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STEEL

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Contents

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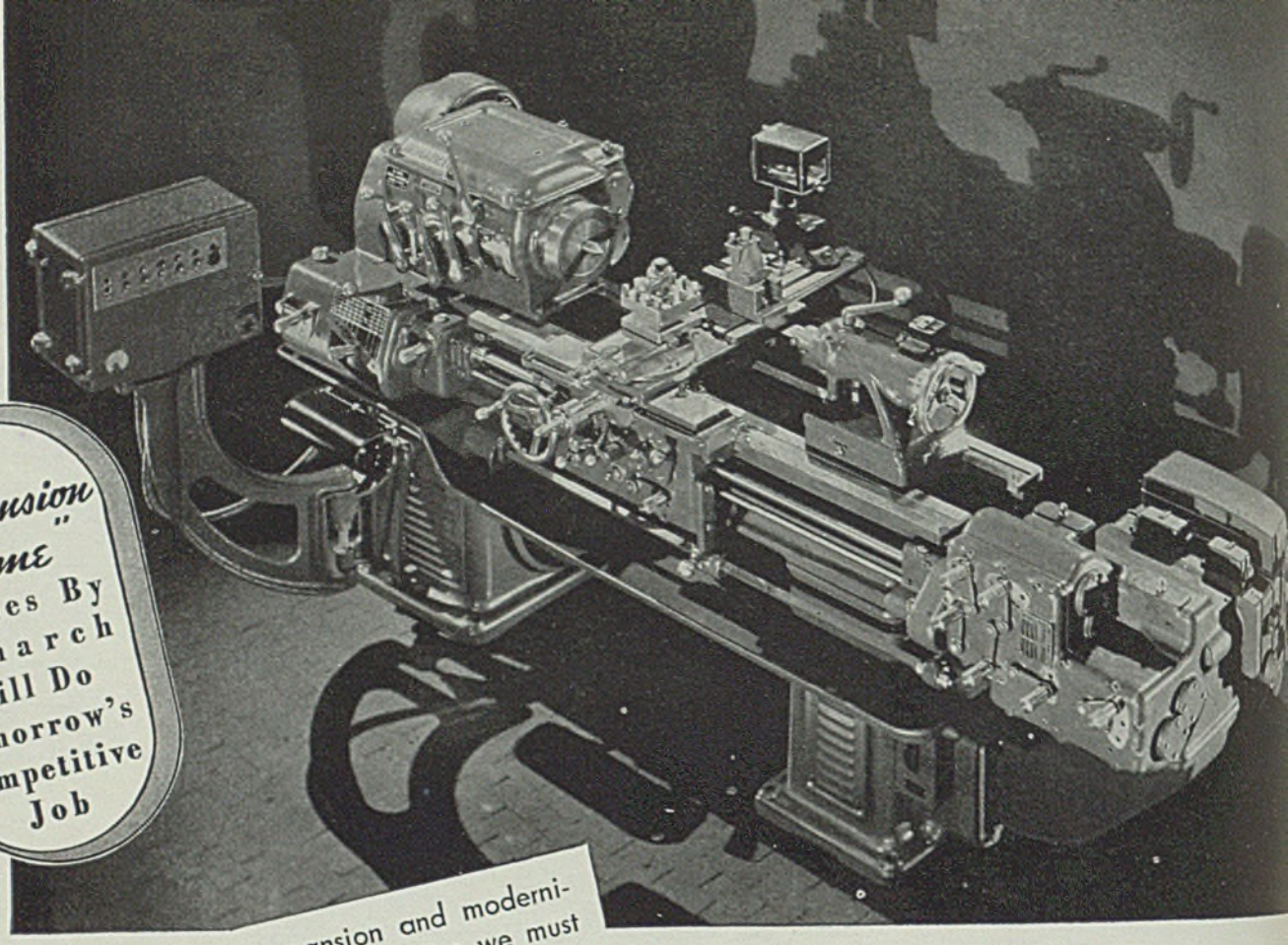

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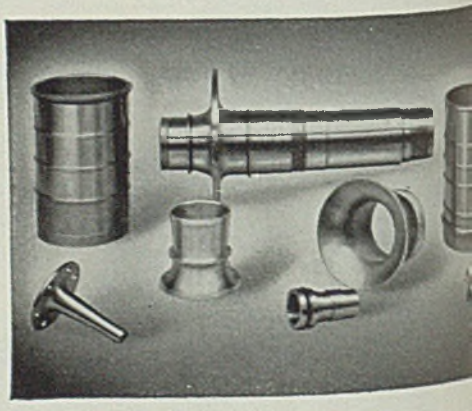


MONARCH LATHES

Tool-up with Monarch!

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING
THIS ISSUE

■ AGAIN steel production moved up another point last week (p. 25) to 96½ per cent of ingot capacity. But demand continues to outrun output and deliveries continue to recede a little farther into the future. Consumers are using up steel so fast (p. 99) that they are unable to build up the substantial inventories they had planned. Realizing possibility of dangers ahead, they are co-operating closely with producers, anticipating needs more thoroughly. Though defense production is gaining, peace-time requirements predominate. Greater public purchasing power is pushing up sales of manufactured products such as (p. 36) automobiles and (p. 28) household washers and ironers.

• • •

The automobile industry (p. 35) has organized to supply parts and subassemblies to aircraft builders. . . . Machine tools will be at hand for defense as rapidly as they can be put to work; that (p. 39) is the determined attitude of the machine tool industry. . . . American Society of Tool Engineers (p. 40) has developed a training program to provide emergency solution to the shortage of skilled mechanics. . . . Last week's government contracts that are of interest to the metals industries fill more than four pages of this issue (p. 41). . . . A conference on pig iron prices was held in the office of Defense Commissioner Leon Henderson last week but (p. 30) no announcement was made as to what transpired.

Train More Mechanics

• • •

Donald M. Nelson (p. 30) has been appointed director of "small business activities" in relation to the defense program. . . . Nineteen leading steel companies representing 84.33 per cent of total ingot capacity (p. 21) earned $70,352,316 in the third quarter; the tax collector and the stockholders shared about equally. Reason for this high return was the high production rate over the period. . . . The treasury department (p. 30) has issued rules telling manufacturers what they must do to be allowed to charge off value of new plants over a 5-year period for tax purposes. . . . Bureau of standards (p. 32) is examining compressive properties of very thin sheets of stainless steel, with aircraft in mind.

Steel Plants Earned More

• • •

Many industrial organizations now are confronted with the need for more manufacturing facilities. Many others will be forced to expand as the defense program gains momentum. Because of this widespread interest, STEEL (p. 50) devotes six pages to an illustrated description of the new diesel engine plant of International Harvester Co. It incorporates many features that will convey definite suggestions to other managements . . . In recent years materials handling has been recognized as a major problem in iron and steel warehouses; Morris E. Neeley (p. 56) describes a highly developed setup for handling a wide variety of products and delivering them in top condition.

New Diesel Plant Shown

• • •

New resistance welding equipment (p. 60) permits extremely rapid assembly of stamped and formed sheet steel parts . . . V. Logan Staley (p. 64) discloses what has been done to permit identification of steel with marks that remain true at temperatures ranging from 150 to 1800 degrees Fahr. Such marks now can be made in seven colors; they can be made either soluble or insoluble in pickle bath . . . A new electrode is available (p. 66) for welding aluminum . . . Surface coatings, tests show (p. 80), generally lower the endurance limits of steel . . . A revised table (p. 85) set up for classifying steels by characteristics of sparks generated by grinding wheels includes some of the newer alloys.

Class Steel By Sparks

Tarring Molds—A Routine Step at Inland

A VISITOR to the Inland Mills, observing the various stages in the making and processing of any product, will immediately be impressed by the thoroughness of attention to detail. He will learn that not the slightest factor, which will contribute to Inland quality and uniformity, is neglected.

For example, consider production of a heavy tonnage product such as plates. From mines and quarries to open hearth furnaces, raw materials are under perfect control. Carefully engineered furnaces are equipped with the latest types of control instruments, and open hearth practice has been standardized, resulting in heat-to-heat uniformity.

Inland molds are tarred to prevent ingot scabs. From the time the ingot is cast, surface and interior inspection is maintained on ingots, slabs, and the final plate product to eliminate any possible surface or internal defects. Surface defects on slabs are marked, and removed by chipping or scarfing before rolling into plate.

Combustion and temperature are under close control in the ingot soaking pits, and ingots are reduced at speeds regulated to assure correct rolling temperatures.

In the finishing mills, heating and rolling temperatures are closely watched by trained observers using special instruments. The result is absolute control of the physical properties of the plate. Finally, skilled inspectors carefully check the finished plate surfaces and dimensional tolerances.

The Inland practice of close attention to detail, plus metallurgical and physical laboratory control, assure steel products of highest quality and exceptional uniformity.

Inland produces plates to the following A.S.T.M. specifications:

A 7-39, Structural Steel for Bridges and Buildings

A 10-39, Plates for General Purposes

When specified, copper of not less than 0.2% can be provided in these specifications.

Other plate grades made by Inland include—Boiler, Fire-box, Hi-Steel and Structural Silicon Steels.

SHEETS • STRIP • TIN PLATE • BARS • PLATES • FLOOR PLATES • STRUCTURALS • PILING • RAILS • TRACK ACCESSORIES • REINFORCING BARS

INLAND STEEL CO.

Chicago

Third Quarter Steel Earnings

145 Per Cent Higher Than in 1939

Near-Capacity Operations Boost Income Despite Higher Taxes.

Industry's Leaders Disclaim Any Probable General Shortage.

Present Prices Held Equitable, Provided Costs Do Not Increase.

Consumers' Earnings Show Substantial Gain Over Last Year.

NINETEEN leading steel producing companies, representing 84.33 per cent of the industry's total ingot capacity, earned a total of $70,352,316 in the third quarter. This compares with $45,212,936 in the second quarter this year and with $28,733,492 in the third quarter of 1939. September quarter earnings this year were 145 per cent greater than in 1939.

Net income of the 19 companies for the first nine months was $158,524,418, compared with $51,371,644 in the comparable period of last year.

The earnings picture is the brightest in many years and reflects the recent high operating rate. For the third quarter operations were slightly under 88 per cent of capacity and for the nine months were 77.77 per cent.

Inroads of the higher normal income tax rate under the second revenue act of 1940 are reflected in the third quarter reports when most companies made provisions for the increase for the entire nine months. Allowances for taxes in many cases were about equal to net income.

United States Steel Corp. reported net income for the third quarter was $33,103,067, compared with $10,420,445 in the third period in 1939. For the first nine months this year, earnings aggregated $69,418,070, against $12,390,756 in the compara-

Steel Producers' Financial Statements Summarized

	Third Quarter 1940	Third Quarter 1939	Second Quarter 1940	Nine Months 1940	Nine Months 1939	Annual Capacity (a)
United States Steel Corp.	$33,103,067	$10,420,445	$19,201,038	$69,418,070	$12,390,756	28,885,000
Bethlehem Steel Corp.	12,462,288	5,377,470	10,807,318	34,160,745†	11,609,456†	11,247,040
Republic Steel Corp.	6,183,880	2,815,339	3,337,730	12,633,333	3,898,651	7,280,000
Jones & Laughlin Steel Corp.	2,956,647	1,129,001	2,141,645	6,232,903	281,189	4,099,200
National Steel Corp.	3,827,311	2,903,881	3,004,624	10,841,128	7,289,305	3,808,000
Inland Steel Co.	4,918,818‡	2,587,750	2,873,655	9,888,484	6,372,810	3,091,200
American Rolling Mill Co.	1,804,511	600,793	1,079,405	3,889,110	2,269,944	3,030,182
Wheeling Steel Corp.	1,611,108	1,504,647	1,019,426	3,275,186	3,043,303	1,960,000
Colorado Fuel & Iron Corp.	161,702*	231,282	394,106	797,331†	1,094,506†	1,105,440
Otis Steel Co.	464,665	184,517*	196,630*	102,523	435,958*	977,000
Alan Wood Steel Co.	318,939	124,585†	224,312	840,497	388,840	739,200§
Allegheny Ludlum Steel Corp.	1,300,582	327,772	1,008,121	2,781,285	682,094	605,360
Sharon Steel Corp.	365,975	59,483*	79,327	754,878†	200,028*	560,000
Granite City Steel Co.	51,635†	53,954	7,238	102,025	88,999	448,000
Continental Steel Corp.	139,312	198,138	141,339	492,107	730,445	364,000
Keystone Steel & Wire Co.	280,409	273,922	446,402†	1,006,197	972,269	280,000
Wickwire Spencer Steel Co.	125,861	52,661*	177,471*	314,310*†	360,514*	168,000§
Copperweld Steel Co.	277,422†	219,129†	293,627	798,736	610,549	144,000†§
Rustless Iron & Steel Corp.	321,588	262,045	254,754	824,190	645,028	44,800
Totals	$70,352,316	$28,733,492	$45,212,936	$158,524,418	$51,371,644	68,836,422

*Loss; ‡before provision for new income and excess profits taxes; †indicated; §as reported to the American Iron and Steel institute; (a) as reported to STEEL for Dec. 31, 1939; †§estimated.

ble period last year.

Directors declared the regular preferred dividend of $1.75 per share, payable Nov. 20 to record Nov. 1. Common stockholders will receive $1, payable Dec. 20 to record Nov. 20.

The owners of U. S. Steel and the tax collector broke about even for the third quarter and for the first nine months. Provisions for third quarter taxes totaled $30,610,901, and for the nine months, $62,746,071.

Taxes accrued in the third quarter and the nine months reflect the higher rates on normal income tax imposed by the second revenue act of 1940. Provisions for taxes in 1940 and 1939:

	Third Quarter 1940	Third Quarter 1939	Nine Months Ended Sept. 30, 1940	Nine Months Ended Sept. 30, 1939
State, local, social security and other	$19,057,552	$16,490,291	$43,917,722	$38,696,601
Federal income	11,553,349	4,134,000	18,828,349	6,604,000
TOTAL	$30,610,901	$20,624,291	$62,746,071	$45,300,601

Ingot production for the third quarter averaged 88 per cent of capacity, and at present is nearly 98 per cent. Finished steel shipments for the quarter were 4,145,329 net tons, equivalent to 85.2 per cent of capacity, and an increase of 29 per cent over second quarter shipments and 53 per cent over shipments in third quarter, 1939.

$3.07 a Common Share

Third quarter earnings were equal, after preferred dividends to $3.07 a common share. Net income for the third quarter and for the first nine months of 1940 include a portion of the charges for refinancing in May and June, in the amounts of $2,311,803 and $3,082,401, respectively, out of total charges of $5,394,212 for amortization and bond discounts, premiums paid on bond retirements; and also the expense involved in settlement of patent litigation whereby the subsidiaries have agreed to pay $3,850,000. Of this total, $2,000,000 has been charged to previously established reserves.

Direct defense contracts so far have contributed relatively little to earnings, according to Irving S. Olds, chairman, in an interview after the corporation's financial statement had been released. He added corporation officials had no way of knowing how much steel sold was used for defense production by the buyers.

Third quarter export business was the heaviest so far reported and raised the average for the first nine months to about 16 per cent of the total, as against 13½ per cent for the first six months. More than half the exports have gone to the United Kingdom, he said.

Questioned concerning priorities, Mr. Olds said need for such action depends on two considerations: (1) How much steel can be produced; and (2) how much steel is needed. He opined there is ample steel capacity under present conditions and doubted that any general action on formal priorities is imminent.

Temporary "jams" are possible under present conditions, it was said. Structurals are in great demand at present with buyers sometimes wanting deliveries immediately. Such cases to date have been adjusted voluntarily.

Mr. Olds said it was too early to comment on prices for the first quarter and added he hoped there would not be increases in costs that would necessitate higher steel prices. The corporation's subsidiaries had not increased pig iron prices.

In response to an inquiry as to expenditures for handling defense work, Mr Olds said that before the emergency program got under way, the corporation last fall had spent $2,000,000 on armor plate facilities. Since the program started, between $11,000,000 and $12,000,000 has been spent for facilities for handling direct contracts from the army and navy. Additional sums have been spent for facilities to handle the increased general demand.

Expenditures mentioned did not include the $5,500,000 expansion program at the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., which is being financed by the government. Mr. Olds explained the facilities will be owned outright by the government and that the contract does not follow the usual form in that it does not provide the corporation the option of acquiring the facilities at the end of the emergency.

Neither is the corporation contributing to the $48,000,000 expansion now being made at the government's navy armor plant at South Charleston, W. Va., which is under lease to the Carnegie-Illinois Steel Corp., a subsidiary.

Net current assets of the corporation on Sept. 30, after deducting current dividend declarations, were $453,723,226, compared with $422,738,632 on June 30, and $401,076,814 on Sept. 30, 1939.

Unexpended balances on approved appropriations for property additions and replacements amounted to approximately $99,000,000, Oct. 1.

Capital outlays during the third quarter for additions and betterments of properties, less credit for properties sold, were approximately $14,500,000, making $43,200,000 for the nine months' period. An amount of $6,521,000 of capital obligations was retired during the quarter through operation of sinking funds, at maturity or by refinancing, while $342,000 of capital obligations were issued, making a net reduction of $6,179,000.

Average number of employes during the third quarter was 261,197, compared with 221,395 in the third quarter, 1939.

Total payroll for the third quarter was $115,749,282, against $90,599,167 in third quarter last year. For the nine months this year, payroll total was $315,621,193, compared with $254,060,918 in the comparable 1939 period.

Bethlehem's Output a Record; Earnings Second Highest

■ DECLARING that in his opinion steelmaking capacity in this country is ample for all requirements at home and abroad, E. G. Grace, president, Bethlehem Steel Corp., last week added: "I would almost go so far as to predict that it would be unnecessary even to resort to a strict priority system, if producers, government buying agencies and commercial consumers all co-operate to the fullest extent."

In discussing with newsmen the corporation's quarterly report he revealed that Bethlehem's steel production in October was the heaviest in its history, amounting to 1,014,000 net tons, against the prior record of approximately 975,000 in August, and 783,000 tons in May, 1929.

Third quarter earnings, he said, were the second highest in the company's history, surpassed only by earnings in excess of $13,000,000 in the fourth quarter of last year. Orders on hand at the end of the third quarter—$1,123,081,930—reached a new peak, a fact he attributed principally to naval work. Actual steel orders, he said, were

almost on a level with those on hand at the close of the preceding quarter.

Bethlehem's navy ship orders have been heavy, amounting to 28 to 30 per cent of all naval ship construction placed with private yards, and 19 to 20 per cent of all orders placed with all yards. This work, he explained, did not include merchant ships, of which his company has many under contract.

Bethlehem Steel Co. during the first nine months this year spent $19,000,000 to improve facilities, and will spend an additional $21,000,000 over the next six to eight months. Included, he remarked, is one item of $10,000,000 for facilities to be devoted entirely to war products.

In addition to what the company is spending, the government is spending $53,000,000 on facilities which will be operated by Bethlehem. These are mainly shipyards, forging capacity, machine tools, heat treating furnaces. Contracts with the government provide for acquisition of these facilities by Bethlehem, if it so desires, at the close of the emergency.

Mr. Grace said he was satisfied with the present level of steel prices and saw no necessity for increases, unless costs are advanced.

The number of Bethlehem employes reached a new high in the third quarter, 123,313, against 112,316 in the second quarter and approximately 95,000 in the corresponding period last year. Hourly wages moved up to 93.2 cents, against 93.1 in the preceding quarter, and 91.4 a year ago. Average hours per week were 36.6, compared with 35.6 and 34.5; and the total payroll, $54,984,000, against $48,731,000 and $39,453,000, another high record.

Mr. Grace stated that when Bethlehem installed a 62½-cent minimum Sept. 1, in conformance with the Walsh-Healey act, it applied this rate to all employes.

During the first nine months Bethlehem set aside for taxes $24,500,000, endeavoring to make all allowances in the absence of full detailed instructions from the treasury department. This is the equivalent, he said, to about $8 a share on the stock, and compares with $12,900,000 for the corresponding period last year.

During the first nine months, Bethlehem exported 28 per cent of its steel output. This compared with an annual average of about 13 per cent in the last three years.

Not Negotiating With CIO

Stating that the company was not conducting negotiations with the CIO, Mr. Grace outlined Bethlehem's labor policy and said that it did not contemplate any change in the policy or methods. He said the company had been practicing collective bargaining for the past 20 years, about 15 years before laws requiring it were passed. Moreover, he said his company has been complying with the national labor relations act in every respect.

Bethlehem's third quarter net profit, after interest, depreciation, depletion, federal income taxes and other charges was $12,462,288. Equal to $3.63 per share on common after deducting regular quarterly dividends on the company's 7 per cent cumulative preferred, this compared with net income of $5,377,470 or $1.10 per common share in the period last year. In June, 1940, quarter, net earnings totaled $10,807,318, equal to $3.07 per common share.

Indicated aggregate net income in first nine months this year, computed from third quarter and first half reports, was $34,160,745 and compared with $11,609,456 earned in the period in 1939. No provision was made in the computation for increased retroactive federal taxes.

Dividend of $1.75 per share on the 7 per cent preferred was declared, payable Jan. 2, 1941, to record of Dec. 6. Common stock dividend of $1.50 per share, payable Dec. 2 to record of Nov. 12 was also declared.

Consumers' Third Quarter Earnings Statements

STEEL'S tabulation of 93 iron and steel consumers' earnings in third quarter, 1940, shows their aggregate net profit for the period was $45,074,268, or 43.3 per cent more than $31,445,379 earned by them in the period last year. Four companies reported a net loss for the quarter, against 15 last year. The same companies' net earnings in the first nine months this year totaled $145,366,524, or 70.8 per cent more than $85,116,483 in the first nine months of 1939. Four reported a deficit for the nine months, compared with 15 last year. All figures tabulated below are net earnings except where asterisk denotes loss:

	Third Quarter		Nine Months	
	1940	1939	1940	1939
Allis-Chalmers Mfg. Co., Milwaukee	$1,159,639	$943,450	$3,769,397	$2,643,873
American Steel Foundries, Chicago	413,921†	75,191†	2,080,446	189,533
Babcock & Wilcox Co., New York	357,361†	136,417†	1,832,266	500,203*
Bower Roller Bearing Co., Detroit	260,362	199,197	826,569	627,531
Central Foundry Co., New York	27,396	29,097	62,564	40,233
Checker Cab Mfg. Co., Kalamazoo, Mich.	338,597	68,494*	516,187†	231,685*†
Clark Equipment Co., Buchanan, Mich.	295,000	203,444	1,133,008	703,635
Cleveland Graphite Bronze Co., Cleveland	209,536	456,246	1,014,457	1,108,203
Crosley Corp., Cincinnati	606,561*†	243,681*†	509,910*	158,376
Detroit Gasket & Mfg. Co., Detroit	39,950	80,369	339,739	321,472
Diamond T Motor Car Co., Chicago	35,477	54,919	87,349†	153,847†
Dresser Mfg. Co., Bradford, Pa.	110,859†	343,168†	844,497	427,130
Driver-Harris Co., Harrison, N. J.	100,266	93,740	331,742†	189,409†
Electromaster Inc., Detroit	10,957	9,343*	20,916	73,753*
General Steel Castings Corp., Eddystone, Pa.	429,405†	179,284†	502,363	335,506*
General Time Instruments Corp., New York	395,926‡	358,713‡	978,251**	526,056*†
Gillette Safety Razor Co., Boston	605,324	801,453	1,938,775	2,418,360
Hoskins Mfg. Co., Detroit	113,209†	112,868†	390,855	315,455
Houdaille-Hershey Corp., Detroit	100,173	9,035	1,572,884	773,045
International Business Machines Corp., New York	1,476,297	2,198,339	6,011,779	6,590,695
Kingston Products Corp., Kokomo, Ind.	17,956	65,525†	35,880*	111,755
Lane-Wells Co., Los Angeles	154,400	134,900	454,100	298,500
Link-Belt Co., Chicago	815,461†	514,957†	1,780,740	957,436
Marchant Calculating Machine Co., Emeryville, Calif.	161,135	140,701	568,902	502,152
Martin (Glenn L.) Co., Baltimore	523,493	546,154	4,798,981	1,513,778
Master Electric Co., Dayton, O.	91,260	180,230	541,558	420,698
Maytag Co., Newton, Iowa	352,334	234,981	1,050,799	798,669
Micromatic Hone Corp., Detroit	48,212†	40,280†	150,332	70,080
Midland Steel Products Co., Cleveland	260,165	248,266	1,351,290	1,265,643
Motor Products Corp., Detroit	400,886*	405,280*	250,874†	321,869*†
Motor Wheel Corp., Lansing, Mich.	453,032	391,504	1,440,532	1,091,770
National Acme Co., Cleveland	853,335	78,385	2,090,385	188,121
National Cash Register Co., Baltimore	392,554	116,272	1,492,385	1,304,641
National Supply Co., Pittsburgh	76,819†	347,924*†	989,649	199,446*
New Idea Inc., Coldwater, O.	95,811†	202,604†	571,333	441,244
Nesbitt-Sparks Industries Inc., Columbus, Ind.	202,530	179,611	653,596	512,008
Otis Elevator Co., New York	769,328	841,521	2,552,957	2,419,678
Pittsburgh Screw & Bolt Corp., Pittsburgh	297,620	165,162§	574,990†	115,686†
Simonds Saw & Steel Co., Fitchburg, Mass.	344,215†	232,226†	1,102,586	603,572
Stewart-Warner Corp., Chicago	317,439	55,948	994,684	256,209
Thatcher Mfg. Co., Elmira, N. Y.	129,017	257,699	394,876	656,930
Victor Equipment Co., San Francisco	44,816	13,539	116,633†	23,986†
Yale & Towne Mfg. Co., Philadelphia	253,225	222,213	678,105	234,804

*Loss; ‡16 weeks ended Oct. 5; †indicated; **40 weeks ended Oct. 5; §before federal income taxes.

	Year Ended Sept. 30	
	1940	1939
Baldwin Locomotive Works, Philadelphia	$1,213,880	$ 614,624*
Continental Can Co. Inc., New York	8,944,485	7,511,996
McGraw Electric Co., Chicago	1,614,919	1,287,049
National Radiator Co., Johnstown, Pa.	205,263	153,765
Pacific Can Co., San Francisco	380,819	382,656
Smith (A. O.) Corp., Milwaukee†	1,686,681	108,131

†Period ended July 31; *loss.

October Pig Iron Output Reaches New High; Rate 93 Per Cent

■ OCTOBER production of coke pig iron in United States reached an all-time high, output for the month aggregating 4,384,194 net tons. Reports from operators of the country's 231 potential blast furnaces, including some estimates for operations the last day or two of October, indicated operations for the period exceeded 93 per cent of capacity. Four more stacks were put it blast during the month.

Average daily output last month was 141,426 tons, 2341 tons or 1.68 per cent greater than September's average, 139,085 tons. It compared with average daily production of 131,053 tons in the month last year, 104,450 tons in October, 1937, and 74,697 tons in the month in 1938. Average daily production of 140,843 tons in May, 1929, ranked second to last month's. Daily production in October was more than 35 per cent greater than in April, this year's low.

Operating rate in October showed an increase for the sixth consecutive month and was 1.5 points higher than September's, 91.5 per cent. In April the rate was 68.9 per cent, in August, 89.9 per cent. Near actual capacity, October's operating rate compared with 85.2 per cent in the period last year; in October, 1938, it was 48.0 per cent; for the month in 1937, 68.4 per cent.

Aggregate output last month exceeded by 211,643 tons or 5 per cent the total in September, 4,172,551 tons. Per cent increase for the month was greater than for daily average, because October was one day longer. Total production in October, 1939, was 4,062,670 tons; for the month in 1937 it was 3,237,949 tons; 3,350,809 tons in October, 1936, and 4,018,724 tons in the 1929 period.

In October, for the first time this year, daily average production for the entire period since Jan. 1 exceeded that in 1937. Daily average in first 10 months was 124,264 tons, against 122,311 in the corresponding 10 months of 1937. In the period in 1938, average daily output was 53,017 tons; in period through October, 1939, it was 88,565 tons.

Total production for the ten months was 37,900,625 tons and compared with 26,923,812 tons in the period last year, 16,117,118 tons in first ten months of 1938 and 37,182,469 tons in the period in 1937.

Stacks in blast Oct. 31 totaled 196, highest since October, 1929, when 203 were active. Production in the prior period, however, was less than last month's, totaling 4,018,724 tons. In September, 192 furnaces were in blast, 190 in August and 187 in July. One hundred eighty-eight were listed active in October, 1939; for the month in 1938, active furnaces totaled 114. In October, 1937, stacks in blast totaled 151.

Five furnaces were put in blast last month and one blown out for repairs. Two merchant stacks resumed and one was blown out. In the steelworks or nonmerchant classification, three stacks were added and none blown out. Furnaces resuming in October:

In Indiana: Gary No. 5, Carnegie-Illinois Steel Corp. In Michigan: Henry stack of Ford Motor Co. In Pennsylvania: Perry furnace, Interlake Iron Corp.; and Midland No. 3, Pittsburgh Crucible Steel Co. In Tennessee: Rockdale furnace, Tennessee Products Corp.

Birmingham No. 3 stack of Sloss-Sheffield Steel & Iron Co., in Alabama, was blown out for repairs.

MONTHLY IRON PRODUCTION

Net Tons

	1940	1939	1938
Jan.	4,024,556	2,436,474	1,618,245
Feb.	3,304,368	2,307,405	1,463,093
March	3,270,575	2,680,446	1,646,636
April	3,139,043	2,301,965	1,554,569
May	3,497,157	1,923,625	1,412,249
June	3,813,092	2,373,753	1,188,037
July	4,060,513	2,638,760	1,358,645
Aug.	4,234,576	2,979,774	1,674,976
Sept.	4,172,551	3,218,940	1,885,069
Oct.	4,384,194	4,062,670	2,315,599
Tot. 10 mo.	37,900,625	26,923,812	16,117,118
Nov.	.....	4,166,512	2,561,060
Dec.	.....	4,219,718	2,478,244
Total	.....	35,310,042	21,156,422

AVERAGE DAILY PRODUCTION

Net Tons

	1940	1939	1938	1937
Jan.	129,825	78,596	52,201	116,327
Feb.	113,943	82,407	52,254	120,800
March	105,502	86,465	53,117	125,385
April	104,635	76,732	51,819	126,956
May	112,811	62,052	45,556	128,083
June	127,103	79,125	39,601	116,304
July	130,984	85,121	43,827	126,501
Aug.	136,599	96,122	54,031	130,677
Sept.	139,085	107,298	62,835	127,604
Oct.	141,426	131,053	74,697	104,450
Nov.	.....	138,883	85,369	74,929
Dec.	.....	136,119	79,943	54,319
Ave.	124,264	96,740	57,962	112,642

OCTOBER IRON PRODUCTION

Net Tons

	No. in blast last day of Oct.	Sept.	—Total Tonnages— Merchant	Non-merchant
Alabama	17	18	121,247*	181,311
Illinois	16	16	86,884	326,554
Indiana	18	17	35	516,936
New York	13	13	91,891	205,420
Ohio	43	43	139,550	828,960*
Penna.	65	63	111,164*	1,251,591*
Colorado	3	3		
Michigan	5	4		
Minnesota	2	2	9,310*	191,456
Tennessee	1	0		
Utah	1	1		
Kentucky	2	2		
Maryland	6	6		
Mass.	1	1	14,793	307,092
Virginia	0	0		
West Va.	3	3		
Total	196	192	574,874*	3,809,320*

*Includes ferromanganese and spiegeleisen.

RATE OF FURNACE OPERATION

(Relation of Production to Capacity)

	1940[1]	1939[2]	1938[3]	1937[4]
Jan.	85.4	51.0	33.6	76.6
Feb.	75.0	53.5	33.6	79.5
March	69.5	56.1	34.2	82.5
April	68.9	49.8	33.4	83.7
May	74.2	40.2	29.4	84.3
June	83.6	51.4	25.5	76.6
July	86.1	55.0	28.2	82.9
Aug.	89.9	62.4	34.8	85.7
Sept.	91.5	69.7	40.5	83.7
Oct.	93.0	85.2	48.0	68.4
Nov.	....	90.3	55.0	49.3
Dec.	....	88.5	51.4	35.6

[1] Based on capacity of 55,628,060 net tons, Dec. 31, 1939; [2] capacity of 56,222,790 net tons, Dec. 31, 1938; [3] capacity of 56,679,168 net tons, Dec. 31, 1937; [4] first six months on capacity of 55,454,265 net tons, Dec. 31, 1936—last six months on capacity of 55,695,065 net tons, June 30, 1937. Capacities by American Iron and Steel Institute.

September Ironer Sales Establish New Record

■ September shipments of household washers were 149,002 units, or 1124 more than in August, according to the American Washer and Ironer Manufacturers' association, Chicago. The September total was 7.2 per cent above the figure for the same month in 1939.

Average retail price of washers shipped in September was $71.57, compared with $69.13 in September, 1939.

September ironer shipments totaled 21,007, highest month in the industry's history and an increase of 84.73 per cent over the 11,372 shipped in September, 1939. August, 1940, shipments were 13,848.

Average retail price in September was $50.99, compared with $63.77 in September, 1939.

■ Farm implement and machinery exports in September were 15 per cent below those in September, 1939, totaling $4,912,825, against $5,748,710. Exports in nine months this year were valued at $61,842,539, compared with $54,121,800 in the corresponding period last year.

EXPANSIONS

$3,000,000 FOR EX-CELL-O WORK AT DETROIT

DETROIT

■ EX-CELL-O Corp. here has announced a $3,000,000 expansion program for stepping up manufacturing facilities on precision aircraft parts by 50 per cent. The company has acquired plant buildings on 15 acres of property in Highland Park, a suburb, buying the property outright from the Eastern Michigan Transportation Co.

Announcement is made that $1,700,000 will be spent on buildings and machinery with $1,300,000 available for working capital. Work has already been started in a limited way in the new plant and it is expected that by April it will be up to full capacity, devoted almost entirely to government orders in the defense program. Eventually employment in Ex-Cell-O plants will be increased from the present 2700 to approximately 4000.

Tucker Aircraft Corp., organized last May by Preston Tucker, has received defense contracts for $6,000,000 worth of power-driven gun turrets for aircraft, and $200,000 worth of liquid cooled aircraft engines designed by Mr. Tucker's associate, Harry A. Miller, well known racing car designer. Production will be centered in the Graham-Paige Motors plant here.

SHARON STEEL TO ADD MILL, ELECTRIC FURNACE

Sharon Steel Corp. plans to spend $1,000,000 on its plants in Sharon, Pa., and Lowellville, O. A new 4-high reversing, cold-reduction mill and a new coating line will be installed at Sharon, and a 20-ton electric furnace at Lowellville. The furnace will permit the company to make its own stainless alloy and special steels, now purchased in ingot form.

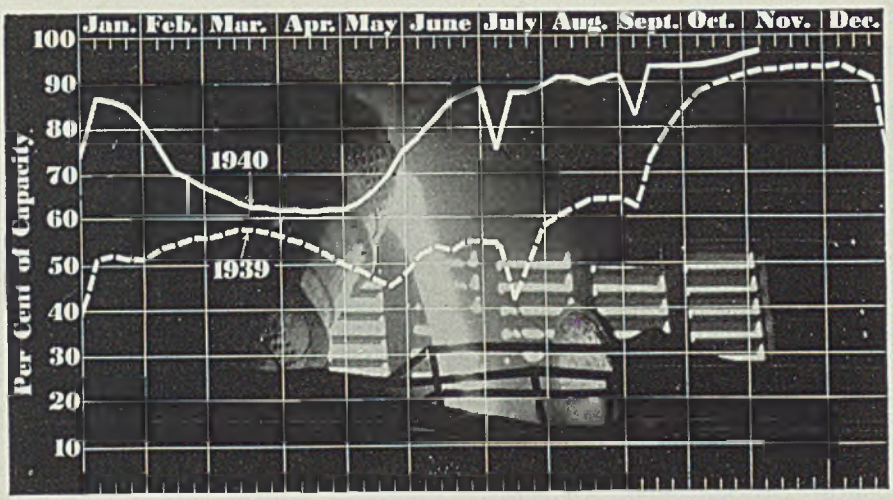
Equipment is expected to be placed in operation early in 1941.

MORE AIRPLANE CAPACITY NEEDED, SAYS ROOSEVELT

WASHINGTON

Reports have been heard in Washington for several days that 15 or 16 new airplane plants are to be erected. President Roosevelt at his press conference Friday stated that while he had no idea how many new plants will have to be built, 12,000 additional airplanes are to be ordered.

Facilities now are insufficient to meet present British and American orders, he said. Additional plants are under construction by airplane companies, and it will be up to the national defense commission to arrange for still more capacity.



PRODUCTION... Up

■ STEELWORKS operations last week advanced 1 point to 96½ per cent. Six districts increased operations, one reported a small decline and five were unchanged. A year ago the rate was 93 per cent; two years ago it was 57.5 per cent.

Youngstown, O. — With 69 open hearths in production, operations held at 91 per cent. This week the schedule is about 92 per cent.

Detroit — Furnace repairs lowered the rate 2 points to 95 per cent. Steelmakers are pushing every unit for maximum production.

St. Louis — Addition of one open hearth by a West Side plant increased output 2½ points to 85 per cent, highest rate since December, 1939.

Cincinnati — Continued at 94 per cent. Finished capacity is engaged about 100 per cent on light rolled products.

Birmingham, Ala. — With one open hearth added last week production reached 100 per cent, an advance of 3 points.

Cleveland — Unchanged at 90 per cent, with the same schedule expected this week.

Central eastern seaboard — Advanced 1 point to 94 per cent, some plants operating above 100 per cent.

New England — Held at 90 per cent operations, two works having all open hearths in production.

Pittsburgh — Up 3 points to 95 per cent, an all-time high.

Wheeling — Regained the previous week's loss, moving up 5 points to 98½ per cent.

Buffalo — Attained a new peak at 95 per cent with a gain of 4½ points, two producers expanding operations.

Chicago — Steady at 98 per cent, some interests exceeding rated production.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Nov. 2	Change	Same week 1939	1938
Pittsburgh	95	+ 3	93	45
Chicago	98	None	91	56.5
Eastern Pa.	94	+ 1	80	35
Youngstown	91	None	92	63
Wheeling	98.5	+ 5	93	59
Cleveland	90	None	90	77
Buffalo	95	+ 4.5	93	51
Birmingham	100	+ 3	94	68
New England	90	None	100	71
Cincinnati	94	None	90	75
St. Louis	85	+ 2.5	80	45.5
Detroit	95	— 2	100	82
Average	96.5	+ 1	93	57.5

Convention Calendar

Nov. 7-8—Society of Automotive Engineers Inc., national fuels and lubricants meeting, Mayo hotel, Tulsa, Okla. John A. C. Warner, 29 W. 39th street, New York, is secretary.

Nov. 7-9—American Society of Mechanical Engineers (fuels division) and **American Institute of Mining and Metallurgical Engineers** (coal division), Hotel Tutwiler, Birmingham, Ala. C. E. Davies, 29 W. 39th street, New York, is secretary.

Nov. 8-9—Industrial Management society, third national time and motion study clinic, Chicago Towers club, Chicago. L. Kolbig, 421 Engineering building, 205 W. Wacker drive, Chicago, is secretary.

Nov. 11-15—American Petroleum institute, annual meeting, Stevens hotel, Chicago. Lacey Walker, 50 W. 50th street, New York, is secretary.

Nov. 12-13—American Management association (production division), Hotel Cleveland, Cleveland. H. J. Howlett, 330 W. 42nd street, New York, is secretary.

Nov. 12-13—Air Hygiene Foundation of America, Inc., fifth annual meeting, Mellon institute, Pittsburgh. Dr. H. B. Meller, 4400 Fifth avenue, Pittsburgh, is managing director.

Nov. 13-14—National Founders' association, forty-fourth annual meeting, Waldorf-Astoria hotel, New York. J. M. Taylor, 120 S. LaSalle street, Chicago, is secretary.

September Exports Off From August Peak

■ Steel and iron exports in September, scrap excluded, totaled 965,444 gross tons, compared with 1,046,084 tons in August and 244,933 tons in September, 1939. The August tonnage set an all-time record. Aggregate exports for nine months, exclusive of scrap, were 5,489,951 tons, and 1,516,988 tons in corresponding period last year.

Scrap exports in September amounted to 255,608 gross tons, a sharp decline from 355,991 tons in August and 330,680 tons in September, 1939. Exports for nine months totaled 2,419,833 tons, compared with 2,761,594 tons in the period last year.

For steel import figures, see page 95.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS
(Gross Tons)

Articles	1940 Sept.	1940 Aug.	1940 Sept. thru Jan.
Pig iron	84,677	121,948	408,351
Ferromanganese and spiegeleisen	611	942	11,800
Other ferroalloys	5,441	3,165	17,015
Ingots, blooms, etc.:			
Not containing alloy	353,448	342,641	1,590,071
Alloy, incl. stainless	38,576	6,390	67,946
Steel bars, cold fin.	2,497	2,446	28,786
Bars, iron	1,062	732	11,478
Bars, concrete	9,781	7,846	106,001
Other steel bars:			
Not containing alloy	58,639	70,499	350,210
Stainless steel	347	40	935
Alloy, not stainless	3,585	2,718	22,135
Wire rods	50,891	42,145	217,382
Boiler plate	865	897	8,154
Other plates, not fab.:			
Not containing alloy	63,899	75,304	386,698
Stainless steel	67	66	393
Alloy, not stainless	109	194	1,828
Skelp iron or steel	19,817	20,443	84,693
Sheets, galv. iron	792	1,341	7,754
Sheets, galv. steel	12,742	11,784	122,165
Sheets, "black" steel:			
Not containing alloy	35,347	51,235	354,110
Stainless steel	123	146	1,338
Alloy, not stainless	302	212	4,113
Sheets, black iron	1,196	2,173	22,774
Strip steel, cold-rolled:			
Not containing alloy	6,574	5,831	42,379
Stainless steel	36	75	508
Alloy, not stainless	126	27	422
Strip steel, hot-rolled:			
Not containing alloy	10,697	16,857	103,453
Stainless steel	3	54	102
Alloy, not stainless	36	532	886
Tin plate, taggers' tin	15,142	19,895	329,664
Terne plate (including long ternes)	541	715	4,753
Tanks, except lined	2,147	3,523	21,946
Shapes, not fabricated	69,470	74,330	275,022
Shapes, fabricated	5,816	4,842	53,738
Plates, fabricated	402	3,682	13,588
Metal lath	98	114	1,038
Frames and sashes	299	193	1,551
Sheet piling	1,260	425	10,228
Rails, 60 lbs.	25,135	70,081	147,831
Rails, under 60 lbs.	3,717	4,090	20,654
Rails, relaying	159	5,064	14,530
Rail fastenings	586	1,215	7,553
Switches, frogs, crossg.	103	92	2,289
Railroad spikes	206	177	3,440
R. R. bolts, nuts, etc.	748	197	2,324
Boiler tubes, seamless	3,122	1,797	17,223
Boiler tubes, welded	51	216	1,572
Pipe:			
Seamless casing and oil-line	13,166	8,422	94,560
Do., welded	5,692	980	27,291
Seamless black	2,104	1,591	24,075
Pipe fittings:			
Mall.-iron screwed	391	277	3,844
Cast-iron screwed	228	115	2,063
Pipe and fittings for:			
Cast-iron pressure	3,033	3,550	40,076
Cast-iron soil	651	1,938	14,827
Pipe, welded:			
Black steel	3,440	2,727	30,212
Black wrought-iron	798	582	6,520
Galv. steel	4,585	4,126	39,787
Galv. wrought-iron	495	772	6,184
All other pipe, fittings	832	1,289	11,631
Wire:			
Plain iron or steel	10,017	7,476	69,364
Galvanized	8,409	6,218	47,297
Barbed	2,834	6,020	28,003
Woven-wire fencing	401	368	3,347
Woven-wire sc'n cloth:			
Insect	110	85	596
Other	239	193	1,727
Wire rope and cable	1,027	1,331	8,397
Wire strand	117	104	1,104
Electric welding rods	428	383	2,965
Card clothing	1	1	11
Other wire	1,236	785	12,256
Wire nails	3,318	4,457	41,141
Horseshoe nails	75	122	854
Tacks	62	70	625
Other nails, staples	337	444	3,987
Ordinary bolts, machine screws	5,434	5,033	20,575
Castings:			
Gray iron (incl. semisteel)	462	378	3,434
Malleable-iron	224	245	1,809
Steel, not alloy	171	237	1,477
Alloy, incl. stainless	133	132	1,133
Car wheels, tires, and axles:			
Wheels and tires	914	1,940	10,110
Axles, no wheels	81	126	1,451
Axles, with wheels	35	50	914
Horseshoes and calks.	3	47	266
Forgings, n.e.s.:			
Not containing alloy	2,500	3,959	20,323
Alloy, incl. stainless	163	180	2,920
Total	965,444	1,046,084	5,489,951
Scrap, iron and steel	251,116	346,087	2,393,292
Scrap, tin plate	.....	.....	2,841
Tin plate circles, strips, cobbles, etc.	162	396	3,249
Waste-waste tin plate	19	220	5,371
*Terne plate clippings and scrap	4,311	9,288	15,080
Total scrap	255,608	355,991	2,419,833
GRAND TOTAL	1,221,052	1,402,075	7,909,784
Iron ore	201,041	220,964	1,048,643

*New class.

U. S. FOREIGN TRADE IN IRON AND STEEL, INCLUDING SCRAP
Gross Tons

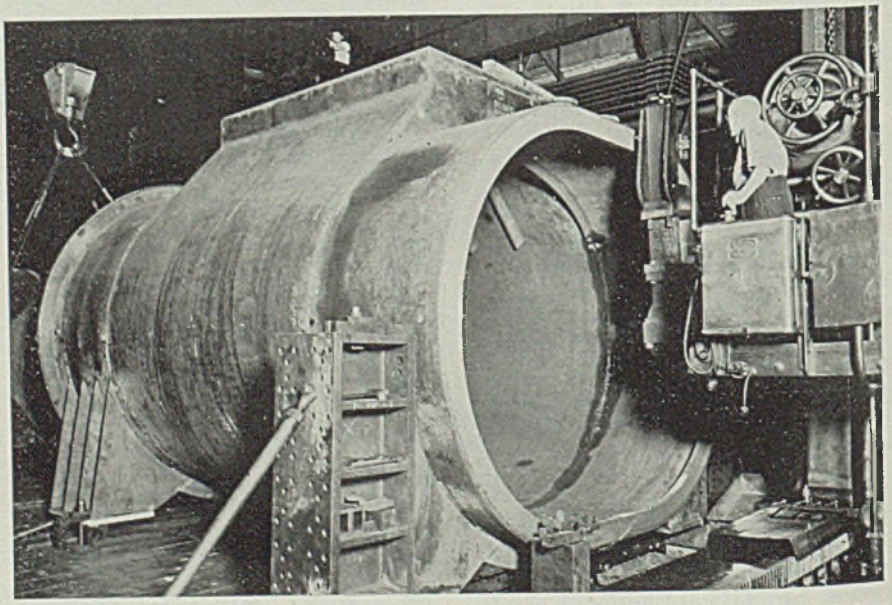
	1940 Exports	1940 Imports	1939 Exports	1939 Imports
Jan.	583,521	8,274	362,672	27,664
Feb.	671,301	6,740	359,690	19,149
Mar.	663,980	5,096	474,360	25,369
April	612,906	6,674	394,008	44,083
May	783,964	7,759	532,641	28,142
June	936,047	5,505	588,856	32,587
July	1,034,938	3,542	513,664	30,851
Aug.	1,402,075	2,105	477,078	28,328
Sept.	1,221,052	2,598	575,613	29,874
Oct.	.....	.....	591,856	19,189
Nov.	.....	.....	605,555	15,216
Dec.	.....	.....	600,437	14,709
Total	.....	.....	6,076,429	315,161

More Machines to Great Britain; Fewer to Japan

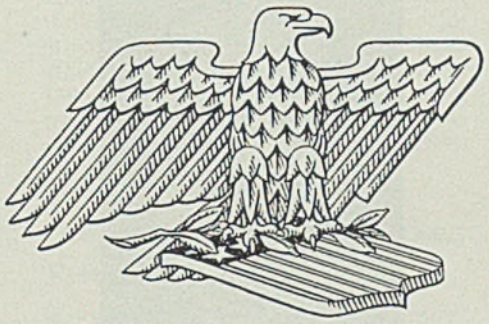
■ Exports of industrial machinery from the United States in September were valued at $36,880,941, a decline of 4 per cent from $38,466,083 in August, machinery division, department of commerce, reports. Power-driven metalworking machinery, however, increased 5 per cent to $22,452,289, a new high, compared with $21,420,050 in August.

Machine tool shipments to Great Britain were valued at $15,070,249; $12,480,621 in August, and $7,954,726 in July. Shipments to Japan in September declined to $587,632 from $1,875,503 in August and those to Russia dropped to $894,999 from $1,795,826. September shipments of power generating machinery showed a slight gain but declines were registered in all other major classes.

Machining 35,000-Pound Condenser Shell



■ Workman machines end flanges of a 9 x 13-foot oval condenser shell, 18 feet long, in the Allis-Chalmers Mfg. Co. shop, Milwaukee. The shell weighs approximately 35,000 pounds and is of all-welded construction. It is part of an 18,000-square foot, 2-pass surface condenser for use with a 15,000-kilowatt steam turbine



A people may prefer a free government; but if, from indolence, or carelessness, or cowardice, or want of public spirit, they are unequal to the exertions necessary for preserving it; if they will not fight for it when it is directly attacked; if they can be deluded by the artifices used to cheat them out of it; if, by momentary discouragement, or temporary panic, or a fit of enthusiasm for an individual, they can be induced to lay their liberties at the feet even of a great man, or trust him with powers which enable him to subvert their institutions—in all these cases they are more or less unfit for liberty; and though it may be for their good to have had it even for a short time, they are unlikely long to enjoy it.

