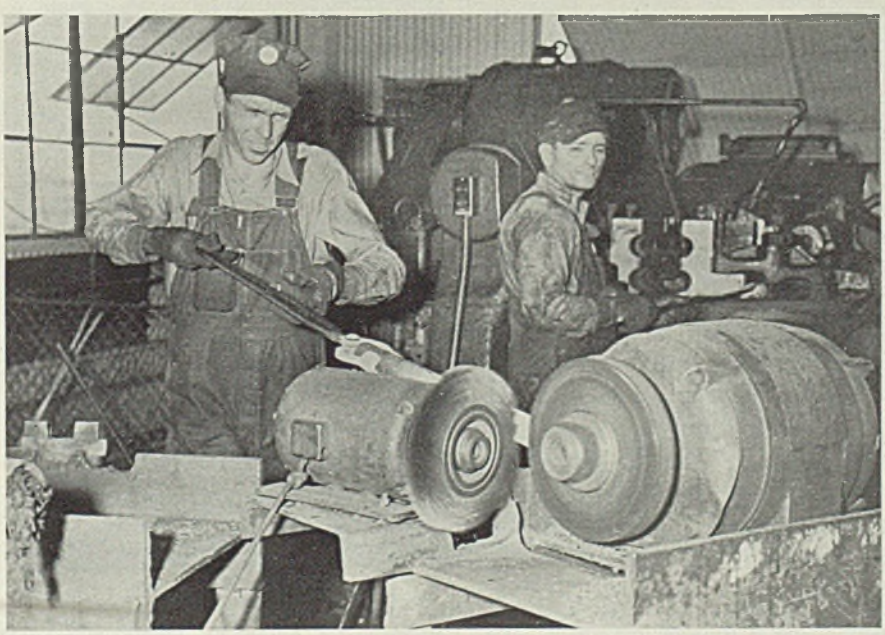
Martin Awarded $166,000,000 Bomber Contract



■ Britain's latest air weapon, the Martin 187 ("Baltimore") medium bomber, was completed last week by Glenn L. Martin Co., Baltimore. It is believed to be the fastest bomber of its class in the world and will carry heavy offensive and defensive firepower, including power-driven gun turret. It is powered with two Wright engines of 1600 horsepower each. It has an all-plastic nose for wide visibility. Last week United States War Department awarded Martin a contract for $166,000,000 medium bombers. See report above

collimating telescopes, $45,647.54.
Edgcomb Steel Co., Philadelphia, strip steel, $1082.90.
Firth-Sterling Steel Co., Philadelphia, steel, $111,058.48.
General Motors Corp., AC Spark Plug Division, Flint, Mich., speedometers, $1870.
General Motors Sales Corp., New Departure Division, Meriden, Conn., ball bearings, $3585.
General Steel Castings Co., Eddystone, Pa., castings, $171,364.44.
Geometric Tool Co., New Haven, Conn., chasers, $4135.
Gleason Works, Rochester, N. Y., tools, $1331.46.
Graybar Electric Co. Inc., Philadelphia, rigid conduit, machine ells and couplings, $1583.11.
Great Lakes Steel Co., Boston, sheet steel, $26,267.13.
Hesse Machine & Mfg. Co., Boston, gages, $1140.
International Harvester Co., Chicago, spare parts for tractors, $16,905.16.
Jahn, B., Mfg. Co., New Britain, Conn., gages, $1074.
Lapointe Machine Tool Co., Hudson, Mass., broach blades, $11,930.
Ludlow Stamping & Fabricated Steel Co., Upper Darby, Pa., chest handles, $6459.60.
Machinery Builders, Long Island City, N. Y., machines for assembling discs, $1758.55.
Mackintosh-Hemphill Co., Pittsburgh, steel castings, $180,618.88.
Manning, Maxwell & Moore Inc., Bridgeport, Conn., pressure gage testers, $9326.
Master Machinery & Tool Co., Chicago, gages, $3780.
McKiernan-Terry Corp., Dover, N. J., staking machines, $17,376.
Modern Tool & Die Co., Philadelphia, gages, $7433.50.
Moore, George W., Inc., Boston, screws, $1356 60.
National Electric Products Corp., Economy, Pa., wire, $2305.50.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., drill shanks, $2650.
Pallet Sales Corp., New York, pallets, $4130.
Pease, O. F., Co., Chicago, blueprinting machines, $4080.50.
Philadelphia Bronze & Brass Corp., Philadelphia, manganese bronze, $37,966.
Red Wing Motor Co., Red Wing, Minn., plugs and parts for tanks, $1606.
Republic Steel Corp., Chicago, steel, $5461.79.
Reska Spline Products Co., Detroit, gages, $7294.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $2231.74.
Signode Steel Strapping Co., Chicago, strip steel strappings, $1520.
Simplex Wire & Cable Co., Philadelphia, transmission cable, $3180.
Sparks-Withington Co., Jackson, Mich., submachine gun magazines, $72,000.
Springfield Stamp & Die Co., Springfield, Mass., steel stamps, $4485.
Standard Steel Spring Co., Blood Brothers Machine Co. Division, Allegan, Mich., parts for tanks, $1083.90.
Star Engineering Co., Newark, N. J., guides, bases, pins, and punches, $5200.
Timken-Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis., transmissions for tanks, $127,400.
Towmotor Co., Cleveland, elevating fork gasoline truck, $2313.68.
Union Twist Drill Co., Athol, Mass., cutting tools, $2989.70.
United Aircraft Corp., Pratt & Whitney Division, East Hartford, Conn., oil temperature controls for tanks, $33,884.
United Shoe Machinery Corp., Beverly, Mass., steel drop forgings, $1866.30.
Universal-Cyclops Steel Corp., Titusville, Pa., steel, $1042.59.
Veit & Young, Philadelphia, parts for case priming tools, $8263.

Brush and Emery Wheel Clean Steel for Shells



■ "Burnishing" a bar of shell steel against an emery wheel and brush at Texasteel Co.'s Ft. Worth, Tex., plant. After the billet has been cut off and heated for forging, operator removes scale thoroughly on this combination grinder and wire brush setup. Grinder removes heavy scale, wire brush removes light scale and cleans entire surface. This prevents scale from becoming embedded in surface of the shell during forging and lengthens life of forging dies. NEA photo, passed by U. S. Army ordnance officer at St. Louis

Warner & Swasey Co., Cleveland, replacement parts, $122,760.
Western Cartridge Co., Winchester Repeating Arms Co. Division, New Haven, Conn., cartridges, shotguns, $21,710; East Alton, Ill., cartridges, $1498.
Whitney Chain Mfg. Co., Hartford, Conn., chain assemblies, $2210.
Wilmington Experimental Station, Wilmington, Del., primer mixing machines, $12,500.
Wood, Alan, Steel Co., Conshohocken, Pa., diamond figured fiber plates, $4693.80.
Yarnall-Waring Co., Philadelphia, gun packet expansion joints, $1851.
Youngstown Sheet & Tube Co., Indiana Harbor, Ind., steel, $3025.22.

Signal Corps Awards

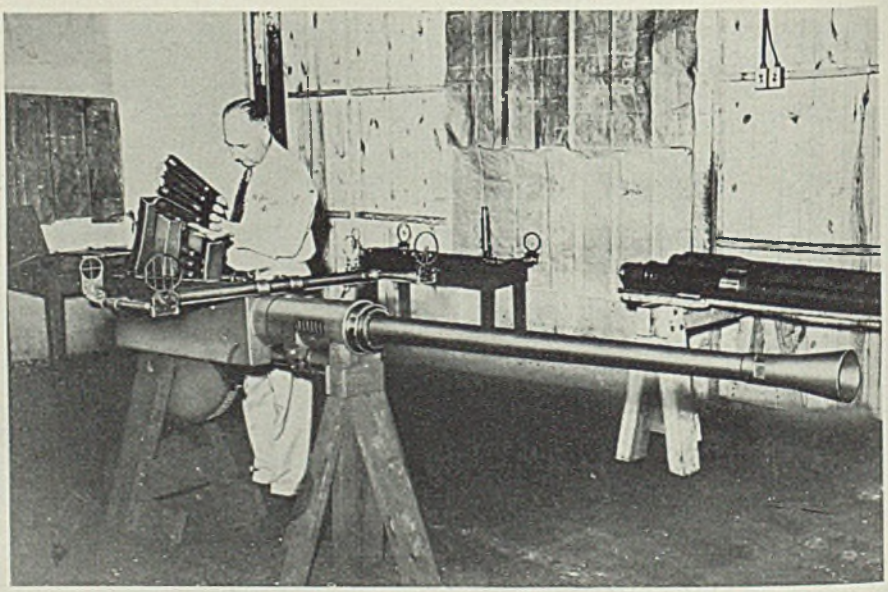
Acorn Insulated Wire Co., Brooklyn, N. Y., wire, $640.78.
Aerovox Corp., New Bedford, Mass., capacitators, $540.
Airadio Inc., Stamford, Conn., panels, $1775.
American Automatic Electric Sales Co., Chicago, telephone central office equipment, dial telephones, $125,751.75.
American Fork & Hoe Co., Charleston, W. Va., axes, $4380.
Anaconda Wire & Cable Corp., Marion, Ind., cable, $10,500.
Bell & Howell Co., Chicago, motion picture cameras, $3531.20.
Bendix Aviation Corp., Eclipse Aviation Division, Bendix, N. J., starting relays and ball bearing spacers, $763.60.
Bendix Radio Corp., Baltimore, radio compass units, $2706.
Bright Star Battery Co., Clifton, N. J., batteries, $803.54.
Circle Wire & Cable Corp., Maspeth, Long Island, N. Y., cable with reels, $76,044.50.
Cornelius, H. M., Co., New York, drill equipment, $965.25.
Dicke Tool Co. Inc., Downers Grove, Ill., bars, $6381.04.
Dietz, H., Co., Brooklyn, N. Y., cases, $1460.
Edison, Thomas A., Inc., West Orange, N. J., recording equipment, $24,405.50.
Ehrick, Fred, Co., Brooklyn, N. Y., panels, $205,500.
Eisenmann Magneto Corp., Brooklyn, N. Y., miscellaneous parts for engine, $563.75.
Electric Storage Battery Co., Cleveland, batteries, $51.894
Federal Mfg. & Engineering Co., Brooklyn, N. Y., tuning units, $28,500.
Folmer Graflex Corp., Rochester, N. Y., cameras, $1338.48.
Frieze, Julian P., & Sons, Baltimore, meteorological equipment, $22,333.
General Dry Batteries Inc., Cleveland, batteries, $5820.33.
General Electric Supply Corp., Syracuse, N. Y., conduit, $2142.53.
Graybar Electric Co., New York, underground telephone cable, cable-layer plow, wire, cable and reels, loading coil cases, switchboards, capacitators, $116,072.78.
Gussack Machined Products Inc., Long Island City, N. Y., knob assemblies, $2192.
Homelite Corp., Port Chester, N. Y., power units, $2560.
Janette Mfg. Co., Chicago, motor generator sets, $7066.40.
Joslyn Co., Chicago, jacks, wire rope, $6279.20.
Karp Metal Products Co. Inc., Brooklyn, N. Y., cabinet racks and panels, $4505.10.
Kaustine Co. Inc., Perry, N. Y., fuel tanks, $6510.
Kellogg Switchboard & Supply Co., Chicago, relay control cabinets, telephone switchboards, $30,861.71.
Kennecott Wire & Cable Co., Phillipsdale, R. I., switchboard cable, $7835.
Laganke Electric Co., Cleveland, panels, $4420.
Lauson Co., New Holstein, Wis., miscel-

laneous engine parts, $3180.
Leich Sales Corp., Chicago, protectors, $1890.
Manco Mfg. Co., Bradley, Ill., locking handle assemblies, $900.
May Hardware Co., Washington, machinist vises, $2694.
Mitchell Camera Corp., West Hollywood, Calif., motion picture cameras, $21,651.
National Carbon Co. Inc., New York, batteries, $66,968.33.
National Cine Laboratories, New York, motion picture tripods, $5199.20.
National Electric & Mfg. Co., Jersey City, N. J., telegraph keys, contact springs and contact levers, $1241.75.
Ohmite Mfg. Co., Chicago, resistors, $644.50.
Ray-O-Vac Co., Madison, Wis., batteries, $56,541.30.
R. C. A. Mfg. Co. Inc., Indianapolis, portable public address sets, beat oscillator assemblies, $13,446.40.
Remler Co. Ltd., San Francisco, plugs, $545.
Sarvas Electric Co., Brooklyn, N. Y., battery charging panels, $1113.
Simplex Wire & Cable Co., East Cambridge, Mass., cable, $977.50.
Solar Mfg. Corp., Bayonne, N. J., capacitors, $523.98.
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., telephones, switchboxes, main distribution and equipment frames, $23,194.67.
Teletype Corp., Chicago, perforators and printers, $58,687.66.
Tophams Inc., Washington, shelters and supports, $3675.
Ulmer, A. J., New Castle, Pa., bearing bushings, adapters, $1357.34.
Ulmer Tool & Mfg. Co. Inc., New York, magazines, $2385.
Underwood Elliott Fisher Co., Bridgeport, Conn., machine heads, $1140.
Utica Drop Forge & Tool Corp., Yorkville, N. Y., pliers, $1930.
Weiler, Edward W., Newark, N. J., soldering equipment, $965.94.
Welch, W. M., Mfg. Co., Chicago, barometers, $7035.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., voltmeters, ammeters, splicing clamps, $28,943.78.
White, David, Co., Milwaukee, theodolites and tripods, $29,135.
Yates American Machine Co., General Refrigeration Division, Beloit, Wis., refrigerating units, $1006.20.

Corps of Engineers Awards

Air Cruisers Inc., Clifton, N. J., pneumatic floats and reconnaissance boat, $2170.
American Car & Foundry Co., New York, railroad cars, $223,750.
American Locomotive Co., Schenectady, N. Y., locomotives, $286,750.
American Steel & Wire Co., Cyclone Fence Division, Cleveland, fence, Connellsville airport radio range, Pennsylvania, $2250; Cincinnati Division, welded steel fabric, Patterson field, Ohio, $7603.20.
Ames, W., & Co., Jersey City, N. J., galvanized bolts, washers, and spikes, $3652.29.
Aqua Systems Inc., New York, Air Corps gasoline fueling system, MacDill field, Tampa, Fla., $99,307; gasoline fueling system, Eglin field, Valparaiso, Fla., $79,253.
Arizona Refining Co., Phoenix, Ariz., bituminous seal coat, Phoenix military airport, Litchfield park, Arizona, $6703.95.
Bair, Roy L., Spokane, Wash., grading and paving of runways, drainage facilities, and boundary fence, Wenatchee city airport, Washington, $288,789.50.
Bethlehem Steel Co., Bethlehem, Pa., structural steel, Patterson field, Ohio, $118,080.
Caterpiller Tractor Co., Peoria, Ill., tractors, $8195.35.
Central Construction Co., Lawrence, Mass., apron, taxiways and gasoline distribution system, Manchester airport, New Hampshire, $370,924.10.
Christy, Lee A., San Antonio, Tex., temporary link trainer building, Brooks field, San Antonio, Tex., $7722.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines, $7023.
Colorado Fuel & Iron Corp., Minnequa, Colo., welded steel fabric for runways, Hill field, Ogden, Utah, $16,100.
Couse Laboratories Inc., Newark, N. J., mobile repair shop bodies, $25,000.
Davenport Besler Corp., Davenport, Iowa, locomotives, $421,425.
Fairbanks Morse & Co., Boston, equipment for Cherry and Pitkin streets pumping stations, East Hartford, Conn., $29,257.
Forcum-James Co., Dyersburg, Tenn., paved runways, taxiway, drainage system, and electric ducts, East Baton Rouge Parish airport, Louisiana, $497,150.
Gammino, M. A., Construction Co., Providence, R. I., extension of existing airport runways, Rhode Island state airport, Hillsgrove, R. I., $189,524.20.
General Electric Co., Schenectady, N. Y., locomotives, $197,400.
Gray Marine Motor Co., Detroit, tug boat, $3021.60.
Hall, E. C., Co. and J. C. Compton, Eugene, Oreg., airport, Eugene, Oreg., $290,161.15.
Hedenberg, A., & Co. Inc., Duluth, addition and alterations, United States engineer office building, Duluth, $46,900.
Hubbard Construction Co., Orlando, Fla., paving runway and taxi strip, Lee county airport, Ft. Myers, Florida, $97,308.50.
Ingersoll-Rand Co., Painted Post, N. Y., air compressors, $7924.
Jahn, C. R., Co., Chicago, trailers, $1865.
Johnson & Kramer, St. Charles, Minn., boiler and engine building, United States Boatyard, Fountain City, Wis., $7966.50.
Keating, Daniel J., Co., Philadelphia, steam supply and return mains, Scott field, Belleville, Ill., $87,000.
K D Lamp Co., Cincinnati, reflectors, $9000.
Luther Grinder & Tool Co., Fond du Lac, Wis., bench grinders, $2537.04.
Markham Products Co., Birmingham, Ala., shores and jacks, $19,375.
Minor Construction Co., Belleville, Ill., theatre, Scott field, Illinois, $70,338.
New State Electric Co., Phoenix, Ariz., lighting system, Sky Harbor airport, Phoenix, Ariz., $36,806.
Nicholson, H. B., Los Angeles, sewage treatment plant, Phoenix military airport, Litchfield park, Arizona, $74,969.
Northwest Construction Co., Seattle, grading and paving runway and taxiway, King county airport (Boeing field), Washington, $239,520.
Nunnelly, F. A., San Antonio, Tex., depot armament, fire-control, supply and repair building, Duncan field, Texas, $93,994.
Petry, N. G., Denver, service club, Lowry field, Denver, $45,950.
Pittman Auto Co., Brownsville, Tenn., hydraulic dump trucks, $3983.64.
Silver State Construction Co., Fallon, Nev., drainage facilities, Winslow airport, Winslow, Ariz., $252,580.
Somerville, Thomas, Co., Washington, pipe fittings, $2754.57.
Sordoni Construction Co., Forty Fort, Pa., airplane repair dock, Middletown air depot, Pennsylvania, $372,300.
South Chester Tube Co., Chester, Pa., drive pipe, $8518.80.
Sturgeon Bay Shipbuilding & Drydock Co., Sturgeon Bay, Wis., steel tug, $94,869.
Sullivan Machinery Co., New York, pile-clay diggers, rock drills, air hose, wood driver attachments, paving breakers, boring machines, $19,764.
Twaits, Ford J., Co., Los Angeles, sew-

Complete First Bofors Antiaircraft Gun



First Bofors 40-millimeter rapid fire antiaircraft gun produced by Chrysler Corp. was tested in Detroit last week before being sent to Akron, O., where its mount was added by Firestone Tire & Rubber Co. Two pilot models, first to be made in America, were formally presented to the United States Army last week. Chrysler has allocated 400,000 square feet of manufacturing space in nine plants in Detroit and Indiana to making the guns, considered by military experts as the best protection against dive bombing. Chrysler also has broken ground for two new plants in Detroit, involving approximately 200,000 square feet (STEEL, June 30, p. 28). Firestone erected a $1,500,000 building in 35 days to build the mounts

age disposal plant, Mather field, Sacramento, Calif., $59,750.

United Steel Fabricators Inc., Wooster, O., steam tunnel cover plates, Patterson field, Ohio, $3339.

Vulcan Construction Co., Boston, sewage treatment plant, Windsor Locks airfield, Connecticut, $77,692.

Wallace & Tiernan Co. Inc., Belleville, N. J., mobile water purification units, $22,000.

Whitcomb Locomotive Co., Rochelle, Ill., locomotives, $2625.

Wilson, Lee, Inglewood, Calif., lighting system, Ventura county airport, Oxnard, Calif., $9862.

Yale & Towne Mfg. Co., Philadelphia, chain pullers, $2032.32.

Medical Corps Awards

Addressograph-Multigraph Corp., Cleveland, imprinting machines, $63,100.

Anstice, Josiah, & Co. Inc., Rochester, N. Y., french fry cutters, $5201.20.

Buck X-Ograph Co., St. Louis, X-ray field units, $38,500.

Hobart Mfg. Co., Troy, O., electric food choppers and mixers, $22,188.58.

Landers, Frary & Clark, New Britain, Conn., hot plates, $5983.

Maclane Hardware Co., New York, hospital and field equipment, $5936.75.

Scanlon-Morris Co., Madison, Wis., combination sterilizing outfit, $153,750.

Service Industries Inc., Chicago, mess equipment, $156,642.

Sklar, J., Mfg. Co., Long Island City, N. Y., surgical instruments, $1889.25.

Vollrath Co., Sheboygan, Wis., miscellaneous hospital equipment, $17,942.

Chemical Warfare Service Awards

Federal Tin Co. Inc., Baltimore, tinplate, $3115.81.

Johnson & Johnson, New Brunswick, N. J., carriers and canisters, $400,090.

Washburn Co., Worcester, Mass., clamps and loops for gas mask assemblies, $4014.47.

Quartermaster Corps Awards

All Coupe Construction Co. Inc., Louisville, Ky., theatre, Ft. Knox, Kentucky, $54,500.

American Shipbuilding Co., Wilmington, Del., tug, DUROCHER, $160,000.

Chell & Anderson, Chicago, two barracks, Ft. Sheridan, Illinois, $54,100.

Chris-Craft Corp., Algonac, Mich., cabin boats, $133,000.

Delaware Construction & Landscape Co., Trenton, N. J., concrete mat for coal storage, Ft. Monmouth, New Jersey, $19,393.50.

Dion, Frederic J., Salem, Mass., power launch, $8546.

Dubuque Boat & Boiler Works, Dubuque, Iowa, distribution box boats, $106,000.

Eckert Fair Construction Co., Dallas, Tex., recreation buildings, regimental chapels, lavatories, service club, theatre, Camp Bowie, Texas, $456,719.57.

Equitable Equipment Co., New Orleans, water barge, $16,800.

Harper, J. A., Crowville, La., two barracks buildings, Camp Livingston, Louisiana, $21,807.

Honeycutt, A. J., Co. Inc., North Birmingham, Ala., nine regimental chapels, Ft. McClellan, Alabama, $141,715.

Hooper, C. A., Co., Madison, Wis., extension to electric systems and protective fence, Savanna ordnance proving ground, Illinois, $95,300.

Interstate Navigation Co., Newport, R. I., steamer WESTPORT, $28,000.

Johnson, Axel E., Chicago, service club, Ft. Sheridan, Illinois, $42,900.

McCarthy, Robert, San Francisco, modified mobilization type administration building, Presidio of San Francisco, $54,318.

McKee, Robert E., El Paso, Tex., 62 recreation buildings, Ft. Bliss, Texas, $128,400.

Mercury Mfg. Co., Chicago, tractors, $3190.

Newark Steamboat Co., Newark, N. J., steamer FAIRVIEW, $16,000.

Shapiro, M., & Son Construction Co., New York, warehouse at Watervliet arsenal, New York, $396,700.

Sturgeon Bay Shipbuilding & Drydock Co., Sturgeon Bay, Wis., distribution box boats, $214,000.

Twaits, Ford J., Co., and Morrison-Knudsen Co. Inc., Los Angeles, three barracks and 12 recreation buildings, Ft. Ord, California, $59,648.

Canada's War Awards $38,873,303 in Week

TORONTO, ONT.

■ War contracts placed by Canada's Department of Munitions and Supply in the week ended June 20 numbered 3230, with total value $38,873,303. Awards placed with United States companies aggregated $3,374,010. The orders:

Aircraft: National Steel Car Corp. Ltd., Hamilton, Ont., $27,500,000; Steel Co. of Canada Ltd., Hamilton, $11,692; Link Mfg. Co. Ltd., Gananoque, Ont., $8046; Fleet Aircraft Ltd., Ft. Erie, Ont., $5247; Weatherhead Co., St. Thomas, $75,304; Aviation Electric Ltd., Montreal, Que., $201,426; Canadian Vickers Ltd., Montreal, $197,454; Canadian Wright Ltd., Montreal, $262,440; Noorduyn Aviation Ltd., Montreal; $241,750.

Land transport: Bickle-Seagrave Ltd., Woodstock, Ont., $97,024; LaFrance Fire Engine & Foamite Ltd., Toronto, $72,768; General Motors Products of Canada Ltd., Oshawa, Ont., $54,842; International Harvester Co. of Canada Ltd., Ottawa, Ont., $17,613; Pierre Thibault, Pierreville, Que., $72,768.

Shipbuilding: Robert Mitchell Co. Ltd., Montreal, $127,900; Star Shipyard (Mercer's) Ltd., New Westminster, B. C., $129,950.

Dockyard supplies: Peacock Bros. Ltd., Montreal, $247,050; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $13,610; Canadian John Wood Mfg. Co. Ltd., Toronto, $6720; British Ropes Canadian Factory Ltd., Vancouver, B. C., $9046; Hamilton Bridge Western Ltd., Vancouver, B. C., $16,400.

Instruments: Instruments Ltd., Ottawa, $16,134; Ontario Hughes-Owens Co. Ltd., Ottawa, $26,320; Zephyr Looms & Textiles Ltd., Guelph, Ont., $22,211.

Electrical equipment: Canadian Westinghouse Co. Ltd., Ottawa, $14,677; Northern Electric Co. Ltd., Ottawa, $13,116; Thomas Pocklington Co., Toronto, $18,200; Toronto Metal Spinning Co., Toronto, $7985.

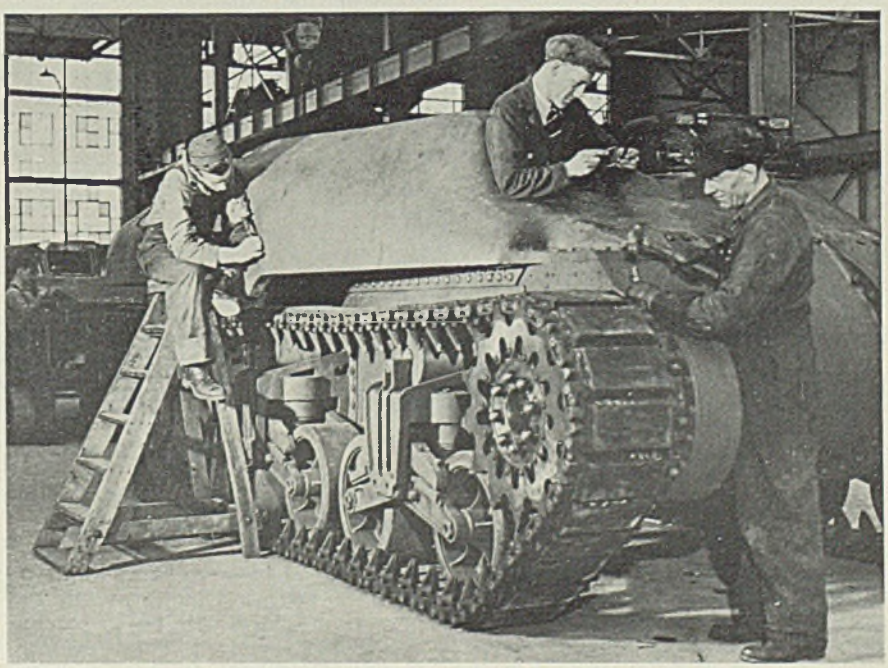
Ordnance: War Office, England, $46,000.

Munitions: J. Eveleigh & Co. Ltd., Montreal, $8750; General Steel Wares Ltd., Toronto, $9362; T. W. Hand Fireworks Co. Ltd., Cooksville, Ont., $17,901.

Miscellaneous: Moore Bros. Machinery Co. Ltd., Montreal, $6548; Canadian Fairbanks-Morse Co. Ltd., Ottawa, $11,745; General Steel Wares Ltd., Toronto, $7086; Dominion Rubber Co. Ltd., Ottawa, $156,121; Northern Construction Co., Vancouver, B. C., $80,000; Poole Construction Co. Ltd., Edmonton, Alta., $300,000; Rayner Construction Co., Leaside, Ont., $280,000; Machinery Depot Ltd., Calgary, Alta., $14,000.

■ Foote Mineral Co., 1609 Summer street, Philadelphia, is distributing to those interested the June issue of Foote-Prints, its monthly publication, containing an article on "Zirconia in Brazil." It is by Gordon H. Chamber, vice president of the company, who visited Brazil last fall and examined the zirkite mines, from which is obtained material for the zirconium alloys used in the steel industry.

Canadian Tank Has Cast Steel Hull, Turret



■ First Canadian-made cruiser tank rolled out of the Montreal Locomotive Works shops last week. It differs from the United States 28-ton tank in that the hull and turret are cast steel, instead of riveted armor plate. (STEEL, June 30, p. 37). Heaviest cannon is mounted in the turret making possible firing in any direction. Photo by NEA from Office of Director of Public Information, Ottawa

Aluminum Plants Proposed To Lift Output 600,000,000 Pounds Annually

■ RECOMMENDED locations for eight new aluminum plants to produce an additional 600,000,000 pounds annually have been announced by OPM. The new plants, when completed, will raise total United States aluminum producing capacity to 1,400,000,000 pounds a year. Canada will supply an additional 200,000,000 pounds.

Recommendations were forwarded by OPM officials to the secretary of war for approval, after which they will be transmitted to the Defense Plant Corp., subsidiary of the Reconstruction Finance Corp., which will finance the new facilities.

With the power problem resolved, construction of all plants in the total aluminum expansion program can go forward immediately. Names of the companies that will operate the plants will be announced soon.

OPM's recommendations, based on a joint report by the Federal Power Commission and the Power Section of OPM, were made after the FPC had completed a nationwide survey of power supplies for aluminum, and after consultations with the Department of the Interior, the Tennessee Valley Authority, and public and private power agencies. Areas selected and the size of plants recommended follow:

Arkansas: 100,000,000 pounds annual capacity.

Bonneville-Grand Coulee area: two plants, one of 85,000,000 and the other of 55,000,000 pounds annual capacity.

Upper New York state: two plants, one of 100,000,000 and the other of 50,000,000 pounds annual capacity.

Alabama: 100,000,000 pounds annual capacity.

California: 70,000,000 pounds annual capacity.

North Carolina: 40,000,000 pounds annual capacity.

Will Be Privately Operated

Recommendations of the FPC and the Power Section of OPM were based on the following conclusions, made after a comprehensive survey of the entire power supply of the nation:

New aluminum plants should be located where they will be economically sound after the emergency.

Power supply at the locations recommended can be obtained as rapidly as the plants can be constructed.

Temporary measures can be taken to assure the necessary power by (a) improving transmission interconnections, (b) pooling and reducing power reserves, and (c) certain curtailment measures.

Specific recommendations for permament removal of power deficiencies, to be met in the interim by emergency measures, are being formulated by OPM in co-operation with the FPC, the Department of War, and other agencies.

All the new plants involved in the recommendations will be government-owned but privately operated under a lease arrangement, details of which will be worked out by the Defense Plant Corp. and the companies involved.

Alcoa Forging, Casting Plants Near Completion

New plants being constructed at Los Angeles and Lafayette, Ind., by the Aluminum Co. of America, Pittsburgh, are rapidly nearing completion. Included in a program which involves expenditure of $200,000,000 of the company's own funds, they are part of an expansion which is crowding into two years the equivalent of at least two decades of peace-time growth.

In 1937, in order to serve the airplane industry more effectively, the company bought 15 acres of land in Vernon, a section of Los Angeles, and erected on it a sand and permanent-mold foundry and forge plant. The works was completed early in 1938. At the start of the war, the Vernon works had a capacity of 100,000 pounds of aluminum alloy forgings, and 424,000 pounds of sand and permanent-mold castings a month.

In the spring of 1940 an expansion of the Vernon facilities was announced, including the addition of an extrusion works and a rivet plant, as well as additions to the existing aluminum foundry and forge plant.

Very shortly, the sand and permanent mold casting capacity will have been increased to 593,000 pounds a month, an increase of 40 per cent, and the forging capacity to 450,000 pounds a month, an increase of 350 per cent. The new extrusion plant will be turning out extruded shapes at the rate of 1,019,000 pounds a month, while the new rivet plant will be producing 70,000 pounds of rivets a month. By March, 1942, forging capacity will have been increased an additional 50,000 pounds a month.

The Lafayette works is also a fairly new plant. An extrusion plant and tube mill were built and placed in operation in January, 1939. When hostilities broke out between Great Britain and Germany in 1939, the Lafayette works had a capacity of 695,000 pounds of extruded shapes and 122,000 pounds of tubing a month. By October of this year, the floor space will have been increased 413 per cent.

By December the extruded shape capacity will have been expanded to 4,256,000 pounds monthly, or six times the capacity in 1939, while the tubing capacity will have reached 1,034,000 pounds a month, or nine times the capacity of 1939. However, by April, 1942, the tubing capacity will have been expanded to 1,348,000 pounds a month, or 11 times the capacity in 1939.

Warns of Boomerang in Antistrike Legislation

■ Efforts to prohibit strikes by law or impose compulsory arbitration are likely to boomerang and increase rather than decrease industrial disputes. This finding, based on a study of the compulsory arbitration laws in Australia, Canada and Great Britain, is contained in a pamphlet recently published by the Public Affairs Committee, 30 Rockefeller Plaza, New York.

Pamphlet, *Labor in the Defense Crisis* by T. R. Carskadon, summarizes a survey of the defense labor problem made by a committee of the Twentieth Century Fund, headed by William H. Davis, chairman, Defense Mediation Board.

Strikes, it is stated, have occurred mainly in newly organized industries.

Voluntary mediation was urged as best means of avoiding strikes and work stoppages. Proportion of success in mediation cases, pamphlet reports, usually runs above 90 per cent.

Government Finances Defense Plant Tooling

■ Metal Cutting Tools Inc., Rockford, Ill., was authorized last week to execute a $250,000 lease agreement with the Defense Plant Corp. for acquisition of machinery and equipment. Facilities are to be used in manufacture of machine tools, and are furnished at War Department's request.

Jesse Jones, federal loan administrator, reported also the Defense Plant Corp. has authorized execution of a lease agreement with Tycoon Tackle Inc., Miami, Fla., for construction and equipping of a plant at Miami. Costing $81,650, the facilities will be used in manufacture of precision instruments for the aircraft industry. Title will be retained by Defense Corp., with Tycoon Tackle operating the plant.

Lake Cities Endorse, Oppose Seaway Project

■ Opposition to the proposed St. Lawrence seaway is being expressed in hearings before the house rivers and harbors committee in Washington. Hubert B. Fuller, chairman of the transportation committee, Cleveland Chamber of Commerce, testified last week that the waterway would be "undesirable from the standpoint of the country at large and would be seriously detrimental to Cleveland."

His organization, he said, does not favor the project from navigation, power or defense standpoint. As a defense project "it seems unwise to dissipate time, energy and money on work that cannot be made available quickly. He expressed the opinion that ocean-going shipments to and from Great Lakes ports would be much less than expected. Surveys of industrial areas adjacent to the lakes indicate small use for the waterway.

As to shipbuilding on the Great Lakes, Mr. Fuller stated Maritime Commission ships had too deep draft to be constructed there and taken to salt water, and types of warships possible to be built on the lakes were limited by depth of the canal. Power development would be of no value to Cleveland or Ohio, he declared.

Mayors of two other Great Lakes cities endorsed the project as an aid to national defense. Mayor Edward J. Jeffries, Detroit, testified the seaway would put the industries of the Midwest on "the main street of world commerce."

Mayor Carl F. Zeidler, Milwaukee, declared his constituents favored the development.

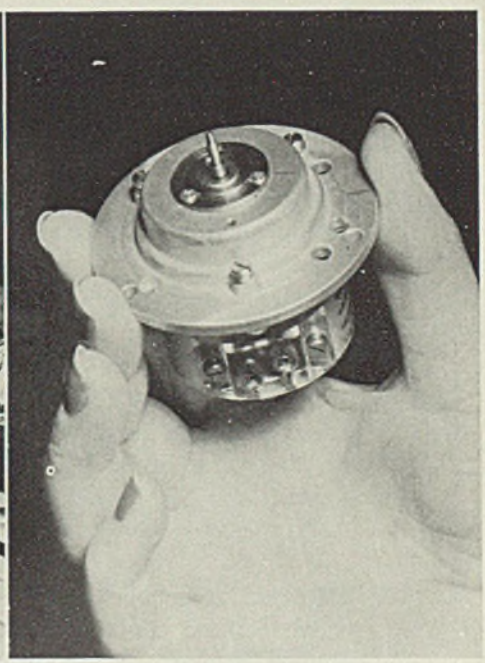
Navy's Ship Orders Total $7,234,262,178

■ Vessels ordered by the Navy since Jan. 1, 1940, total 2831, with aggregate cost $7,234,262,178, Secretary of the Navy Frank Knox reported last week. The Navy's program for aiding privately owned shipbuilding concerns expand facilities to speed up the naval building rate has given direct benefits to 26 states, he said. Employed on the shipbuilding program as of June 1, 1941, were 203,416. Navy yards employed 150,893, private shipyards 52,523. This represented an increase of 6225 since May 1, 1941.

Contracts signed for expansion of facilities totaled $381,677,944. Total of letters of intent was $41,000,195, and prospective contracts aggregated $77,321,860. Navy yards' total of contracts signed was $207,853,984; private shipbuilders', $132,017,229; and general industry, $41,806,731. Private shipbuilders had been issued letters of intent totaling $5,342,000; general industry, $35,658,195.

States benefiting most from the half-billion dollar expansion program, and the total for each: Pennsylvania, $102,447,094; New York, $30,920,097; California, $47,310,491; Virginia, $43,958,000; Massachusetts, $33,874,700; New Jersey, $32,633,094; Washington, $24,060,000; South Carolina, $12,675,000; Ohio, $12,102,509; and New Hampshire, $10,035,500.

Assembly Line for Small, Vital Defense Motors



■ One of the most unusual production operations in which General Motors Corp. has ever engaged is the manufacture of a tiny, but vital defense item, watch-like in size and precision, weighing scarcely 7 ounces and accurate to one ten-thousandth of an inch. It is the Autosyn motor made by the Delco Appliance Division, Rochester, N. Y., at the rate of several hundred daily. Four months after receiving a $2,500,000 subcontract from Bendix Aviation Corp., the plant was tooled and in regular production.

In multiple installation of as many as 20-odd in one aircraft, the function of the motors is to "tell" the pilot the exact position of the moving parts of his ship.

The field lamina is built of high silicon steel and assembled into a nickel silver case, after which it is machined to precision dimensions. At each step in the operation, the unit must pass a complete inspection and if at any stage it is more than one ten-thousandth of an inch too large or too small it is rejected.

Similar inspections to similar limits are maintained as the rotor is built up. The rotor is mounted on highly sensitive ball bearings, which are stored prior to use, in glass vials filled with oil; the bearings are never touched by human hands.

Final assembly of the unit is performed in a completely dust-free, air-conditioned room.

Wanted: More Cheers, Less Sneers and Smears

■ AMERICAN industry seldom puts its best foot forward. Few companies brag about their contributions to the defense program, except in self defense when they are wrongfully accused.

A few days ago Leon Henderson intimated that the Chrysler Corp. was not "playing the game." Thus provoked, the automobile company stated its case in a way that left no doubt as to its wholehearted and effective co-operation in the defense program.

♦ ♦ ♦

If every company engaged in defense work were to catalog its achievements to date, the exhibit for industry as a whole would be astounding. Few persons, even in vantage points in Washington, have more than a hazy idea of what has been accomplished in America's mills and shops to date.

But this fine showing could have been infinitely better. It is a showing that has been made under the severest of handicaps. It is a showing that cannot be improved much in forthcoming months unless the worst of these handicaps are removed.

♦ ♦ ♦

Most of these obstacles to a more effective defense effort can be traced to a common source. They spring from an epidemic of class hatreds which have been fanned into flame during the last eight years.

For instance, in our defense work of 1941 our labor problems are complicated first by the feud between A. F. of L. and C.I.O. and secondly by government agencies which are openly partial to certain favored union organizations.

In 1918 industry did not face this handicap; it enjoyed the effective co-operation of labor through a sterling leader in the person of Samuel Gompers and through government agencies which were impartial.

Today industry contends with all sorts of animosities. Farmers have been taught to discount industry's motives. Employes have been incited into assuming that their employers are unfair. Investors have been given the impression that most investment opportunities are crooked. Small business is being told that "big business" is out to ruin it. The public is being encouraged to think success is a crime and failure a virtue. A general state of cynicism prevails which approaches close to nihilism.

♦ ♦ ♦

In 1918 industry had none of these destructive factors to contend with. Men and women in all walks of life were willing to believe that the other fellow sometimes was actuated by proper and generous motives. There were no clearly defined class lines. Enthusiasm for a common objective —a democracy's primary weapon against the ruthless efficiency of a military despotism—was this nation's big asset in 1918.

We do not have that enthusiasm now.

Why?

Because we have in Washington in 1941 too few cheer leaders and too many sneer and smear leaders.

E. L. Shaner

EDITOR-IN-CHIEF

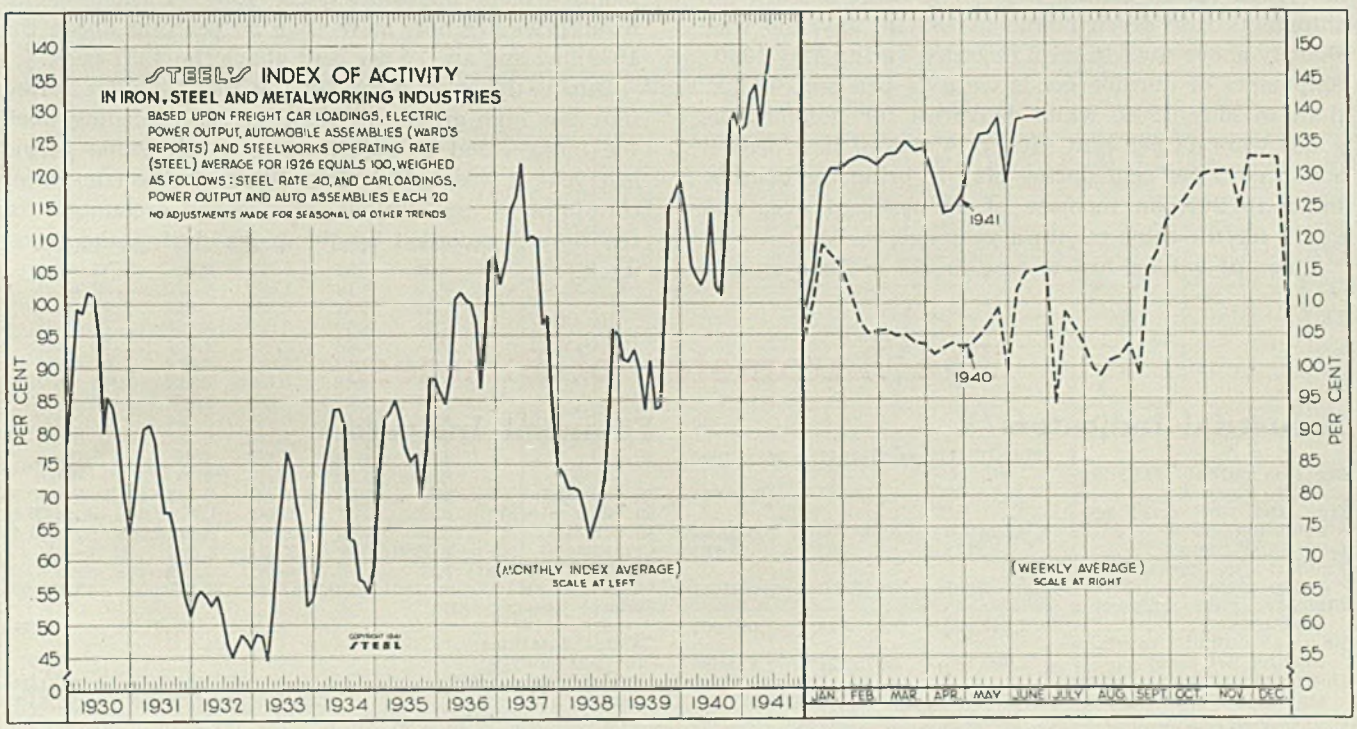
The BUSINESS TREND

Activity Index Climbs to New Peak During June

ACTIVITY in the iron, steel and metalworking industries, as measured by STEEL'S index, climbed to a new peak level during June. In that month the weekly index averaged 138.7, compared with the 134.8 recorded during May and was well above the 127.2 average for April. During June 1940 the index averaged 114.1, while for the comparable month of 1937 and 1929 it was 109.9 and 120.3 respectively.

Encouraging headway has been made toward the change-over to a defense and war economy during the first half of this year. Output of defense industries has recorded marked improvement the last six months. In many industrial lines production facilities are being strained to the limit and output is frequently over rated capacity. However, despite this record breaking output of military goods, production is still substantially below the desired level.

In some instances use of substitutes and large inventories have made it possible for civilian goods manufacturers to maintain the near peak operations of recent months. However, growing scarcity in those vital raw materials needed for defense industries and



STEEL'S index of activity gained 0.4 point to 139.1 in the week ended June 28:

Week Ended	1941	1940
April 19	124.2	103.4
April 26	126.5	102.8
May 3	132.6	103.3
May 10	135.9	104.8
May 17	136.1	106.8
May 24	138.6	109.1
May 31	128.4	99.2
June 7	138.4	111.9
June 14	138.7	114.6
June 21	138.7	114.8
June 28	139.1†	115.3

†Preliminary.

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101 2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	....	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	....	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85 4
Sept.	....	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64 3

rapidly declining inventories seem to indicate that production for civilian consumption will soon be curtailed.

Rationing of more and more materials through voluntary and mandatory action renders replenishment of stocks difficult or impossible and in some instances affect the availability of substitute materials. OPM estimates the 1941 defense program will absorb about 64 per cent of last year's durable goods capacity and that 1942 defense program calls for 6 per cent more durable goods than turned out for all purposes in 1940.

Where Business Stands

Monthly Averages, 1940 = 100

	May 1941	April 1941	May 1940
Steel Ingot Output	125.1	122.9	94.7
Pig Iron Output	115.7	113.0	88.0
Building Construction	164.4	121.8	98.6
Augo Output	141.2	125.3	115.7
Freight Movement	120.4	102.6	95.9
Wholesale Prices	108.2	106.0	99.9

According to the National Industrial Conference Board, shipments of manufactured goods attained a new high record during May. The board's index on shipments rose seven points to 185 in May and was sharply above the 116 level recorded during May 1940. Shipments of durable goods were 74 per cent higher than in May 1940, while deliveries for non-durable goods were 43 per cent higher. Value of new orders advanced 2 per cent during May to bring the board's index to 247, an increase of 90 per cent over the figure for the same month a year ago.

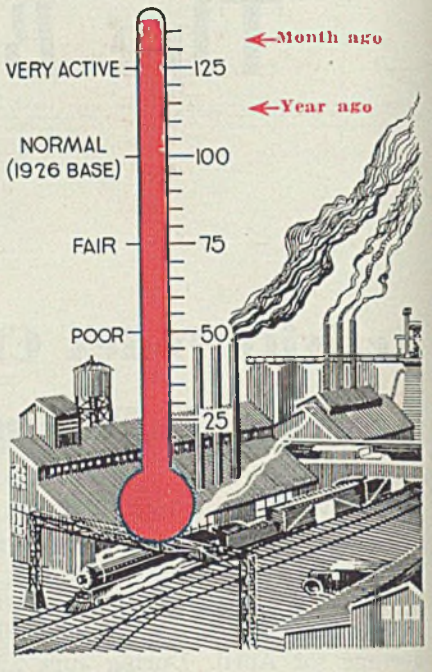
Index of unfilled orders rose to 512 in May, an advance of 8 per cent during the month and 263 per cent since May 1940. Value of inventories rose 2.4 per cent in May. Stocks held by durable goods manufacturers continue the upward trend reported in every month except one since June 1939. Durable goods inventories are now more than 50 per cent above the 1939 low and are 14 per cent above the 1937 peak.

During the week ended June 28 STEEL's index moved into new high ground of 139.1. In the preceding week the index stood at 138.7, while in the same period last year it was 115.3. Sharp gains in electric power consumption and freight carloadings accounted for the upturn recorded by the index during the latest week.

Industrial Weather

TREND:

Upward



The Barometer of Business

Industrial Indicators

	May, 1941	April, 1941	May, 1940
Pig iron output (daily average, tons)	148,262	145,685	112,811
Iron and steel scrap consumption (tons)	4,609,000	4,406,000	3,061,000
Gear Sales Index	273	292	133
Foundry equipment new order index	298.7	377.2	129.1
Finished steel shipments (Net tons)	1,745,295	1,687,674	1,084,057
Ingot output (average weekly; net tons)	1,603,106	1,575,228	1,121,395
Dodge bldg. awards in 37 states ($ Valuation)	$548,700,000	$406,675,000	$328,914,000
Automobile output	552,000*	533,912	452,433
Coal output, tons	43,400,000	5,975,000	34,896,000
Business failures: number	1,119	1,149	1,238
Business failures; liabilities	$10,065,000	$13,827,000	$13,068,000
Cement production, (1,000,000) bbls.†	12.20	10.60	10.04
Cotton consumption, bales	918,902	920,142	641,636
Car loadings (weekly av.)	841,557	717,573	670,351

†April, March and April respectively.
*Preliminary.

Commodity Prices

	May, 1941	April, 1941	May, 1940
STEEL's composite average of 25 iron & steel prices	$38.15	$38.15	$37.33
U. S. Bureau of Labor index	84.9	83.2	78.4
Wheat, cash (bushel)	$1.038	$0.928	$1.118
Corn, cash (bushel)	$0.83	$0.745	$0.765

Financial Indicators

	May, 1941	April, 1941	May, 1940
30 Industrial Stocks†	$116.44	$119.10	$130.76
20 Rail stocks†	28.25	28.48	26.52
15 Utilities†	$17.30	$18.66	$21.45
Commercial paper rate (N. Y., per cent)	½–⅝	½–⅝	½–⅝
*Com'l. loans (000 omitted)	$10,226,000	$9,870,000	$8,475,000
Federal Reserve ratio (per cent)	91.1	91.3	88.4
Capital flotations: (000 omitted)			
New Capital	$106,750	$746,178	$121,445
Refunding	$299,089	$175,738	$129,870
Federal Gross debt, (millions of dollars)	$47,721	$47,231	$42,810
Railroad earnings ($1,000,000)	$88.63	$52.57	$47.08
Stock sales, New York stock exchange (1,000,000)	9.66	11.18	38.97
Bond sales, par value ($1,000,000)	$169.3	$209.5	$176.5

†Dow-Jones averages.
*Leading member banks Federal Reserve System.

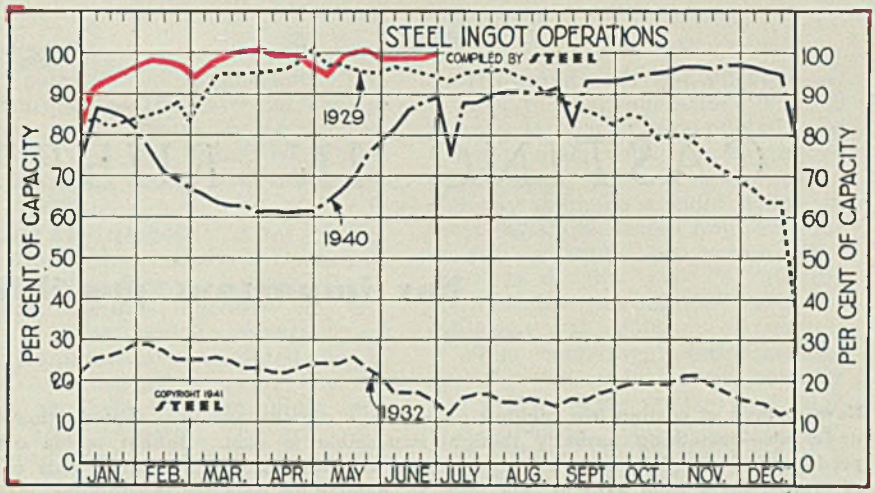
Foreign Trade

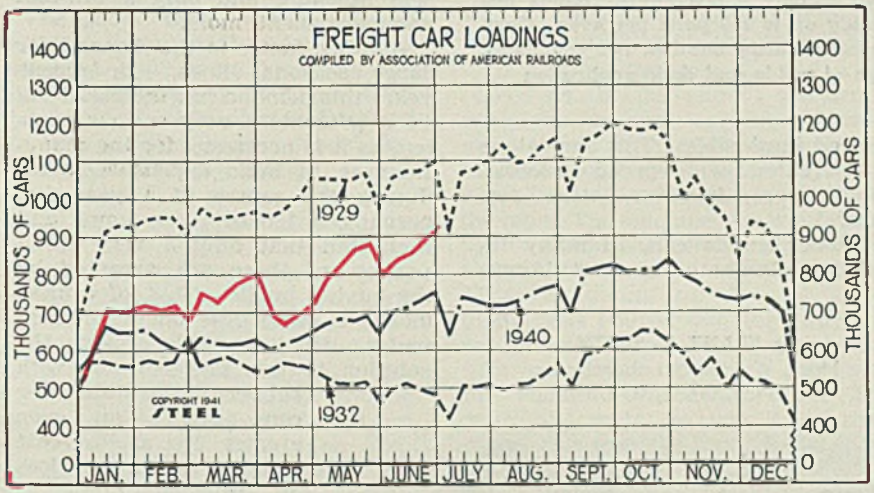
	April, 1941	March, 1941	April, 1940
Exports	$385,454,000	$357,565,000	$324,018,000
Imports	$287,550,000	$267,784,000	$212,238,000
Gold exports	$2,000	$3,000	$33,000
Gold imports	$171,994,000	$118,569,000	$249,885,000

Steel Ingot Operations

(Per Cent)

Week ended	1941	1940	1939	1938
June 28....	99.5	89.0	54.0	28.0
June 21....	99.0	88.0	54.5	28.0
June 14....	99.0	86.0	52.5	27.0
June 7....	99.0	81.5	53.5	25.5
May 31....	99.0	78.5	52.0	25.5
May 24....	100.0	75.0	48.0	28.5
May 17....	99.5	70.0	45.5	30.0
May 10....	97.5	66.5	47.0	30.0
May 3....	95.0	63.5	49.0	31.0
April 26...	96.0	61.5	49.0	32.0
April 19...	98.0	61.5	50.5	32.5
April 12...	98.0	61.0	51.5	32.0
April 5...	98.0	61.5	53.5	32.0
March 29..	99.5	61.0	54.5	36.0
March 22..	99.5	62.5	55.5	35.0
March 15..	98.5	62.5	56.5	32.0
March 8...	97.5	63.5	56.5	30.0





Freight Car Loadings

(1000 Cars)

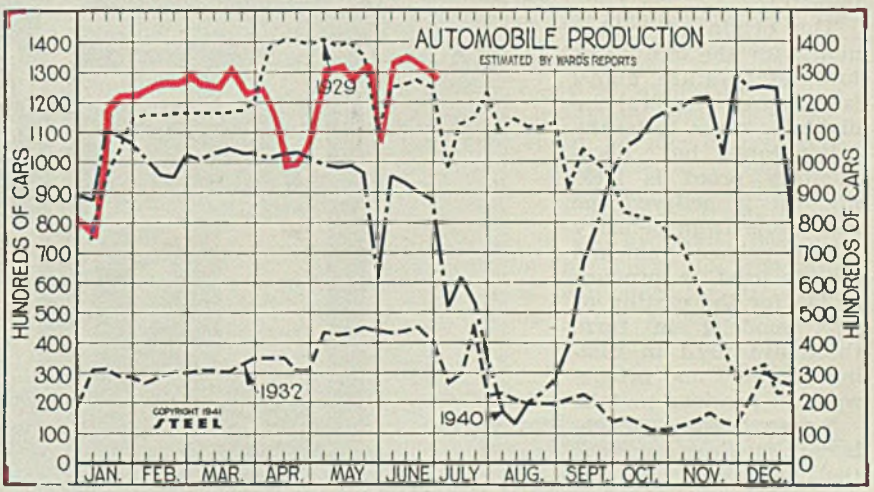
Week ended	1941	1940	1939	1938
June 28.....	920†	752	666	589
June 21.....	886	728	643	559
June 14.....	863	712	638	556
June 7	853	703	635	554
May 31.....	802	639	568	503
May 24.....	886	687	628	562
May 17.....	864	679	616	546
May 10.....	837	681	555	542
May 3.....	794	666	573	536
April 26.....	722	645	586	543
April 19.....	698	628	559	524
April 12.....	680	619	548	538
April 5.....	682	603	535	522
March 29....	792	628	604	523
March 22....	769	619	605	573
March 15....	759	619	595	540
March 8.....	742	620	592	557

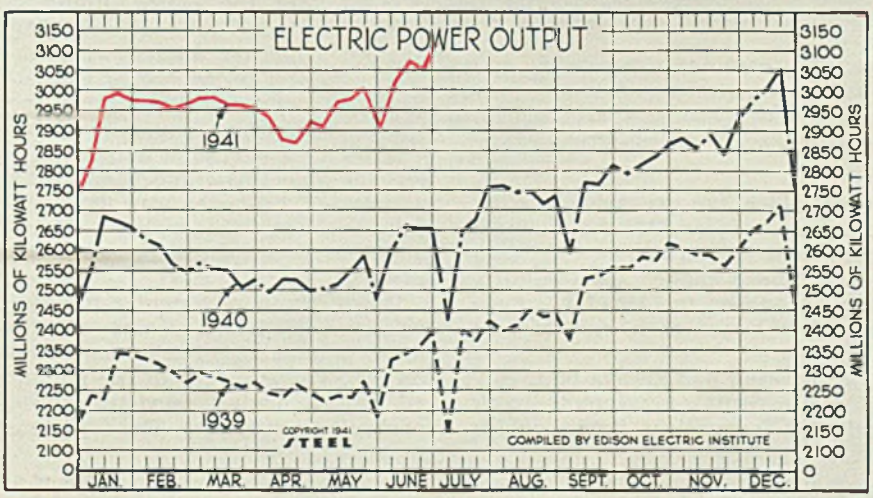
†Preliminary.

Auto Production

(1000 Units)

Week ended	1941	1940	1939	1938
June 28....	127.9	87.6	70.7	40.9
June 21....	133.6	90.1	81.1	40.9
June 14....	134.7	93.6	78.3	41.8
June 7....	133.6	95.6	65.3	40.2
May 31....	106.4	61.3	32.4	27.0
May 24....	133.6	96.8	67.7	45.1
May 17....	127.3	99.0	80.1	46.8
May 10....	132.6	98.5	72.4	47.4
May 3....	130.6	99.3	71.4	53.4
April 26...	108.2	101.4	86.6	50.8
April 19...	99.9	103.7	90.3	60.6
April 12...	99.3	101.9	88.1	62.0
April 5....	116.3	101.7	87.0	61.0
March 29..	124.2	103.4	86.0	57.5
March 22..	123.8	103.4	89.4	56.8
March 15..	131.6	105.7	86.7	57.6
March 8...	125.9	103.6	84.1	57.4





Electric Power Output

†

(Million KWH)

Week ended	1941	1940	1939	1938
June 28.....	3,121	2,660	2,396	2,074
June 21.....	3,056	2,654	2,362	2,082
June 14.....	3,057	2,665	2,341	2,051
June 7.....	3,042	2,599	2,329	2,057
May 31.....	2,924	2,478	2,186	1,937
May 24.....	3,012	2,589	2,278	2,031
May 17.....	2,983	2,550	2,235	2,024
May 10.....	2,975	2,516	2,239	2,019
May 3.....	2,915	2,504	2,225	1,992
April 26.....	2,926	2,499	2,244	1,996
April 19.....	2,874	2,529	2,265	2,010
April 12.....	2,882	2,530	2,235	2,016
April 5.....	2,938	2,494	2,244	2,050

†New series: Includes additional governmental and power generation not previously reported.

CASTING IN RUBBER MOLDS

has important possibilities

New method of casting low melting point alloys permits excellent reproduction of undercuts—something formerly thought impossible to cast. Rubber molds also produce fine detail in most intricate shapes without distortion. Method cuts cost of typical mold from $125 to less than $5, shortening time for making the mold from former period of one to two weeks down to only a few hours. Molds last 600 pours, casting at 550 degrees Fahr., producing up to 150 parts per hour. Casting speed about 25 pours an hour. One operator easily handles two machines. Here are latest recommendations on design of molds and their application

■ CASTING alloys at temperatures up to 600 degrees Fahr. in rubber molds was thought by most rubber experts to be impossible. However, rubber has successfully replaced sand and other mold materials and today is used by scores of plants in the United States and Canada. This new method of casting, while still in its infancy, promises to become important in many lines of manufacture. In the short span of 18 months, it has completely revolutionized the jewelry industry.

The origin of rubber molds for the casting of low temperature alloys is obscure. Several individuals claim to be the originators, but documentary proof is lacking. It is believed the idea came from denistry where rubber was and still is used to produce molds for the casting of wax models; in turn, these are used in casting dentures and bridgework in precious metals.

Solves Many Problems: It is certain that the incentive for the great recent development in rubber molds was provided by the jewelry industry where it is especially applicable for many reasons. In this industry a device or process which will produce the unusual or make possible the fabrication of any item at less cost is quickly accepted, as the success or failure of a jewelry manufacturer depends on his ability to create new motifs or adopt expensive items to low-cost volume production.

Rubber molds offer the opportunity to produce undercut designs, an accomplishment formerly considered impossible. This fact alone has created wide-spread interest. There were, however, other reasons.

Rubber molds can, in many instances, eliminate hand-cut bronze molds which are expensive, costing in some instances $125 for a single mold and requiring one or two weeks time to make. On the other hand, a rubber mold can be made in a few hours at a cost of less than $5.

Sandcasting had always been considered essential for sample work and for expensive items which would not run into volume production. Here, too, rubber molds offer a better way by producing a finer casting which requires far less finishing and only a low-cost semipermanent mold.

Another factor is the demand for large seasonal lines. In recent years this demand has increased until it presents a very serious problem as it is necessary for the manufacturer to build expensive molds during the course of a year for, perhaps, a 100 or more items and then find that only a very small portion of these are accepted by the buying public. This, of course, means a heavy loss on the unused molds. Rubber molds provide the solution to this problem, for with rubber a manufacturer can produce an even greater line at less cost and the amount of loss on rejected items is negligible because of the low unit cost.

By FRANK K. SMITH
Mark Weisberg Laboratories
Providence, R. I.

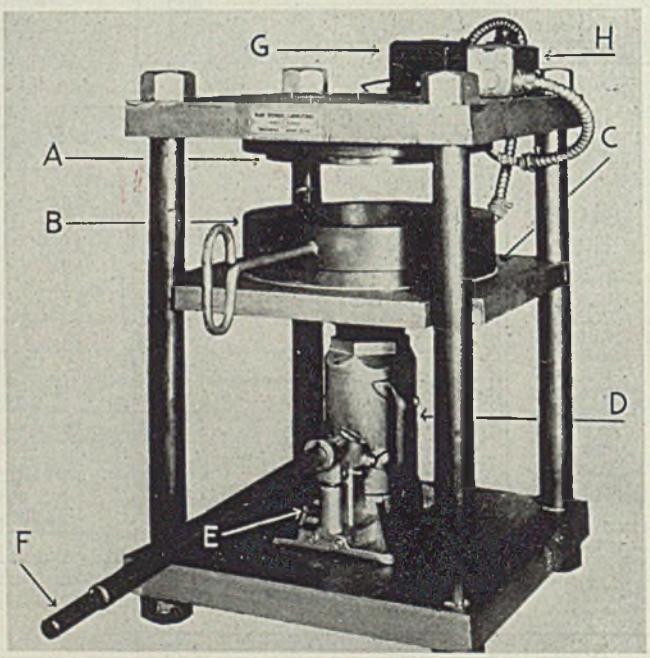


Fig. 1—Electrically heated and automatically controlled vulcanizer for making rubber molds. A and C, plunger plates; B, removable ring; D, hydraulic jack and plunger; G, thermostat controlling heat elements; H, switch

Even First Efforts Successful: While the first rubber molds were crude, they revealed the possibilities of this type of casting, so development was rapid. In early stages, a mold was made by using two steel plates 8 inches long by 6 inches wide by ⅜-inch thick having three bolt holes on each side, and a frame 6 inches long by 4 inches wide and 1 inch high and ¼-inch thick. The procedure consisted of laying the frame on one of the plates, filling it half full of molding plaster diluted with water to the proper consistency, and mounting the desired model in this plaster in a manner that left the model half imbedded in the plaster. The plaster was then permitted to dry thoroughly. Generally heat was applied to hasten the drying.

When dry, a rectangular piece of rubber 6 x 4 inches and slightly more than ½-inch thick was forced into the frame on top of the mounted model, having previously been preheated until soft. The top plate

was then set up and the six bolts tightened by hand. The entire set-up then was placed in an oven over an ordinary single-burner gas plate.

Frame temperature then was raised to 150 degrees Fahr. measuring the temperature by a thermometer inserted through a hole in the side of the oven and resting on the steel plate. Readings were somewhere within 40 degrees of the actual temperature. Upon reaching 150 degrees Fahr., the frame was removed and all bolts were tightened with a socket wrench, the frame returned to the oven and heated for two hours at 290 degrees Fahr.

The mold was then considered cured, so after cooling for 45 minutes, the bolts were loosened, the plaster and rubber removed from the frame, and the plaster dissolved in water, leaving the model imbedded in the cured rubber.

This piece of rubber with the model in it was now placed back in the frame with the model side on the top. An unvulcanized piece of rubber, 6 x 4 x 17/32 inch, preheated until soft, was placed in the frame, the top plate adjusted, the bolts hand-tightened, and the same procedure repeated. Upon cooling the completed mold was forced out of the enclosing frame and split by inserting a dull instrument between the two parts. The model was removed during this operation, and the mold was then ready for gating.

Gating: Gates were cut from the 4-inch end of the bottom or back side of the mold to the impression and were graduated from a large opening at the end to a small entry gate at the impression. The appearance of the gates on one of these molds could be compared with a tree—the trunk being the supply channel and the limbs the feed gates.

Cast Centrifugally: After gating, the mold was ready for casting which was done in a centrifugal dental casting machine of the spring type which consisted of a horizontal arm mounted on a shaft rotated by a spring. A release pin held the arm under tension until released. The arm was stepped down 0.5-inch, 6 inches from the end, and was 4 inches wide. Directly before the stepdown was a cup-like depression with a channel cut through the step.

In casting, the joined mold was placed on the flat end of the arm, with the channel opening of the mold forced against the channel cut through the step. A flat steel plate, 6 x 4 inches, was clamped on top of the mold. The machine was wound up by hand and the release pin raised to hold the arm. A ladle of molten alloy, consisting of tin and antimony, was poured into the cup-like depression, the pin released and the arm permitted to spin. This set up enough centrifugal force to cause the metal to flow from the depression into the mold to form a casting.

It is apparent this early method was cumbersome and slow. Neither the best types of rubber compounds nor the most suitable alloys were known. However, low quality camel-back retreading stock was the most common rubber compound used.

The life of these early molds was short, and it was not unusual for a mold to burn out after 10 or 12 pours. It was an exceptional case when a mold could be poured 40 to 50 times. It took practically a full day to make a mold which, in most instances, lasted only an hour or two in actual production. Yet the use of this type of casting showed its possibilities, and its evolution was rapid.

While centrifugal force seemed best for casting in rubber, both air and gravity were studied and finally eliminated. The main objective then became the development of a method that was simpler, a procedure whereby more than one casting could be made in a single mold.

Equipment Developed Rapidly: After trying rectangular molds with several cavities a circular mold and a revolving table was adopted. The metal was poured into the center of the mold while the mold was revolving at a high speed. Making and vulcanizing the mold was improved by placing the models directly between the two disks of rubber and vulcanizing the entire mold in one operation.

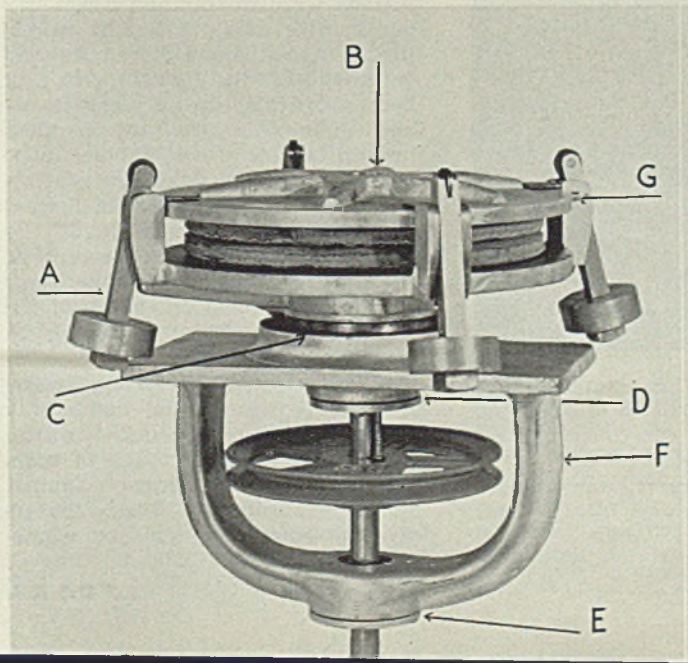
While it still took 6 or 7 hours to make a mold, multiple castings were produced and the process became so practical it was quickly adopted. As the demand for equipment increased, the mechanical features were developed and improved until the process of today resembles the equipment of just 18 months ago only in theory.

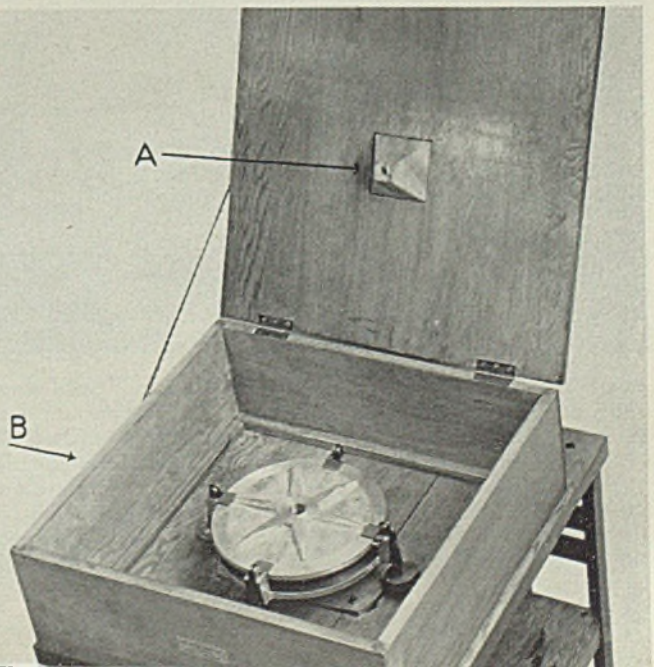
Now Standardized: Casting in rubber today is standardized to a point where anyone with the proper equipment can produce high quality castings regardless of previous experience. The first consideration is the type of rubber. While many compounds are available, few are suited for this work. No one compound is adaptable for all types of casting, but it is possible to de-

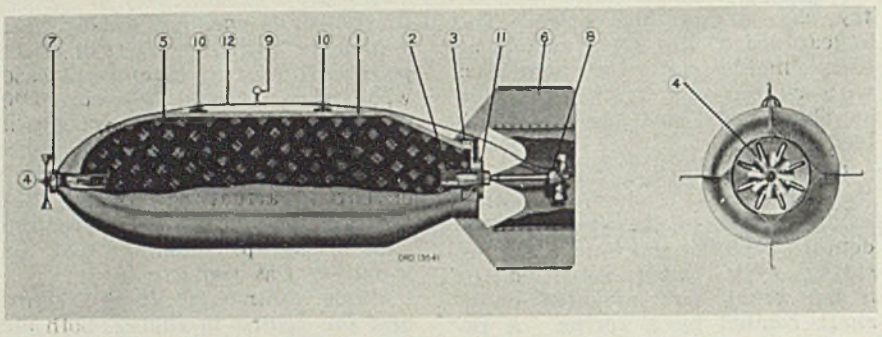
(*Please turn to Page* 78)

Fig. 2—Inner part of a modern centrifugal casting machine. A, one of four swing arms exerting pressure on top plate; B, hole through which molten metal is poured in casting; C, 4-inch thrust bearing on which assembly rotates; D and E, 2-inch ball bearings mounting shaft; F, alloy steel supporting bracket. (View at left)

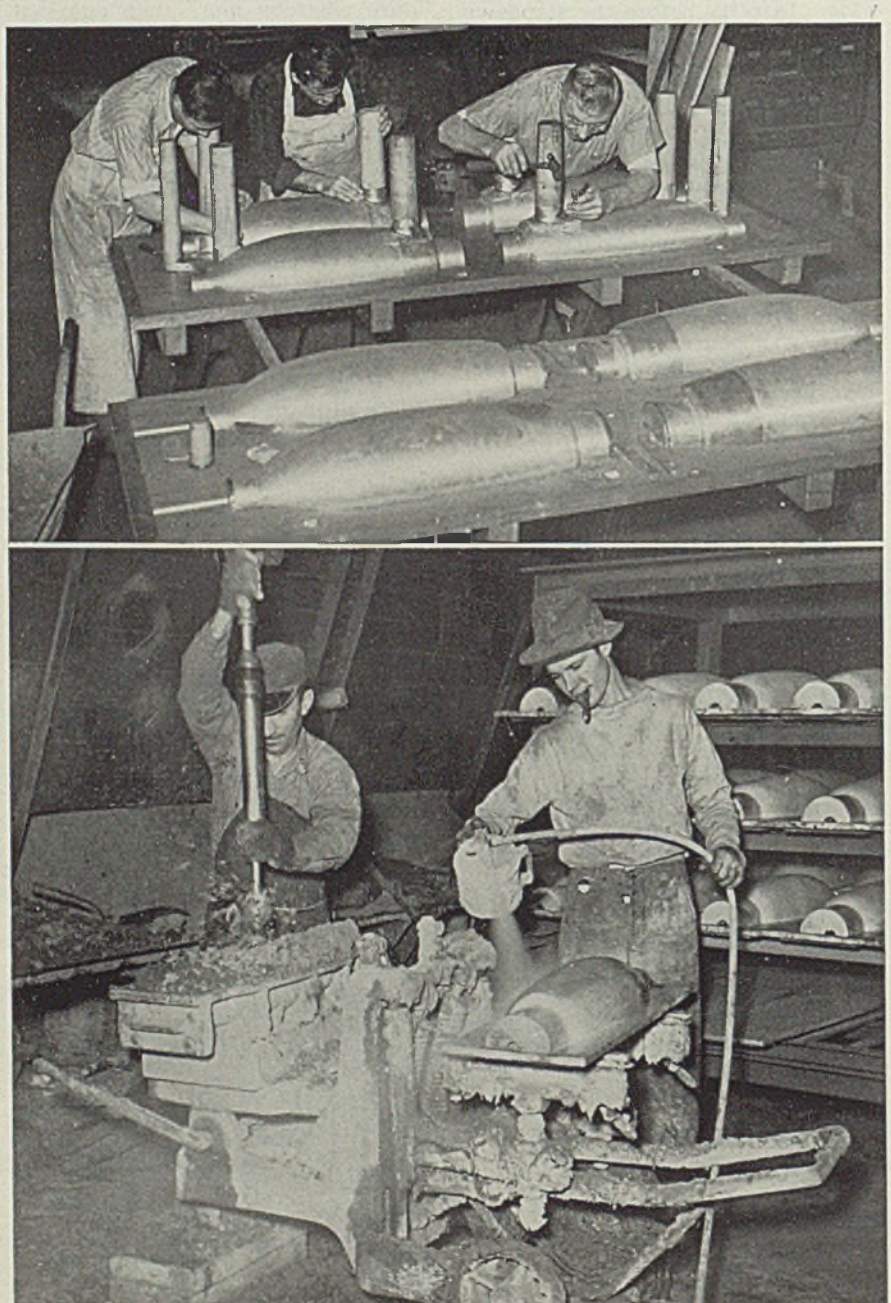
Fig. 3—Complete unit shown in Fig. 2 mounted in cabinet. A is pouring spout; B, frame protecting operator. Note view at right







Ammunition chart for cylindrical-type demolition bombs, 100 to 2000-pound: Key: 1—body; 2—booster; 3—cap, rear; 4—clip, safety; 5—filler, explosive; 6—fin; 7—fuze, nose 8—fuze, tail; 9—loop, swivel; 10—lug, suspension; 11—nut, fin lock; 12—wire, arming



Bomb casing patterns, upper view, matched four on a board, are inspected and repaired at end of each shift. All these illustrations show sequence of operations in making British cast steel bomb cases at Scullin Steel Co., St. Louis, and are shown here through courtesy of Office of Emergency Management

Dry half of bottom half of core, lower view, is made on core rollover machine. Coremaker is ramming core while helper is spraying core previously made. Completed core is placed in rack in background

THE

By ARTHUR F. MACCONOCHIE

Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.

IT IS somewhat depressing to realize how early in the history of aviation the potentiality of the airplane as a bomb carrier was recognized. Aviation meets were once enlivened by the dropping of oranges and bags of flour upon prepared ground targets. It was not very long, however, before explosive bombs were dropped in good earnest, the Italians having the distinction of first using them in their campaign in Tripoli in 1912. These bombs were relatively small and could be classed among the "fragmentation" type since they were designed for use against personnel on the ground.

As the size and weight-lifting capacity of aircraft increased, there was an increasing tendency toward the use of the "demolition" type of bomb, or a bomb whose principal function is the destruction of "materiel" by its explosive force rather than the production of injury by flying fragments of the steel case. This type has a relatively thin-walled case and contains the maximum amount of high explosive (generally TNT), the ratio of explosive to the total weight of the bomb being in excess of 50 per cent. While in 1914-18 bombs weighing around 300 pounds were in common use, today our service employs bombs weighing 2000 pounds and more. As may be imagined, the "blast" effect of bombs of this size is very heavy and their effect on any luckless human targets which happen to be within range far from pretty. This blast effect, however, has a limited range, the killing effect of flying fragments being much greater at some little distance than the force of the explosion itself.

In giving consideration to the design of the bomb, the provision of maximum explosive capacity in the case of the demolition bomb is a prime necessity, the enclosing case being merely thick enough to withstand fracture on impact against such "unprotected" targets as streets, houses, roads and earth-

AIRPLANE BOMB

Read: Considerations governing bomb design; fragmentation as against "blast" types; manufacturing methods; special test setups; standard types of bombs

See the complete sequence of illustrations showing how Scullin Steel Co., St. Louis, makes cast steel bomb cases for the British purchasing commission

This Is Number 21 in a Series on Ordnance and Its Production, Prepared for STEEL *by Professor Macconochie*

works. A "protected" target would be the deck of a heavily armored ship.

Then with regard to the "form" of the case, manufacturing considerations being disregarded for the moment, a streamlined profile would appear necessary. We are at much greater liberty in this respect than in the case of a shell since the bomb is not intended to be projected out of a gun, nor is it designed to preserve its orientation in flight by virtue of its rotation. We depend on the tail fins for that. As a matter of fact, while the resistance of the atmosphere does vary with the particular shape employed, the trajectory of the bomb when dropped from a moving plane is not much affected. The tendency, especially in bombs of the largest size, is toward the use of cylindrical bodies with heads whose profiles are modified ellipses, on account of the greater ease of loading and the desirability of utilizing the facilities of tube manufacturing plants.

The "fragmentation" bomb, on the other hand, has a relatively heavy case containing just enough explosive to cause fracture into the desired number of pieces and to project those fragments with sufficient velocity to disable personnel. An effective fragment for this purpose weighs about 0.2 ounce and has sufficient kinetic energy to penetrate a ¾-inch spruce board. This means that it must move about 550 feet per second and be possessed of some 60 foot-pounds of energy. The percentage of explosive (TNT, amatol, etc.) in the fragmentation bomb is about 15 per cent of the total weight. This total weight, by the way, is much less than that of the demolition bomb and does not exceed 30 pounds in our service. This relatively small weight enables the plane to distribute a relatively large number of bombs over a given area and so to increase the effective radius of the killing fragments. Planes dropping fragmentation bombs should not fly below 800 feet if they are to avoid injury from their own missiles.

Among "bomb type" ammunition might be included submarine mines, depth charges, torpedo warheads and land or wrecking mines, all loaded with relatively large bursting charges and depending for their several effects rather on the destructive effect of the charge than on the penetrative power of the container. Then there are chemical bombs containing mustard gas, tear gas, or such smoke producers as white phosphorus, titanium tetrachloride and the like, depending on whether we desire physiological effects or a screen from attack. The explosive commonly employed in demolition bombs is TNT, but amatol or other high explosive is sometimes used.

Bomb cases may either be cast or forged. Among the forged types we may make the head and body integral and screw in the base, or the heads and bodies may be made separately and welded together. Again in the case of streamlined types, the body may be made in several segments and welded circumferentially—the use of longitudinal joints being generally undesirable from the standpoint of strength.

The British bomb shown in the accompanying series of illustrations of procedures at Scullin Steel Co. is of cast steel and is intended as a "general purpose" missile, producing its effects in part by the force of the blast and also maiming and killing with the flying fragments of the case. Another plan followed by our service in the design of our small fragmentation bombs is to thread a number of steel rings over a relatively thin tube and hold the assembly together by cast or forged front and rear sections screwed to the inner tube. A closely wound steel coil may be substituted for the separate steel rings.

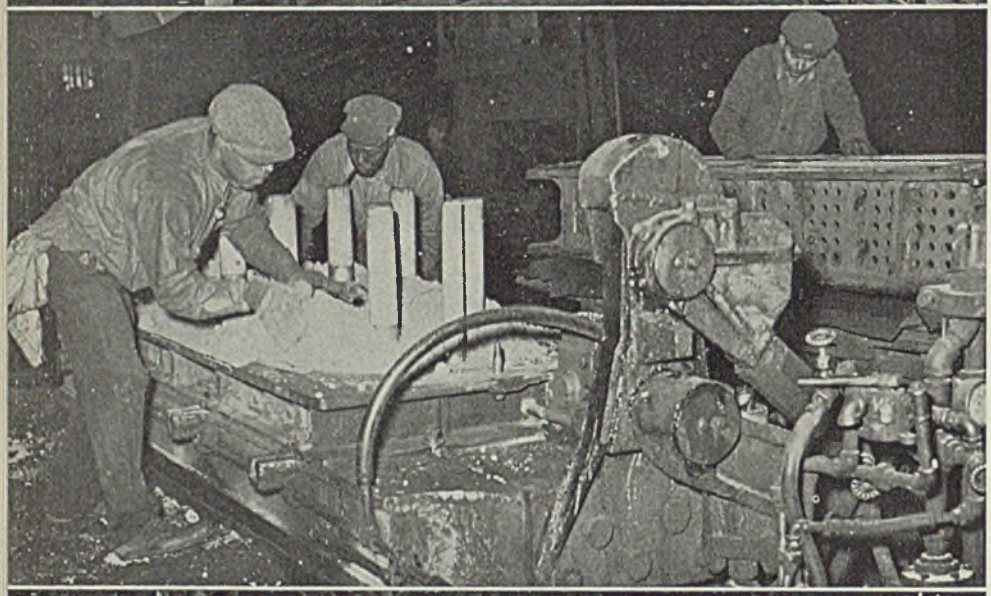
The tests to which bombs are subjected may be of some interest. First in importance perhaps is the efficacy test. This has two aspects, the blast effect as well as the nature and distribution of the fragments resulting from the explosion. For the first purpose, two boards clamping a sheet of tested paper between them are employed. These boards have each a series of holes of varying size which register with the exactly similar series in the other board. The effect of the blast is to blow through the paper membrane stretched across the holes—the heavier the blast the more of the smaller holes suffering. The general arrangement is to start with hole ¼-inch in diameter and work upward, the next size having twice the area of the one below it and so on until we arrive at holes as large as 5.65 inches in diameter.

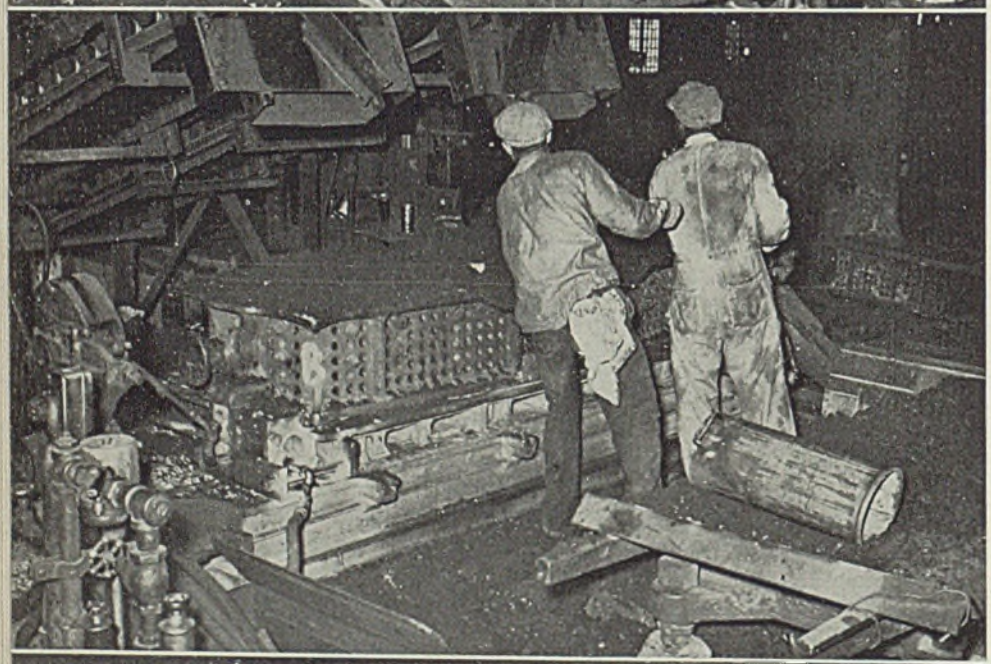
These "blast meters" are set up at standard distances from the bomb which is detonated in a vertical position on top of a slab of armor plate mounted on a concrete foundation. While the meter gives no direct measure of the pressure produced by the explosion, the effects of different bombs may be estimated on a comparative basis.

The estimation of the destructive effects of the flying fragments of the case of a fragmentation bomb is made by setting up a series of stout wooden frames mounting 2-inch thick oak at standard distances and heights above the ground. After the explosion these "panels" are examined and a count is made of the perforations in each panel section. The sizes of the holes are also measured and photographs taken.

The "pit" test is made by burying the bomb in sifted sand and exploding it with an electric squib. The fragments are subsequently recovered by sifting the sand through five sizes of screens varying from an 0.312-inch opening up to 0.838-inch. The number and weight of the fragments retained on each screen are recorded and photographs again taken for purposes of record.

The test for strength of the bomb case is made at such an elevation





that the bomb will penetrate a slab of concrete one foot thick, the elevation normally found necessary being from 2000 to 3000 feet, depending upon the weight of the bomb. The reason for this requirement, of course, is to offer a guarantee that when fitted with a fuse having a delay action, the bomb will penetrate the target before breaking up. In this respect, the bomb resembles the armor-piercing shell inasmuch as both have to resist the destructive effects of the target before detonation. The bomb, however, is not expected, nor is it normally designed, to pierce armor plate. Against armor plate, reliance is placed on the crushing effect of the explosion, which in this case is instantaneous.

Other routine tests include the suitability and efficiency of the suspension arrangements, the reliability of the fuses, etc. The reason for fitting two fuses to demolition bombs is to give a very positive guarantee of action. The carrying of a load of bombs within striking distance of an objective is usually a dangerous and oft-times an expensive business. Hence the insurance provided against failure of the bomb to explode by the provision of an extra fuze is well worth the small extra expense.