JOHN STUART MILL

ESSAY ON REPRESENTATIVE GOVERNMENT — PUBLISHED 1860

MEN of INDUSTRY

■ HENRY H. TIMKEN JR. has been named chairman of the board, Timken Roller Bearing Co., Canton, O. He succeeds his father, the late Henry H. Timken Sr., and will continue as vice president and general manager of the company's steel and tube division. Mr. Timken has been associated with the company since graduation from Harvard, and has been a director ten years.

John E. Fick, superintendent of the steel mill, has been added to the board. He has been affiliated with Timken over 20 years.

♦

Alfred Kauffmann, president, Link-Belt Co., Chicago, is celebrating his fortieth year with the company. He started his career with the organization in 1901 as an engineer.

♦

Powell Pardee, associated with Inland Steel Co., Chicago, about 35 years, and from 1913 to early this year manager of the company's order department, has been appointed district sales manager at New York. About six months ago he was sent to New York as a special representative in export business. The New York office, established Nov. 1, with headquarters at 40 Wall street, will handle both export and domestic business in the eastern territory.

♦

N. E. MacCallum has retired as superintendent, Phoenix Iron Co., Phoenixville, Pa. He had been associated with the company about 40 years.

♦

J. E. Urquhart, general superintendent of all operations, Woodward Iron Co., Woodward, Ala., has been

D. C. Peterson

Whose appointment as works manager, Superior Engine division, National Supply Co., Toledo, O., was reported in STEEL, Oct. 28, page 30

Powell Pardee

elected president, Southern Blast Furnace and Raw Materials association, Birmingham, Ala. Other officers are: Vice president, G. M. Harris; secretary-treasurer, E. R. Merrill. W. E. Curran and G. R. Armstrong have been added to the board of governors.

♦

Harry G. Schoene has been appointed sales manager, H. Forsberg Co., Cleveland, maker of industrial finishes. He formerly was identified with Sherwin-Williams Co., Cleveland.

♦

Leo G. Naber, heretofore associated with Hilb & Bauer, Cincinnati, has joined David J. Joseph Co., Cincinnati, dealer in iron and steel scrap.

♦

Walter J. Burns has been made plant manager, Chevrolet transmission division, Saginaw, Mich. Mr. Burns, general superintendent of the plant since 1936, succeeds the late Harold M. Spears.

♦

Dr. Harry P. Evans, consulting metallurgist, formerly chief metallurgist for Ingersoll Steel & Disc Co. and Calumet Steel Co., divisions of Borg-Warner Corp., Rockford, Ill., has been retained by Laucks Laboratories Inc., Seattle, to be in charge of the metallurgical and physical testing departments.

♦

M. W. Thompson has been appointed sales promotion manager, Norge division, Borg-Warner Corp., Detroit. He formerly was engaged in sales promotion work with Stewart-Warner Corp., and more recently has been assistant sales manager with Farnsworth Television & Radio Corp., Fort Wayne, Ind.

♦

George C. Brainard, president, General Fireproofing Co., Youngstown, O., has been appointed chief of the Cleveland ordnance district of the United States army. He filled a like position during the World war, acting in an advisory capacity in the organization of industry in that area including northern Ohio and parts of western Pennsylvania. His duties do not require his relinquishing his present office.

♦

Eugene R. Perry has been promoted to manager of engineering and superintendent of the Micarta works, Westinghouse Electric & Mfg. Co., at Trafford, Pa. Associated with Westinghouse since 1929, Mr. Perry has been acting superintendent of the Micarta works since last May.

♦

Wayne Mendell has been named acting general sales manager of all divisions of American Machine & Metals Inc., East Moline, Ill. Mr. Mendell, heretofore in charge of the company's central sales region, will now make his headquarters at East Moline. He was formerly vice president and general sales manager, U. S. Hoffman Machinery Corp., Barrett Co. Ltd., and International Steel Corp., having served as director of the latter company and also of Fletcher Works Inc.

♦

Stanley A. McCaskey Jr. has been appointed to an executive position with Allegheny Ludlum Steel Corp., Pittsburgh. A graduate of Harvard law school, Mr. McCaskey joined Allegheny Ludlum Sept. 15. In addition to general corporation experience with the South Penn Oil Co. and the Six States Coal Corp.,

W. T. Roundy

Who has been transferred to the Atlanta, Ga., sales territory of Cutler-Hammer Inc., Milwaukee, as noted in STEEL, Oct. 28, page 30. His headquarters will be in Orlando, Fla.

Stanley A. McCaskey

he was chief counsel for the treasurer of the United States and also served in Porto Rico with the Porto Rico reconstruction administration.

♦

G. S. Swanson, the past several years associated with the Pettibone-Mulliken Corp., Chicago, has joined Wellman Engineering Co., Cleveland, as Cleveland district sales manager for Williams clamshell and dragline buckets. He was associated with G. H. Williams Co., Erie, Pa., prior to Wellman's purchase of that company's bucket division about nine years ago.

L. R. Kells has been placed in charge of Wellman's furnace department. He has had considerable experience in designing and selling furnaces, having been associated with the following firms: Mt. Vernon Bridge Co., Pennsylvania Railroad Co., Chapman Engineering Co., Surface Combustion Corp., Askania Regulator Co., Ohio Valley Clay Co., and more recently as chief engineer, Salem Engineering Co., Salem, O.

♦

William F. Conlin, division metallurgist, American Steel & Wire Co., Cleveland, has been appointed open-hearth superintendent at the steelworks in Donora, Pa. John A. Slenker, open-hearth superintendent at Donora, has been transferred to Cleveland as a division metallurgist. Henry R. Patterson, assistant general superintendent, Donora Steel & Wire works, has been transferred to Cleveland as engineer of wire drawing development, while A. F. Iacqua has been named division metallurgist on high carbon steels at Cleveland.

World Tin Output Up

■ September world tin production is estimated at 22,600 gross tons, compared with the revised figure of 19,100 tons in August, the International Tin Research & Development council reports. Nine months' production aggregates 167,400 tons, against 111,300 tons in the corresponding part of 1939.

United States deliveries for nine months totaled 81,814 tons, an increase of 75 per cent over 46,620 tons in nine months, 1939. World stocks of tin, including smelters' stocks and carryover, increased 1592 tons in September, to 52,824 tons at the end of the month. A year ago world stocks were 39,398 tons.

Steel Employment Makes Fifth Monthly Gain

■ Employment in the steel industry rose during September to an average of 565,000 employes, according to the American Iron and Steel institute. This was the fifth consecutive monthly gain in employment in the industry.

In August, an average of 560,000 workers were on the industry's payrolls, while in September, 1939, employment averaged 502,000.

As a result of the smaller number of working days in September, due to the Labor day holiday and to the fact that there was one less day in the month than in August, payrolls were slightly lower in September than in the preceding month. Payrolls during September totaled $82,068,000, compared with $83,837,000 in August, and with $69,735,000 in September, 1939.

The number of hours worked per week by steel wage earners averaged 36.5 in September, which compares with 36.7 in August, and 35 in September, 1939.

Wage earning employes earned an average of 85.4 cents per hour in September, as against 85.1 cents in August, and with 84.7 in September, 1939.

Holds Red Tape Delays Defense Production

■ Governmental red tape is retarding national defense production and planning, asserted H. W. Prentis Jr., president, National Association of Manufacturers, speaking last week before an industrial leadership conference in Cleveland.

Mr. Prentis, who also is president, Armstrong Cork Co., Lancaster, Pa., advised the immediate appointment of an executive head "with real authority" to co-ordinate the work of the national defense advisory commission, enforce its decisions, cut through red tape and standardize specifications.

The army, navy and other government departments, Mr. Prentis declared, are doing the best job possible "under the circumstances under which they are forced to work by an administration which has rarely shown any general understanding of the problems of American industry and which, for reasons it has never explained, refuses to adopt the organizational procedure that proved effective in the last war."

Died:

■ WILLIAM F. RUST, 66, formerly executive vice president, Koppers Co., Pittsburgh, at his home near Leesburg, Va., Oct. 29. He retired from active service several years ago. Mr. Rust joined Koppers in 1915 as chief engineer, later becoming executive vice president and also president of Alan Wood Steel Co., Eastern Gas & Fuel Associates, and other affiliated companies. Prior to joining Koppers he served as assistant chief engineer, American Sheet & Tin Plate Co., Pittsburgh; chief engineer, Youngstown Sheet & Tube Co., Youngstown, O., following which, as general superintendent, he had charge of the building and operation of the new plant of Otis Steel Co., Cleveland.

♦

Willard J. Bell, president, Newaygo Engineering Co., Newaygo, Mich., in that city, Oct. 17.

♦

William B. Hosford, 98, retired vice president, Dodge Mfg. Co., Mishawaka, Ind., in that city, Oct. 27.

♦

Herman W. Schatz, 57, sales manager, American Tool Works Co., Cincinnati, at his home in Norwood, O., Oct. 21.

♦

Joseph E. Buker, for 30 years vice

Herman Frederick Heyl, 54, superintendent at the Easton, Pa., plant of Taylor-Wharton Iron & Steel Co., in Easton, Oct. 12. He had been associated with the company since 1906.

♦

William B. Storey, 82, retired president, Atchison, Topeka & Santa Fe railroad, in Chicago, Oct. 24. He served as president from 1920 to 1933, retiring in the latter year but remaining a director and member of the executive committee.

♦

Raymond R. Harrington, district manager at Indianapolis for Noblitt-Sparks Co., Columbus, Ind., maker of automobile accessories, recently in Pittsburgh. He had been associated with the company 16 years.

♦

William E. Craig, 53, general superintendent of mines on the Mesabi and Cuyuna ranges for M. A. Hanna Co., Oct. 22, at his home in Hibbing, Minn. He joined the Hanna company in 1925 as superintendent of the Susquehanna iron ore mine at Hibbing.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Regulations Issued on Five-Year Amortization.

Pig Iron Producers, Henderson Talk Over Prices.

Commercial Aircraft Priority Committee Established.

Wage-Hour Division Studies Metal Mining Industry.

WASHINGTON

■ TREASURY department last week announced new rules which may save manufacturers millions of dollars in connection with the emergency defense construction program.

The regulations, that may govern taxes on an estimated $3,000,000,000 to $5,000,000,000 in new plant construction, tell manufacturers what they must do in order to be allowed to charge off the value of their new plants in five years for tax purposes.

The new rules on amortization of defense facilities were issued under the second revenue act of 1940, which gave corporations this new privilege of depreciating certain plants in five years, rather than in the customary 15 or 20 years, provided the facilities were of an emergency national defense nature.

Only construction which actually was started after June 10, 1940, can qualify for the speedy amortization, the treasury ruled. This means, officials said, that five-year amortization could not be claimed for a portion of a building erected before June 10, even if the entire structure, completed after June 10, were used for national defense purposes.

A flat requirement was made, in conformance with the tax law, that the privilege will be granted only when the national defense commission and either the army or navy certify the necessity of the new construction.

Taxpayers were given permission to elect either the new five-year plan of depreciating their new construction, or to continue with the slower, normal charge-off allowances.

But in what officials said was an attempt to give the broadest possible interpretation, the rules allow a manufacturer to switch from normal depreciation to rapid whenever he wishes, and even to switch back again to normal.

Tax experts pointed out that some firms may not choose to use the new provisions for 5-year amortization, for fear that after the 60-month period the national emergency would still be in force, their profits would be high, but they would no longer be permitted to make tax deductions for depreciation.

Under the regulations a manufacturer who is being reimbursed by the government for undertaking new construction is not entitled to the fast amortization privilege unless the defense commission and either the war or navy departments certify that the public interest has been protected.

What "protection of the public interest" would mean was not up to the treasury, officials said. That term was left to be expained by the defense commission.

Officials said that the new rules mean that once a manufacturer gets the amortization privilege for defense construction he can not lose it.

♦

Conferences on pig iron prices were held last week by Leon Henderson, defense commissioner in charge of price stabilization, and executives of the commercial blast furnace producing interests.

Conferences were held separately, and no statement was made regarding personalities, nor when the conferences were held. It is understood that one of the producers' representatives was from the Pittsburgh Coke & Iron Co., which recently advanced pig iron prices.

Mr. Henderson told STEEL's representative that inasmuch as no general conference was held it would be unfair to comment on any of them.

It was stated officially last week that Mr. Henderson's division has made surveys of costs and prices of pig iron in conjunction with the recent review of the scrap iron and steel situation.

DONALD NELSON TO DIRECT SMALL BUSINESS' ACTIVITIES

National defense advisory commission has designated Donald M. Nelson, co-ordinator of national defense purchases, as director of small business activities to deal with the problems and interests of smaller business establishments in relation to the defense program. This office has been created in conformity with the established policy of the defense commission which holds that smaller business occupies a place of vital importance in the defense program.

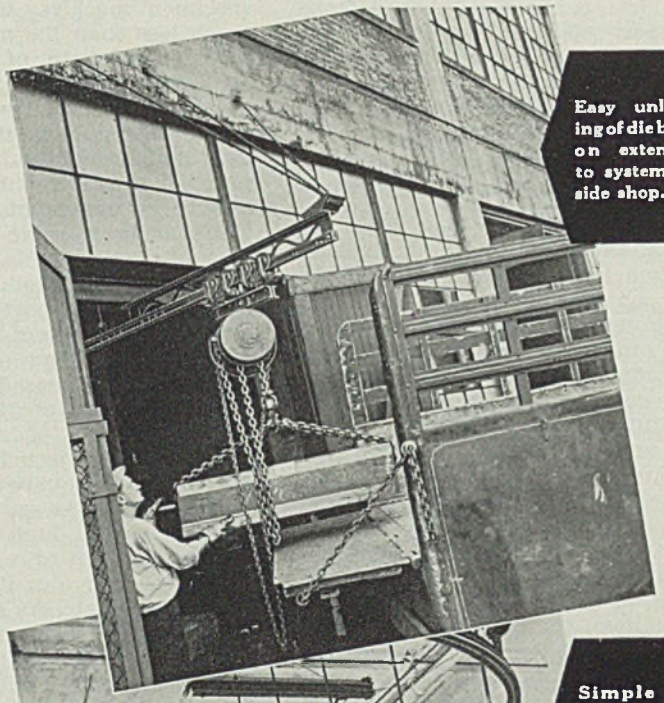
Office of the director of small business activities will serve as a clearing house of information for the smaller enterprises, keeping them advised of war and navy department requirements they may be qualified to fill. The director will lend his assistance in facilitating financing required by smaller business to effectuate defense contracts. His office will co-operate with local commercial banks in this connection and will assist in establishing contacts with federal reserve banks and the reconstruction finance corporation when local banks may be unable to extend required credits.

Defense commission believes that the director of small business activities will be in a position to serve as an effective liaison between war and navy procurement officers, potential contractors, subcontractors

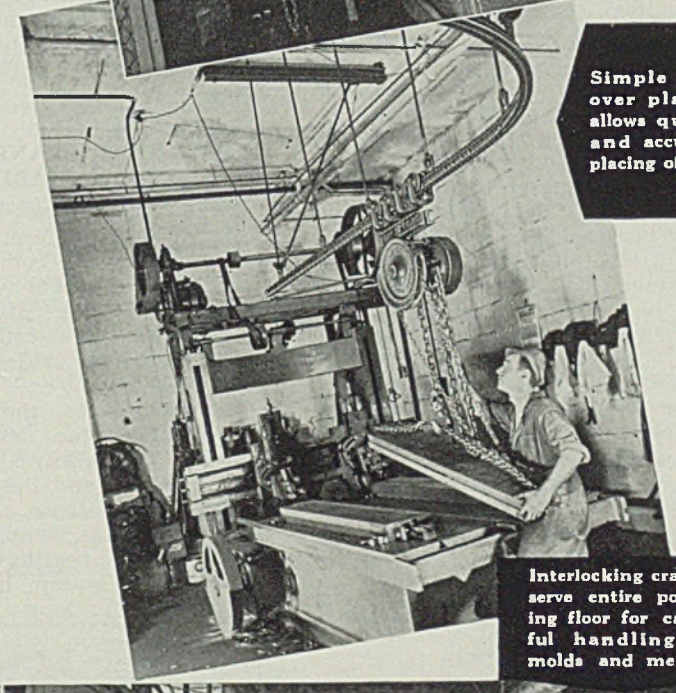
Simple Methods for stepping up Defense Production

With a surging demand for greater output, plants operating on defense materiel use every possible means to obtain it. It is no wonder that these plants are rapidly installing overhead handling equipment to relieve floor congestion...to gain time through process aids...or to conserve skilled manpower by eliminating handling fatigue.

Simple systems as shown here are quickly and inexpensively applied wherever a short cut is needed. American MonoRail engineers can spot these places in a short survey of your plant. They will then offer a detailed proposal which does not obligate you in any way. Why not give them a chance to help push along your defense production?



Easy unloading of die block on extension to system inside shop.



Simple spur over planer allows quick and accurate placing of die.

Interlocking cranes serve entire pouring floor for careful handling of molds and metal.

THE AMERICAN MONORAIL COMPANY

13102 Athens Ave. Cleveland, Ohio

and local bankers so that defense contracts may be executed simultaneously with provision for adequate bank or Reconstruction Finance Corp. financing.

WAGE-HOUR STUDY OF METAL MINING INDUSTRY STARTED

Economic studies have been begun at the wage and hour division for two informal fact-finding hearings on metal mining industry which will be held soon. Studies were ordered by Col. Philip B. Fleming, administrator of the division, after conferring with executives of the International Union of Mine, Mill and Smelter Workers, a CIO affiliate.

One hearing will be in Birmingham, Ala.; the other will be in a western city convenient to the metal mining industry of the Mountain states.

Details of the hearings will be announced soon, Colonel Fleming said. Facts found at hearings will be used in arriving at administrative determinations of whether work day begins and ends when worker enters and leaves mine, or when he arrives at and leaves his work place in the mine. Colonel Fleming's conferees included Reid Robinson, president of the International union, and Benjamin Riskin, research director, both of Denver; Van D. Jones, member of the union's international board, and W. B. Lemley, W. C. Gunnin, John Hill, J. L. Robinson, James Lipscomb, Louis Tarrant, Asbury Hower, Jesse Gaines, all of Bessemer, Ala.; and E. A. Sisemore, of Powderly, Ala. The last named all are officers or representatives of locals operating in the mines of Tennessee Coal, Iron & Railroad Co., Sloss-Sheffield Steel & Iron Co., Woodward Iron Co., and Republic Steel Corp.

COMPRESSIVE PROPERTIES OF THIN SHEET BEING TESTED

Information on the compressive properties of very thin sheets of stainless steel is now being obtained at the bureau of standards, department of commerce, through a new testing method developed by experts of that agency. The development of this special test was part of a research project undertaken for the national advisory committee for aeronautics, supported by funds from eight manufacturers. According to Dr. Lyman J. Briggs, director of the bureau, knowledge on how this material will behave under high compressive stress should increase its use in the manufacture of airplanes and may help to appreciably speed up airplane production.

The making of a compression test on a very thin sheet of metal is a difficult procedure because the specimen buckles under stresses much less than the maximum compressive strength of the material. Yet, accurate information on the compressive properties is essential for a safe and at the same time light and economical design. The problem was solved by building up a test specimen of many pieces placed side by side similar to a pack of playing cards. These pieces are cemented together with shellac and are supported in such a way as to prevent buckling laterally as the load on the testing machine is increased. Using this method, sheets of the metal two one-thousandths of an inch thick have been subjected to loads of 110 tons per square inch.

Bureau experts say that stainless steel possesses high strength and is very resistant to corrosion. With a full knowledge of its compressive properties, engineers need no longer hesitate to consider the use of this widely available material for aircraft and other light-weight structures.

COMMERCIAL PLANE PRIORITY COMMITTEE ESTABLISHED

Commercial aircraft priority committee to co-ordinate production and maintenance of commercial air transport equipment with the requirements of the national defense program has been established, the government's priorities board has announced.

This committee, the first to be set up under the new board, includes representatives of the aircraft industry and the army, navy and national defense advisory commission. It was established in the belief that a healthy commercial air transport system is an important adjunct to a strong national defense.

Duties of the committee will be to formulate policies to be submitted through the administrator of priorities to the priorities board for consideration and approval. The committee will have an administrative officer who, working under the direction of administrator of priorities, will carry out the policies formulated by the committee and approved by the board. He will handle all cases and make the necessary contacts with industry and with government departments. Thus his relationship to the committee will be much the same as the relationship of the administrator of priorities to the priorities board.

The following have been appointed members of the committee: Capt. Sydney M. Kraus, representing the production division of the defense commission, administrative officer; Col. John H. Jouett, president, Aeronautical Chamber of Commerce of America Inc., representing the aircraft industry; C. R. Smith, president, American Airlines, representing the transportation division of the defense commission; Maj. A. J. Lyon, representing the army; and Capt. D. C. Ramsey, representing the navy.

MR. HILLMAN TO REVITALIZE NATION'S "GHOST TOWNS"

Sidney Hillman, commissioner in charge of the labor division of the national defense advisory commission, announces the start of an intensive drive to revitalize the nation's "ghost towns," using latent labor and plant capacities of these areas to meet national defense needs. "Ghost towns" are Mr. Hillman's own words. The program will start in Ohio, Pennsylvania, and Illinois.

Technological advances and development of new industries have caused the plants in some single industry areas to close down, leaving the population without useful enterprise, he stated. Unemployment in "ghost towns" has become acute during the past few years. In most cases, buildings, machines, and power plants are in excellent condition. Skilled workers are available.

To carry out this revitalizing work with the aid of Morris Llewellyn Cook, Mr. Hillman has appointed four field representatives to obtain full information regarding available facilities and personnel for national defense orders in the following areas:

Pierce Williams will go to Carbondale, Ill.; Mr. Williams was former secretary of the Pittsburgh chamber of commerce and more recently aide to the WPA administrator. Robert T. Beal, REA economist, will go to Newcastle, Pa.; Chester Lake, REA engineer, to Cambridge, O.; and Lauren W. Casaday, West coast shipping executive, to Mansfield, O.

Others To Be Appointed

Others will be appointed within the next few days to meet expansion of the program.

Mr. Hillman said "the primary program will use the 'farming out' method. This is an efficient means of dividing work. During the World war the Hog Island shipyard was able to turn out a record breaking two ships a week only because 2,300 different plants participated. Some of these plants produced only a single part, but did so on a mass production basis. The work under this program will be broken up among the plants, diversifying the industries in each area. Production and employment will be fairly distributed thus emphasizing cooperation between these towns in an integrated program."

Employers Show Generosity Toward Workers Called to Colors

■ LIBERAL provisions for the protection of jobs, seniority, insurance and pension benefits of employes called to military service have been approved by many metalworking companies. A considerable number will grant service allowances or extra compensation, in varying amounts, to draftees or national guardsmen in training.

The selective service and training act of 1940, of course, endeavors to safeguard the employe's right to his job upon completion of the training period and to protect his ordinary employe benefits. The wording of that section of the act, however, is vague and permits several interpretations.

In the weeks since the act's passage, many companies have formulated definite policies on the treatment of employes called to service. While these vary in detail, practically all provide: (1) For retention of seniority rights; (2) for credit under company pension plans, where such plans are in operation; (3) reinstatement at the end of his service period; (4) for retention of coverage in the company's group insurance plan, with some modifications.

Some companies engaged in production of national defense materials have provided that company officials may request deferment of training period where employes are doing important work and where replacement would be difficult or would retard defense production.

Provision for payment of extra compensation is fairly common among metalworking companies, although this obviously is less feasible where large numbers of production workers are employed than where employment is limited and comprises mainly clerical employes.

Some Grant Financial Aid

Typical of the more liberal policies announced recently are the following:

York Ice Machinery Corp., York, Pa., will grant a month's salary, payable in 12 equal monthly installments, provided the employe has at least one year's service; reinstate employes at end of training period; continue group life insurance.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will grant a month's pay to employes who have been with the company one year; grant vacation allowances in addition to the month's pay; and otherwise protect the conscripted employes' interests as regards reinstatement, seniority, insurance and savings plan.

Inland Steel Co., Chicago, will supplement the income of employes drafted or called to service with the national guard by monthly payments equal to the base service pay; maintain group life insurance; and protect seniority.

American Brake Shoe & Foundry Co., New York, will grant two months' pay, less deductions for employes' retirement system and tax for federal old age benefit and unemployment compensation; allow employes to remain members of the retirement system while in service, although neither company nor employe will make contributions during the service period; pay premiums on group life insurance without deduction from the employe, reinstate employes at end of service period.

General Electric Co., Schenectady, N. Y., will contribute one month's pay; allow retention of G. E. employes securities corporation bonds; credit eligible employes with participation in the general profit sharing plan based on earnings prior to induction into training, payable upon application for reinstatement; maintain the life insurance carried on employe by the company.

Pullman Co., Chicago, will pay a severance allowance equal to one month's salary or wages to employes with more than six months' service; continue group natural death insurance, company to pay premiums; and otherwise protect employes' interests.

Allis-Chalmers Mfg. Co., Milwaukee, will pay bonuses of one month's salary for salaried workers and one-third of the employe's highest quarterly earnings in the preceding year for hourly workers; company also will maintain in force group life insurance and will pay premiums.

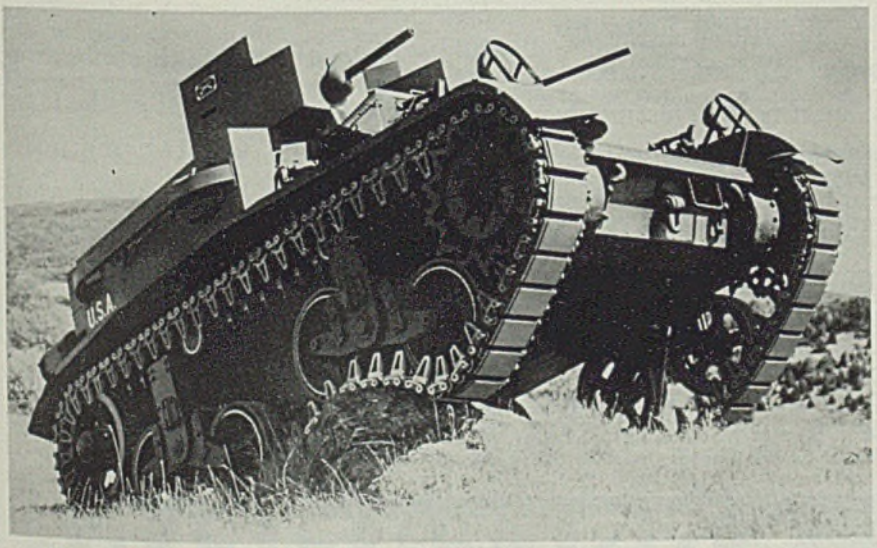
Will Give Vacation Allowances

United States Steel Corp., Pittsburgh, will grant vacation allowances to those eligible; continue group life insurance, provided employe continues to pay his share; grant full continuous service credit toward the corporation's pension plan with earnings figure at rate of the preceding 12 months. Contributions to the contributory pension plan will be suspended for the period of training, but may be resumed at the end of the service period.

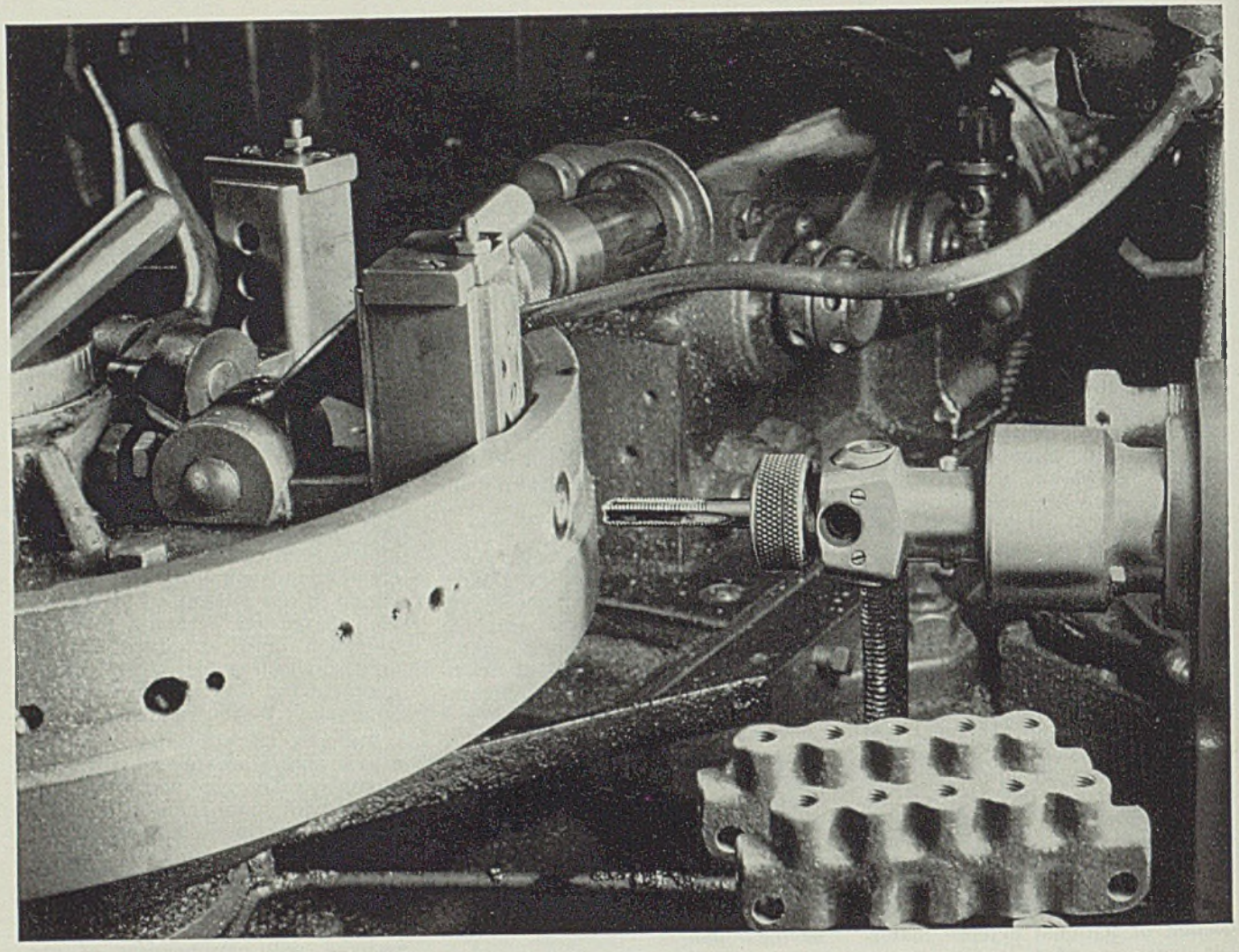
Western Electric Co. Inc., New York, will grant employes with a year's service or more their regular pay less government pay for three months; and otherwise protect employes' interests.

RCA Mfg. Co., Camden, N. J., will grant one month's pay less government pay and will continue group insurance, with the company paying the employe's portion of the premiums.

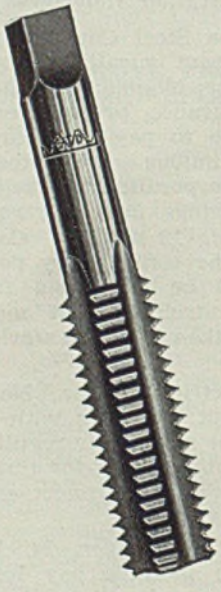
Rubber Shoes for Army Tanks



■ Orders for 130,000 units of rubber track blocks for light tanks, United States army, have been placed with Goodyear Tire & Rubber Co. by American Steel Foundries, American Car & Foundry Co. and Rock Island arsenal. The blocks will be vulcanized to metal plates and furnished with bushings and accessories, at the rubber company's plant in Akron, O. Photo, courtesy of Goodyear, shows tank equipped with blocks



"GTD Greenfield" Taps Chosen for this hard job



Here's a ten-way double junction casting turned out by a big specialty manufacturer — 10 tapped holes in each cast-iron piece. To handle it economically calls for a real investment in tapping machinery and fixtures *plus good taps.* The company saves itself money by using *"GTD Greenfield"* 5/16-24 Ground Thread High Speed Steel Bottoming Taps — to the tune of 240 completed tapped holes per hour.

Don't make the mistake of figuring tap "savings" on the cost of the taps. Figure on cost per tapped hole. *"Greenfield"* can help you get your costs down on this basis — and will be glad to work out test runs on your own work to prove it.

GREENFIELD TAP & DIE CORPORATION, Greenfield, Mass.

Detroit Plant: 2102 West Fort St. Warehouses in New York, Chicago, Los Angeles and San Francisco. In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.

GTD GREENFIELD

TAPS . DIES . GAGES . TWIST DRILLS . REAMERS . SCREW PLATES . PIPE TOOLS

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Lewis' Renunciation Weans Part of UAW from New Deal.

Inadequate Military Housing Booms Trailer Sales.

Automobile, Partsmakers Learn Aircraft Program Role.

Governmental Red Tape Hindering Rearmament.

DETROIT

■ TOMORROW one-third of the nation—and not the "ill-fed, ill-clothed and ill-housed" third—drives to the polls to determine whether any individual, however great, can be entrusted with presidential power for 12 years. The third-term issue seems after all the primary one, and few clearer expressions of the present situation have been seen than that written a mere 80 years ago by John Stuart Mill in an essay on representative government and being passed around here. He said:

"A people may prefer a free government; but if, from indolence, or carelessness, or cowardice, or want of public spirit, they are unequal to the exertions necessary for preserving it; if they will not fight for it when it is directly attacked; if they can be deluded by the artifices used to cheat them out of it; if, by momentary discouragement, or temporary panic, or a fit of enthusiasm for an individual, they can be induced to lay their liberties at the feet even of a great man, or trust him with powers which enable him to subvert their institutions—in all these cases they are more or less unfit for liberty; and though it may be for their good to have had it even for a short time, they are unlikely long to enjoy it."

Effect of John L. Lewis' renunciation of the New Deal on automobile laboring forces is not immediately apparent, despite statements of union subofficials that their sheep are solidly behind F. D. R. It is stated authoritatively that last Monday a good number of Roosevelt buttons were swept up in one of the Chrysler plants, and in Oakland county a group of 1800 workingmen enlisted in the Willkie cause. A crew of dockworkers unloading steel here shifted to Willkie because of bitterness over the conscription plan.

If you are to base your beliefs on the noise attending such laughable events as the recent tour of key auto plants by New York's Mayor La-Guardia, the New Deal has nothing to worry about. On the other hand, seasoned observers of the local scene last week were of the opinion Willkie has at least an even chance, that his campaign will reach its peak on election eve. Late New York odds were reported at even money. The possibility was being discussed that the closeness of the contest might mean the electoral vote going contrary to the popular vote.

■ WHATEVER the outcome, there is no doubt about business generally continuing at a high level for months to come. All car builders are enjoying large backlogs of orders and assemblies move progressively into higher ground each week, although output still is some distance from the ceiling set in the week ended May 4, 1929, when plants assembled 153,647 cars and trucks.

An interesting sidelight on the retail sales picture, noted by *Ward's Automotive Reports,* is the boom which has developed in house trailers as the result of mobilization of the national guard. Inadequacy of camp facilities has persuaded many officers to buy a trailer, hitch it to the family car and move the entire family to the scene of mobilization.

Clarification on what automobile producers may be expected to contribute to the airplane phase of national defense activity followed the recent meeting here with defense commissioner Knudsen. A program involving parts for 12,000 airplanes in two standardized models, one a two-engine 20,000-pound bomber and the other a four-engine 40,000-pound ship, was unfolded by Mr. Knudsen before a gathering of the cream of officialdom in the motor, auto body, motor parts, tool and die industries, as well as army air corps officers and engineers from aviation companies.

The auto industry, it was pointed out, is being asked to supply parts and subassemblies to aircraft builders for assembly by the latter. A committee including Alvan Macauley, chairman of Packard; Edsel Ford, president of Ford; K. T. Keller, president of Chrysler; C. E. Wilson, acting president of General Motors; C. C. Carlton, vice president of Motor Wheel; L. D. Adams (alternate), vice president of Associated Spring, and a representative of the truck industry, will establish a technical committee which will undertake a five-fold program of preliminary investigation. This program includes:

1. Inspection of airplane plants making the types of planes involved in the automotive assignment, to get the proper picture of methods of manufacturing now employed. (This would appear to be an incongruity since the planes considered were understood to be entirely new designs, not as yet in production.)

2. Detailed study of plane parts and blueprints, in co-operation with aviation manufacturers, to determine what production changes may be possible.

3. Survey of automotive equipment now in place, which may be available for press and die work on airplane parts.

4. Survey of plant facilities avail-

able for subassembly of such items as wings, ailerons, tail surfaces, rudders, etc.

5. Investigation of the forging situation in both aluminum and steel, and study of machining facilities now available.

There is a ticklish problem involved in this whole matter, for, as pointed out in these columns previously, the airplane industry and the automotive industry do not see eye to eye in the matter of manufacturing, the one considering the other as louts in the matter of precision production, while the motor industry at times regards airplane builders as fuss-budgets. However, Mr. Knudsen is a past master at composing differences of opinion, and in time of national emergency these minor matters are forgotten to a large extent.

The army air corps *materiel* division shortly will bring to Detroit detail drawings of the parts involved to expedite production studies. Motor companies have cleared the decks for immediate action insofar as engineering is concerned, but it will likely be next spring before much production has been started.

Specifications Troublesome

In addition to the airplane program, there is of course a vast amount of other defense work on which Detroit plants either are figuring or are actually working. One of the chief difficulties so far experienced is the matter of specifications. Each branch of the government has its own exacting specifications which must be rigidly observed. The case is related of a local shop which was figuring on some navy work for shipment to the Panama canal. Study of the requirements showed that the finished job was subject to acceptance or rejection —*at the Panama canal.* Upon learning this, the estimator threw up his hands in despair.

Steel specifications likewise prove troublesome. A primary contractor on government work will order certain parts from a subcontractor, specifying that the steel must meet such-and-such navy specification. Not knowing what this means, the subcontractor will contact a steel supplier who in turn is usually ignorant of the specification requirements and will refer the subcontractor to the district office of the government procurement agency. The latter may not be able to provide much assistance, except to refer the subcontractor back to the prime contractor, and thus a complete circle has been traversed.

A simplification of government specifications, which at best are none too clear, or a more general dissemination of them among manufacturers, would speed up activity. It is related that a somewhat similar situation prevailed in Canada at the start of Britain's participation in the war. A particular case was that involving a large number of transport lorries which had to meet certain rigid specifications, though they were nothing more than some standard structural shapes welded into an assembly and set on a couple of axles with wheels. A Canadian manufacturer found first shipments of these lorries being rejected because of some apparently minor infraction of specifications. Finally, this manufacturer went to government officials and said substantially, "Look, we have been building these things for years and have had no complaints from any of our customers. They have confidence in our knowledge and ability to build these units. Why can't we expect the same treatment from you?"

Confronted with this commonsense attitude, the government decided to relax on specifications and accept the lorries as designed by the builder. Production immediately was expedited and so far as is known there have been no instances of failures.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.....	226,952	356,692	449,492
Feb. ...	202,597	317,520	422,225
March...	238,447	389,495	440,232
April....	237,929	354,266	452,433
May.....	210,174	313,248	412,492
June	189,402	324,253	362,566
July.....	150,450	218,494	246,171
Aug.	96,946	103,343	89,866
Sept.	89,623	192,678	284,583
9 mos....	1,642,520	2,570,370	3,160,060
Oct.....	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.....	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
Oct. 5.....	105,153	76,095
Oct. 12	107,957	75,860
Oct. 19	114,672	70,114
Oct. 26	117,080	78,210
Nov. 2	118,092	82,690

†Comparable week.

40 Per Cent for Taxes

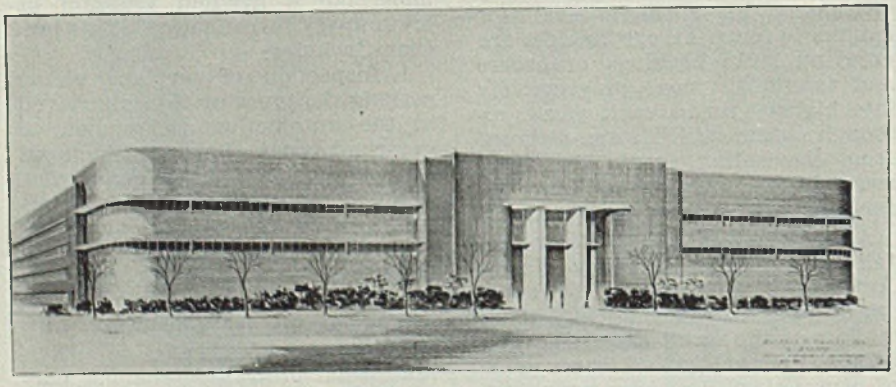
Financial statement of General Motors Corp. for the third quarter of this year reveals that out of net income of $28,174,030, over 40 per cent had to be set aside for taxes, leaving $15,597,030, or 31 cents per share of common earnings. Tax bill in the first nine months of the year — $52,472,000 — was nearly double the impost of the same period a year ago, reflecting the impact of the new revenue acts on the cost of operating a profitable business these days.

Commenting upon business trends, the GM report observes that "so far as the trend over the next two or three years is concerned it seems assured that, as long as the synthetic influence of the enormous amount of government spending continues, a high level of production will in all likelihood be maintained. Thus, we may expect the superficial indications of returned prosperity. . . . It must be recognized that the problems which have beset industry for so many years still remain unsolved and are far too greatly unappreciated. They may be counted on to reassert their influence when the present emergency is over."

Retail sales reports for first 20 days of October:

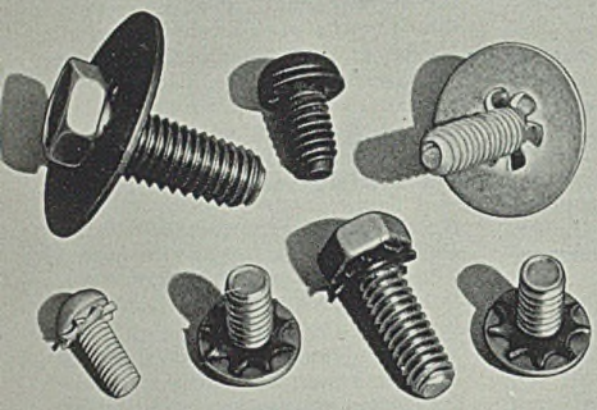
	Units	% Over Same Period, 1939
Pontiac	16,615	61.6
Olds	12,225	37
Buick	20,738	31.9
Chevrolet ...	61,147	167

Ford's Airplane Engine Plant Under Construction

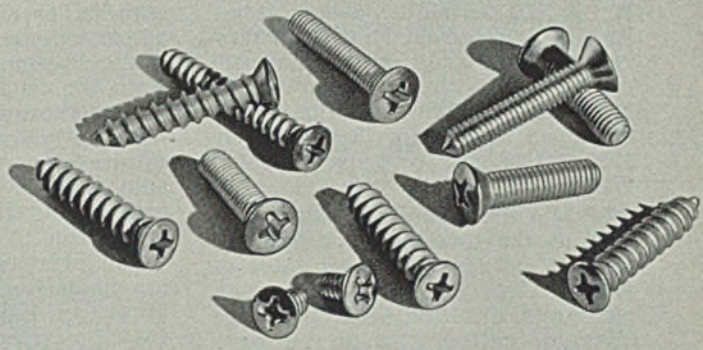


■ Ford Motor Co.'s $11,000,000 airplane engine plant at Dearborn, Mich., will be completed and producing Pratt & Whitney engines about next March 1. Building will be 360 x 1000 feet in size and will contain 800,000 square feet of floor space. Four thousand tons of steel piling now are being driven to bedrock and 9000 tons of structural steel will be erected by mid-January

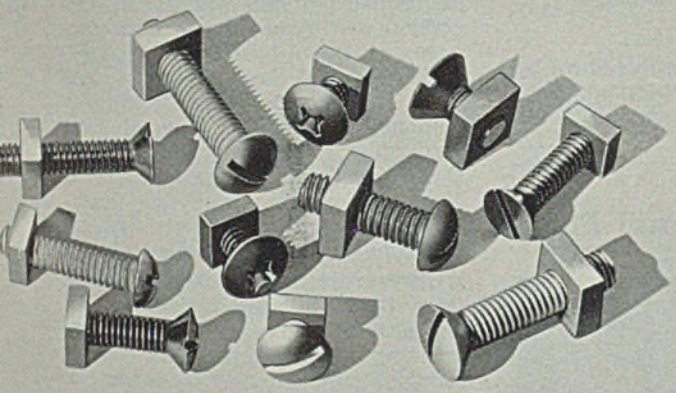
Standard FASTENINGS SAVE YOU MONEY



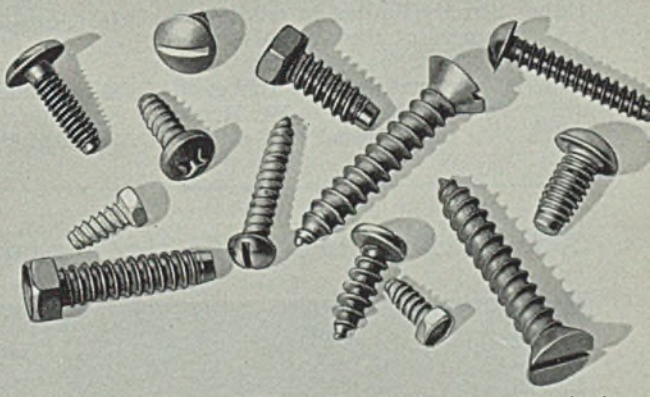
Lamson Pre-assembled Lock Washer screws are available in 8/32" to 5/16" diameters, and in lengths up to 1 1/2". Standard head styles are round head, binding head, oven head and hexagon head. Lamson & Sessions Company is a licensed manufacturer of this patented screw.



Phillips Recessed Head screws are stocked in all sizes with both standard machine screw threads and hardened self-tapping screw threads. Lamson & Sessions Company is a licensed manufacturer of this patented screw.



Round Head, Flat Head, Oval Head, Oven Head and Binding Head Stove Bolts are made in a full range of sizes. Pointed, knurled, ribbed and slotted Hinge Pins, threaded Rods and Wires, Crating Rods and Hook Bolts are made to specifications.



Lamson Hardened Sheet Metal screws are stocked in three standard types for metal and plastic assemblies. Types "A", "B" and "Z" are available with slotted or Phillips head. Type "C" Hardened Self-Tapping screws have American National Standard thread and also are available with slotted or Phillips Head.

• Quite frequently our engineers are asked to provide a "made to order" fastening for an assembly which would have been as well served in all respects by a standard bolt or screw from our stock! If in doubt about whether a standard fastening exists which can be used in your assemblies—ask our engineers' advice. If a special headed and threaded part is necessary, and can be made on bolt-making machinery, they will develop the most economical design for you. All of the bolts and screws illustrated are "standard," *and we mean stocked,* ready for shipment today to meet your production and assembly schedules.

•

THE LAMSON & SESSIONS CO., Cleveland, Ohio

75th ANNIVERSARY 1865-1940

Your Jobber stocks the Lamson line

LAMSON & SESSIONS

BOLTS • • NUTS • • COTTERS • • CAP SCREWS • • SPECIAL

41.23 Per Cent Shift in 1936 Roosevelt Vote Revealed by Poll

■ DECIDED shift away from President Roosevelt since 1936 was revealed by STEEL's presidential poll conducted at the National Metal Exposition in Cleveland Oct. 21-25. Of those voting for Roosevelt in 1936, 41.23 per cent now prefer Wendell L. Willkie.

Mr. Willkie received 78.63 per cent of the total vote, or 3440 of the 4375 votes cast. Mr. Roosevelt received 935 votes, or 21.37 per cent. In 1936, 58.52 per cent of those participating in the poll voted for Mr. Landon, and 41.48 per cent for Mr. Roosevelt.

Visitors to the show cast their ballots on modern voting machines, loaned by the Berger Mfg. Co., division of Republic Steel Corp. The poll attracted great interest and an estimated 12.5 per cent of all those attending the show cast ballots.

At the end of the first four days of the show, Mr. Willkie had polled 81.16 per cent of the vote. During these four days, attendance was rather strictly limited to exhibitors, and members of the several technical societies whose meetings were held in conjunction with the exposition. The slight rise in Mr. Roosevelt's vote on the final day was attributed to a slight relaxation in admittance requirements.

Other significant facts gleaned from the vote were that 62.55 per cent of those voting believed longer working hours should be permitted to accelerate the defense program, and 71.65 per cent believed the excess profits tax would discourage production.

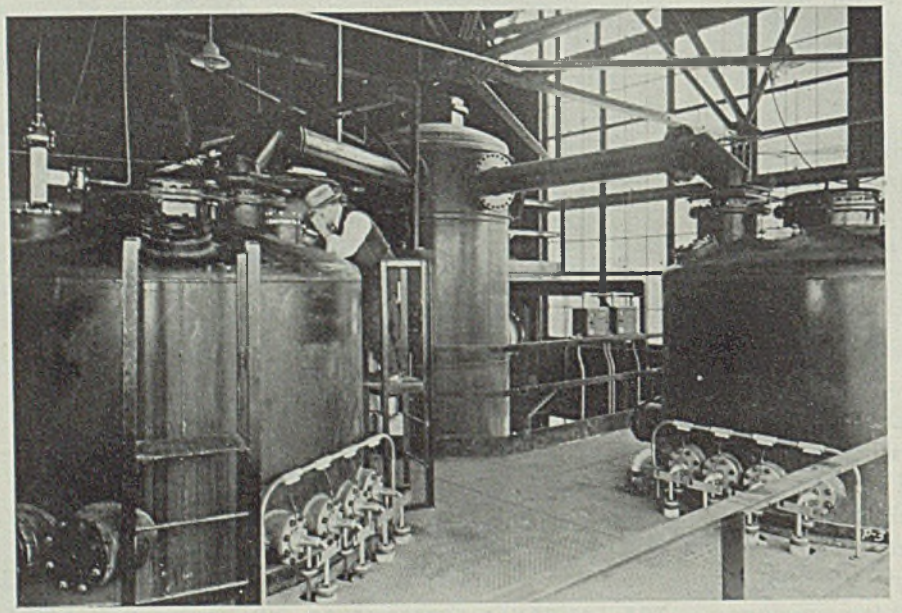
The presidential vote figures offer the basis for an interesting computation. In 1936, a total of 44,156,256 actual votes were cast. Of these 27,476,673, or 62.22 per cent were for Mr. Roosevelt, and 16,679,583, or 37.78 per cent for Mr. Landon.