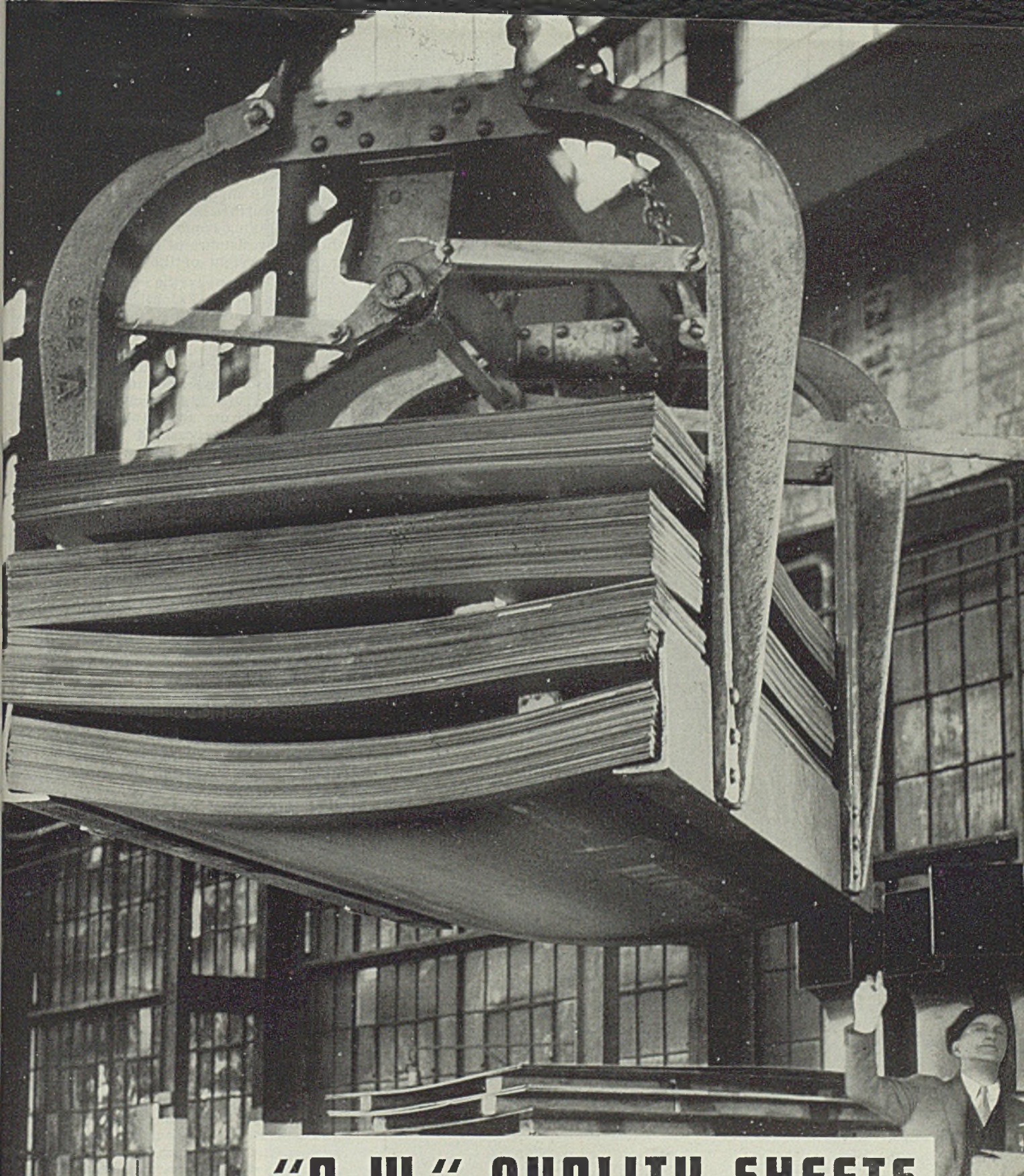
Since we have heard much about airplane bomb sights, it may be of interest to offer some indication of the nature of the problem which the bomb sight has to assist in solving. In a vacuum, of course, the bomb would describe a perfect parabola whose exact form could be readily determined when the magnitude and direction of the initial velocity of the bomb were given and the elevation from which it was dropped was known. But just as in

Top, general view of department making bomb-casting cores: After loading on racks, cores are dried in oven and entire rack taken to molding floor by power lift truck. Cores are not removed from rack until placed in mold

Bomb casings, view second from top, are made in Jolt-Rollover machines. New sand is placed against face of patterns to insure smooth and clean surfaces

Back-up or heap sand is fed into the molds by conveyor feeders, note view second from bottom, then leveled off before the Jolter starts operation. Number of jolts is kept constant to obtain uniform results

This natural-gas torch, bottom, is used in skin drying the molds. This operation prevents moisture from contacting the molten metal during pouring. Small spots shown in mold are vent holes



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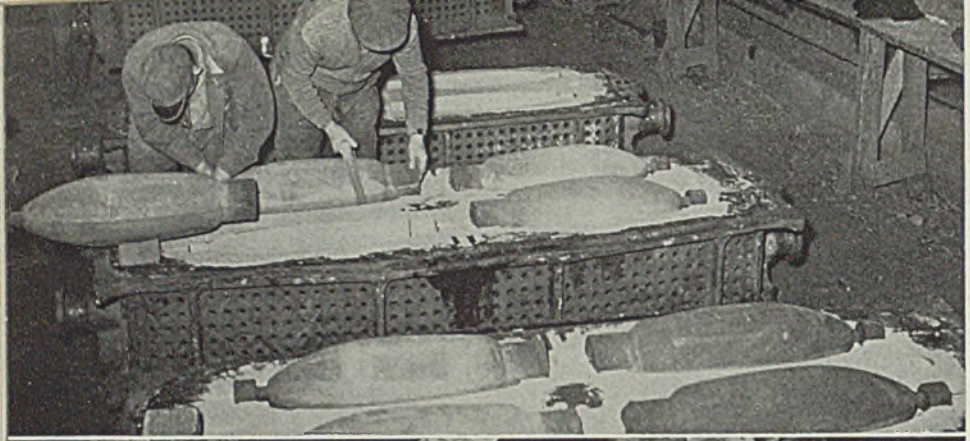
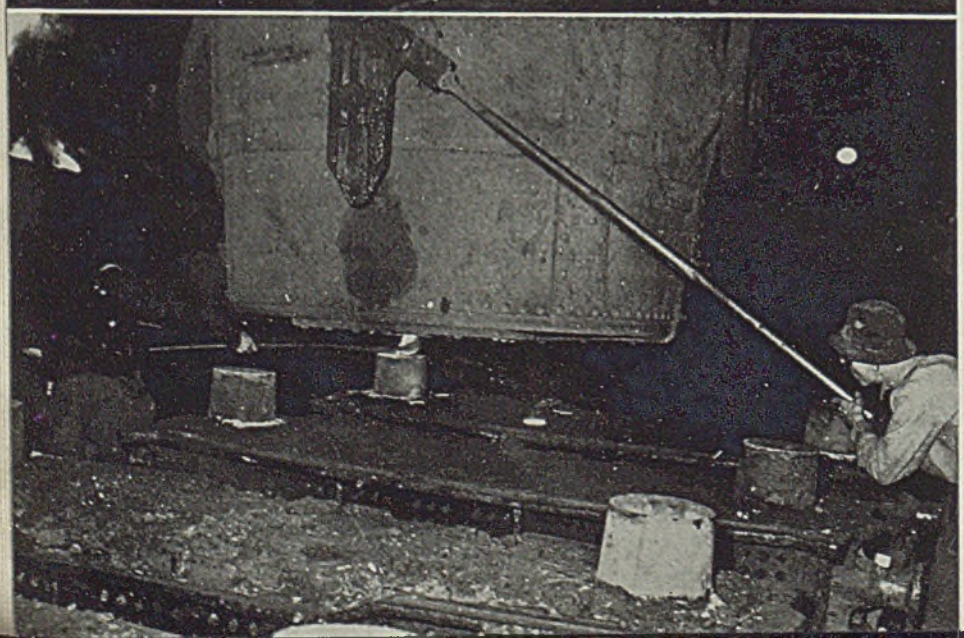




the case of a shell, we are not dealing with a vacuum but with a space filled with the atmosphere whose presence modifies the trajectory by resistance to flight and finally prevents any further increase in velocity of the falling bomb at that point where the resistance of the air just equals the weight of the bomb.

This is known as the "terminal velocity," a phrase which has a different connotation from the same expression used in association with the flight of a shell. Depending principally on the weight of the bomb, but also to some extent on its ballistic characteristics, this terminal velocity varies from around 725 feet per second in the case of the 50-pound bomb to 1200 feet per second for the 2000-pound units. Thus there is also a correspondence between these terminal velocities and the range, striking velocity, angle of fall and time of flight for any given altitude and airplane speed, an association which is obviously capable of mechanical analysis when the variables are supplied by the bombardier.

The estimation of the various ballistic characteristics of airplane bombs is made by two cameras—one, known as the vertical camera obscura and the other the oblique camera obscura—which project the image of the plane on their respective plotting boards. These cameras are mounted at the opposite ends of a base line 12,000 feet long and are connected by telephone line in order that a clock may give signals at second intervals simultaneously. The plotter, using a special pencil, marks the position of the plane on

Top, two men set cores. One man holds core by nose while other uses a strap around the base end to steady core. Only perfect cores are used

After being placed in mold, cores are inspected for height with gage on right, for length using gage on left. Metal thickness gages also are used. Note view second from top

Completed molds are given special handling to prevent shifting in closing and in placing for pouring. Flasks have case-hardened bushing in each end, inspected daily for wear. Here a heat, second photo from bottom, is being tapped from one of the 30-ton furnaces

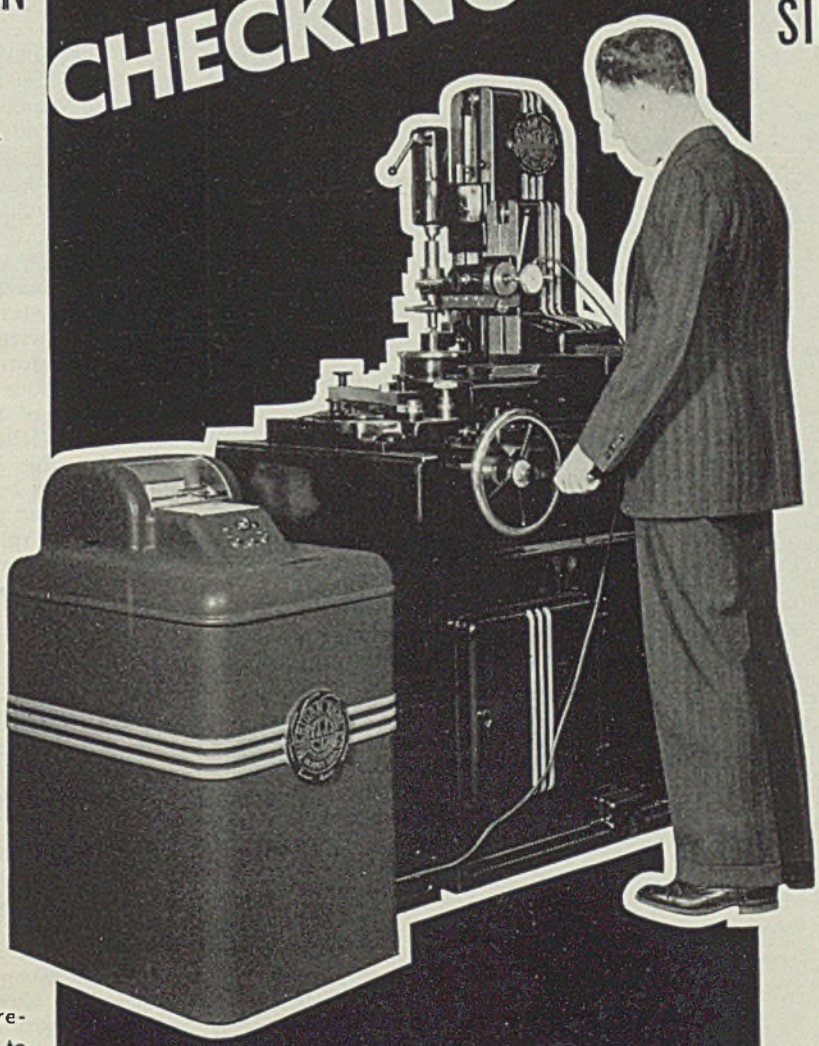
Bottom, pouring bomb casings: At left, a spoon test is being taken from the ladle, will be sent to laboratory as final step in watching action of heat, closely controlled from start to finish. Temperature tests also are taken. Pouring is critical since strained castings will result if poured too hard. They will then exceed allowable weights, also

MICHIGAN

GEAR CHECKING RECORDER

Announcing

SINE-LINE



At left, the new recorder connected to a Michigan Sine-Line involute checker.

Operating on a new electrical principle, this new recorder converts an indicating type gear or hob involute or lead checker into a recording type. No mechanical connections necessary. Can be used with any Michigan SINE-LINE checker and many other types. Rubber-tired for portability. Operates on standard 110 volt A. C.

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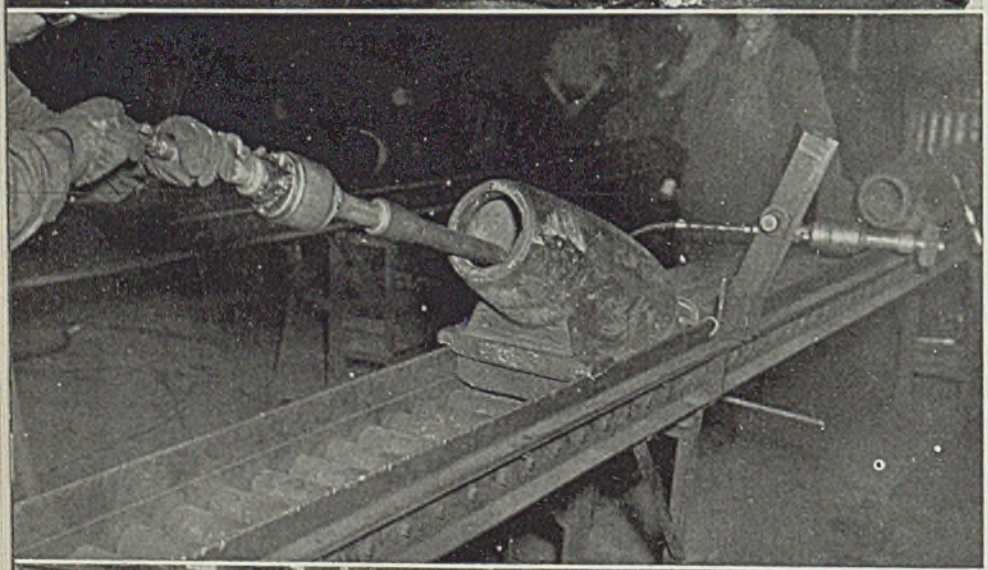
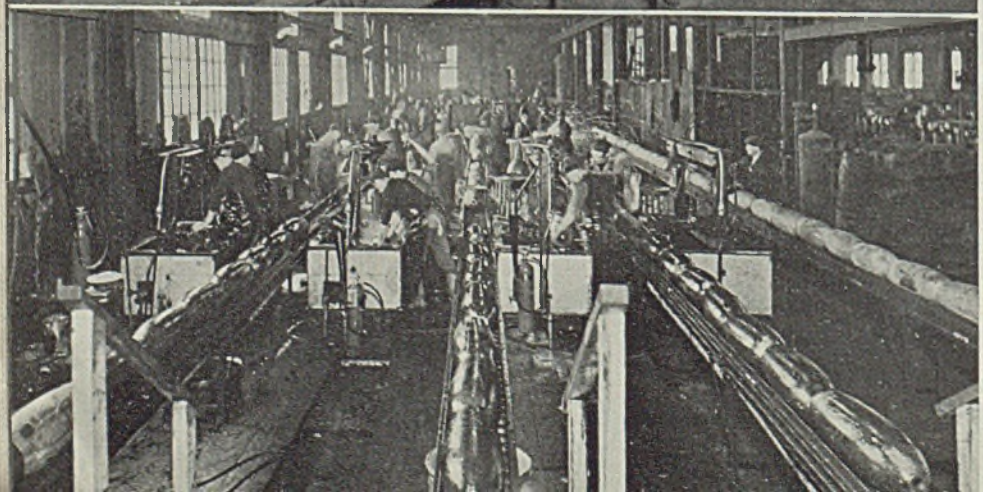




the board, a chronograph meanwhile recording the exact time this was done. At the instant the bomb is released a radio signal is employed to mark the event on the chronograph; and thus means are at hand for calculating the exact position of the plane at the instant the bomb was released, together with its direction and speed. The point at which the bomb struck the ground being now determined by azimuth observations (i.e. angular measurements in the horizontal plane) from two towers 2800 feet apart, the horizontal range of the bomb may be found; and so also with the aid of the chronograph, the time of flight. The data obtained from a number of tests with each type and mark of bomb give information on the ballistic accuracy of each.

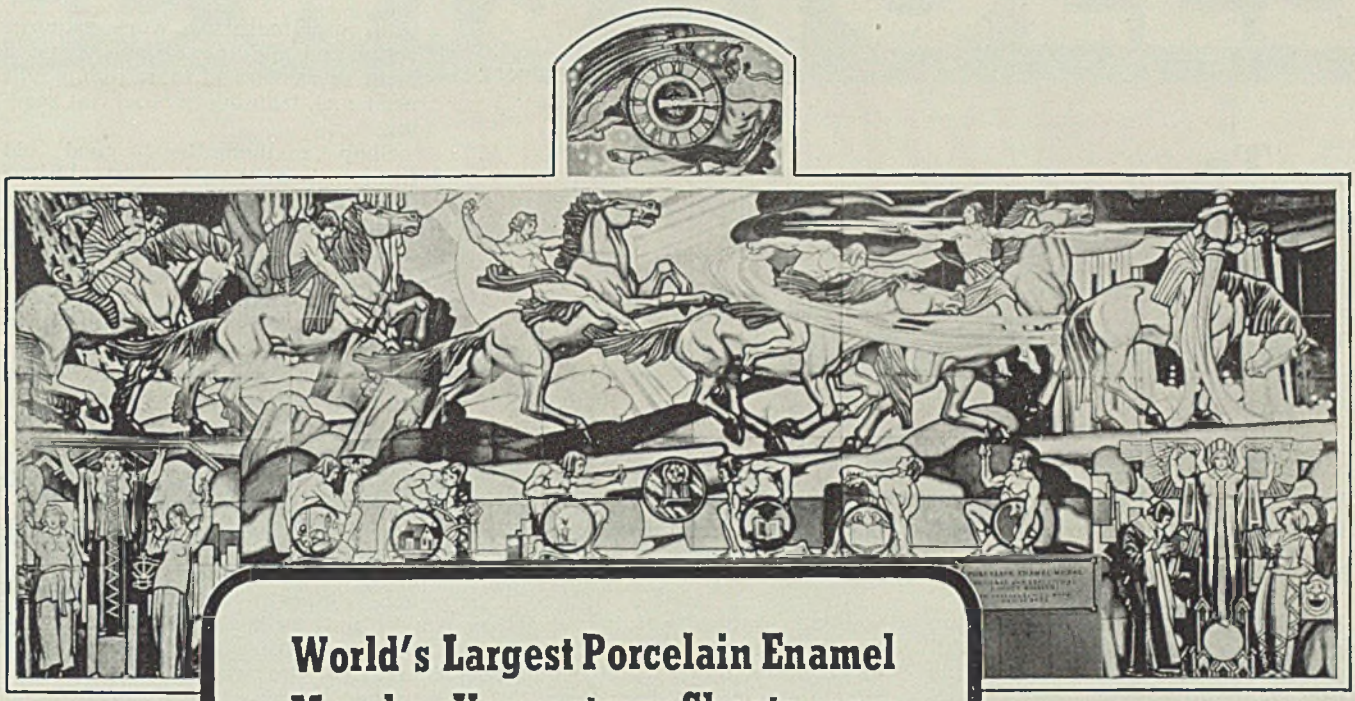
An accompanying illustration shows a standard type of bomb. The arming wire and other features already referred to are clearly seen. The arming wire serves to prevent rotation of the vane on the fuze or fuzes as the case may be, and so keeps the bomb safe until withdrawn by being held in the arming mechanism in the bomb rack as the bomb is released. When it is desired to drop the bomb safe, the arming wire is allowed to fall with the bomb.

After casings have been removed from mold, first operation on the roughing floor, top photo, is to cut off gates and risers with torches using natural gas and oxygen

Next, everything is removed from inside of the casing, including core rods, cores and any fins which may appear. Then casings are suspended on hooks while a chain conveyor carries them through a continuous sand blast where they are blown in four positions; two blasting nozzles are directed at inside surfaces, other two at outside. Note view second from top

Bomb casings then enter finishing department on roller conveyors where they are inspected, excess metal chipped off and surfaces ground smooth. Here operator, third view from top, is using long portable grinder on inside surfaces which must be smooth and free from all imperfections. Note gate on conveyor

Bomb casings are tested at air pressure of 50 pounds per square inch while under water. This is done to check soundness of the casings—a most important requirement. In this general view, bottom, of finishing conveyor lines, these testing tanks are in central foreground. After passing all tests and inspections, casings are dipped in oil, then are ready for transit to machine shop



World's Largest Porcelain Enamel Mural on Youngstown Sheets, now Installed in Cleveland Terminal Concourse

The visitor to Cleveland's Terminal Building now sees this gorgeously colored mural, executed by the Ferro Enamel Corporation in porcelain enamel on Youngstown Enameling Sheets for the New York World's Fair.

Flatness - a very necessary quality in any application of this character is an inherent quality of Youngstown Enameling Sheets. In this vast expanse of porcelain, executed in rich reds, blues and shades of yellow, ochre and orange, the same virtues are pre-eminent that make these sheets so suitable for the manufacture of ranges, refrigerators, washers, cabinets, pots and pans.

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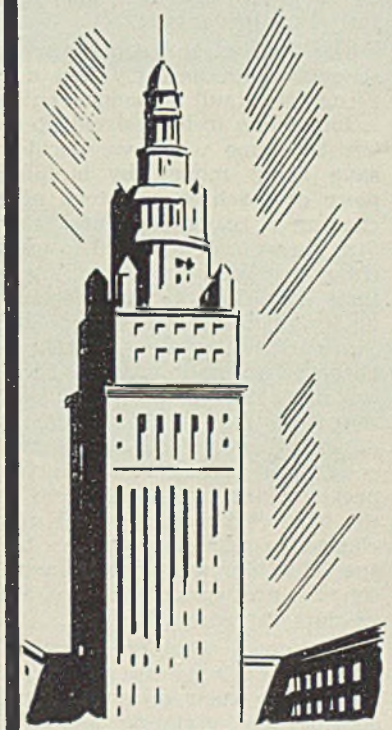


Largest piece ever executed in porcelain enamel, this giant mural is 72 x 32 ft., approximately the size of a tennis court. It depicts "Man's Struggle Against the Elements" - snow, frost, sun, wind, lightning and floods. Several new panels have been added to fit the mural to the new location in the Cleveland Terminal Concourse.

How To Get WELDING OPERATORS

By HAROLD LAWRENCE
Welding Engineer

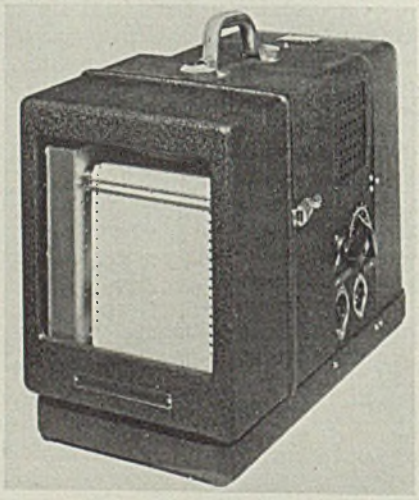
In the second of this series on training welders, Mr. Lawrence tells how to set up a welder training school in your own plant for quickly and efficiently training welders to do the particular types of welding operations found in your plant

■ LAST week the private welding school came in for a detailed discussion because it represents the best source of new welders. To supplement this source, industry can and is training the operators needed for the present defense effort. But not without cost.

The parallel between the welding school within industry and a well recognized fault of some engineers is too strong to be resisted. Remember the time when we decided to save some money by building a piece of machinery instead of purchasing a ready-made article? At first we were determined to use full shop overhead in computing the final cost. But an unexpected difficulty in design showed up during fabrication. Another mistake was observed in fit-up. And a big bull was made during construction. When the final cost figures were computed, all concerned agreed to forget the impractical idea of including proper plant overhead. Even then, the bare cost exceeded that of purchased equipment made by a specialist. Similarly, private welding schools are specialists in training welders at reasonable cost.

But good welding schools are filled to capacity so many plants must train their own welders. But considerable planning should precede the actual establishment of a training school. The first problem is the type of training desired. Does the activity of the plant warrant a comprehensive course in welding? Or should an apprentice training program be aimed at teaching the bare essentials of a specific job? Each plan has a definite place, depending largely upon the plant requirements, in turn depending on the product itself. Obviously, the training need be no more comprehensive than the types of jobs in the shop.

Five major divisions should be considered in connection with the welding course—welding practice, welding theory, blueprint reading, shop mathematics, and length of time to complete the course. Of course, all the following suggestions should be regarded in the light of the requirements of your own work using only those applicable or suitable in your case. Likewise, the amount of welding practice devoted to metallic arc welding, oxyacetylene welding and oxygen cutting should bear a close relation to the proportion of each activity in your own shop.



The Arconograph, an instrument recording arc voltage, proves valuable aid not only in checking aptitude of new students but also in checking on their progress

Not too much emphasis need be given to welding theory. But enough attention to the reasons for doing things in particular ways is important. A few explanations on what takes place during welding and cutting, keeping the exercises quite elementary, should suffice.

Often a welder is asked to build an assembly from a blueprint. Certain manufacturing work requires setup and welding directly from a print so welders in these plants will need such training in blueprint reading.

Shop mathematics — good old fashioned arithmetic with liberal doses of fractions—will usually be found necessary in this same class of plants as most mathematics is associated with calculations occasioned by blueprints.

The length of time required to train a welder depends on what is meant by the term "welder." No one expects a finished operator at the end of a brief training period. But it is entirely possible to train a good welder for a particular class of work in a short period of time.

Eighty hours is a minimum. This appears quite short and is recommended for only the simplest training. Plants that can use operators with only 80 hours of training must be those with extremely easy welding jobs. Only repetitive work of a limited degree of difficulty, and not much more, can be expected.

Need Shorter Training Period

Two hundred hours is sufficient for a surprisingly thorough training course. Since bare fundamentals take the same time in either a long or a short course, the extra time in the 200-hour program seems to work wonders by giving the student more actual working experience. Confidence is gained in the early stages, leaving the student free to devote his entire attention to mastering the fine points. This program may also encompass theory of welding and blueprint reading along with welding practice. Ten hours a week for five months prescribed at the rate of two hours a day will not interfere with productive ability on the student's regular job. And more intensive training may cause him to go stale.

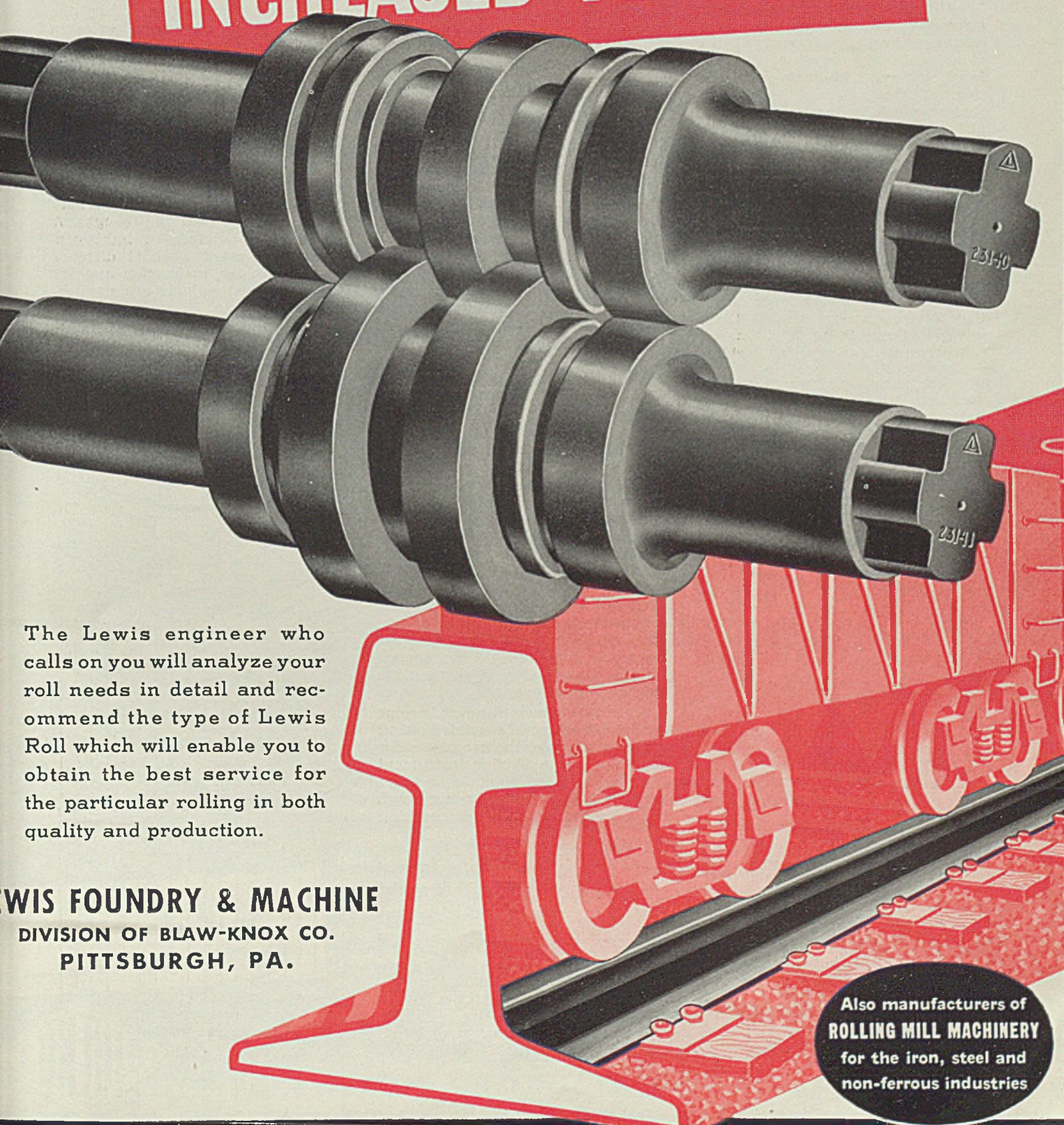
Such a program takes about three years to establish. Details of this long-term program will be reserved for the article on apprentice training within industry, the third and concluding article in this series. Our present need, however, is too great to consider such a long haul. Elementary training schedules of shorter duration will provide more welders right now—and that's what we want now.

Instruction in welding and cutting practice, the most important phase in the course, calls for the utmost care in the selection of an instructor. Most welders do not have the ability to teach. Therefore sacrifice some welding ability if necessary to obtain a good teacher. Remember many coaches train athletes who establish far greater records than the coaches themselves ever made.

Welding theory may be handled by the plant welding engineer.

Lewis ROLLS

BETTER FINISH INCREASED TONNAGE



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Similarly, a draftsman or engineer can supervise the blueprint reading and shop mathematics courses, using a simple textbook for each with most of the lessons being worked at home.

How are the men to be chosen? This is a perplexing problem. Outside men can be hired or men trained from existing personnel. High school graduates are to be preferred because unless a man has completed high school there is a distinct possibility that he lacks the stick-to-itiveness that a welder needs.

All applicants must be in good physical condition. Welding is a healthful occupation, but it is a strenuous one, too. Operators must assume awkward positions for hours at a time while maintaining a fine touch for arc and torch manipulation.

Mechanical inclination is helpful although not a hard and fast prerequisite. Yet welding aptitude is a definite requirement. Some men, even if they lived forever would never be able to weld for they lack that particular co-ordination of mind and muscles necessary for welding.

Welding aptitude is difficult to judge. To the casual observer men may appear hopeless even while they are beginning to find themselves in the welding field. One excellent means for studying welding aptitude is with the Arconograph. It provides a chart of arc voltage which affords an easily read record. Comparing successive records shows the progress made as well original aptitude.

Two series of Arconograph records are presented here. A is that of a normal student, the four charts being made at eighth, seventeenth, twenty-eighth and forty-first lessons. Series B is that of a student who lacks aptitude. Note the tremendous variations even in the twentieth lesson record. There is little comparison between the two series even though the B series was made at tenth, twentieth, thirty-third and forty-second lessons to give the poorer student the benefit of additional practice.

Device Weeds Out Poor Welders

The A charts show that after the eighth exercise, the student was able to hold a fairly steady arc and hold it largely in the correct range. However he had to make a few starts and stops at this time. Succeeding charts show a consistent improvement. There are no more starts and stops, and the swings out of the correct range become narrower. In the forty-first lesson, it took him a few seconds to get into stride, but after that he was holding very well. At this point, the chart shows him to have enough welding skill to justify putting this man to work on routine factory welding operations.

The record of student B is quite different. At the end of ten lessons he still had great difficulty getting his arc started and in general was holding much too long an arc. At the end of another ten lessons he was not much better, although his too long arc had been replaced by one too short. In the two succeeding charts it is obvious that he has learned to hold an arc for a considerably longer time, but his arc length is far from uniform. In fact the last record would indicate that no more than half of his deposit would be acceptable on any but the crudest sort of work.

Since men who will never become good welders must be weeded out as early as possible, the use of the Arconograph or a similar instrument may be a wise decision. Too, a chart record, being perfectly unbiased, has a distinct advantage in checking both aptitude and progress.

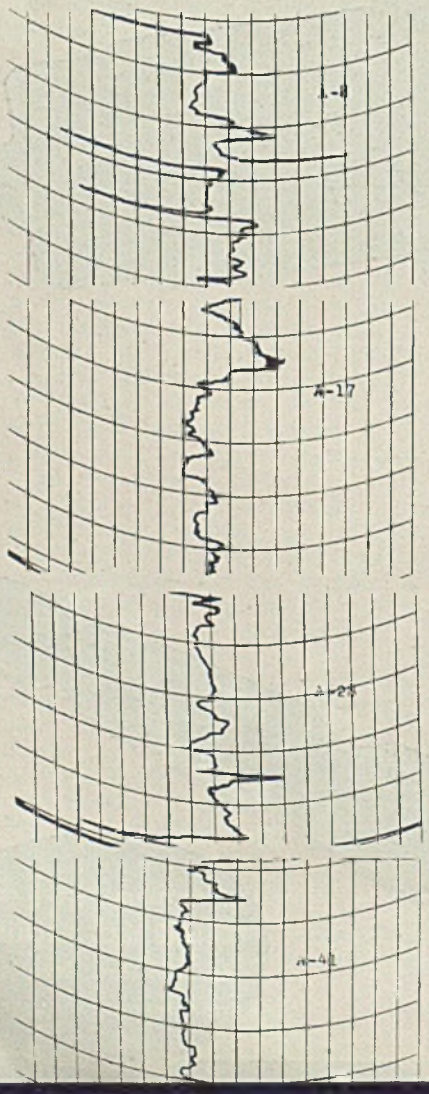
Completing the discussion on the selection of students, there is a choice between men brought in from the outside and those employed on minor jobs in the plant. Taking men from the outside eliminates all charges of favoritism. Men are hired for simple jobs with the understanding that they are to be trained for welding positions in the company welding school.

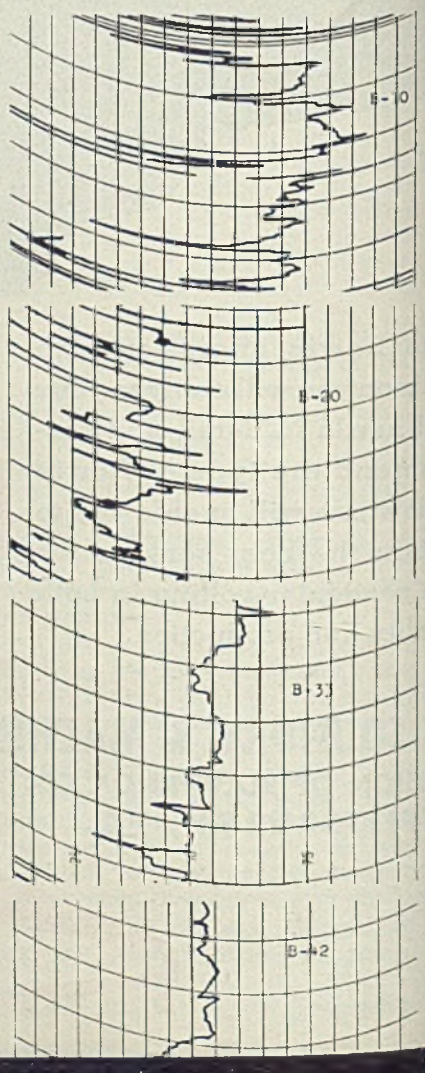
On the other hand, there is good reason for training existing employes. As most welding work occupies the higher wage levels, an assignment to welding may be construed as a promotion. Thus the welding school may serve an extra function as a reward for good work in lower job classifications. However, extreme precaution is needed to avoid discrimination. It is a management function to be sure that all men elected for welder training are chosen on merit and merit alone.

With plants operating 24 hours a day using all existing equipment, the location of the industrial school provides much food for thought. A small steel building of light construction located a short distance away from the main shop appears to be the most satisfactory arrangement.

Equipment is scarce, too, yet additional equipment must be pur-

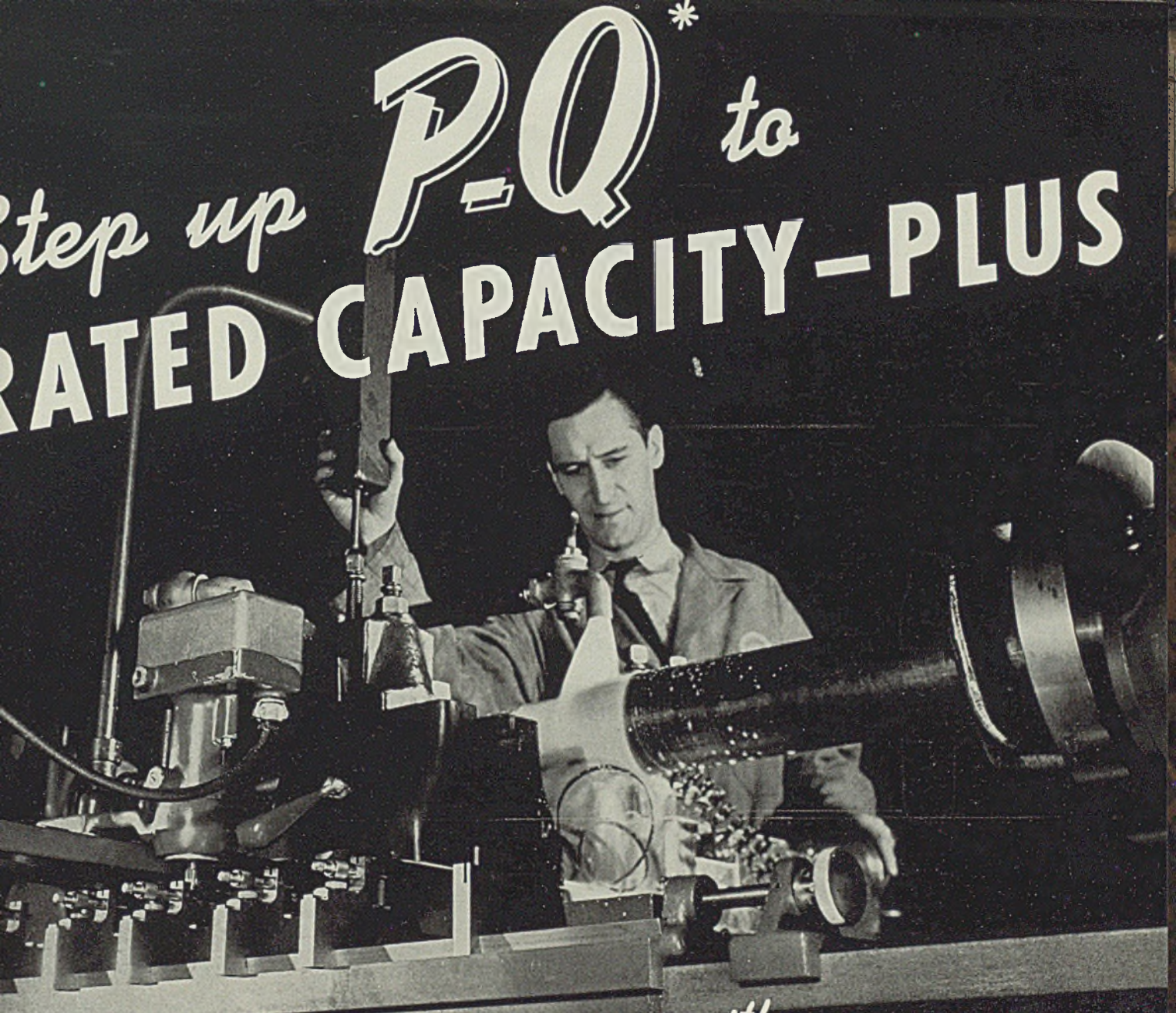
(*Please turn to Page* 102)





These two series of charts represent progress of two different students. Those in the A series at left represent normal progress, were taken after 8th, 17th, 28th and 41st lessons. This man was holding a fairly steady arc even in the first test, while the student in B series at right has many starts and stops even after 20th lesson, evidence that he has little aptitude and will never make a really good welder

Step up P-Q* to RATED CAPACITY-PLUS



Rough turning 5" diameter shaft on a Monarch 20" model M engine lathe. Courtesy of Monarch Machine Tool Co.

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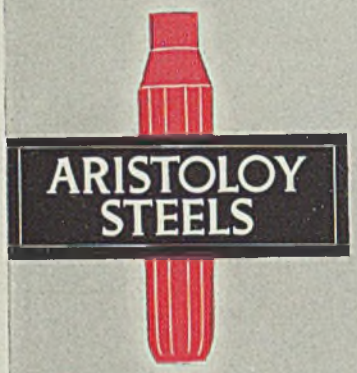
TOOL AND ELECTRIC FURNACE ALLOY STEELS



CARBON TOOL STEELS
ALLOY TOOL STEELS
VALVE STEELS
SPECIAL AND FINE STEELS
STAINLESS STEELS
FREE CUTTING STAINLESS STEELS
NITRALLOY STEELS

ARISTOLOY TOOL, SPECIAL, AND STAINLESS STEELS
Hot Rolled • Pressed • Tempered • Annealed • Spheroidized Annealed
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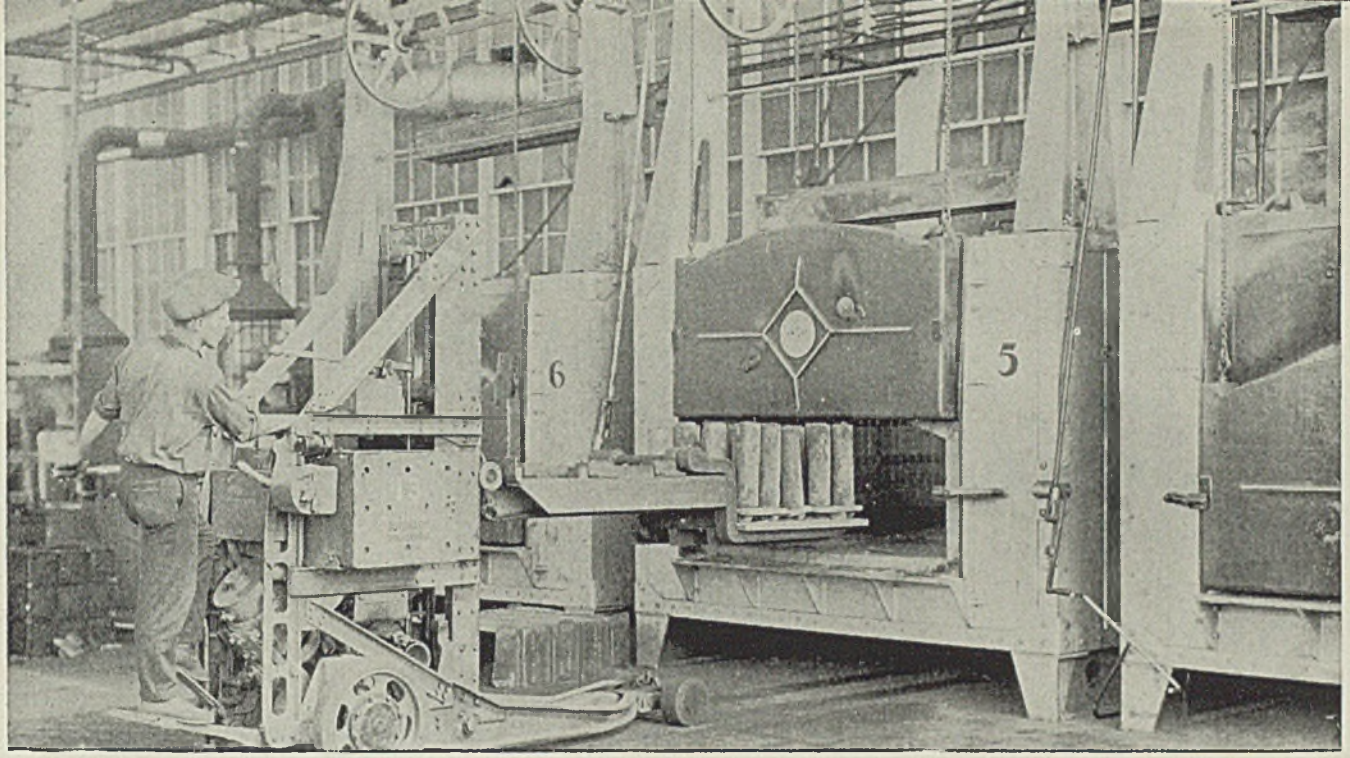
COPPERWELD STEEL COMPANY WARREN, OHIO

ARISTOLOY STEELS

SPECIAL AND FINE STEELS, AIRCRAFT QUALITY STEELS, NITRALLOY STEELS, BEARING QUALITY STEELS, CORROSION AND HEAT RESISTING STEELS, CARBON TOOL STEELS, ALLOY TOOL STEELS, VALVE STEELS, STAINLESS STEELS, FREE CUTTING STAINLESS STEELS



Smallest parts are placed in cylindrical carburizing boxes and charged in the furnaces by means of a fork truck. Rectangular boxes are used for larger parts. Carburizing a 7000-pound charge requires only 8 hours and 40 minutes

Converting a

Pack Carburizing Furnace

Increases

Production 25 Per Cent

AVAILABILITY of gas burners which deliver a large percentage of their heat output in the form of radiant energy makes it possible to adapt heating furnaces of simple box-type construction to gas firing. Advantage of this was taken recently by a New England manufacturer of textile machinery in equipping eight pack carburizing furnaces with radiant burners to obtain increased capacity.

These furnaces, originally electrically-heated are of the conventional box-type design employed for carburizing and annealing. To have adapted these units to older types of gas firing would have necessitated costly modifications in their design. This would have involved equipping them with hearths which could be under-fired, special wall and arch construction for any over-firing through tunnel burners, or other types of reconstruction.