Simple proportion permits this equation: 58.52 per cent (as 1940 show visitors voted for Landon in 1936) is to 37.78 per cent (Landon's proportion of actual popular vote in 1936) as 78.63 per cent (1940 show straw vote for Willkie) is to x (Willkie's percentage of popular vote on Nov. 5.)

In this equation, x figures out to 50.76 per cent for Willkie.

■ Revenue passenger miles flown by domestic airlines in September were 108,533,749, a 57.02 per cent increase over September, 1939, according to Col. Edgar S. Gorrell, president, Air Transport Association of America. September volume was down only 2.3 per cent from August, the highest month of all time. First nine months of 1940 showed an increase of 60.98 per cent over the same period in 1939.

3000 Tons of Steel in Plastic Company's Phenol Plant



■ More than 3000 tons of steel plates, pipe and structurals were required in the new phenol manufacturing plant of Durez Plastics & Chemicals Inc., at North Tonawanda, N. Y. Under construction for two years, the plant cost $2,000,000 and contains 40 miles of pipe. Duplicate equipment is installed at every stage, since stoppage of action at any point might disrupt the manufacturing process. Phenol, important in plastics manufacture, also is used in the making of explosives

Steel Exhibit Enlarged At Industrial Museum

■ Museum of Science and Industry, Jackson Park, Chicago, has opened a new central pavilion which incorporates a large iron and steel exhibit area.

Introduction to the exhibit is through a main entrance hall featuring large murals sponsored by Inland Steel Co., Chicago, and depicting steelmaking and rolling processes and uses of steel. Maps show the Chicago steel producing area, and sources of raw materials for steelmaking. Illuminated bullseyes display samples of raw materials and typical rolled steel specimens. Embedded in the terrazzo floor are 300 rolled steel cross sections.

In the main exhibit room are operating models of processes by which iron ore, limestone and coal are converted into metal. In succession are to be seen a blast furnace, an open hearth and a 1/24-scale model of Ford Motor Co.'s hot strip mill at Dearborn, Mich. A demonstrator puts a pig of lead through the blooming mill, bloom shear, reheating furnace, scale breaker, roughing mill, five finishing stands, hot bed and strip coiler, and converts it into a coiled ribbon.

Glass-protected machine tools perform the five basic machining operations—shaping, drilling, cutting, grinding and milling. The visitor provides motive power by turning a crank.

Also displayed, are four metal lathes dating successively 1840, 1870, 1900 and 1940; an operating nail machine; one to make coil springs to order; a pantograph machine; precision gages; an oxyacetylene flame cutter; a machine in continuous operation sawing, filing and polishing; a gray iron foundry fully equipped and operating; and forge exhibits.

Republic Steel Expands Houston, Tex., Facilities

■ Republic Steel Corp., Cleveland, has leased seven acres of land adjoining its Houston, Tex., pipe yard, and will increase the number of pipe stocking racks. Two new buildings, an 100 x 120-foot single story warehouse and an 1800-square foot sales office building, will be constructed for Truscon Steel Co., Republic subsidiary.

Machine Tool Builders Promise "No Failure in Any Crisis"

■ REALIZATION of the importance of the industry in the national defense program was evident at the National Machine Tool Builders' association's thirty-ninth annual convention in Chicago, Oct. 24-25. Despite the pressure under which machine tool builders are working, 216 delegates representing 105 companies, attended, largest number in the history of the organization.

Determination that the industry shall not fail the country in any crisis, was reflected in every address and discussion. That it not only is dealing vigorously and effectively with existing conditions but actually anticipated the present state of affairs a long time ago and formulated long-range plans to meet them, was emphasized by John E. Lovely, vice president and chief engineer, Jones & Lamson Machine Co., Springfield, Vt.

Just prior to turning over the responsibilities of the association presidency for the coming year to Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati, Mr. Lovely said:

"Several years ago many members of our industry felt much concerned because our government was paying no attention to the march toward preparation for war on the part of the aggressor nations. . . .

"At that time our association appointed a committee of important men from our industry to co-operate with officials of the army, navy and other branches of the government in problems of national defense. This committee urged the government to put its arsenals and navy yards in good condition, replacing obsolete equipment therein so that they could most effectively serve our country in case of need. The government was urged to appropriate several million dollars a year for this purpose—but congress would appropriate only a mere fraction of the necessary amount."

In closing Mr. Lovely declared: "We want it definitely understood that insofar as the national defense program depends upon the machine tool industry, we are resolved that we shall not be found lacking, and that as individuals, as companies, or as an industry, we shall find the means to furnish the machine tools that are needed."

One session was devoted to forum-type discussions of priorities and other problems now facing machine tool builders as a result of rapidly spreading and complicated ramifications of the defense program. Members of the association's defense committee who for the past several months have spent much time in Washington collaborating with army and navy officials and with the advisory defense commission, were able to give suggestions as to voluntary allocation of various types of equipment to points in the defense production setup where its need is being felt or will be felt in the near future.

Frederick V. Geier

Elected president, National Machine Tool Builders' association, as reported in the Oct. 28 issue of STEEL. He is president, Cincinnati Milling Machine Co.

Among those participating in the discussion were: Clayton R. Burt, president and general manager, Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Conn.; Howard W. Dunbar, vice president and general manager, grinding machine division, Norton Co., Worcester, Mass.; Charles J. Stilwell, president, Warner & Swasey Co., Cleveland; Robert M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill.; Mr. Lovely, Mr. Geier, and Tell Berna, general manager of the association. Mason Britton, director, machine tool division, advisory defense commission, Washington, was a guest.

"TOOLS CAN BE DELIVERED, BUT NOT ALL AT ONCE"

Machine tool production for 1940 will be 20 times larger than in 1932 and two and one-half times more than in 1929, Mr. Berna told the American Society of Tool Engineers at the Homestead club, Endicott, N. Y.

"The manufacturers of the United States are going to get the machine tools they need for national defense production," Mr. Berna said, "but they can't get them all at once. I am confident that machine tools will be at hand as rapidly as they can be put to work.

"A manufacturer tooling up for increased production does not need all of his machine tools at once. Machine tools are only one of many items which must be assembled and co-ordinated . . .

"I most earnestly urge the machine tool buyer not to demand all of his new machine tools for earliest possible delivery. His best course of action is to take the machine tool builder into his confidence and explain how many machines he will need tomorrow, how many in one month, how many in three months, how many in six months.

"On that basis I believe the machine tool industry is going to come mighty close to making deliveries on schedule."

"Standards of Accuracy for Engine Lathes" Released by Builders

■ ANNOUNCEMENT has just been made through the office of the National Machine Tool Builders' association that 26 builders of lathes have authorized the release of their recently adopted "Standards of Accuracy for Engine Lathes."

This has been presented as a comprehensive report to the American Standards association. Builders anticipate this set of specifications of tolerances and test procedure will be adopted and recorded as an American standard as promptly as the Standards association's procedure will permit.

Tests for accuracy—of which 23 of the 27 are shown by diagrams in the report—are as follows: Bed level—transverse direction; bed level—longitudinal direction; tailstock way alignment; spindle center runout; spindle nose runout; cam action of spindle; spindle taper runout; headstock alignment—vertical; headstock alignment — horizontal; tailstock spindle alignment—horizontal; tailstock spindle alignment — vertical; tailstock taper alignment — horizontal; tailstock taper alignment—vertical; vertical alignment of head and tail centers; lead screw alignment; lead screw cam action; cross slide alignment; face plate

runout; chuck runout; collet chuck runout; degree of roundness of short chucked work; variation in turned diameters of two ends of 12-inch chucked test bar; variation in turned diameters of two ends of 12-inch test bar held between centers; accuracy of lead screw—lead per foot; accuracy of lead screw—lead in any 4 inches; backlash on cross feed screw; and backlash on compound rest screw.

In each case three sets of limits are set forth, these being for tool room lathes; engine lathes of 12 to 18-inch swing, inclusive; and engine lathes of 20 to 36-inch swing, inclusive.

It is a significant commentary on the tremendous improvement in quality of machine tools within recent years that the limits of accuracy now specified as standard for large-capacity heavy-duty engine lathes would have been considered "tight" even for high precision tool room lathes a quarter of a century ago.

This is proved by the following limits now accepted by the industry for the three classes of lathes mentioned in the foregoing paragraph: For spindle nose runout, total indicator readings of 0 to 0.0003, 0 to 0.0004, and 0 to 0.0006-inch respectively; headstock alignment—horizontal—at end of 12-inch test bar, 0 to plus or minus 0.0003, 0 to plus or minus 0.0005, and 0 to plus or minus 0.0008-inch respectively; and vertical alignment of head and tail centers, high at tailstock 0 to 0.0008, 0 to 0.001 and 0 to 0.0015-inch respectively.

Tool Engineers Develop Training Plan To Alleviate Labor Shortage

■ AMERICAN Society of Tool Engineers has developed a training program in an effort to provide emergency solution to the shortage of skilled mechanics, tool and die designers and tool engineers.

Developed also has been a new 4-year high school course as a long-term training program to prevent recurrence of the present shortage and improve employability of high school graduates. A college course also is being outlined.

The society estimates 75 per cent of all high school graduates at present are unemployable, primarily because high school curricula are designed mainly as college preparatory courses rather than being designed to fit graduates for jobs.

Complete details of the training program are to be made available to industry, government, and educational bodies as soon as final revisions, in process, are completed.

Fundamentally, the program, while national in scope, is designed to take care of immediate needs in each industrial community. The program calls for co-operative action by industry, educational bodies, and political subdivisions. Program calls for:

Counties or municipalities to furnish school buildings.

Industry to assist in supplying shop equipment.

Industry to provide manpower for shop instruction from their own staffs.

These instructors to be given a preliminary intensive short-term course in "teaching" by men provided by educational bodies in the community.

Trainees to be designated by the various industrial organizations in which they are to receive employment on completion of the course.

Any necessary financing to be supplied by government bodies.

Training to be specific, for a definite job or jobs, rather than general.

On completion of course, trainee to go on industrial payroll as an apprentice for a short period.

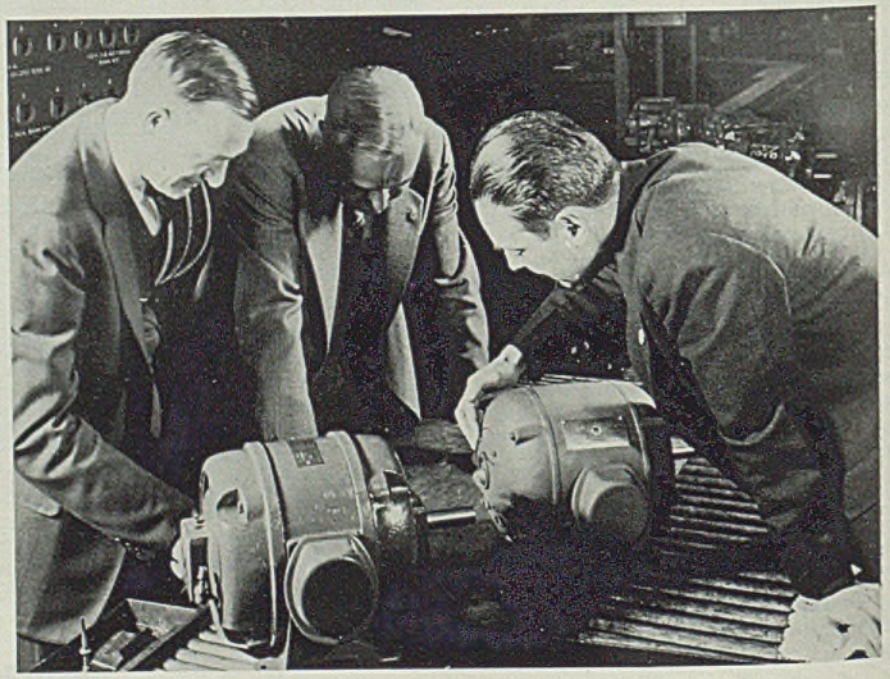
Administration to be controlled by an advisory committee on which all interested bodies will be represented.

To expedite the setting up of emergency training programs, the society is proceeding to set up educational committees of its own in each of its 38 chapters. Committees will function in an advisory capacity, without compensation.

Included in the training course is a means of progressive "upgrading" of skilled and technical help. Thus, at the bottom of the list, completely untrained men will be taught to become machine operators, qualified machine operators will be converted into skilled craftsmen, while tool designing and engineering will be taught to skilled mechanics, etc., who apparently possess an aptitude for such work.

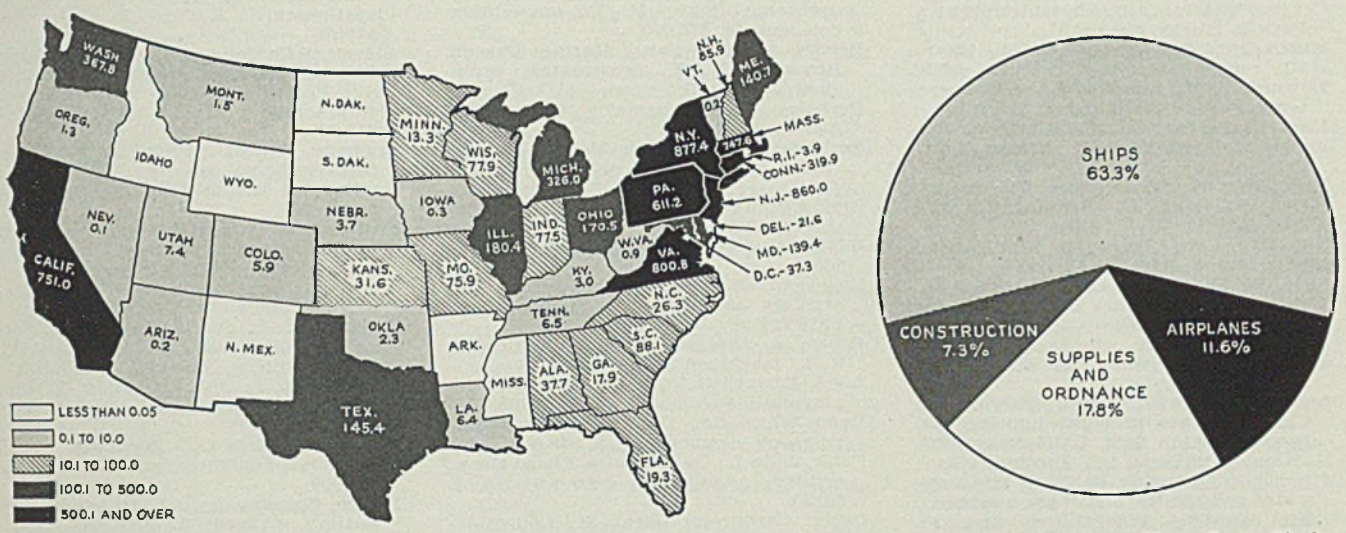
As far as machine operators are concerned, the detailed program is designed to train such men for employment in a period of from three to six weeks.

More Power Per Cubic Inch and Per Pound



■ Typical of the new compactness in small electric motors is the 1½-horsepower squirrel cage induction motor, at right, which weighs 25 per cent less and occupies 27 per cent less space than the older style at left. The new type conforms to the dimension standards promulgated by the National Electrical Manufacturers' association Oct. 1, which permits lighter and more compact motors as well as streamlined design. The changes are expected to be especially beneficial to machinery builders, to whom space long has been a problem. Photo, courtesy, Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Distribution of National Defense Contracts, by States and by Types



■ Map at left shows distribution of national defense contracts, in millions of dollars, awarded from June 13 to Sept. 30, by states. Circle at right shows percentage distribution by types. Contracts totaled $7,921,300,000, and included $829,100,000 let in United States possessions or not allocated by states. Data from government reports, compiled by National Industrial Conference board, New York

$253,456,445 Defense Contracts Placed; Ordnance Awards Heavy

■ UPTURN in volume of government defense contracts awarded last week, as announced by the war and navy departments, increased the period's total to $253,456,445.89. Accelerated preparation for military training of draftees is indicated by larger purchases of quartermasters' supplies and increased awards for barracks. Ordnance department awards continued heavy. War department's purchases totaled slightly more than twice as much as the navy's. War department announced the following awards:

Air Corps Awards

Air Cruisers Inc., Clifton, N. J., portable oxygen apparatus, pneumatic rafts, $459,050.

Albertson & Co., Sioux City, Iowa, grinders, $6400.

American Chain Link Machine Co., Los Angeles, fencing, March field, California, $3069.

Autocar Co., Ardmore, Pa., tractor trucks, $3417.98.

Bell Aircraft Corp., Buffalo, armament equipment, $229,245.

Bendix Aviation Corp., Eclipse Aviation division, Bendix, N. J., switch assemblies, $5,663,167.

Bendix Aviation Corp., Bendix division, South Bend, Ind., aircraft armament, $12,671,030.

Brown & Sharpe Mfg. Co., Providence, R. I., machines, $34,093.

Cincinnati Electric Tool Co., Cincinnati, buffers, polishers, grinders, $75,840.20.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, machines, $71,349.80.

Cyclone Fence Co., Los Angeles, fencing, March field, California, $5700.

Eckert-Fair Construction Co., Dallas, Tex., temporary housing, Barksdale field, Louisiana, $203,000.

Ex-Cell-O Corp., Detroit, grinders, $4737.28.

Fisher, Alfred P., San Francisco, temporary warehouses, including utilities, at San Francisco port of embarkation, California, $30,972.

Gem City Sheet Metal & Mfg. Co., Dayton, O., landing lamp assemblies, $56,560.

Grimes Mfg. Co., Urbana, O., landing lamp assemblies, $232,530.

Hadley Contracting & Construction Co., Philadelphia, temporary housing, Ft. Du Pont, Delaware, $459,000.

Haslam, John H., Salt Lake City, Utah, flagpole, base and steps, Hill field, Utah, $4147.

Heald Machine Co., Worcester, Mass., grinders, fixtures, $79,000.

Jack-Heintz Ltd., Palo Alto, Calif., starter assemblies, $2,535,367.50.

Kinsey, E. A., Co., Cincinnati, machines, $177,501.50.

Mall Tool Co., Chicago, electric portable drills, $26,737.50.

Martin, Glenn L., Co., Baltimore, armament equipment, $738,555.

Mercury Aircraft Inc., Hammondsport, N. Y., trainer assemblies, $125,737.50.

Motch & Merryweather Machinery Co., Cleveland, grinders, fixtures, $136,590.15.

Pausin Engineering Co., Newark, N. J., battery operated booster coils, $60,588.

Reynolds Metals Co., Louisville, Ky., aluminum, $80,147.99.

Savage, W. J., Co., Knoxville, Tenn., machines, $5075.50.

Saville, Allen J., Inc., Richmond, Va., housing facilities at Norfolk navy yard, Portsmouth, Va., and St. Juliens Creek, Va., $713,000.

Seifreat-Elstad Machinery Co., Dayton, O., machines, $256,003.

Sellers, William, & Co. Inc., Philadelphia, grinders, $11,405.25.

Standard Steel Works, North Kansas City, Mo., standard assemblies, $178,850.

Star Machine Mfrs. Inc., New York, switch assemblies, $207,150.

Swartchild & Co., Chicago, buffer and polishers, $1032.72.

Timmons, George W., Columbus, O., radio laboratory, Wright field, Ohio, $9400.

United Aircraft Corp., Pratt & Whitney Aircraft division, East Hartford, Conn., maintenance parts for airplanes, $632,460.05.

United States Electrical Tool Co., Cincinnati, electric portable drills, buffers, polishers, grinders, $102,932.95.

Valley Electric Corp., St. Louis, grinders and buffers, $23,734.60.

Variety Aircraft Corp., Dayton, O., standard assemblies, $115,200.

Vultee Aircraft Inc., Vultee field, Downey, Calif., maintenance parts for airplanes, $327,792.13.

Wilaka Construction Co. Inc., New York, temporary housing Ft. Ontario, New York, $461,838.

Quartermaster Corps Awards

Aluminum Products Co., La Grange, Ill., aluminum stock pots, $54,195.

Alvord, Burdick and Howson, Chicago, cantonment for seventh corps area training center, Decatur and Wayne counties, Iowa, $8,428,670.

American Steel & Wire Co., Chicago, repair parts for bedsteads, $6340.

Aschermann, N. J., & Co., Chicago, repair parts for bedsteads, $54.

Autocar Co., Ardmore, Pa., tractor-trucks, $254,450.

Barrett & Hilp, San Francisco, flagpole, flagpole base and reservoir, Golden Gate National cemetery, San Bruno, Calif., $106,000.

Belknap Hardware & Mfg. Co. Inc., Louisville, Ky., miscellaneous equipment for field ranges, $15,400.

Branford Construction Co. Inc., Hartford, Conn., fire station and guard house, Westover field, Mass., $89,277.

Cowen Construction Co., Shawnee, Okla., boiler house and equipment, Ft. Sill, Okla., $71,700.

Dickey, J. E., San Antonio, Tex., warehouse at Duncan field, Texas, $92,332.

Dodge, C. A., Co., Cambridge, Mass., fire escapes, heating installations at Ft. Andrews, Mass., $6293.

Fowzer Construction Co., Houston, Tex., electric distribution system, flying field, San Angelo, Tex., $13,139.13.
General Motors Corp., Chevrolet division, Detroit, trucks, $98,852.91.
Harris-Hub Bed & Spring Co., Cicero, Ill., repair parts for bedsteads, $6550.
Howard, B. B., Ada, Okla., heating systems, Ft. Sill, Oklahoma, $31,912.
Hunter Electric Co., Charlotte, N. C., electrical works, Ft. Bragg, North Carolina, $18,600.
Ivy, Henry A., Montezuma, Ga., recreation buildings, Ft. Benning, Georgia, $100,536.
Kay Mfg. Corp., Brooklyn, N. Y., repair parts for bedsteads, $1787.50.
Litle, W. Frank, and C. A. James, Amarillo, Tex., temporary housing, Ft. Sill, Oklahoma, $36,837.
Longwell-Scott Inc., St. Louis, railroad tracks, coal trestle at Ft. Custer, Michigan, $90,874.
Luppen & Hawley Inc., Sacramento, Calif., changes in night lighting system, McClellan field, California, $4078.
MacDonald Building Co., Tacoma, Wash., temporary housing, sanitary sewerage, water and electric distribution systems, Ft. Worden, Washington and Ft. Stevens, Oregon, $751,120.
Myers Bros., Los Angeles, recruit reception center, Ft. MacArthur, California, $287,000
O'Driscoll & Grove Inc., New York, temporary housing, electric distribution system and air corps hangar, Ft. Dix, New Jersey, $1,124,400.
Pensford, H. T., El Paso, Tex., temporary housing at William Beaumont general hospital, Texas, $73,370.
Petley, W. W., Los Angeles, temporary housing, utilities at Salinas airport, California, $281,793.
Petry, N. E., Denver, cantonment-type hospital, Lowry field, Colorado, $275,-000.
Ralph, Frank C., Portland, Oreg., temporary barracks, Vancouver barracks, Washington, $6800.
Rife, A. J., Construction Co., Dallas, Tex., temporary housing, Ft. Sill, Oklahoma, $1,603,420.
Severin, N. P., Co., Chicago, warehouses, Ogden ordnance depot, Utah, $1,030,000.
Sheppard-Pollak Inc., New York, temporary housing, Ft. Wadsworth, New York, $28,480.
Soderberg, John L., Construction Co., Omaha, Nebr., paint and oil house, Ft. Riley, Kansas, $3634.
Superior Sleeprite Corp., Chicago, repair parts for bedsteads, $3100.
Superior Trailer Mfg. Corp., Indianapolis, trailers, $378,966.
Townsend Co., New Brighton, Pa., repair parts for bedsteads, $80.
Twaits, Ford J., Co. and Morrison-Knudsen Co. Inc., Los Angeles, temporary housing, Ft. Ord, California, $3,448,357.
Watt-Sinclair, West Palm Beach, Fla., building at Orlando airport, Orlando, Fla., $6720.
Whittenberg Construction Co., Louisville, Ky., temporary housing, Bowman field, Louisville, Ky., $972,000
Williams Lumber Co., Columbus, Ga., temporary buildings, Ft. Benning, Georgia, $39,456.
Yellow Truck & Coach Mfg. Co., Pontiac, Mich., trucks, $717,988.50.

Ordnance Department Awards

American Brass Co., Waterbury, Conn., small arms ammunition, brass forgings, $1,047,234.40.
American Car & Foundry Co., New York, automotive equipment, $1179.40.
American Chain & Cable Co., A. C. Campbell division, Bridgeport, Conn., small arms ammunition, $21,350.
Anderson, A. & J. M., Mfg. Co., Boston, artillery ammunition components, $1,-570,800.
Aresto Mfg. Co. Inc., Baltimore, automotive equipment, $2535.
Bauer Bros., Co., Springfield, O., artillery ammunition components, $2,337,-740.
Bendix Aviation Corp., Eclipse Machine division, Elmira, N. Y., ammunition components, $78,000.
Bendix Aviation Corp., Marine division, Brooklyn, N. Y., fire control equipment, $36,417.75.
Berkeley Equipment Co., Corry, Pa., machines, $7685.
Bethlehem Steel Co., Bethlehem, Pa., artillery ammunition components, $1,-425,000.
Blakeslee, G. S., & Co., Cicero, Ill., machines, $3075.
Bliss, E. W., Co., Brooklyn, N. Y., presses, $3330.
Bridgeport Brass Co., Bridgeport, Conn., artillery ammunition components, $1,-120,000.
Brown & Sharpe Mfg. Co., Providence, R. I., machines, gages, $4847.98.
Budd, Edward G., Mfg. Co., Philadelphia, ammunition components, $574,793.
Budd Wheel Co., Detroit, artillery ammunition components, $7,818,380.
Cable, John L., Co., Jamaica Plain, Mass., artillery ammunition components, $6120.
Carter Carburetor Corp., St. Louis, artillery ammunition components, $1,-076,001.40.
Chicago Roller Skate Co., Ware Brothers division, Chicago, artillery ammunition components, $978,110.
Christiansen, C. B., Newark, N. J., tools, $7000.
Cleveland Container Co., Cleveland, artillery ammunition components, $4387.44.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms materiel, $15,000.
Connolly, Arthur J., Newark, N. J., machinery, $4290.
Continental Tool Works, Detroit, cutters, $1694.80.
Coslin Birmingham Mfg. Co. Inc., Birmingham, Ala., artillery ammunition components, $1,740,000.
Derbyshire Machine & Tool Co., Philadelphia, machines, $4500.
du Pont, E. I., de Nemours & Co., Carney's Point Works, Carney's Point, N. J., artillery ammunition, $334,950.
du Pont, E. I., de Nemours & Co. Inc., Wilmington, Del., small arms ammunition, $62,954.28.
Eastman Kodak Co., Rochester, N. Y., artillery ammunition components, $12,-000,000.
Edison, Thomas A., Inc., Edison Storage Battery division, West Orange, N. J., fire control equipment, $1380.
Electric Auto-Lite Co., Toledo, O., ar-

Purchases Under Walsh-Healey Act

(In Week Ended Oct. 19)

Iron and Steel Products

Aerial Machine & Tool Corp., New York
Allegheny Ludlum Steel Corp., Brackenridge, Pa.
American Bridge Co., Boston
American Cast Iron Pipe Co., Birmingham, Ala.
American Rolling Mill Co., Middletown, O.
Barnard Aviation Equipment Co. Inc., Wilkes-Barre, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

Carnegie-Illinois Steel Corp., Pittsburgh
Crane Co., Long Island City, N. Y.
Dierks, A., & Co. Inc., Brooklyn, N. Y.
Diercksmeier Co., Chicago
Eastern Rolling Mill Co., Baltimore
Electric Heater Co., Bridgeport, Conn.
Ellicott Machine Corp., Baltimore
Farrel-Birmingham Co. Inc., Ansonia, Conn.
Foster Wheeler Corp., New York
Glascote Products Inc., Cleveland
Greene-Wolf Co. Inc., Brooklyn, N. Y.
Gussack Machined Products Inc., Long Island City, N. Y.
Hadley Special Tool Co. Inc., Boston
Holden, N. M., Co., Philadelphia
Hunt, J. R., & Co., Baltimore

International Silver Co., New York
Jones & Laughlin Steel Corp., Pittsburgh
Kennedy Mfg. Co., Van Wert, O.
Kiefaber, W. H., Co., Dayton, O.
Koppers Co., Bartlett Hayward division, Baltimore
Lakeside Bridge & Steel Co., Milwaukee
Law Pipe Railing Corp., Long Island City, N. Y.
Leach Co., Oshkosh, Wis.
Leroy Automotive Distributors, New York

Lukens Steel Co., Coatesville, Pa.
Maxson, W. L., Corp., New York
Midvale Co., Philadelphia
Oliver Iron & Steel Corp., Pittsburgh
Pacific Car & Foundry Co., Seattle

Parish Pressed Steel Co., Reading, Pa.
Patterson Tool & Supply Co., Dayton, O.
Plomb Tool Co., Los Angeles
Reeves Steel & Mfg. Co., Dover, O.
Republic Steel Corp., Cleveland
Ryerson, Joseph T., & Son Inc., Chicago
Scrimgeour, William, Washington
Sheffield Steel Corp., Kansas City, Mo.
Stevens, L. E., Co., Cincinnati
Stevens-Walden Inc., Worcester, Mass.
Superior Valve & Fittings Co., Pittsburgh
Surface Combustion Corp., Toledo, O.
Timken Roller Bearing Co., Canton, O.
United States Pipe & Foundry Co., Philadelphia
West, Rudolph, Co., Washington
Wickwire Spencer Steel Co., New York
Wood, Gar, Industries Inc., Detroit
Worth Steel Co., Claymont, Del.

Commodity	Amount
Drag assemblies	$19,200.00
Steel	10,141.76
Structural steel	26,200.00
Water pipe	22,532.00
Steel	24,807.38
Bolts and brackets	24,390.00
Hawsers, sheet steel, wire rope	129,200.38
Steel	*4,994,663.52
Valves	*12,731.50
Heating equipment	17,380.00
Adapter plates	10,008.30
Sheet steel	27,445.00
Steel barrels	156,232.34
Pump casings	13,840.00
Chill molds	10,862.72
Boiler	128,137.00
Storage tanks	11,110.00
Unions	43,052.71
Mast base	66,571.20
Sight leafs	19,761.50
Files	13,271.05
Motor maintenance equipment	21,841.21
Steel tableware	55,700.00
Steel bars	*86,281.80
Tool kits	53,279.20
Files	12,461.64
Slide gates	252,000.00
Steel towers	105,845.00
Rail fence	10,688.00
Reel units	150,900.00
Motor maintenance equipment	16,719.36
Steel plates	*889,024.85
Telescope mounts	139,658.67
Forgings	21,429.00
Bolts and nuts	49,218.13
Fabricated structural steel	10,350.00
Reels	95,862.18
Screwdrivers	20,353.85
Bars and sockets	13,972.72
Corrugated cans	19,200.00
Steel	18,518.95
Steel sheets	24,958.04
Openers, knives	48,182.14
Reinforcement bars	12,410.40
Piping system	20,985.00
Cartridge holders	10,752.00
Valves	19,946.02
Furnace	10,419.00
Steel	17,142.70
Water pipe	29,519.92
Files	19,783.20
Tinplate, coke	26,828.00
Reel units	191,817.00
Steel plates	*1,343,095.52

tillery ammunition components, $748,000.
Electric Household Utilities Corp., Hurley Machine division, Chicago, artillery ammunition components, $755,590.
Emerson Electric Mfg. Co., St. Louis, artillery ammunition components, $822,232.
Fay, J. A., & Egan Co., Cincinnati, machinery, $1064.
Federal Screw Works, Detroit, artillery ammunition components, $2,298,000.
Fox Munitions Corp., Philadelphia, gages, $1165.
Fuller, F. C., Co., New York, presses, $3043.
Fulton Sylphon Co., Knoxville, Tenn., artillery ammunition components, $3591.38.
General Motors Corp., Delco Products division, Dayton, O., artillery ammunition components, $51,340.
General Railway Signal Co., Rochester, N. Y., artillery ammunition components, $1,400,000.
Gilbert & Barker Co., West Springfield, Mass., fire control equipment, $1,635,287.35.
Hampden Brass Co., Springfield, Mass., bronze castings, $1329.92.
Hoover Co., North Canton, O., artillery ammunition components, $3,923,300.
Insel Co., Arlington, N. J., artillery ammunition components, $9492.20.
International Harvester Co., Chicago, artillery ammunition components, $554,000.
Jones & Lamson Machine Co., Springfield, Vt., turret lathes, $86,110.
Jones & Laughlin Steel Corp., Pittsburgh, artillery ammunition components, $1436.
Keystone View Co., Meadville, Pa., fire control equipment, $23,200.50.
Krebs Mfg. & Engineering Co., Chicago, artillery ammunition components, $27,823.75.
Landis Machine Co., St. Louis, artillery ammunition components, $769,100.
Lanceko Engineering Co., Philadelphia, gages, $1122.
La Salle Steel Co., Chicago, steel, $1075.79.
Lepel High Frequency Laboratories Inc., New York, furnaces, $4250.
LeTourneau, R. G., Co., Toccoa, Ga., artillery ammunition components, $4,569,290.
Lindberg Engineering Co., Chicago, furnaces, $7788.
Lloyd & Arms Inc., Philadelphia, presses, $2300.
Machinery Builders Inc., Long Island City, N. Y., machines, $3919.51.
Mergenthaler Linotype Co., Brooklyn, N. Y., fire control equipment, $2,983,308.06.
Mullins Mfg. Corp., Salem, O., artillery ammunition components, $4,980,300.
Murray Mfg. Corp., Brooklyn, N. Y., artillery ammunition components, $840,000.
National Pneumatic Co., Rahway, N. J., artillery ammunition, $54,468.40.
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., machines, $7259.28.
Norton Co., Worcester, Mass., machines, $17,085.25.
Oliver Machinery Co., Grand Rapids, Mich., planers, $4025.95.
Omaha Steel Works, Omaha, Nebr., artillery ammunition components, $2,955,750.
Peters Engineering Co., Philadelphia, gages, machinery, $10,940.
Pfaudler Co., Rochester, N. Y., machinery, $1417.
Philco Corp., Philadelphia, artillery ammunition components, $2,098,600.
Precise Tool & Mfg. Co., Farmington, Mich., gages, $10,136.10.
Prentiss, Henry, & Co. Inc., New York, drilling machines, $20,248.
Pullman-Standard Car Mfg. Co., Chicago, artillery ammunition components, $4,415,030.
Quaker City Gear Works, Philadelphia, worm gears, $1462.50.
Reliable Tool Co., Irvington, N. J., tools, $5669.
Remington Arms Co. Inc., Bridgeport, Conn., small arms materiel, $165,253.01.
Republic Electric Co., Davenport, Iowa, lead encased cable, $3425.71.
Reska Spline Products Co., Detroit, gages, $1370.
Revere Copper & Brass Co., New York, artillery ammunition components, small arms ammunition, $2,821,660.
Rumsey Pump Corp., Seneca Falls, N. Y., machines, $1029.30.
Schlosser Mfg. Co., Philadelphia, gages, $12,850.
Schoettle, Edwin J., Co., Philadelphia, small arms ammunition, $130,350.
Scovill Mfg. Co., Waterbury, Conn., artillery ammunition components, $1,970,752.
Sperry Gyroscope Co. Inc., Brooklyn, N. Y., fire control equipment, $3,048,081.25.
Standard Products Co., Detroit, artillery ammunition components, $1500.
Stevens-Walden Inc., Worcester, Mass., tools, $1905.
Swind Machinery Co., Philadelphia, lathes, $4010.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J., artillery ammunition components, $2,721,240.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., artillery ammunition components, $5,823,600.
Thompson's Ltd., New York, artillery ammunition components, $2500.
Tool & Gages Inc., Cleveland, gages, $5736.
Tube Turns Inc., Louisville, Ky., artillery ammunition components, $668,610.
Union Hardware Co., Torrington, Conn., cleaning brushes, $9611.99.
Vinco Corp., Detroit, gages, $7180.
Warner & Swasey Co., Cleveland, turret lathes, $183,645.
Warren Webster & Co., Camden, N. J., artillery ammunition components, $663,000.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn., presses, $7400.
Willys-Overland Motors Inc., Toledo, O., artillery ammunition components, $8,820,040.
Woods, S. A., Machine Co., Boston, artillery ammunition components, $846,000.
Wright Machine Co., Worcester, Mass., artillery ammunition components, $1,091,400.

Purchases Under Walsh-Healey Act (Cont.)

Nonferrous Metals and Alloys

Aluminum Cooking Utensil Co., New Kensington, Pa.	Stock pots	$58,039.01
Aluminum Products Co., LaGrange, Ill.	Stock pots	149,742.00
American Brass Co., Waterbury, Conn.	Copper-nickel alloy, brass forgings	262,798.71
Bers, E., & Co., Philadelphia	Lead-antimony alloy	28,250.00
Chase Brass & Copper Co. Inc., Waterbury, Conn.	Brass	106,734.50
International Nickel Co. Inc., New York	Nickel-copper alloy, nickel	95,462.48
Kennecott Sales Corp., New York	Copper	57,840.00
Mueller Brass Co., Port Huron, Mich.	Brass forgings	10,840.45
Revere Copper & Brass Inc., Baltimore	Copper, bullet cups	103,111.59
Scovill Mfg. Co., Waterbury, Conn.	Copper tubing	33,568.48
Wallace, R., & Sons Mfg. Co., Wallingford, Conn.	Forks and spoons	76,875.00

Machinery and Other Equipment

Acme Machine Tool Co., Cincinnati	Lathes	$26,136.00
Addressograph-Multigraph Corp., Cleveland	Addressing machines	29,175.00
Barnes, W. F. & John, Co., Rockford, Ill.	Drilling machines	13,680.00
Brown & Sharpe Mfg. Co., Providence, R. I.	Milling machines	52,656.00
Case, J. I., Co., Racine, Wis.	Tractors	18,795.00
Caterpillar Tractor Co., Peoria, Ill.	Patrol graders, tractors	45,901.64
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati	Milling machines	135,844.68
Consolidated Machine Tool Corp., Rochester, N. Y.	Lathes	161,345.00
Coolerator Co., Duluth	Refrigerators	405,800.00
Dexter Folder Co., Pearl River, N. Y.	Folders	*43,890.00
Feenaughty Machinery Co., Portland, Oreg.	Cranes	14,856.00
General Machinery Corp., Niles Tool Works division, Hamilton, O.	Planers	571,200.00
Gosiger, C. H., Machinery Co., Dayton, O.	Drill presses	17,535.00
Gulberson Diesel Engine Co., Dallas, Tex.	Engines	2,915,095.86
Hydraulic Controls Inc., Chicago	Hydraulic steering	66,379.80
Kearney & Trecker Corp., Milwaukee	Milling machines	31,151.80
Lelman Brothers Inc., Newark, N. J.	Vacuum pumps	10,608.00
Lidgerwood Mfg. Co., Elizabeth, N. J.	Winches	34,596.00
Lodge & Shipley Machine Tool Co., Cincinnati	Lathes	23,255.00
McKiernan-Terry Corp., Harrison, N. J.	Crane machinery	56,570.00
Motley, James M., & Co. Inc., New York	Hammers	17,799.00
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn.	Tools, drilling and milling machines	107,118.50
Northwest Engineering Co., Chicago	Draglines	46,035.00
Pacific Marine Supply Co., Seattle	Pumps	13,053.00
Pump Engineering Service Corp., Cleveland	Vacuum pumps	17,212.50
Reed-Prentice Corp., Worcester, Mass.	Lathes	29,988.00
Rockford Machine Tool Co., Rockford, Ill.	Planer	18,774.00
Sellers, William, & Co. Inc., Philadelphia	Milling machines	56,506.00
Smith-Courtney Co., Richmond, Va.	Grinders	19,167.00
Vickers Inc., Waterbury Tool division, Waterbury, Conn.	Gears	126,078.00
Warner & Swasey Co., Cleveland	Lathes	25,446.00
Western Electric Co. Inc., New York	Telephone equipment	434,299.70
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.	Heaters, evaporators	53,885.00

*Estimated.

Medical Department Awards

American Sterilizer Co., Erie, Pa., hospital equipment, $1500.
Bausch & Lomb Optical Co., Rochester, N. Y., laboratory equipment, $8940.40.
Becton, Dickinson & Co., Rutherford, N. J., surgical instruments, $213.56.
Bishop, J., & Co. Platinum Works, Malvern, Pa., surgical instruments, $56.
Blickman, S., Inc., Weehawken, N. J., hospital furniture, equipment, mess equipment, $5733.76.
Bramhall-Deane, New York, autoclaves, $16,590.
Buck X-Ograph Co., St. Louis, X-ray equipment, $1063.50.
Burdick Corp., Milton, Wis., hospital furniture, equipment, $3701.
Christy Surgical Sales, Cincinnati, surgical instruments, $21,600.
DePuy Mfg. Co., Warsaw, Ind., surgical instruments, $835.83.
Electro Surgical Instrument Co., Rochester, N. Y., surgical instruments, $165.80.
Foster Bros. Mfg. Co., Utica, N. Y., beds, $5282.
Hospital Supply Co., and Walters Laboratories, New York, sterilizers, $33,915.
Imperial Machine & Foundry Corp., Lindenhurst, L. I., mess equipment, $780.
Karpen, S., & Bros., New York, hospital furniture, $25,525.
Liebel Flarsheim Co., New York, X-ray equipment, $10,725.
Logan Company Inc., Louisville, Ky., hospital furniture, $25,691.71.
Ohio Chemical & Mfg. Co., Cleveland, surgical instruments, $1962.60.
Pearless Dishwasher Co. Inc., Rochester, N. Y., mess equipment, $1752.
Pelton Crane Co., Detroit, dental equipment, $11,429.
Pilling, George P., & Son Co., Philadelphia, surgical instruments, $2394.
Prometheus Electric Corp., New York, sterilizers, $7623.70.
Ranney Refrigerator Co., Greenville, Mich., refrigerators, $1153.88.
Royal Typewriter Co., Brooklyn, N. Y., typewriters, $7853.80.
Sanborn Co., Cambridge, Mass., surgical instruments, $1147.23.
Shampaine Co., St. Louis, hospital furniture, equipment, $1332.50.
Simmons Co., New York, hospital furniture, $80,500.
Sklar, J., Mfg. Co., Long Island City, N. Y., surgical instruments, $1668.48.
Spencer Lens Co., New York, microscopes, laboratory equipment, $6270.97.
Standard X-Ray Co., New York, X-ray equipment, $12,188.21.
Taylor Instrument Co., Rochester, N. Y., surgical instruments, $1965.
Van Range, John, Co., Cincinnati, mess equipment, $680.
Weaver, H. C., & Son, Millersburg, Pa., reconditioning folding beds, $7066.40.
Weber Dental Co., Canton, O., X-ray equipment, $18,607.
Wilmot Castle Co., Rochester, N. Y., hospital furniture, equipment, dental equipment, $12,665.87.
Wocher, Max, & Sons Co., Cincinnati, hospital furniture, equipment, $1674.40.

Chemical Warfare Service Awards

Areway Equipment Co., Philadelphia, welding machines, $1455.
Benson, L. A., Co. Inc., Baltimore, diesaws, shears, squaring machines, $4534.15.
Bliss, E. W., Co., Brooklyn, N. Y., gang slitters, $1175.
Brown & Sharpe Mfg. Co., Providence, R. I., surface, tool grinders, $4360.70.
Buss Machine Works, Holland, Mich., surface plane, $2773.53.
Callaham, E. J., Co., Baltimore, sieves, ovens, $1786.92.
Carey Machinery & Supply Co., Baltimore, sanders, planers, jointers, folders, $2533.55.
Continental Machines Inc., Minneapolis, contour saws, $1280.
Fletcher Works Inc., Philadelphia, centrifuges, $6378.
Glascote Products Co., Cleveland, storage, cooling tanks, $11,110.
Heald Machine Co., Worcester, Mass., surface grinders, $4208.
Henrici Laundry Machinery Co., Boston, washing machine, $1700.
Landis Machine Co., Waynesboro, Pa., threading machines, $6314.75.
Mercer Engineering Works, New York, portable elevator, $1720.
Mid-West Spring Mfg. Co., Chicago, cadmium coated springs, $1042.
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., jig borers, $7903.
Paasche Airbrush Co. Inc., Chicago, paint spraying equipment, $10,217.76.
Pratt Thompson, Baltimore, pipe fittings, $2389.07.
Pressed Steel Tank Co., Milwaukee, shipping containers, $4034.
Sellers, William, Inc., Philadelphia, drill grinders, $900.
Stokes, F. J., Machine Co., Philadelphia, tablet machines, $2300.
Stuber & Kuck Co., Peoria, Ill., tinplate containers, $1176.
Swind Machinery Co., Philadelphia, threading and key seating machines, $2862.
United-Carr Fastener Corp., Cambridge, Mass., hand presses, dies, $447.63.
Worthington Pump & Machinery Corp., Harrison, N. J., air compressors, $1586.25.

Signal Corps Awards

Bendix Radio Corp., Baltimore, frequency meter sets, radio compasses, $2,713,067.99.
General Electric Co., Schenectady, N. Y., radio equipment, $8,303,296.50.
R. C. A. Mfg. Co., New York, radio receivers, $2,388,354.64.

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Following awards were announced by the navy department for its bureau of supplies and accounts:

Allen, H. F., Co. Inc., New York, metal cutting band saws, $6091.55.
Alteneder, Theo. & Sons, Philadelphia, drawing instruments, $6475.
American Automatic Electric Sales Co., Chicago, telephone equipment, $16,105.84.
American Car & Foundry Co., New York, railroad cars, $32,280.
American Gas Accumulator Co., Elizabeth, N. J., flood lighting units, $116,481.
American Tool Works, Cincinnati, engine lathes, $42,098.
Armstrong-Blum Mfg. Co., Chicago, hack saws, $9291.
Askania Regulator Co., Chicago, submarine training device, $135,399.
Barkelew Electric Mfg. Co., Middletown, O., knife switches, $5724.
Bay State Dredging & Contracting Co., East Boston, Mass., dredging at naval reserve aviation base, Squantum, Mass., $189,900.
Bayonne Steel Barrel Co., Bayonne, N. J., steel barrels, $79,000.
Beattie Corp., Fall River, Mass., extension of seawall, naval torpedo station, Newport, R. I., $49,500.
Bender Body Co., Elyria, O., steel mess tables, $42,334.20.
Bendix Aviation Corp., Eclipse Aviation division, Bendix, N. J., aircraft starters, $17,100.
Bendix Aviation Corp., Marine division, Brooklyn, N. Y., salinity indicating equipment, $42,330.50.
Bethlehem Steel Co., Bethlehem, Pa., steel forgings, $391,785.
Biddle, James G., Co., Philadelphia, testing generators, $54,092.77.
Boston & Lockport Block Co., East Boston, Mass., semi-steel block sheaves, $13,642.98.
Brown & Sharpe Mfg. Co., Providence, R. I., milling machine, $5288.
Buda Co., Harvey, Ill., type DB engines for power boats, $673,062.20.
Camden Forge Co., Camden, N. J., turret training gear racks and pinions, $240,860.
Carlin, Anthony, Co., Cleveland, steel rivets, $38,737.50.
Chisholm-Moore Hoist Corp., Tonawanda, N. Y., chain hoists, $15,394.72.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, centerless type grinders, milling machines, $328,779.92.
Cleveland Pneumatic Tool Co., Cleveland, air hose couplings, $18,889.15.
Continental Electric Co. Inc., Newark, N. J., motor generators, $36,986.76.
Cuno Engineering Corp., New York, oil filters, $42,480.
Eagle Metallic Bed Corp., Brooklyn, N. Y., double deck bunks, $5670.
Electric Arc Cutting & Welding Co., Newark, N. J., motor generators, $30,114.
Electric Products Co., Cleveland, motor generator sets, $5320.
General Electric Co., Schenectady, N. Y., arc welding sets, $32,000.
General Motors Corp., Chevrolet division, Detroit, motor trucks, $138,062.93.
Gerwick, Ben C., Inc., San Francisco, pier at navy yard, Mare Island, California, $392,117.
Gleason Works, Rochester, N. Y., gear generators, $57,484.53.
Haffner-Thrall Car Co., Chicago, railroad cars, $36,123.20.
Hamilton Watch Co., Lancaster, Pa., navigational aircraft watches, $8470.
Hardie Tynes Mfg. Co., Birmingham, Ala., air compressors, $505,542.
Hardinge Bros. Inc., Elmira, N. Y., precision lathes, $10,391.40.
Hendey Machine Co., Torrington, Conn., precision and toolmakers' lathes, $56,564.
Ideal Electric & Mfg. Co., Mansfield, O., motor generator sets, $11,280.
Insinger Machine Co., Philadelphia, dishwashing machines, $6345.75.
International Nickel Co. Inc., New York, remelting nickel, $17,686.36.
Irwin & Leighton, Philadelphia, additions to Bancroft hall and new recitation hall, Naval academy, Annapolis, Md., $1,786,500.
Jones & Lamson Machine Co., Springfield, Vt., automatic thread grinding machine, $8257.80.
Kelley-Koett Mfg. Co. Inc., Covington, Ky., X-ray units, $6300.
Lloyd & Arms Inc., Philadelphia, radial drilling machines, $36,343.55.
Lodge & Shipley Machine Tool Co., Cincinnati, engine lathes, $206,399.
Lyon Metal Products Inc., Aurora, Ill., metal lockers, $12,730.
Midvale Co., Philadelphia, turret training gear racks and pinions, $239,600.
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., radial drilling machines, universal vertical shapers, $45,579.85.
Onan, D. W., & Sons, Minneapolis, electric generating sets, $18,562.50.
Oppleman, L., Inc., New York, navigators' cases and dividers, $13,670.
Pacific Marine Supply Co., Seattle, portable gasoline engine pumps, $20,148.05.
Pittsburgh Screw & Bolt Corp., Pittsburgh, steel rivets, $43,680.
Prentiss, Henry, & Co. Inc., New York, boring, drilling and milling machine, $25,184.
Rainear, C. J., & Co. Inc., Philadelphia, welding elbows, $26,578.38.
Revere Copper & Brass Inc., Baltimore division, Baltimore, admiralty metal condenser tubes, $5304.
Robinson, Hugh, & Sons, South Gate, Calif., refrigerating plant compressor, naval hospital, San Diego, Calif., $1975.
Rusgreen Mfg. Co., Detroit, cable terminal lugs, $14,479.62.
Sawyer Construction Co., Boston, light

shop activities, building and accessories, Boston navy yard, $550,000.
Sellers, William, & Co. Inc., Philadelphia, vertical boring mills, $78,730.
Simmons Co., New York, steel mess tables, furniture, $73,165.26.
Somerville, Thos., Co., Washington, cocks and valves, $6131.64.
Tidewater Supply Co. Inc., Norfolk, Va., universal hobber gear machine, $12,477.
Townsend Co., New Brighton, Pa., steel rivets, $31,785.
United Aircraft Corp., Vought-Sikorsky Aircraft division, Stratford, Conn., airplanes, $28,679,070.
Vickers Inc., Waterbury Tool division, Waterbury, Conn., hydraulic pumps, $122,203.75.
Warner & Swasey Co., Cleveland, universal turret lathes, $28,683.
White Motor Co., Cleveland, motor buses, $44,040.