Using gas radiants, however, it was only necessary to replace the electric elements, distributed on both side walls of the furnaces, with gas-fired elements located in the roofs. This was accomplished by using a Selas Duradiant roof with 36-type K-510 Duradiant burners, spaced in five rows of five burners each and four rows of four burners each.

Despite the fact all of the heat is applied to the roof of the furnace, no overheating on the top of the charge is reported, the products of combustion having sufficient agitation to distribute the heat evenly over the entire heating area.

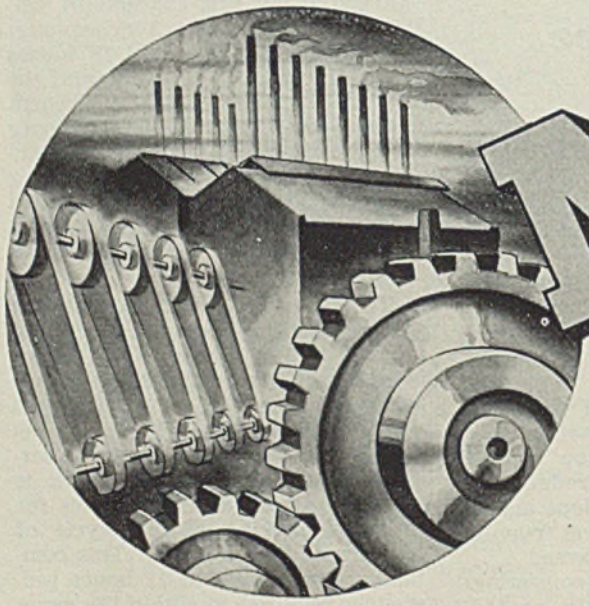
This type of burner, consisting principally of a ceramic tip located within a refractory cavity, essentially is a radiating surface, the cavity being made incandescent from the effect of many small flames surrounding the ceramic tip. Fuel enters through a multiplicity of jets, these channels being formed by narrow grooves in the burner-tip surrounded by the cylindrical opening in the refractory cavity. Ignited within the cavity, the gases traverse a heated surface which causes rapid and thorough burning.

About three-fourths of the work done by these furnaces is carburizing of small textile machinery parts. Smallest parts are charged in cylindrical boxes as shown in the accompanying illustration. Larger parts are charged in carburizing boxes 4 feet, 3 inches long; 2 feet, 1 inch wide, and 18 inches deep. Legs hold the bottoms of the boxes 3 inches above the hearth line of the furnace. Three boxes may be charged at a time, the converted furnace chambers each being 6½ feet long and 5 feet, 7 inches wide. Charging and unloading of the furnaces is accomplished by an electric fork truck.

The usual charge of three boxes has a total gross weight of 7000 pounds and is placed in a furnace when the latter is at a temperature of 1650 degrees Fahr. It requires 40 minutes for the furnace to recover this temperature after insertion of the charge. The work is allowed to soak at 1650 degrees for 8 hours, making a total cycle of 8 hours and 40 minutes. This compares with a total of 12 hours previously required to obtain the same depth of carburized case in a charge of like size.

Gas consumption for a 7000-pound charge during the normal cycle of 8 hours and 40 minutes is indicated as 7000 cubic feet of 530 B. t. u. fuel, with a furnace operation efficiency of slightly better than 48 per cent.

Operating cycles have been decreased with the lighter annealed charges in relatively the same amount as that shown for carburizing. This shorter cycle has resulted in a reported increase of approximately 25 per cent in production.



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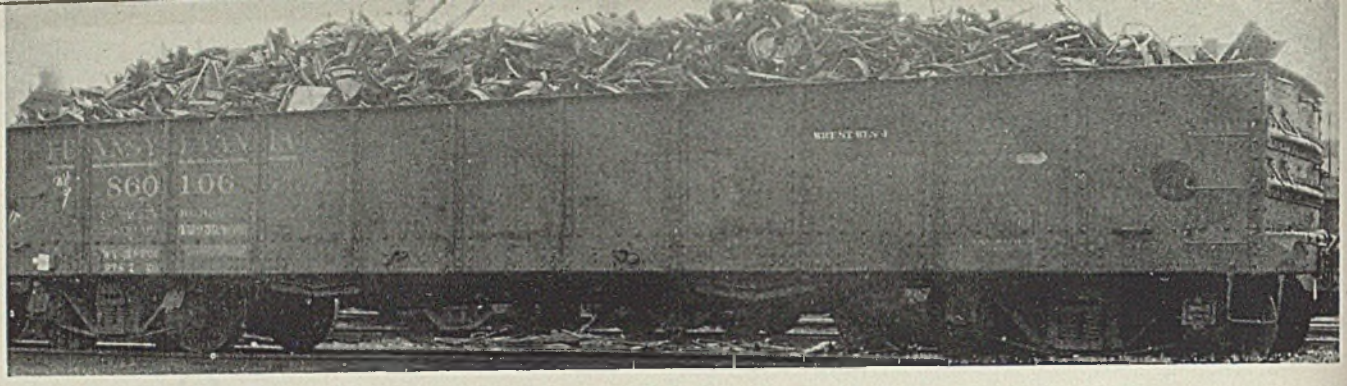

Fig. 1—Carload of No. 1 heavy melting scrap ready for unloading

The Manufacture of HIGH-QUALITY, LOW COST STEEL

basic open-hearth scrap

By PAUL J. McKIMM
Cleveland

■ PROPORTIONS of iron and scrap employed in the manufacture of steel will vary from 100 per cent scrap to well over 72 per cent iron, depending upon the location, prices of the different commodities, supplies of scrap, kind of scrap and its condition and the type of steel to be produced. No deviation from a predetermined quality for a given grade of steel can be tolerated, irrespective of raw material cost because the loss of yield in the several processes and loss of ultimate yield or failures in performance would more than off-set any initial savings. A mix of different scraps of the charge having a variance of size, shape and price can be maintained on a low composite cost basis thus affording a lower cost ingot. The simplest and easiest way of attaining ingot cost is by the utilization of lower cost raw materials, not necessarily inferior, rather than by operation.

Skepticism maintained by operators and metallurgists regarding the use of certain types of scrap for steelmaking purposes is based on a number of reasons. Often in selecting scrap no attention is given to its potential oxidation loss which when excessive means a loss in weight; over-burdening with flux and blocking the checkerwork further curtails production.

The most influencing factor regarding scrap usage today is that of residual elements that contaminate certain grades of steel to the extent of impairing their quality and ultimate use. Practically no statistics are available covering the production and consumption of scrap in any of its forms and the same condition applies to residual elements classed as "tramp" elements which by contaminating the steel become injurious either to the steel's workability, rolling characteristics, surface or physical properties.

According to the American Iron and Steel Institute the amount of iron and steel in current use in the United States is over 1,100,000,000 tons. This year approximately 36,000,000 gross tons of scrap and in excess of 40,000,000 gross tons of iron will be employed for a production of approximately 91,000,000 tons of steel ingots. Hence, scrap as a raw material is important as further evidenced by the fact that a number of blast furnaces are utilizing scrap in their burdens to increase production. These plants ordinarily would not use scrap for this purpose because of their ore holdings. Scrap has to be purchased in the open market and means of distribution make it uneconomical even under previous peak tonnage demands.

At the moment the scrap supply is a problem as indicated by a recent Bureau of Mines report showing that domestic stocks of iron and steel scrap at consumers' and suppliers' plants and in transit at the end of March, 1941, approximated 7,235,000 net tons, a decline of 8 per cent from 7,843,000 tons at the end of 1940. Known stocks held by consumers and suppliers at the end of the first quarter were equivalent to six weeks' supply at the rate of consumption in March, a position slightly lower than at the end of the year when available stocks were equivalent to seven weeks' supply.

Further an editorial in May 29 issue of *Daily Metal Trade* stated that "iron and steel scrap consumers and dealers are beginning to wonder whether sufficient tonnages will be made available to permit indefinite continuation of capacity steel making operations. Cause for

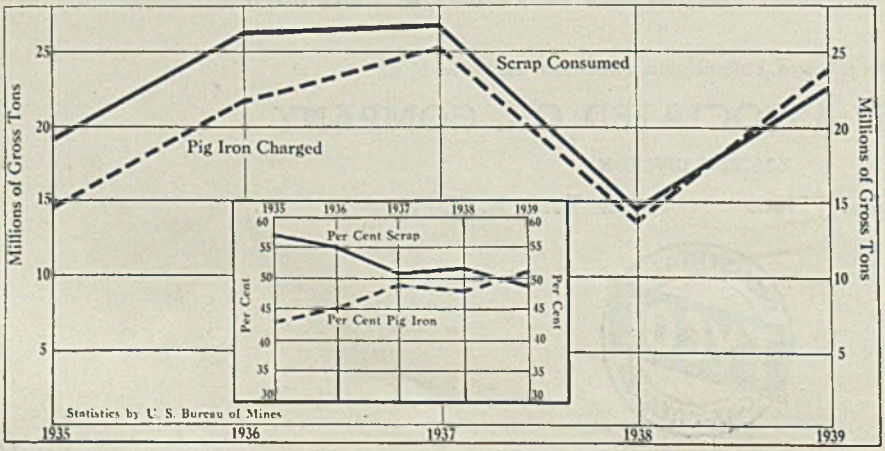

Fig. 4—Ratio of scrap to pig iron in open-hearth furnace charge, declining

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Details are given in Bulletin R-2-G which will gladly be sent on request.

R-132

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Fig. 2—View from front end of car after top had been stripped

this concern lies in the fact that in a number of districts scrap is being consumed much faster than it is being replaced—a condition which obviously cannot prevail for many weeks without serious consequences".

Marketing of scrap has often been conducted in a questionable manner by some dealers and in many cases yielding a profit but endangering good will. In recent years considerable progress has been made in clarifying this situation through the efforts of consumers and several committees and the bundling committee in particular of the Institute of Scrap Iron and Steel Inc. Yet the movement to properly align this vast scrap program along honorable and mutually beneficial lines will only be accomplished by mutual co-operation between dealer and consumer and the co-ordination of their respective personnel. This joint organized program must offer definite facts concerning the type scrap that can be utilized in specific furnaces and also protect the mills from carelessness and abuse as well as dealers from chiselers. This relationship will have to be built on honesty, trust, confidence and goodwill.

Other important factors include the metallic yield, the existant oxidation losses during melting and the loss of steel production. The lightness and bulkiness of the scrap necessitates charging a large number of box-loads thus increasing the charging time. Some years ago some steel plants employed eight or more boxes of blast-furnace bushelings in their open-hearth charge. These bushelings were thin gage, of small sectional area of good quality scrap and free of rust. This however, was a high-cost practice because of the oxidation loss during the melt down. Another evil effect under these conditions is that when surface areas become molten or fused, an extensive sulphur absorption occurs which often necessitates extra amounts of lime, manganese and time to meet the required specification. This scrap in its present form, therefore, is valueless as a part of open-hearth metallic mixes.

The foregoing denotes the lack of data on the value of respective scraps by the technician or operator, and the lack of definite data on the effects of alloys are equally lacking. This is more or less due to the fact that no single kind of scrap is ever used in any steel melt. These factors are necessarily a function of the steel manufacturers personnel and not that of the dealers because dealers are commodity merchandizers and not steelmakers or metallurgists. These facts are attested by a survey conducted in the major steel producing district, primarily regarding bundled scrap but holds true for all types of scrap[1].

The Department of Commerce, classification of iron and steel scrap and its simplified practice recommendation (R 58-36) covers the various classifications of scrap in a general manner. Hydraulically compressed sheet scrap, baled sheet scrap and hand-bundled sheet scrap are all practically the same as to quality the only difference being the size, shape and weight of the package. The trade is considering

(*Please turn to Page* 85)

[1] "Developing Markets for Bundled Scrap," *Waste Trade Journal*, Jan. 22, 1938.

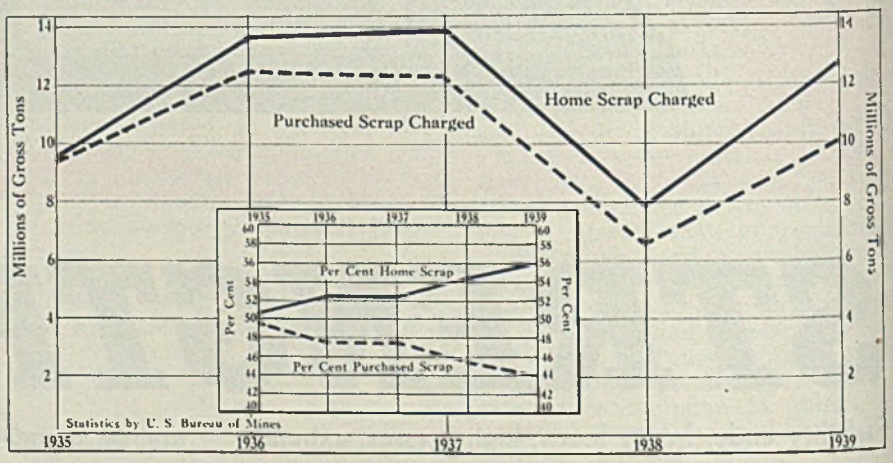

Fig. 5—Proportion of home scrap in open-hearth furnace charge, rising. (Upper graph)

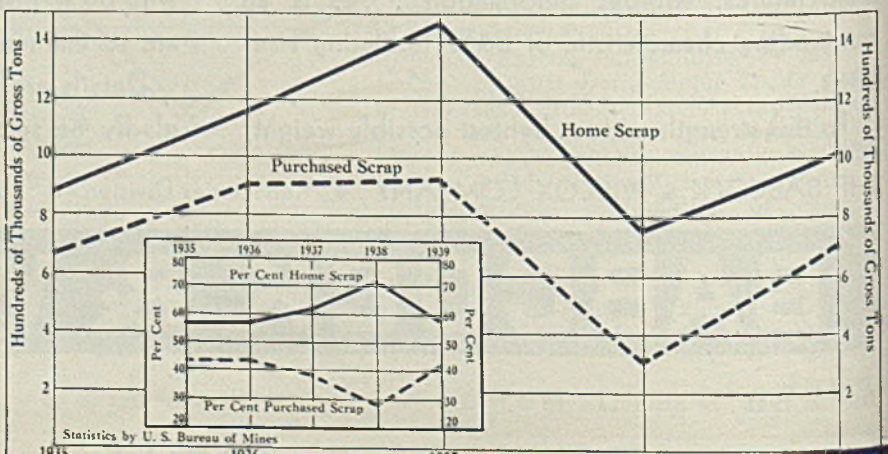

Fig. 6—Purchased scrap ratio in blast furnace charge, higher in 1939. (Note lower graph)

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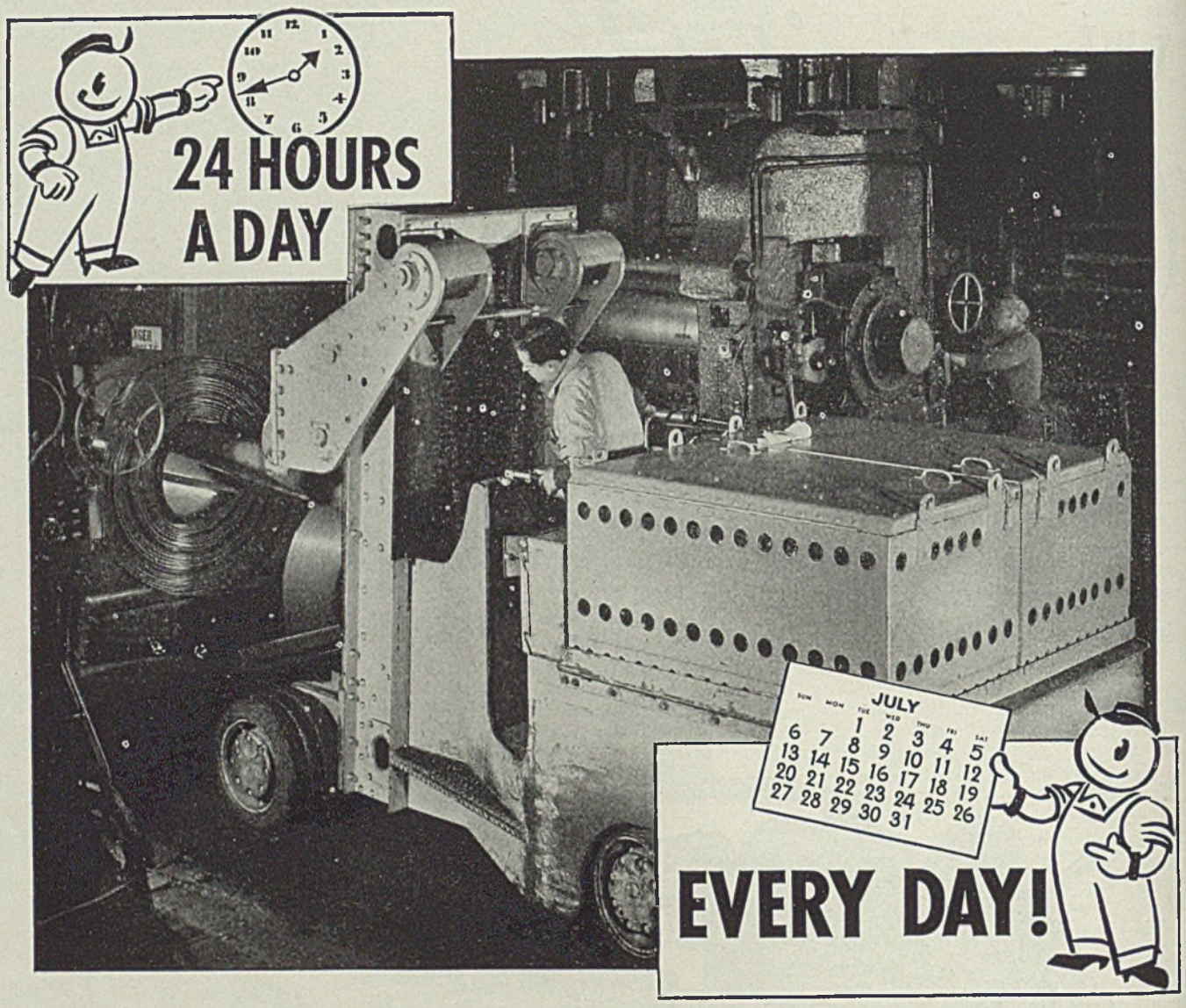

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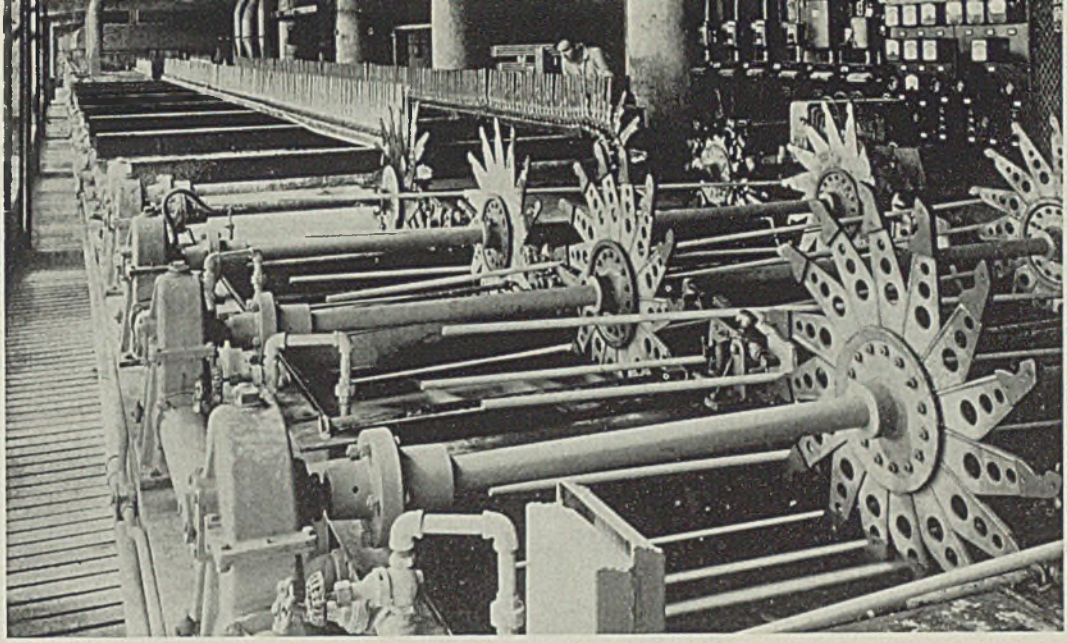


Fig. 1—This shows portion of unusual conveying equipment used to transfer Electrunite Steeltubes conduit in new electrogalvanizing line at Brooklyn, N. Y., plant of Steel & Tubes Division of Republic Steel Corp.

unusual conveyors featured in

MATERIALS HANDLING SYSTEM

of new continuous automatic line for electrogalvanizing pipe

SEEKING a more uniform zinc coating in manufacturing galvanized electrical metallic tubing, Steel & Tubes Division of Republic Steel Corp., a short time ago replaced the older equipment with a new electrogalvanizing line of revised design at its Brooklyn, N. Y., plant. The result is a better product and also an increase in galvanizing capacity.

Electrical metallic tubing, a raceway for electric wiring, is the principal product of this plant, being made in seven sizes ranging from ⅜ to 2 inches. Standard length for all diameters is 10 feet. The sizes are such that the inside diameters are the same as for corresponding iron pipe sizes. The outside diameters are therefore considerably less than the corresponding iron pipe dimensions, since the walls are thinner.

Electric resistance tube welding machines are employed in fabricating this electrical raceway. Flat cold-rolled strip in coils is fed to the welders continuously. Here it is formed into a tubular shape, the seam welded and the completed tube cut to length as it emerges from the machine.

Curiously, the first step in this forming process is designed to roughen one side of the strip—just the opposite condition of that generally sought in making tubular products for other uses. This is accomplished by a knurling roll which raises slight "bumps" on what shortly becomes the inside surface of the tube. The reason for this operation is the fact that electric wires are drawn through the tube with less effort when the inside surface has these slight "bumps" raised in it.

Beyond the knurling roll are a series of forming rolls which shape the strip into tubular form preparatory to welding. The welding head consists of two revolving copper disks which serve as electrodes. Each electrode makes a rolling contact on opposite sides of the butted seam. Edges of the strip are brought almost instantaneously to welding temperature by the passage of a heavy electric current from one electrode to the other across the joint.

A final pass through a series of sizing rolls gives the tube a true circular cross section. On emerging from the machine, the tube is cut to 10-foot lengths by a flying shear. From this point on, all operations occur in continuous sequence and there is no piling up of work at any machine. It is carried immediately to the next operation.

Additional processing involves straightening the tubes and machining their ends. Two roll-straightening machines are located adjacent to and on opposite sides of a facer. The straighteners are fed manually but they in turn feed the facer which picks up the tubes automatically. As the tubes feed through the straighteners, they drop to the bed of the facing machine. The latter, equipped with multiple spindles, operates in unison with the straighteners and automatically removes the slight dent made in shearing, in addition to machining the tube to exact length and reaming the ends.

From this point the tube passes into a hopper from which it drops on an endless link conveyor and is carried to the galvanizing equipment on the floor below. The speed of the conveyor is adjusted so that the tubes arrive at the galvanizing floor and are deposited in the first bath in the galvanizing equipment

TABLE I—Sequence of Galvanizing Operations

Step	Operation
1	Soak in hot caustic (180 degrees Fahr.)
2	Hot water rinse
3	Electrolytic cleaning (160 degrees Fahr.)
4	Water rinse
5	Sulphuric acid pickle (130 degrees Fahr.)
6, 7 and 8	Water rinses
9	Zinc strike in zinc cyanide bath
10 and 11	Water rinses
12	Main zinc deposition in zinc sulphate bath; temperature, 100 degrees Fahr.; 150 amperes per square foot; 6 volts

at a rate that matches the flow of work through the various cleaning and plating tanks.

Passage of the tubes from each tank to the succeeding one is accomplished mechanically by means of continuously revolving pairs of wheels. These wheels, made of micarta to resist corrosion, carry the tubes on arms projecting from the wheels' periphery. As the wheels revolve, the tubes drop from the supporting arms down a slide to the arms of the adjacent pair of wheels and thus progress through the baths. See Fig. 1. Over a thousand "hands" in the conveyor system thus carry the tubes from one bath to another.

Each pair of wheels is arranged so that one end of the tube is slightly higher than the other when being lifted from one tank to the next, thereby speedily draining the entrapped liquid. Drained liquid is caught and directed back to its proper tank.

Cleaning baths are heated by low-pressure steam, while temperature of the galvanizing tank solution is held down by circulation of cold water through submerged lead pipes. Temperature regulators automatically operate valves controlling the flow of steam to the cleaning baths and cold water passage through cooling pipes of the plating bath. Insufficient heat in this soak tank retards the cleaning action, while excessive temperature in the zinc sulphate bath has a harmful effect on the structure of the galvanized coat. Thus automatic regulation is a definite assurance of quality here.

Fumes rising from the acid and caustic baths are trapped by an effective exhaust system. Three blowers draw away any noxious gases through hoods located over each of these tanks.

Twelve separate immersions are given the tube before and during the actual galvanizing. See Table I. The first is into a soak tank containing a caustic solution held at 180 degrees Fahr. Next is a water or rinse tank, followed by another cleaning tank, where a low voltage is applied. Here the temperature is 160 degrees. After a second rinsing the conduit is passed to a pickling tank containing a 10 per cent solution of sulphuric acid and heated to 130 degrees. Purpose of the pickling is to remove the slight oxide formed in welding.

To remove the acid, the conduit is carried through three water rinse tanks prior to being deposited in a strike tank containing a zinc cyanide bath. The latter gives the tubes a light zinc coating. This promotes the main zinc deposition —subsequently accomplished in a zinc sulphate bath — because zinc sulphate itself does not have a good "throwing" power. Between the cyanide and sulphate baths the conduit passes through two water rinse tanks where traces of the cyanide solution are removed.

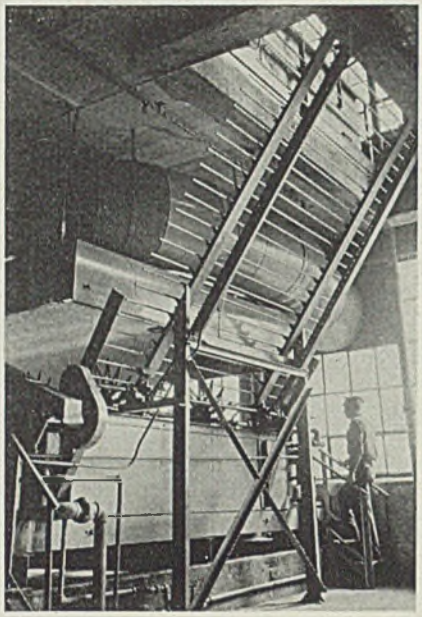


Fig. 2—Here the conduit tubes are entering the sulphuric acid pickling tank from which they pass on to the electrogalvanizing tank. Note the combination pusher-lifter conveyor

Tubes Rolled Continuously

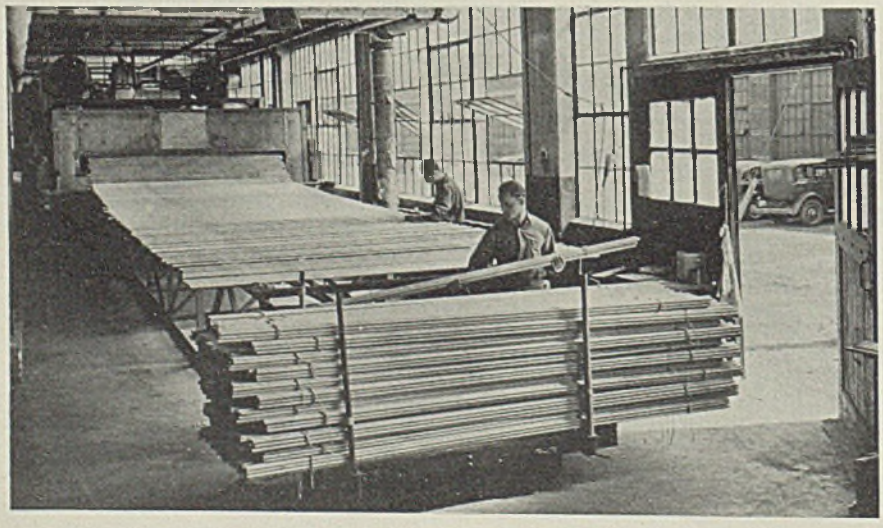
During the plating process the tubes are rolled by continuously moving conveyor arms while resting on negatively-charged copper bars located near the tank bottom. These bars are rubber covered except on top where contact is made with the tubes, so that they do not become coated with zinc. Zinc slabs are placed closely together beneath the work. The plating material, a zinc alloy containing mercury, originally is in 80-pound slabs.

Most connections between the copper buss bars of the electrical conduit are brazed, and to this is attributed much of the efficiency of the electrical system. Voltage drop from generator to tubes is only 0.2-volt. The buss bars, ½-inch thick and 6 inches wide, are joined together by means of a silver-phosphorus brazing alloy. To make these joints, ends of the bars were over-lapped and a strip of the alloy placed between the pieces. Then the joint was heated to brazing temperature while held in clamps under pressure, assuring a perfect contact throughout the entire overlapping area.

After reaching the end of the galvanizing tank, the tubes are picked up by a link conveyor and carried to and through an adjacent drier where circulated hot air removes the moisture. Upon emerging from the drier, tubes pass through a machine which marks off the entire length of each tube in feet and inches. This "inch-marking" is designed to make electrical wiring installation easier and more accurate. When an electrician wants to cut a length of tube, or to make a bend in the tube, it is easy for him to find his exact mark.

From the "inch-marking" machine, the pieces of tube travel by conveyor to the first floor where they are enameled inside. This is done automatically by a special machine which places a number of tubes at a time in a horizontal position for the insertion of slender spray tubes. When the latter are withdrawn, enamel is ejected from their ends to give an even coating the entire length of the tube. When the sprayers are completely withdrawn, they shut off automatically and the work drops to a conveyor to be carried to a baking oven. After passing through the oven, the finised tube is ready for inspection.

Fig. 3—After passing through 12 baths, tubes are dried in baking oven in rear, travel down table for final inspection, are then bundled for shipping



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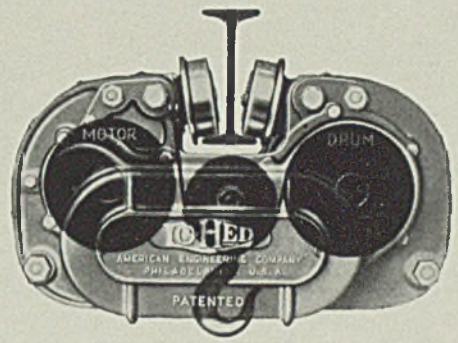

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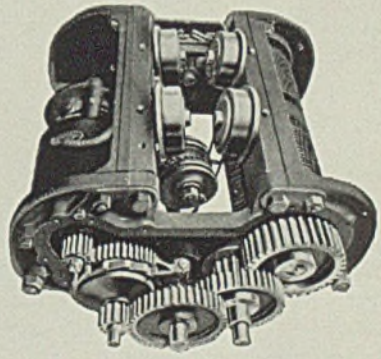

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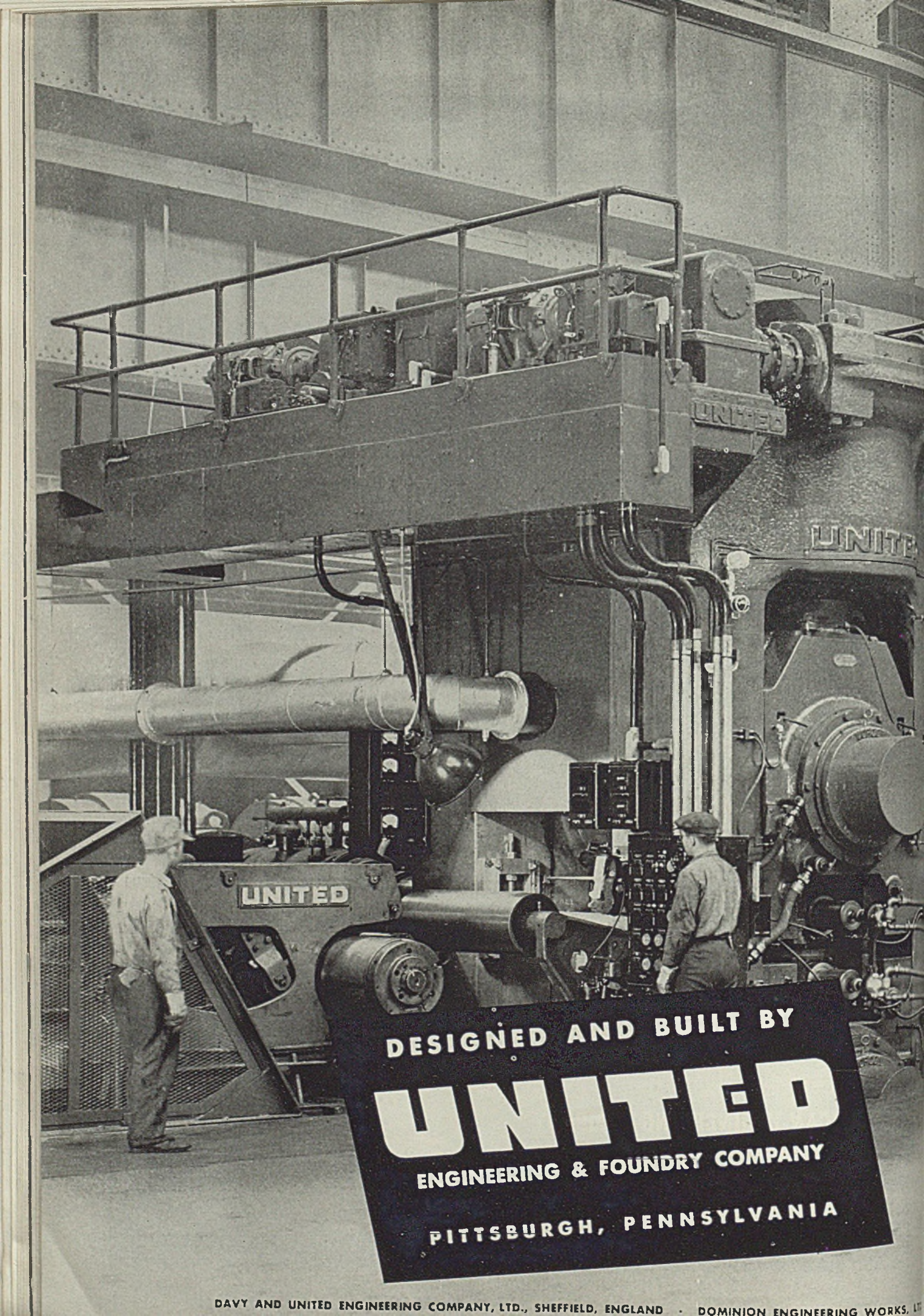

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Casting in Rubber Molds

(*Continued from Page* 51)

fine two compounds which take care of most ordinary requirements.

What Rubber to Use: The first of these compounds is for castings having modulations, undercuts or other irregularities. This material has a specific gravity of 115 to 120, plasticity of 20 to 24, durometer hardness of 60 to 65, and a tensile strength rating of 2600 pounds. It is the most widely used compound. The second compound is for flat work. It has a specific gravity of 128 to 132, plasticity of 30 to 38, durometer hardness of 70 to 75 and a tensile strength rating of 2600 pounds. This material is employed primarily for plane surfaces, although it may be used for other types of work.

The present method of casting in rubber utilizes two 9 inches by 17/32-inch rubber disks, with one disk having a 1⅝-inch center hole. When the proper quality of rubber has been determined, the next step is to lay out the models on the disk which has the center hole, allowing for proper gating.

Then markings are made for guides which are placed between the models. Each mold should contain at least three guides to prevent the mold from shifting. A hexagon head bolt cut off ⅜-inch from the head is the most common guide. After marking for the guides, the models are removed and holes, slightly smaller in diameter than the bolt shanks, are punched through the disk. Guide bolts are placed in these holes.

Next step is to determine whether or not the models require backing —necessary if the models are highly domed or deeply modulated and also used in some instances to adjust the height so the parting line

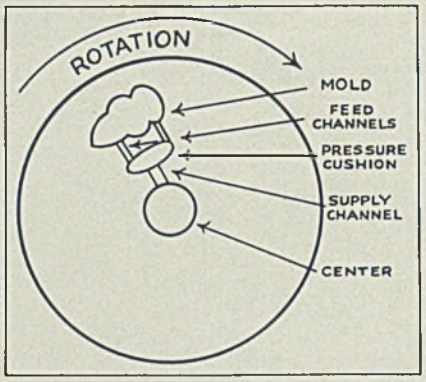


Fig. 5—This shows system of gating employed

may come in a specified position. In backing, a piece of rubber the size of the model, or slightly smaller, is cut from a sheet of ⅛-inch or ¼-inch rubber. The surface of the mold is cleaned by scraping and washing with benzene or naphtha, and the backing is cemented to the mold.

Next the surfaces of both disks are covered with a separating agent such as graphite, talc, zinc stearate, soapstone or glycerine. After all excess is removed either by blowing or wiping, the two disks are laid on top of the vulcanizer for preheating.

This vulcanizer, Fig. 1, is electrically heated and automatically controlled by a thermostat G. H is the control switch. A pilot light indicates when the vulcanizer has reached temperature. When preheated until warm and soft, the disk with the hole is placed on a board ⅜-inch thick by 6 inches square, and a bronze center, or sprue, tapered 1⅝ inches to 1 inch is placed in the hole with the tapered side down.

Now the models are laid out on the disks as predetermined. With the vulcanizer heated to the operating temperature of 300 degrees Fahr the ring B is removed from the vulcanizer and slid over the disk mounted on the ⅜-inch board. Then the other disk is placed inside the ring and pressed tightly against the bottom disk. The entire setup is then lifted carefully and placed in the vulcanizer on the ⅜-inch plunger D. Care is taken not to tip the setup ring as the models might slip out of position.

The vulcanizer is a floating ring type with the two plunger plates A and C serving as terminal points of pressure on which a 1¾-inch ring may adjust itself regardless of variations in the size of the mold vulcanized. The two electrically heated plungers can develop a temperature of 370 degrees Fahr. With the ring on the bottom plunger, the hydraulic lift E is operated by pumping the handle F until the top plunger enters the ring. The mold remains in this position for two minutes. Then it is forced up full, using one hand only.

Few Molds Can Be Spoiled

Excessive pressure does not tend to make a good mold. It generally takes some practice to determine the exact pressure. However, the range is not critical and it is practically impossible to spoil a mold if minimum care is taken.

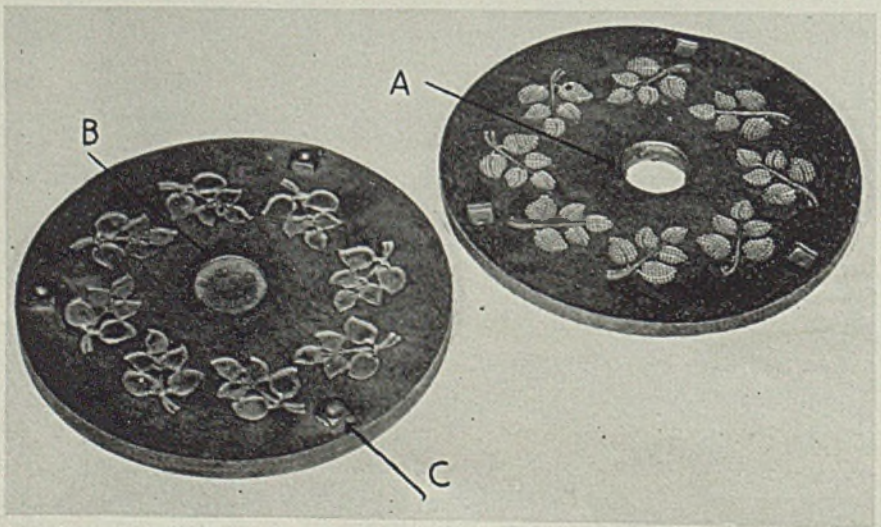
After vulcanizing for 45 minutes, the hydraulic pressure is released permitting the bottom platen to drop until the ring can be lifted from the vulcanizer. The mold is forced out of the ring and allowed to cool for 5 to 10 minutes before gradually opening the mold with a blunt instrument by working it around the edge of the mold. After splitting, the mold may be immersed in cold water to hasten the cooling.

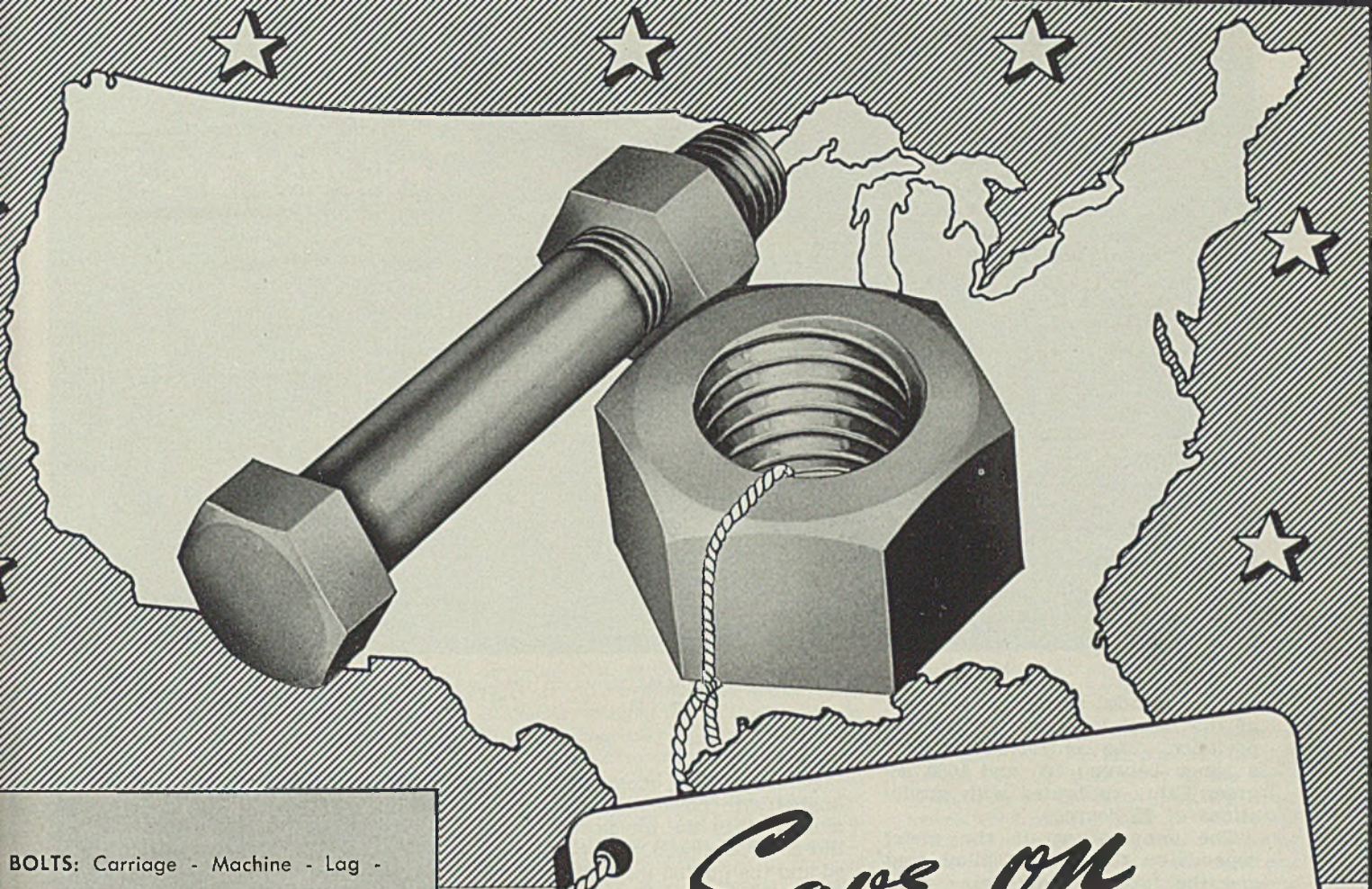
Fig. 4 shows the mold after splitting and before gating. A is the entry point vulcanized into the mold by the bronze center sprue. B is the slight depression made by the bronze center sprue, which serves as a base for the poured metal. C is the guide bolt after it has been vulcanized into the mold.

The mold is now ready for gating which is done with a razor blade or scapel. Fig. 5 illustrates the best system of gating. A large channel is cut from the center to a large oval cut-out which acts as a pressure cushion. From here small gates are cut as feed channels to the depression. The pressure cushion produces a more uniform flow of metal than if the gate were cut directly from the point of entry to the depression.

Melting pot may be any conventional type for low melting point alloys and should have an adequate gas supply. Automatic heat con-

Fig. 4—Typical set of patterns made of rubber, before gating: A, pouring hole; B, bronze center sprue to support molten metal; C, guide bolt





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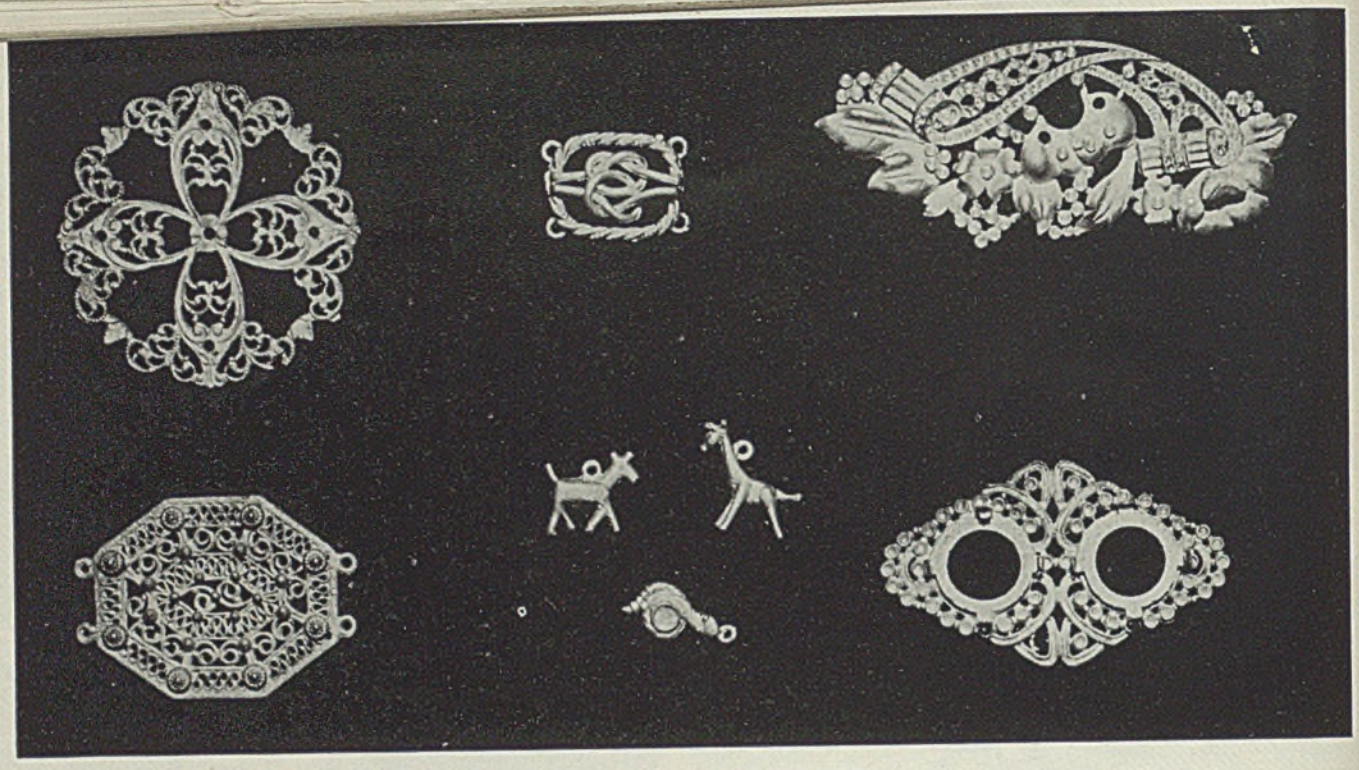


Fig. 6—Typical items made in rubber molds

trol is essential as the temperature of the metal is of the utmost importance. The control should have a range between 100 and 1000 degrees Fahr., calibrated with graduations of 25 degrees.

The temperature of the metal depends on the type of alloy used and the type of item being cast. In general, items with fine lines use higher temperatures, heavy or plain items use low temperatures. The average operating range is between 500 and 600 degrees Fahr. The most common alloy employed consists of 98 per cent tin, 1 per cent copper and 1 per cent antimony. Alloys containing lead and zinc and other elements may be used.

Fig. 2 is the inner part of a modern centrifugal casting machine. Here B is the point of entry where the hole in the plate connects with the hole in the finished mold. The mold is spun at a peripherial speed approximating 6000 feet per second. The swing arms lift from centrifugal force to exert pressure on the top plate, locking the mold in position. The pin G stops the top plate from turning and prevents the mold from moving. C is a 4-inch thrust bearing on which the plate rotates. D and E are 2-inch surface ball bearings operating around a ¾-inch shaft. F is a nickel chromium steel suspension bracket which serves as a base for rotation.

Fig. 3 is the same unit as Fig. 2 but is set in a cabinet. A is the wood pouring spout, the only material that will stand up without causing the metal to adhere to it during the pouring. The frame B protects the operator from possible spray due to over-pouring. The cover of the machine is closed, of course, during the casting. The unit is rotated by a ¼-horsepower motor through a V-belt drive.

Before casting, mold surfaces are dusted with powdered talc or soapstone. With the molds in position, the cover is closed, the motor started and the molten metal poured into the wooden crucible at top. The machine is permitted to spin for approximately 30 seconds, which is about the time required to place the ladle back into the melting pot and cut off the switch. When the machine stops, the mold is removed, the castings taken from the mold and the procedure repeated.

Fig. 6 illustrates several types of items cast by this process. These items are shown exactly as broken from the core and have not been retouched in any way.

In many instances the first gating does not produce the proper cast but the first casting shows what needs to be done. If castings are not full or are porous, it generally may be assumed that air is pocketing in a depression. This may be eliminated by drilling through the rubber with a No. 40 or 45 drill and cutting a fine outlet from the affected point to the hole. This permits the air to be released from this portion of the depression and should correct the fault. For sharp pointed depressions often it is necessary to drill directly through the mold at the tip of the point.

It is evident that the procedure for making a mold and for casting have been simplified to a point where practically anyone can utilize rubber molds for the casting of low temperature alloys.

The cost of a 9-inch mold varies between $1.50 to $2.60 for a set of two disks, depending on the quality of the material. The proper rubber compound should be obtained from recognized source only. The life of a mold depends on the casting temperature and the type of item cast. The average life of a mold, casting fairly well-drafted work at a temperature of 550 degrees Fahr., is from 500 to 600 pours.

Total production obtained from these molds depends, of course, on the number of pieces in the mold. In present practice, this may vary from a minimum of six to as high as 150. It will be understood that a mold having deep undercuts or one cast at higher temperatures will not last as long. The casting speed is approximately 25 pours per hour per machine, with one operator easily able to handle two machines.

The value of rubber molds appears practically unlimited. Rubber molds are not necessarily suitable for all castings. This method has found its greatest usefulness in decorative, ornamental and novelty work where absolute precision is not a determining factor. While fairly close tolerances may be obtained, casting in rubber molds cannot, in all cases, closely duplicate the precision work of diecasting by the pressure method. Rubber molds, however, have many advantages over any other method of casting as they reproduce perfectly any and all undercuts; they produce perfect detail without distortion, and can be made to cast the finest and most intricate designs.

Work is now under way for the adaption of rubber molds to the casting of higher melting point alloys, and the design of larger and more elaborate equipment is practically completed. The potential possibilities of rubber casting have just begun to be exploited. A big future appears to await this new and radical development.

Advertisement JULY, 1941

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Copper Sheet is Good Base for Silver Plate

Copper sheet is used as a base for the production of silver plated articles because it is easily and economically stamped into desired shapes, and because it is particularly well adapted to electroplating and finishing. Bridgeport copper sheet with its uniform high quality, made possible by the company's new and up-to-the-minute equipment, is considered excellent for this purpose. It is helping manufacturers of silver plate achieve highly satisfactory results at economical cost.

Easy and accurate stamping of copper sheet supplied by Bridgeport is made possible by Bridgeport's carefully controlled manufacture.

Three-Step Procedure For Cleaning Alloys

A new method of cleaning brass, bronze and copper preparatory to plating gives a sequence of operations said to produce economies, superior plating color and better plate adhesion.

The process comprises three steps: (1) Effective pre-cleaning of the work with either an alkaline compound or an emulsifying solvent, depending on the condition and shape of the pieces; (2) Anodic cleaning with an alkaline electro-cleaner prepared for this particular purpose; and (3) A sulphuric acid dip. The work is rinsed, of course, following each operation.

Incomplete removal of oils, greases and dirt has always been considered a cause of poor electrodeposits. The new process is said to be capable of eliminating all types of oil and dirt. Moreover, it is reported to do away with the smutty deposits and soap films that contribute to poor adhesion of the electrodeposit. A further advantage is the slight etch it provides on alloys, which also makes for better adhesion of the electrodeposit.

Progress is Made in Substituting Copper for Brass in Varied Uses

Factors to be Considered Include Oxygen Content of Copper Used, Comparative Machinability, and Need for Retooling

In considering the possible substitution of copper for high brass, there are different types of copper which will provide slightly different specific properties that may be of advantage. The properties of these various types of copper were discussed in the "Types of Copper" column in the COPPER ALLOY BULLETIN from May to July, 1939.

One of the differences not previously mentioned in the present series of articles is the effect of oxygen content on the machinability of copper. While high brass is not commonly expected to be readily machined, it can be done fairly well when in the cold worked condition. None of the various types of copper, however, is as readily machinable as cold worked high brass. Annealed copper is particularly tough and machining speeds must be greatly reduced in order to cut it at all. Copper containing particles of cuprous oxide such as regular electrolytic tough pitch copper is somewhat superior to deoxidized copper in this respect. This is due to the presence of the copper oxide particles which tend to break up the otherwise long stringy chips. The cutting tool edge must have considerable rake and clearance. This type of cutting edge tends to produce long chips and therefore drilling and tapping operations are particularly difficult. Copper which must be machined should be in the cold worked condition and of the tough pitch type, but even under the best conditions, it is not an easy operation compared to high brass.

Tubing and Stampings

During the past few months some progress has been made in the substitution of copper for brass. In most cases these are the simple types of fabrications, but a few have required some care and planning in order to get satisfactory products of copper. The use of copper tubing in the plumbing industry has been quite extensive. High brass pipe has been replaced quite generally by red brass and copper pipe. The thin wall tubes used in exposed plumbing fixtures, which are normally chromium plated, have been replaced by deoxidized copper. In both these cases deoxidized copper has been used because its ductility is sufficiently greater than tough pitch copper to permit severe bending operations.

There has also been some copper used for name plate work and flat stampings of that general type. Consideration is also being given to the use of copper in small pressure vessels which can be made from cold worked material and soft soldered without softening of the vessels themselves. There also seems to be a field for copper in flashlight parts and bodies, for these parts have been made of copper in the past and it seems probable that most of them could be made of copper without the use of special tools and extra operations. Some parts used in electrical hardware normally made of brass would seem to be suitable for a change over to copper.

Desirability of Retooling

When this series of articles was started, the scarcity of zinc for use in non-defense applications was the primary consideration. As the defense program has developed, the need for copper for defense purposes has reached the point where the desirability of such substitution needs consideration from a somewhat different viewpoint. When the use of copper requires extensive tool changes as it does in some cases, it is questionable whether the machine tooling required for such changes is justifiable. From the production standpoint it seems possible that the substitution of copper may be desirable only because it saves a remelting operation which might be better used for essential defense work than for other purposes. It is well to bear these considerations in mind, therefore, when planning changes from alloys to pure copper. The accompanying table lists some of the physical properties of high brass and commercial copper.

PROPERTY	COPPER	HIGH BRASS
Specific Gravity, 20°C	8.94	8.47
Density, lbs./cu. in.	0.323	0.306
Linear Coefficient of Expansion @ 25°C	16.8 x 10^{-6}/°C	19.0 x 10^{-6}/°C
Electrical Resistivity, 20°C	1.682 microhms/cm^3	6.68 microhms/cm^3
Electrical Conductivity, 20°C	100%	25.85%
Thermal Conductivity, 20°C	0.923 cal/cm^2/cm/sec/°C	0.286 cal/cm^2/cm/sec/°C
Specific Heat	0.0918 cal/gr/°C	0.0909 cal/gr/°C
Modulus of Elasticity, cold worked	16,000,000 lbs./sq. in.	14,500,000 lbs./sq. in.

COPPER ALLOY BULLETIN

ALLOYS OF COPPER

This is the twenty-fifth of a series of articles on the properties and uses of copper alloys, and continues the subject of modifications of the copper-zinc alloys.

ADDITIONS OF LEAD TO COPPER-ZINC ALLOYS

Because of purely manufacturing considerations, the addition of lead to copper-zinc alloys (to improve machinability) is usually confined to the range from 55 to 63% copper. Occasionally, however, lead has been added to pure copper and other alloys from 90-10 copper-zinc on down to 55% copper.

The addition of lead reduces the ductility of the copper alloys in both hot and cold working operations. Those alloys which are normally the most difficult to hot work are the alloys most seriously affected by the presence of lead. Hence the alloys with copper contents above about 63% and containing additions of lead have been processed almost entirely by cold working. Such alloys, besides being difficult to hot work, are also sensitive to processing variables in cold working. Thus the use of some otherwise very desirable alloys has been restricted by the excessive cost of manufacture.

Those alloys containing less than 63% copper are two-phase alloys above about 700° C. This second phase, beta, is much more ductile in that range of temperatures and the lead does not seem to reduce its ductility to the extent that it does the alpha phase. For this reason, alloys around 60% copper can be produced readily by hot working even when containing appreciable quantities—2 or 3% for instance—of lead.

The accompanying table lists the commercial leaded alloys normally available:

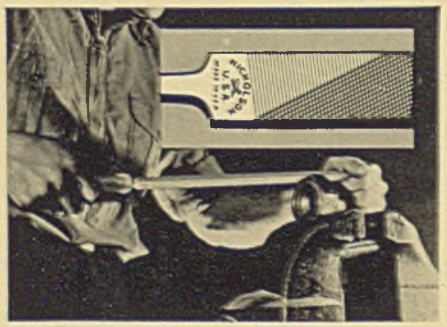
COMMERCIAL LEADED COPPER-ZINC ALLOYS

ALLOY	ASTM	ALLOY NO.	COPPER	ZINC	LEAD
Leaded Commercial Bronze	B-41T	B	88.5	9.5	2.0
Hardware Bronze	B-41T	A	85.0	13.0	2.0
Leaded High Brass	B135-40T	3	66.0	33.5	0.5
Leaded Brass Tubes	B135-40T	4	66.0	32.4	1.6
Clock Brass	B121-39T	5	63.0	35.0	2.0
Leaded Naval Brass	B21-40T	B	60.5	39.0	0.5
Forging Rod	B124-39T	2	60.0	38.0	2.0
Leaded Cold Heading Rod			63.0	35.4	1.6
Screw Machine Rod	B16-29		61.5	35.5	3.0

Special File For Brass

Filing brass is quite different from filing other metals, says a leading file maker. While brass is generally softer than ferrous metals, it is malleable, ductile and tough. Thus, a regular or general purpose file will cut brass rapidly enough for a few strokes. Then the teeth tend to clog rapidly and consequently slip over the metal surface, without removing much stock.

A special brass file that will correct this, the file manufacturer claims, has a combination of tooth angles and number of tooth points per inch to give excellent results. It possesses a long overcut angle and a short upcut angle. The short upcut angle keeps the file on the work, while the long overcut angle, producing many fine scallops on the short upcut, breaks up the filings. This permits the file to clear itself of chips. In other words, this prevents the file from taking too much of a bite and eliminates clogging and chattering. It is also said to leave a good finish.



Filing of brass involves a special technique. Inset shows tooth design of brass file.

NEW DEVELOPMENTS

Electroplating brushes which are said to be practically unaffected by normal plating solutions are now available. They do not deteriorate rapidly, as do hog bristles. They are called soft enough for use even with such deposits as silver. **(No. 210)**

A welder's glass for use in helmets is reported to cut off most of the infra-red rays and all of the ultra-violet rays, thus preventing distress and injury to the eyes. Moreover it makes possible better observation and more accurate control of the flow of metal, it is said. **(No. 211)**

A sheet metal gage measures the thickness of brass, copper and other non-ferrous metals from one side only, without contacting reverse side. It is recommended for use with copper tanks, brass pipe and many other applications. **(No. 212)**

A sander-polishing machine, though small and portable, is designed to give heavy-duty, continuous service. This bench-type belt sander-polisher is said to be well adapted to use on edges, irregular work, curves, flat pieces, small members and small radii. **(No. 213)**

An air-line dehydrator utilizes easily-renewed silica gel as moisture-removing agent. Fresh supply is quickly screwed in. The shell is made of brass with brazed joints, and the outlet screen is 200-mesh brass. **(No. 214)**

A tool grinding fixture holds cutters for sharpening on drilling machines. Fixture is readily tightened on drill table and will hold straight or taper shank tools up to 1-in. in diameter, including end-milling cutters, counterbores, and facing cutters, it is said. Cup grinding wheel rides in drill spindle chuck. **(No. 215)**

Marking tool with solid die is said to automatically make clean-cut identifying marks in high production on parts such as shells and other ordnance and non-ordnance parts. Used on automatic screw machines or lathes. **(No. 216)**

A hexagon bed turret, designed to step up bench and engine lathe production to a rate comparable with that of hand screw machines, is announced. It is said to have many new automatic features and is designed to fit many makes and sizes of lathes. **(No. 217)**

A soft rubber polishing wheel has an improved composition which rapidly produces highly polished surfaces on any base metal, it is reported. It is said to greatly reduce polishing time because of the 5 different types of polishing compounds impregnated in the binder. It can readily be dressed for contours. It also eliminates scratches and blemishes, it is claimed. **(No. 218)**

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

BAKER CRANE TRUCK

brings New Efficiency to yard operations at the Cleveland Electric Illuminating Company

IN THIS SUPPLY YARD a great variety of materials must be handled daily. No job is too small, none too large or difficult for the Baker Crane Truck—which has been in constant service since 1937, contributing materially to the high standard of efficiency set by this great Cleveland company.

The truck is a standard Baker locomotive-type crane, with capacity of 6000 lbs. at 6 ft. radius. Its maneuverability and accurate control make it ideally suited for yard operation—where congestion complicates handling problems, and where space must be utilized efficiently for storage.

Let us show how Baker can solve your handling problems.

BAKER INDUSTRIAL TRUCK DIVISION
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BAKER IS THE OLDEST MANUFACTURER OF ELECTRICAL VEHICLES

Trade-mark Registered U.S. Pat. Off.
Baker INDUSTRIAL TRUCKS

High-Quality Steel

(*Continued from Page* 70)

bundles for the present No. 1 hydraulically compressed bundle, No. 1 dealer bundle and No. 2, dealer bundle. Some produce a so-called galvanized bundle where a small percentage is composed of galvanized material and also a so-called No. 3 bundle which contains 50 per cent or less of coated material. This really would conform to a Dealer No. 1 bundle; Dealer No. 2 bundle, Dealer No. 3 (the now called galvanized) and the present so-called No. 3 bundle would be a counterpart of a No. 4 bundle of material.

In considering coated material it is evident that lead and terne-coated base metal should be decoated because lead is the most harmful material that can be charged to the furnace due to its deleterious effects to the furnace bottom. Coatings can be burned off before the steel is compressed into bundles. With enameled steel scrap a great amount of the coating is broken off in the bundling process and further amounts are hammered off.

As previously stated, where care is used in eliminating foreign metals a better quality bundle is had and a profit realized from the foreign material. Recently in a large steel producing district a considerable quantity of a No. 2 bundle became available. Classified properly it would have been easily converted into a good commercial bundle and the nonferrous material sold at a profit far in excess of the total value of the scrap. It contained a large quantity of commercially pure aluminum in sections about 2 inches wide, 3/16-inch thick and 3 to 4 feet long and this would have brought 14½ cents per pound. A large amount of scrap copper and brass in fairly large sections and lead analyzing 90 per cent lead and 10 per cent tin, also was included. Other detrimental characteristics of bundled scrap are coatings, especially tin. Little alloy steel appears in the form of sheets, hence most of foreign elements occur from the various classifications of loose scrap, such as Nos. 1 and 2 heavy melting scrap, noted in Simplified Practice Recommendation, R 58-36, items 9: 10: 11: 12 etc.

No. 1 or factory bundles are equivalent in yield to No. 1 heavy melting steel while No. 2 bundles may be regarded as the counterpart of the No. 2 heavy melting steel, subject, however, to loss in melting due to paint, dirt and other surface and unavoidable oxides. In the case of enameled sheets most of the coating usually is broken off. Nevertheless, the constituents used in

(*Please turn to Page* 92)

Table I—Components of Enamel and Their Effect on Open-Hearth Bath

Enamel compounds	% Used	Effect on steel
Kaolin	40-60	Causes high sulphur
Tin oxide	-17	Source, tin
Calcium phosphate	.	Source, phosphorus
Cobalt oxide	1- 2	Source, cobalt
Antimony oxide	10	
Lead oxide	20-50	Hard on furnace
Chromium oxide	5- 9	Source, chromium
Copper oxide	1	Source, copper
Titanium oxide	1	Source, titanium
Uranium oxide	12½	Source, uranium
Sulphate of iron	25	Source, sulphur
Barium sulphate	5	Source, sulphur

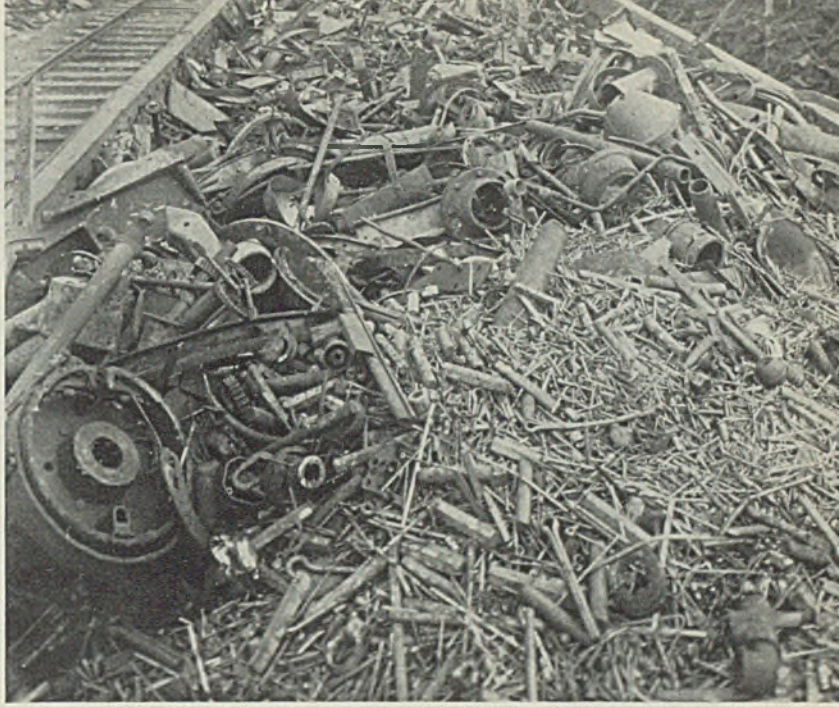


Fig. 3—View from rear end of car after top had been stripped

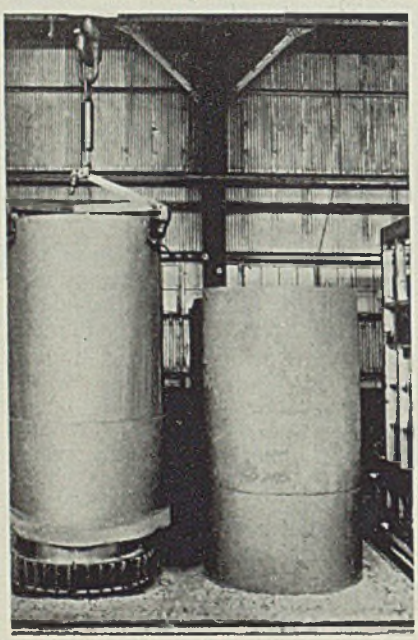
Table II—Analyses of Steel Scrap for Basic Open Hearth

Description	C	S	P	Mn	Cr	Ni	Si
⅛" scrap sheet	0.12	0.039	0.008	0.60	....	....	....
Hot water tank	0.12	0.40	0.011	0.38	....	....	....
Bedstead angle iron	0.30	0.075	0.054	1.01	....	....	....
Auto lamp	Paint	0.025	0.009	0.41	....	....	....
Auto disk wheel	Paint	0.022	0.009	0.44	....	....	....
Auto brake drum	0.17	0.029	0.006	0.32	nil	nil	nil
4" iron pipe	0.11	0.068	0.109	0.48	....	....	....
Auto intake manifold	3.11	0.092	0.674	0.56	....	....	2.14
2" malleable pipe T	2.25	0.189	0.189	0.60	....	....	0.97
2" galvanized pipe	0.12	0.034	0.059	0.34	....	....	....
2" iron pipe	0.11	0.034	0.066	0.46	....	....	....
2" iron bolt	0.14	0.085	0.010	0.80	....	....	....
Roller bearing sleeve	3.00	0.096	0.163	0.31	....	....	1.05
Auto crankshaft	0.43	0.048	0.044	0.61	0.43	....	0.11
C.I. piston, bronze bushing	2.03	0.060	0.291	0.64	....	....	1.96
Universal joint	0.67	0.021	0.016	0.84	nil	....	....
Auto spindle arm	0.87	0.038	0.016	0.61	nil	0.06	....
Generator chain	0.21	0.027	0.022	0.38	0.76	0.58	....
Spindle steering arm	0.41	0.022	0.015	0.75	0.87	0.04	....
Hot plate burner	3.26	0.082	0.906	0.36	....	....	....
Scrap sheet	0.11	0.035	0.024	0.40	....	....	....
Clincher rim	0.12	0.039	0.018	0.38	....	....	....
Auto engine cover	0.18	0.081	0.10	0.27	....	....	....
Flywheel gear	0.12	0.033	0.110	0.84	....	....	....
Mowing machine angle	0.45	0.063	0.012	0.95	....	....	....
Tire rim	0.12	0.049	0.015	0.46	....	....	....
Galv. angle iron	0.21	0.043	0.008	0.45	nil	....	....
Farm implement seat	0.13	0.048	0.046	0.40	....	....	....
Auto radius rod	0.30	0.046	0.015	0.39	....	....	....
Auto diff. housing	2.17	0.079	0.152	0.36	....	....	1.14
Trans. brake drum	3.45	0.054	0.376	0.84	....	....	3.19
Auto wrench	1.77	0.047	0.201	0.29	....	....	1.14
Conn. rod with babbit	0.28	0.047	0.032	0.59	1.04	....	0.125
Auto pedal arm	1.12	0.034	0.020	0.74	....	....	0.22
Wagon wheel hub	1.39	0.098	0.160	0.27	....	....	0.86
Auto front axle	0.51	0.031	0.027	0.83	1.20	....	....
Auto axle shaft	0.75	0.045	0.023	0.61	0.69	1.64	0.16
Auto bumper	0.58	0.036	0.140	0.56	nil	0.06	0.104
Camshaft gear	3.37	0.020	0.600	0.41	....	....	2.10
RR car spring	0.98	0.026	0.100	0.40	....	....	0.177

Industrial Equipment

Lifting Tongs

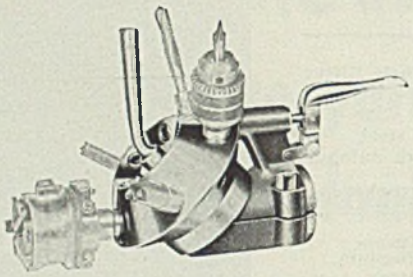
■ Heppenstall Co., Forty-seventh and Hatfield street, Pittsburgh, has introduced a new type automatic Safe-T-Tongs which is suitable for lifting annealing covers from stacks of steel in coil form. Made of forged nickel-chromium-molybdenum steel, these tongs eliminate the



necessity of a ground man placing chains or hooks on the extremely hot corners. Being fully automatic, all that is required with the tongs it to lower them on the work. Their lifting capacities run as high as 200,000 pounds.

Machining Tools

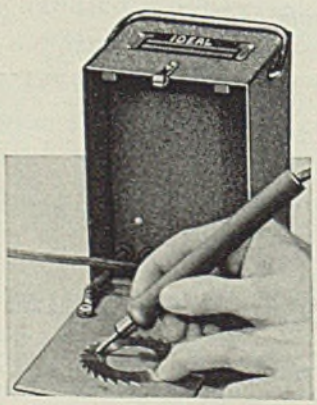
■ Jefferson Machine Tool Co., Fourth, Cutter and Sweeney streets, Cincinnati, announces two new tools—a type B tool-post turret and a No. 5 tailstock turret. The first is for carrying four separate tools instead of one. The second accommodates five separate tools, and is attached in a few seconds to the spindle of the tail-stock. The tool-post turret is mounted on the cross slide of the lathe. It may be adjusted accurately and quickly to any desired pitch or height in relation to the lathe center. It also can be made interchangeable if desired for several lathes. The head of the unit is available in two sizes—small for standard 0 and 00 tool holders; and large for standard No. 1 and No. 2 tool holders. The tail-stock turret is easily attached to the spindle of the tail-stock of any engine lathe. The attachment is built rigid, and



extra strong. When once attached each tool positively centers automatically when brought into action by an indexing plunger. The tail-stock turret is specially bored to a micrometer fit to the outside diameter of the tail-stock spindle of the lathe on which it is to be used. It permits the operations of forming, roughing, boring, finishing, drilling, tapping, etc., without stopping to change tools while performing five different operations. It also can be furnished so as to be interchangeable for use on more than one lathe. This unit is available in four sizes.

Electric Etcher

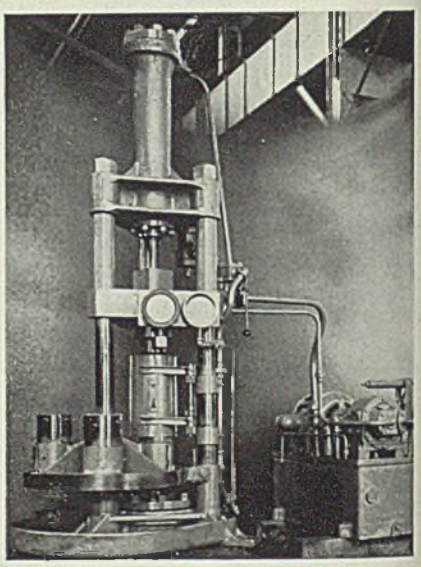
■ Ideal Commutator Dresser Co., 5076 Park avenue, Sycamore, Ill., announces a new small Thin Line etcher for permanently marking small tools and parts. It writes with a fine line, burning the mark, identification number or name into the metal, so it cannot become blurred or worn off with ordinary usage. To mark tools, parts in production and finished products made of iron, steel and their alloys they must be placed on work plate (in-



side of cover). Etcher is then held and used as if writing with an ordinary lead pencil. Complete unit includes 9-foot primary lead and plug, 2-ounce heat resisting hand piece with 3-foot lead, 4 x 7 inch work plate. Available in several voltages and frequencies, the etcher weighs 5¼ pounds. Its overall size is 4¼ x 4¼ x 7 inches.

Shell Testing Press

■ Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia, announces a turret type shell testing press capable of testing approximately 60 shell per hour. Higher speeds are possible but the testing speed is primarily dependent upon the handling facilities available. The rotary turret of the unit carries fixtures for three shell; one station for filling the shell body with water, the second for testing, the third for gaging the tested shell. The press operator brings the questionable shell

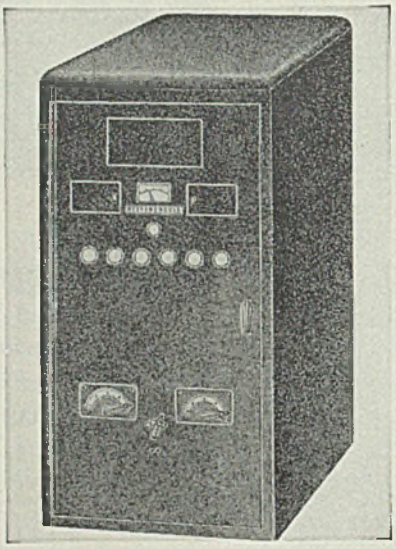


into position under the test plunger, clamping it in place with the double-acting hydraulic piston located in the base of the machine. After closing the guard the upper plunger is moved into the water-filled shell body. The upper plunger acts as an intensifier ram to raise the hydrostatic pressure within the shell to the point where cracks and porosity are shown by failure or leakage. The test pressure within the shell is indicated by a gage. The unit shown tests shell ranging from 75 to 155 millimeter. It was developed from experience gained during the last war. Outstanding improvement in the machine is the individual pumping unit, which permits the machine to be relocated quickly.

Welding Control for Use with Aluminum

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new capacitor discharge resistance welding control for welding aluminum and alloys such as those used in the aircraft industry. Known as the Condens-O-Weld, this unit

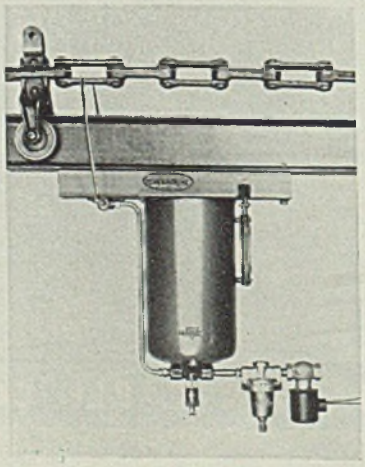
is a complete control designed to include in one floor mounted cabinet all necessary apparatus required to control an electrostatic energy storage welder. It is for operation on 230/460 volts plus or minus 10



per cent, 3 phase, 50 or 60 cycles. The charging circuit and its control charges a 2640 microfarad capacitor bank to 3000 volts, and spot welding speeds of 40 to 80 spots per minute are obtained depending on the size of the capacitor bank. The capacitor may be charged during the entire time interval between successive welds. When used with certain welding machines, line kilovolt-ampere demands as low as 1/10 of that taken by a typical single phase alternating current aluminum welder are possible.

Lubricator

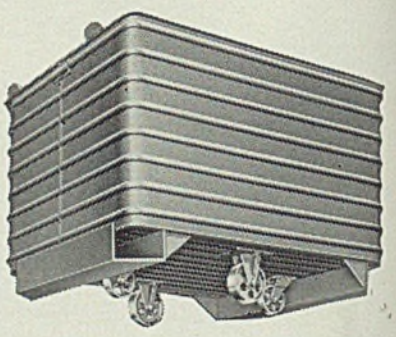
■ J. N. Fauver Co. Inc., 49 West Hancock avenue, Detroit, offers a new automatic conveyor chain lubricator for lubricating chain links of conveyors passing through ovens, kilns and other hot zones. It con-



sists of a 2-gallon tank hooked up with the plant air line, with an air regulator set at 80 pounds pressure to insure effective control and operation of the outfit. The air, passing through the lubricator, picks up a predetermined and adjustable amount of lubricant and delivers it, in the form of an oil fog, through ⅜-inch outside diameter copper lines to both sides of the chain links. The spray of lubricant is easily adjusted to conform with kiln temperature and with chain speed. An electric solenoid valve on the lubricator inlet line is wired to the starting switches of the chain drive motors to actuate the lubricator the minute the conveyor starts and operates continuously and automatically.

Steel Tiering Dump Box

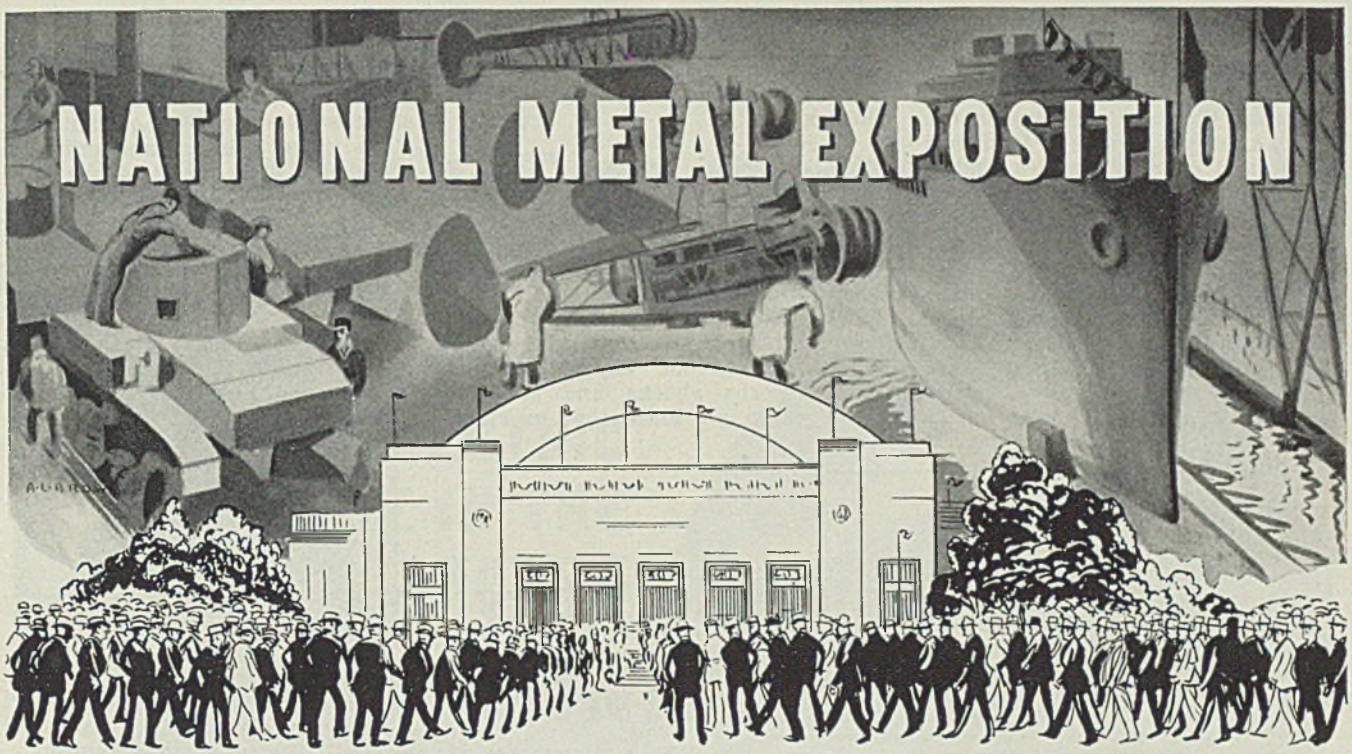
■ Union Metal Mfg. Co., Canton, O., has placed on the market a new corrugated steel box designed for use with lift trucks equipped with revolving type forks. It features special fork pockets to facilitate emptying. These are welded to the bottom at either end and run the full length of the box. When the forks are inserted in these two



pockets, the box can be lifted, turned completely over, then righted again. Top flange of box can be equipped with tiering or crane lugs for storage and handling. Ends of the pockets are cut at a 45-degree angle, eliminating unnecessary protrusion.

Hydraulic Press

■ Diamond Machine Co., 2447 Aramingo avenue, Philadelphia, has introduced a new Diamond 40 hydraulic press suitable for a wide variety of work such as assembling, broaching, straightening, riveting and pressing operations. While designed as a general purpose machine, it has a satisfactory productive capacity. Its steel ram is guided, steadied and prevented from rotating for the full length of its travel by a crosshead riding on four rigid tension rods. The press is powered by a high pressure Hele-Shaw pump. The oil tank, electric motor and hydraulic pump with their controls are grouped at the top of the press and covered by a "modernized" removable housing. Gages for the oil system pressure, total pressure of the piston and oil level, start



GOES ALL-OUT FOR DEFENSE

This year's 23rd annual Metal Congress and Exposition is going "all-out" for defense — giving the nation's defense producers a chance to take stock of their progress and study new methods and equipment for speeding defense preparations.

Each morning during the week of October 20th one of the government's leading executives will address the Metal Congress on defense progress and requirements in Army, Navy, Aircraft and civilian production. During the afternoon and evening sessions of the Congress, round-table discussions on the most important phases of armament production will be headed by armament experts.

These important sessions will attract thousands of "big-guns" in national defense production to Philadelphia's Public Auditoriums where more than 275 manufacturers will display their products at the Metal Exposition.

If you have a new aid to production . . . a better metal . . . a more efficient machine . . . a speedier way to process and fabricate metals . . . you should plan to sell the 20 billion dollar metal industry through an exhibit in its biggest annual event.

Advance reservations are the heaviest in history; however, choice locations are still available at the regular $1.00 a square foot rate, so write, telephone or wire collect today for floor plan and full particulars. Address: W. H. Eisenman, Secretary, American Society for Metals, 7300 Euclid Avenue, Cleveland, Ohio.

Cooperating Societies

American Welding Society
American Society for Metals
Wire Association
Institute of Metals Div. &
Iron and Steel Div. of A. I. M. E.

OCT. 20-24

NATIONAL METAL CONGRESS AND EXPOSITION

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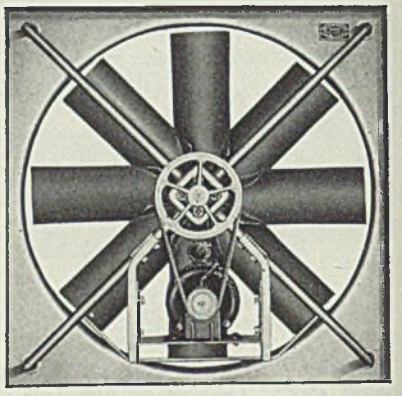
and stop push buttons, hand lever and foot pedal controls are at the front of the press. The base of the unit is 12 inches high and has a 10-inch hole centered under the ram. A 16-inch V-table is furnished but 6 and 10-inch V-tables and a 12-inch extension table are available as standard accessories. The press has an automatic return, and the speed of the return stroke is double that of the approach. Relief valves in the oil circuit protect it against overloading. An overload relay also protects the electric motor. Total daylight is 4 feet 6 inches without the V-table, 3 feet 2 inches with it. Diameter of the ram is 4 inches, stroke 24 inches and maximum tonnage 40 tons. The overall height of the press is 9 feet 7¾ inches.

Ventilating Fan

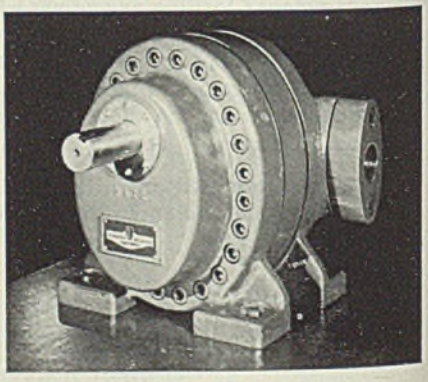
■ Autovent Fan & Blower Co., 1805 North Kostner avenue, Chicago, has placed on the market an improved ventilating fan which because of its multiple-bladed construction overcomes normal restrictions in air flow. It does not "churn" the air and absorbs shocks and sudden changes in air loads that overtax motor capacities. The fan operates with V-belt drive from a standard 1725 revolutions per minute motor. The fan blades are of 14 or 12 gage sheet steel depending on fan size. Units up to 36-inch diameters have six blades, sizes up to 54-inch have eight blades. The assembly is rigidly held in place by four tubular



steel supports welded to a square panel of 16, 14, or 12 gage sheet steel. Panel has 1½-inch flange all around, with holes for mounting.