Contract Awards on Seaplane Tenders

Associated Shipbuilders, Seattle, 4 seaplane tenders, $4,545,499 each; total $18,181,996.
Lake Washington Shipyards, Seattle, 6 seaplane tenders, $4,510,000 each; total $27,060,000.

Canada To Build More War Material Plants

TORONTO, ONT.

■ Contracts for several important new war material plants were announced last week by the Canadian government. A $10,000,000 powder plant will be constructed near Toronto on a 2505 acre site. Defense Industries Ltd., a government-owned agency, has awarded a contract for a chemical plant at Winnipeg, Man., estimated to cost $12,000,000 to Fraser Brace Engineering Co. Ltd. A $5,000,000 plant near Toronto to manufacture war materials, the nature of which was not announced, will be constructed by Carter-Halls-Aldinger Co.

Manufacture of mechanical transport has been speeded and exports now average 400 units a day. September motor vehicle production was 15,475 units.

War orders announced by the department of munitions and supply last week totaled $8,894,812, of which $154,127 were awarded to United States companies. Orders include:

Aircraft: Aviation Electric Ltd., Montreal, Que., $5925; Noorduyn Aviation Ltd., Montreal, $5448; Northern Electric Co. Ltd., Ottawa, $15,825; DeHavilland Aircraft of Canada Ltd., Toronto, $51,184; Turnbull Elevator Co. Ltd., Toronto, $31,687; National Steel Car Corp. Ltd., Malton, Ont., $20,889.

Dockyard Supplies: Dominion Engineering Co. Ltd., Montreal, $56,080; Thos. Pocklington Co., Toronto, $6650; United Steel Corp. Ltd., Toronto, $70,252; National Steel Car Corp. Ltd., Hamilton, Ont., $13,213; Hayes Steel Products Ltd., Merritton, Ont., $13,250.

Mechanical transport: F. X. Gauthier Reg'd., Montreal, $13,777; International Harvester Co. of Canada Ltd., Ottawa, $91,894; Cregg Mfg. Co., Ltd. Winnipeg, Mann., $10,784.

Electrical equipment: Northern Electric Co. Ltd., Ottawa, $45,238; Outboard Ma-

(*Please turn to Page* 94)

■ **Storm-Tossed:** An iron ore carrier rides Lake Superior waves. Against summer squalls and winter blasts "the fleet" for a decade or more has made a remarkable record for safety, due to soundness of steel construction and scientific aids to navigation. McDow photo

Ore Industry Rises to Emergency, Shipping 64,000,000 Tons

■ LAKE SUPERIOR iron ore at lower lake docks and furnaces probably will amount to only 10,000,000 to 12,000,000 tons on May 1, 1941, the smallest tonnage in 17 years, according to the present outlook.

At the close of this shipping season there seems likely to be 52,000,000 tons at docks and furnaces, but consumption is proceeding at a rate of about 6,000,000 tons per month.

During the past 17 years the smallest reserve on May 1 was 14,632,038 tons in 1937, while the largest was 33,478,882 tons, in 1932. In these years they were in inverse ratio to the prevailing rate of blast furnace operations.

■ **Additional news of the steel and metalworking industries will be found on pages 79, 94 and 95.**

With little more than a month remaining, total shipments from the Lake Superior district this season are estimated at 64,000,000 tons, fourth largest on record. In 1916, 66,902,778 tons of ore was shipped; in 1917, 64,694,636 tons, and 1929, 66,157,359 tons.

The estimate includes 10,000,000 tons for October and presupposes 5,000,000 tons in November. November always is a comparatively light month, due to unfavorable weather. Little ore is shipped in December. Insurance rates practically prohibit shipments after Nov. 30.

The movement of cargo coal got under way earlier than usual this season and deliveries to the Northwest have been virtually completed. Consequently most of the ore boats now are proceeding up the lakes light. This enables them to make round trips in seven instead of nine days from lower lakes, facilitating ore shipments.

Ore tonnage in September—9,998,618 tons—was an all-time record for the month. It is now expected October also will set a record. Based on reports for the first 18 days the total will be 9,600,000 tons, but the final count may exceed the 10,000,000 of October, 1919.

The ore fleet was 100 per cent engaged in ore transportation Sept. 15 with 296 vessels, for the first time since August, 1937. By the middle of October seven more vessels had been added to the fleet but only 286 were carrying ore, a 96 per cent rate.

If the ore at lower docks and furnaces should decline to 12,000,000 tons or less by May 1 shipments in 1941 might establish an all-time record.

EDITORIAL

Willkie Rekindles Americanism

■ Wendell L. Willkie has waged a good fight. Whether he wins or loses the election, he has not only earned the admiration of a large proportion of the American people in all walks of life, but he has done something for them that no other man has been able to do in many decades.

He has awakened in them a sense of the value of their free institutions and a determination to fight for their preservation.

Mr. Willkie's service to American industry is second only to his service to the nation as a whole.

Before he started his campaign, business was in the doghouse of public opinion. The pleas of business men to the man in the street to renew his confidence in the efficacy of American enterprise made little impression. The millions of dollars poured into educational campaigns for the same purpose were only partially successful. Apparently the public was only mildly concerned with the fate of private enterprise.

* * *

But about six months ago a strange thing happened. A man named Willkie, who had never been in public office, was mentioned casually as a possible candidate for the presidency. Politicians scoffed, but Willkie's popularity increased. At the Philadelphia Republican convention he was nominated by the sheer enthusiam of his unbossed supporters.

Then came the most amazing campaign in our history. The start was weak, even discouraging. Critics said Willkie's radio personality was poor, he lacked glamour, he wore the same necktie too often, his campaign was amateurish, he was paying no attention to party bosses, etc., etc. Polls showed him far behind his opponent. He was booed. He was showered with eggs and vegetables.

But Willkie persevered. He hammered home an old-fashioned philosophy of sound government based upon opportunity for private initiative to assert itself. He glorified the producer, the business man. He stressed harmony and unity as against class hatred. He argued for less power in government and more power in the hands of the citizens.

* * *

People began to understand his program. In it they saw a hope for restoring valued old institutions and relief from the heavy hand of federal bureaucracy. Business men squared their shoulders and held their heads higher. Politicians jumped onto the Willkie band wagon. Union labor chiefs rechecked their positions. Men, women and children became Willkie enthusiasts.

In short, Willkie rekindled the latent spark of true Americanism in the minds and hearts of the people.

Today, on the eve of election, the least every American can do to help repay the debt to Willkie is to get out and help him.

If enough of us render that help, history at some future time will record Nov. 5, 1940 as the date on which the United States definitely turned its back upon the temptation of dictatorship, reaffirmed its faith in the efficacy of the American way of life, and by its example led the whole world back to sanity.

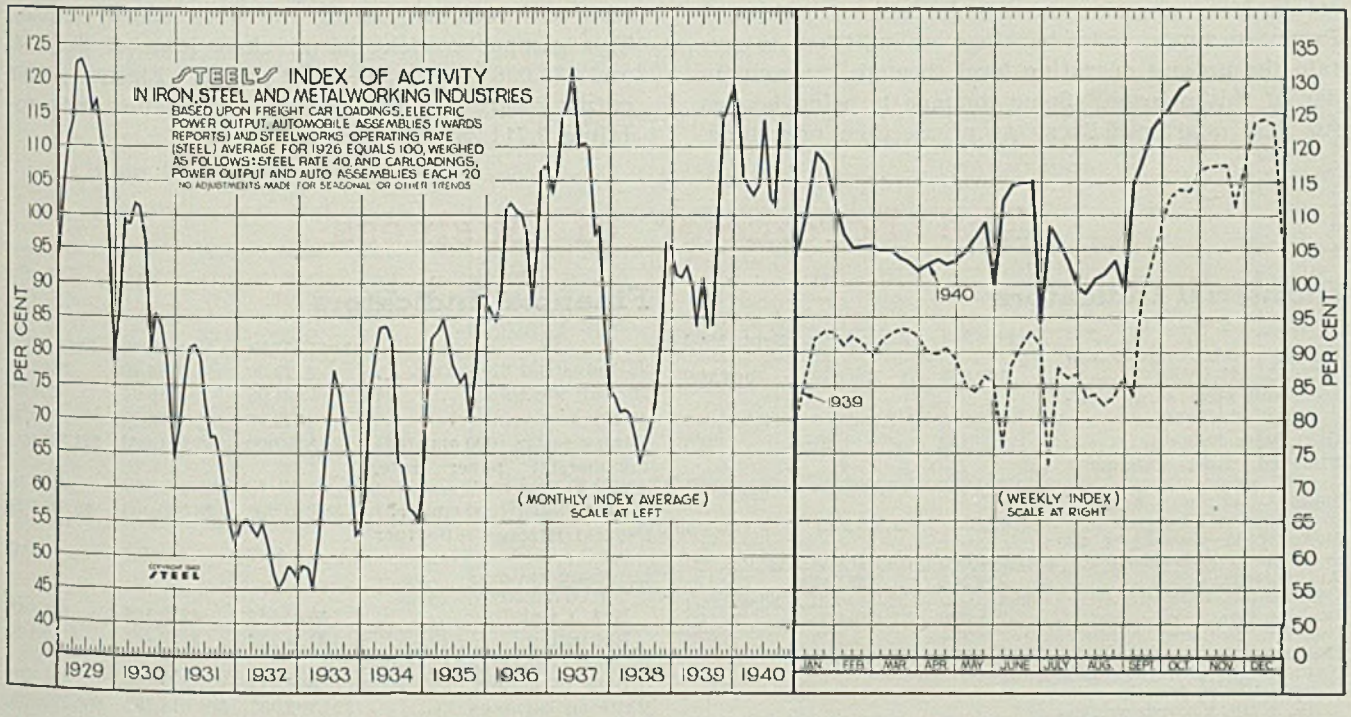
E. L. Shaner

The *BUSINESS TREND*

Activity Index Climbs To New High Level

■ STEADY improvement in new demand continues unabated with miscellaneous consumers attempting to build up inventories as a hedge against possible higher prices and inability to get reasonably prompt deliveries later on. Accelerated buying from miscellaneous consumers, active purchasing by governmental authorities and large export demand have bolstered order backlogs in most industrial lines to the highest level in many months. Despite the near capacity operations in the heavy industries, new orders have exceeded output in some instances.

An indication of the sharp upturn in new demand is illustrated by the current report of the National Industrial Conference board, which states that September bookings exceeded the sharp upturn immediately after the outbreak of the war. The board's seasonally adjusted index for September rose to 164 from 140 in August, a gain of 17 per cent. This compares with 161 in September, 1939 and is at the highest level in the history of the index with the exception of December, 1936. Recording the most substantial gain for the year, the index of the value



STEEL'S index of activity gained 1.6 *points to* 129.9 *in the week ended Oct.* 26:

Week Ended	1940	1939
Aug. 10	98.5	83.9
Aug. 17	100.8	82.2
Aug. 24	101.4	83.4
Aug. 31	103.5	86.3
Sept. 7	98.7	83.7
Sept. 14	114.9	97.5
Sept. 21	117.7	103.0
Sept. 28	122.8	107.9
Oct. 5	124.4	112.5
Oct. 12	126.0	113.9
Oct. 19	128.3	113.6
Oct. 26	129.9	116.2

Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	.....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

of inventories during September rose to 135.5, or 22 per cent above the September, 1939 level.

Large order backlogs accumulated in the capital goods' industries will sustain capacity operations for some time. Further expansion of output in these lines awaits only the completion of expansion programs now underway.

In the latest week STEEL's index again climbed to a new high level of 129.9. This represents a gain of 1.6 point over the previous peak recorded during the week ended Oct. 19 and compares with the high point reached in 1929 of 125.3. At this time last year STEEL's index stood at 116.2, while in the corresponding periods of 1938 and 1937 it was at the 91.4 and 95.7 level.

On a tonnage basis steel production is the greatest in history, and a further increase is indicated. Producers report order backlogs are sufficient to sustain the present operating level through the remainder of this quarter. Some tonnage is being booked for first quarter delivery at prices then prevailing, but sellers generally are discouraging forward commitments and are not accepting blanket orders.

For the week ended Oct. 26 the steel rate stood at 95.5 per cent, up one-half point from the previous period and compared with the 92 per cent level recorded at this time last year.

A new 1940 peak in freight carloadings of 837,651 cars was recorded during the week ended Oct. 26. This compares with the previous high of 822,434, and 834,096 cars in the 1939 period. Electric power output reached an all time high in the latest week, totaling 2,711,282,000 kilowatts.

Where Business Stands

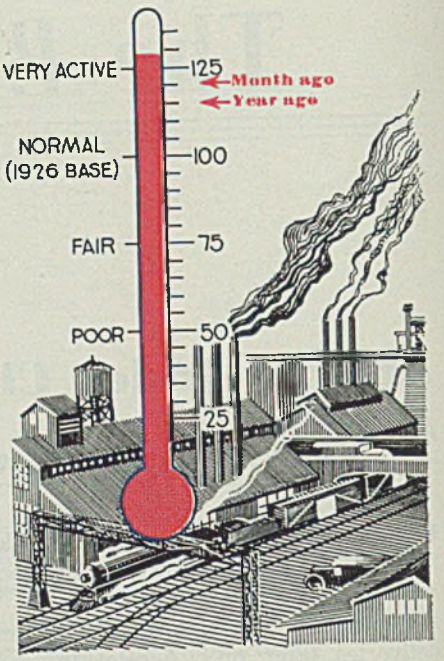
Monthly Averages, 1939 = 100

	Sept., 1940	Aug., 1940	Sept., 1939
Steel Ingot Output	140.1	138.5	113.4
Pig Iron Output	143.8	141.2	110.9
Freight Movement	119.7	113.5	119.2
Building Construction	117.5	140.2	109.2
Automobile Production	91.5	28.9	62.0
Wholesale Prices	101.2	100.4	102.6

Industrial Weather

TREND:

Upward



The Barometer of Business

Industrial Indicators

	Sept. 1940	Aug., 1940	Sept., 1939
Pig iron output (daily average, net tons)	139,085	136,599	107,298
Iron and steel scrap consumption (tons)	3,876,000	3,968,000	3,018,000
Gear Sales Index	183	191	126
Finished steel shipments (Net tons)	1,392,838	1,455,604	1,086,683
Ingot output average weekly; net tons)	1,377,391	1,361,859	1,114,362
Dodge bldg. awards in 37 states ($ Valuation)	$347,651,000	$414,941,000	$323,227,000
Automobile output	284,583	89,866	192,678
Coal output, tons	38,413,000	39,240,000	38,465,000
Beehive Coke	271,000	278,000	77,000
Business failures; number	976	1,128	1,043
Business failures; liabilities	$11,397,000	$12,997,000	$10,545,000
Nat'l Ind. Conf. board (25 industries, factory):†			
Av. wkly. hrs. per worker	38.5	38.1	37.9
Av. weekly earnings	$28.58	$28.16	$27.58
Cement production, bbls.	13,123,000	12,719,000	11,937,000
Cotton consumption, bales	639,252	654,503	624,183
Car loadings (weekly av.)	783,833	743,670	780,663

†August, July and August, respectively.

Foreign Trade

	Sept., 1940	Aug., 1940	Sept., 1939
Exports	$295,245,000	$349,928,000	$288,956,000
Imports	$194,928,000	$220,520,000	$181,536,000
Gold exports†	$10,000	$8,000	$13,000
Gold imports	$334,113,000	$351,563,000	$326,089,000

†August, July and August, respectively.

Financial Indicators

	Sept., 1940	Aug., 1940	Sept., 1939
25 Industrial Stocks	$171.50	$164.48	$195.86
25 Rail stocks	$21.05	$19.94	$24.91
40 Bonds	$73.18	$72.02	$70.56
Bank clear'gs (000 omitted)	$23,820,000	$22,591,000	$21,733,000
Commercial paper rate, (N. Y., per cent)	½–⅝	½–⅝	⅝–¾
*Com'l. loans (000 omitted)	$8,689,000	$8,509,000	$8,350,000
Federal Reserve ratio (per cent)	89.6	89.3	89.2
Capital flotations: (000 omitted)			
New Capital	$110,687	$129,104	$41,669
Refunding	$114,752	$152,365	$138,348
Federal Gross debt (millions of dollars)	$44,073	$43,905	$43,771
Railroad earnings	$74,193,237	$66,014,798	$86,529,622
Stock sales, New York stock exchange	11,940,530	7,616,050	57,080,610
Bond sales, par value	$126,289,025	$79,592,825	$481,361,375

*Leading member banks Federal Reserve System.

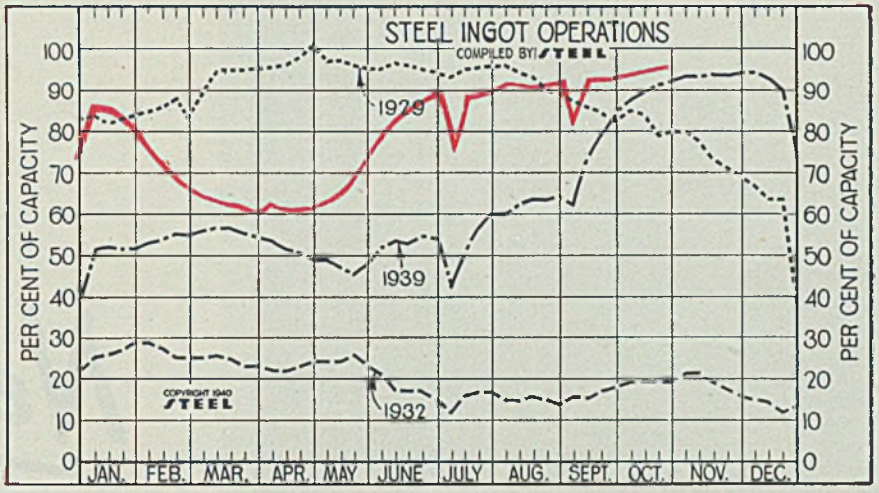
Commodity Prices

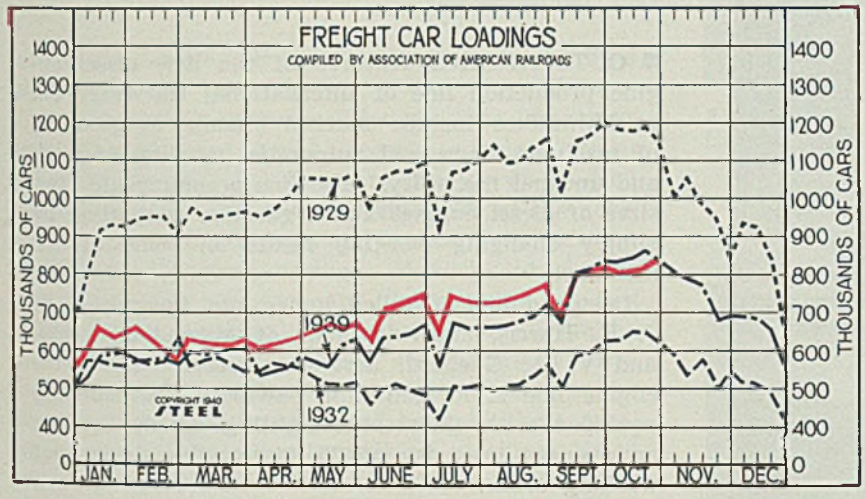
	Sept., 1940	Aug., 1940	Sept., 1939
STEEL's composite average of 25 iron and steel prices	$37.93	$37.70	$36.67
U. S. Bureau of Labor index	78.0	77.4	79.1
Wheat, cash (bushel)	$0.97	$0.90	$1.04
Corn, cash (bushel)	$0.82	$0.81	$0.72

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
July 27....	89.5	60.0	37.0	84.0
Aug. 3....	90.5	60.0	40.0	84.5
Aug. 10....	90.5	62.0	40.0	84.0
Aug. 17....	90.0	63.5	41.5	81.0
Aug. 24....	90.5	63.5	43.5	83.0
Aug. 31....	91.5	64.0	44.5	83.0
Sept. 7....	82.0	62.0	41.5	72.0
Sept. 14....	93.0	74.0	46.0	80.0
Sept. 21....	93.0	79.5	48.0	76.0
Sept. 28....	93.0	84.0	47.0	74.0
Oct. 5....	93.5	87.5	48.5	66.0
Oct. 12....	94.5	89.5	51.5	63.0
Oct. 19....	95.0	91.0	51.5	53.0
Oct. 26....	95.5	92.0	54.5	51.0





Freight Car Loadings

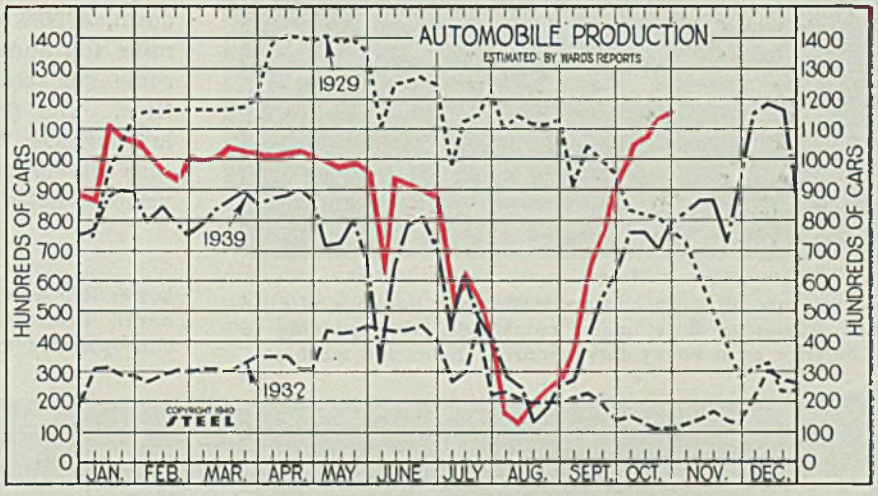
(1000 Cars)

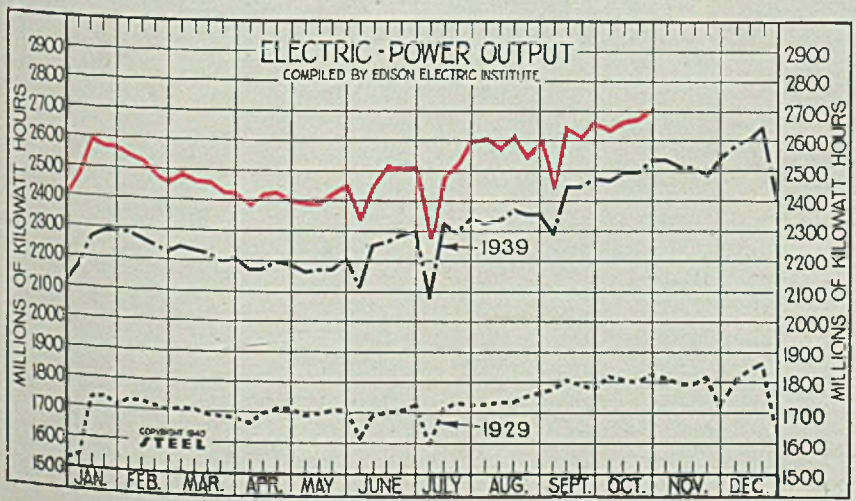
Week ended	1940	1939	1938	1937
July 27.....	718	660	589	783
Aug. 3.....	718	661	584	770
Aug. 10.....	727	665	590	777
Aug. 17.....	743	674	598	781
Aug. 24.....	761	688	621	787
Aug. 31.....	769	722	648	805
Sept. 7.....	695	667	569	711
Sept. 14.....	804	806	660	827
Sept. 21.....	813	815	676	840
Sept. 28.....	822	835	698	847
Oct. 5.....	806	835	703	815
Oct. 12.....	812	845	727	810
Oct. 19.....	814	861	706	773
Oct. 26.....	838	834	709	772

Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
July 27....	34.8	40.6	30.4	86.4
Aug. 3....	17.4	28.3	14.8	78.7
Aug. 10....	12.6	24.9	13.8	103.3
Aug. 17....	20.5	13.0	23.9	93.3
Aug. 24....	23.7	17.5	18.7	83.3
Aug. 31....	27.6	25.2	22.2	64.2
Sept. 7....	39.7	26.9	17.5	59.0
Sept. 14....	66.6	41.2	16.1	30.1
Sept. 21....	78.8	53.9	20.4	28.0
Sept. 28....	95.9	62.8	25.4	45.8
Oct. 5....	105.2	76.1	37.7	72.0
Oct. 12....	108.0	75.9	50.5	89.7
Oct. 19....	114.7	70.1	68.4	91.9
Oct. 26....	117.1	78.2	73.3	90.2



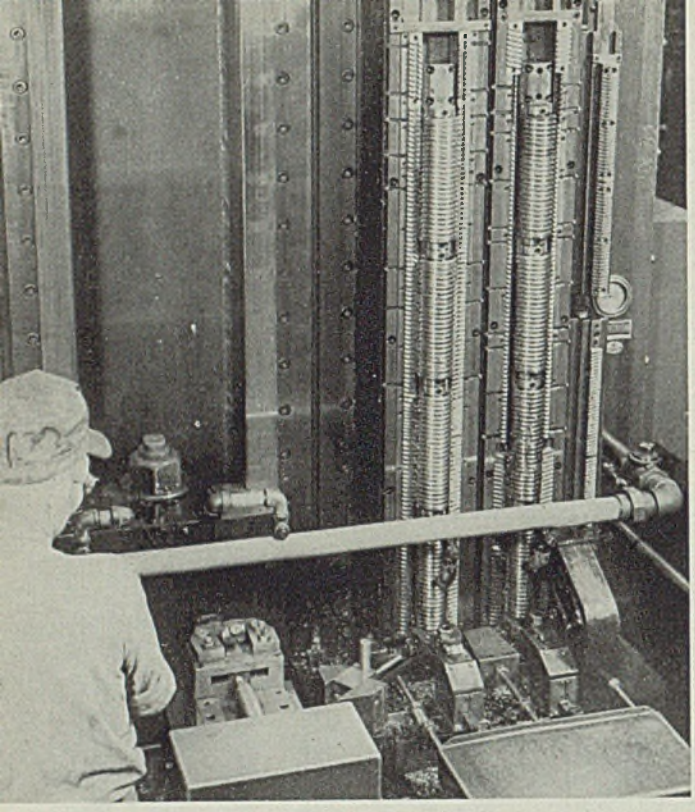


Electric Power Output

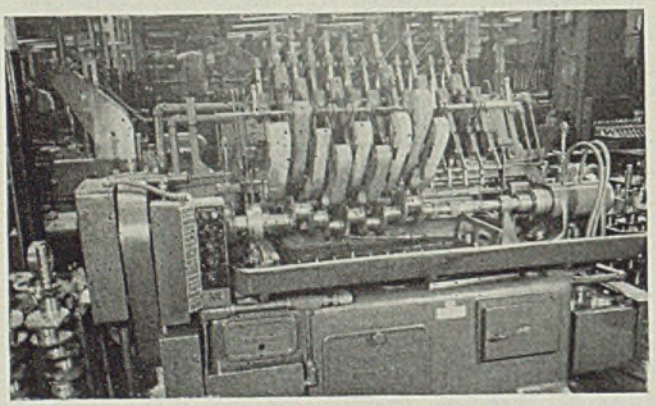
(Million KWH)

Week ended	1940	1939	1938	1937
July 27...	2,601	2,342	2,094	2,256
Aug. 3...	2,605	2,325	2,116	2,262
Aug. 10...	2,589	2,333	2,134	2,301
Aug. 17...	2,606	2,368	2,139	2,304
Aug. 24...	2,571	2,354	2,134	2,295
Aug. 31...	2,601	2,357	2,149	2,321
Sept. 7...	2,463	2,290	2,048	2,154
Sept. 14...	2,639	2,444	2,215	2,281
Sept. 21...	2,629	2,449	2,154	2,266
Sept. 28...	2,670	2,470	2,139	2,275
Oct. 5...	2,641	2,465	2,154	2,280
Oct. 12...	2,665	2,495	2,183	2,276
Oct. 19...	2,687	2,494	2,214	2,282
Oct. 26...	2,711	2,539	2,226	2,255

New Diesel



Above, a 40-ton broaching machine. One slide straddle broaches connecting rod caps and the sides of connecting rods at both ends. Other slide broaches back face and half-round diameter of connecting rod and connecting rod cap



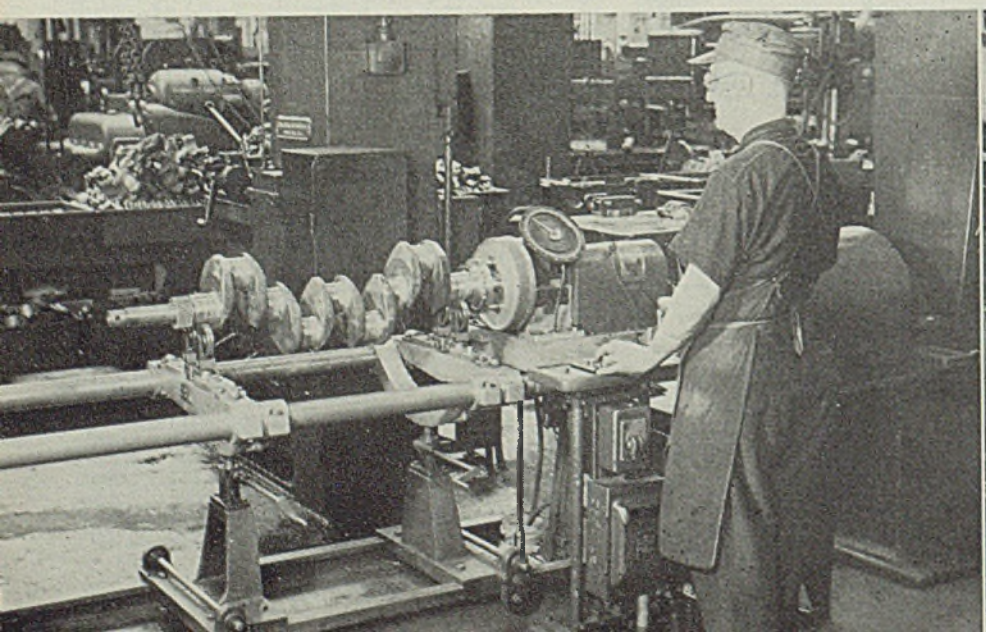
Above, lapping main and connecting rod bearings of all 4 and 6-cylinder diesel motor crankshafts after grinding to balance on a heavy-duty hydraulic balancing machine

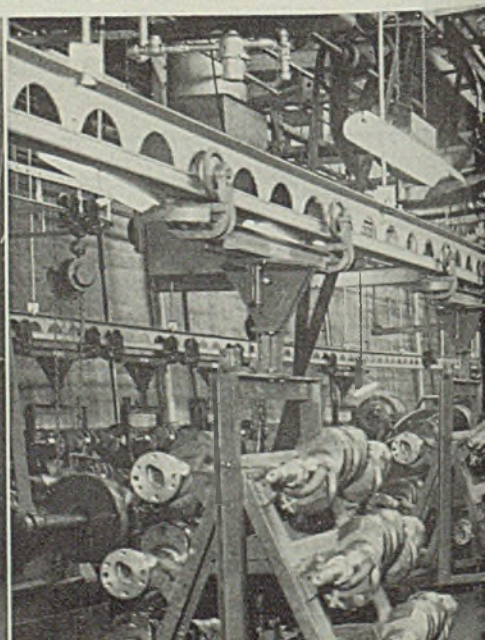
■ OUTSTANDING features of the new diesel engine production line of International Harvester Co. at Milwaukee include marked change in grouping of machines, increased automatic handling of work and unusual flexibility. The line accommodates two sizes of diesel engines and a gasoline adaptation by simply changing working heads on some of the machines.

Designed and installed under the supervision of J. E. Harris, superintendent of Milwaukee works, and V. A. Guebard, assistant superintendent, the engine line is located in a sawtooth roof building equipped with fluorescent lighting which develops an average intensity of 25 footcandles throughout working areas.

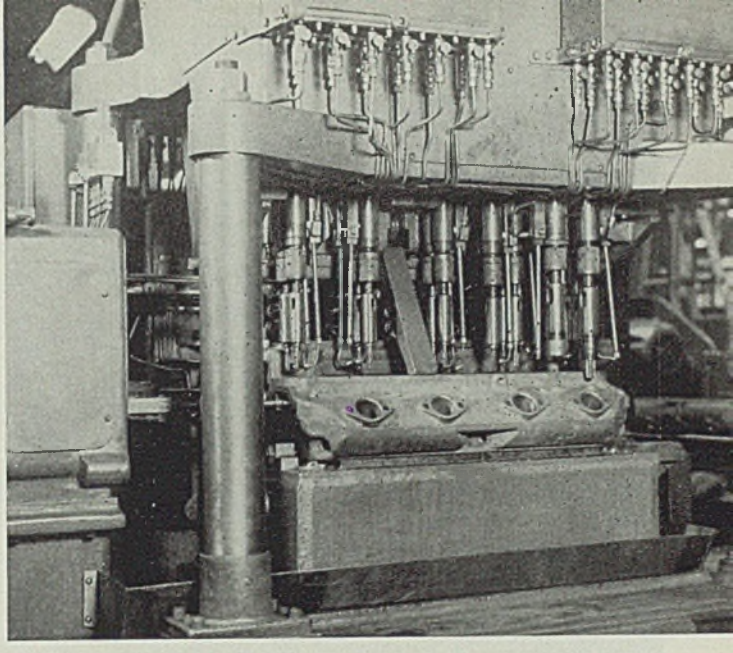
Crankcase Line: After the rough casting is clamped down, a Newton heavy-duty rotary milling machine mills top and bottom, and on the return stroke the same surfaces are finish broached without loss of time. The finishes achieved are excellent as gasket surfaces. Similarly the two ends of the crankcase are combination machined and broached. Next, various holes are drilled, cylinder bores roughed

Lower left, balancing crankshaft on a static dynamic balancer. Below, overhead conveyor carries crankshafts from one operation to another until finished units are ready for assembly department





Plant

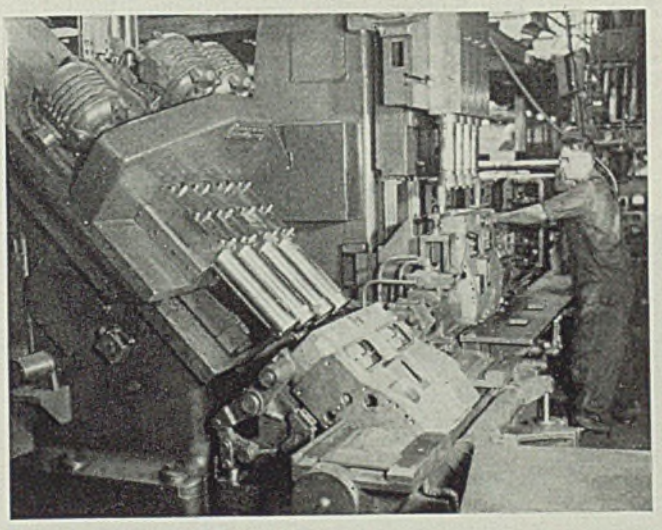


Above, tapping cylinder heads on a 3-way special machine. Like the special drilling machines, these units are designed and equipped to tap two different cylinder heads

out, bearing seats milled and notched on standardized equipment.

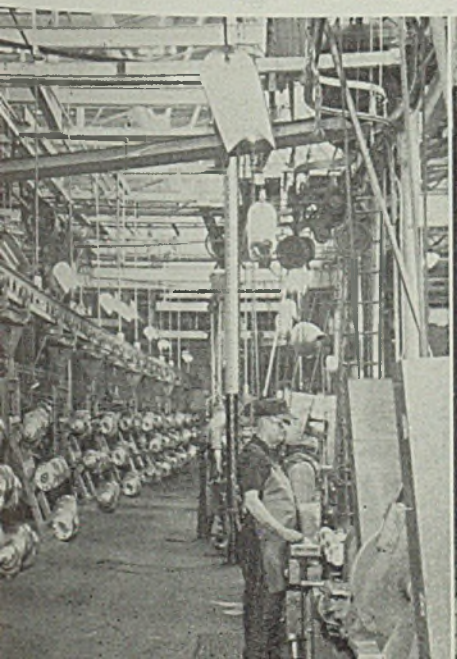
A gravity-feed conveyor delivers the crankcase to a group of three special Greenlee automatic transfer machines operated from one master pushbutton control board to drill and tap remainder of the holes in the crankcase automatically, except for a camshaft and crankshaft borings. A series of electric controls, limit switches and interlocking devices eliminate the possibility of confusion or mistiming. Between these three machines are automatic turnaround and chip unloading devices which require no attention. Also interspersed between these operations are three automatic washing machines timed with the automatic transfer. Automatic suction devices remove chips from the crankcase, carry them to the roof of the building, from where they pass by gravity conveyor to a common unloading point outside the building. This prolongs machine life, eliminates untidiness and cuts costs.

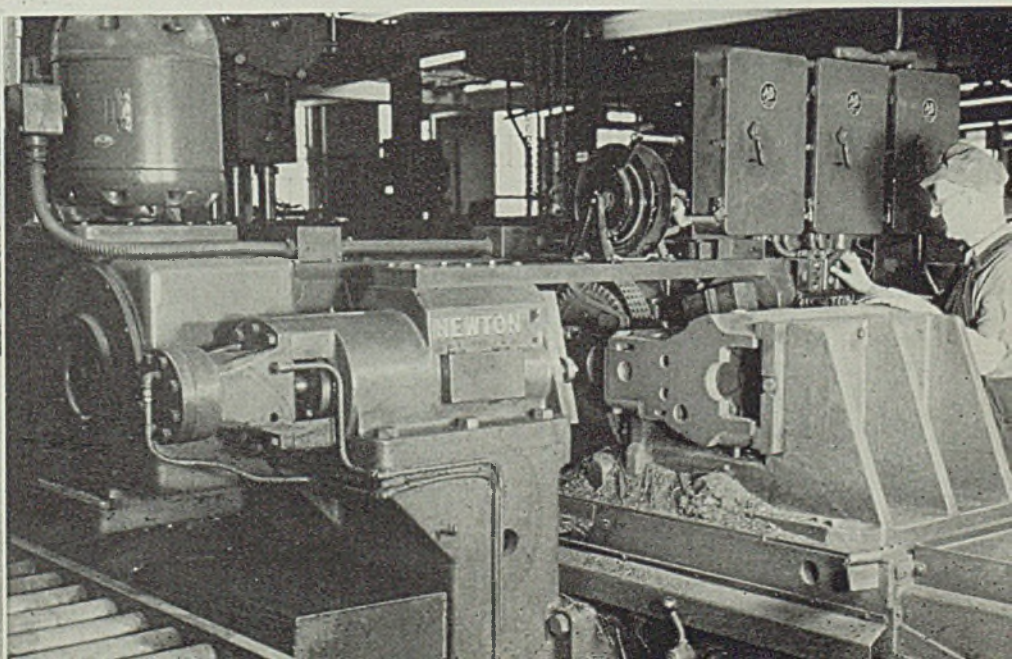
Camshaft, crankshaft and oil pump bores are worked simultaneously on a roughing and finishing machine which precisely maintains relationships be-

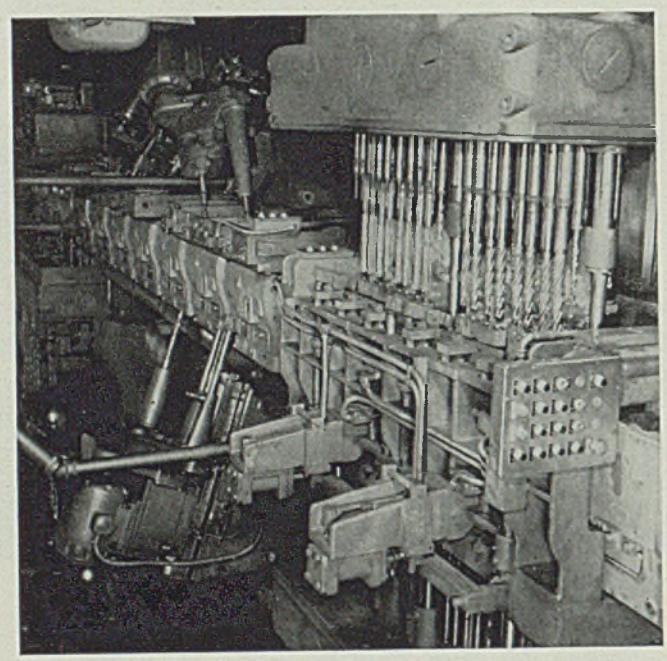


Above shows the semifinish bore on the crankcase for the dry liner cylinder sleeve on a 4-spindle boring machine, and finish bore for dry liners on a 4-spindle inclined precision borer. These bores are held to 0.0002-inch for parallel and out of round

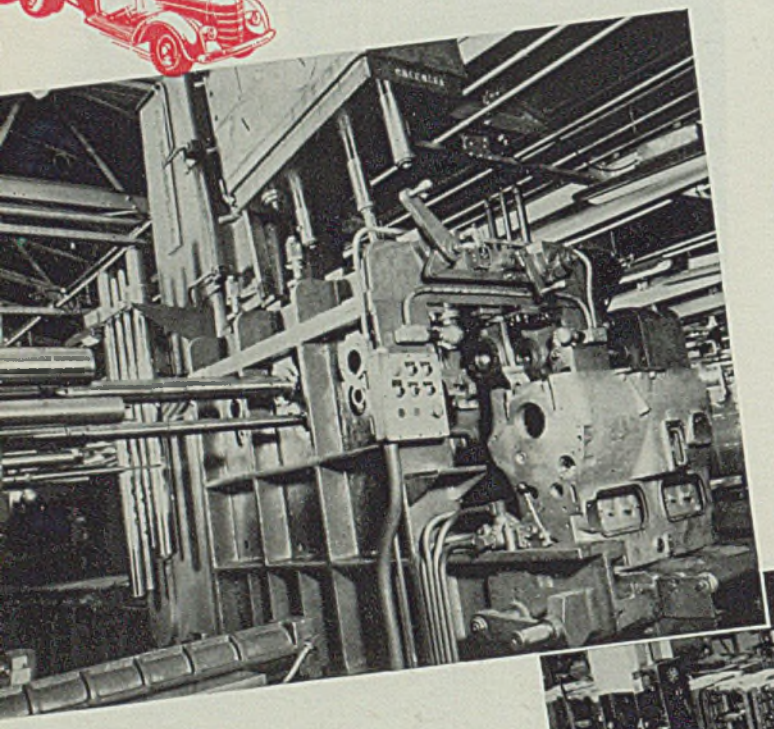
Lower right, this duplex hydraulic miller and broaching machine mills both ends of a crankcase and broaches both ends on return stroke of milling table. Some broaching chips are 12 inches long







Above, one of a battery of three special drilling machines which drill all holes at top, bottom and sides of the crankcases in one operation. Most holes are drilled perpendicularly to main surfaces but a few are at an angle and are handled separately a short distance down the conveyor



Closeup above shows 3-way drilling and boring machine which finish bores main and connecting rod bearings, reams oil pump bore and finish reams dowel holes on both ends of three different size crankshafts

tween these bores. An angular type Ex-Cell-O precision borer finishes the cylinder bores with individual spindle drives working independently of the hydraulic traverse of the machine.

All machines in the above crankcase line have automatic-cycle pushbutton-control with adequate safety devices. Throughout the line, no manual lifting, clamping or trucking is performed. At no time is it necessary for a crankcase to be removed from a conveyor. All inspection work also is done on the conveyors.

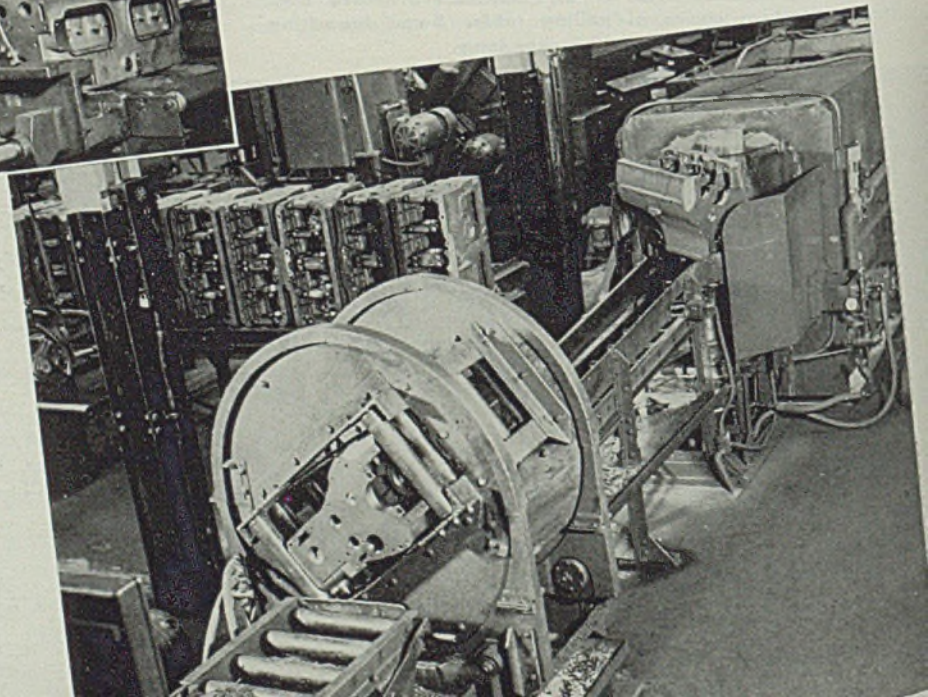
Crankshaft Line: All crankshafts are handled on a 500-foot endless overhead conveyor which makes a complete circuit of the machines on the crankshaft line. Each conveyor cradle carries six crankshafts. No trucking is done.

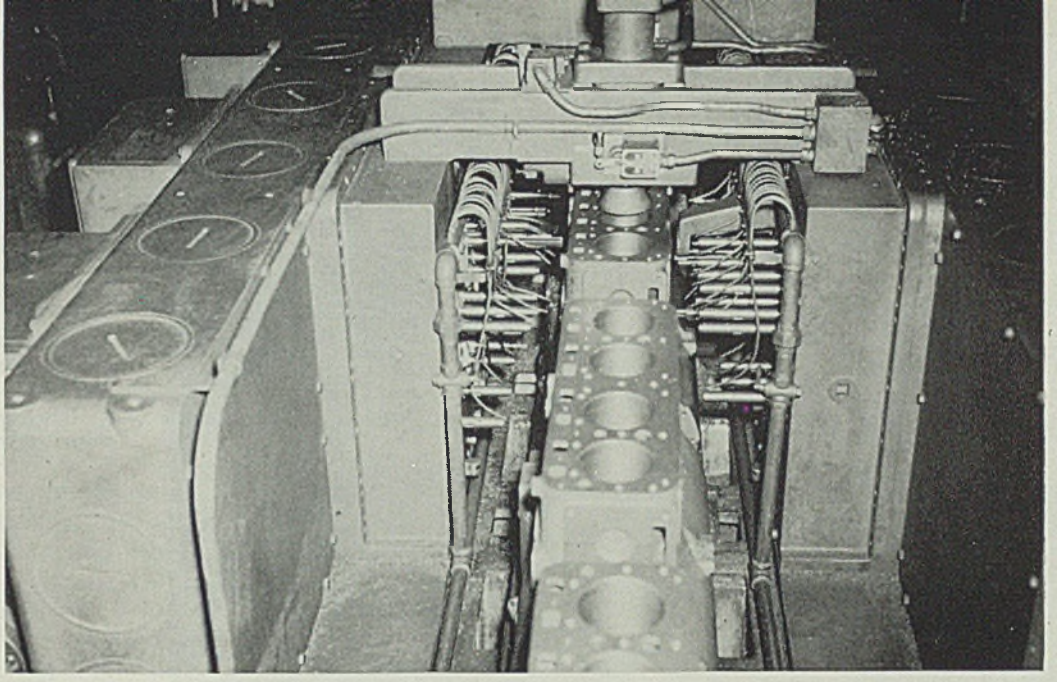
Crankshafts are induction heated and quenched automatically by the Tocco process. Both line and pin bearings are ground on Norton machines of special construction to maintain a tolerance within 0.0003-inch. Both static and dynamic balance of crankshafts is obtained with a Tinius Olsen balancer.

Crankshaft flange holes are drilled, counterbored, reamed and tapped automatically on a Snyder drilling machine. On the opposite end, the machine drills and reams two diametrically opposite holes in the stud end. This 4-position machine has a lateral automatic index from front to rear with automatic return to starting position.