Pressure Generator

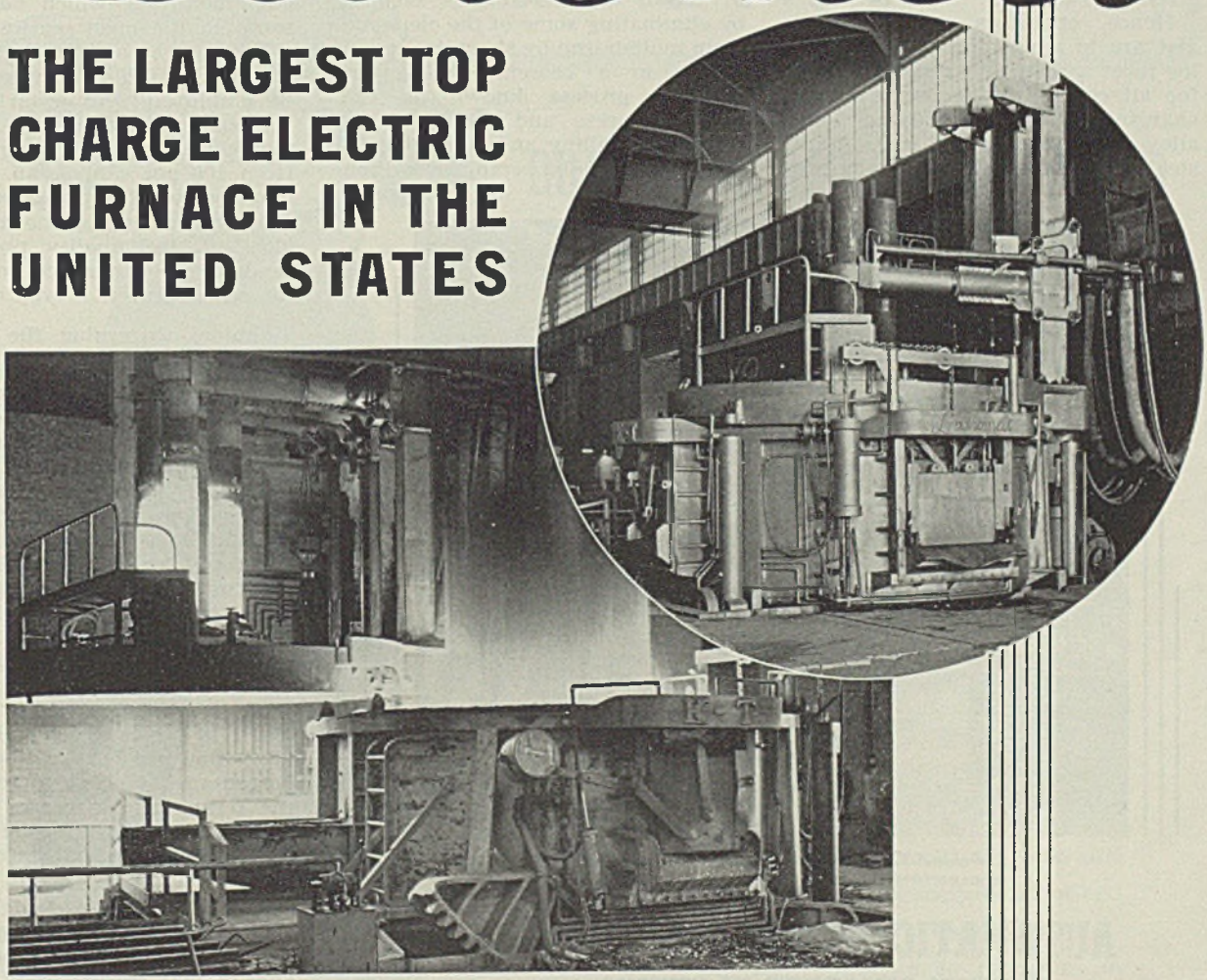
■ Hydro-Power Systems Inc., Mount Gilead, O., announces a new larger size model G-60 gear type hydraulic pressure generator which has a delivery of 60 gallons of oil per minute at 1000 pounds per square inch line pressure. The pump is a constant delivery type featuring unusual heavy duty construction with flange connections. It utilizes precision spur gears of narrow width and large pitch diameter. Long bearing life and



accurate positioning of the pump gears are provided for and maintained by mounting gear shafts on precision Timken tapered roller bearings. The gear pump can be used for a variety of applications. It serves as prime mover for hydraulically operated machines requiring medium pressures and as a drive for auxiliary units. It often can be used in conjunction with high pressure pumps to furnish large volumes of fluid at medium pressure to effect rapid traverse of the machine cycle.

Lectromelt

THE LARGEST TOP CHARGE ELECTRIC FURNACE IN THE UNITED STATES



The 50-ton top charge LECTROMELT furnace pictured here is now in operation at the Copperweld Steel Company, Warren, Ohio on alloy steel production. The upper view shows the furnace in normal operating position. The lower view shows the furnace with roof rotated to permit quick charging with drop bottom bucket. Two furnaces of similar size are now under construction in our shops.

Both top charge type and door charge LECTROMELT furnaces are available. LECTROMELT furnaces are built in standard sizes ranging from 100 tons down to 25 pounds capacity. Two 75-ton machine—door charge furnaces are in operation at a large Eastern steel plant. The top charge type of furnace results in savings in man hours, power, electrodes, and refractories. Write for details.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PA.

High-Quality Steel

(*Continued from Page 85*)

the enamel affect the steel if present in sufficient amounts, as shown in Table I.

Different grades of heavy melting and loose scrap can readily be classified by visual observation and by chemical analysis. Various kinds of scrap and their analysis are given in Table II.

Hence, operators and metallurgist are in a position to formulate the most satisfactory mix or charge for all controlling factors such as charging efficiency, oxidation loss, alloy contamination and cost. Alloy steel scrap should be kept separate and so classified so that the "tramp" metals can be salvaged.

Fig. 1 shows a car of No. 1 heavy melting before unloading. Fig. 2 is a view of the car (Fig. 1) after stripping the surface, Fig. 3, shows the other end of the car. This scrap, as will be observed, does not conform to its respective classification.

Another grade of scrap is that of blown metal. This is secured by eliminating some of the elements from molten iron by short-time processing in a bessemer converter. Another process known as the R. K. process and developed by Count Bo Kalling and Ivar Rennerfelt in Stockholm, employs carbon as a suitable substitute for steel scrap for remelting furnaces[2]. Still another grade is that of sponge iron powder[3].

These several methods for creating scrap for remelting are of paramount importance. The converter material has been employed extensively during the past several years when the scrap market was short or by plants owning ore and equipment but which had to buy scrap in the open market.

When scrap as a steelmaking raw material is fully understood, it can be employed with great flexibility thereby establishing the most economical charge. This may vary from 100 per cent scrap charge to that somewhat approaching 100 per cent iron at the same time yield identical steel quality, providing, a predetermined practice be followed for each respective type of charge.

Factors Governing the Charge

The amount of iron or scrap that should be used depends upon how the change in the type of charge will co-ordinate with hot or cold metal, the type and condition of the furnaces, combustion features, as well as how the charge will meet the difficulties that may be encountered by charging large quantities of scrap. When large quantities of light scrap are charged the increased charging time becomes a cost factor. If suitable charging facilities are available some advantages lie in greater speed in melting down, hence the total time per heat is lower as the percentage of scrap increases. As the scrap ratio increases the ingot yield increases unless the condition of scrap is such that excessive oxidation occurs.

Another feature of higher scrap ratios is that the fluxing medium can be lower and whether or not burned lime is used with the limestone depends on the plant location as to stone and burned lime cost per unit of steel produced. Generally the deficiency of silicon and manganese of this type of charge is compensated by raising these constituents in the iron. To secure the desired carbon melt, adjustment is made with carburizers which may be coke or other carbonizer. Pebble graphite is recommended for this purpose inasmuch as it affords excellent controlled characteristics. Many operators fear that high-quality steel will not result with charges of high scrap due to excessive oxidation but this is not so if the practice is properly established and slag composition properly manipulated as is the case

[2] "Decarburization of Granulated Pig Iron," Iron and Steel Institute (British), Vol. 140, No. 2, p. 137.

[3] "Steel Powder for Iron." See STEEL, May 27, 1940, p. 54.

where high iron charges are followed with the charging of iron ore.

One of the objections to the use of high-scrap charges is the residual alloys which contaminate low-carbon rimming steels and special or deep drawing grades. When open-hearths are producing large quantities of special drawing steels to meet extremely low residual metals specifications it is necessary to produce all grades to low limits in order to prevent costly segregation in processing. Under any condition it is costly to maintain a low residual metals content whether by selection of scrap or the use of higher iron proportions or other means. The maximum amounts of residual metals desired in the steel should be determined. At present no definite data are available and the permissible percentages vary widely.

Copper and nickel are practically all recovered and hence exist in the final steel. Chromium while having a high recovery in the blast furnace is mostly lost in the open hearth; it depends on the oxidizing condition of the bath and is in keeping line with the manganese decrease during the early stages of the process. Zinc volatilizes at steelmaking temperatures. Recovery of tin, arsenic and antimony are not well known though it is probable that nearly all the tin and a fairly high proportion of the arsenic remain in the steel. Tin has been much blamed for poor physical properties in deep drawing steel and its resultant failure in performance[4].

[4] "Residual Tin in Steel." See STEEL, May 6 and 13, 1940. Also, "Bibliography on the Influence of Arsenic and Tin on the Properties of Iron and Steel," British Iron and Steel Institute, bibliography series No. 4.

Steel Pouring Reflects Quality Refractories

In a paper presented at the annual meeting of the Open Hearth Committee of the A.I.M.M.E., in Chicago, R. H. Stone of Vesuvius Crucible Co., Swissvale, Pa., reported that the outstanding fact today regarding steel pouring refractories is the increasing number of ingot shops reporting pouring practices of 95 per cent and over. A half dozen or so shops, he said, are consistently getting 98 per cent plus. What pouring troubles do occur are usually due simply to failure to carry out carefully the standard practices that most shops have established.

Desirable changes in design or standards may be suggested by consideration of the weight and size of the steel stopper rod, sleeve bricks, stopper head and bolt in relationship to the size and shape of ladle: also, modification of the design of the stopper head and nozzle to conform to the best practice may be considered. The more pointed type stopper is favored with a convex nozzle rather than a nozzle that is rather flat seated.

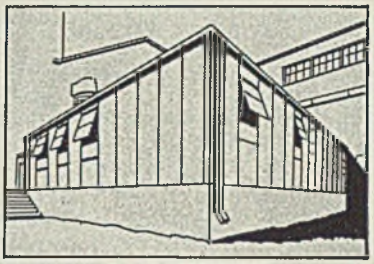
The well around the nozzle should be wide and shallow. If the rigging is in good shape there need be no fear of the stopper getting out of place with a shallow well.

There are few shops left using a clay stopper head. Up to three or four years ago, some shops clung to clay heads because they were cheap and a shut off could usually be made. Nowadays, however, the elimination of inclusions is so important that no possible source that can be eliminated should be tolerated.

Using a graphite stopper head and fire clay nozzle, dribbles, if they occur, may be cured by bringing the stopper head down on the nozzle slowly and then exerting a steady, squeezing pressure. The head will then form a new seat in the soft surface of the nozzle.

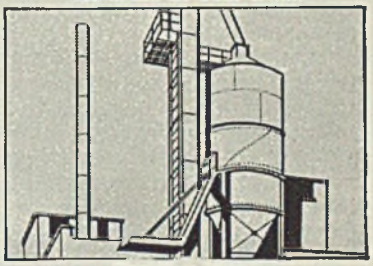
Three types of stopper heads are used—namely, the bayonet, threaded, and bolted on: Ninety-five per cent of all the heads used are of the bolted-on or pin type.

"We've decided on U·S·S Copper Steel Sheets, Bill... they're the best, and cheapest in the long run!"

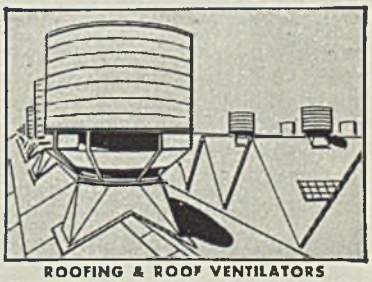


PLANT EXTENSIONS

ALL KINDS OF DUCT WORK



STACKS & TANKS



ROOFING & ROOF VENTILATORS

U·S·S COPPER STEEL SHEETS will save time and money for you in three *separate ways:*

They're easy to work with. You get true bends, tight seams and neat joints. They have 2 to 3 times the corrosion resistance of plain steel.

And the cost of U·S·S Copper Steel Sheets is so low that it makes little difference in the completed product or installation. Experienced builders and metal men have selected U·S·S Copper Steel Sheets, time and time again for all types of factory and plant expansion work—they're being used for roofing and sidings, smoke stacks, housings, heating and air conditioning ducts, ventilators, utility buildings of all kinds and various other equipment exposed to atmospheric and gaseous corrosion.

The small graph at the right shows the result of the A.S.T.M. tests over a period of 21 years—proving that Copper Steel lasts more than twice as long as other comparable materials.

Further information on U·S·S Copper Steel Sheets is available from any of the companies listed below.

This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated). Other materials were decidedly inferior.

U·S·S COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

Scully Steel Products Company, Chicago, *Warehouse Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

New Porous Metal Filters and Diffuses

■ A porous metal product, called Porex, capable of removing foreign materials from fluid, such as oil, and of altering the characteristics of gases by diffusion is announced by Moraine Products Division of General Motors Corp., 1550 Wisconsin boulevard, Dayton, O. Manufactured from powdered metal subjected to a series of processing operations, it has certain physical characteristics, such as chemical composition, structure, porosity, strength and ductility, which may be varied within certain limits to accommodate specific applications. Uses for the product are found in almost any appliance or piece of industrial equipment involving the flow of gases or liquids.

This new filter and diffusing material, for example, is used to prevent clogging of orifices in diesel injector nozzles with effective removal of fibrous materials. It also acts effectively in preventing a drying agent from passing from its chamber into a refrigeration system when the refrigerant passes through it to be dried.

A feature of the product is its ability to be bonded to steel and copper. It can be made an integral part of solid metal which may be machined, ground, bored, threaded, or processed for individual requirements. The metal is available in the form of disks, cylinders, and truncated cones. Special shapes also are obtainable.

Coating Material Protects Metal Surfaces

■ Marlox, a plastic coating for metals, is announced by Marley Chemical Co., 983 East Milwaukee, Detroit. A plastic coating of the structural type, it is used either as a priming coat, or purely for protection against rust and corrosion.

The coating is said to have very little porosity. It is successfully applied by spraying, painting or dipping, forming a thin flexible coating—so flexible that it is not affected to any noticeable degree by temperature changes.

When used as a base coat, it provides a tough, durable bond between metal surface and any kind of finishing coat. To inhibit rust and corrosion, it is applied to a thickness of ½ of 1/10,000-inch. When used as a priming coat, it is applied to a thickness of 5/10,000-inch. Tests by automotive manufacturers showed complete protection of Marlox-coated metal kept in a humidity chamber for six months, with average relative humidity of 98.5, at a temperature of 94 degrees. A similarly coated panel was subjected to a salt spray test for 600 hours with satisfactory results.

The product dries quickly and can be handled in 5 to 10 minutes after applying. It can be applied to all types of metals and alloys including steel, cast iron, aluminum, aluminum alloys, magnesium alloys, copper, brass, cadmium plate and galvanized or zinc coated steel.

New Blackening Process Coats Zinc Rapidly

■ An immersion process called Ebonol Z for blackening of zinc, stainless steel, steel and other alloys is announced by Enthone Co., 442 Elm street, New Haven, Conn. It consists of immersing the zinc or zinc alloy in a 1-pound-per-gallon solution of Ebonol Z salts (in 1 gallon of water) at a temperature from 150 to 212 degrees Fahr., forming a jet black finish on the metal in 1 to 5 minutes.

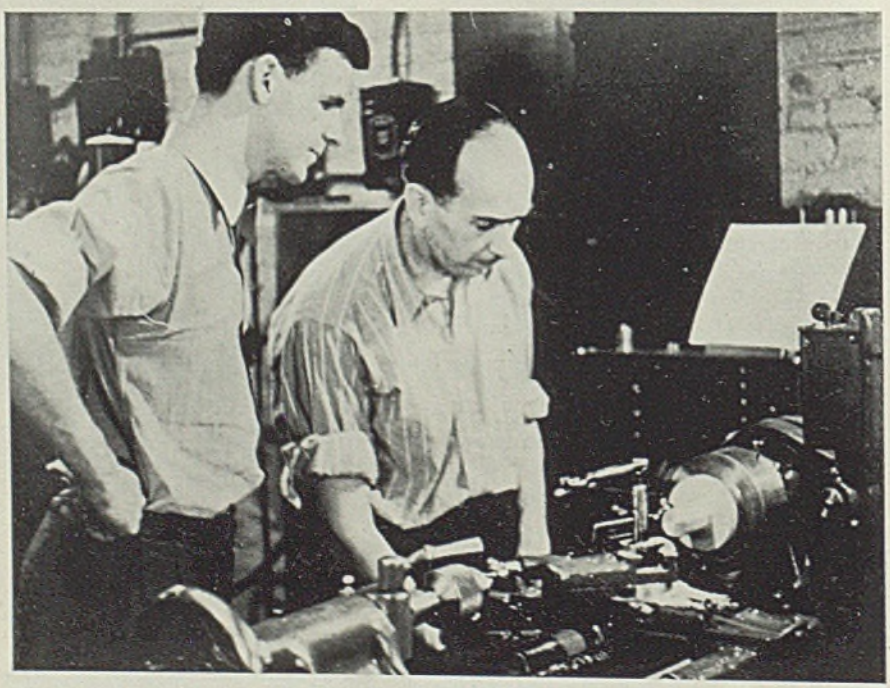
Before being immersed, the work is cleaned or degreased similarly to preparing work for plating. According to the manufacturer, 1 pound of salts will blacken over 150 square feet of zinc surface. The solution can be used for producing a black coating on stainless steel, nickel silver, nickel and noble metals by making a couple with these metals and a piece of zinc. This can be done by using a zinc basket or by fastening a sheet of zinc to the rack or basket in which the metals are to be blackened.

The process can be used for blackening zinc-plated or hot-galvanized surfaces, as well as for solid zinc or its alloys. Unlike plated or enameled coatings, the Ebonol Z coating does not change the thickness of the piece more than a few hundred thousandths of an inch, thus maintaining close dimensions. Also, the bath is not critical and requires little control.

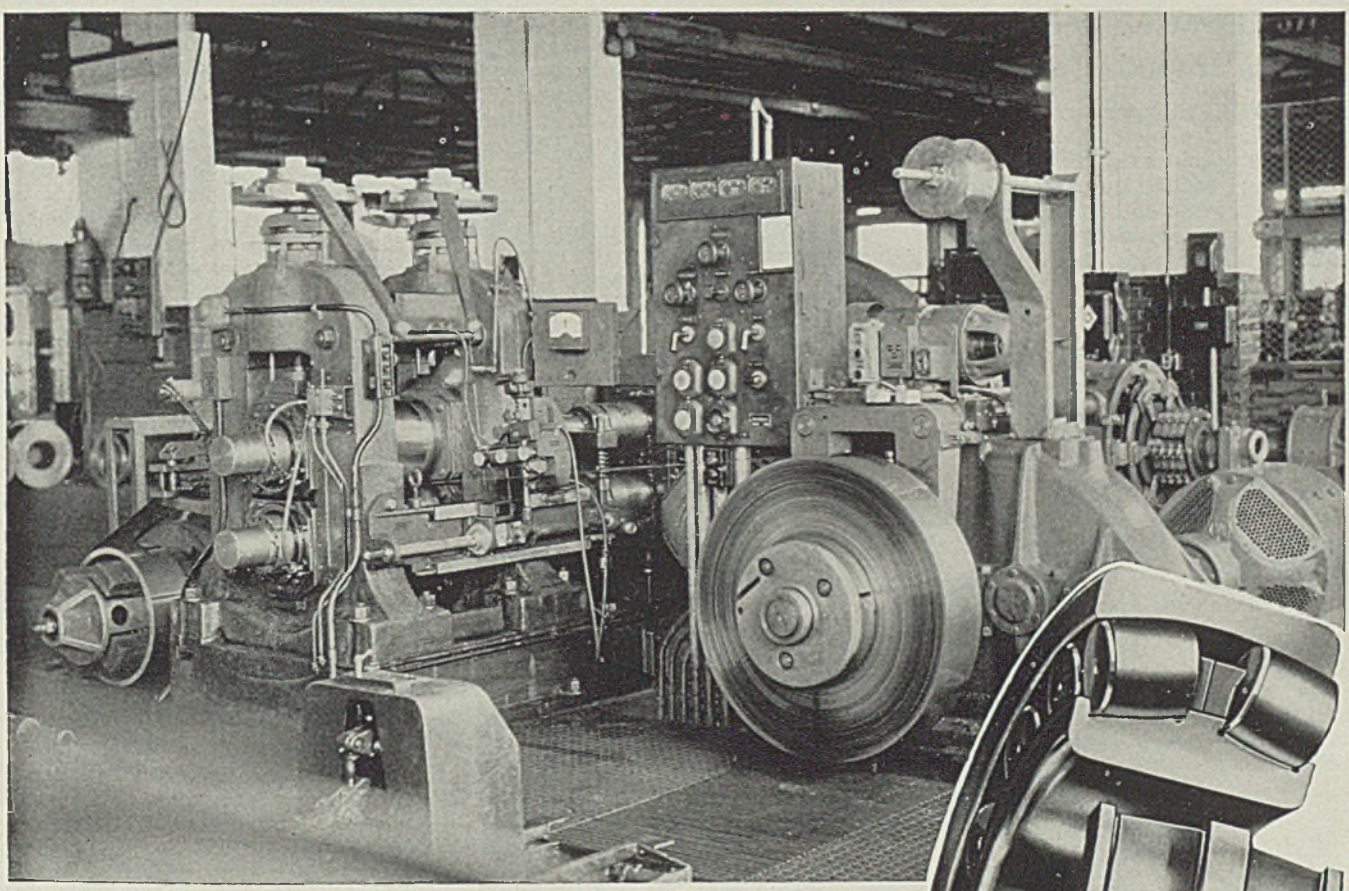
Develops Dies for Cold Stamping

■ According to Acromark Corp., 251 North Broad street, Elizabeth, N. J., its newly developed dies, type and holders now enable manufacturers to stamp cold, angle iron which formerly had to be heated before being stamped. During a test, angle iron frames made from reclaimed railroad track were stamped by two holders assembled with type and the one solid die placed into a 125-ton press. The company states that after 10,000 impressions, little sign of wear was noticed.

"Passing the Know-How Along"



■ Seasoned worker showing beginner how an entire operation is performed: View above is a scene from a motion picture called "Passing the Know-How Along" prepared by the Jam Handy Organization, 2821 East Grand boulevard, Detroit, to aid experienced workmen in conveying fundamental instructions to the apprentice. This picture is based on bulletin 2-C of the "Training Within Industry" section of the Office of Production Management



Built by WATERBURY FARREL FOUNDRY & MACHINE CO., *this 13" Two-High Planishing Mill is equipped with two* SKF *Sphericals per roll neck—and with single* SKF*'s of same size on all low-speed locations to eliminate special adjustments, special bearings, and a multiplicity of bearing sizes.*

Peak Production

WITH SKF BEARINGS

Out in the plant of The Wallingford Steel Company, this 13" Two-High Planishing Mill continues to planish strip at 625' per minute without bearing trouble. That's what it's been doing day and night since 1938, and, because it depends on 14 SKF Spherical Bearings, there's every reason to believe it will keep up the good work. Where there's an SKF, there's maintained PEAK production . . always.

4841

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

ROLLER SKF BEARINGS

New Grouting Method Speeds Installation

■ ENGINEERS for many years have sought a method of grouting under new and existing mills that could be installed quickly and easily. Such a method has been made possible by the development of a grouting aggregate, known under the tradename of Groutex and manufactured by the Fort Pitt Chemical Co., Twenty-sixth and Smallman streets, Pittsburgh. The aggregate, a compound of hardening elements, is mixed with ordinary Portland cement and sand. The grout is said not to shrink in setting, to be oilproof and waterproof, to possess ductility, to resist constant vibration and pounding of mill shoes, to possess permanent compression strength and to harden quickly.

Plain cement grouts frequently shrink in setting, leaving a void beneath the mill shoe for the entry of moisture and oil, and permitting vibration. By the use of this new aggregate the grout retains its full volume, tightly filling the space between the concrete foundation and the shoe.

Tests show that not only does Groutex mortar possess far greater strength than plain, but that it has so great a compression strength at the end of 12 hours as to permit mills to be put back into operation in one day if necessary without shortening the life of the grout. For 1-inch clearances or less it is recommended that 100-pound Groutex, 1 sack of Portland cement and 1 cubic foot of coarse, clean sand be used. For clearances in excess of 1-inch, 1½ cubic feet of pea gravel is added to this mixture.

The material is also efficient for patching and repairing concrete floors, and for emergency concrete of all kinds where the job must be placed in operation in 12 hours.

Brake, Clutch Linings Arc Welded in Place

■ No screws or rivets are used for installing linings in the brakes or clutches built into the earth-moving equipment manufactured by R. G. LeTourneau Co. of Toccoa, Ga. Instead a special lining with ⅛-inch steel backing is used, the lining being cut back from the edges of the steel for about ⅛-inch and then welded in place using tack welds about ⅜-inch long spaced about 1 inch apart for a typical brake band lining job. Hobart welding equipment is used. The metal backed lining is clamped to the brake or clutch with C-clamps during welding. The spaces between lining sections compensate for expansion and contraction.

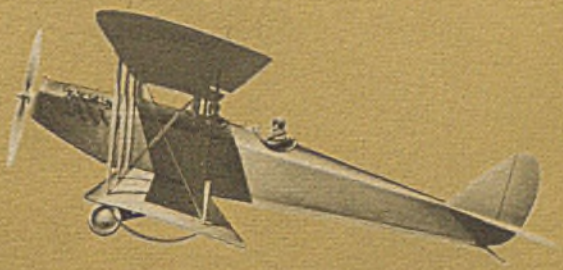
Advantages claimed for this method are: Machine shop labor is saved as there is no drilling or tapping; linings fit perfectly at all times; there are no screws or rivets to work loose in service; there is no chance for scoring of brake drums or clutches.

Develops Lubricants for Drawing Aluminum

■ Two new lubricants for drawing and machining aluminum and its alloys are reported by Wayne Chemical Products Co., 9502 Copeland street, Detroit. One of these, No. 4 aluminum drawing oil, is a viscous lubricant that does not "squeeze out" under the great pressures exerted in deep drawing thin sheets of aluminum. It already has been adopted by several large press plants now working on defense orders.

The other, No. 2 aluminum cutting oil, is a very thin oil that provides the necessary lubricating properties to insure the highest type of machining—perfect threads, clean holes, etc. Free samples are available for metalworking plants interested.

From the "Baling-Wire Age" to the R. A. F. . . .



It's only a short time as the years are counted — ten
eleven to be more exact — since twilight fell on aviation
underpowered, barnstorming, "baling-wire" days. But it
a long stretch from there to the present day, if you cou
the progress in engineering, design and construction th
has produced the "flying cannons" of 1941 . . .

Today, every ship this country builds for the R.A.F., th
U. S. Army and Navy, and our own commercial airlin
carries a common symbol of this progress. *In every on
of them, you'll find Fafnir Aircraft Ball Bearings.*

This marked preference for Fafnirs in vital controls an
engines results from two achievements by this compan
First, Fafnir's recognition of the need for dependabl
friction-free bearings, back in the "baling-wire" days . .
and the pioneering that gave birth to Fafnir's Aircra
Division with its wealth of engineering knowledge. Secon
the Fafnir Aircraft Bearing line — *complete* — and built
standards that have established a reputation for keepin
ships aloft. The Fafnir Bearing Company, New Britain, Con

Specialized Fafnir Ball Bearing — for Hamilton Standard Propellers

Standard Fafnir "K" Type Aircraft Ball Bearing — for control surfaces

Fafnir Rod End — for friction-free aircraft engine controls

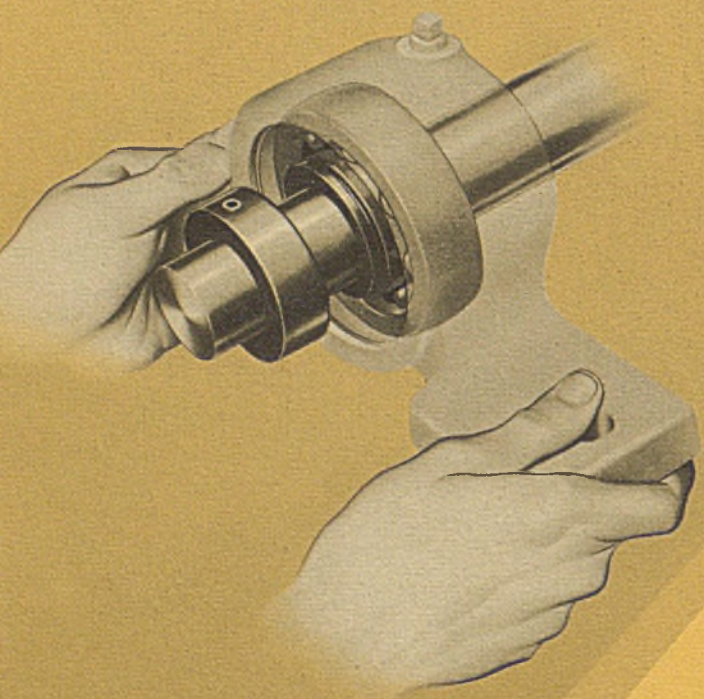
— Representative units in the extensive Fafnir Aircraft line —

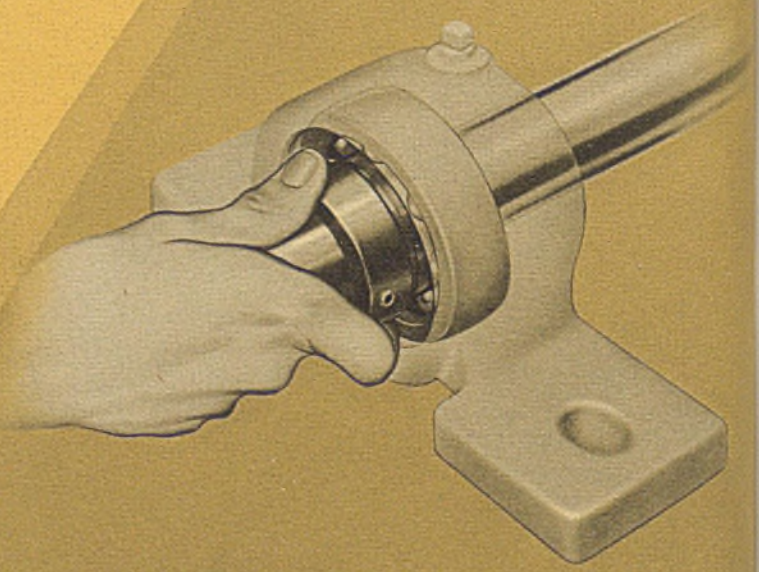
FAFNIR

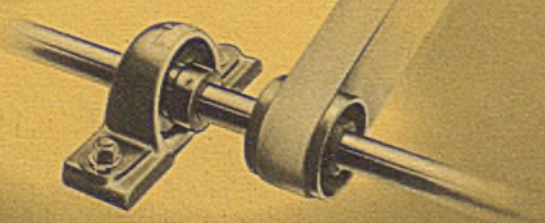
Ball Bearings

THE BALANCED LINE
MOST COMPLETE IN AMERIC

Locks to the Shaft With a Finger-Twist!







You don't need shaft shoulders, locknuts, adapters, or precise machining to install a Fafnir Transmission Unit on its shaft. For Fafnir alone offers the Wide Inner Ring Ball Bearing construction with exclusive Self-Locking Collar. These bearings are machined to inch instead of metric bore dimensions, for slip fit on stock shafting. And a simple finger-twist of the collar locks the inner ring to the shaft.

Give the shafts in your plant and your product the benefit of frictionless ball bearing support. Specify Fafnir Ball Bearing Units and assure yourself of unbeatable ease of installation. The Fafnir Bearing Co., New Britain, Conn.

Standard Ball Bearing Pillow Block

Heavy Series Pillow Block with Extra Seals

Double Pillow Block

Flange Cartridge

— Typical Fafnir Ball Bearing Transmission Units —

FAFNIR
Ball Bearings

THE BALANCED LINE
MOST COMPLETE IN AMERICA

EVERY KNOCK'S A BOOST . . . IN STRENGTH

Do this to some metals and you weaken them. Do this to Tellurium Lead and you *strengthen it!*

Yes, every knock's a boost for this unusual metal. For Tellurium Lead *work-hardens.* A rugged lead to begin with, Tellurium Lead actually *grows stronger under stress.*

Hammer it! Roll it! Stretch it! Bend it! And you've got an even *tougher* lead than you started with.

That means:

1. *Turnover points and joints are less subject to cracking.*
2. *Where vibration is excessive, buckling and creeping are cut down to a minimum.*
3. *Where heat changes are frequent and rapid, there is less danger of fracture.*

Another point to remember! Tellurium Lead keeps sulphuric and other corrosive acids under control — resists their bite even at temperatures close to the metal's melting point. Thus it makes for greater economy and safety in tank linings, heating coils and pipe lines.

Tellurium Lead of our manufacture is time-tested St. Joe chemical lead, alloyed with a small quantity of tellurium. It gives the desirable advantages of this well-known chemical lead plus important new ones. Yet the cost is only a fraction of a cent more per pound than chemical lead. In sheets, pipe and coils. For further facts, write to nearest branch listed at right.

NATIONAL LEAD COMPANY—New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.

TELLURIUM LEAD

How To Get Operators

(*Continued from Page* 62)

chased for training purposes. Generally it is best to purchase new welding equipment for plant operations with the displaced gear going into the welding school. Greater efficiency in the main plant may be enjoyed while the welding school will function just as well with the used machinery.

Both arc and gas equipment should be placed with due regard for convenience of both instructor and students. There should be a power saw for examining section of welds. A power grinder is necessary to polish the cut surfaces for a subsequent etch.

As to details of the welding course, several leading suppliers of electrodes and gases have excellent instruction manuals. But most manuals will be too extensive. The instructor should choose those lessons and exercises that appear most suitable. For simplicity, some companies write their own manuals drawing upon existing booklets for a guide. This concentrates the study on just that material deemed essential to the specific program outlined.

Must Follow Training Pattern

Medium thicknesses of from ¼ to ½-inch seem easiest to weld so most exercises call for ¼-inch material. These gages provide enough material to avoid a too rapid burn-through while they are thin enough to teach the elements of penetration and build-up without using too much material.

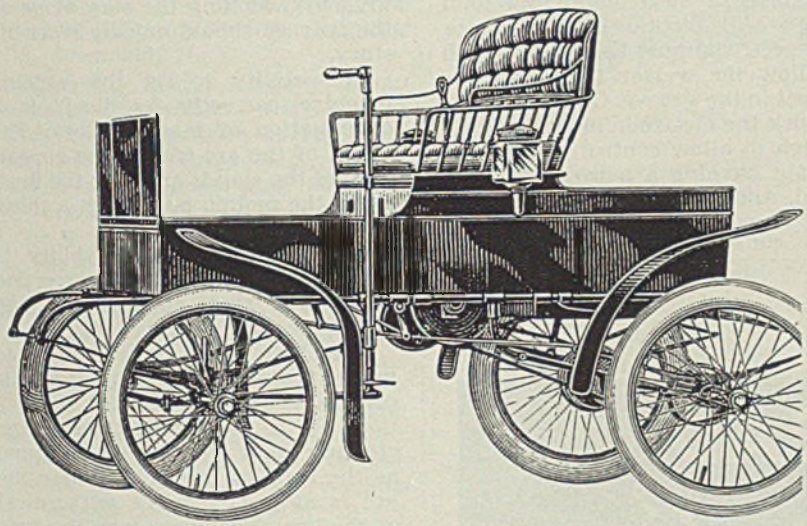
Definite training patterns should be followed. Never allow a student to trace an irregular pattern across the surface of his test material. While the waste of metal that accompanies this dilatory behavior is shameful enough, the student fails to acquire the direction of purpose so valuable in welding work. Many times a seemingly slow welder has developed such a keen sense of directive effort that he saves every motion for a specific accomplishment, so gets more done. That is an important characteristic worth considerable effort to instill in a trainee.

The second most difficult type of welding is sheet metal work. Training in light gages should follow that in the medium gages.

No doubt hardest welding is on heavy plate for eternal vigilance is necessary while continuing to go through the same motions hour after hour. Heat adds to the discomfort of a monotonous, repetitive maneuver. Yet the welder must watch arc and slag with the utmost care while following an exacting weld sequence to avoid cracking. All these factors must be explained during exercises and discussion periods.

Seven abilities are expected of the

"No smell, noise, jolt, etc..."



"Positively the most perfect machine on the market" was the manufacturer's description of this horseless carriage in 1900. And only the rich could afford such perfection. Parts were finished by hand. Interchangeability of parts was unheard of. Then came man-made abrasives such as "Carborundum", and later "Aloxite", to help bring about the mass production that has made available to everybody that miracle of transportation—the modern American car.

The use of man-made abrasives made it possible to finish parts to uniformly close limits of accuracy. Interchangeable crankshafts, cams, cylinders, pistons, gears could be produced in quantity for instant assembly. Better-built cars became available at new low prices. And the same mass production methods extended to other products have helped bring us a new standard of living.

A leader in the advancement of grinding, Carborundum now supplies abrasive products for obtaining finishes of unbelievable accuracy. Whether you are in a mass production industry or not, you will find it profitable to use Carborundum engineering service. The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM
REG. U.S. BRAND PAT. OFF.
ABRASIVE PRODUCTS
50 YEARS OF SERVICE
TO ALL INDUSTRY

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.

finished graduate: The ability to select the proper size and type of electrode; to control the molten pool by observing the slag; to adjust his machine to the correct setting by "feel"; to recognize the causes and correction of trapped slag, undercut, overlap and inadequate penetration; to make proper starts and stops; to read blueprints; and to do simple shop mathematics.

No one should attempt to establish an industrial welding school without a written plan with a specific goal such as these seven points.

The ability to select the proper size and type of electrode should be taught from the very beginning and the trainee should learn to rely upon his judgment as only a few plants designate electrode types and sizes on their drawings. From the type of product the student can be taught to choose the right type of electrode. With much work positioned nowadays, the type choice is simplified. Thickness of base metal and joint design will dictate electrode size. The electrode must be small enough to allow the welder to control his deposit in the groove. On other types of work the electrode must be small enough to allow control of the pool without burning a hole in the base metal. And a large enough electrode must be used to keep our production rates at a high point. The student must learn to evaluate these factors properly in choosing an electrode size.

The ability to control the molten pool by observing the slag is of utmost importance. An experienced operator will turn out a finished weld by watching the slag alone so the learner should quickly learn its story.

The ability to set the welding machine correctly by "feel" is a combination of many factors: The sound of the arc is one; the appearance of the slag is another; the fluidity of the molten pool is yet a third, and there are others.

A fourth goal is the ability to recognize the causes and correction of trapped slag, undercut, overlap and inadequate penetration.

The fifth point, the ability to make proper starts and stops, is often obscured by lack of recognition. With correct technique, the starting point is every bit as sound as the body of the weld. Where the arc is stopped, correct withdrawal of the arc, depending upon the type of electrode, will produce a sound crater.

The ability to read and follow blueprints as well as an understanding of shop mathematics round out the objectives.

Where a plant welding school becomes necessary, give it proper thought and planning along the lines suggested in this article. Much flexibility is possible, while adequacy must not be disregarded for haste, even in the present emergency.

A welding apprentice training plan such as will be described in the third article in this series involves almost no formal instruction. After a few hours of preliminary instruction, the apprentice begins to earn his way by doing simple tacking and welding on production work. Where such a plan is feasible, quickest response to training will be obtained. About the only limitation placed upon the apprentice training procedure is the type of welding done in some plants. For this scheme to work well, there must be many simple welding operations for the beginners to perform. This problem will be taken up next week.

Waterproof Compound Protects Masonry

■ A new liquid-type waterproofing compound for masonry, called Hydrozo, is announced by Hydrozo Products Co., 2725 Kendall avenue, Madison, Wis. It consists of a colorless synthetic mineral gum reduced with a volatile to form a liquid compound. Applied by brush or spray, the product is colorless and penetrates the pores of the masonry to a depth of ¼ to ¾-inch.

Uses Stroboscope To Solve Conveying Actions

■ Determination of the most efficient speeds and strokes for conveying various bulk materials is accomplished by use of a stroboscope in testing vibrating conveyors, screens and packers in the plant of the Ajax Flexible Coupling Co., Westfield, N. Y.

According to the company, stroboscopic observation and testing have been responsibe for developing accurate performance curves based on weights and sizes of materials.

By stroboscopic "freezing" of the action as well as reduction of the travel to slow motion, it has been possible to determine the most effective speed and stroke to obtain maximum capacity and flow. This method has proved helpful in governing stratification in screening and conveying operations.

In addition to the study of materials, the actions and reactions of various working parts of the machine show up any unexpected or concentrated stresses, aiding the design engineer in securing smoother action and eliminating points of fatigue.

Another application in which this method of analyzing has proved valuable is in the handling of fragile materials where breakage is a serious problem.

Metallurgy as Applied To Engineering Work

■ *Modern Metallurgy for Engineers*, by Frank T. Sisco; cloth, 426 pages, 6 x 9 inches; published by Pitman Publishing Co., New York, for $4.50.

The author had three objectives in writing this book. First was to give a broad, concise outline of metallurgy to afford a sound understanding of the important characteristics of metals. Second was to summarize the present status of metallurgy for older engineers who may have lost touch with advances in metallurgical thought. The third was to survey the whole field of ferrous and nonferrous metallurgy, with especial attention to structure and properties, for the benefit of those who have not had a broad fundamental training.

Safety, durability, utility and economical construction hinge extensively on variables inherent in manufacture and treatment of metals and alloys discussed here and their significance is readily apparent. This volume authoritatively and clearly treats the engineering properties of metallic materials, variables affecting them and the importance of these variables. The relation between constitution and

structure of materials and properties is briefly shown in an elementary discussion of fundamental modern concepts of physical metallurgy.

The volume is of value to mechanical engineers, civil engineers, mining engineers, metallurgists and instructors and students of engineering.

Announces New Tool Index; Steel Selector

■ Equipped with the new 96-page preference tool index and steel selector issued recently by Carpenter Steel Co., Reading, Pa., experienced toolmakers should be able to locate easily the recommended steel for any standard tool within a minute or two.

The index and steel selector, an addition to the company's "Matched Tool Steel Manual," alphabetically thumb-indexes all types of tools and dies in general use. The various conditions each type of die or tool may meet in fabrication, heat treatment and service are analyzed and specific tool steels recommended to meet each set of possible conditions. The selector was developed at the request of toolmakers and with their active collaboration.

In addition to the tool index and steel selector, the new manual retains all the material in the old, revised with latest research data and toolmaking practice. This section contains instructions for using the matched set method and descriptions of the nine Carpenter matched tool steels, valuable data and information of speeds of heating for hardening, lengths of time to reach drawing temperatures, furnace atmospheres, etc. The entire manual now contains 159 pages and is obtainable through any company representative.

Seeks Approval of Revision on Hack Saws

■ Proposed revision of simplified practice recommendation R90-36, "Hack-Saw Blades," is now in the hands of industry and other interests for consideration and approval, according to the National Bureau of Standards, Washington. The original draft of this recommendation, which became effective July 1, 1928, was limited to standard tungsten and carbon blades. In the 1929 revision, the scope of the recommendation was enlarged to include high-speed blades. The last revision, effected in 1936, included special-alloy blades.

The one now proposed increases the scope of the recommendation still further by the addition of schedules of stock sizes for coarse-tooth blades. By reason of the changes that have taken place in the demand for different sizes and types of blades since 1936, it is proposed to drop 17 of the stock varieties then listed and add 6 new ones, making a net production of 11 items from the 1936 schedule.

Following approval of producers, distributors, users and others interested, the revised recommendation will remain in effect until it is again revised by the Standing Committee of the industry. Mimeographed copies of the proposed revision may be obtained free from the Division of Simplified Practice.

Statistics of Metals

■ *Metal Statistics*, cloth, 704 pages, 4 x 6 inches; published by *American Metal Market*, New York, for $2.

The thirty-fourth annual edition, this volume has been enlarged and refined, presenting a wealth of information on ferrous and nonferrous metals and miscellaneous economic subjects.

Additions in the iron and steel section include statistics of continuous hot sheet mills, weekly and monthly production of steel ingots since 1917 and statistics on tungsten. In the metals section are included statistics of copper and brass mill fabricators and other new material.

Non-Defense Steel Users Find Supply More Acute

Many have exhausted inventories on which they lived for six months. Producers ever stricter in honoring priority ratings.

MARKET I
TABLOID

Demand

Orders in June were smalle a welcome development.

Prices

Freezing keeps most mark strictly under control.

Production

Down 6 points to 93½ per ce

■ VOLUME of steel orders has fallen off with greatest rapidity in several months. For the majority of companies June sales were much below those of May and often were the smallest for the year to date. This is due to more drastic shelving of nondefense inquiries, to the voluntary abandonment of projects by many civilians because of known futility of getting materials and to the fact that some producers still refuse to sell for 1942 delivery.

The aggregate of defense orders is holding its own and perhaps increasing, though there is less evidence of certain large tonnages, such as ship plates, which figured in a flurry of buying a few weeks ago. It is recognized that the first phase of defense, the setting up of buildings and equipping with machinery, is about completed, with the next phase, buying of materials for mass production, now dominant.

Nondefense users, who have been living off inventories which they had built up for the past six months, have about exhausted them in many cases and are more frantic for steel and must depend on current shipments from mills. More prevalent and stricter priorities also handicap civilians. Some producers are being forced to exercise what they call "priorities on priorities," apportioning steel among holders of the same priority ratings, a specific example being a steel producer ordered to supply an aircraft engine maker and an airplane builder, both with A-1-a ratings, but having not enough steel to supply both completely.

This bears out the frequent warning that too prevalent priorities will defeat the purpose for which they were issued, though apparently no better system has been devised. One prominent steelmaker notes that among high ratings A-1-a and A-1-b submitted to him they are about equally divided. Much steel for the Maritime Commission is said, surprisingly, to carry only an A-1-c. Railroads have been assigned generally an A-3 rating with purchasing brisk.

Producers are much stricter than a month ago in their handling of priority ratings. First, they will not honor an inquiry until the certificate or photostatic copy is definitely exhibited. Secondly, the certificate must carry a fairly accurate and specific description of the steel wanted. Thirdly, they will no longer allow nondefense tonnages to ride along under the umbrella of priorities, a consumer formerly often getting more tonnage than needed for defense.

Because of the red tape involved some consumers, entitled to high priority ratings, have not bothered to obtain them, though admit that they are now practically compelled to do so. One manufacturer needing special plates required 58 sheets of paper for the application and 30 days for approval from OPM. The plates were delivered quickly thereafter. A maker of aviation gasoline tanks has ignored asking for priority ratings to date, having been supplied voluntarily. One specialty steel maker reports 95 to 100 per cent of sales on priorities.

Several injustices are natural in the present difficult emergency. Thus structural fabricators are often required by their plain steel suppliers to show priority ratings, where purchasers of the fabricated and erected material possess no such certificates. Warehouse distributors complain, not only of shipping out steel on priorities and being unable to get priorities to replenish, but having to furnish defense agencies on a mill tonnage basis.

June pig iron production was 4,551,040 tons, or 151,701 tons daily, as against 4,596,113 tons, or 148,262 tons daily for May. The daily rate was within 6 tons of the all-time record in March, 1941. Average operating rate was 96.3 per cent of capacity, up 2.2 points and equal to March, the high for the year. A net gain of 5 furnaces brought 211 in blast.

Automobile production for the week ended July 5 was scheduled for 96,457 units, down 31,469 for the week, comparing with 51,975 in the like week of 1940.

Because of the holiday the steel operating rate last week dropped 6 points to 93½ per cent. Declines took place as follows: Buffalo 15 points to 75½, eastern Pennsylvania 5 points to 92, Detroit 13 points to 83, Birmingham 5 points to 90, Cleveland 5½ points to 92½, Cincinnati 9½ points to 81½, Chicago 7 points to 95½, New England 10 points to 90, Pittsburgh 2½ points to 97½ and Youngstown 8 points to 90. St. Louis was same at 98, Wheeling up 3 to 87.

STEEL's three composite price groups for last week were unchanged: iron and steel at $38.15, finished steel at $56.60 and steelworks scrap at $19.16.

COMPOSITE MARKET AVERAGES

	July 5	June 28	June 21	One Month Ago June, 1941	Three Months Ago April, 1941	One Year Ago July, 1940	Five Years Ago July, 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.15	$37.63	$33.49
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	53.40
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.16	18.56	12.89

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	July 5, 1941	June 1941	April 1941	July 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.25
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.21	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	July 5, 1941	June 1941	April 1941	July 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.22	24.22	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	30.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.20	$19.55
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	18.00	17.50
Heavy melting steel, Chicago	18.75	18.75	18.80	17.45
Rails for rolling, Chicago	22.25	22.25	22.65	21.65
No. 1 Cast, Chicago	20.00	21.50	22.31	16.95

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$5.50	$4.75
Connellsville, foundry, ovens	7.25	7.25	6.00	5.75
Chicago, by-product fdry., del.	12.25	12.25	11.85	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 303	No. 304
Bars	24.00	26.00	25.00
Plates	27.00	29.00	29.00
Sheets	34.00	36.00	36.00
Hot strip	21.50	27.00	23.50
Cold strip	28.00	33.00	30.00

20% Ni.-Cr. Clad

Plates	18.00*
Sheets	19.00

**Annealed and pickled*

Straight Chromes

	No. 410	No. 416	No. 430	No. 442
Bars	18.50	19.00	19.00	22.50
Plates	21.50	22.00	22.00	25.50
Sheets	26.50	27.00	29.00	32.50
Hot strip	17.00	18.25	17.50	24.00
Cold stp.	22.00	23.50	22.50	32.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c-2.54c
Philadelphia, del.	2.15c
Boston, delivered	2.42c-2.57c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c-2.35c
Sparrows Point, Md.	2.10c-2.35c
Claymont, Del.	2.10c-2.35c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Roofing Ternes

Pittsburgh base, package 112 *sheets* 20 x 28 *in., coating I.C.*

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Duluth, base	2.25c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail	2.59c
Pac. ports, dock	2.80c
All-rail	3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail	2.59c

Pac. ports, dock 2.80c
All-rail 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20
4100 .15-25 Mo			0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni.			1.20
5100 80-1.10 Cr.			0.45
5100 Spr. flats			0.15
6100 Bars			1.20
6100 Spr. flats			0.85
Carb., Van.			0.85
9200 Spr. flats			0.15
9200 Spr. rounds, squares			0.40
T 1300, Mn, mean 1.51-2.00			0.10
Do., carbon under 0.20 max.			0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pittsburgh, Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base..... 2.15c
Gulf ports, dock..... 2.50c
All-rail 2.59c
Pacific ports, dock 2.80c
All-rail 3.25c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pittsburgh, Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail 2.59c
Pacific ports, dock..... 2.80c
All-rail 3.25c
Detroit, del. 2.25c

Iron Bars

Philadelphia, del. 2.37c
Chicago 2.25c
Pittsburgh, muck bar, .. 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails..... $2.55

(Per Pound)

Polished fence staples.. 2.55c
Annealed fence wire.... 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C.L. column) ... 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham 2.10c
Detroit, del. 2.20c
Philadelphia, del. 2.42c
New York, del. 2.46c
Pacific Coast ports ... 2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.. 2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown 2.80c
Chicago 2.90c
Detroit, del. 2.90c
Worcester, Mass. 3.00c

Carbon	Cleve.,	Pitts.
0.26—0.50		2.80c
0.51—0.75		4.30c
0.76—1.00		6.15c
Over 1.00		8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown 2.95c
Chicago 3.05c
Detroit, del. 3.05c
Worcester, Mass. 3.35c
Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.15c
Car axles forged, Pitts., Chicago, Birmingham. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter.....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.
Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1¼-inch	57	58
1⅜ and larger..	56	..

Hexagon Cap Screws

Upset 1-in., smaller .....64 off

Square Head Set Screws

Upset, 1-in., smaller.....71 off
Headless set screws.....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞ inch and under.....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.25 off

Tool Steels

Pittsburgh base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.5	4	1	8.5	54.00
.....	4	2	8	54.00
5.5	4	1.5	4	57.50

Welded Iron, Steel, Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Blk.	Galv.
Steel		
½	63½	51
¾	66½	55
1—3	68½	57½
Iron		
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel		
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½
Iron		
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe

Steel	
1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cutlengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham.. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs *(Gross Tons)*

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.) $2.00
Do., over ⅝ to ⅷ-in. incl. 2.15
Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. ... 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered . 12.25
Terre Haute, del. .. 11.75
Milwaukee, ovens.. 12.25
New England, del... 13.75
St. Louis, del. 12.25
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. ... 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia....$30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.12	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	41.80
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty paid, sbd. $120.00; Carlots, del. Pitts. 125.33; Carlots, f.o.b. Southern furn. 145.00. For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot. 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50; Do., ton lot 87.00; Do., 75 per cent 135.00; Do., ton lots 151.00; Spot, $5 a ton higher.

Silicomanganese, c.l., 2¼ per cent carbon 118.00; 1½% carbon 128.00. Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c; Do., ton lots 11.75c; Do., less-ton lots 12.00c; less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23; Do., less-ton lots 1.25; 20-25% carbon, 0.10 max., ton lots, lb. 1.35; Do., less-ton lots 1.40. Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25; Do., less-ton lots 2.30. Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50; Do., spot 145.00; Do., contract, ton lots 145.00; Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50; Do., spot 160.00; Do., contract, ton lots 160.00; Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c; Do., ton lots 8.00c; Do., less-ton lots 8.50c. Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c; Do., ton lots 7.50c; Do., less-ton lots 7.75c; Do., less 200 lbs. 8.00c. Spot ¼c lb. higher

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50; Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10; Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c; Do., spot 85.00c

88% chrome, cont. tons. 79.00c; Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.50c; Do., 2% 13.00c. Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50; Ton lots 84.50; Less-ton lots, lb. 4.00c; Less 200 lb. lots, lb. 4.25c. Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c; Ton lots 6.00c; Less-ton lots 6.25c. Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50; Do., ton 108.00

35-40%, contract, carloads, lb., alloy 14.00c; Do., ton lots 15.00c; Do., less-ton lots 16.00c. Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60; Do., 100-200 lb. lots 2.75; Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	6.90	....	....
Seattle	4.00	4.00	5.20	4.00	4.00	5.75	4.00	6.50	5.25	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 1499 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b U.K. Ports	£	s	d
Merchant bars, 3-inch and over	£66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.79c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 21 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.15	1	15	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, lmp.	23.50-24.00
Chrome ore, Indian, 48% gross ton, cif.	$43.00-46.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	....
So. African, 48%	70.00-72.00
Brazilian, 46%	69.00-71.00
Chilean, 47%	65.00-70.00
Cuban, 50-51%, duty free	....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

IRON AND STEEL SCRAP PRICES

Maximum Prices Announced June 18 by Office of Price Administration and Civilian Supply (Gross Tons)

	Pittsburgh, Weirton, Steubenville(a)	Youngstown, Canton, Sharon	Chicago	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.75	18.75	19.50	19.25	19.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.75	16.75	17.50	17.25	17.50
Mixed borings and turnings	15.25	15.25	14.00	13.50	14.00	14.00	14.75	14.50	14.75
Machine shop turnings	15.50	15.50	14.25	13.75	14.25	14.25	15.00	14.75	15.00
Shovel turnings	16.50	16.50	15.25	14.75	15.25	15.25	16.00	15.75	16.00
No. 1 busheling	19.50	19.50	18.25	17.75	18.25	18.25	19.00	18.75	19.00
No. 2 busheling	15.50	15.50	14.25	13.75	14.25	14.25	15.00	14.75	15.00
Cast iron borings	15.75	15.75	14.50	14.00	14.50	14.50	15.25	15.00	.....
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
No. 1 cupola	21.00	21.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00
Heavy breakable cast	19.50	19.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50
Stove plate	19.00	.....	17.00	18.00	18.50	18.00	18.00	19.00	17.50
Low phos. billet, bloom crops	25.00	25.00	23.75	23.25	23.75	23.75	24.50	24.25	23.50
Low phos. bar crops and smaller	23.00	23.00	21.75	21.25	21.75	21.75	22.50	22.25	21.50
Low phos. punch., plate scrap	23.00	23.00	21.75	21.25	21.75	21.75	22.50	22.25	21.50
Machinery cast cupola size	22.00	22.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Clean auto cast	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Punchings and plate scrap†‡	22.00	22.00	20.75	20.25	20.75	20.75	21.50	21.25	20.50
Punchings and plate scrap§§	21.00	21.00	19.75	19.25	19.75	19.75	20.50	20.25	19.50
Heavy axle and forge turnings	19.50	19.50	18.25	17.75	18.25	18.25	19.00	18.75	18.00
Medium heavy elec. furnace turnings	18.00	18.00	16.75	16.25	16.75	16.75	17.50	17.25	16.50

	St. Louis	Toledo, O.	Detroit	Duluth	Birmingham	Chattanooga	Radford, Va.	New England‡	Pacific Coast§
No. 1 heavy melting	$17.50	$.....	$17.85	$18.00	$17.00	$.....	$.....	$16.50	$14.50
No. 1 hyd. comp. black sheets	17.50	.....	17.85	18.00	17.00	.....	.....	.....	14.50
No. 2 heavy melting	16.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
Dealer No. 1 bundles	16.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
Dealer No. 2 bundles	15.50	.....	15.85	16.00	15.00	.....	.....	.....	12.50
Mixed borings and turnings	12.75	.....	13.10	.....	12.25	.....	.....	.....	9.75
Machine shop turnings	13.00	.....	13.35	15.50	15.00	.....	.....	.....	10.00
Shoveling turnings	14.00	.....	14.35	16.50	.....	.....	.....	.....	11.00
No. 1 busheling	17.00	.....	17.35	17.50	16.50	.....	.....	.....	14.00
No. 2 busheling	13.00	.....	13.35	13.50	12.50	.....	.....	.....	10.00
Cast iron borings	13.25	.....	13.60	13.75	12.75	.....	.....	.....	10.25
Uncut structurals and plate	18.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
No. 1 cupola	20.00	.....	20.35	18.00	20.00	20.50	21.00	22.00	18.00
Heavy breakable cast	18.50	.....	18.85	16.50	18.50	.....	.....	20.50	17.00
Stove plate	17.00	15.60	14.10	.....	17.00	17.50	18.00	14.00	14.00
Low phos. billet and bloom crops	22.50	.....	22.85	23.00	22.00	.....	.....	.....	.....
Low phos. bar crops and smaller	20.50	.....	20.85	21.00	20.00	.....	.....	.....	.....
Low phos. punch. and plate scrap**	20.50	.....	20.85	21.00	20.00	.....	.....	.....	.....
Machinery cast cupola size††	21.00	.....	21.35	19.00	21.00	21.50	22.00	23.00	19.00
No. 1 machine cast, drop broken, 150 pounds and under	21.50	.....	21.85	19.50	21.50	22.00	22.50	23.50	19.50
Clean auto cast	21.50	.....	21.85	19.50	21.50	22.00	22.50	23.50	19.50
Punchings and plate scrap†‡	19.50	.....	19.85	20.00	19.00	.....	.....	.....	.....
Punchings and plate scrap§§	18.50	.....	18.85	19.00	18.00	.....	.....	.....	.....
Heavy axle and forge turnings	17.00	.....	17.35	17.50	16.50	.....	.....	.....	14.00
Medium heavy elec. furnace turnings	15.50	.....	15.85	16.00	15.00	.....	.....	.....	12.50

*Claymont, Del., Coatesville, Phoenixville, Harrisburg, Pa. †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Seattle; **⅜-inch and heavier, cut 12 inches and under; ††may include clean agricultural cast; ‡‡under ⅜-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under.

Maximum Prices for Iron and Steel Scrap Originating from Railroads

	Pittsburgh, Wheeling, Steubenville	Youngstown, Canton, Sharon	Chicago	Kokomo, Ind.	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 Railroad grade heavy melting steel	$21.00	$21.00	$19.75	$19.25	$19.75	$19.75	$20.50	$20.25	$20.50
Scrap rails	22.00	22.00	20.75	20.25	20.75	20.75	21.50	21.25	21.50
Rerolling quality rails	23.50	23.50	22.25	21.75	22.25	22.25	23.00	22.75	23.00
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	22.75	22.75	23.50	23.25	23.50
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	23.00	23.00	23.75	23.50	23.75
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	23.25	23.25	24.00	23.75	24.00

	St. Louis	Kansas City	Detroit	Duluth	Birmingham	Minnequa, Colo.	Radford, Va.	New England‡	Pacific Coast§
No. 1 Railroad grade heavy melting steel	$18.50	$17.00	$18.85	$19.00	$18.00	$17.50	$.....	$.....	$15.50
Scrap rails	19.50	18.00	19.85	20.00	19.00	18.50	.....	.....	16.50
Rerolling quality rails (a)	21.00	19.50	21.35	21.50	20.50	20.00	.....	.....	18.00
Scrap rails 3 feet and under	21.50	20.00	21.85	22.00	21.00	20.50	.....	.....	18.50
Scrap rails 2 feet and under	21.75	20.25	22.10	22.25	21.25	20.75	.....	.....	18.75
Scrap rails 18 inches and under	22.00	20.50	22.35	22.50	21.50	21.00	.....	.....	19.00

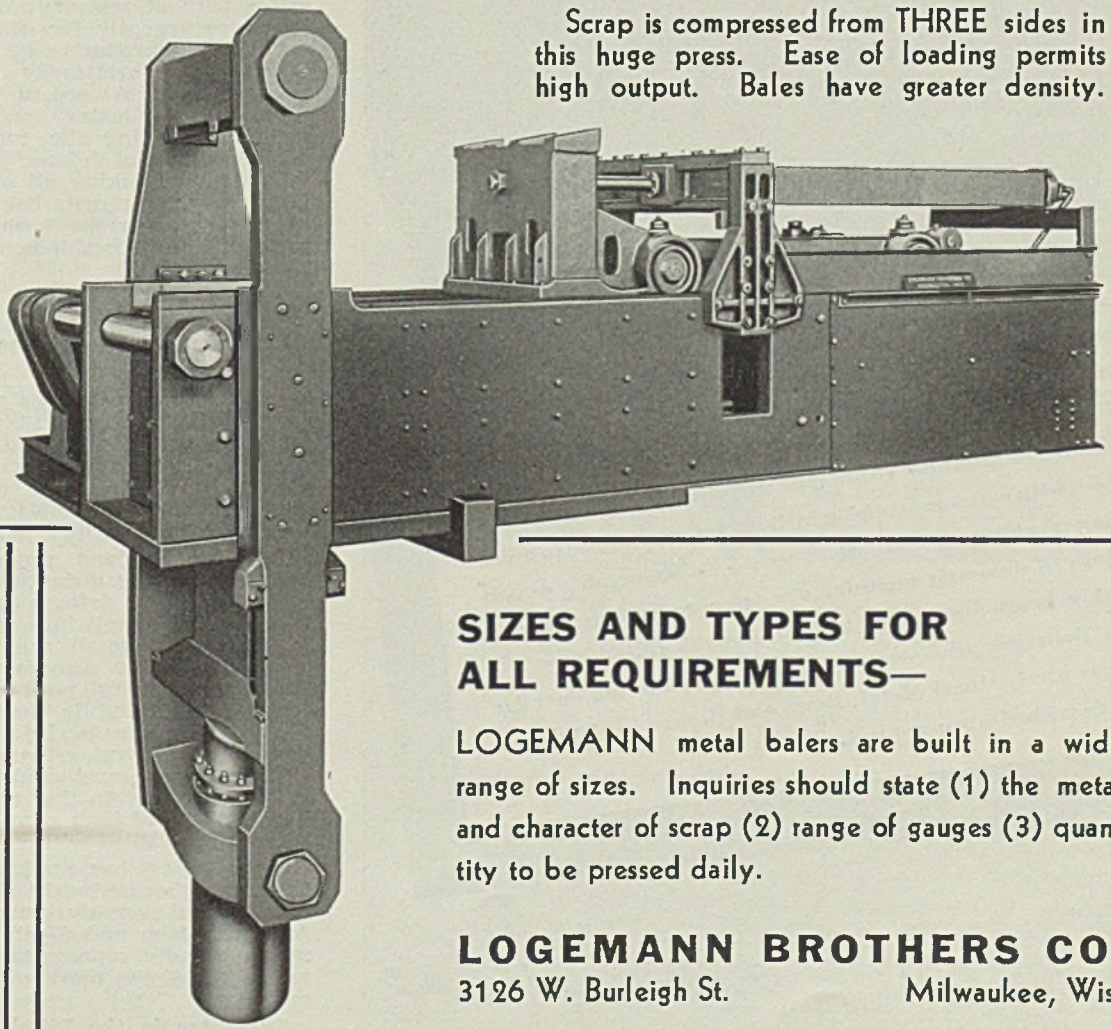
*Philadelphia, Wilmington, Del., Claymont, Del., Coatesville, Phoenixville, Harrisburg, Pa.; †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Seattle. (a) also Johnstown, Pa., Warren, O.

NOTE: Where the railroad maker of scrap operates in two or more of the consuming points named above, the highest of the maximum prices set out above for such basing points shall be the maximum price at consumer's plant at any point on the railroad's line, except that switching charges of $4 cents per gross ton shall be subtracted from the maximum price of scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. (a) Re-laying quality $5 higher.

SHEET SCRAP?

Bale it in a LOGEMANN SCRAP PRESS

"Hydraulic-compressed" scrap pressed in LOGEMANN metal balers, commands the best price at all times. It can be more conveniently stored and more economically handled. It can be readily held for favorable markets. It practically eliminates corrosion, saves much heat in remelting. It easily loads cars to capacity.



Scrap is compressed from THREE sides in this huge press. Ease of loading permits high output. Bales have greater density.

SIZES AND TYPES FOR ALL REQUIREMENTS—

LOGEMANN metal balers are built in a wide range of sizes. Inquiries should state (1) the metal and character of scrap (2) range of gauges (3) quantity to be pressed daily.

LOGEMANN BROTHERS CO.
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Plates

Plate Prices, Page 108

Plate deliveries have become tighter, a situation particularly felt by freight car builders, who have heavy quantities to place for shipment over the remainder of the year. Ship requirements also are large and producers are urging shipyards to lay out regular schedules as far in advance as possible.

Approximately 50,000 tons of rolled armor plate and a substantial tonnage of forged armor plate will be required for six heavy cruisers to be built by New York Shipbuilding Corp. This is in addition to 45,000 tons of plates and shapes already placed, that total having been increased to 50,000 tons, including some bars.

Shipyards take most available plate supply in the New England area. Builders of tanks, even with relatively high priority rating, find limited supplies. Fabricating shops with miscellaneous defense contracts receive some tonnage but are unable to build up inventories. Shops without such contracts are being pinched for supplies, especially light plates. Suppliers of marine equipment are pressing for better deliveries, with some success.

In the Birmingham, Ala., district demand for plates for ship and car building is heavy and production is not sufficient to meet all needs, deliveries falling behind, even on priority rating.

PLATE CONTRACTS PLACED

450 tons, also 300 tons of shapes, five lighters for navy department; Pacific Car & Foundry Co., Seattle, contractor.

PLATE CONTRACTS PENDING

175 tons, 3,000,000-gallon steel reservoir, Scott Field, Ill., Graver Tank & Mfg. Co., East Chicago, Ind., $47,428, low, inv. 181, bids June 16 to United States engineer, St. Louis; government estimate $42,500.

100 tons, floor plates, schedule 7395, for Oakland, Calif.; bids opened in Washington.

Sheets, Strip

Sheet & Strip Prices, Pages 108, 109

Sheet producers generally are making no firm delivery promises beyond the year end and some not beyond the end of third quarter. Most tonnages are accepted only with some leeway provision, because of uncertainty over priorities. Galvanized are scarcest of all sheet grades and mills and jobbers as a rule have no stocks, due to rationing of zinc, which is available now only for high priority tonnage.

Narrow cold strip buying continues slightly in excess of production and shipment, being practically balanced in the case of some producers. However, no progress is being made in reducing backlogs. Defense orders with priority are crowding some commercial tonnage from finishing schedules and fabricators without reserves are appealing more urgently for deliveries.

Cold strip producers in some instances are arbitrarily reducing releases against orders for the automobile industry and parts-makers, diverting the tonnage to other channels of defense use. Strip mills are not taking all orders offered, even for remote delivery and as a result current bookings are more in line with shipments.

Bars

Bar Prices, Page 108

Little bar business is being booked without priorities and most carry a high rating. Shipbuilding takes a steady volume and machine shops are specifying heavily, being unable to obtain their usual requirements from secondary sellers, turning to mill sources for supply.

In New England producers of alloy bars have substantial tonnage on books for defense purposes, which extends well into next year. Production of small arms, forged chain and other armament materials is attaining peak schedule, which is reflected in heavy specifications for bars and forging billets. Every forging hammer, including many considered obsolete, is in operation. In that area warehouse stocks of both alloy and carbon bars are filled with gaps.

Since July 1 bar producers have been operating under the steel products manual recently issued by the American Iron and Steel Institute, which broadly represents a standardization of the most widely used analyses.

Iron bars in the Pittsburgh district now are quoted at 5.00c for

muck bar quality and 8.00c for staybolt quality. The former was quoted at 3.50c when made of scrap but now this is not available and it is produced entirely from pig iron, hence the higher quotation. Staybolt iron quality is unchanged.

Pipe

Pipe Prices, Page 109

Several forms of steel pipe, including merchant, line, casings and conduits probably reached an all-time high in June. One of the pending large pipe line orders is said to be on the point of award. In rare cases galvanized pipe users have been able to obtain prompt delivery from suppliers who had good reserves.

Distributors of black pipe are meeting added difficulty in obtaining replacements, a situation matching that in galvanized pipe. Demand for black pipe has been heavier than usual at this season.

Cast iron water pipe is more active, with several large inquiries, totaling several thousand tons for New England municipalities. Southern cast pipe makers are operating at capacity, largely for defense projects, and considerable pipe is on inquiry.

CAST PIPE PLACED

300 tons, 6 and 12-inch, Revere, Mass., to Warren Pipe Co., Everett, Pa.; also 100 tons, fittings, Boston, to same foundry.

300 tons, various sizes, housing project extensions, Portsmouth, N. H., to Warren Pipe Co., Everett, Mass.

250 tons, 6 and 10-inch, Oakville, Conn., to United States Pipe & Foundry Co., Burlington, N. J.

166 tons, 6 and 12-inch, San Bernardino, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

150 tons, 6 and 8-inch, Stoneham, Mass., to Warren Pipe Co., Everett, Mass.

135 tons, 6 and 8-inch, Bristol, Conn., to R. D. Wood & Co., Florence, N. J.

CAST PIPE PENDING

1650 tons, 16-inch, Waterville, Me.; bids in.

550 tons, 8 and 16 inch, Avalon Way improvement, Seattle; Argentieri & Colarossi, Seattle, low, $66,950.

300 tons, 10-inch and under, Epsom, N. H.; bids in.

Unstated, but large, tonnage, 30-inch steel, cast iron or concrete pipe, division of water supply, Cleveland.

Wire

Wire Prices, Page 109

Heavy and diversified demand for wire and wire products, with limited rod supplies, shortage of zinc for galvanizing and upset finishing schedules and processing presenting difficult problems. Spring and welding wire are notably active, with more priority orders than for other products.

Third quarter opens with backlogs heavier than three months ago, in spite of peak production and deliveries at a high rate. Finishing schedules are disrupted frequently by appearance of high-priority defense orders, which result in further extension of other tonnage beyond promised delivery dates. In

some instances mills have been able to ship bright-finished common wire in 10 to 12 weeks.

Wire rod supplies continue below requirements and non-integrated wiremakers are cutting into whatever inventory they have. Finishing capacity appears adequate. Defense demand includes protective fencing for industrial and armament plants, spring coils for packing explosives, bomb clips and other items.

Rails, Cars

Track Material Prices, Page 109

Orders for cars and locomotives continue to be booked by builders in large lots, as carriers seek to provide sufficient rolling stock to meet expected emergencies of defense. Builders have fully as many units on order as they can fabricate the remainder of this year and a considerable number is expected to go over to 1942.

Freight car bookings in June were larger than for any full year from 1931 to 1935, inclusive.

CAR ORDERS PLACED

Akron, Canton & Youngstown, 100 dump hopper cars, of 50 tons capacity, and 30 seventy-ton gondolas, to Bethlehem Steel Co., Bethlehem, Pa.

Atchison, Topeka & Santa Fe, 37 coaches, to Edward G. Budd Mfg. Co., Philadelphia, comprising 16 chair cars, eight diners, seven storage-mail cars and six lounge-club cars; in addition to 22 previously noted as placed.

Cambria & Indiana, repairs to 400 hoppers to Bethlehem Steel Co., Bethlehem, Pa.

Central of Georgia, 50 fifty-ton box cars, to Pullman Standard Car Mfg. Co., Chicago; in addition to 150 fifty-ton automobile cars recently noted as going to American Car & Foundry Co., New York.

Chicago, Rock Island & Pacific, 200 gondolas, to American Car & Foundry Co., New York.

Clinchfield, five seven-ton covered hoppers and seven cabooses, to American Car & Foundry Co., New York.

Florida East Coast, 30 fifty-ton gondolas, 30 fifty-ton hoppers, to American Car & Foundry Co., New York.

Litchfield & Madison, 50 hopper cars, to General American Transportation Co., Chicago.

Mexican National, 1000 box cars to Ralston Steel Car Co., Columbus, O.

Milwaukee Electric Transportation Co., 35 trolley coaches to Pullman-Standard Car Mfg. Co., Chicago.

Nickel Plate, 900 fifty-ton box cars to General American Transportation Co., Chicago; 250 fifty-ton hoppers to American Car & Foundry Co., New York.

Norfolk & Western, 25 seventy-ton gondolas, to Ralston Steel Car Co., Columbus, O.

Reading, 500 seventy-ton gondolas to Bethlehem Steel Co., Bethlehem, Pa.

Schenectady Railway Co., 10 diesel-electric buses to General Electric Co., Schenectady, N. Y.

Seaboard Air Line, 500 box cars to Pullman Standard Car Mfg. Co., Bessemer, Ala., 100 flat cars and 50 cement cars to Greenville Steel Car Co., Greenville, Pa.

Southern Pacific, 700 gondolas to Bethlehem Steel Co., Bethlehem, Pa., 500 box cars to Mt. Vernon Car Co., Mt. Vernon, Ill., 300 flat cars to Pacific Car & Foundry Co., Seattle, 250 tank cars to General American Transportation Co., Chicago, 150 hoppers to American Car & Foundry Co., New York; in addition to 2100 box cars previously placed.

CAR ORDERS PENDING

Argentina State Railways, 375 thirty-ton hopper cars, contemplated.

Army, Quartermaster Corps, Ft. Benning, Ga., twelve 36-inch gage motor cars and two trailers.

Chief army engineers, fifty-nine 10,000-gallon gasoline tank cars, General American Transportation Co. low.

Navy, 26 flat cars for Yorktown, Va., Haffner-Thrall Car Co., Chicago, low.

St. Louis Southwestern, 500 freight cars; court permission to build in own shops requested.

LOCOMOTIVES PLACED

Delaware & Hudson, 15 freight locomotive Co., New York.

Florida East Coast, three diesel-electric, 2000-horsepower passenger locomotives, to Electro-Motive Corp., La Grange, Ill.

New York, Susquehanna & Western, two diesel-electric 1000-horsepower locomotives, to American Locomotive Co., New York.

RAIL ORDERS PENDING

Navy, Bureau of supplies and accounts, 9575 tons, delivery Baldwin, Long Island, N. Y.; bids July 11, sch. 7715, Washington.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 109

While the bolt and nut industry now is operating well in excess of theoretical capacity, in fact, as high

as possibly 110 per cent, there is serious doubt that this rate can long be maintained, because of difficulty in replacing raw materials. There is a marked excess of business, but a pronounced shortage of steel, even where relatively high priorities are held.

Structural Shapes

Structural Shape Prices, Page 108

Inquiries and awards are lighter, partly because of the holiday week, and partly because of nearness to completion of the initial phases of the defense effort and housing. The amount of work in sight may still produce business above average, but apparently small by comparison with first quarter, this year. Fabricators often have to show priority certificates to obtain plain material, yet their own customers fail to display such ratings for their projects, which makes for confusion.

SHAPE CONTRACTS PLACED

5027 tons, state highway bridge, Illinois river, FA-172, section 15F, Peoria, Ill., to American Bridge Co., Pittsburgh; bids June 13.

3125 tons, two hangars, naval air station, Lakehurst, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; bids July 2.

2700 tons, hangars, Wright Field, Dayton, O., to Bethlehem Steel Co., Bethlehem, Pa.

1950 tons, power house, navy yard, Brooklyn, N. Y. to Easton Steel Structures Inc., Easton, Pa., through J. G. White Engineering Corp., New York.

1900 tons, Mystic power station 200, Everett, Mass., Boston Edison Co., to American Bridge Co., Pittsburgh.

1080 tons, army depot sheds, Columbus, O., to Mt. Vernon Bridge Co., Mt. Vernon, O.

940 tons, outfitting plant, New York Shipbuilding Corp., to American Bridge Co., Pittsburgh.

440 tons, plant addition, Hamilton Watch Co., Lancaster, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through D. S. Warfel, Lancaster, contractor.

940 tons, repair dock, air field, Middletown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; is in addition to 800 tons for another repair dock recently.

630 tons, state bridge, Lancaster county, Pennsylvania, to American Bridge Co., Pittsburgh.

600 tons, state highway bridge FAGM-414C, Burlington, Des Moines county, Iowa, to American Bridge Co., Pittsburgh; Jensen Construction Co., Chicago, contractor.

520 tons, gas plant structure, West Henderson, Ky., to Virginia Bridge Co., Roanoke, Va.

450 tons, piling, substructure, Canal street bridge, Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; Midwest Construction & Asphalt Co., Chicago, contractor; bids May 21.

435 tons, state highway bridge, FAGH-419H, Bellevue, Jackson county, Iowa; to Clinton Bridge Works, Clinton, Iowa; Jensen Construction Co., Chicago, contractor.

400 tons, building, Pittsburgh Metallurgical Co. Inc., Charleston, S. C., to Scully Steel Products Co., Baltimore; G. M. Guest & Co., Anderson, S. C., contractor.

270 tons, state highway bridge, route FA-12, section 56-2-VF, Stubblefield, Bond county, Illinois, to Bethlehem Steel Co., Bethlehem, Pa.; bids June 13.

250 tons, ordnance building, Fort Lewis, Wash., to Isaacson Iron Works, Seattle; Bailey Construction Co., Seattle, contractor.

220 tons, overpass, Baltimore & Ohio railroad, Branchville, Md., for state, to American Bridge Co., Pittsburgh.

200 tons, coal bunkers, navy yard, Brooklyn, N. Y., to Easton Structures Inc., Easton, Pa.

200 tons, magazines, Quonset Point, R. I., to Belmont Iron Works, Philadelphia.

180 tons, staging towers and spalls, Federal Shipbuilding & Dry Dock Co., Kearny, N. J., to American Bridge Co., Pittsburgh.

175 tons, protein building, Glidden Co., Chicago, to Wendnagle & Co., Chicago.

175 tons, state bridge 5466, Worthington, Minn., to American Bridge Co., Pittsburgh.

170 tons, State street subway stations, S-10-E, Chicago, for city, to American Bridge Co., Pittsburgh.

145 tons, state bridge, Montour county, Pennsylvania, to Phoenix Bridge Co., Phoenixville, Pa.

140 tons, grade crossing elimination, Garden City, N. Y., to American Bridge Co.,

SHAPE AWARDS COMPARED

	Tons
Week ended July 5	21,195
Week ended June 28	37,930
Week ended June 21	37,195
This week, 1940	23,619
Weekly average, 1941	30,697
Weekly average, 1940	28,414
Weekly average, June, 1941	27,157
Total to date, 1940	495,751
Total to date, 1941	859,507

Includes awards of 100 tons or more.

Pittsburgh, through E. W. Foley Inc., Brooklyn, N. Y., contractor.

133 tons, factory, Firestone Tire & Rubber Co., Akron, O., to American Bridge Co., Pittsburgh.

110 tons, extension, soaking pit, Republic Steel Corp., Canton, O., to Fort Pitt Bridge Works, Pittsburgh.

100 tons, shapes and bars, addition, Wyman-Cordon Co., Worcester, Mass., to Stafford Iron Works and George F. Blake Co., both Worcester, through J. B. Lowell Inc., that city, contractor.

100 tons, infirmary building, No. 9, veterans' hospital, Roanoke, Va., to Roanoke Iron Works, through L. B. Gallimore, Greensboro, N. C., contractor; reinforcing bars to West Virginia Rail Co.

100 tons, new plant, Ohio Ferro-Alloys Corp., Tacoma, Wash., to Pacific Car & Foundry Co., Seattle.

100 tons or more, plant addition, Scintilla Magneto Co., Sidney, N. Y., to American Bridge Co., Pittsburgh; Frank Lewis & Son, Bainbridge, N. Y., contractor; bars to Joseph T. Ryerson & Son, Inc., Chicago.

100 tons or more, shapes and bars, power plant, Monsanto Chemical Co., Indian Orchard, Mass., to Haarmann Steel Co., Holyoke, Mass.; Adams & Ruxton Construction Co., Springfield, Mass., contractor; bars to A. D. Donald, Springfield.

SHAPE CONTRACTS PENDING

6000 tons, sheet piling, graving dock, Richmond, Calif.; bids opened.

3000 tons, two navy hangars, Lakehurst, N. J.; bids July 2.

3000 tons, army signal corps buildings, Lexington, Ky.; bids July 15.

2000 tons, boiler house, Brooklyn, N. Y., for navy.

1600 tons, three warehouse buildings, Ogden, Utah, for army.

1491 tons, highway bridges, State of Oklahoma; low bidders as follows: Phara & Co., 293 tons; El Reno Construction Co., 694 tons; C. K. Howard, 116 tons; J. W. Moorman & Son, 252 tons and Ottenger Bros., 128 tons.

1100 tons, 11 units, McClelland Field, Sacramento, Calif., James I. Barnes, Los Angeles, low.

1100 tons, 14 radial gates, Ft. Loudoun dam, Lenoir City, Tenn., for Tennessee Valley authority.

1000 tons, piling, blast furnace and ore yard construction, American Rolling Mill Co., Ashland, Ky.

900 tons, power house extensions, Ohio Edison Co., Akron, O.

800 tons, power station, for Mon. West Penn Public Service Co., Rivesville, W. Va.

650 tons, plant C, New Departure division, General Motors Corp., Bristol, Conn.

600 tons, flood wall, Cincinnati; bids July 17, U. S. engineer, Cincinnati.

550 tons, extension to south end casting plant building, the Midvale Co., Philadelphia.

550 tons, New York ventilation building, North tube, Lincoln tunnel, Port of New York authority, contract MHT-57; Thompson-Starrett Co., New York, low; bids July 1.

525 tons, overhaul and fitting out hangar, Lakehurst, N. J., for navy.

500 tons or more, 850 transmission towers, Coulee-Covington line, Washington state; Fritz Ziebarth, Vancouver, Wash., low to Bonneville project.

460 tons, railroad bridge, highway 5, Ravenna, O., for state.

450 tons, storehouse, at Puget Sound navy yard, Washington; bids in.

440 tons, plant, B. F. Goodrich Co., Louisville, Ky.

420 tons, building, R. Lavin & Sons Inc., Chicago.

400 tons, bascule bridge, Miami, Fla., for Dade county, Florida.

400 tons, general storehouse and supply pier, navy yard, Bremerton, Wash.; bids opened.

375 tons, hangar, Bolling field, Washington, for army engineers.

335 tons, six garages, National Guard, Peekskill, N. Y., for state.

300 tons, bridge, Chapline street, Wheeling, W. Va., for city.

300 tons, quartermaster's warehouse, Seattle; bids in June 28.

300 tons, casting plant addition, Midvale Co., Nicetown, Pa.

265 tons, state bridge 5962, St. Paul, Minn.

245 tons, bridge, New York, New Haven & Hartford railroad, Bird street, Boston; Coleman Bros. Corp., Boston, low, $98,263.35, bids July 1, Department of Public Works, Boston.

235 tons, gymnasium addition, Utica, N. Y.

215 tons, calcining building, National Carbon Co., Clarksburg, W. Va.

205 tons, bridge 49.56, Mt. Sterling, O., Baltimore & Ohio railroad.

200 tons, underpass, East Red Bank avenue, Woodbury, N. J., for state.

190 tons, four-story addition, Thompson Wire Co., Worcester, Mass., to Stafford Iron Works, Worcester; Fiske Carter Construction Co., Worcester, contractor; Joseph T. Ryerson & Son, Inc., Cambridge, Mass., awarded reinforcing bars.

140 tons, three storehouses, ammunition depot, Fallbrook, Calif., for navy.

120 tons, bridge repairs, various locations, Northern Pacific railway.

100 tons, shapes and bars, highway proj-

ect, including wide flanged beam bridge, Leicester-Salisbury, Vt.; Bristol Construction Co., Bristol, N. H., low.

Reinforcing Bars

Reinforcing Bar Prices, Page 109

Even builders of projects carrying highest priority ratings often find it difficult to buy concrete bars. Such is an arsenal project at Watertown, Mass., needing 1700 tons. Housing projects, for taking care of increased industrial workers, are making progress haltingly because of this scarcity and because workers can live in tents, trailers or other makeshift shelters when direct defense plants are so necessary. In many cases plan to redesign from structural shapes to concrete have stymied because of steel shortage. The scarcity of 2-inch squares and other heavy bars is notably acute, replacements awaiting rollings in most instances. Some non-defense engineering projects, partially completed, may have to be abandoned because of shutting off of supplies.

REINFORCING STEEL AWARDS

980 tons, flood protection wall, Paducah, Ky., to Laclede Steel Co., St. Louis; G. E. Tillman, Centralia, Ill., contractor.

950 tons, flood control proj., sect. 4, U. S. engineer, Binghamton, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through L. B. Strandberg & Son, Chicago, contractors; $957,748.

580 tons, including 350 tons bars and 230 tons wire mesh, warehouse, Rock Island arsenal, Rock Island, Ill., to Laclede Steel Co., St. Louis; Permanent Construction Co., Chicago, contractor; bids June 14.

450 tons, warehouse foundation, Philadelphia navy yard, completion in 71 days, to Truscon Steel Co., Youngstown, O.

400 tons, addition, Frankford arsenal, Philadelphia, to American Steel Engineering Co., Philadelphia, through Hughes-Foulkrod.

355 tons, Blue Mountain dam, Waveland, Ark., to Sheffield Steel Corp., Kansas City, Mo.; Myers, Myers & Gowen, contractors.

300 tons, King county and Sunset Field airports, Spokane, Wash., to Northwest Steel Rolling Mills, Seattle.

290 tons, flood wall, Cairo, Ill., U. S. engineer, to Laclede Steel Co., through Lake States Engineering Co.

250 tons, eight shipways, Sun Shipbuilding & Drydock Co., Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; Raymond Concrete Pile Co., contractor.

150 tons, addition, Marquette Cement Co., Des Moines, Iowa, to Truscon Steel Co., Youngstown, O., through A. H. Neumann & Bro.

150 tons, Washington state highway projects and Seattle city light substation, to Northwest Steel Rolling Mills, Seattle.

135 tons, plant addition, Hamilton Watch Co., Lancaster, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through D. S. Warfel, Lancaster, contractor.

119 tons, project FA 861-A (1), Monana county, Iowa, to Des Moines Steel Co., Des Moines, Iowa; Orshek & Christensen, contractors.

114 tons, project FA 331-A (2), Rice, Kans., to Sheffield Steel Corp., St. Louis; Taylor Construction Co., contractor.

114 tons, bridge, Ft. Sheridan, Ill., for war department; to Joseph T. Ryerson & Son Inc., Chicago; Thomas McQueen Co., Chicago, contractor.

100 tons, first unit, Central library, Washington, D. C. to Bethlehem Steel Co., Bethlehem, Pa.; Ross Engineering Co., contractor.

REINFORCING STEEL PENDING

5000 tons, superstructure, warehouse, Philadelphia navy yard; bids Aug. 27.

2800 tons, storehouse, Puget Sound navy yard, Washington; Howard S. Wright, Seattle, and L. H. Hoffman, Portland, joint low bidders, $2,194,550.

2200 tons, quartermaster storehouse, Seattle; bids in June 28.

1900 tons, 800-foot pier, Puget Sound navy yard, Washington; Sound Construction & Engineering Co., Seattle, and Peter Kiewitt, Omaha, joint low bidders, $1,944,700.

1500 tons, additional tonnage, Antigua naval base.

CONCRETE BARS COMPARED

	Tons
Week ended July 5	5,437
Week ended June 28	8,861
Week ended June 21	14,915
This week, 1940	1,765
Weekly average, 1941	11,043
Weekly average, 1940	9,661
Weekly average, June, 1941	11,277
Total to date, 1940	220,162
Total to date, 1941	309,217

Includes awards of 100 tons or more.

Behind the Scenes with STEEL

Tax Hint

■ We have long been hinting in this column and elsewhere that STEEL is more than just reading matter—that it is really a tool for use in your business, and one which properly used might well be the most valuable tool of all. Now comes a much more impressive authority agreeing with us fully—none other than the tax collector! One company we know has been deducting subscription costs for STEEL from its tax report as part of the cost of doing business, and thus action has been upheld by the tax collectors on the grounds that trade papers are actually tools for use in business. Of course, we're not advocating this use of STEEL as a tax dodge, but certainly there is nowhere else you get so much for your money and a tax exemption to boot!

Foresight

■ And speaking of taxes, we have just purchased and stuck away for safe-keeping a brand new two-cent postage stamp for use on that black fifteenth day of the third month of the year of our Lord, 1942. Of course, we may be a bit too pessimistic but with any set of figures we use we can't come out with even two pennies left to rub together —let alone get the stamp to send our little contribution through the mails.

Up & Down

■ But things are never really as good nor as bad as they seem. We proved it conclusively just last Sunday with an 8 on the first hole, a par three on the second, and then a big fat 7.

Signs of the Time

■ Queer things are happening these days. Pittsburgh is now producing more steel than any other city in the world, but it itself is up against it for a few tons of steel to build a bridge on Bigelow boulevard. Still facing a 28-day truck drivers' strike, a trucker refuses to haul the necessary girders 20 miles from Canonsburg.

Success

■ Erle Ross, former engineering editor and now Chicago editor for STEEL, sends us, with little or no compunction, a page from the Chicago *Daily Times* carrying his picture—with detailed instructions on how to find it. In a picture story of a typical girl commuter's day, Erle accidentally got "shot" in the lunch scene, looking very glum in between the two vivacious young ladies. The *Times* posed the question, "Are commuters people?" and Erle insists the presentation of his picture proves they are. Well . . . maybe.

Floral Offering

■ A nice bouquet in the mails today from L. F. Hirsh of the Philadelphia Rust-Proof Co. over in Philadelphia. He writes: *We find* STEEL *one of the most interesting magazines to read, and it appears to us you also have more pertinent and up-to-date information about electroplating than any other magazine we know of, including those devoted to the plating industry.* Those, dear reader, are pure white orchids.

Odd Jobs

■ *Peeler*—A guy who strips bark off logs in a sawmill.