Five different crankshafts can be handled on the highly flexible Schraner hydraulic polisher which handles all main and pin bearings. Output of this machine is checked using a flat piece of steel similar to a Johanssen block on which a slight trace of Prussian blue is placed. After contact with the block, the crankshaft must show a trace of blue

Below, crankcase coming from washing machine at right is raised by elevator to height of gravity conveyor, makes a quarter turn, is pushed automatically into roll-over device which turns it half way over ready for the next scheduled tapping operation





Right, rear view of the third special horizontal tapping machine in the crankcase drilling and tapping unit where both sides of the crankcase are tapped

throughout entire length of the bearing being checked.

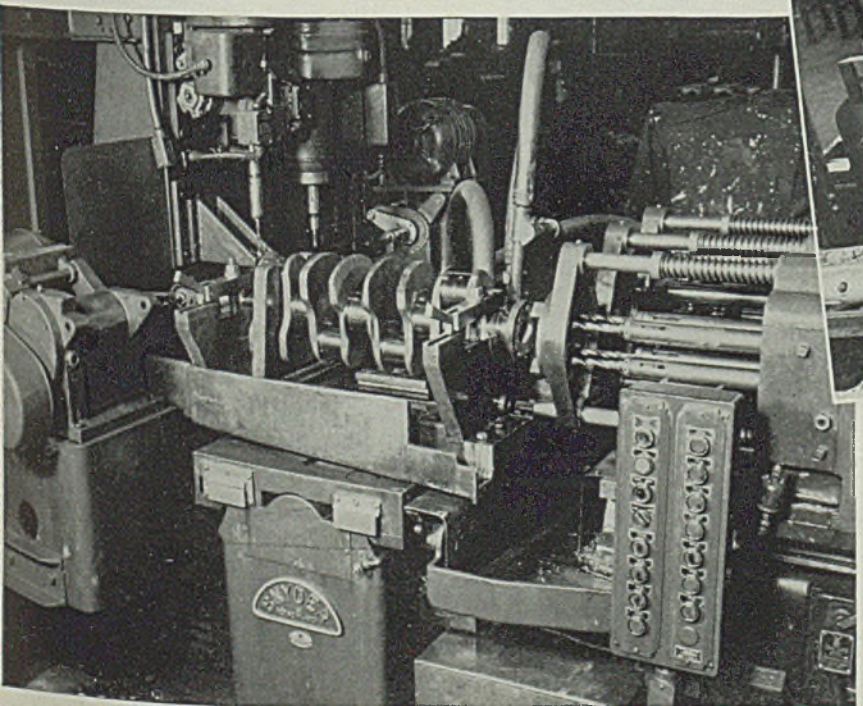
A profilometer affords periodic checks on surface smoothness.

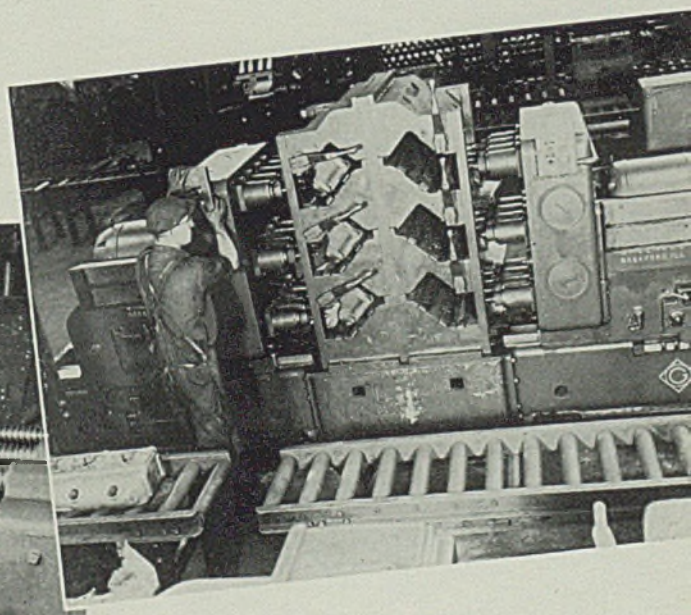
Connecting-Rod Line: First operation is to broach the two sides of the crankpin, two sides of the wristpin, the half-hole, caps, contact face and two morticed joints which hold the cap and rod together, also the back side of the rod which is machined so it may clear through the cylinder bores. This is done on a vertical twin-ram 40-ton Oil Gear surface-broaching machine with two fixtures having a shuttle motion in and out in sequence with the two rams. Clamping is done automatically.

Crank bore is finish ground on a Heald Gauge-matic machine which eliminates the possibility of a bell-mouthed bore. Distance between the two morticed joints on the cap contact faces is held to a tolerance of 0.0005-inch. Oil hole between wristpin and crank bore is drilled on a Leland Gifford drill press notable for a hydraulic unit that returns the drill to starting position automatically when the drill becomes loaded with chips.

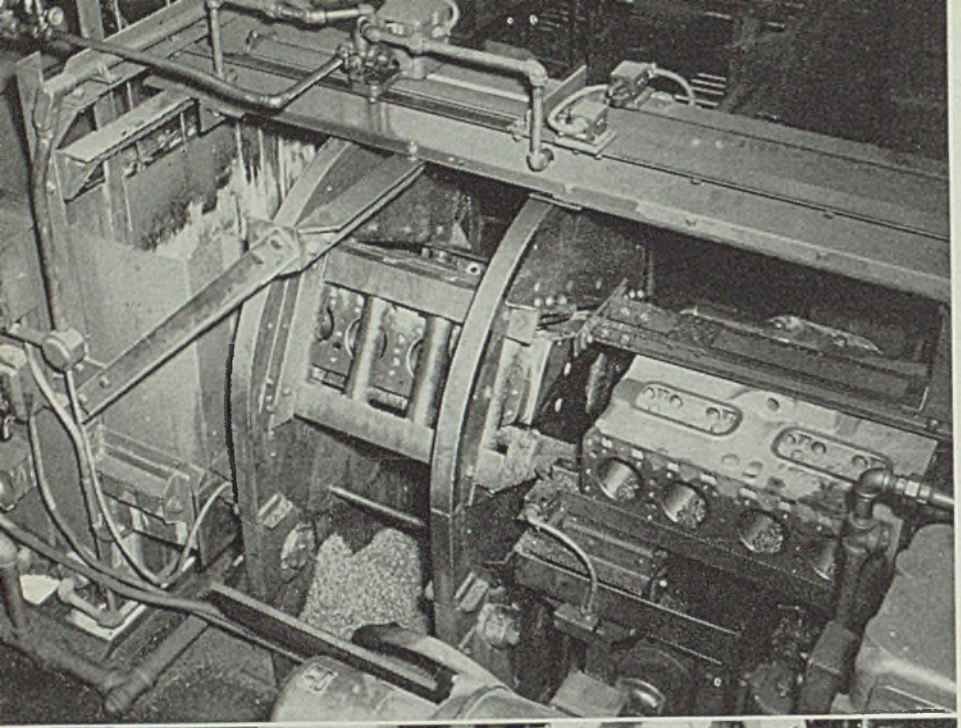
A 2-spindle Ex-Cell-O machine diamond bores the wristpin hole. Balancing pads at both wristpin and crankpin ends of the rod are used to obtain balance within two-tenths of an ounce-inch on a rise-and-fall Snyder automatic balancer. Thus connecting rods are held in balance from the beginning of production—an important factor in reducing future serv-

Below, both ends of crankshaft are automatically drilled, reamed and tapped. Operator merely loads, unloads machine which drills holes for flywheel bolts, starting crankpin, flywheel dowel pin, starting crankpin setscrew; reams holes for flywheel dowel pin, starting crank drivepin; taps holes for setscrew and flywheel bolts

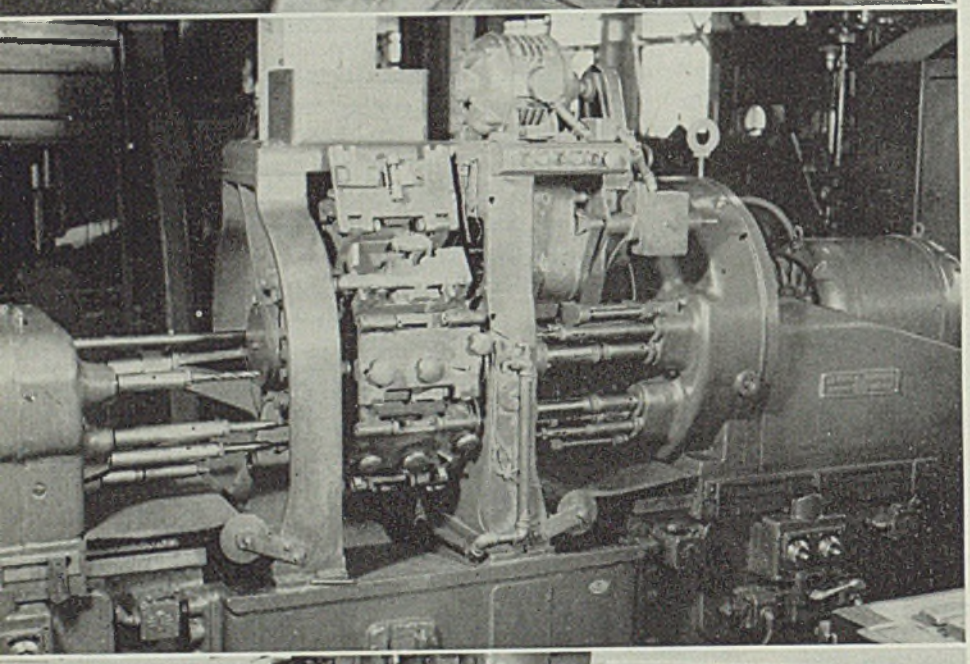




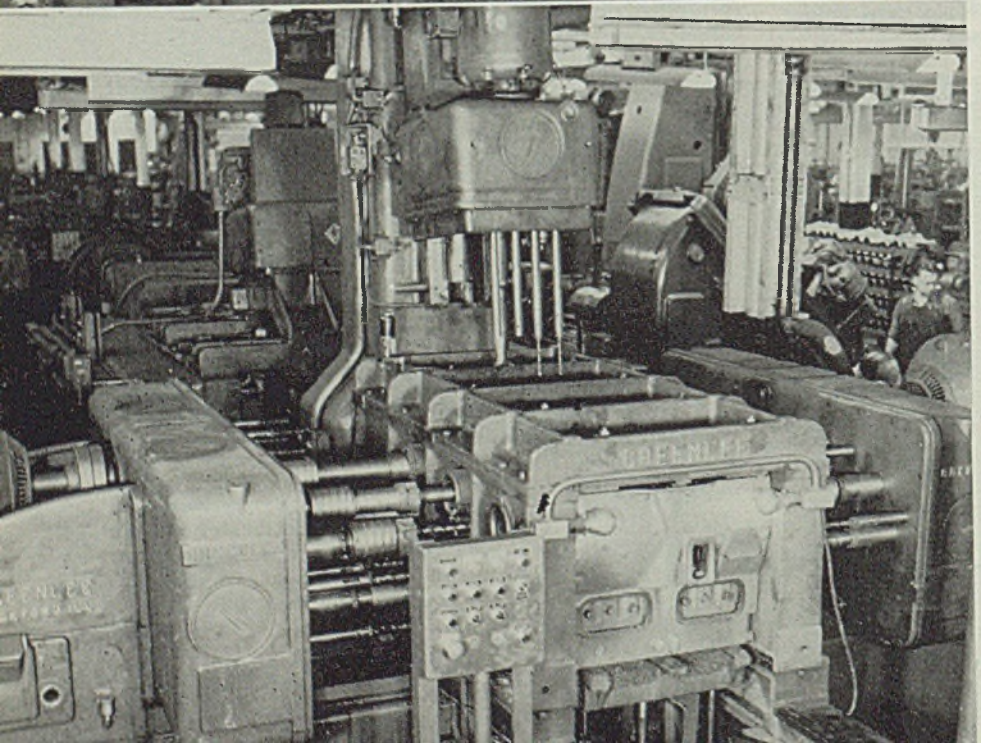
Above, fuel injection nozzle bores are being rough, semi and finish bored on a 2-way machine. Fixture is tooled up to handle one size head on left side, another on right side



This roll-over device is located between first and second of the automatic drilling and tapping machines. Unit is one of three in this line. A bar pushes crankcase into roll-over, which makes a three-quarter turn, dumping out chips, then delivering crankcase to washing machine



Special 2-way machine drills, taps, bores, reams, faces and turns all machined surfaces on oil pump bodies in one operation. It accommodates three different size oil-pump bodies



Here is the second of the three special automatic horizontal drilling machines. It rough bores the camshaft bore, main bearing seat and drills all holes in both ends of the crankcase

ice problems. In addition to inspection in the forge shop for grain flow, trim marks, scratches, each connecting rod is magnafluxed to guard against fatigue.

Cylinder-Head Line: Cylinder heads are alloy iron with a high chromium content and are carefully checked for cracks, flaws or blow holes both before and during machining. Tops and bottoms are rough and finish milled on a special Ingersoll drum-type machine. All holes, regardless of angularity or position, are done on multiple equipment. This unit-head equipment is flexible enough for any future design.

An interesting machine on the cylinder-head line is a special Oil Gear broaching machine which presses in valve guides simultaneously and then broaches and burnishes the inside of the valve guide stem. Broaches fall through into a wooden container beneath the machine. Each spindle is equipped with an electric eye which flashes a warning to the operator when pressures are either too high or too low.

Piston Line: All pistons are turned on automatic lathes. Wristpin hole is bored on an Ex-Cell-O precision machine. All pistons are handled on conveyors with a return conveyor underneath for empty trays. No grinding is done on outside piston diameters but diamond turning is done on a special Sundstrand automatic lathe. Finish and smoothness are at least equal, if not superior, to the usual ground finishes.

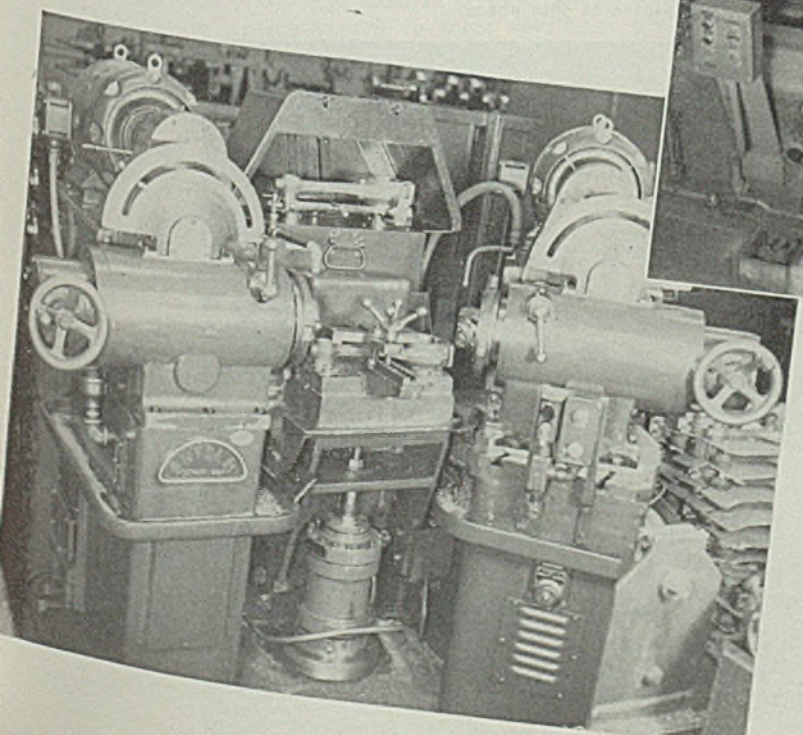
Sleeve Line: Cylinder sleeves are hard, dry liners. Rough boring is done on a vertical 8-spindle W. F. & John Barnes machine. Outside diameters are turned on automatic Fay lathes. Next sleeves are heat treated in a gas furnace, adjoining and part of the line. Hardness must fall within 45 to 55 rockwell C.

After heat treating, sleeves are not ground on the inside but instead are reamed on a battery of special Baker hydraulic drills and equipment developed by Barber-Colman Co., with reamer blades tantalum carbide tipped. Short gravity feed conveyors between machines eliminate trucking. Sleeves run on these conveyors on their own periphery. The piston and sleeve lines converge at a point where pistons, pins and sleeves are fitted.

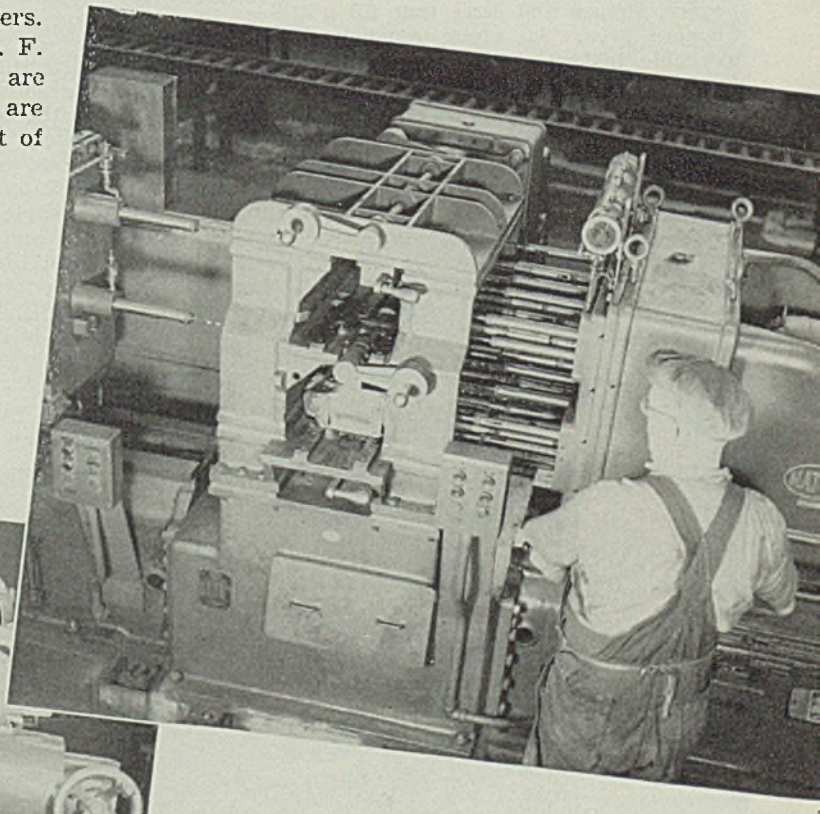
Miscellaneous parts manufactured include oil pumps, oil pump covers, water pumps, drive pulleys, starting crank nuts and other small machine equipment.

An interesting machine used on oil pump bodies is an Ex-Cell-O trunnion horizontal multiple drilling and reaming machine. It performs every operation performed on the oil pump body except centering or turning operation. No line boring or reaming is necessary after the pump body leaves this machine as it is fully automatic, pushbutton controlled.

For timing gears, a 6-spindle rotary-type Lees Bradner vertical machine is so built that if one spindle requires repairs, the other five may still be kept in production. Since the machine rotates, the operator need not move from spindle to spindle.



Below, balancing both ends of connecting rods on a special machine. The rods are held to extremely close limits. Total variation in weight of the four connecting rods in the diesel engine is held to within approximately 0.2 of an ounce



The 3-way drilling machine above is designed and equipped to handle two sizes of cylinder, one is drilled in lower magazine of the fixture, the other in the upper. The drill heads are tooled up to handle either one

WAREHOUSING STEEL

By MORRIS E. NEELEY
Superintendent
Horace T. Potts Co.
Philadelphia

Highly developed handling methods at large warehouse feature improved roller racks and portable roller stands for moving stainless sheets in and out of storage in original packing boxes. Shears, punches and other machines are served by portable stands topped by rollers and ball casters to facilitate moving and feeding materials

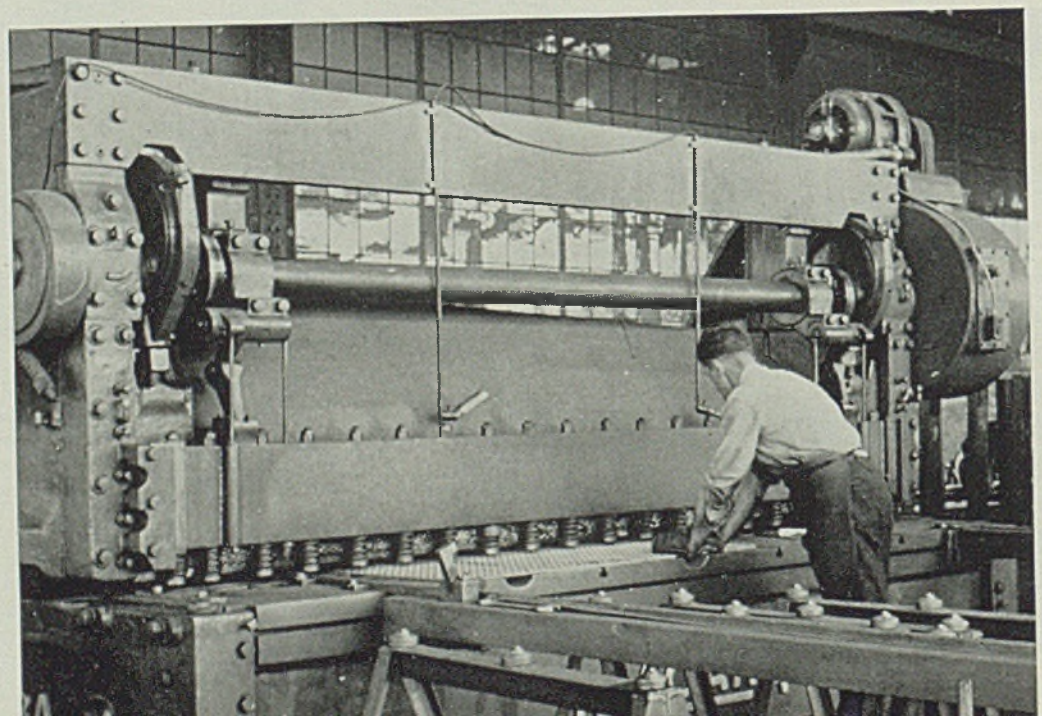
■ AS HANDLERS of steel since 1815, the Horace T. Potts Co., Philadelphia, has developed a number of exceptionally efficient handling and storing methods that are a definite aid to prompt delivery of steel in top condition. Serving a wide variety of industries, the warehouse regularly stocks a variety of grades, shapes and sizes that fill a 6½-acre area. All stock must be available instantly. Also, adequate facilities must be at hand for shearing, flame cutting and fabricating. Since in all these operations handling is a large portion of the costs involved, it is of utmost importance that it be done efficiently.

The introduction of new grades, such as stainless and tool steels, has meant the erection of new storage balconies, the design of new types of racks and the modification of old handling methods. In addition to the extensive stock of bars, tubes, sheets and plates, the company also stocks a wide variety of specialties such as boiler tubes, welding rods, wire and chain link fences, bunting bushings, wire rope, perforated metal sheets, brass and copper bars and sheets, reinforcing steel and structural steel sections up to 60 feet in length.

Warehouse itself is of brick and steel with the side areas entirely of glass in metal sash. Roof is fireproof gypsum. Adequate skylights provide ample daylight. Nearly the entire floor is creosoted wooden block on a 10-inch concrete foundation. Cracked blocks are pulled out individually and replaced by blocks left over from the original installation. After 17 years' service, there are still plenty of blocks left for replacement from this original stock.

The interior of the building is arranged in a series of bays, none less than 30 feet wide. Each bay provides a free and unobstructed storage area served by one or more overhead cranes. One 75-foot bay for storing plain carbon steel bars, shafting and plates extends the length of the building. The bridge-type roof eliminates completely

Fig. 1—Note the welded angle-iron stands with ball casters on top for moving about and feeding large plates to this shear



the need for obstructing columns.

A 2-track railroad siding with a capacity of 10 cars extends across the south end of the building. All incoming materials are received on an adjoining platform. The great majority arrive in open freight cars, protected by temporary weatherproof paper covers where necessary. This permits the steel to be lifted from the cars by crane and conveyed directly to the proper storage racks. The occasional box cars are unloaded by 3-wheel shop trucks which are run right into the car and then are pulled to the proper section of the warehouse by electric tractors when loaded.

A shipping platform extends across the north end of the plant, where a line of trucks can be loaded simultaneously. Thus it is evident that the flow of materials is in at one end, straight across the warehouse and out the other end. There can be no interference between receiving and shipping operations—an important feature of good warehouse layout.

Storage of materials is divided into two sections. The "tight" storage section, occupying the greater portion of the warehouse, is entirely enclosed from the weather and from the open portion of the building. Large rolling steel doors block off the ends of this section, and metal sash windows divide it from the remainder of the building. The atmosphere in this section is regulated according to the weather so the air is warm and dry at all times. A ventilating duct running the length of the building delivers air that has been warmed by passing over steam coils. In this section are stored cold-rolled sheets, bars, tool and alloy steels, stainless steels and specialties.

Plain carbon steel bars and plates are stored in the "open" section of the warehouse, where the atmosphere is not regulated.

In general, materials are stored in either "drop" or "push" type racks. Both types can be seen in Fig. 4. The drop racks are often in the form of a series of upright channel irons which form divisions in which the long bars or plates can be dropped directly by the cranes. The push racks consist of numerous compartments made by strips and bars, into which the long tubes and bars must be pushed lengthwise. Some of the drop racks are divided into several vertical sections by removable cross members, permitting segregation of various sizes with heavier sizes stored at the bottom, lighter sizes on top. When a load of the heavy bars is to be dropped into place, the lighter bars above are removed, the cross-pieces taken out and the load of heavy bars dropped directly into place.

Many of the plain carbon steel shafts in the open section of the plant are stored in combination drop and push racks. See Fig. 4. To conserve floor space, these drop racks are mounted on top of a long row of push racks. Thus faster moving types of bars can easily be placed or removed from the open-top racks above, while the slow moving grades are pulled by hand from the lower, closed racks.

Thin steel sheets are stored flat on high racks with several horizontal tiers. These occupy little floor space and make the sheets easily available.

High grade tool steels are stored in a large push type rack with numerous divisions. Each grade of

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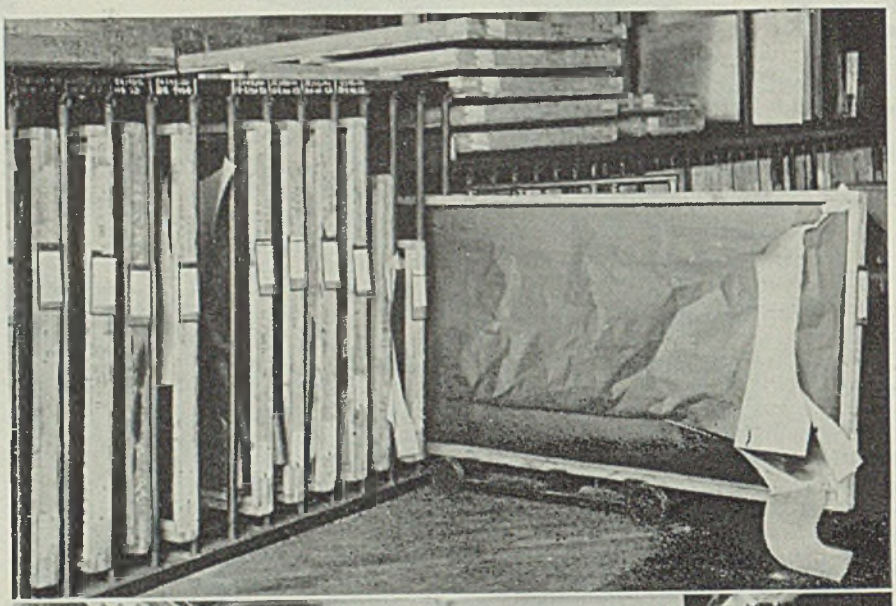
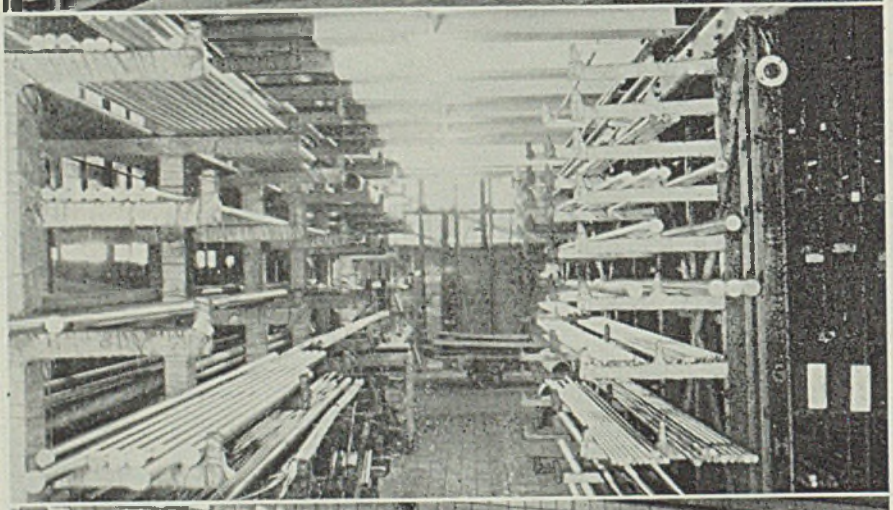




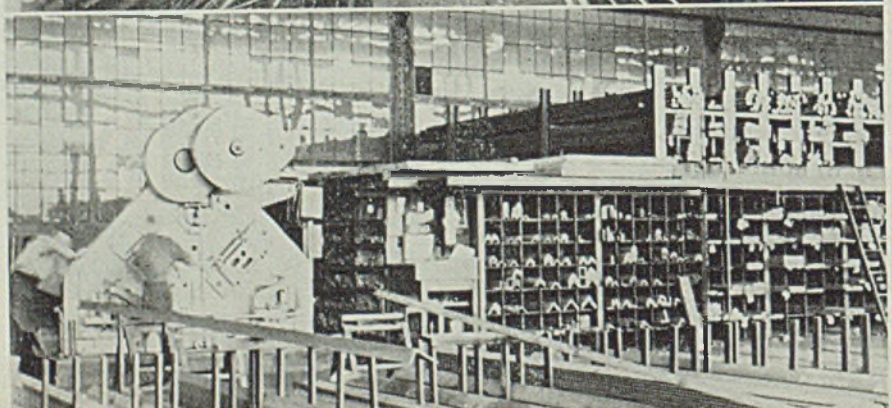
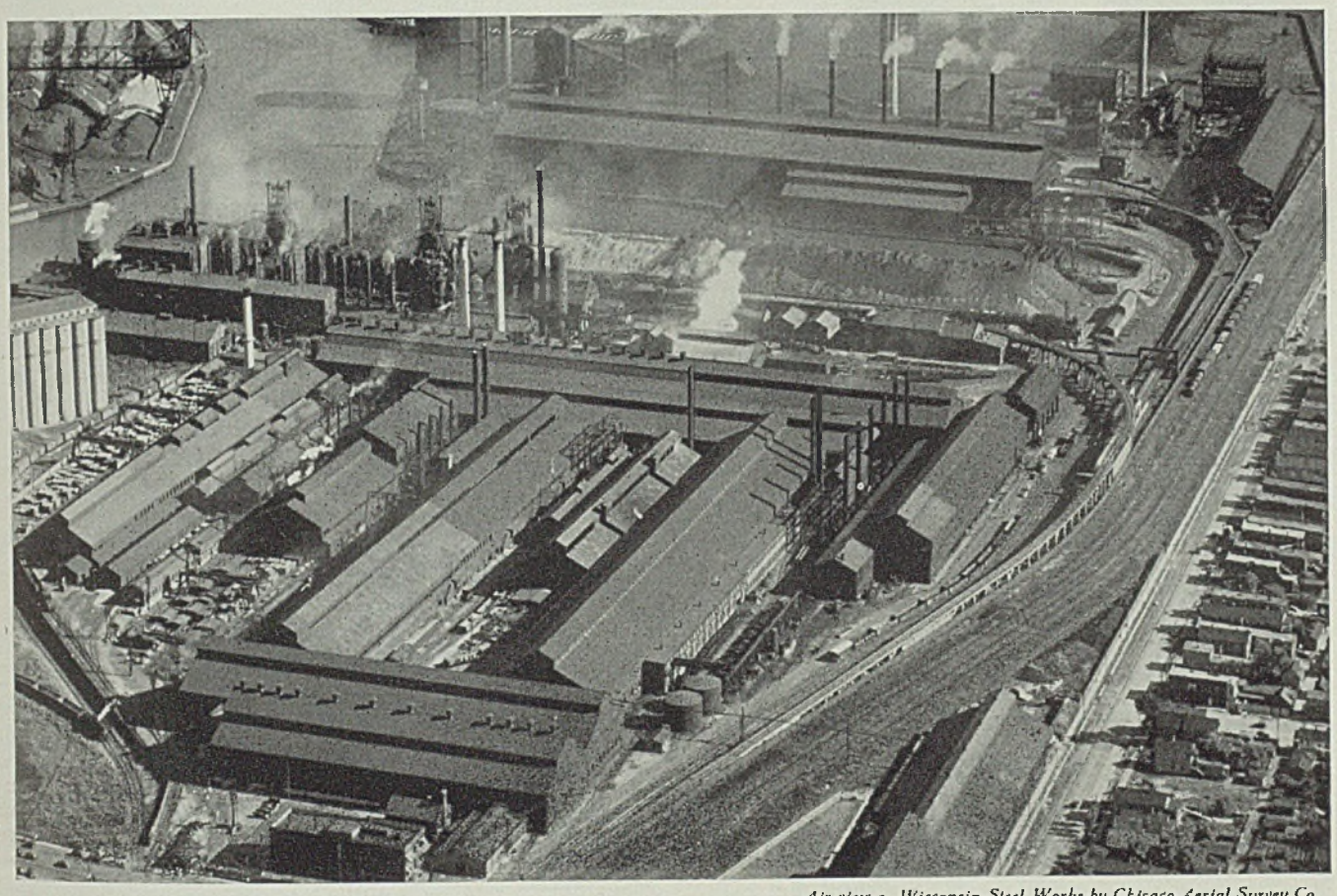


Fig. 2—Method of storing stainless steel sheet in open packing boxes on edge at a slight slant to keep sheets in boxes. Bottom of rack has rollers which allow boxes to be moved in and out easily. Rollers on portable stand also aid in removing boxes

Fig 3—Stainless steel bars are stored on open-arm burlap-covered racks as shown here

Fig. 4—Both push and drop racks are shown here. Note drop racks on top of push racks at right—for greater access to most used items. Welded angle-iron stands topped with rollers aid work in moving and feeding angle iron to shears at left

The Right "FOLLOW THROUGH" Counts in Making Quality Steel



Air view o Wisconsin Steel Works by Chicago Aerial Survey Co.

Users of alloy and carbon steels recognize the value of dealing with a firm that "follows through."

Wisconsin Steel maintains a rigid "follow through" policy. It begins when the salesman writes the order. It continues through every operation at Wisconsin Steel's modern, up-to-date plant. A competent staff sees that the finished product measures up to the most exacting specifications.

Wisconsin Alloy and Carbon Steels are being used successfully by manufacturers in many lines of business. Ask us to point out how your business can benefit from Wisconsin Steel's "follow through" policy. We are well equipped to supply a full range of alloy and carbon steels, as well as high quality pig iron that is "better controlled from mine to mold." Write or phone us. Inquiries will receive prompt attention.

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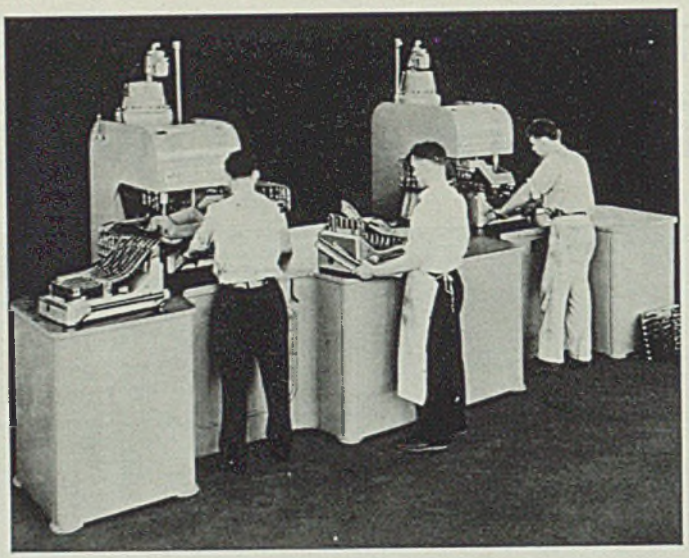


Fig. 1—Some 4000 spot welds assembled 1000 stampings into 100 radiator grille halves per hour in this novel assembly welding setup

High Speed Assembly Welding

New production spot-welding system has advantages which make it particularly suitable for assembly welding groups of sheet metal parts. Fixtures eliminate all hand clamping. Dual series electrode guns make four welds simultaneously. Thus an assembly requiring 40 or more welds needs only short welding cycle which is entirely automatic once initiated, including automatic releases of completed assembly

■ ONE OF THE newest developments in high-production resistance welding work is the extremely rapid assembly of stamped and formed sheet steel parts to produce radiator grilles in direct competition with diecast grilles.

The method and unique equipment recently developed by Progressive Welder Co., 3031 East Outer drive, Detroit, enables one automobile manufacturer to assemble some 1000 stampings into 100 complete radiator grille halves per hour employing some 4000 spot welds.

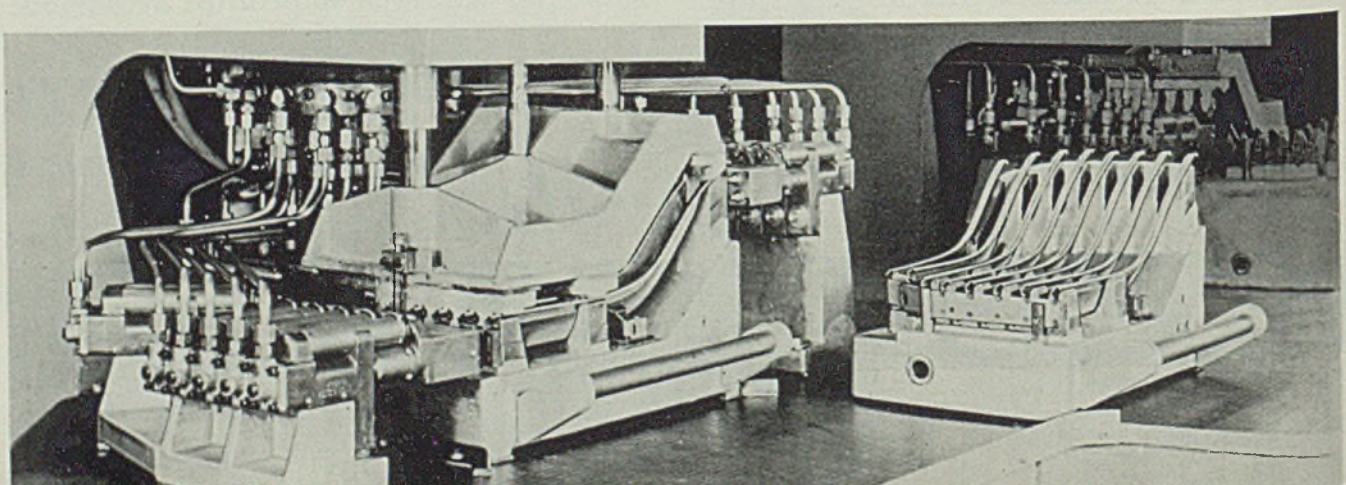
The radiator grilles are made in halves. The left half being opposite the right half necessitates a separate welding setup—therefore, two welding stations are employed in the integrated production equipment shown in Fig. 1. As will be seen, the two working stations are combined into a single compact unit by a common housing and working surface. Each welding station employs two operators, each of whom works his own rubber-tired jig fixture. Thus while one operator is loading the parts into his fixture, the other operator is moving his completely loaded jig into the welding position and is welding his assembly. By the time his assembly is completed, the other operator has completed loading his fixture which he rolls into position in the welding unit for assembly welding the grille half.

At the other welding station, two operators are working on the grille halves which supplement those made on the first station. Here, too, each operator has an individual jig fixture which he loads while his partner is at the welding position. In this manner the welding units are kept in almost continuous operation and no time is lost in loading and unloading fixtures. This system permits 100 complete radiator grille halves to be welded per hour.

Details of fixture design, arrangement of welding electrodes, sequence of operations for this work are interesting because of the many unique features involved. At the same time, the system is widely adaptable to other types of assembly work simply by developing proper fixtures and so warrants study because of the important production possibilities it offers.

Each half of the radiator grille

Fig. 2—Here the portable jig for half the radiator grille is clamped in welding position with another jig at right just taken from welder with completed part ready to lift off



ALTER EGO: Literally "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

ALTER EGO: Let's talk things over. As your other self, I feel it my duty to give you some advice on how to improve your product and cut its cost.

Well, you're one fellow I don't mind getting advice from. I know you won't try to sell me something.

ALTER EGO: All right. Here's my suggestion. First, improve your reasoning technique. Learn to *trust your Alter Ego.* Listen to that inner voice more often.

All right, but I've had to use my conscious mind so much to ward off exposure to arc welding salesmen that I've got in the habit of trusting my surface judgment.

ALTER EGO: Yes, and because of surface reasoning you're too prone to deride that which you don't sufficiently understand. Look how others are profiting with arc welding.

But how can I understand arc welding without opening up to sales exposure?

ALTER EGO: I understand that Lincoln is a good source for arc welding information that's devoid of your pet aversion. Not a high-pressure sales talk in a book-full.

• •

LINCOLN SUGGESTS: To acquaint yourself with arc welding, why not obtain a factual, informative discussion of this metal working process—as applied to your problems? Lincoln has a series of bulletins on Design for Welding which suggests how to change over to arc welding for improved products, lower costs and faster production. Why not write for them?

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"No one wave can batter down the rocks; it is the eternal pounding away of the surf that changes the shore-line . . . We admit the persistency of our advertising is aimed to influence a change in stainless and heat-resisting welding technique; a change destined to become habit forming."

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BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

STEEL

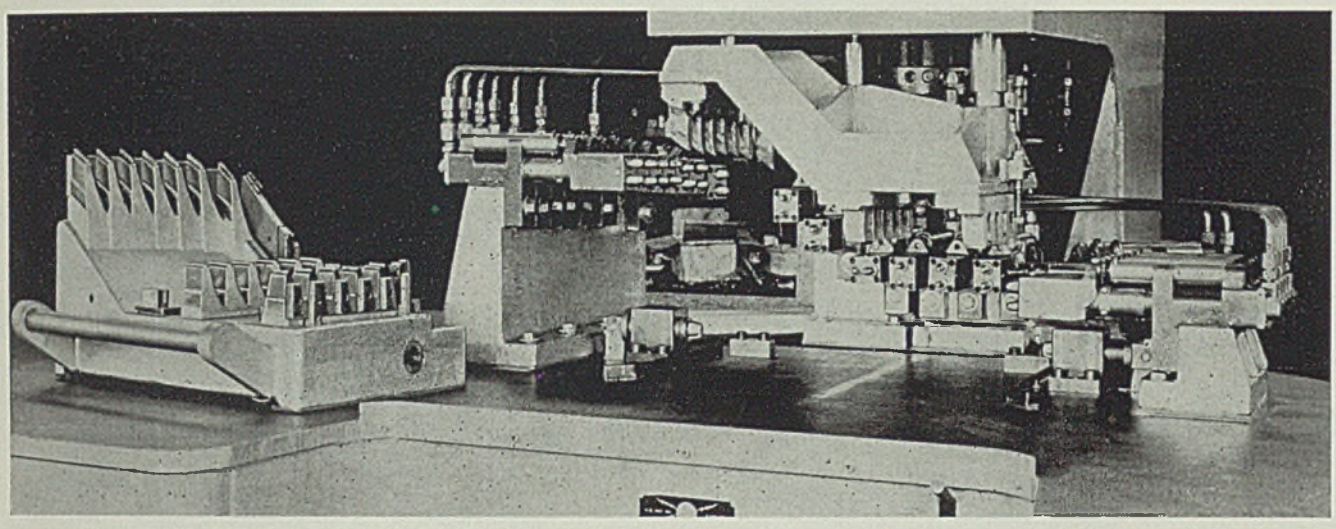

Fig. 3—An empty jig is at left with vertical clamping fixture in raised position, welding guns in idle position. Note guides and stops on table to position movable jig and also the locating pins. Lever at right center foreground operates air cylinders which move the vertical clamping head

consists of eight specially formed sections which are bent about 45 degrees near their center longitudinally as can be seen in Figs. 1 and 2. These eight longitudinal pieces are placed on edge in the portable fixture which locates each piece at three points, thereby assuring accurate positioning.

As will be seen at the extreme right in Fig. 2, crosspieces are spot welded along both ends of these eight pieces to form the grille. This makes ten pieces in the completed assembly. The ends of the eight longitudinal pieces are turned over a short distance to provide a flat surface which can be welded against the two end pieces.

When one of the portable fixtures has been loaded with parts, it is moved into position in the stationary fixture. Rubber-tired casters underneath each portable fixture permit it to be moved about readily upon the work surface of the welding machine and so facilitate moving the jig in and out of the welding head. Also they are mounted on springs which permit the portable fixture to be clamped down directly against the working surface of the welder by means of the upper air-operated clamp—a part of the stationary fixture. This clamping head moves vertically up and down, actuated by an air cylinder, the control valve handle for which can be seen extending through the front panel of the welding machine at the operator's position just below the working table level in all the illustrations. In Fig. 1, a portable fixture is in position in the welder and the air-operated overhead clamp has descended to clamp the portable fixture tightly against the work table.

In Fig. 3, an empty portable fixture can be seen at the left, while the air-operated clamp is in the raised position. This also shows well the wedge-shaped tips on the air-operated clamp which help hold the sheet steel parts accurately in position during the welding operation. Note in Fig. 3 also that dies and locking pins are mounted on the tables to locate the portable fixture. The left-hand locking pin is pivoted to a plate fastened to the work table, while the right-hand locking pin is pivoted to an air cylinder which clamps the portable fixture accurately in position. Note also the guides on the working surfaces and the stops which permit the portable fixture to be pushed accurately into position without the operator needing to watch the alignment. It will be noted that when the wedges of the air-operated clamp descend, the welding fixture is clamped firmly on the table as the springs supporting the wheels are compressed. In the compressed position, the locating pins at either end of the jig engage the locating holes. However, since the vertical motion in compressing these springs is only slight and since the locating pins are pointed and pivoted at one end, the matter of engaging involves no complications. At the same time, guides for the locating pin blocks assure proper positioning of the work on the table.

No hand clamps are used or needed as all clamping is done by the wedges of the vertical-moving air-operating clamp. Also, the design of the portable jig permits the parts to be dropped into position, thus eliminating the time-consuming necessity of fitting parts in place. It is such comparatively simple features as this provision that afford high output with minimum effort from the operators.

Electrodes are arranged in pairs on Progressive Hydro-O-Matic welding guns in such a manner that they are entirely self-equalizing and thus assure uniformity even though two welds are made simultaneously by each gun.

Path of welding current is from the welding transformer in the base of the machine through the two tips of one gun, through the parts to be welded, to the mobile jig and back through the two tips of a second gun—making four spot welds simultaneously. In rapid succession 36 other welds are made in sets of four each to make 40 spots in all that are required for each grille half. Control equipment is set so once the welding cycle has been initiated the 40 welds are made successively in sets of four and the jig automatically released for removal and unloading at completion of the welding cycle.

Flexible Gun Movement

It will be noted the welding guns are individual units assembled on a fixture bolted to the working surface of the welder. This means that it is not a difficult proposition to rearrange the welding guns and fixtures to accommodate changes in size and design of the work as different models are developed. This extreme flexibility is one of the important features of this method.

As originally pointed out, the grilles are made in halves with the right-hand grille half welded at one welding station, the left handled at the other. After an operator loads portable fixture at the left of either station, he rolls the jig to the right into welding position and then returns it to the left side of the station, if he happens to be working on that side. His partner meanwhile working at the right of the welding station loads his jig, moves

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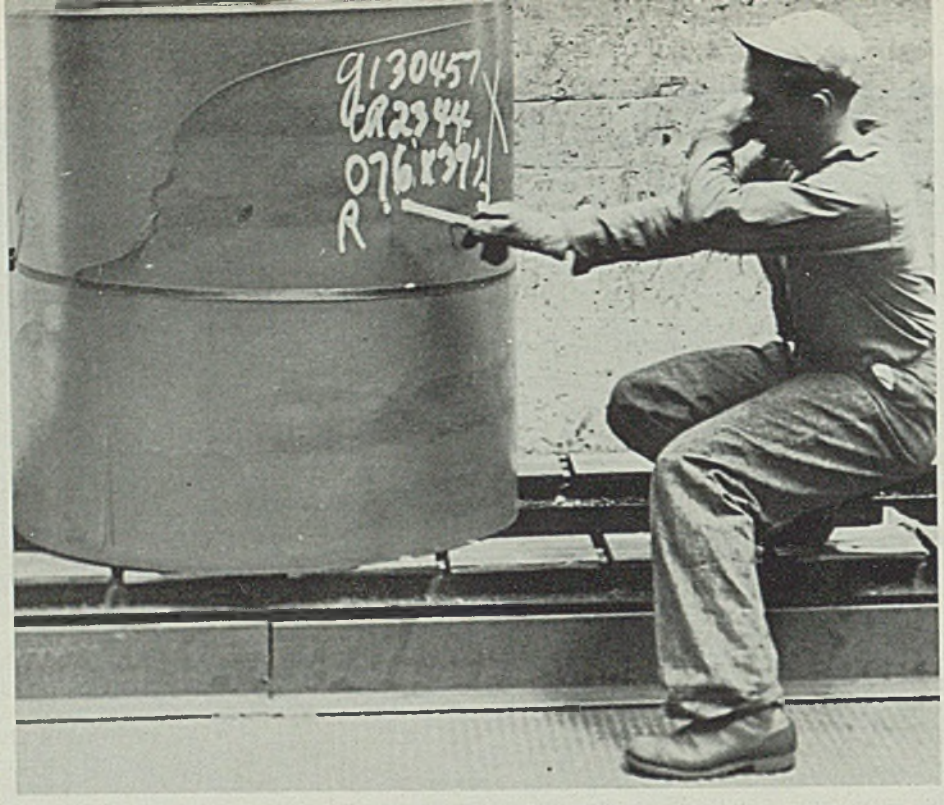


Some mills now mark strip at temperatures as high as 1800 degrees Fahr.—and the marks must stay on

Marking Hot Steel

To cover wide temperature range effectively, two compounds are developed with two overlapping ranges. Each is available in seven colors; either soluble or insoluble in pickle baths

By V. LOGAN STALEY
President
Helmer-Staley Inc.
325 West Huron Street
Chicago

■ UNLIKE most other raw or finished products, the exact grade or type of steel cannot be determined by visual inspection. The problem of identifying steel through marking, therefore, goes hand in hand with steel production. The increasing complexity of steel production, likewise, places increased responsibility upon adequate and dependable marking.