Hot-stuff Man or *Shake-out Man*—A gentleman who dumps out hot pans in a bakery.

Frog-leg Assembler—A fellow who puts together the works inside an automobile door.

Vamper—The boy who sews uppers in a shoe factory.

Bull-runner—A man who has to do with power in a foundry.

New Face

■ In keeping with the general expansion, STEEL's masthead this week adds a third dimension which, we all agree here, gives it considerable more wim, wigor and witality. Like it?

SHRDLU

1250 tons, flood wall, Cincinnati; bids July 17, U. S. engineer, Cincinnati.

1235 tons, highway work, county board of road commissioners, Wayne county, Michigan; letting July 2.

750 tons, two shipways, New York Shipbuilding Corp., through Leonard Shaffer, Philadelphia; bids July 2.

740 tons, army base warehouses and bridges, San Juan, Puerto Rico; Paul Smith Construction Co., contractor.

700 tons, extension Wright field, Dayton, O.

600 tons, pier, Newport News Shipbuilding & Drydock Co., Newport News, Va.; McLean Contracting Co., contractor.

470 tons, three over-crossings, Los Angeles county, for state; bids opened.

400 tons, Lincoln tunnel, contract 55, New York; George J. Atwell, contractor.

400 tons, substructure, navy yard storehouse, Philadelphia; Golder Construction Co., low.

400 to 700 tons, airplane engine test building, Studebaker Corp., South Bend, Ind.; bids postponed from June 23 to July 10.

340 tons, naval base station facilities, Lakehurst, N. J.; Karno-Smith & Co., contractors.

250 tons, building, American Brass Co., Kenosha, Wis.; Austin Co., contractor.

225 tons, machine shop, Falk Corp., Milwaukee; Klug & Smith Co., Milwaukee, contractor; bids June 30.

200 tons, two eight-story buildings, housing, Washington, D. C.

178 tons, radio building, station WTMJ, Milwaukee; Dahlman Construction Co., Milwaukee, contractor.

176 tons, state highway bridge, FAGH-419H, Bellevue, Jackson county, Iowa; Jensen Construction Co., Chicago, contractor.

126 tons, state highway bridge, FAGM-414C, Burlington, Des Moines county, Iowa; Jensen Construction Co., Chicago, contractor.

113 tons, residence hall, St. Norbert's college, West Depere, Wis.; bids in.

106 tons, building, Oscar Mayer & Co., Chicago; bids in.

100 tons, state highway work, Clark, Cowlitz and King counties, Washington; bids to Olympia, July 15.

100 tons, two reservoirs, Fort Lewis cantonment; Standard Construction Co., Seattle, low, $35,349.

100 tons, state bridge, Potlatch Creek, Idaho, and underpass near Troy, Ida.; J. F. Konen, Lewiston, and Clifton & Applegate, Spokane, Wash., contractors.

Unstated, dry docks 5 and 6, navy yard, Brooklyn, including substantial volume of two-inch squares and heavier bars; bids to contractors July 7.

Tin Plate

Tin Plate Prices, Page 108

Tin mill operations are unchanged, with the national rate estimated at 94 per cent.

Truck strike at Pittsburgh has hampered packers, both in moving finished product and obtaining empty cans and plate. Another by-product of that strike which interested tin plate circles was the edict of Pittsburgh food inspectors impounding all food products tied up in the strike except those packed in cans. Much of the bulk commodities will have to be destroyed because they have deteri-

orated during the 25-day tieup.

Carnegie-Illinois Steel Corp., which recently started operations on 20 hot tin mills at its Shenango works, New Castle, Pa., will start ten additional mills there after the July 4 holiday. There are 40 mills in all, and it is expected that most of these will be in operation shortly.

Pig Iron

Pig Iron Prices, Page 110

Pig iron distribution is the major problem in current transactions, available supplies being spread as widely as possible among a large number of melters, to assure some supplies for all. The high melt puts all receipts into immediate consumption and inventories are not being accumulated, many melters dipping constantly into reserves. The number of individual shipments increases each week, small lots being involved. Shipments by most sellers are in excess of production and yard stocks are shrinking. Prices have little effect on buying and announcement of maximum prices by OPACS has stabilized the market and removed uncertainty of future costs to melters.

It is believed the principal purpose of increasing silicon differential from 25 cents to 50 cents for each 0.25 per cent above the base grade of 1.75 to 2.25 per cent silicon, was to encourage use of the base grade and reduce demand for higher silicons.

Some eastern sellers are booking tonnage at prices applying at delivery, to protect against changes possible by interpretation of the recent order fixing prices and differentials. Some confusion exists as to manganese differentials.

Sales are being judged on the basis of need and sellers keep close check on melters. Up to this time no foundries have suffered from lack of iron or coke, beyond an occasional pinch of little consequence. Pig iron shipments in the main are close to schedule.

Construction started last week on a sixth blast furance at Lackawanna works of Bethlehem Steel Co. at Buffalo. The stack is expected to be ready in the fall.

Southern Ohio melters are seeking changes in OPACS pig iron regulations to increase supply of northern iron. No merchant iron is available at Hamilton, O., and elimination of this basing point is desired by some interests to enable a price f. o. b. furnace. Furnaces in other districts are disinclined to absorb part of freight charges to this market. Southern iron is being sold into this area on a spot basis, contracts for the quarter being refused.

OPACS officials have advised some eastern pig iron sellers that the 50-cent differential for 50 points of manganese above 1 per cent applies to basic as well as other grades. With new extras on silicon and manganese melters will turn more to ferroalloys for these elements.

Probability that general priorities will go into effect on iron within the next few weeks is indicated by Washington reports that OPM will endeavor to complete a survey of orders by consumers by about August 1, with the idea of putting into effect some more rigid form of allocation.

Scrap

Scrap Prices, Page 112

Better understanding and improved conditions in some respects are developing in the steel and iron scrap market as a result of revision of the original order fixing prices. In one respect there has been little improvement, volume of scrap not being materially increased. Tight spots continue to develop and are being supplied temporarily, apparently becoming more frequent.

The Pittsburgh area, being a heavy consumer in proportion to its scrap production, is particularly affected and means is sought to increase scrap receipts from outside areas, particularly as enlargement of open-hearth capacity is planned. Practice in that district is that when steel output passes 80 per cent of capacity home scrap, industrial returns and similar sources become inadequate and material must be obtained elsewhere. In the present situation reserves are being depleted without replacements.

In the Chicago district consump-

tion exceeds incoming shipments, leading to shortage unless the supply is increased. Yard stocks are shipped promptly and collections are light, indicating usual sources are well cleared. Addition of the 84-cent switching charge to railroad scrap originating and consumed in the Chicago district has had beneficial effect. However, railroad offerings are small. On railroad grades on which maximum prices were not set an agreement has been reached with OPACS, prices being based on averages of previous sales.

Some eastern mills have been operating with only a few days' supply and are in doubt whether they would be able to continue at the previous rate after the holiday. Steel turnings, which are in better supply than melting steel grades, have helped to some extent. Buyers and sellers in the East foresee an increasingly tight situation, in cast scrap as well as steelmaking.

Buffalo interests are concerned over shipments to Canada from the seaboard by barge canal. One Canadian dealer reports receipts of 6000 tons from the United States in the past five weeks.

Competition is keen between New England consumers and Eastern Pennsylvania mills. Foundries in the Boston district are taking steel substitutes because of lack of short rails, most of which are used for rerolling.

Semifinished Steel

Semifinished Prices, Page 109

In addition to the 460,000 tons of steel, principally semifinished, recently allocated for Great Britain, another allocation of about 340,000 tons is expected soon. The plan now is to get this tonnage produced and shipped by the end of August, the tonnage thus to move at the rate of about 400,000 tons a month.

Meanwhile, the original inquiry for 1,000,000 tons has been revised, not only in scope, but in specification detail. It was the plan to move this tonnage over a period of four months, beginning with June; however, there was greater delay than expected in getting the allocation started under the lease-lend schedule. In fact, the British had become greatly concerned and at one time recently, prior to the allocation of 460,000 tons, were said to be considering an attempt to arrange with the mills direct for the allocation of the steel, with the whole matter of payment to be left for later arrangement.

Orders for steel, in addition to the 800,000 tons, are expected to come up within a few weeks. The inquiry for 240,000 tons of pig iron for Great Britain is still pending.

Newport Rolling Mill Co., Newport, Ky., closed June 28 until July 6 because of shortage of sheet bars.

Coke Oven By-Products

Coke By-Product Prices, Page 109

New York—Effective July 1 phenol prices advanced ½-cent per pound for contract and spot lots, lots of 1000 pounds and over being quoted 13.25c and 1000 pounds and under 14.25c. Little material is available for new buying, prevailing contracts requiring the bulk of current production.

Pacific Coast

Seattle—The situation has become so acute with reference to obtaining materials that general contractors are refusing to bid on private projects. Steel mills and supply houses, under pressure by federal agencies, are unable to serve regular customers. Steel plants are operating full but are making no headway against increasing backlogs. Reinforcing jobs are being refused almost daily. Several hundred tons for school and other jobs are going begging in this area.

The expansive program of airport construction and improvement, under direction of United States engineers, involves much concrete bar tonnage for runways and buildings and continued building at the Puget Sound navy yard, Fort Lewis and other army and navy centers in Washington and Oregon is making heavy demands for both shapes and concrete bars.

Warehouse situation is unchanged, stocks are low and all items in strong call. Prices have risen with the increased cost of transportation by rail, water space being unavailable.

Cast iron pipe inquiries are less, as many projects are being postponed because deliveries are either impossible or indefinite. Army and navy projects, requiring considerable tonnage, are being served.

Foundries, operating at capacity, are bidding actively for cast iron scrap, supplies being unequal to current consumption. As a rule the top price, $19.50 per gross ton, prevails. Steel scrap is more plentiful but receipts are behind consumption, stocks declining at tidewater. Rolling mills, although buying in volume, report no difficulty in obtaining requirements.

San Francisco — Demand continues unabated with reinforcing bar and structural shape markets most active. Bar lettings aggregated 7383 tons and brought the total to date to 54,764 tons, compared with 79,868 tons for the corresponding period in 1940. Pending business calls for more than 12,750 tons.

Over 3800 tons of cast iron pipe inquiries are pending in ten major projects. Awards totaled 616 tons, bringing the year's aggregate to 29,309 tons, compared with 15,797 tons for the same period a year ago.

Featuring the plate market is the award of 30 C-3 type cargo vessels for the United States Maritime Commission to Seattle-Tacoma Shipbuilding Corp., which will require 72,000 tons in addition to 48,000 tons of shapes. So far this year bookings aggregated 422,778 tons as compared with 33,993 tons

for the corresponding period in 1940.

Prospects in the structural market are bright and over 102,000 tons are expected to be placed within the next 60 days. Awards totaled 2870 tons, bringing the aggregate to date to 319,207 tons, compared with 106,868 tons a year ago.

Canada

Toronto, Ont.—New buying in the Canadian steel market continues in increasing volume with practically all orders directly associated with war industry. Plants not engaged in war materials production are finding more difficulty in obtaining delivery with the more rigid enforcement of priority schedules both by Canadian and United States steel producers. While Canadian mills have advanced production to the maximum of present facilities, and imports from the United States exceed $70,000,000 monthly, demand for steel is well ahead of the available supply, and demand is advancing more rapidly than production possibilities. Local representatives of United States steel producers state that new orders have increased considerably in the past two months and inquiries indicate that much heavier buying would be done across the line if there was any assurance of early delivery.

Heavy inquiries for sheets overhang the market and buyers state they are having difficulty in getting producers to accept orders even with indefinite delivery dates. Nonwar industry is beginning to feel the pinch and some state they are continually reducing production schedules owing to lack of raw materials.

Plate demand is expanding, with the market faced with large tonnage for merchant and war ship construction. Most new orders for plates are said to be going to the United States as Canadian producers are fully booked for months ahead.

Merchant bars sales show further increase and some mills report orders now running to the end of the year. Good tonnages also are going to the automotive industry and agricultural implement makers.

Awards for structural steel are at a high rate with most new business associated with war effort. The Ottawa government is clamping down more rigidly on construtions that has no bearing on war enterprise. Steel awards for the past week rose to about 12,000 tons, while prospective building programs indicate about 15,000 tons pending.

Orders and inquiries for merchant pig iron are flooding the market, while there has been no increase in shipments to melters in the past two or three weeks. Priority requirements are taking all available supplies of foundry and malleable iron, leaving little available to melters not engaged in war work. Local blast furnace representatives estimate that demand could absorb about 50 per

cent more than is being produced.

Difficulty in obtaining pig iron continues to boost business in iron and steel scrap. Dealers and brokers are deluged with orders for machinery cast and stove plate and while they are filling the more urgent demands, there is not sufficient cast to meet all requirements. Special efforts are being made to gather all the scrap throughout the country and many small organizations now are at work bringing forth material that otherwise would not reach the market.

Steel in Europe

Foreign Steel Prices, Page 111

London—(*By Cable*)—Steel mills in Great Britain start last half with heavy programs and insistent demand for shipbuilding material, especially plates. Sheet deliveries are slightly easier. Output of shell steel is increasing. Heavy engineering foundries are pressing for supplies. Pig iron demand is brisk and contracting for third quarter has started.

Iron Ore

Iron Ore Prices, Page 111

Shipments of Lake Superior iron ore in June, Canadian included, were 10,789,929 gross tons, an all-time high for June, though under the all-time record of last May of 11,081,199 tons, according to the Lake Superior Iron Ore Association, Cleveland. The fact that June contained one less day may have caused the falling behind the previous 31-day month. The increase over June of last year was 1,264,435 tons. Shipments for the season to July 1 have been 28,825,921 tons, compared with 17,268,690 tons for the corresponding period last year.

Comparisons by ports for June are as follows:

	Gross Tons June 1941	June 1940
Escanaba	684,324	504,528
Marquette	657,197	837,484
Ashland	884,265	860,384
Superior	3,862,989	3,377,137
Duluth	2,730,219	2,138,565
Two Harbors	1,912,143	1,768,721
Total U. S. ports	10,731,137	9,486,820
Michipicoten	58,792	38,674
Total	10,789,929	9,525,494
Increase from 1940	1,264,435	

Comparisons by ports for the season to July 1 are as follows:

	Gross Tons To July 1, 1941	To July 1, 1940
Escanaba	1,805,081	910,906
Marquette	2,281,611	1,605,249
Ashland	2,737,287	1,639,461
Superior	9,885,874	6,017,755
Duluth	7,095,613	3,813,304
Two Harbors	4,852,024	3,209,363
Total U. S. ports	28,657,490	17,196,038
Michipicoten	168,431	72,652
Total	28,825,921	17,268,690
Increase from 1940	11,557,231	

Equipment

Seattle—Stocks are low in all lines and deliveries are protracted. Dealers give priority to the needs of federal agencies. Automotive and electric equipment is in strong demand and heavy construction items are moving freely. Low bids to Bonneville project include: 14 circuit breakers, General Electric Co., $1,108,190; 99 disconnecting switches, Railway & Industrial Co., Greensburg, Pa., $153,800; 9 portable concrete mixers, Nelson Equipment Co., $7,478; 50,000 insulator units, Corning Glass Works, Corning, N. Y., $80,000.

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten types

For each 1% tungsten contained

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

Nonferrous Metal Prices

June	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
28	12.00	12.00	12.25	52.87½	52.25	5.85	5.70	7.25	17.00	14.00	35.00
30	12.00	12.00	12.25	52.75	52.12½	5.85	5.70	7.25	17.00	14.00	35.00
July											
1	12.00	12.00	12.25	52.75	52.00	5.85	5.70	7.25	17.00	14.00	35.00
2	12.00	12.00	12.25	52.62½	51.87½	5.85	5.70	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.25
Cleveland	9.50-10.00
Chicago	9.00-9.25
St. Louis	9.00

Heavy Copper and Wire

New York, No. 1	10.25-10.37½
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	10.00-10.25
St. Louis	10.00

Composition Brass Turnings

New York	9.00

Light Copper

New York	8.25-8.37½
Cleveland	8.00-8.50
Chicago	8.00-8.25
St. Louis	8.00

Light Brass

Cleveland	4.50-5.00
Chicago	6.25-6.50
St. Louis	5.00

Lead

New York	4.95-5.10
Cleveland	4.75-5.00
Chicago	4.75-5.00
St. Louis	4.50

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

Nonferrous Metals

New York—Further curtailment of use of metals for nondefense purposes appears likely as supplies tighten. Full and complete priorities over copper may be instituted in the near future while some action may be taken in lead as producers likely will be unable to continue to cover needs fully.

Copper—A decision to strengthen the copper priorities order followed a meeting of OPM officials with representatives of producers and other industries allied with copper. Co-ordination of Latin American and domestic production, allocations and shipments is one of the biggest problems that the industry wants solved immediately.

Lead—Industry-wide curtailment of auto production in August is expected to free some lead for other uses. Whether this will come soon enough for producers to have sufficient supplies of lead to cover fully both defense and nondefense work is problematical. Demand has been much heavier than the 10,000 tons which have been available weekly.

Zinc—Distribution of zinc has presented some difficult problems but so far they all have been taken care of quickly and with a minimum of confusion. The official control order was revised to the

effect that, although producers must put aside a specified amount of zinc for defense pool allocation, full deliveries of minimum quantities are still permitted where deliveries do not interfere with filling defense orders. Minimum quantity is set at carload lots for metallic zinc and 2000 pounds for zinc oxide.

Tin—United States continues to get practically all of the world's tin, receiving 87 per cent of total deliveries in June and holding title to 97 per cent of the total afloat at the month-end. Prices held steady last week at around 52.75c to 52.87½c for Straits spot. Sales continued heavy.

Construction and Enterprise

Ohio

CLEVELAND—Euclid Electric & Mfg. Co., 1335 Chardon road, Christian A. Rasmussen, president, is building an addition of 1360 square feet, costing about $4500.

CLEVELAND—Jordan Welding & Mfg. Co., 9428 Cassius avenue, William Jordan, president, is seeking industrial building with 15,000 square feet floor space for manufacturing and storage.

CLEVELAND — Builders Structural Steel Co., 2912 East Thirty-fourth street, will build an addition to storage and office space, about 1885 square feet, to cost about $3000.

CLEVELAND—Lees-Bradner Co., 6210 Carnegie avenue, has been allocated $281,449 by Defense Plant Corp. for machinery and equipment for machine tool manufacture, which probably will be housed at its West 121st street plant.

CLEVELAND—Addressograph Multigraph Corp., 1200 Babbitt road, is preparing to erect a second addition before first is completed. Second extension will add 19,000 square feet floor space. H. K. Ferguson Co., Hanna building, will build.

CLEVELAND—Black Boring & Machine Co., 4909 Luther avenue, will build plant next fall and begin production of a new type jig boring machine. Lester G. Black is president. Company has been a tool jobber.

CLEVELAND—Cleveland Hobbing Machine Co., 1170 East 152nd street, William H. Staples, manager, has given contract to Hadlock Krill Co., 2169 East Thirty-third street, for a new plant 200 x 200 feet on East 200th street, near Chardon road.

LORAIN, O. — American Shipbuilding Co., 400 Colorado avenue, is building a new joiner shop with 9100 square feet floor space, costing $20,000. J. C. F. Shafer Co., Caxton building, is general contractor.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 118 and Reinforcing Bars Pending on page 119 in this issue.

Connecticut

BRIDGEPORT, CONN.—Public works department, P. Brewster, director, is having plans prepared for a sewage disposal plant at Walker street and Seaview avenue. H. L. Rowland, city hall, is engineer.

NORWICH, CONN.—Board of water commissioners, M. Kane, superintendent, will take bids soon on a filtration system, two stories, to cost about $300,000. Buch, Seifert & Jost, 112 East Nineteenth street, New York, engineers.

New York

LACKAWANNA, N. Y.—Snyder Mfg. Co., Hamburg turnpike, is taking bids on a 60 x 160-foot tank shop, to cost $40,000, with equipment. M. C. Snyder is in charge.

New Jersey

BOUND BROOK, N. J.—Bakelite Corp., 247 Park avenue, New York, has let general contract for machine shop additions to Turner Construction Co., 420 Lenox avenue, New York. Cost estimated at about $200,000.

NORTH BERGEN, N. J.—Grand City Container Corp., 622 West Forty-seventh street, New York, will let contracts soon for a one and two-story 300 x 800-foot factory and office building, to cost about $750,000. Contracts to be let through E. J. Kahn and R. A. Jacobs, architects.

2 Park avenue, New York.

Pennsylvania

CLEARFIELD, PA.—Harbison-Walker Refractories Co., A. H. Munro, district superintendent, Farmers Bank building, Pittsburgh, will build a firebrick plant costing over $65,000.

OIL CITY, PA.—Oil City Tank & Boiler Co. will alter and improve its plant and install a new tube mill, at cost of over $40,000.

Illinois

CHICAGO—Rauland Corp., 3333 West Belmont avenue, manufacturer of radio amplifiers and transmitters will build new plant at 4245 Knox avenue to handle expanding defense work, one story 175 x 234 feet, costing $115,000. John S. Cromelin is architect.

DECATUR, ILL.—Bids will be taken soon for waterworks improvements, including a new boiler and a plant addition. Warren & Van Praag, Decatur, are engineers. Cost estimated at $110,000

HARVEY, ILL.—Defense Plant Corp. has entered into agreement with Wyman-Gordon Co., 105 Madison street, Worcester, Mass., to build, maintain and operate an ordnance plant here, to cost $2,046,845.

HARVEY, ILL.—Ingalls-Shepard division, Wyman-Gordon Co., forgings manufacturer, is building a plant addition costing $2,115,000, including equipment. R. H. Maveety is architect. Will include forge shop, cleaning and shipping building, machine shop and service building, cafeteria and additions to office building and boiler house. New equipment will include four drop hammers, several yard cranes, presses and furnaces.

MOLINE, ILL.—Deere & Co., 1325 Third avenue, has let contract to J. H. Hunzinger Co., Davenport, Iowa, for a two-story 110 x 220-foot plant addition costing about $131,000.

SAVANNA, ILL. — Manhattan Construction Co., Muskogee, Okla., is low bidder at $958,300 for 14 warehouses and three other buildings for the war department at Savanna ordnance depot, Proving Ground, Ill. Award is expected soon.

SCOTT FIELD, ILL. — O'Driscoll & Grove Inc., 247 Park avenue, New York, is low bidder at $990,000 for six additional radio school buildings for the war department air corps post here.

WOODRIVER, ILL.—Standard Oil Co. of Indiana, S. A. Montgomery, manager, will build an electric power plant to supplant present plant, to cost about $1,000,000. Work will start about mid-August.

WOODSTOCK, ILL.—City will receive bids until July 18 for new equipment for municipal power plant, including boiler unit, feedwater heater, boiler feed pump and accessories.

Alabama

SYLACAUGA, ALA.—War department has authorized an addition to Alabama ordnance works for manufacture of TNT, DNT and tetryl, allocating $24,675,000 for building, machinery and equipment.

District of Columbia

WASHINGTON — Bureau of supplies and accounts, navy department, will open bids as follows: July 10, schedule 7673, motor-driven reciprocating surface grinder, for Key West, Fla.; July 11, schedule 7625, 23 portable boring bars, for east and west points; schedule 7631, six motor-driven punch, shear and bar cutter machines, for east and west coast points; schedule 7632, three motor-driven vertical spindle surface grinders, for east and west coast points; schedule 7721, 21 diesel-engine driven ten-ton cranes, for east and west coast points; July 15, schedule 7648, three motor-driven pipe and nipple threading machines, for Bremerton, Wis.; July 18, schedule 7702, two motor-driven plain cylindrical grinders, for east and west coast points.

Kentucky

VERSAILLES, KY.—Kentucky-Illinois Hemp Co., Frankfort, Ky., will let contract soon for three buildings, 50 x 120 feet, 40 x 90 feet and 20 x 60 feet, a large drying kiln and small office building, to cost about $50,000.

Mississippi

LAUREL, MISS. — Masonite Corp., Laurel, plans plant improvements, including a 13,500-kw. steam turbine power plant, to cost about $1,500,000.

Tennessee

SOMERVILLE, TENN. — Chickasaw Electric Co-operative Corp., J. M. Ozier, president, has let contract to Volz Construction Co., Ripley, Tenn., for 216 miles of rural transmission lines, at $117,000.

Missouri

ST. LOUIS — Enterprise Plating Co.,

Harry Vogel, manager, has been incorporated to do metal plating and has installed equipment at 507 Pine street.

ST. LOUIS—Lambert Auto Ordnance Co., S. L. Lambert, president, has been incorporated to manufacture machine guns at 3149 Locust street, where equipment has been installed.

ST. LOUIS—Soden Mfg. Co., Gene Soden, president, 1509 North Broadway, has been incorporated to manufacture metal chairs, ladders, etc. Plant has been established with 8000 square feet floor space.

Arkansas

HOPE, ARK.—War department has allocated $15,000,000 for Southwestern proving grounds for testing ordnance equipment.

MARCHE, ARK.—War department has allocated $16,750,000 for a picric acid plant, to be known as Maumelle Ordnance Works.

TEXARKANA, ARK. — W. S. Dickey Clay Mfg. Co., New York Life building, Kansas City, Mo., has given contract to Winn-Senter Construction Co., Railway Exchange building, Kansas City, Mo., for rebuilding its clay products plant here, including dryer building, machine shop and press room, at cost of about $150,000.

Wisconsin

OSHKOSH, WIS.—Wisconsin Axle Co., 567 High street, has let contract for a one and two-story 70 x 180-foot plant addition to B. B. Ganther Co., 78 State street, to cost about $60,000.

MILWAUKEE—Falk Corp. will build an addition of 100,000 square feet, costing about $900,000, under emergency construction program. Company manufactures reduction gears for the navy and maritime commission.

Texas

HOUSTON, TEX. — Houston Compressed Steel Corp. has been organized by Max and A. M. Byer, Cincinnati and has bought four-acre site for erection of scrap compressing plant. Will install 140,000-pound capacity hydraulic press. Total cost about $100,000.

Kansas

FORT RILEY, KANS.—Aqua System Inc., 385 Gerard avenue, New York, is low bidder at $37,146 for installation of gasoline fueling system for Marshall Field, Fort Riley.

Iowa

CHARLES CITY, IOWA—Iowa Public Service Co., Waterloo, Iowa, plans improvements to its power plant here, including a new boiler and switchgear, costing about $200,000.

MALLARD, IOWA—A. H. Stiel, city clerk, will receive bids until July 22 for municipal light and power plant building 23 x 39 feet, and equipment and also on electric distribution system and street lighting system, estimated cost is $45,000. K. R. Brown, 802 Valley Bank building, Des Moines, Iowa, is consulting engineer.

California

BERKELEY, CALIF. — Pan American Engineering Co., 820 Parker avenue, has let general contract to Fox Bros., 1748 University avenue, for a 1-story plant, to cost about $46,000.

BURBANK, CALIF.—Lockheed Aircraft Corp., 1705 Victory place, will build storage and office building 41 x 50 feet, costing $12,000.

LONG BEACH, CALIF.—Joshua Handy Iron Works, 2350 Artesia boulevard, will build an addition of 7000 square feet, a new office building and service quarters.

LOS ANGELES—E. Carlson and A. Anderson, 800 East Gage street, will build a machine shop 79 x 79 feet, costing $9000, at 6422 McKinley avenue.

LOS ANGELES—Industrial Engineers will build a new mill building 39 x 40 feet at 819 East Fifty-ninth street, costing $5000.

LOS ANGELES—Air Associates, 3479 Union Pacific avenue, will build an additional plant 200 x 200 feet, costing $54,000, at 5827 West Century boulevard.

LOS ANGELES—Kimble Electric Motors Inc. has been organized with 2500 shares no par stock, by L. Talhot and associates. Gibson, Crutcher & Dunn, 634 South Spring street, are representatives.

Oregon

PORTLAND, OREG.—Willamette Iron & Steel Corp. has been awarded maritime commission to build 20 sets of reciprocating engines for steam freighters under construction here.

Washington

SEATTLE—B. F. Lytle, Sioux City, Iowa, has been awarded a C.A.A. contract for $420,576 to erect airport and radio station at Big Delta, Alaska, including five 135-foot radio towers, steel antenna masts and other equipment.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Blast Cleaning)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVES (Wheels)
Bay State Abrasive Products Co., Westboro, Mass.

ACCUMULATORS
Elmes, Chas. F., Engineering Wks., 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

ACID-PROOF LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.
Quigley Co., 56 W. 45th St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

AIRLESS BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

ALKALI CLEANING COMPOUNDS
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS (Hard Surfacing)
Stoody Co., Whittier, Calif.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge & Jefferson Ave., E. St. Louis, Ill.

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
General American Transportation Corp., 185 So. LaSalle St., Chicago, Ill.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

ANODES (All Types)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

ANODES (Nickel)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALANCING MACHINES
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1842 S. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)
***Also Stainless**
*Strom Steel Ball Co., 1842 S. 54th Ave., Cicero, Ill.

BAND FILES (Metal)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BAND SAWS (Metal Cutting)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

BARS (Brass, Bronze or Copper)
American Brass Co., The, Waterbury, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BATHS (Heat Treating-High Speed)
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.

BATTERIES (Storage)
Edison Storage Battery Div. of Edison, Thomas A., Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BEARINGS (Journal)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The Canton, O.

BEARINGS (Roll Neck)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Harrison, N. J.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller Tapered)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

BEARINGS (Rolling Mill)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BENCH PLATES
Challenge Machinery Co., Grand Haven, Mich.

BENCHES
Challenge Machinery Co., Grand Haven, Mich.

BENDING AND STRAIGHTENING MACHINES
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Thomas Machine Mfg. Co., E'na Branch P. O., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

BILLETS AND BLOOMS (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bk. Bldg., Pittsburgh, Pa.
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Reading Chain & Block Co., Dept. 36, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*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., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
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 & Rockwell Sts., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
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.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

» » » WHERE-TO-BUY « « «

BOLTS (Track)—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9374-B, Scranton, Pa.

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 185 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
General American Transportation Corp., 185 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
American Broach & Machine Co., Ann Arbor, Mich.
Bullard Co., The, Bridgeport, Conn.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Colonial Broach Co., 147 Jos. Campau, Detroit, Mich.

BRUSHES
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BRUSHES (Industrial)
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BRUSHES (Steelgript)
Fuller Brush Co., The, Industrial Div., Dept. 8C, 3582 Main St., Hartford, Conn.

BUCKETS (Clam Shell, Dragline Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Beatty Machine & Mfg. Co., Hammond, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
North American Mfg. Co., The, 2910 E. 75th St., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAR DUMPERS
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Cinder Pot)
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Iron)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro Alloys Co., The, Elyria, O.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

CASTINGS (Corrosion Resisting)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Electro Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

WHERE-TO-BUY

CASTINGS (Steel)—Con.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Div. of Baldwin Locomotive Works, The Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.
Quigley Company, 56 W. 45th St., New York City.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S-15, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc. Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHEMICALS (Industrial)
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

CHISELS (Chipping)
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCK OPERATING CYLINDERS
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

COAL, COKE, ORE, ASH HANDLING MACHY.—Con.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Koppers-Rheolaveur Co., 300 Koppers Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL OR COKE

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S-15, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9374-B, Scranton, Pa.

COTTER PINS
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUT-OFF MACHINES (Abrasive)
Challenge Machinery Co., Grand Haven, Mich.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Rotary)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 15 Thomson Ave., McKees Rocks, Pa.

CYLINDERS (Air or Hydraulic)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

WHERE-TO-BUY

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE CUSHIONS
Dayton Rogers Co., Dept. "C," 2830-13th Ave., So., Minneapolis, Minn.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Vaughn Machinery Co., Cuyahoga Falls, O.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Hard Surfacing Welding)
Stoody Co., Whittier, Calif.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
C. H. Hunt, 1213 First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
C. H. Hunt, 1213 First National Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
Loftus Engineering Corp., Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Fairbanks, Morse & Co., Dept. G75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. G75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Kerosene)
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Crane Cab)
Graybar Electric Co., Dept ST, Graybar Bldg., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

FANS (Portable)
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE EXTINGUISHERS
Kidde, Walter, & Co., Inc., 632 West St., Bloomfield, N. J.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOOR RESURFACING
Flexrock Co., 2330 Manning St., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Open Steel Flooring Institute, Inc., Dept. E-519, American Bank Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Upton Electric Furnace Div. of Commerce Pattern Mach. & Fdry. Co., 2213 Grand River Ave., Detroit, Mich.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1368 Blount St., Cleveland, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Despatch Oven Co., 922 Ninth St., S.E., Minneapolis, Minn.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Upton Electric Furnace Div. of Commerce Pattern Mach. & Fdry. Co., 2213 Grand River Ave., Detroit, Mich.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

WHERE-TO-BUY

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Commercial Metals Treating, Inc., Toledo, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING COMPOUNDS
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., Dept. G75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.

ENERATING SETS—Con.
'estinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

ENERATORS (Acetylene—Portable and Stationary)
inde Air Products Co., The, 30 E. 42nd St., New York City.

ENERATORS (Electric)
llis-Chalmers Mfg. Co., Milwaukee, Wis.
airbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
eneral Electric Co., Schenectady, N. Y.
arnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
incoln Electric Co., The, Cleveland, O.
ellance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
'estinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

ENERATORS (Plating)
dylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RARS—FOR SHEETS, COILS, INGOTS
B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

RATING
law-Knox Co., Blawnox, Pa.
ravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
'i-Lok Co., 5515 Butler St., Pittsburgh, Pa.

REASE (Lubricating)—See LUBRICANTS (Industrial)

REASE RETAINERS AND SEALS
hicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

RINDERS (Circular Saw)
otch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

RINDERS (Foundry Core)
ilwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

RINDERS (Precision Thread)
x-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
ones & Lamson Machine Co., Springfield, Vt.

RINDERS (Single Slide Internal)
ryant Chucking Grinder Co., Springfield, Vt.

RINDERS (Surface)
rown & Sharpe Mfg. Co., Providence, R. I.
eald Machine Co., Worcester, Mass.
orton Company, Worcester, Mass.

RINDER CENTERS
cKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

RINDING (Shear Knife)
merican Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

RINDING COMPOUNDS
un Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.

RINDING MACHINES (Automotive Reconditioning)
eald Machine Co., Worcester, Mass.

RINDING MACHINES (Centerless, Internal and External)
incinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
eald Machine Co., Worcester, Mass.

RINDING MACHINES (Chucking)
incinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
eald Machine Co., Worcester, Mass.

RINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
incinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
orton Company, Worcester, Mass.

RINDING MACHINES (Oscillating)
incinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

RINDING MACHINES (Plain and Universal)
rown & Sharpe Mfg. Co., Providence, R. I.
incinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
orton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company, Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.

GRINDING WHEELS
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., The, Jackson, Mich.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUARDS (Belt, Machine & Window)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BUSHINGS
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

HAMMERS (Drop)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEATERS (Air)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HEAT TREATING
Commercial Metals Treating, Inc., Toledo, O.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 36, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1906 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Co., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, O.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Superior Mold & Iron Co., Penn, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Dept. ST. Graybar Bldg., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING BRICK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S-15, Chrysler Bldg., New York City.

WHERE-TO-BUY

INSULATING CONCRETE—Con.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Eagle-Picher Lead Co., The, Cincinnati, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Axelson Manufacturing Co., 6160 So. Boyle Ave., Los Angeles, Cal.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 866 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 866 E. Madison St., South Bend, Ind.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co. Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466 Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

MACHINE WORK
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Special)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5800 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2670 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Hard Surfacing)
Stoody Co., Whittier, Calif.

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. 36, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. G75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
*Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St. Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

OILS (Cutting)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

WHERE-TO-BUY

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Industrial)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.

PAINT (Marking)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERN EQUIPMENT (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6002 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

PICKLING EQUIPMENT
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
International Nickel Co., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

PIPE (Steel)—Con.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE ROLLS (Magnetic)
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube and Bar)
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3828 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSES, BRIQUETING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Suply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. G75, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. G75, 600 S. Michigan Ave., Chicago, Ill.

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., Hammond, Ind.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.

REFRACTORIES (Dolomite)
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Carter County Fire Clay Corp., 212-214 Kitchen Bldg., Ashland, Ky.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-15, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless)
(*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Phosphor Bronze)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

RODS (Rounds, Flats and Shapes)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.

RODS (Rounds, Flats, Shapes)
(*Also Stainless)—Con.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLER LEVELLERS (Backed-up)
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLS (Bending and Straightening)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O. Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.

RUST PROOFING COMPOUNDS
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

SALT TABLETS
Fairway Laboratories, Div. The G. S. Suppiger Co., 1530 Hadley St., St. Louis, Mo.
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND-BLASTING NOZZLES (Borium)
Stoody Co., 1134 W. Slauson Ave., Whittier, Calif.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co.,
300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co.,
5700 Bloomingdale Ave.,
Chicago, Ill.
Morgan Engineering Co., The,
Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co.,
78-80 Sycamore St., Etna P. O.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc.,
1324 So. Washington Ave.,
Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Huther Bros. Saw & Mfg. Co.,
1190 University Ave.,
Rochester, N. Y.
Simonds Saw & Steel Co.,
Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co.,
5700 Bloomingdale Ave.,
Chicago, Ill.
Simonds Saw & Steel Co.,
Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co.,
1190 University Ave.,
Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co.,
1190 University Ave.,
Rochester, N. Y.
Pittsburgh Saw & Tool Co.,
78-80 Sycamore St., Etna P. O.,
Pittsburgh, Pa.
Simonds Saw & Steel Co.,
Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co.,
78-80 Sycamore St., Etna P. O.,
Pittsburgh, Pa.
Simonds Saw & Steel Co.,
Fitchburg, Mass.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

SAWS (Segmental)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co.,
78-80 Sycamore St., Etna P. O.,
Pittsburgh, Pa.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.)
300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. G75
600 So. Michigan Ave.,
Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. G75,
600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. G75,
600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. G75,
600 So. Michigan Ave.,
Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.

SCHOOLS
International Correspondence Schools, Box 9374-B, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co.,
4 English St., Westfield, N. Y.
Buffalo Wire Works Co.,
437 Terrace, Buffalo, N. Y.
Chicago Perforating Co.,
2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co.,
171 York St., Rochester, N. Y.
Harrington & King Perforating Co.,
5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The,
Newstead Ave. & Wabash R. R.,
St. Louis, Mo.
Wickwire Spencer Steel Co.,
500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co.,
4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp.,
Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div.
Associated Spring Corp.,
Bristol, Conn.
Hindley Mfg. Co.,
Valley Falls, R. I.
National Acme Co., The, 170 E.
131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cone Automatic Machine Co., Inc.,
Windsor, Vt.
National Acme Co., The, 170 E.
131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp.,
Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co.,
2930 E. 79th St., Cleveland, O.
Continental Screw Corp.,
New Bedford, Mass.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp.,
194-200 Varick St.,
New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The,
112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co.,
2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E.
131st St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co.,
2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.

SCREWS (Conveyor)
Lee Spring Co. Inc.,
30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp.,
194-200 Varick St.,
New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp.,
194-200 Varick St.,
New York City.

SCREWS (Machine)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co.,
Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Harper, H. M., Co., The,
2646 Fletcher St., Chicago, Ill.
International Screw Co.,
Detroit, Mich.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
New England Screw Co.,
Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co.,
Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Self Locking)
Shakeproof Lock Washer Co.,
2525 N. Keeler Ave.,
Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co.,
Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co.,
Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Shakeproof Lock Washer Co.,
2525 N. Keeler Ave.,
Chicago, Ill.

SCREWS (Thumb)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co.,
Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The,
Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co.,
Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co.,
663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The,
2670 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works,
Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co.,
4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co.,
1461 So. 66th St.,
Milwaukee, Wis.
Roebling's, John A., Sons Co.,
Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co.,
3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.
Wapakoneta Machine Co., The,
Wapakoneta, O.

SHEARS
Beatty Machine & Mfg. Co.,
Hammond, Ind.
Buffalo Forge Co.,
446 Broadway, Buffalo, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Hilden Machine Co., The,
Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co.,
Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The,
Alliance, O.
Niagara Machine & Tool Works,
637-697 Northland Ave.,
Buffalo, N. Y.
Thomas Machine Mfg. Co.,
Etna Branch P. O.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET BARS
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The,
13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co.,
Hyde Park, Pa.
J-B Engineering Sales Co.,
1743 Orange St.,
New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co.,
Ridge & Jefferson Aves.,
E. St. Louis, Ill.
Niagara Machine & Tool Works,
637-697 Northland Ave.,
Buffalo, N. Y.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Foster, L. B., Co., Inc.,
P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co.,
38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The,
67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The,
Newport, Ky.

WHERE-TO-BUY

SHEETS (Black)—Con.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-77, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Nickel Silver)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Phosphor Bronze)
Seymour Manufacturing Co., 51 Franklin St., Seymour, Conn.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

» » » WHERE-TO-BUY « « «

SHEETS (Steel)
Mahoning Valley Steel Co., The, Niles, O.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Dayton Rogers Co., Dept. "C," 2830-13th Ave., So., Minneapolis, Minn.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn.
New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Transue & Williams Steel Forging Co., Alliance, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

WHERE-TO-BUY

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Electric)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 120 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Process Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.

STEEL (Strip, Hot and Cold Rolled)—Con.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
General American Transportation Corp., 185 So. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOOLS
Superior Mold & Iron Co., Penn., Pa.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
New Jersey Zinc Co., 160 Front St., New York City.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TABLES (Elevating)
Lyon Iron Works, 131 Madison St., Greene, N. Y.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 185 So. LaSalle St., Chicago, Ill.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

TANTALUM-TUNGSTEN CARBIDE
Vascoloy-Ramet Corp., No. Chicago, Ill.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

TERMINALS (Locking)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stanton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.

TIE PLATES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co. Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL BITS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.

WHERE-TO-BUY

TRACK BOLTS—Con.

Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS

Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)

Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED

Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)

Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)

Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)

Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)

Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS

American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 36, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES

Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

TRUCKS AND TRACTORS (Electric Industrial)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)

Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.

TRUCKS (Dump-Industrial)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Hydraulic Lift)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)

Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRUCKS (Lift)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.
Lyon Iron Works, 131 Madison St., Greene, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT

Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.

TUBES (Boiler)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett-Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)

American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)

Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUBING (Alloy Steel) (*Also Stainless)

*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)

American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Monel)

Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)

American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

» » » WHERE-TO-BUY « « «

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

TURBINES (Steam)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TURBO BLOWERS—See BLOWERS

TURNTABLES
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TURRET LATHES—See LATHES (Turret)

TWIST DRILLS
Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

VALVE CONTROL (Motor Operated Units)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

VALVES (Blast Furnace)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Check)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Control—Air and Hydraulic)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Electrically Operated)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Gas and Air Reversing)
Blaw-Knox Co., Blawnox, Pa.

VALVES (Gate)
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Crane Co., The, 836 So. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.
Western Gas Div. Koppers Co., Fort Wayne, Ind.

VALVES (Globe)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Needle)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES (Open Hearth Control—Oil, Tar, Steam & Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Proportioning)
North American Mfg. Co., The, 2901 E. 75th St., Cleveland, O.

VALVES (Steam and Water)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

VALVES AND FITTINGS—See PIPE FITTINGS

VANADIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—(Steel)

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Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

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Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
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Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST71, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

WELDERS (Electric-Resistance)
Federal Machine & Welder Co., Dana St., Warren, O.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Lincoln Electric Co., The, Cleveland, O.
Western Gas Div., Koppers Co., Ft. Wayne, Ind.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST71, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
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Linde Air Products Co., The, 30 E. 42nd St., New York City.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

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Revere Copper & Brass, Inc., 230 Park Ave., New York City.

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American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST71, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
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Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., Phillipsdale, R. I.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wilson Welder & Metals Co., 60 East 42nd St., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WELL WATER SUPPLY SYSTEMS
Layne & Bowler, Inc., Memphis, Tenn.

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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

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*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
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Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Annealed, Bright, Galvanized)
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Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
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Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
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Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
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Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Spring)

American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stainless)

Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)

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General Electric Co., Sec. CDW-1907, Appliance & Merchandise Dept., Bridgeport, Conn.
Graybar Electric Co., Dept. ST, Graybar Bldg., New York City.
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Seneca Wire & Mfg. Co., Fostoria, O.
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Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

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WIRE NAILS—See NAILS

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Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Hubbard, M. D., Spring Co., 432 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Hazard Wire Rope Div. of American Chain & Cable Co., Inc., Wilkes-Barre, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.
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Macwhyte Co., 2912 14th Ave., Kenosha, Wis.
Roebling's, John A., Sons Co., Trenton, N. J.

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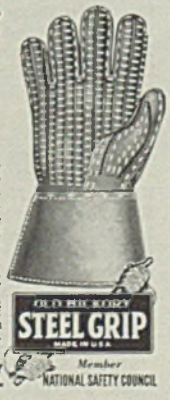

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THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

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Where-to-Buy Products Index carried in first issue of month.

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UNDER the pressure of our national defense program people are wakening to facts that always existed—but weren't always realized. One of those facts: that the point of actual production in a machine shop is—the tools. They are the work-horses of every shop. On the quality of their work, the length of their service, depends that whole shop's quality of work and volume of production. Midvale tool steel is made to meet Midvale's own requirements—than which there are none more exacting.

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