The demand for closer tolerances in sizes, better finishes, more exacting metallurgy, greater variety in steel alloys and more rigid specifications generally has resulted in many additional "grades" to which unmistakable identity must be given. It has, too, resulted in many changes in operating practices, chief of which, from the viewpoint of this article, is the necessity of marking metals while at temperatures of from 200 to 1400 degrees Fahr. and up.

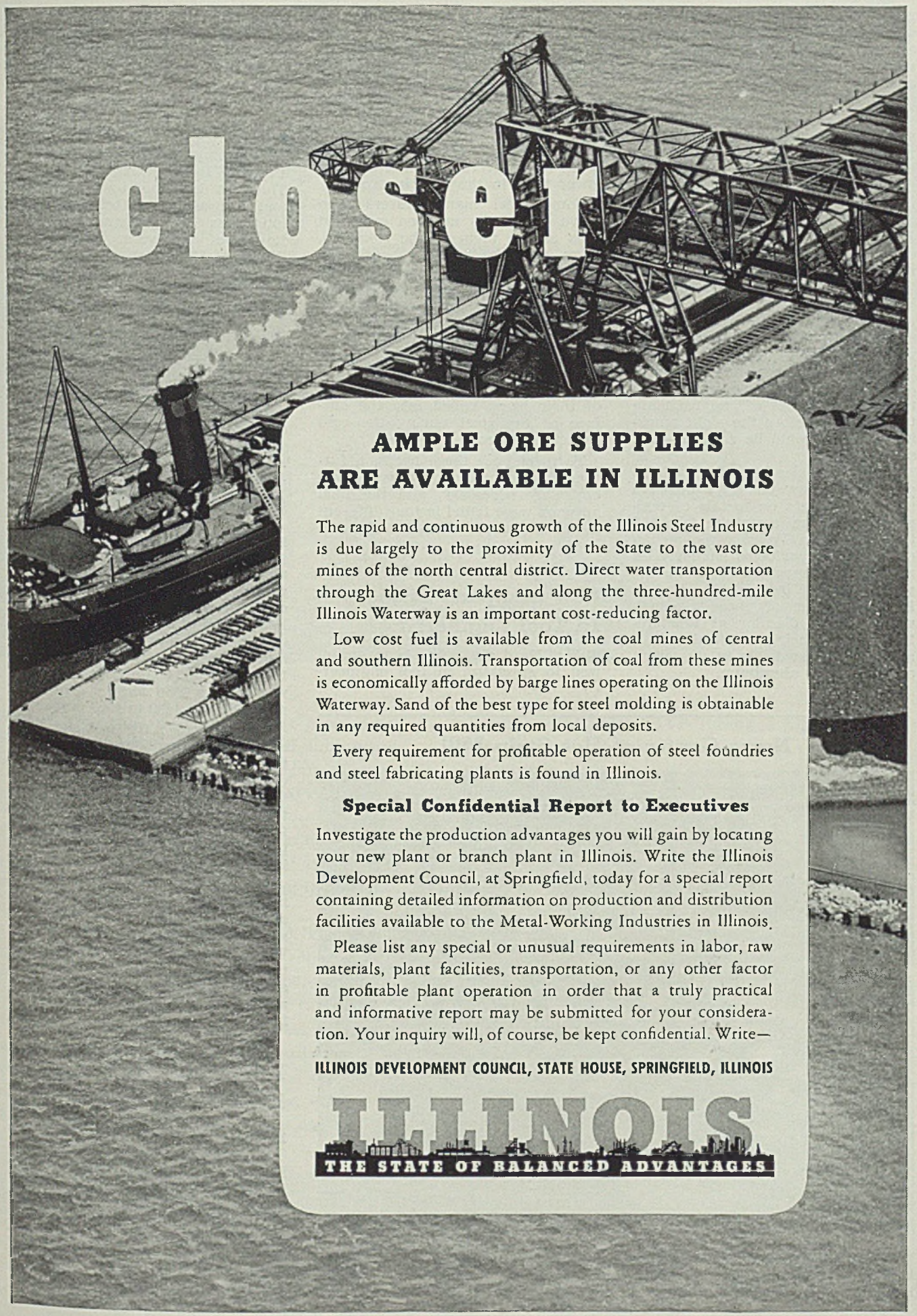
At temperatures above 1500 degrees Fahr., scale is apt to form on the surface of the cooling metal and at least a part of the identifying markings may drop off. Most plants remove this scale with a wire brush before marking.

Before the advent of the hot strip method of rolling steel, the problem of marking "hot" steel was not so acute. Billets were processed at a moderate rate of speed and the temperature range at which they were marked was moderate. With strip rolled at various temperatures depending on the alloy, gage and purpose for which it is to be used, hot strip mills have adopted various methods of marking. Some mills do this marking when the strip is still on the coiler, others mark at various places on the conveyor leading from the coiler, and still others lift their coils across the plant before making any attempt to mark them.

Varying marking practice thus has widened the marking range until now it runs from a minimum of approximately 150 degrees Fahr. up to 1400 or 1500 degrees Fahr., and in some cases even as high as 1800 degrees Fahr. The problem has become further complicated by the fact that also within these temperature ranges it is often necessary to mark with various colors and these colors must be true even at the high temperatures.

In addition, some plants want identification markings to remain on the steel through the pickling process, while others want them removed in the pickle bath. Many plants expose their coils to the weather either in shipping or in storage so the markings must not be destroyed by the elements.

The difficulty in taking care of these widely varying conditions has always been the inability of any one



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Low cost fuel is available from the coal mines of central and southern Illinois. Transportation of coal from these mines is economically afforded by barge lines operating on the Illinois Waterway. Sand of the best type for steel molding is obtainable in any required quantities from local deposits.

Every requirement for profitable operation of steel foundries and steel fabricating plants is found in Illinois.

Special Confidential Report to Executives

Investigate the production advantages you will gain by locating your new plant or branch plant in Illinois. Write the Illinois Development Council, at Springfield, today for a special report containing detailed information on production and distribution facilities available to the Metal-Working Industries in Illinois.

Please list any special or unusual requirements in labor, raw materials, plant facilities, transportation, or any other factor in profitable plant operation in order that a truly practical and informative report may be submitted for your consideration. Your inquiry will, of course, be kept confidential. Write—

ILLINOIS DEVELOPMENT COUNCIL, STATE HOUSE, SPRINGFIELD, ILLINOIS

ILLINOIS

THE STATE OF BALANCED ADVANTAGES

material to perfectly suit the requirements found in marking metals at comparatively low temperatures while at the same time being suitable for the extremely high temperatures.

This is so, obviously, since any material so used must necessarily "fuse" in the writing or transferring process. Secondly, a material compounded to fuse at 150 degrees Fahr., for instance, will be practically liquified or volatilized when subjected to temperatures in excess of 1000 degrees Fahr., with resultant material waste.

It would, of course, be a relatively simple matter to compound a material which would be perfectly satisfactory within a limited temperature range. This procedure, however, would necessitate too great a variety of marking materials—the ascertaining of approximate temperature before the right marking medium could be selected—and so on.

These obstacles have finally been overcome. Now one type answers all requirements on metals of temperatures from approximately 150 to 900 degrees Fahr., while an additional type performs similarly on metals at temperatures from approximately 350 to 1400 degrees Fahr. Neither of these products will flash or discolor at temperatures within their prescribed ranges, and both are available in six colors, as well as in aluminum.

To illustrate the necessity for the wide temperature range of both types, hot strip may be marked on the coiler. This same strip, if marked *after* being removed from the coiler will be considerably cooler. If allowed to stand in the coil for an hour or so before marking, the resultant temperature will be at least several hundred degrees lower than in the first instance.

Some steel manufacturers who move their coils in open cars and thus expose them to the elements, want the identification marks to remain on the steel throughout the pickling process and during the period when coils are subjected to the weather. Others want these marks *removed* in the pickling process, claiming that if they are not placed far enough down on the "tag end" of the strip, there is danger of their being rolled into the surface of the steel during the cold reduction process.

To meet both these needs, a further division of the above types was obviously necessary, and the final answers were found in *four* different materials instead of two.

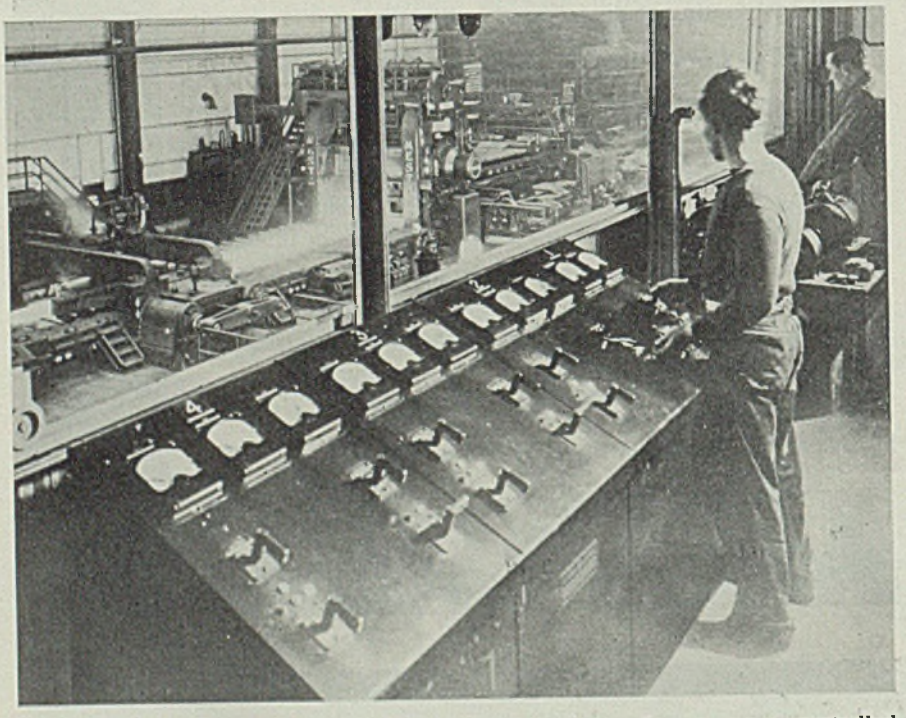
New Company Engages In Tool Engineering

■ Tuff-Hard Corp. has been organized to specialize in tool engineering, with plant and headquarters at 705 Piquette avenue, Detroit. Fred Johnson is president; Fred A. Endress, vice president and manager; D. G. Ong, secretary and treasurer; and John L. King, sales manager. Mr. Johnson also is president of Progressive Welder Co., Detroit.

The company owns the Tuff-Hard process for treating tool steels. This was developed by Mr. Endress and has a dual effect, imparting toughness as well as hardness. Range of transverse strengths is 525,000 to 625,000 pounds per square inch. Rockwell C scale values range from 65 to 69.

Steels are available in nine types for all cutting operations. They are said to stand up well, particularly in hot and cold punches and in tools that cannot be backed up, as thin saws, tool bits for interrupted cuts, cutoff tools for screw machines.

Nerve Center of Hot Strip Mill



■ Operator's pulpit where tremendous concentrations of power are controlled by a twist of the wrist. Modern semiflush instruments give constant and accurate indication of the load and speed of 10 large driving motors totaling more than 30,000 horsepower

Burning Temperature Of Neopake Reduced

■ Neopake, the white porcelain enamel cover coat for refrigerators, now can be fused at the same temperature as antimony-bearing porcelain enamels, according to Porcelain Enamel & Mfg. Co., Eastern and Pemco avenues, Baltimore. The burning temperature of antimony-free porcelain enamels prior to this was 1540 to 1550 degrees. Neopake now fuses at 1480 to 1500 degrees.

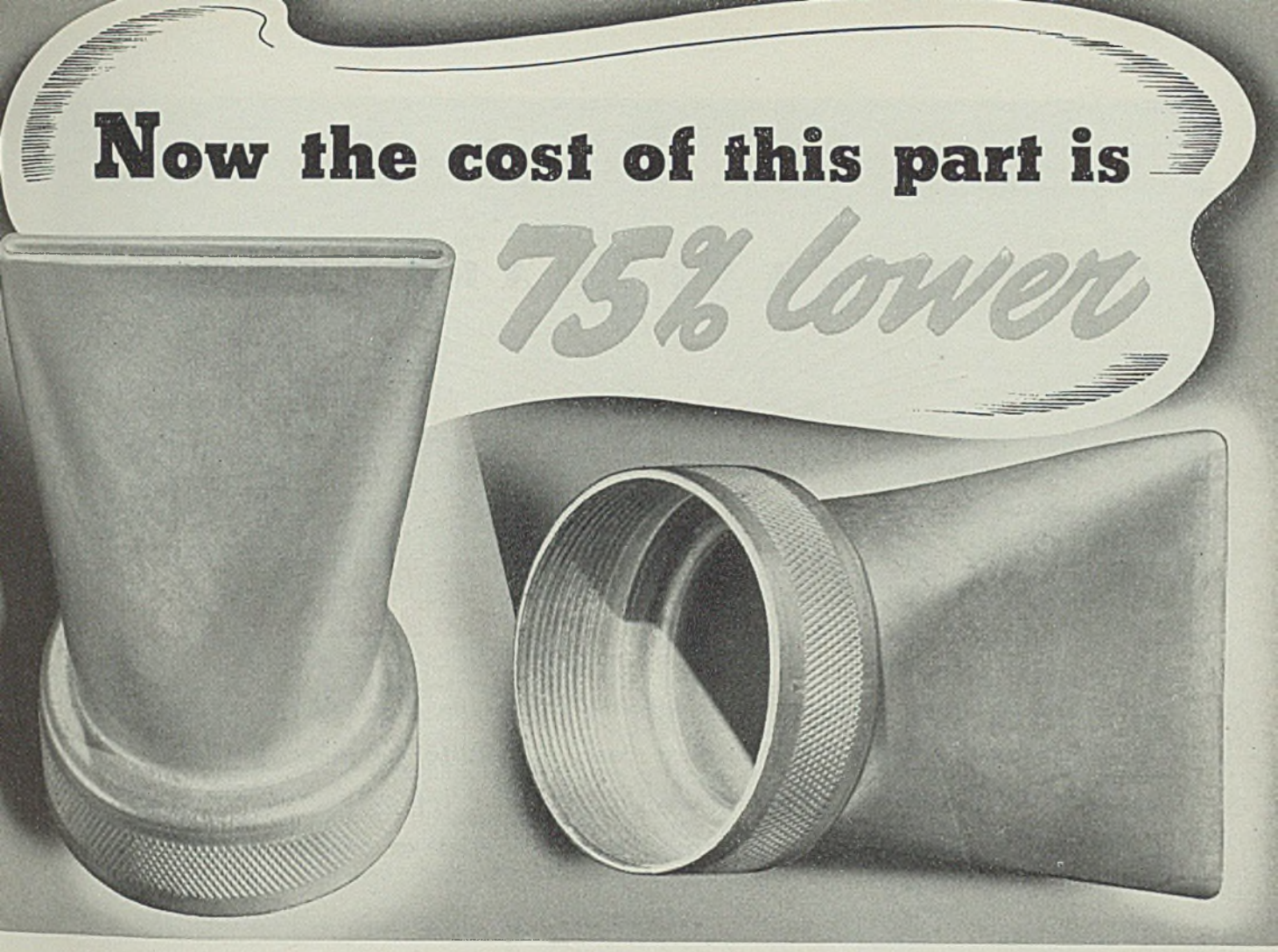
The company's research staff first reduced accepted burning temperatures for ground coats in the porcelain enameling industry during World War I. This latest reduction is reported to result in lower fuel costs, less warped ware, faster production and a more uniform and lower cost finish per unit.

The reduction in cover coat burning temperatures of 22 years ago resulted from research made necessary by the exigencies of the World War. This latest reduction has been made possible through intensive research because of the demand for antimony, created by national defense needs.

Introduces Electrodes For Welding Aluminum

■ Universal Power Corp., 4300 Euclid avenue, Cleveland, announces Luminarc 2S, a new electrode suitable for arc welding on 2S aluminum where the deposit and parent metal are to be anodized, and where a good color match of weld and base metal when anodized is desired. This electrode is especially useful to makers of ornamental aluminum welded products.

Now the cost of this part is 75% lower



Have you ever investigated the possibilities that Republic ELECTRUNITE Tubing presents for reduction in cost or improvement in quality? If not, you may be overlooking a real opportunity.

Take the case of a caulking gun manufacturer. Formerly, he produced the nozzle of the gun by taking a short piece of tube, flattening it and brazing one end of it to a threaded collar.

Now he takes a piece of 1¾" O. D. x 16 gauge ELECTRUNITE Tubing and forms the nozzle in two press operations. One press movement forms the knurled shoulder end by drawing the tubing from 1¾" O. D. to 2¼" O. D. Another press movement flattens the nozzle end over an inside die. The knurled shoulder then is threaded and the part is ready for plating. The total cost now is approximately 75% less than the cost of the old method.

Republic ELECTRUNITE Tubing is highly ductile and easy to fabricate. Because of its consistent uniformity in diameter, wall thickness, concentricity and hardness, it assures perfectly-formed finished tubular parts. And its fine scale-free surface permits the application of paper-thin coatings of glass-like smoothness.

How much can you save by using Republic ELECTRUNITE Tubing? That depends entirely upon the nature of your product and its component parts. But Steel and Tubes engineers, with their wide experience accumulated in the production and assistance in application of more than a billion feet of tubing, are ready to give you an intelligent answer promptly. Write Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio —*world's largest manufacturer of steel and ferrous alloy electric resistance welded tubing.*

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ELECTRIC RESISTANCE WELDED TUBING

DRYING AND BAKING WITH Radiant ENERGY

Radiant ovens using incandescent lamps as the energy source feature exceptionally low first cost, eliminate warm-up periods, operate at high efficiencies, afford positive temperature control, easily changed to accommodate new models or type of work

Part II

■ *Part I last week explained basic factors essential to most profitable use of either incandescent lamps or gas radiants as the energy source. Part II here details application of incandescent-lamp radiant-energy ovens. Part III next week will cover use of gas radiants as the energy source.*

■ USE of incandescent lamps for radiant energy baking and drying has advanced greatly with the advent of the special infra-red or near infra-red type lamp—several of which are illustrated in Fig. 5 and now are available in 250, 500 and 1000-watt sizes. The 250-watt tungsten-filament lamp is available in the regular clear bulb and also in a bulb with an inside aluminum reflecting surface as shown second from the left, Fig. 5.

Incandescent lamp applications must strike an economical balance between lamp renewal cost and faster or better drying results obtainable with higher color temperatures. While higher color temperatures generally give best results, they also produce shorter lamp life. For most applications, a tungsten filament drying lamp with a color temperature of 2500 degrees Kelvin gives a good balance between the various factors involved and has a service life from 10,000 to 20,000 hours. A small number of applications, however, show slightly better results with lower color temperature, especially in such work as curing white enamels. However, the difference is so slight that going to a lower color temperature cannot be justified in view of the lower overall efficiency that ensues.

Outstanding advantages of incandescent lamp type radiant energy ovens are briefly: Low initial cost; no warm-up, as they start at the flick of a switch; immediate and positive control of temperature; utmost flexibility, as the reflecting surfaces can easily be rearranged to suit new work—also the lamps may be moved to the work if it is more convenient than moving the work to the lamps.

To make a radiant energy drying or baking oven using incandescent lamps it is only necessary to arrange a rack to hold the lamp sockets and reflectors. This rack may be left open or enclosed. Thus the initial cost for such radiant energy equipment is extremely low. In fact, it may be only a fraction of that usually expended for a conventional oven for handling similar operations.

As the reflectors and other parts of the equipment absorb little heat, the maximum temperature is obtained almost instantly, thus completely eliminating warm-up periods and permitting work to be started and stopped intermittently as production rates may require. This low heat storage also permits changing the temperature produced quickly using ordinary

A correlated abstract prepared largely from material in papers by Howard Haynes, Nela Park engineering department, General Electric Co., Cleveland; H. J. Bennett, Glidden Co., Cleveland; D. J. Stedtefeld, chief chemist, Clinton Co., Chicago; D. A. Jacobson, field engineer, Burdett Mfg. Co., Chicago; Hale A. Clark, Michigan Consolidated Gas Co., Detroit; F. O. Hess, president, Selas Co., Philadelphia; Infra-Red-Ray Heating Clinic of American Gas association's industrial gas conference at Toledo, O.

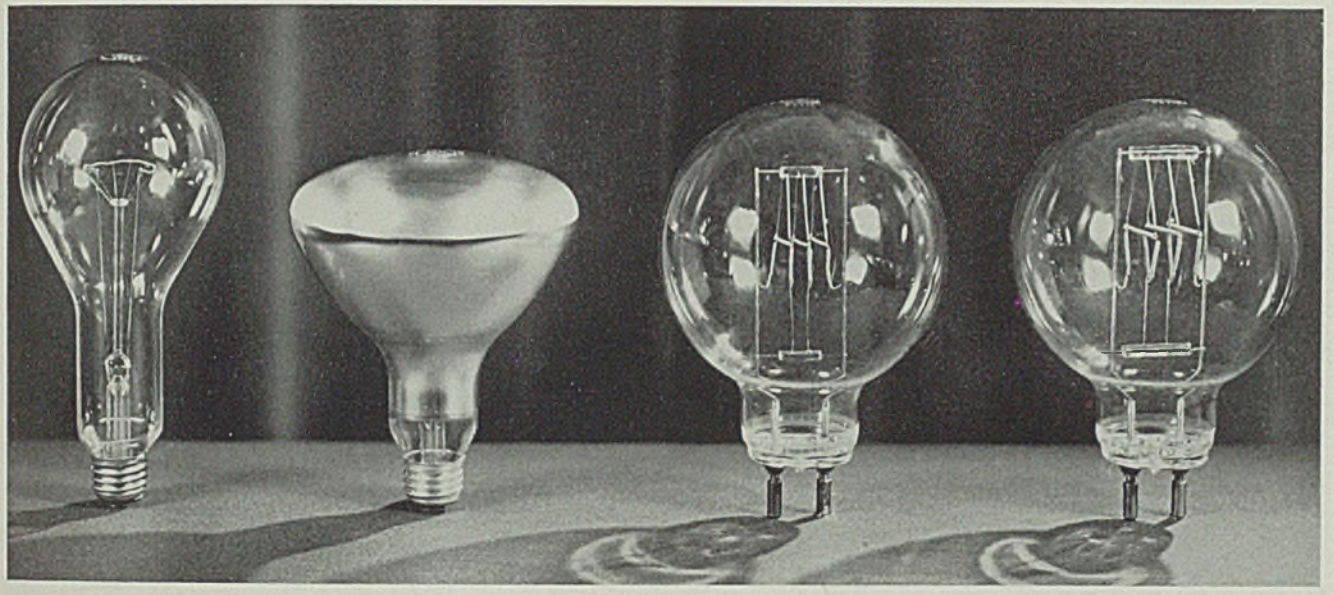


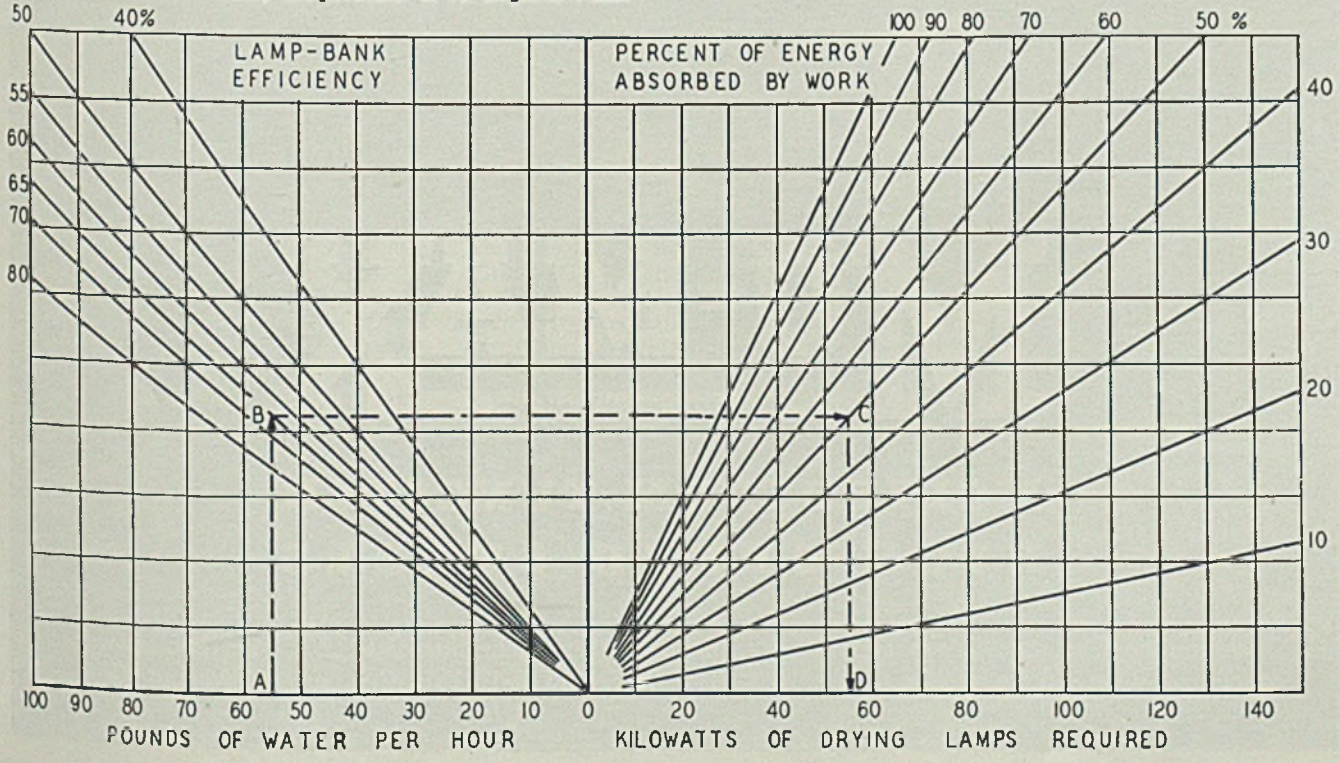
Fig. 5—Infra-red and near infra-red lamp sources for radiant energy ovens

thermostatic control equipment to switch on or off the lamps in various combinations.

Since so little structural work is required for a setup of this type, it is extremely flexible and can be rearranged to accommodate changing production rates, different types of work and various other production requirements. In addition, the light mass of the equipment permits portable setups to be built which can be taken to repair jobs where they permit extremely fast drying.

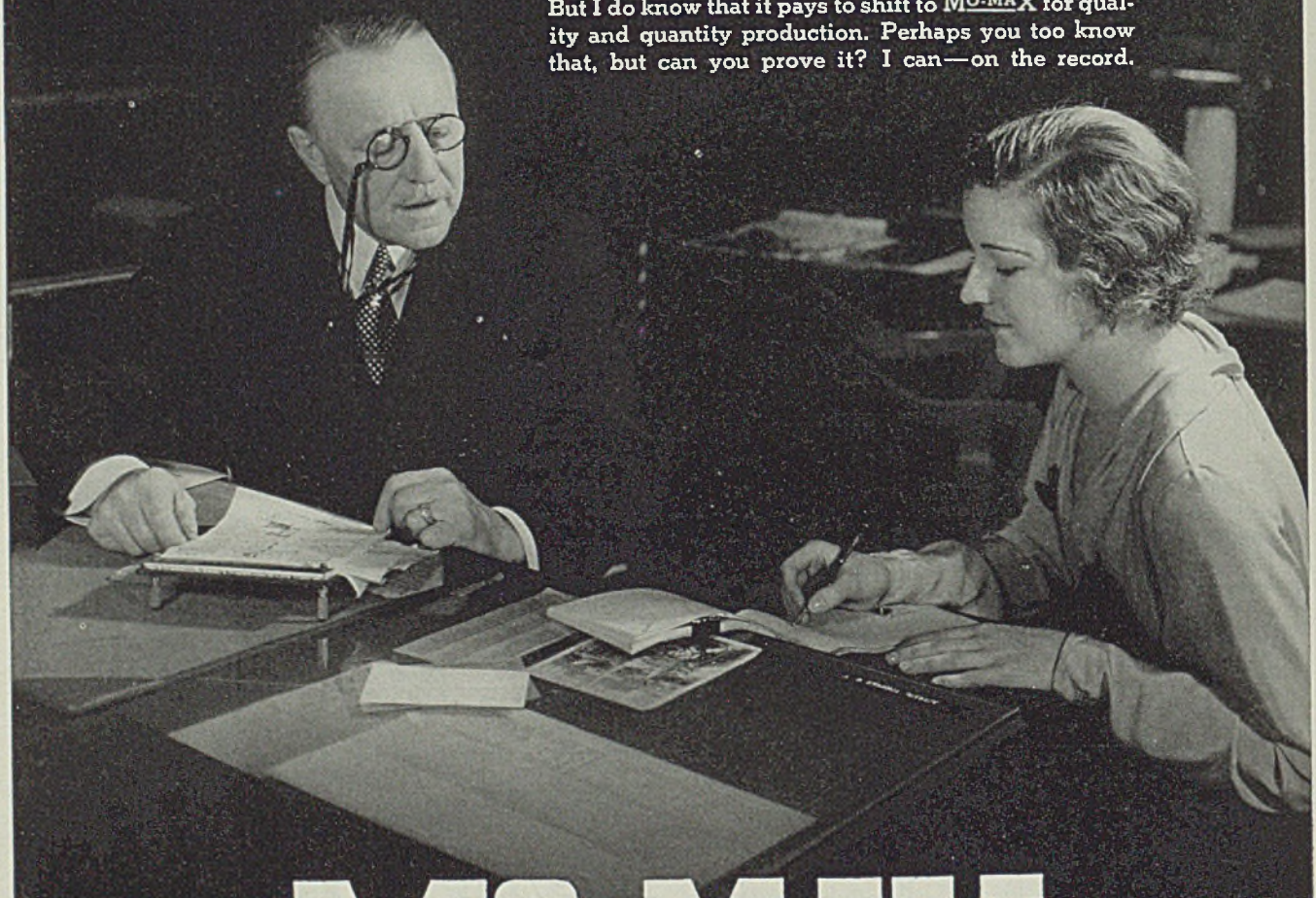
Of the several designs of drying lamp ovens now in successful use, perhaps one of the most popular is the cylindrical tunnel. Fig. 10 shows a typical "tunnel" in which drying lamps are being used to bake black synthetic enamel on sheet steel parts as they rest on a conveyor passing down the tunnel. This installation employs 216 lamps of the 250-watt type and drying time is 6 minutes. One large Dayton, O., manufacturer of metal pieces now has two such tunnels for drying high-bake synthetic enamel. Inside diameter of these tunnels is 42 inches, and overall lengths are 20 and 80 feet with 336 and 1344 250-watt lamps respectively in gold plated reflectors. A temperature of over 400 degrees Fahr. is attained upon the work and the finish is baked in 6½ minutes. This high temperature is accounted for mainly by

Fig. 6.—To determine approximate kilowatts for water heating and evaporating: Start with given weight of water (for example, 55 pounds per hour at A); proceed clockwise to the lamp bank efficiency (for example, 65 per cent, at B); to absorption per cent (for example, 50 per cent, at C); then to final answer D, or 55 kilowatts in this case. This chart is based on an initial water temperature of 70 degrees Fahr.



MO-MAX makes high speed tools average twenty per cent higher in efficiency, and you may quote me.

I KNOW from our own experience. No matter what other brands of high speed steel you are now using, I recommend that you try corresponding tools made of MO-MAX. They will average twenty per cent higher in efficiency. I've talked to other manufacturers with jobs similar to ours, and their experience is identical with our own. My investigations subjected me to some embarrassment when I was asked why it had taken me six years to investigate. That's off the record. But I do know that it pays to shift to MO-MAX for quality and quantity production. Perhaps you too know that, but can you prove it? I can—on the record.



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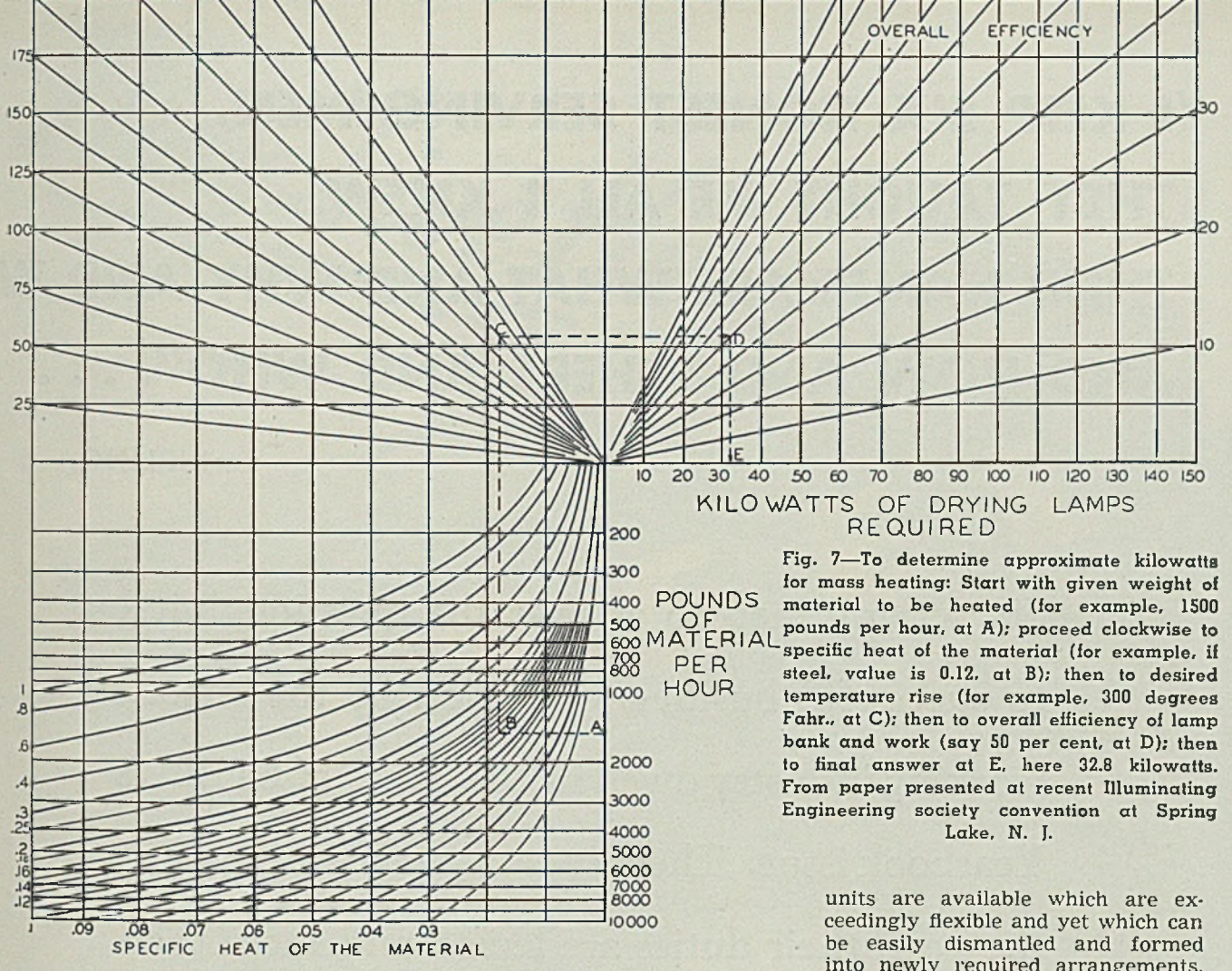

Fig. 7—To determine approximate kilowatts for mass heating: Start with given weight of material to be heated (for example, 1500 pounds per hour, at A); proceed clockwise to specific heat of the material (for example, if steel, value is 0.12, at B); then to desired temperature rise (for example, 300 degrees Fahr., at C); then to overall efficiency of lamp bank and work (say 50 per cent, at D); then to final answer at E, here 32.8 kilowatts. From paper presented at recent Illuminating Engineering society convention at Spring Lake, N. J.

the design of the oven as the cylindrical shape allows the energy from more reflectors to be directed on the work, thus giving a higher concentration of radiant energy. At present, drying lamp tunnels are being used for drying finishes on automobile bodies, wheels and other parts. Other industries also are using them widely.

Flat banks of drying units can be mounted to advantage over flat work such as steel panels, and flat parts like ash trays can be baked best by radiant energy under such flat banks of units. One bank of 90 units with 250-watt lamps is now being used to dry a synthetic lacquer on large flat pieces in 40 seconds. Sometimes a bank of units can be placed on each side of the work to cut both time and space required.

A third method of applying drying lamps, emphasizing their flexibility, is to mount them in portable racks which are moved to the work. This is a particular advantage where pieces are large and clumsy or where only a portion of the work is to be heated, as for example touch-up work on automobile bodies.

Typical of what can be done is one large installation where a high-bake synthetic enamel requiring 1½ hours in an oven at 300 degrees Fahr. now is baked under 2.8 watts per square inch of radiant energy from 250-watt drying lamps in 6 minutes. In another installation where green medium-bake synthetic enamel required ½-hour in an oven at 250 degrees Fahr., the drying time under 250-watt drying lamps has been reduced to 5 minutes.

Such heat ray lamp assemblies utilize standard sockets mounted on a metal frame. Reflectors, however, are more important. They should have highly polished surfaces and be of a material that resists corrosion from gases and from the heat developed. Many reflectors now used are gold plated as this material affords the most efficient reflection of the radiant energy. Others are polished aluminum.

Some reflectors are parabolic and others spherical in shape. The parabola provides the necessary concentration when the work is carried through the heat zone on a conveyor. Spherical reflectors redirect a larger percentage of the radiant energy for the given diameter, it is claimed. Modified parabolic reflectors can be deeper for a given diameter and if proper advantage is taken of cross reflections, an exceedingly uniform distribution of energy can be obtained on the work. In practice, the lamps with their reflectors are mounted in banks either arranged in parallel rows or in staggered form with the lamp reflectors edge to edge. Portable units are available which are exceedingly flexible and yet which can be easily dismantled and formed into newly required arrangements.

An important factor is to watch that escaping volatiles do not fog the reflectors. Any film deposit must be removed carefully to avoid damaging the highly polished surface of the reflectors. All abrasive cleaners must be avoided as these will produce minute scratches resulting in lowered efficiency.

A new type "sealed" drying lamp unit using the 500 and 1000-watt lamps has recently been announced. Its use may prove valuable as an aid in handling the fog problem. This unit has a cover glass which absorbs a considerable portion of the light output and yet transmits most of the infra-red energy. This unit can be cleaned easily simply by wiping off the cover glass. Also there is less possibility of a lamp being broken, thus exposing a hot filament to any fumes that might be present. Accurate control of the energy is possible by proper shaping of the reflector and configuration of the cover glass. Too, these elements combine to form less glare.

Design of drying lamp installations: Size and cost of an installation can be determined by comparison with existing installations, by calculation or by experiment. Because so few installations duplicate conditions exactly, any information gained from an existing installation should be backed up with experiments under actual plant conditions. While calculations are useful in de-

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THEY TAUGHT ME ALL I KNEW.
THEIR NAMES ARE WHAT AND WHY AND WHE
AND HOW AND WHERE AND WHO"....

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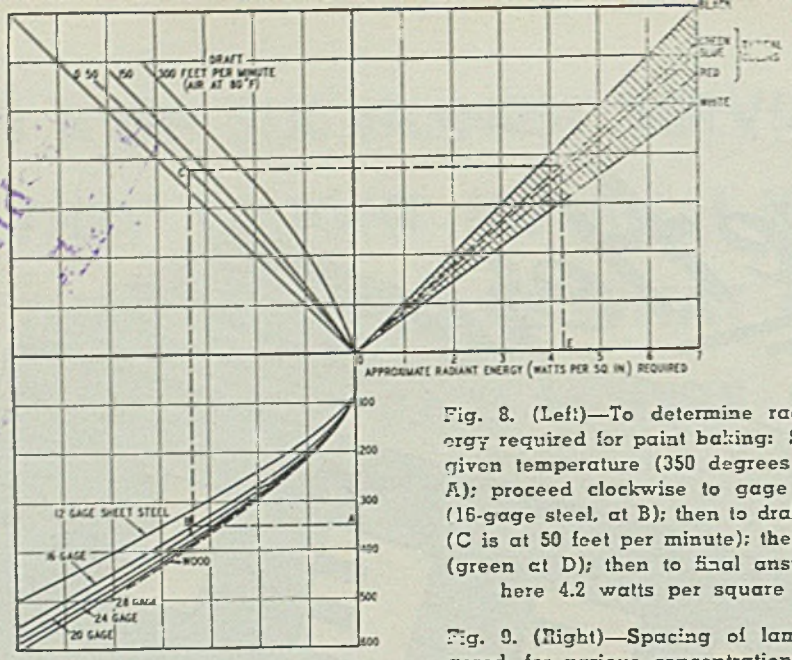


Fig. 8. (Left)—To determine radiant energy required for paint baking: Start with given temperature (350 degrees Fahr., at A); proceed clockwise to gage of metal (16-gage steel, at B); then to draft at work (C is at 50 feet per minute); then to color (green at D); then to final answer at E, here 4.2 watts per square inch

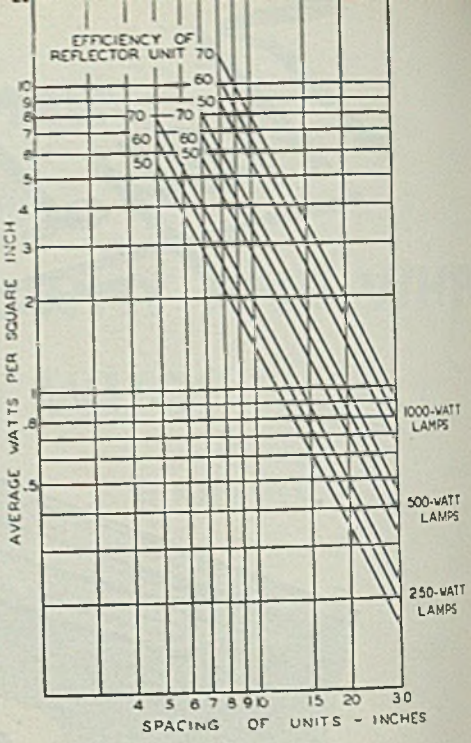


Fig. 9. (Right)—Spacing of lamps, staggered, for various concentrations of radiant energy

termining the general practicability of a proposed application, these too should be followed up by actual tests.

Testing is the best way to determine requirements. When flat work is being tested, it is satisfactory to use a small flat bank of drying lamps and reflectors. The smallest recommended bank is seven of the proposed units, six mounted in the form of a hexagon with the seventh located in the center.

Work carried on under the center unit will receive approximately the same concentration of energy as will be obtained from a large flat bank of those units mounted on the same centers.

When the work has three dimensions, it becomes necessary to construct a small section of the proposed tunnel, large enough to cover the work completely. Knowing the time required and rate of production, it then becomes easy to compute the required length of tunnel.

Tunnels, since they afford the highest concentration of energy, are possibly the most widely used. However, in designing a tunnel the possibility of paint dripping on bottom lamps and reflectors must be considered as well as the fact that vaporized paint may condense and bake on the fixtures directly above the work, thus cutting their efficiency. Also, remember to provide means of cleaning the reflectors, preferably by hinging sections of the tunnel so they can be swung open to give complete access to lamps and reflectors. Much ingenuity can be used in designing a shape to best suit the product. Where several sizes or types of articles must be treated, however, successful results have been obtained with one tunnel with enough adjustments and special conveyor holders or "trees" to adapt it to all the work.

Some tunnels are like inverted U's in cro[illegible] while others consist of two flat banks of lamps facing each other. If even distribution of the energy on the work can be realized with the latter type, it is probably most desirable, especially from the standpoint of low cost and ease of maintenance.

Water Evaporation: In water and solvent evaporating applications, the primary purpose of the drying lamp is to supply a sufficient number of heat units to bring the liquid up to the vaporization point and then supply the necessary heat of vaporization. While 1 B.t.u. will raise a pound of water 1 degree Fahr., 970 B.t.u.'s are required to change the pound of water at 212 degrees Fahr. to vapor at the same temperature. Calculations for this type require that the pounds per

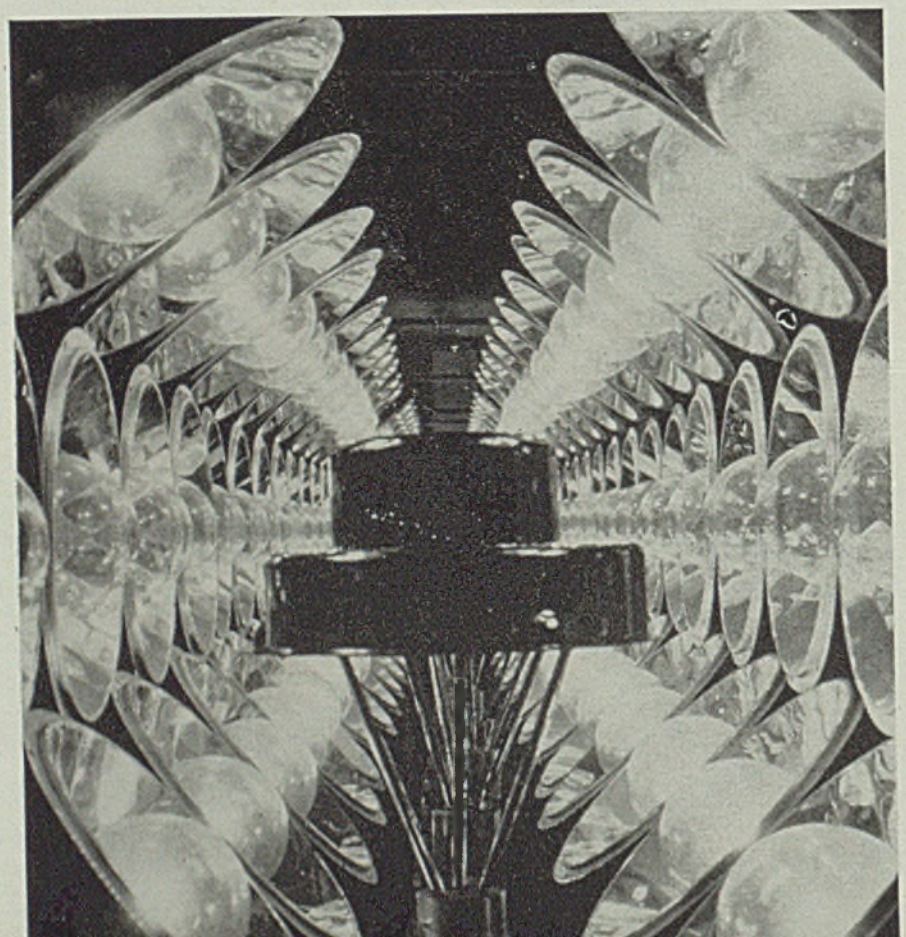


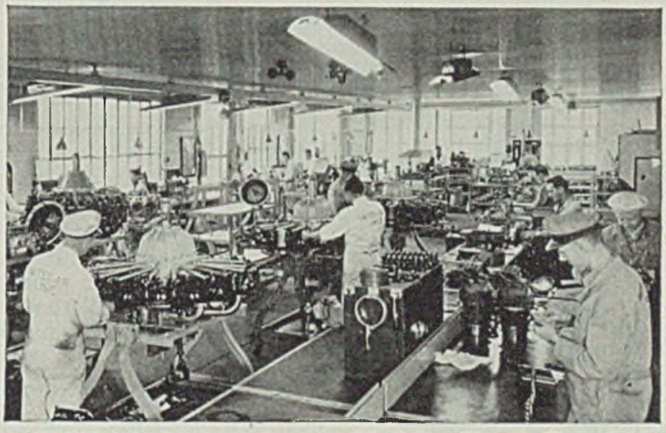
Fig. 10—Drying lamps for baking black synthetic enamel on sheet steel parts. Here two hundred and sixteen 250-watt lamps dry the work in 6 minutes

THE LIGHT THAT DIES

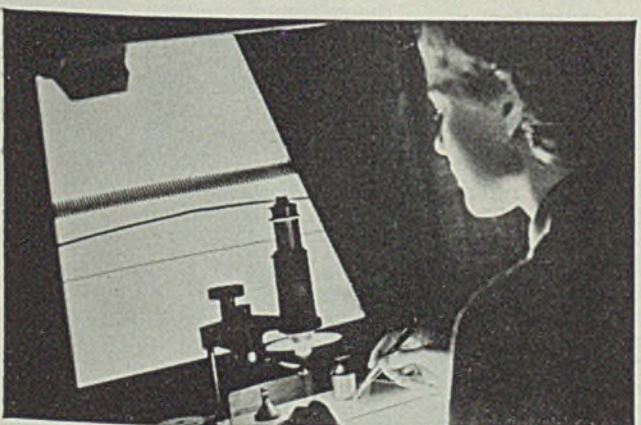
to save a Miner's Life!

1 **HALF A MILE UNDERGROUND,** the tiny filament in a miner's headlamp flickers and burns out. Time was when this might have spelled disaster. But now the bulb in his lamp has *two* filaments, one designed to "die" before the other, as a signal that the bulb should be replaced.

2 **THIS NEW MINER'S LAMP BULB** is one of many recent developments from the General Electric lighting laboratories at Nela Park, Cleveland. In addition General Electric makes more than 9000 different types and sizes of lamps that have helped make the G-E monogram a household word for research.



3 **PRECISION WORK** requires good lighting. Here in United Air Lines' overhaul and repair depot in Cheyenne, G-E Cooper Hewitt mercury vapor lighting provides day and night shifts with the right kind and amount of light. Ask your G-E lamp man or your electric company about this type of illumination.



4 **SO TINY ARE THE FILAMENTS** in G-E MAZDA lamp bulbs that they are magnified 60 times for final inspection. An inspection so rigid that 25,000,000 filaments are rejected a year to maintain the high standard of G-E MAZDA lamp quality. Be sure to buy G-E MAZDA lamps. They give more light for the same current, every year.

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Whether you run a coal mine, a machine shop, or an office, General Electric makes lamps to fit your lighting needs. Because G-E makes all kinds of lamps, you can be sure of an unbiased lighting recommendation. Find out how economically better lighting can help increase your production. Ask your General Electric lamp man or write General Electric Company, Dept. 166-S-K, Nela Park, Cleveland, Ohio.

The president's office of the Binkley Coal Company in Chicago is well lighted with a 1000-watt G-E Silvered Bowl MAZDA lamp in a special silvered bowl lamp fixture. Illumination on the desk is approximately 25 footcandles.

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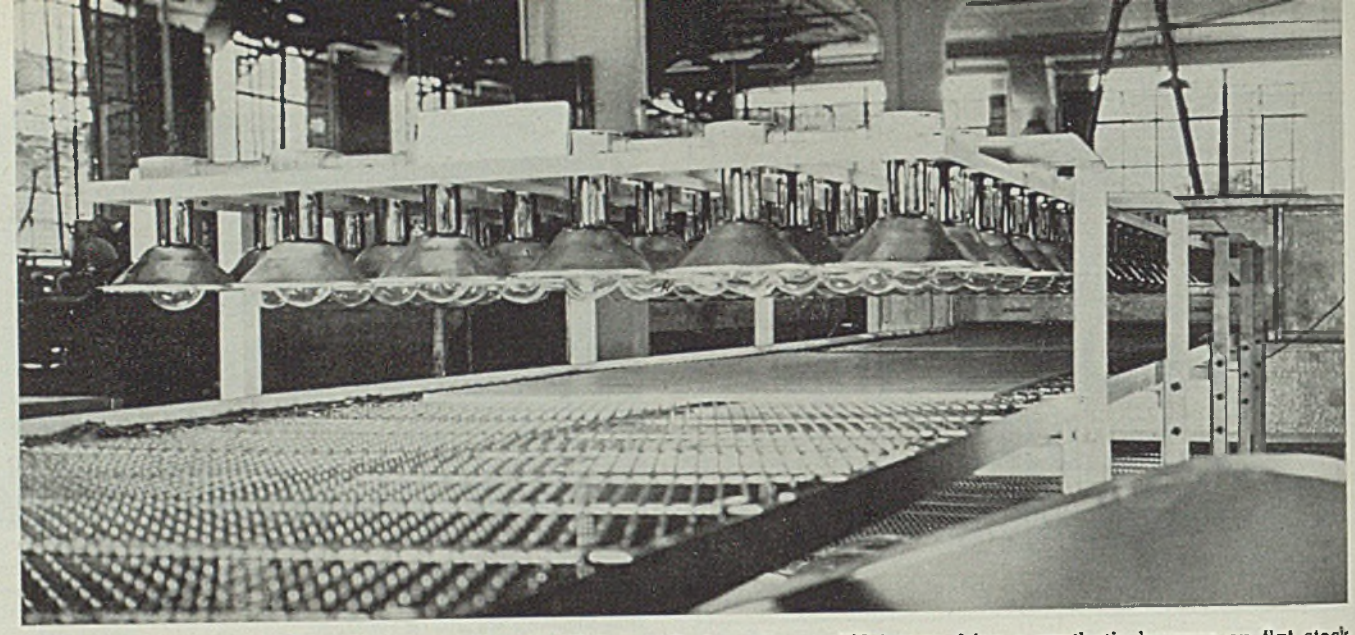

Fig. 11—This installation of some 100 lamps dries a synthetic lacquer on flat stock in a minute and a half

hour of water or other solvent and the initial temperature be known. From these it is possible to figure the B.t.u.'s per hour required. After correcting this figure to account for efficiency of the lamp bank, absorption factor of the work, etc., the kilowatts per hour can be found by dividing the number of B.t.u.'s by 3413.

Fig. 6 can be used for estimating the number of kilowatts required for a given job of water evaporation. For example, 55 pounds of water per hour requires starting to the left of the center at the 55-pound line, moving vertically to the efficiency of the lamp bank, assumed to be 65 per cent, and then to the right horizontally. Depending upon the absorption of the work, the kilowatts required can be read directly from the right-hand section of this chart. For 50 per cent absorption, 55 kilowatts of drying lamps would be required.

Mass Heating: The above does not include heating to the vaporization point the material which holds the water—paint, enamel, lacquer, and the like involve other solvents than water but the principle is the same. The kilowatts required to do this must be added to the above calculated value. The chart, Fig. 7, may be of value in this work. This same chart also may be used to determine the kilowatts required for "mass heating" applications where considerable weight of metal must be raised to the vaporization point. Of course the correct specific heat value for the material at hand must be used.

These charts assume that all energy arriving at the working plane strikes the work. If there are gaps between the work or holes in the pieces through which energy can be lost, the final efficiency figure must be decreased by the appropriate percentage.

It is interesting to note that incandescent-lamp radiant-energy ovens need no insulation—the energy is directed at the paint film in which it is absorbed and turned into sensible heat.

In designing a drying lamp tunnel, wattage and spacing of lamps, length and cross section of tunnel must be considered. The cross section of the tunnel is determined by the shape and size of the largest object it is desired to heat. Distance from the reflector and lamp units to the work should be from 6 to 18 inches, depending upon the units and the requirements of uniformity of radiant energy distribution.

Wattage and spacing of lamps are determined directly by the watts per square inch concentration required for the job and by the efficiency of the reflecting unit. Fig. 8 shows the method of estimating the watts per square inch, or this value can be found by experiment.

Spacing of the units required to attain this concentration of radiant energy is shown in Fig. 9. These data are for staggered arrangement of units. When lamps or reflectors are mounted in a square pattern, the concentration of energy will be approximately 87 per cent of that obtained with the staggered arrangement.

Remember that if a thin steel panel is placed between two banks directing, say, 1.5 watts per square inch of energy on each side, then the effective concentration on the steel is 3 watts per square inch. When the reflectors are spaced on converging axes, the concentration of energy as estimated from Fig. 9 should be modified by the ratio of the area covered by the radiant energy and the area of the face of the reflector banks. This is extremely important.

Length of the tunnel required for any given job is a function of the time required for drying and of the production rate in feet per minute. Multiplying the minutes required to bake or dry the finish to the necessary degree by the conveyor speed in feet per minute will give the length of the tunnel in feet.

Note that drafts in the drying lamp tunnel will decrease the temperature attained, necessitating a higher concentration of energy. While some ventilation is necessary, excessive drafts waste heat. Air flow should be only that necessary to keep the volatiles down to a low percentage. Sheet steel or aluminum commonly is placed back of the reflectors to prevent strong convection currents. In all instances the reflectors are mounted as closely together as possible. Where reflectors are mounted on greater centers than their diameter, it is advisable to close the openings with sheet aluminum to cut down radiation losses which otherwise would represent an energy loss through the openings.

Paint or water, of course, should not be allowed to drop on lamps. Also it is well to locate the tunnel a short distance from the spray booth. This not only increases safety but allows the finish some time for evaporation of the thinner, thus decreasing the drying load and permitting use of a smaller tunnel. On the other hand, when time is all important it may be possible to accelerate the evaporation of thinner, in this case using the "sealed" lamps.

In any radiant-energy oven, it is desirable to take into account all the factors which make for increased efficiency in use of the radiation. For example, the major part of the solvent in a paint film would evaporate spontaneously in a few moments, so there is little to be gained by applying the radia-

(*Please turn to Page* 93)

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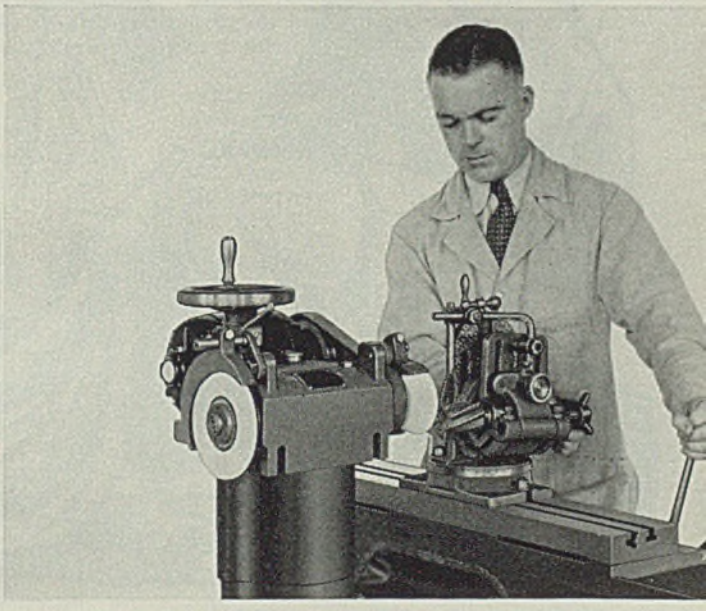
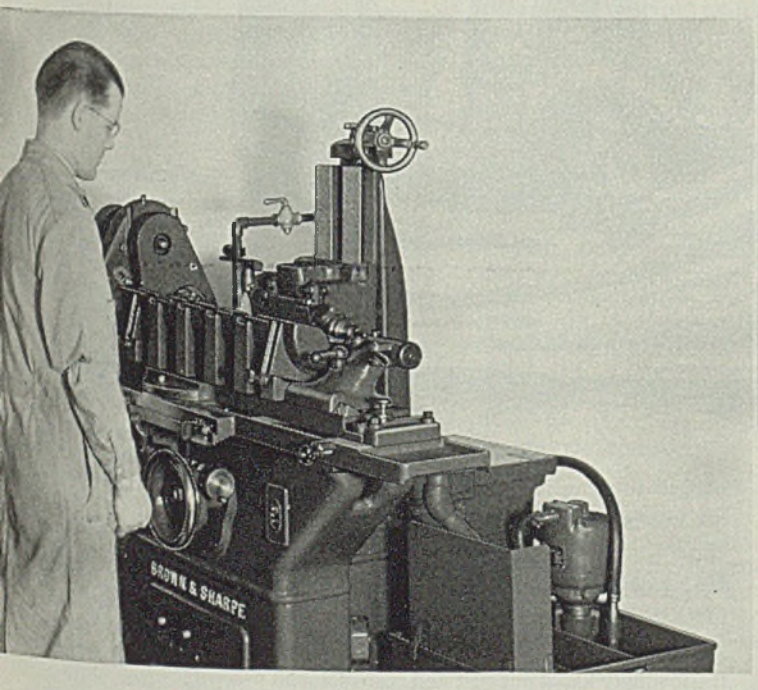
- No. 10 Cutter & Tool Grinding Machine - - to improve the production of your milling departments by keeping cutters in efficient cutting condition.

- No. 13 Universal & Tool Grinding Machine - - for general purpose toolroom grinding, sharpening cutters, reamers and other cutting tools — and for small cylindrical work.

At right — Sensitive, easily operated controls and convenient adjustments of the No. 10 simplify accurate cutter and tool sharpening.





Above — A wide selection of additional equipment, such as the Wet Grinding Attachment shown, adapts the No. 13 to practically every type of toolroom grinding operation.

Simplicity of design – ease of set-up an operation – wide versatility – long-live accuracy . . . features which mea reduced costs and fast and accurat output – all are found on both thes money-saving machines. Ask fo literature which includes complet description of the many availabl attachments. Brown & Sharpe Mfg. Co Providence, R. I., U. S. A.

B·S

BROWN & SHARPE

Activities of Steel Users, Makers

■ TRIANGLE STEEL CORP., Los Angeles, has been appointed agent by Henry Disston & Sons Inc., Philadelphia, to handle sales of Disston tool steels in southern California, Arizona and Nevada. This corporation has taken over the steel stocks formerly carried by the California Steel Treating Co., (Tool Steels Inc.) which will now devote its entire time to heat treating. Dwight F. Metcalfe, formerly with E. F. Houghton & Co., will supervise the tool steel division of the Triangle corporation.

♦

Welding Equipment & Supply Co., Detroit, has moved its offices and plant to 223 Leib street.

♦

Wilbur Henry Adams, industrial designer, has moved his office from 2014 East 105th street, Cleveland, to R. D. No. 1, Erie, Pa.

♦

Square D Co., Milwaukee, has moved its offices and factory to new quarters at 4041 North Richards street.

♦

Exclusive rights for the manufacture and distribution of Oman self-lubricating metal have been acquired by the Kitson Co., Philadelphia.

♦

Bendix-Westinghouse Automotive Air Brake Co. has concluded negotiations which will result, shortly, in the removal of the organization's general office and factory from Pittsburgh to Elyria, O.

♦

Industrial Gas Engineering Co., 5700 Greene street, Philadelphia, has been formed to offer a service in engineering, designing and building of plants for technical and industrial gases.

♦

Cutler-Hammer Inc., Milwaukee, has established a new factory, warehouse and sales office at 711 Potrero avenue, San Francisco. F. H. Oberschmidt, manager of the San Francisco office, also supervises the Seattle and Portland, Oreg., sales offices.

♦

DeVilbiss Co., Toledo, O., manufacturer of spraying equipment, spray guns and spray hoods, is completing a building at 1278 West Washington boulevard, Chicago. The 1-story structure, designed by Mayo & Mayo, will be used for display purposes. It is modern in design, with silver and blue front.

♦

Westinghouse Electric & Mfg. Co., steam division works at Lester, Pa., will expand facilities at a cost of over $9,500,000, to assure on-time delivery of turbines for 45 fighting ships of the United States navy. "Recent contracts which total over $64,500,000 have established a new record backlog of orders for our plant," R. A. McCarty, manager, said.

♦

Arens Controls Inc., Chicago, maker of remote controls, is undertaking an expansion program which will more than double present production. Present plant will be enlarged from 3500 square feet to 10,000, and new machinery will be installed. The engineering department also will be enlarged.

♦

Martin Electric Co., Detroit, manufacturer of resistance welding transformers, is completing an addition to its new plant on East Outer drive, which will double the manufacturing floor space and will add more than 100 per cent to production capacity.

♦

Kropp Forge Co., Chicago, recently completed a 4000 square foot addition to its plant, which will house a new 14,000-pound steam hammer, two double-door billet heating furnaces and a 400-horsepower boiler unit to supply steam for the hammer. This is the fourth major plant addition the company has made since 1937.

♦

With the discontinuance of the mill supply department of National Supply Co., Toledo, O., many years agent for Geometric Tool Co., New Haven, Conn., the sale of Geometric threading tools and machines in northwestern Ohio has been taken over by the Detroit office of the Geometric company.

♦

Otto Konigslow Mfg. Co., Cleveland, manufacturer of sheet metal stampings, and automobile parts, has been purchased by Chester A. Thompson, who will operate the business as an individual under the company name. Rodney C. Murphy will assist Mr. Thompson, and Otto Konigslow and M. E. Konigslow will continue with the company.

♦

Raybestos-Manhattan Inc., Passaic, N. J., has purchased the Brighton mills plant adjacent to the main plant of the Manhattan Rubber Mfg. division at Passaic. Property includes approximately five and one-half acres on which are buildings with 240,000 square feet of floor space.

♦

United States Steel Corp. awarded medals to 77 employes of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., during the third quarter of 1940 in recognition of long service, it was announced last week by Robert Gregg, president of the Tennessee company. One received a 45-year award; two 40-year medals; twelve 35-year medals; thirty-one 30-year medals and thirty-one 25-year medals.

♦

To cope with the demands of national defense, American Magnesium Corp., New York, has under way a plant expansion program which will triple its fabricated magnesium output. Most of the company's plants are operating on a three-shift-a-day, full capacity basis, and others are being placed on that basis as soon as personnel can be trained.

♦

Worthington Pump & Machinery Corp., Harrison, N. J., has completed research and design standards for hot process water softeners and pressure filters for all capacities. Worthington's chemical and other technical departments, as well as its manufacturing facilities, have been supplemented to accommodate the requirements of water purification service.

♦

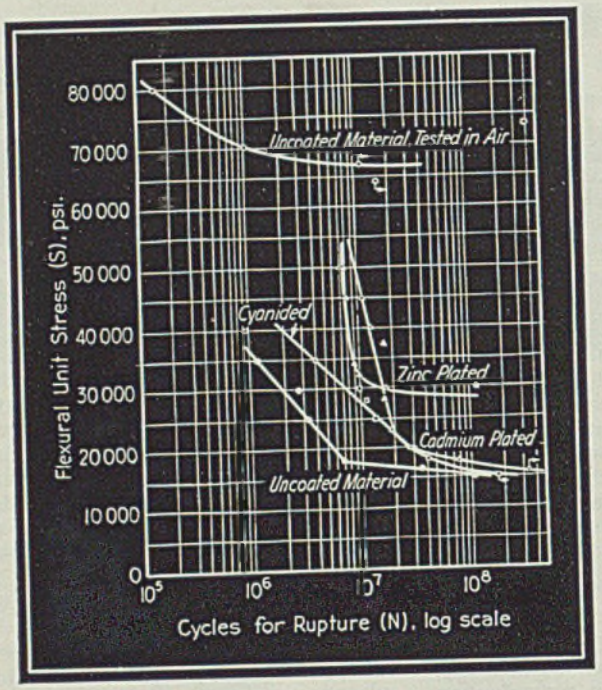
Timken Roller Bearing Co., Canton, O., has placed an order for a new 60-ton electric furnace to meet increased demands for aircraft steel in connection with the national defense program. The second 60-ton electric furnace to be installed by Timken in recent months, this unit will boost electric steel production from 21,000 to 27,000 net tons per month when it is placed in operation about Feb. 15.

♦

Graybar Electric Co. Inc., New York, has established an office and warehouse in Portland, Me., and also in Chattanooga, Tenn. T. A. Huston, sales manager, is in charge of the Portland branch, with W. J. Dowd as service supervisor. Chattanooga branch will be in charge of C. C. McGraw, sales manager, and his assistant will be J. P. Majors, service supervisor.

♦

To fill national defense contracts totaling over $4,000,000, R. Hoe & Co. Inc., manufacturer of printing press machinery and saws, is converting part of its present facilities and will shortly erect a new $40,000 welding plant on Locust avenue, Bronx, N. Y., for the manufacture of recoils for guns and gun parts. Contract for design and construction of the new unit has been awarded to Brown & Matthews Inc., New York.



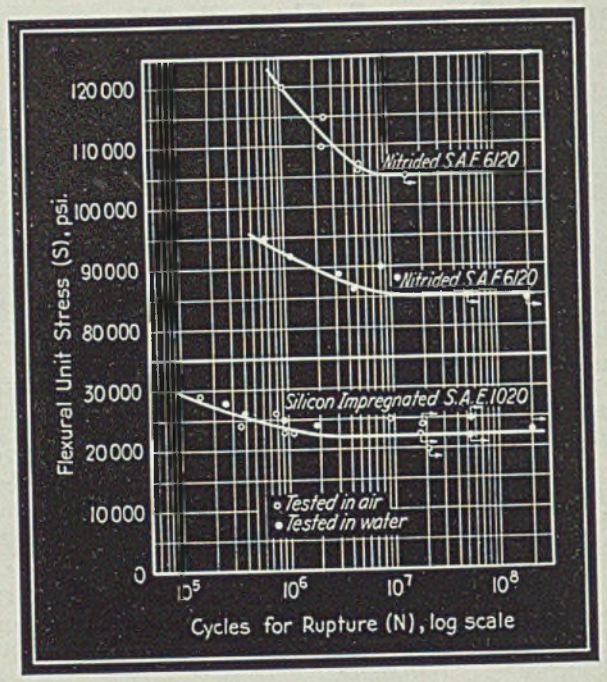


Fig. 1. (Left)—Reversed flexural fatigue tests of SAE 3140 steel, tested in water unless otherwise noted. Fig. 2. (Right)—Reversed flexural fatigue tests of silicon-impregnated SAE 1020 and nitrided SAE 6120

Surface Coatings Found To Affect Properties of Steel

Combination corrosion-fatigue tests reveal coatings generally lower endurance limits. Specimens with nitrided case exhibit exceptionally high fatigue strength and corrosion resistance

■ SERIOUS reduction in fatigue strength of steel is produced by the simultaneous action of a mildly corrosive liquid in contact with the steel while it is being repeatedly stressed. The resistance to this type of combined action depends chiefly on the ability of the surface material to resist localized corrosive attack; unless corrosion pitting is prevented, increase in the static strength and ordinary fatigue strength of a steel by alloying or heat treatment does not materially affect the corrosion-fatigue strength.

A significant increase in corrosion-fatigue strength of a steel could be obtained if the surface were coated or otherwise treated in such manner that the localized corrosion pits usually developed by the simultaneous corrosion and repeated stressing would either be inhibited or prevented from deepening with time.

The purpose of the investigation herein reported was to determine quantitatively the protection offered by several commercial impregnations and coatings on steel specimens subjected to completely reversed cycles of flexural stress while under the corrosive influence of a stream of fresh tap water. A comparison was made of the endurance limits of specimens tested in air with the endurance limits of coated specimens tested in water.

Effects of thin electroplated zinc and cadmium coatings, heat and air-hardenable bakelite varnishes, cyaniding, nitriding and silicon impregnation on specimens subjected to this type of corrosion-fatigue test were studied.

Tests were made on seven groups of specimens, each group of which had a different kind of protective coating, and three different steels were used in the tests: SAE 3140, 6120 and 1020. A brief outline of the various heat treatments used and the methods of applying the protective coatings to specimens of each group are shown in Table I.

It was found the number of corrosion-fatigue pits appearing on the surface of the coated or uncoated SAE 3140 steel specimens was a function of the stress and type of coating. In general, for a given type of protective coating, the lower the stress, the fewer and deeper

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Abstracted from a paper by T. J. Dolan and H. H. Benninger, University of Illinois, presented before forty-third annual meeting of the American Society for Testing Materials, Atlantic City, N. J., June 1940.

TABLE I—Protective Treatments and Coatings

Type of steel	Preliminary Heat Treatment	Protective Treatment	Type of Coating	Thickness of coating—inch
SAE 1020	Annealed at 1610 F.	Heated 1½ hrs. at 1840 F. in mixture of silicon carbide and chlorine gas, cooled in furnace	Silicon impregnation	0.02
SAE 3140	Normalized at 1600 F. quenched in oil from 1510 F.; tempered at 1100 F.	Electrolytic bright zinc plating	Zinc	0.00015
		Electrolytic cadmium plating	Cadmium	0.0001
		Two coats air hardenable bakelite varnish	Bakelite varnish	.....
		Two coats heat hardenable bakelite varnish, baked at 300 F.	Bakelite varnish	.....
SAE 3140	Normalized at 1650 F.	Heated in cyanide salt bath at 1520 F. for ½-hr., quenched in oil, tempered at 400 F.	Cyanide case	0.004
SAE 6120	Quenched in oil from 1630.; tempered at	Heated 60 hr. at 970 F. in ammonia gas	Nitrided case	0.02

were the corrosion-fatigue pits when the specimen ruptured. Furthermore, the specimens with the zinc plating (which is electrochemically more active than cadmium) exhibited a larger number of small corrosion-fatigue pits than those with the cadmium plating. It is interesting to note that no visible corrosion pits were found on any of the nitrided or cyanided specimens tested; these coatings evidently offered a protection against localized corrosive pitting.

The S-N curves in Figs. 1 and 2 show the results obtained for each specimen tested, and the endurance limits for each type of coating were scaled from these curves as the stress which was just sufficient to cause failure in 100 million cycles of stress. Even though no definite horizontal asymptotes are obtained to the S-N diagrams for corrosion-fatigue tests, it was felt that this was a sufficiently large number of cycles of stress on which to base the relative protective value of various coatings.

The results of corrosion-fatigue tests on cadmium and zinc-plated SAE 3140 steel specimens indicated that only a small amount of permanent protection against corrosive attack was produced by these coatings. From the S-N curves in Fig. 1 it may be observed that the life of these specimens was materially lengthened by the application of either coating if the part was subjected to cycles of stress above the corrosion-fatigue endurance limit. However, only a small increase in utilizable strength of the steel would result from the thin cadmium plated coating when the part was subjected to an indefinitely large number of cycles of relatively low stress, whereas the thin zinc plating produced a definite increase in the corrosion-fatigue strength. Both of these electrolytically plated coatings were very thin and would usually be intended only for very mild service; perhaps thicker platings would produce a somewhat more effective protection.

There undoubtedly is a progressive lowering of the corrosion-fatigue endurance limit as the number of cycles of stress (and corresponding period of corrosion) are increased. After a corrosion pit has once formed in a coated flexural fatigue specimen, it is only a question of time before the pit develops to a sufficient depth to originate a final fatigue fracture. Pits of the types shown in Fig. 3 were developed on both cadmium and zinc-coated specimens after several million cycles of stress while in contact with water.

Cyaniding of the SAE 3140 steel did not produce a definite increase in corrosion-fatigue strength of the specimens tested. While the specimen showed no visible signs of corrosion pitting, which would indicate a protection against corrosive action, it was evident that the carbon content of the original steel was too high or perhaps the treatment employed was unsatisfactory for proper application of a cyanide case. The specimens were extremely brittle and warped slightly in quenching. Possibly some residual stresses were also present in the specimens and the combined effect of these undesirable conditions was to lower the endurance limit materially. Perhaps a cyanide case would be effective in increasing the

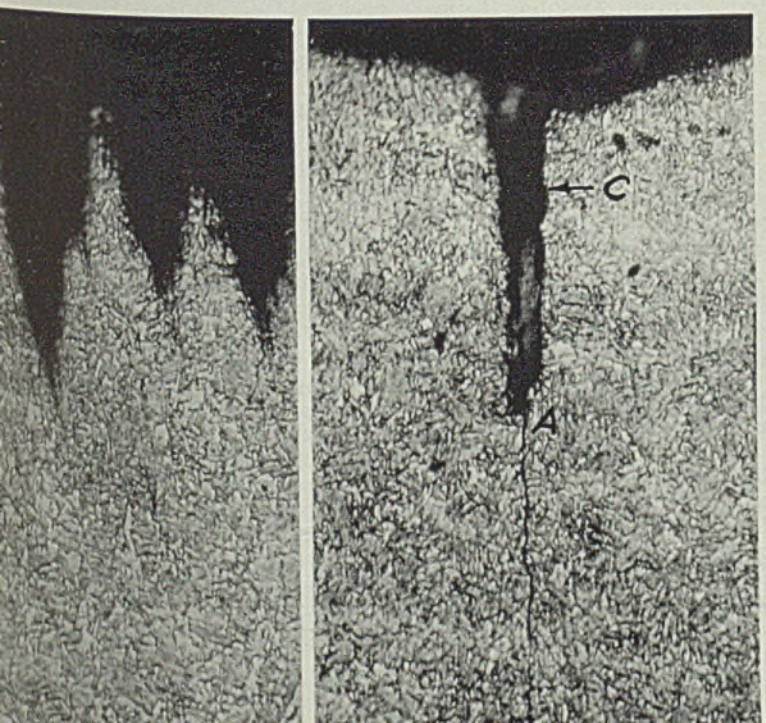


Fig. 3. (Left)—Corrosion-fatigue pits in zinc and cadmium plated specimens of SAE 3140 steel at 400 diameters

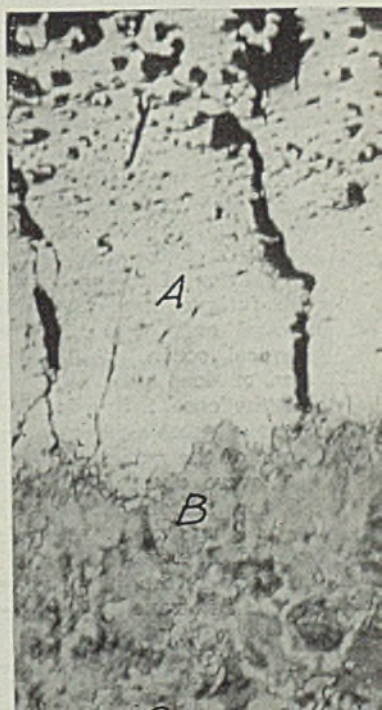


Fig. 4. (Right) — Fatigue cracks in silicon impregnated case on SAE 1020 steel at 100 diameters. Case A has a high silicon content: at B is a high carbon region: core C is pearlitic low carbon steel

corrosion-fatigue strength of a low-carbon steel if the treatment could be properly controlled.

While no data are available concerning the endurance limit in air for the untreated SAE 6120 steel, it can be assumed from the high endurance limit obtained (105,000 pounds per square inch) that the nitrided surface on this steel greatly increased the fatigue strength of the specimens in air. The data indicate that the nitrided case was effective in resisting the corrosive attack and that approximately 80 per cent of the strength of the nitrided steel, as determined by the endurance limit of the material in air, can be utilized if the material is simultaneously subjected to fresh water corrosion and fatigue. The endurance limit of 85,000 pounds per square inch obtained for the nitrided specimens tested in water is higher than that obtained for specimens of most steels when tested in air and is about four times as great as the usual corrosion-fatigue endurance limits of most steels.

Strength Governed by Case

Silicon impregnated SAE 1020 steel was the only material studied that had a corrosion-fatigue endurance limit equal to the endurance limit in air. The fatigue strength of the SAE 1020 steel in air was probably lowered somewhat by the application of the high silicon case; however, the corrosion-fatigue endurance limit of untreated SAE 1020 steel would normally be lower than that obtained for the specimens with the silicon impregnated case.

One factor noted which affected the strength of the silicon impregnated low-carbon steel was the porosity of the case which developed a notch effect on the specimens subjected to repeated loading. The photomicrograph in Fig. 4 shows several fatigue cracks which progressed through the case of the material and in some instances started from pits in this porous surface.

The strength of these silicon impregnated specimens in fatigue would normally be governed by the strength of the case and the notch-sensitivity of the material; perhaps the fatigue strength could be improved somewhat by close metallurgical control to prevent formation of deep pits, and by grinding off the case to a greater depth to remove most of the outer porous layer of the material. No corrosion pits were observed on the surface of the silicon impregnated specimens that were tested in water; even after two hundred million cycles of a stress in the neighborhood of the endurance limit only a slight discoloration of the surface could be detected.

Table II—Corrosion Fatigue Tests of SAE 3140 Coated with Bakelite Varnishes

Coating	Flexural Stress lbs./sq. in.	Cycles to Fracture
Heat Hardenable:		
XV 11444	40,000	2,628,300
	30,000	171,122,000*
Air Hardenable:		
15 BK	50,000	5,780,100
	40,000	164,890,000*
Air Hardenable:		
12 BK	40,000	14,497,800
	30,000	13,488,700

*Specimen did not fracture, but test stopped at the number of cycles indicated.

Only a few tests were made of specimens with surfaces coated with bakelite varnishes and the results for each specimen tested are shown in Table II. By comparison with the S-N curves in Fig. 2 it will be noted that all of these bakelite varnishes were effective in increasing the life of the specimen beyond that of the untreated steel, and that two of these varnishes apparently increased the corrosion-fatigue endurance limits to values above those obtained for any of the other coatings employed on the SAE 3140 steel. It was found difficult to obtain a good uniform adherence of the varnish without the necessity of roughening the surfaces of the specimens and the fractured specimens showed an irregular distribution of corrosion pitting at localized areas in which the varnished surface had dust particles imbedded or had cracked at random when stressed during the test. For service conditions in which abrasion is not likely to occur, some of the bakelite varnishes may offer an effective means of protecting a member from localized corrosive attack, and should materially increase the corrosion-fatigue strength of a member.

Summary: In general, the corrosion-fatigue endurance limits for specimens with commercially used protective coatings were considerably below the endurance limits of the steels tested in air. Specimens with a silicon impregnation case exhibited the same endurance limit when tested in air or in water, but the value obtained for this endurance limit was comparatively low (about 22,500 pounds per square inch). Zinc-plated specimens had a greater corrosion-fatigue strength than the cadmium-plated specimens, but both platings were rather thin and gave endurance limits less than 45 per cent of the fatigue strength of the uncoated steel in air. Specimens with a nitrided case were very efficient in resisting pitting by corrosive attack, and a very high corrosion-fatigue strength was obtained for the nitrided specimens (85,000 pounds per square inch).

Steel Scaffold Suitable For Many Jobs

■ A new safety steel scaffold, for use by maintenance departments, is announced by Mechanical Handling Systems Inc., 4600 Nancy avenue, Detroit. Called the Quik-Set safety scaffold, it is designed on gravity-locking principles providing interchangeability with a minimum number of separate units. No screws, bolts, or clamps are used and no tools of any kind are required to erect or disassemble the scaffold.

The structure consists of square-section tubular steel brace and corner post units of rigid construction with electrically welded parts. The design of the various units permits erection in straight line, in corners, around rectangular or circular constructions, either inside or outside. Bridging over obstructions is accomplished with simple truss units.

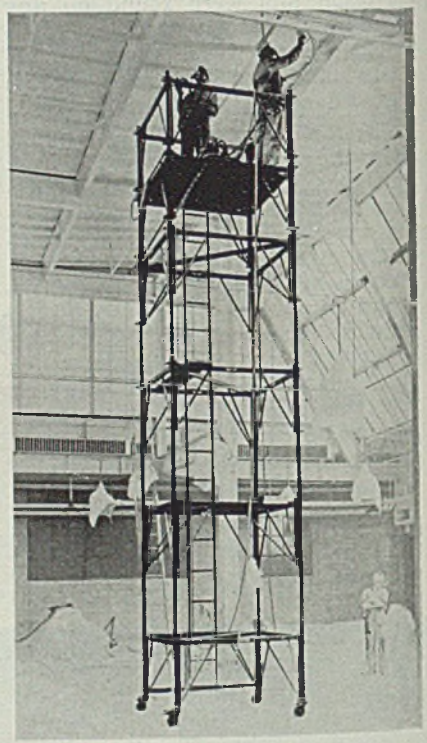


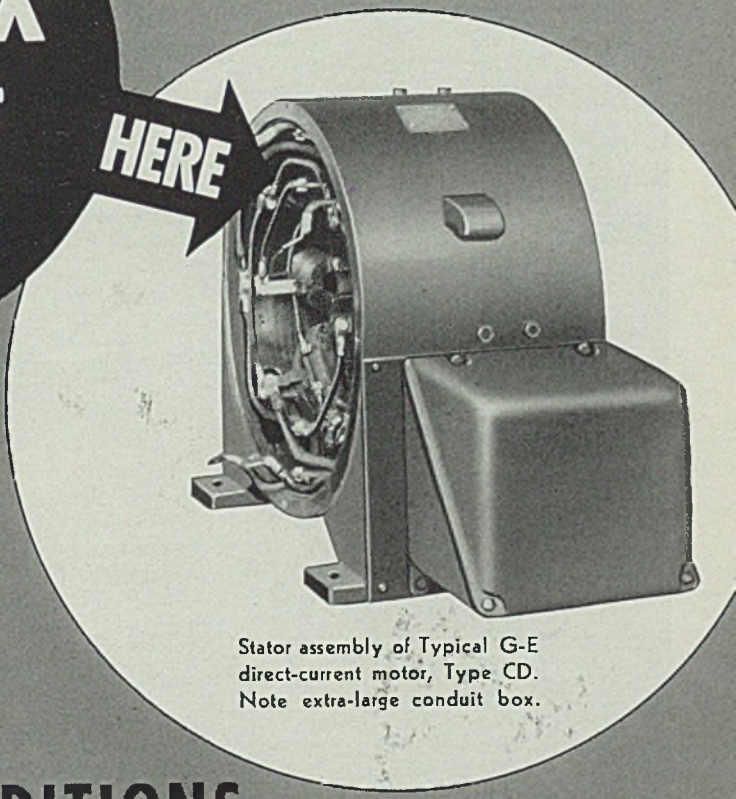
Illustration shows the Quik-Set safety scaffold being used on a painting job at a Detroit plant

In addition to the scaffold side and vertical units, steel floor sections are supplied which may be placed at any point in the scaffold. Also provided are detachable ladders, adjustment posts for erection on uneven surfaces, brackets for catwalks and for holding material, casters for use on interior work such as decorating, cleaning, etc.; and a simple skip-hoist for lifting materials.

Now FORMEX MAGNET WIRE HERE

Reg. U. S. Pat. Off.

IN G-E DIRECT-CURRENT MOTORS FOR LONG INSULATION LIFE UNDER SEVERE OPERATING CONDITIONS



Stator assembly of Typical G-E direct-current motor, Type CD. Note extra-large conduit box.

SOME of the adverse conditions in steel mills and mines, and conditions surrounding various manufacturing applications, can make it tough for the insulation of d-c motors.

Voltage surges, overloads, frequent starting of large motors—these can cause either mechanical shock or injurious overheating, which may damage or shorten the life of the insulation—particularly the insulation of the field coils.

That's why General Electric is now using Formex magnet wire for the main field coils of direct-current motors.

"Formex" is the trade name of the General Electric Company for a new G-E magnet wire insulated with a synthetic resin of the vinyl acetal type. It is a product of many years' research and experimentation by G-E engineers and scientists.

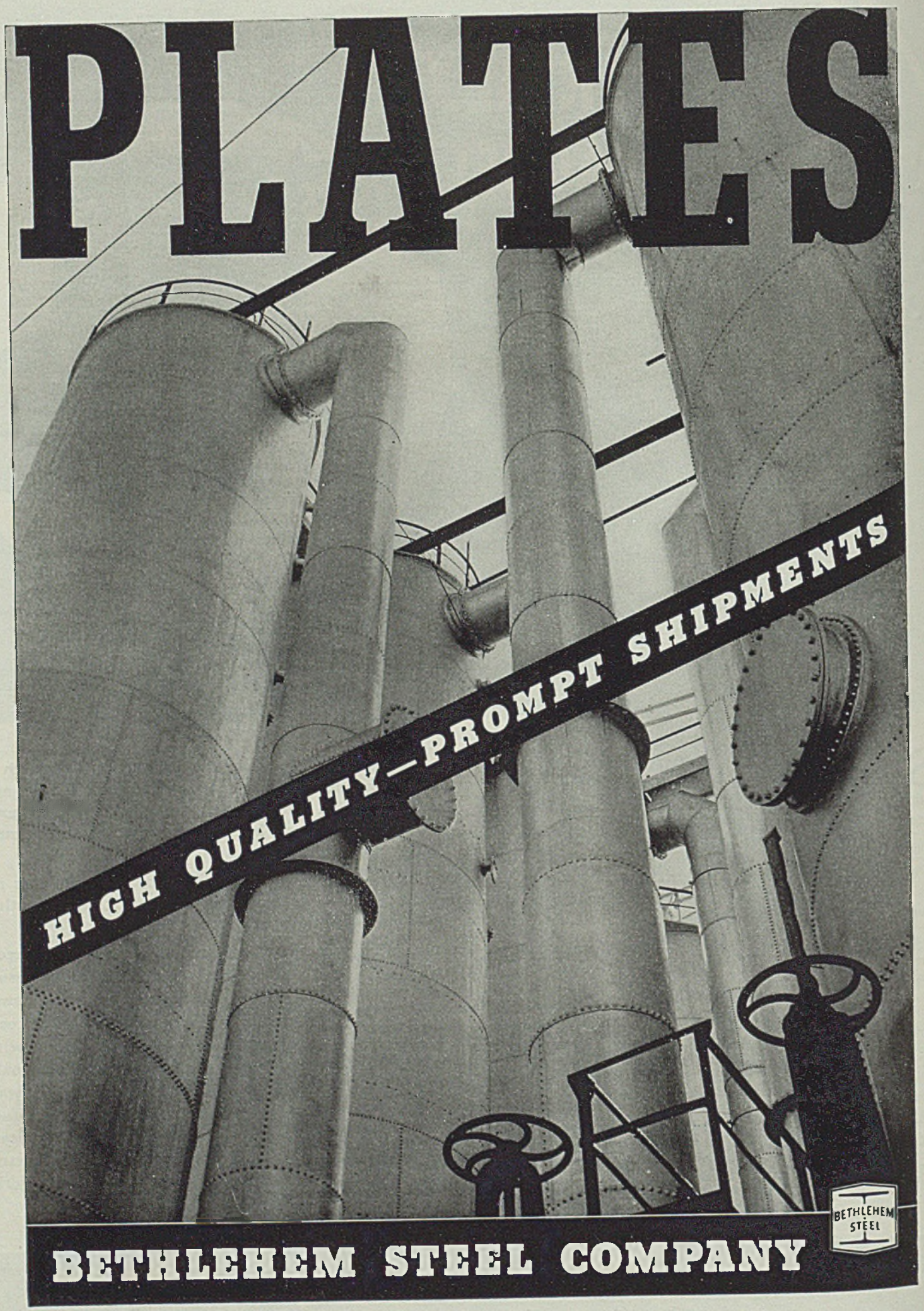
Physically, Formex enamel has outstanding qualities. It retains the high dielectric strength of conventional enamel. It is at least three times tougher and more flexible and much more resistant to abrasion. It shows no tendency to become brittle, crack, and lose its toughness on long exposure to heat.

Another advantage of Formex enamel is that it is resistant to the solvents used in the treating varnishes that are applied to winding assemblies.

Think what just this *one* feature of the new G-E direct-current motors means! Greater assurance of continuous operation, fewer repairs and replacements, lower costs of production. Why not plan now to get these advantages? You need only specify "G-E D-C Motors" in your equipment order. Or, if you prefer, talk over your requirements with our nearest representative. General Electric Company, Schenectady, New York.

GENERAL ELECTRIC

750-23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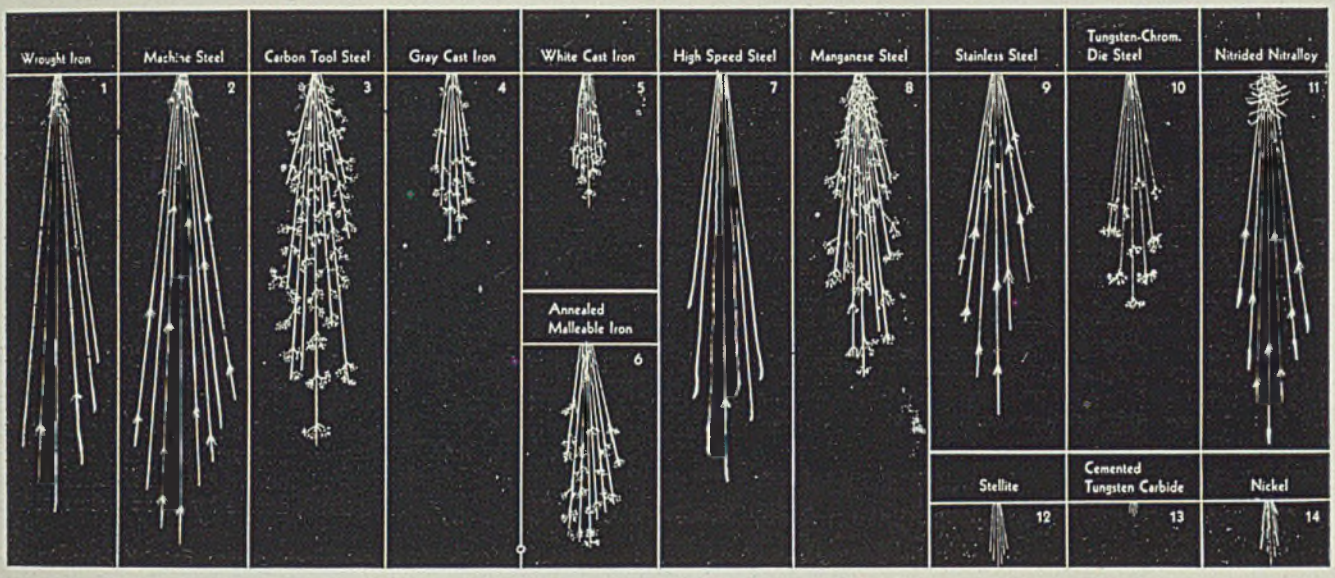
BETHLEHEM STEEL



Spark Testing

■ CHARACTERISTICS of sparks generated by a grinding wheel have several ways of imparting information to the experienced operator. One use is in classifying irons and steels. The accompanying chart and table gives not only information on the more familiar steels but also on some of the newer alloys and represents latest information available on this subject.

Spark characteristics are largely a function of oxidation of elements present in the specimen. Thus presence of carbon in the iron leads to high-intensity spurts as the carbon burns in the air a short distance away from the wheel. Some soft nonferrous metals like copper and aluminum yield no true grinding sparks in air. Practically no spurts appear from 19 per cent tungsten high-speed steel — apparently they are inhibited by the tungsten. Die steel with 5 per cent tungsten still yields explosive sparks.

While neither photographs nor sketches can convey a true picture of sparks as seen by the eye, they do help to classify and illustrate pronounced differences. All colors tabulated refer to streaks, not spurts. A fine repeating spurt is one whose branches explode several times—a formation suggestive of a clump of fine flower blossoms. A striking example is provided by plain high-carbon steel.

Length of stream tabulated here is from use of an Alundum 36-P wheel, 12 inches in diameter, 1 inch thick, running at about 5000 surface feet per minute. A portable grinder with a 6-inch wheel, 1¼ inches thick, may be more convenient. In each case the full length of the stream should be exposed to the view of the inspector to examine both initial and secondary details of the phenomenon. Necessarily, experience and acquaintance with sparks from metals of known composition are necessary for reliable judgment. This judgment, however, is not a substitute for exact chemical analysis but merely is a rapid, economical method of separating and classifying types of irons and steels and some nonferrous metals.

Of the newer alloys, high-speed steel is not easily mistaken when inspected by the spark method. Dull color near the wheel and long length are quite apparent. Manganese steel, 8, yields a stream of high brilliance. Stainless steel could be confused with machine steel but the stain-

From "Sparks from Grinding" by H. W. Wagner, research engineer, Norton Co., Worcester, Mass.

Metal	Volume of Stream	Relative Length of Stream, Inches†	Color of Stream Close to Wheel	Color of Streaks Near End of Stream	Quantity of Spurts	Nature of Spurts
1. Wrought iron	Large	65	Straw	White	Very few	Forked
2. Machine steel	Large	70	White	White	Few	Forked
3. Carbon tool steel	Moderately large	55	White	White	Very many	Fine, repeating
4. Gray cast iron	Small	25	Red	Straw	Many	Fine, repeating
5. White cast iron	Very small	20	Red	Straw	Few	Fine, repeating
6. Annealed mall. iron	Moderate	30	Red	Straw	Many	Fine, repeating
7. High speed steel	Small	60	Red	Straw	Extremely few	Forked
8. Manganese steel	Moderately large	45	White	White	Many	Fine, repeating
9. Stainless steel	Moderate	50	Straw	White	Moderate	Forked
10. Tungsten-chromium die steel	Small	35	Red	Straw*	Many	Fine, repeating*
11. Nitrided Nitralloy	Large (curved)	55	White	White	Moderate	Forked
12. Stellite	Very small	10	Orange	Orange	None	.....
13. Cemented tungsten carbide	Extremely small	2	Light orange	Light Orange	None	.....
14. Nickel	Very small**	10	Orange	Orange	None	.....
15. Copper, brass, aluminum	None	..	.....	.....	None	.....

†Figures obtained with 12-inch wheel on bench stand and are relative only. Actual length in each instance will vary with grinding wheel, pressure, etc. *Blue-white spurts. **Some wavy streaks.

less steel sparks are less brilliant in color near the wheel and the stream itself is thinner. Different brands of stainless steels and irons yield spark streams with a wide divergence of volume and color. The stream sketched in 9 is from a 12 to 14 per cent chromium low-carbon type. Tungsten-chromium die steel, 10, differentiates itself from the cast irons by blue-white glows at the spurt.

Nitrided Nitralloy, 11, exhibits one surprising eccentricity. Sparks near the wheel form whorls and some actually turn from the main line of travel by much over 90 degrees. The same tendency is exhibited to a lesser extent by manganese steel and to a still lesser extent by some other steels.

Stellite, 12, and cemented carbide, 13, in contrast to their brilliant performance as tools, provide drab fireworks. Line of travel is plain and short. Temperature color from the carbide material is slightly higher than from the stellite and the stream is extremely short. Nickel, 14, yields a spark which at first might be confused with the stellite spark. Close observation, however, will reveal a wavy motion of some of the nickel streaks while the stellite streaks are all straight.

Less spectacular than sparks, pellets formed from fused particles of iron and steel in the stream have been used to identify certain alloy steels.

Such pellets have distinct characteristics which provide fairly reliable comparisons.

Harnesses Uranium Atom

■ By means of the above apparatus, 200,000,000 electron-volts of the split uranium atom, U-235, were made to turn on the new 50,000-watt, air-cooled transmitter of Westinghouse station WBZ, near Boston, recently.

The splitting action took place inside the gleaming polystyrene chamber, right, at the top of which is a small piece of uranium. Dr. William E. Shoupp, research engineer, is holding a container in which is a mixture of radium and beryllium covered with paraffin to provide a source of slow neutrons, or atomic bullets. The electric current produced by the split uranium atom was pictured on the oscillograph screen, lower right, in the cabinet at the left. The apparatus was designed by Dr. E. U. Condon, left, associate director of the company's research laboratories. Courtesy Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Pig Iron, Ferroalloy Activity Off in 1939

■ Manufacturers of pig iron and ferroalloys reported moderate decreases in employment, wages and production in 1939, compared with 1937, according to preliminary figures of the census of manufactures for 1939, made by the bureau of the census.

Figures cover establishments engaged in manufacture of pig iron and ferroalloys from ore and scrap, and castings made direct from the furnace. Manufacture of electric ferroalloys is included in the chemicals industry.

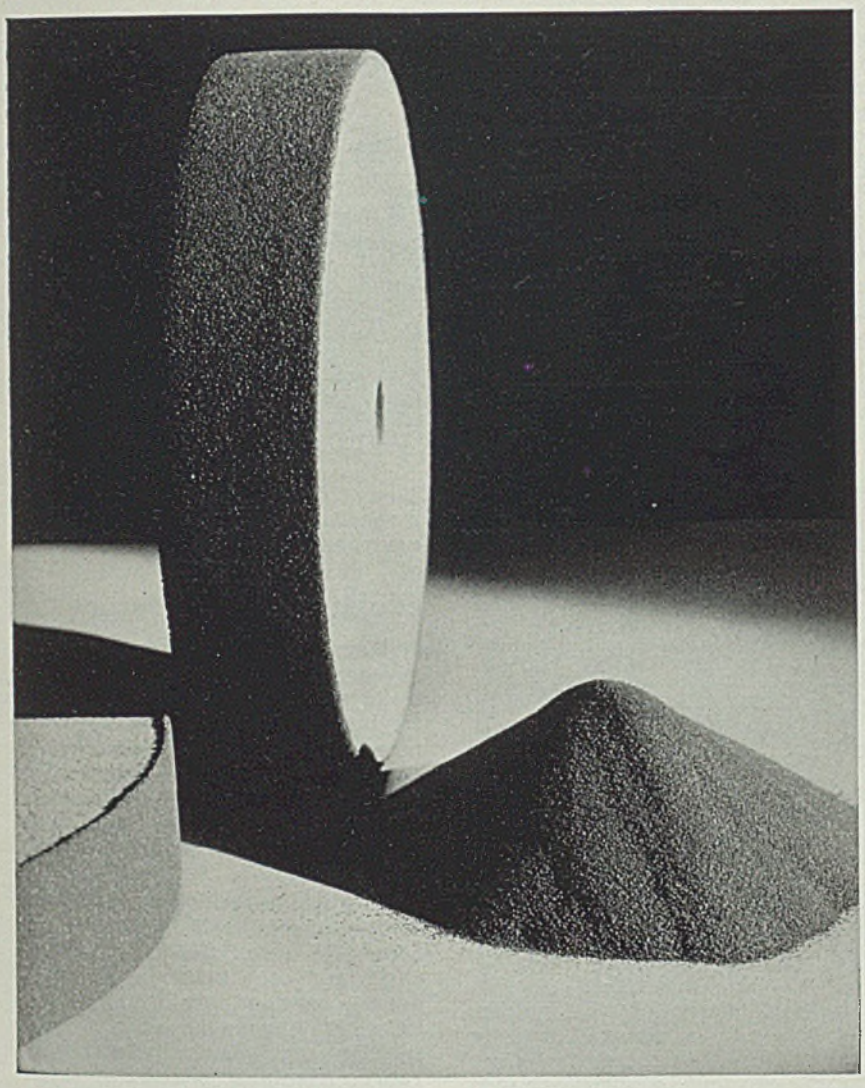
Value of products in 1939 was $550,802,313, a decrease of 18.1 per cent compared with $672,525,407 in 1937. Wage earners primarily engaged in manufacturing in 1939 numbered 19,537, a decrease of 15.3 per cent compared with 23,075 reported for 1937. Wages in 1939 totaled $28,312,336, which was 25.5 per cent less than $38,001,438 paid in 1937. Establishments engaged in this production in 1939 numbered 81; in '37 they totaled 87.

Export Firm Organized

■ Alberto Ubbelohde Inc., has been organized, with headquarters at 2 Rector street, New York, to serve as the American affiliate of Alberto Ubbelohde Compania which has its headquarters in Buenos Aires, Argentina, and offices in Rosario, Argentina, and Montevideo, Uruguay. The new company also is affiliated with F. C. Ubbelohde of London and Antwerp.

At Buenos Aires, the Ubbelohde company is an importer of steel and various metallurgical products and sundries. At New York it exports the same products. It also proposes to create American outlets for various products of Argentina and Uruguay, for reciprocal reasons.

Alberto Ubbelohde is president of the new company. Jules Dierckx, who long had been active in machine tool sales, and who now is manager of foreign sales for Chambersburg Engineering Co., Chambersburg, Pa., is vice president. T. J. Lancaster is secretary and treasurer. Mr. Dierckx and Mr. Lancaster are at 2 Rector street, New York.



Grains that Stick Better and Cut Faster . . .

The New ALUNDUM "S" ABRASIVE

AVAILABLE in sizes 90 and coarser, the new Alundum "S" Abrasive has proved outstandingly successful in field trials. Not only does its special surface treatment give grains with better sticking power but also a faster cutting action—and a cutting action that lasts. Right up to the moment that recoating is necessary you'll find that wheels set up with Alundum "S" Abrasive are still cutting fast. You'll surely want to try this newest Norton development on your polishing jobs that use size 90 or coarser.

NORTON COMPANY, WORCESTER, MASS.

New York	Chicago	Detroit	Philadelphia
Pittsburgh	Hartford	Cleveland	Hamilton, Ont.

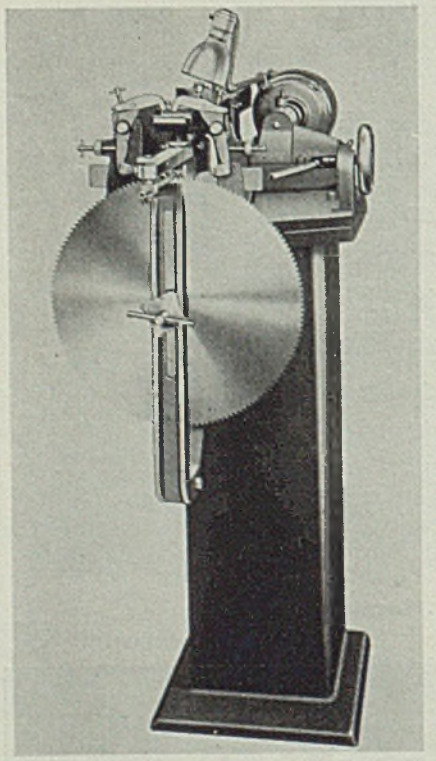
G-114

NORTON ABRASIVES

Saw Filing Machine

■ Industrial Engineering Co. Inc., Pence building, Minneapolis, has placed on the market an automatic Quick Way universal saw filing machine which incorporates a special attachment that holds circular saws concentric within a maximum error of 0.0002-inch. It also is available equipped to file hand and band saws.

The unit shown in the illustration incorporates a special floating arbor which carries the circular saw. It is threaded and is adjustable instantaneously to the proper tension in order to hold the saw rigid and yet allow the feed pawls to move it smoothly, tooth by tooth. The cone arbor is of hardened steel to prevent wear. A lock nut behind

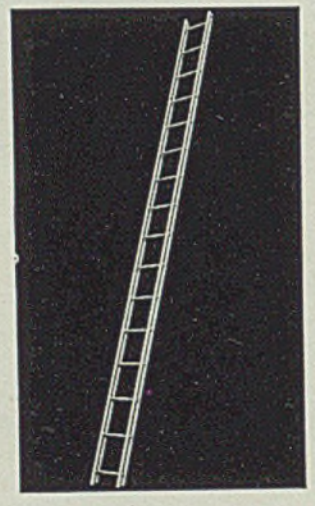


the cone arbor locks it to the treaded shaft on which it is mounted.

The transmission and clutch of the filer are enclosed in the housing shown. Instead of belts or gears a worm drive is utilized. The built-in clutch and finger-tip control lever stop the file stroke instantly, preventing injuries to the operator or damage to saws. Adjustments of the file stroke and feed pawl are readily made by a hand wheel.

Aluminum Ladder

■ Aluminum Ladder Co., Tarentum, Pa., has introduced a new aluminum straight ladder, weighing only 1 pound per foot but strong enough for all ordinary uses. It is recommended for many industrial pur-



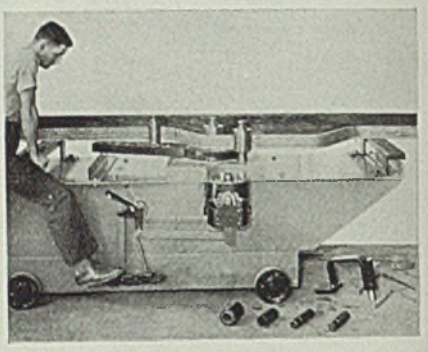
poses, particularly for airplane use. This ladder is constructed entirely of aluminum alloy 61 S.T., having a tensile strength of 48,000 pounds per square inch. Its side rails and ¾-inch round rungs are sturdily built. The ladder can be supplied in numerous sizes up to 16 inches wide and 20 feet long, fitted with safety shoes if desired.

Fluorescent Lamp

■ Westinghouse Lamp division, Bloomfield, N. J., has placed on the market a new 6-watt 9-inch fluorescent lamp for use where space is limited and high lumen output is not required. It is available in two colors —daylight and white. The lamp has a rated average life of 750 hours.

Bending Machine

■ G. D. S. Machinery & Supply Co. Inc., 101 Walker street, New York, has developed a new automatic bending machine for bending reinforcing bars. Heavier and of greater capacity than the predecessor type formerly built, it is furnished in two sizes, one handling round bars up to 2¼ inches and square bars up to 2 inches, the other accommodating 1½-inch round bars and 1¼-inch square bars. The machine is equipped with a 5-horsepower motor and automatic control. Direction of movement of the bending plate is controlled by two clutches. Weighing 3000 and 4000 pounds,



respectively, the machines are equipped with wheels.

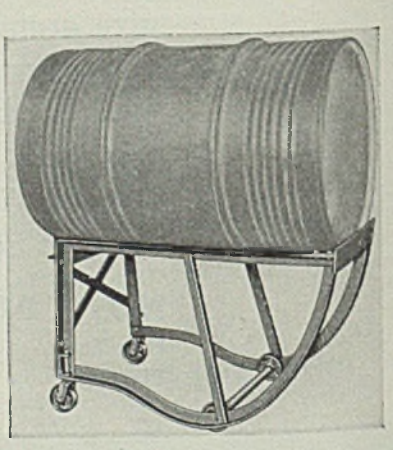
Multipoint Indicator

■ Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, has introduced a new multipoint indicator for indicating drafts, pressures, differentials, and other factors in boiler and industrial furnace operation. It is supplied with 2 to 16 of the interchangeable gage units, and is built for either flush or projected mounting.

Zero adjustments and all piping connections for each gage unit are accessible from the front of the panel and each unit may be withdrawn without disturbing other units. Each gage is actuated by a sensitive dry-bellows diaphragm for ranges from 0 to 50 inches of water.

Cradle Truck

■ Morse Mfg. Co. Inc., Syracuse, N. Y., has placed on the market a No. 45 cradle truck for handling



drums and barrels. It features steel angle construction, and is equipped with two 3-inch wheels at the rocker end. These are placed well ahead of the center of the load. At the other lower end of the truck are two 3-inch easy turn casters mounted at the extreme width of the unit (20

inches). These provide a long and wide wheel base insuring safety and easy movement. The truck weighs 32 pounds and has a load-carrying capacity of 1000 pounds.

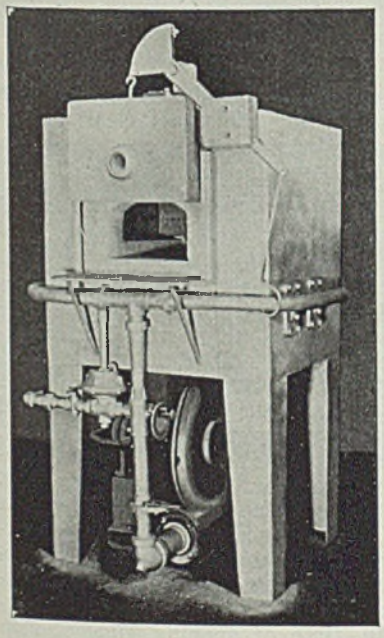
Multibreakers

■ Square D Co., 6060 Rivard street, Detroit, announces Type M multibreakers for use on 3-phase 4-wire solid neutral 120/208 volts alternating-current systems. Three-pole breakers with neutrals are used for this type of service. The breakers are common trip; that is, when an overload or short circuit occurs on any one pole, all poles trip simultaneously.

The breakers are trip free and cannot be held closed on a short circuit or overload. The indicating handle shows clearly whether the breaker is on, off or tripped. The units are calibrated and sealed at the factory so intended and proper capacity cannot be exceeded. Capacities range from 15 to 100 amperes. Sheet steel enclosures are furnished for either flush or surface mounting.

Tool Furnace

■ Mahr Mfg. Co., division of Diamond Iron Works Inc., Minneapolis, has introduced a new tool furnace, combustion chamber which supplies



uniform heat throughout the hearth area at any temperature. Its improved control assures results that can be repeated at the will of the operator. The special proportional air-gas mixer has a vernier control graduated for easy and quick setting. The operator can make a temperature chart of adjustments. He also can chart any number of specific processes for treatment of the various classes of steel or other metal. The ratio then can be changed to either oxidizing or reducing at positive settings by movement of the vernier control. The record chart of results desired permits instant settings for future repeat operations. This 12 x 18 x 6-inch gas underfired furnace is equipped with four premixed gas burners arranged for single valve control. It has a graduated blast gate for primary setting to adjust for any class or grade of gas used in industry. It also is lined with a special quality refractory. The frame is all welded steel construction. The furnace can be furnished with or without blower.

Welding Transformers

■ Gentral Electric Co., Schenectady, N. Y., has introduced new 300-ampere arc-welding transformers equipped with built-in power-factor correction. They use smaller line cable, switches and fuses.

Other advantages include finger-tip current adjustment; large, easily-read current indicators; protected output terminals and fan-forced ventilation. Design of the unit permits reduction in size,

weight and floor-space requirements. Each welder is only 43 inches high, 21 inches in diameter and has a net weight of only 450 pounds.

Moisture Indicator

■ Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has placed on the market an improved moisture determination unit. It consists of a sturdy motor driven fan. During operation air is heated by an electric element and forced through the sample being tested. The sample is contained in a sample pan equipped with a 500-mesh Monel filter cloth bottom. A timer is used to stop the drying process at any predetermined time from 0 to 15 minutes. Granular and fibrous materials require from 1 to 3 minutes to dry while powdered materials require 5 minutes.

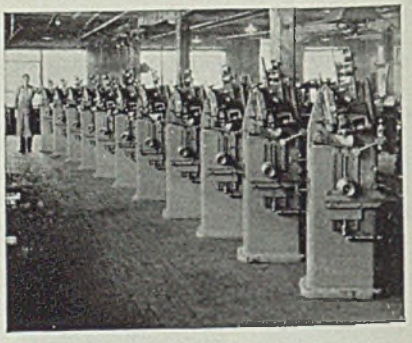
Telescriber

■ TelAutograph Corp., 16 West Sixty-first street, New York, has placed on the market a new telescriber for transmitting instantaneously written messages over wires. It is capable of transmitting writing, sketches or figures in facsimile to a number of stations simultaneously or to any one or more stations selectively—within one building or between buildings miles apart.

The telescriber is compact and measures 10⅝ inches high, 12½ inches wide and 18¾ inches deep. It operates on alternating current. Two new features increase its speed of operating. The complete writing field is automatically cleared of each message by one touch of a starter switch, and an electric paper take-up replaces the manual winder previously used.

Precision Grinder

■ E. C. Atkins & Co., 402 South Illinois street, Indianapolis, announces a new precision No. 11-30 grinder for sharpening its Curled Chip saws which are used in metal cutting. This new unit was developed with the co-operation of Covel-Hanchett Co. and it preserves the set of the Curled Chip tooth forms. The sharpener is controlled by special cam action for the exact clearances of high and low teeth as well as precise beveling. Antifriction bearings are employed for all working parts.



Molding Press

■ Cropp Engineering division, Warren Lamp Co., Warren, Pa., has introduced a 12-ton automatic molding press for compression type bakelites. Its hopper is capable of holding material for a full shift, the material being fed by a solenoid-operated multiple-measuring device. The machine is equipped with a time sequence device with each circuit adjustable while press is in operation, including: time of measuring, time of loading, time of closing, time of opening, time of stop opening, time of air (clean out mold), time of closing air and time of weighing molded piece.

It also features jog push buttons, "open" and "close", to facilitate placing of molds. The press is powered by an oversize 5-horsepower motor which operates only 10 per cent of the time. The reversing contactors are mechanically interlocked and together with electrical interlocks assist in braking motor to a

stop by electrical plugging. A mechanical weighing device or scales sensitive to a differential weight of 3 grams also is included.

Magnetic Filter

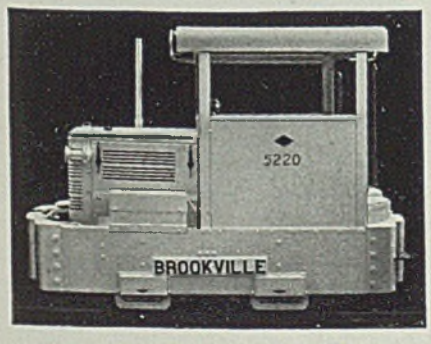
■ S. G. Frantz Co. Inc., 161 Grand street, New York, has placed on the market a FerroFilter which magnetically removes ferrous particles from circulating oil systems in machines and engines. It is placed near the machine or engine in the oil pipe line and becomes part of the system.

It consists essentially of a set of magnetized screens enclosed in a casing through which the liquid flows. The screens present thousands of feet of strongly magnetized edges to the material passing through. These comb and recomb the product retaining the magnetic particles on the screen edges until the end of the run. The filter is then demagnetized and flushed.

Features of the unit include full flow of product, low pressure drop, high capacity, and no moving parts. It does not remove any of the oil additives. All parts are given a high finish where needed to facilitate cleaning.

Locomotives

■ Brookville Locomotive Co., Brookville, Pa., has placed on the market a new series of locomotives in 4, 5 and 6-ton weights, equipped with the UD-6 International diesel engine recently introduced by In-



ternational Harvester Co. This engine is a 4-cylinder 4-stroke cycle, diesel developing 39 horsepower at 1500 revolutions per minute. Its high torque at slow speeds gives it the lugging ability of a steam engine, and its power is applied to all four locomotive drive wheels through four forward and four reverse speeds. The latter are made available by the reverse gear operating in conjunction with a heavy duty 4-speed transmission. The work capacity of the locomotive is further increased by the use of steel tires. These increase traction by a full 25 per cent over the former wheels. Other features of the locomotive include: Dual spring journal suspension, steel frame, Timken bearings and use of standard International parts in the engine clutch and transmission. The unit is available in any gage with or without cab, standard or mine types.

Elevating Truck

■ Lyon Iron Works, Greene, N. Y., has introduced a 10,000-pound hydraulic elevating truck for unloading coils of strip steel from a recoiling machine. It is arranged to run on a track at approximately floor level with the lower portion of the truck in a pit below floor level.

Of the toggle lever type, the truck handles coils of steel up to 46-inch diameter. Its platform is 45 inches fitted with an adjustable stop. The platform tilts 15 degrees from horizontal operated from the tandem valve assembly that operates the elevating and lowering of the main platform. The lowered height from track to vertex of V of platform is 13½ inches, elevated height 25½ inches, elevation 12 inches. The pump is motor-driven by a 3-horsepower motor and furnishes the power for the four elevating hoists,

one lowering hoist, and tilting hoist. The pump is controlled by a tandem 4-way valve which is mounted on the column of the truck. The motor is controlled by a push button and magnetic starter and is equipped with cable reel and cable.

Lift Truck

■ Baker-Raulang Co., 2168 West Twenty-fifth street, Cleveland, has introduced a type H-2 series F Hy-Lift truck which is available in 4000-pound capacity. It is for operation in narrow aisles and congested areas.

Lifting is accomplished by a hydraulic system consisting of a gear pump driven by its own motor and connected to the lifting cylinder through suitable control and release valves. Control valves are the metering type controlling the speed at all times. The truck has a standard simple lift of 60 inches and standard telescoping lift of 119 inches. It can be operated in aisles 61 inches wide.

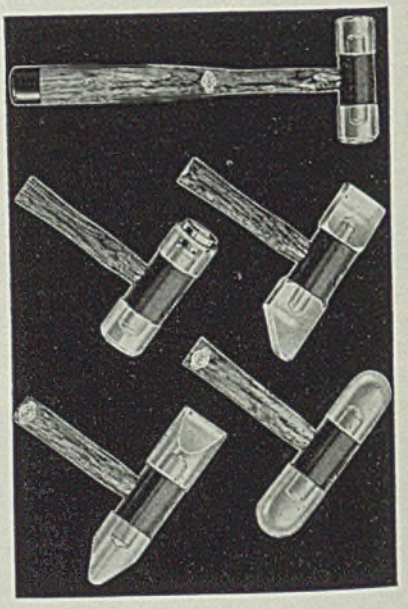
Spray Nozzle

■ Trabon Engineering Corp., 1814 East Fortieth street, Cleveland, announces a new spray nozzle for both low and high pressure service, spraying either water or oil. It consists of only two parts—a header adapter of stainless steel and the nozzle. The nozzles are made with several sizes of orifices. Design of the latter is instrumental in controlling the pattern of the spray.

Their delivery is the same thickness at the sides as in the middle. The spray has no feather edges with corresponding reduced pressure. Except for a slight allowance for the extra distance the spray travels, the pressure at the edges of the spray is about the same as in the middle. These nozzles, used in the pressure headers of a descaling system assure the production of cleaner steel with fewer rejections.

Soft-Face Hammers

■ Stanley Tools, New Britain, Conn., announces a new line of soft face hammers for use on assembly jobs requiring a hammer which will not mar finely finished surfaces or delicate machine parts. The tips are of Stanloid, the hickory handles being securely wedged in a steel center body. Various shaped tips—regular face, ball pein, cross pein, straight pein, offset pein, square tip, and regular face with brass insert — are available. All are renewable.



Geared Motors

■ Walker-Turner Co. Inc., Plainfield, N. J., announces a new 2-speed geared motor for equipment requiring instantaneous speed change. Its two speeds are controlled by a push-button switch. Available in various speeds from 700 to 8000 revolutions per minute and in sizes from ¼ to 3 horsepower for polyphase circuits only, this motor has been thoroughly tested in service as standard equipment on flexible shaft machines.

Assembly Welding

(*Concluded from Page* 63)

it to the left to the welding position and returns it to the right for reloading. Thus two operators work in sequence without interfering with each other.

While production of 100 grille halves per hour is expected to fulfill requirements, it is entirely possible to step up production above this figure simply by adding additional loaders or portable fixtures at each station—no changes in the machine itself being required.

Advantages of this assembly process briefly are: Use of rubber-tired movable jig fixtures permits almost continuous operation of the welder, thus high output. Multiple spot welding in series permits four spots to be welded simultaneously so a large number of spots occupy only a small welding cycle. Equal pressure to all electrode tips is assured. Completely automatic machine operation is provided including automatic locating of movable jig and automatic control of welding cycles and release of work at end of the welding cycle. Elimination of hand clamping is an important production feature. Little floor space is required as the entire sequence of operations requires but a 5 x 12-foot floor area.

♦

Radiant Energy

(*Concluded from Page* 76)

tion while this solvent is evaporating. At the opposite end of the operation, it is possible to avoid forced cooling of the work by having a conveyor carrying the work beyond the source of radiant energy yet enclosing the material to allow it to bake with the heat energy already stored in the metal.

When estimating cost of a drying lamp installation, it is well to remember that incandescent-lamp radiant-energy ovens occupy extremely small amount of floor space, conform to modern straight-line production requirements, have maximum flexibility and require no warm-up period. All of these may on occasion afford important dollars-and-cents savings.

(*Concluded Next Week*)

Institute Depicts Uses of Steel in Houses

■ "Steel Makes the Home" titles an attractive illustrated booklet issued by the American Iron and Steel Institute, New York.

According to the foreword, "All-steel houses are practical and available, while another widely adopted application of steel in home construction has been its use in conjunction with other materials, each serving the purpose for which it is best suited.

This booklet also illustrates some of the advantages of steel in home construction. It reviews the progress brought about by the increased use of steel in heating and cooking appliances, bathtubs and other household equipment."

Among the topics described and illustrated are: "Keeping Down Up-Keep," "Planning a Fire-Safe Home," "The Elements Defeated," "Termites Can't Eat Steel," "Steel Simplifies Construction," "Prefabricated but Individual," "Variety with Steel," "Building with Steel Panels" and "Equipment Ready Made."

Booklets may be obtained gratis from the institute, 350 Fifth avenue, New York.

Flexrock Announces New Non-Slip Floor Wax

■ Flexrock Co., Dept. S, 2300 Manning street, Philadelphia, has applied for a patent to cover a process whereby Neoprene is used in the manufacture of a nonslip floor wax. The product is claimed to have unusual lasting qualities and a higher gloss.

War Orders Placed by Canadian Government

(*Concluded from Page 45*)

rine & Mfg. Co. of Canada Ltd., Peterborough, Ont., $5923; MacLennans Ornamental Iron Works, Toronto, $33,750.

Instruments: Northern Electric Co. Ltd., Ottawa, $11,500.

Machinery: Canadian Fairbanks-Morse Co. Ltd., Ottawa, $8328; E. W. Bliss Co. of Canada Ltd., Toronto, $39,625; John Bertram & Sons Co. Ltd., Dundas, Ont., $16,250; A. R. Williams Machinery Co. Ltd., Toronto, $5639.

Hardware: Anglo-Canadian Wire Rope Co. Ltd., Montreal, $5437; Steel Co. of Canada Ltd., Hamilton, $5962.

Fire fighting equipment: Canadian Fire Hose Co., Montreal, $11,390; Walter Kidde & Co. of Canada Ltd., Montreal, $183,444; Two Fire Equipment Co. of Canada Ltd., Toronto, $183,444; LaFrance Fire Engine & Foamite Ltd., Toronto, $169,338; Pyrene Mfg. Co. of Canada Ltd., Toronto, $167,900.

Ordnance: War office, England, $50,400.

Munitions: Triumph Explosives of Canada Ltd., Ottawa, $21,000; Frost & Wood Co. Ltd., Smiths Falls, Ont., $50,996; Anaconda American Brass Ltd., New Toronto, Ont., $95,950.

Miscellaneous: British admiralty, England, $8000; Millard Box Co. Ltd., Yarmouth, N. S., $6156; Dominion Rubber Co. Ltd., Montreal, $19,200; Gillette Safety Razor Co. of Canada Ltd., Montreal, $36,800; J. E. Lortie Co. Ltd., Montreal, $8650; Dominion Rubber Co. Ltd., Ottawa, $31,750; S. S. Holden Ltd., Ottawa, $127,000; B. F. Goodrich Rubber Co. of Canada Ltd., Kitchener, Ont., $76,800; R. C. A. Victor Co. Ltd., Ottawa, $27,518; Kelvinator of Canada Ltd., London, Ont., $5326; Casket & Specialties Mfg. Co. Ltd., Montmagny, Que., $13,937; Steel Co. of Canada Ltd., Montreal, $6510; Pedlar People Ltd., Ottawa, $34,794; Frost Steel & Wire Co. Ltd., Hamilton, $14,674; Automatic Sprinkler Co. of Canada Ltd., Montreal, $5882; Atlas Polar Co. Ltd., Toronto, $69,070.

Construction projects: M. A. Condon & Son, Kentville, N. S., $419,972; Storms Contracting Co., Toronto, $336,000; Howard Furnace Co. Ltd., Toronto, $130,000; General Steel Wares Ltd., Toronto, $169,000; Clare Bros. & Co. Ltd., Preston, Ont., $218,000; Iron Fireman Mfg. Co., Ltd., Toronto, $220,000; Bremner Norris & Co. Ltd., Montreal, $187,000.

In the preceding week, orders aggregating $14,650,704 were announced:

Aircraft: Irvin Air Chute Ltd., Ottawa, Ont., $1,117,611; Switlik Canadian Parachute Ltd., Montreal, Que., $1,057,806; Aviation Electric Ltd., Montreal, $50,065; J. W. Pyke & Co. Ltd., Montreal, $18,826; Canadian Westinghouse Co. Ltd., Ottawa, $15,675; Metallic Roofing Co. of Canada Ltd., Ottawa, $7913; R. Laidlaw Lumber Co. Ltd., Toronto, $6235; Brunner Corp. (Canada) Ltd., Toronto, $15,267; National Steel Car Corp. Ltd., Malton, Ont., $10,324; B. F. Goodrich Rubber Co. of Canada Ltd., Kitchener, Ont., $59,072; S. & B. Aircraft Ltd., Winnipeg, Man., $7371.

Mechanical transport: Metallic Roofing Co. of Canada Ltd., Ottawa, $386,132; Dunlop Tire & Rubber Goods Co. Ltd., Toronto, $24,587; Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto, $123,359; Firestone Rubber Co. of Canada Ltd., Hamilton, Ont., $62,141.

Instruments: War office, England, $85,450; Dominion Electric Protection Co., Montreal, $5160; Instruments Ltd., Ottawa, $6220; Ontario Hughes-Owens Co. Ltd., Ottawa, $49,052; Neptune Meters Ltd., Toronto, $6495.

Machinery: Williams & Wilson Ltd., Montreal, $10,767; General Supply Co. of Canada Ltd., Ottawa, $5076; Gar Wood Industries of Canada Ltd., Windsor, Ont., $14,641; Service Lamp Co. Ltd., London, Ont., $6056.

Shipbuilding: Kenneth MacAlpine & Co., Shelbourne, N. S., $31,968; W. C. McKay & Sons Ltd., Shelbourne, N. S., $15,984; Imperial Oil Ltd., Toronto, $12,210.

Ordnance: War office, England, $1,010,000; Montreal Suspenders & Umbrellas Ltd., Montreal, $14,400; Hugh Carson Co., Ottawa, $11,000.

Construction: La Campagnie de Construction Laviolette, Three Rivers, Que., $101,959; H. F. McLean Ltd., Calleyfield, Que., $205,000; Cook & Leitch, Montreal, $205,000; William W. Stewart, Montreal, $205,000; Canadian Comstock Co. Ltd., Toronto, $67,300; Tope Construction Co. Ltd., Hamilton, $119,469; Assiniboia Engineering Co. Ltd., Winnipeg, Man., $337,317; Bird Construction Co. Ltd., Winnipeg, $152,000; Tomlinson Construction Co. Ltd., Winnipeg, $461,207; Buchan Construction Co., Calgary, Alta., $330,000.

Miscellaneous: Messrs. Gauthier & Julien, Portneuf Station, Que., $8800; Knechtels Ltd., Hanover, Ont., $7068; North American Bent Chair Co. Ltd., Owen Sound, Ont., $6134; LaPerelle Lumber Co. Ltd., Rimouski, Que., $159,500; Dominion Wire Rope & Cable Co. Ltd., Montreal, $11,302; Drummond, McCall & Co. Ltd., Montreal, $6750; Foundation Co. of Canada Ltd., Montreal, $5310; Hugh Carson Co. Ltd., Ottawa, $58,305; S. S. Holden Ltd., Ottawa, $51,000; Coulter Copper & Brass Co. Ltd., Toronto, $10,308; General Steel Wares Ltd., $7980; B. F. Goodrich Rubber Co. of Canada Ltd., Kitchener, $93,000; R. C. A. Victor Co. Ltd., Ottawa, $34,398; Frost & Wood Co. Ltd., Smiths Falls, Ont., $27,471; Gold Medal Furniture Mfg. Co. Ltd.,

ORIGIN OF SEPTEMBER IMPORTS

Gross Tons

	Iron ore	Pig iron	Manganese ore
United Kingdom	97	.....	.....
Canada	29,134	36	71
Mexico	53	.....	.....
Cuba	11,500	.....	2,844
Chile	114,100	.....	.....
Brazil	8,250	.....	10,129
Iran	1,050	.....	.....
Netherlands-Indies	.....	.....	572
British India	.....	1,794	6,629
Soviet Russia	.....	.....	50
South Africa	.....	.....	16,499
Gold Coast	.....	.....	8,186
Total	164,184	1,830	44,980

	Sheets, skelp and sawplate	Steel bars	Hoops and bands
Canada	2	...	...
Sweden	...	1	...
Belgium	...	...	2
Total	2	1	2

Toronto, $20,947; Kelvinator of Canada Ltd., London, Ont., $19,003; Maxwells Ltd., St. Mary's Ont., $22,700; Acme Office Supplies Ltd., Ottawa, $26,898; Federal Typewriter Co. Ltd., Ottawa, $39,650; Underwood Elliott, Fisher Ltd., Ottawa, $179,108.

Steel, Iron Imports Up Slightly in September

■ September steel and iron imports, scrap excepted, rose in quantity but declined sharply in value, compared with August, metals and minerals division, department of commerce reports. September receipts were 2542 gross tons, valued at $160,988, against 2089 tons, valued at $516,187 in August. September imports were less than one-tenth the September, 1939, volume, 26,658 tons, valued at $1,431,318.

Total for nine months was 46,809 tons, valued at $5,528,578, compared with 240,964 tons, valued at $14,087,302 in the comparable period in 1939. Pig iron was the leading product imported, British India supplying 1794 tons of the 1830-ton total.

Scrap imports were 56 tons, valued at $1017, against 16 tons, valued at $148 in August. In September, 1939, scrap imports were 3216 tons, valued at $27,314. Scrap imports in nine months were 4484 tons, valued at $40,797, against 25,183 tons, valued at $249,041 in the January-September, 1939, period.

■ Attendance by employes at industrial training programs will not be considered working time requiring compensation by the employer, the wages and hours division of the United States labor department has ruled. Attendance must be voluntary and employes must not produce goods or perform any other productive work during the training periods.

UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

(Gross Tons)

Articles	Sept. 1940	Aug. 1940	Jan. through Sept. 1940
Pig iron	1,830	882	9,554
Sponge iron	.....	1	610
Ferromanganese (1)	.....	267	8,530
Spiegeleisen	25	25	9,213
Ferrochrome (2)	.....	.....	1
Ferrosilicon (3)	137	105	1,008
Other ferroalloys (4)	.....	.....	215
Steel ingots, blooms, etc.	.....	.....	3
Billets, solid or hollow	.....	.....	437
Concrete reinforc. bars	.....	.....	8
Hollow bar, drill steel	1	10	855
Bars, solid or hollow	11	43	1,798
Iron slabs	.....	.....	.....
Bar iron	.....	.....	194
Wire rods	37	5	3,986
Boiler and other plate (including skelp)	.....	1	10
Sheets, skelp, saw plate	2	11	115
Die blocks, blanks, etc.	.....	.....	12
Tin plate, taggers' tin and terneplate	11	6	89
Structural shapes	.....	19	710
Sashes and frames	.....	.....	16
Sheet piling	.....	.....	.....
Rails, track material	1	28	1,445
Cast-iron pipe, fittings	.....	.....	419
Mall. iron pipe fittings	27	.....	29
Welded pipe	.....	.....	31
Other pipe	336	190	2,685
Cotton ties	.....	.....	13
Other hoops and bands	2	.....	601
Barbed wire	.....	.....	86
Round iron, steel wire	34	43	883
Teleg., telephone wire	.....	.....	.....
Flat wire, steel strips	47	396	2,055
Wire rope and strand	4	19	490
Other wire	.....	.....	1
Nails, tacks, staples	1	2	107
Bolts, nuts, and rivets	1	1	129
Horse and mule shoes	.....	.....	3
Castings and forgings	35	35	468
Total	2,542	2,089	46,809
Iron and steel scrap	56	16	1,484
GRAND TOTAL	2,598	2,105	48,293

(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content.

Warehousing Steel

(*Concluded from Page* 58)

steel is segregated by trade name with color-indicating stripes. The various sizes of each grade are located by reference to a chart hanging in front of the rack and showing the size in each compartment.

Each grade of steel in the warehouse has its own color code designation. Not only is each section of the racks colored to designate the grade of steel stored there, but the ends of bars, tubes and plates are likewise painted to indicate the proper grade. This eliminates uncertainty in selecting grades and assures that a piece of cut steel will be returned to its proper place.

The advent of highly polished stainless steel presented new storage problems. These steels cannot rest against ordinary steel without becoming contaminated, and a minimum of handling is necessary to prevent marring the surface. Metal arms and uprights used to hold stainless bars and tubes are all wrapped with burlap so no metal can touch the stainless steel. See Fig. 3. The long bars or tubes are removed sidewise from the open racks, so there is no scraping or scratching of the surface when the pieces are handled.

Special new racks were built for stainless steel sheets. These racks permit storing sheets in the same packing boxes in which they are received. The boxes slide horizontally on their long edge into these racks. Rack divisions are not exactly vertical but are slanted a little so sheets will lie on edge in the open-top boxes. Rollers installed on the bottom of the racks permit the boxes to slide in and out of the rack easily. A portable stand has been designed to facilitate further the handling of these boxes. This stand, Fig. 2, is really an extension of a single rack but it is mounted on wheels so it can be moved in front of any division in the racks. When a box of steel sheets is pulled from the rack, it moves directly onto rollers on the stand. The rollers allow heavy loads to be moved with little effort. The stand can be moved away, or the box easily opened right on the stand if it is desired to remove only a few sheets as one side of the stand is open. This simple yet effective method assures minimum work in handling the stainless steel sheets while making all extremely accessible. Also it provides adequate protection and keeps the material in the best condition possible.

Overhead cranes are used in each bay for general handling. Cab-type units are equipped with two travelers or trolleys to facilitate handling long bars. Floor operated cranes, electric hoists and chain hoists are used extensively around cutting machines. Three-wheel shop trucks, pulled by electric tractors, are used for handling light materials between bays. Heavy 4-wheel solid-tired wagons move the heavy materials.

Bodies for most of the nine delivery trucks of the company are specially built. For the large trucks, a flat steel body is fastened directly on the chassis crossmembers. Slots for upright stakes are provided to allow the placing of long bars that may extend past the cab. Low side panels can also be put in place when desired.

To meet the customer demand for various sizes and shapes of materials, the company has installed a variety of equipment including several high-speed hack saws, circular saws, band saws and various size shears. Instead of maintaining a large stock of corrugated steel sheets, the firm has installed a corrugating machine and can turn out corrugated sheets to meet customers' specifications. The plant also is equipped with flame cutting equipment to cut any thickness of steel plate to any contour a customer may order. In addition, the company installs steel fences and fabricates suitable gates for these fences to meet specification.

Handling around these fabricating units is facilitated by a number of devices which have proved extremely useful. Fig. 1 shows welded structural iron stands equipped with ball casters on top. These permit plates and sheet packs to be moved about easily, greatly aid feeding the material and afford conveniently assembled temporary platforms for storing material in process of being sheared, flame cut, corrugated or for similar operations.

Likewise, stands topped by rollers afford an easy means of handling and feeding bars, rods and light structural shapes. Several of these stands are being used in Fig. 4 in connection with shearing operations.

Manual of Blueprint Reading for Welders

■ *Simple Blueprint Reading, with Special Reference to Welding;* simulated leather, 138 pages, 6 x 9 inches, 164 illustrations; published by Lincoln Electric Co., Cleveland, for 50 cents in the United States, 75 cents elsewhere.

A basis for study of blueprint reading is afforded in this volume, with practice in actual reading of drawings. While intended primarily for welders it contains information of value for anyone concerned with mechanical construction.

The text is written in practical language, the drawings are clear and lettering large. The discussion goes into every phase of the elements used in blueprint drawings and their interpretation.

A comprehensive explanation gives a clear understanding of various symbols used in drawings of various types of welded joints. Illustrations include practical examples of drawings of a number of machine parts, pipe connections, general construction, tanks and the like. A list of questions and answers allows the student to test his knowledge.

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*

Brass Widely Used in Making Clock Parts

The manufacture of precision clock parts is one of the many applications for which brass is ideally suited because of its ready workability.

Typical of the ways in which Bridgeport brass contributes to production economy is its use in the manufacture of automobile clocks at the plant of George W. Borg Corp. Brass sheet, specially engineered for fast production, is first passed through a blank and form die and then trimmed. In addition, the brass is selected to take a smooth finish by buffing with a minimum of labor.

Blanking and forming operations are employed in the production of clock parts from Bridgeport brass sheet.

Memos on Brass—No. 15

Brass offers a combination of desirable features found in few other materials: ease of working, low cost, relatively high tensile strength, resistance to corrosion, ready adaptability to a wide variety of decorative finishes.

Flame Cutting Now Adaptable to Brass

The popular flame cutting process can be readily adapted to cutting openings in brass plate or pipe by the use of a refractory paste, it has been reported.

The paste, it is said, consists of a mixture of water and a quick-drying iron cement, and is used to paint a band around the opening to be cut. The paste dries under the heat of the cutting flame, and acts as a refractory to protect the brass beyond the area of the cut.

It is said that a strongly oxidizing flame gives most uniform results. The method, it is reported, is often more economical than the use of circular saws for openings larger than 2 inches in diameter.

Lead Additions Improve Machining Characteristics of Forging Alloys

Control of Content Effects Necessary Compromise Between Ductility and Machinability Requirements

It is common brass mill practice to add small quantities of lead to all forging alloys, in order to obtain free machining characteristics. It is generally necessary to finish forgings by machining operations such as turning, drilling, and tapping. While these operations can be performed on non-leaded alloys, the presence of lead materially improves the ease with which the operations are performed. The improved machining characteristics are brought about largely by the effect of lead on the type of chip produced. (See Fig. 1.)

While the addition of lead is beneficial in machining forging alloys, there are limitations on the extent to which lead may be added, because of its deleterious effect on the forging properties. It is therefore apparent that forging alloys must represent compromises between alloys of maximum ductility and those of maximum machinability.

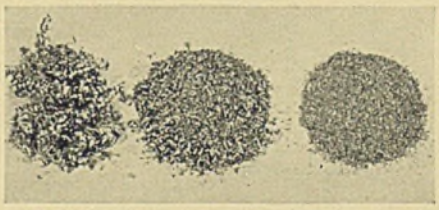


Fig. 1. Samples of chips produced with alloys having lead contents, from left to right, of 0%, 1.8%, and 3%.

Limitations on Lead Content

There are in general two such types of alloys: one for hot forging and one for cold forging. In cold forging alloys the lead content is limited by the nature of the forging operation. In order that the alloy may be made by hot working operations, the copper content is reduced below that of the alloy of maximum cold working characteristics and raised above that of the alloy of maximum hot working characteristics. Such an alloy, containing about 1.4% lead and 63% copper, is suitable for the simpler cold forging operations, can be readily machined, and is suitable for manufacture by hot working operations. In hot forging alloys the lead content is limited to about 2% because of the tendency toward cracking which develops if the lead content is much greater. In order to compensate for the higher lead content, the copper content is maintained below 60%. Such an alloy is not as free machining as standard leaded brass rod, but it is much more satisfactory for not forging than the standard leaded rod.

The nature of the compromise is illustrated by the samples in Fig. 2. Drop hammer tests were made on three alloys representing the extremes of maximum machinability on the left and maximum cold working ability on the right. In the center are samples of a compromise cold working alloy. In the upper row, the original sample is shown at the extreme left, together with the test samples after a series of blows from the drop hammer at room temperature. The greater ductility of the alloy on the right is obvious. However, at high temperatures, such as 750° C, the relative ductility is reversed because of the difference in copper contents. With the highest lead content, it can be seen that the sample has cracked. The center alloy therefore represents a compromise alloy on which some hot working, cold working, and machining operations can be performed.

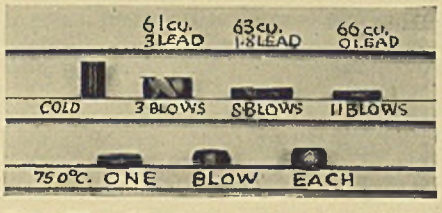


Fig. 2. Effect of drop hammer tests on alloys of different lead contents at room and at elevated temperatures.

In Fig. 3 are shown the effects of lead additions on an alloy of the best hot working properties. These samples indicate the effects of successively higher temperatures in the drop hammer test from left to right. The top row represents an alloy with no lead, the center row an alloy with 0.4% lead, and the bottom row an alloy of 1.75% lead. As the lead content increases, it becomes necessary to control more carefully the temperatures at which the hot working operation is carried out.

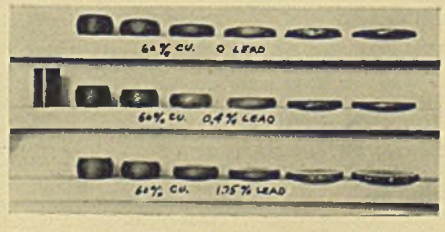


Fig. 3. Effects of lead additions on an alloy of the best hot working properties.

ALLOYS OF COPPER

This is the seventeenth of a series of articles on the properties and applications of copper alloys, and continues the subject of modifications of the copper-zinc alloys.

MODIFICATIONS OF THE COPPER-ZINC ALLOYS

As mentioned last month, the value of many of the modifications of the copper-zinc alloys was discovered by experience before the underlying reasons were clearly understood. It is probable, for example, that tin was first added to brass as the result of sheer accident. Experience soon indicated, however, that small quantities of tin were beneficial in reducing corrosion, particularly by sea water, and for this reason several alloys containing tin have been made for many years. Tin is also added to some alloys because it increases strength, and to others because of its effect on the color of the polished metal.

Effect of Iron

One element which has been added to brass for its strengthening effect is iron. This was common practice at one time. Because of the deleterious effects of iron in rolling and annealing operations, additions of iron are not now generally used in the wrought alloys, although they are still employed in the casting industry.

Manganese and aluminum have also been used in the past, particularly in cast alloys, because of their toughening and strengthening effects. All of these elements have been used for many years, and their use is the result of experience, except insofar as metallurgical study has promoted a clearer understanding of how and why they are beneficial.

Recent Studies

As a result of recent studies, other elements have been added to specific alloys for definite purposes. Arsenic, phosphorus, and antimony are added to condenser tube alloys to reduce the tendency to dezincification. Phosphorus is regularly added to high brass in England to assist in controlling grain size. Silicon is added to low brass to assist in pressure welding operations and improve the tensile strength. It is also added to Muntz Metal welding rod stock to prevent fuming during welding. Nickel is added to brass casting alloys to produce grain refinement, and in combination with aluminum or silicon it has been added to copper-zinc alloys in order to produce precipitation-hardening effects.

More detailed consideration of some of these modifications will be covered in future articles in this series.

Nickel Thickness Main Factor in Chrome Life

Thickness of nickel plate is the most important factor in the corrosion resistance of copper and brass coated with chrome-over-nickel and used in outdoor service, it has been demonstrated by long-time exposure tests.

The tests are said to prove conclusively that a coating of chromium applied directly to copper or brass offers very little protection, even in only mildly corrosive atmospheres. Nickel plating prior to chrome plating increases the protection value, and the degree of protection was found to increase with increased thickness of nickel plate.

Increasing the thickness of the chromium plating, on the other hand, showed an actual loss in protection value beyond a certain point, which apparently lies between 0.00001 and 0 00003 inch. Heavier coatings of chromium resulted in severe cracking, which penetrated through the nickel and allowed corrosion of the base metal.

The protection value of similar coatings was apparently only slightly affected by the choice of the base metal. Copper and various kinds of brass behaved similarly when coated with the same thicknesses of nickel and chromium.

Bridgeport will gladly refer readers to a source from which a complete report on these tests can be obtained.

New Solder Ends Need of Tinning or Fluxes

Reaction soldering—a new method of joining metals—is said to eliminate the need of tinning and fluxing and the use of the conventional solder bar. The process is reported to be applicable to copper, brass, and bronze.

The reaction solder, it is said, comes in powder form. When it is applied to the joint and heated to relatively low temperatures, a chemical reaction takes place between the solder and the metal, it is claimed. It is also stated that the reaction takes place rapidly, and that the low temperatures make it possible to join light-gage metals without warping and annealing.

Another application that has been suggested for reaction solder is the filling of cracks in castings.

NEW DEVELOPMENTS

Hammered metal finishes can be simulated by application of a new coating over a base coat, it is said. Maker states that the coating can be applied by means of a special spray gun, and that it is adaptable to any kind of metal. **(No. 120)**

A spot soldering machine is said to be designed to leave both hands free for holding the work. Treadle is reported to advance the iron, and solder is fed automatically as iron returns from the work. **(No. 121)**

A threading machine is designed for operations in which extremely close tolerances for concentricity between thread and body of work must be maintained, according to the manufacturer. **(No. 122)**

A large gas torch is said to be suitable for soldering copper fittings up to 6 inches in diameter. It is reported that the torch produces a flame 6 to 24 inches long and 4 to 8 inches wide. **(No. 123)**

A disc sander of the two-speed type has been developed for use in metal fabricating plants carrying on a variety of sanding, polishing, and buffing operations. It is said to provide high sanding efficiency at 4,200 RPM. At 1,300 RPM, it is said to be suitable for polishing operations with felt rubbing pads. **(No. 124)**

A power press is rated at 5 tons, has 1¼ inch stroke, 12 inch throat, is powered by a 1 HP motor, according to the maker. It is said that an automatic stock feed can be supplied to specification. **(No. 125)**

Electrical connectors are said to be provided with arched bearing surfaces that fit the curve of the conductor, assuring maximum contact and distributing pressure over curve of wires held. **(No. 126)**

A new liquid flux intended for use in bronze welding is reported to be especially advantageous where the bronze welding is continuous, the sections being joined are relatively light, and the joint is sufficiently exposed. **(No. 127)**

A magnetic separator is said to be useful in separating brass and iron turnings and borings, and is suitable for use in smelter plants. **(No. 128)**

A sensitive bench drill embodies a variable-speed drive that is said to give an infinitely variable spindle speed range from 2,000 to 10,000 RPM. Speed change is made by turning a hand-wheel, and an indicator shows operating speed. **(No. 129)**

A shellac fortifier is mixed with shellac to produce a liquid intended for application on patterns and core boxes, according to the maker. It is said that the product prevents sand from sticking, and protects the patterns from moisture and abrasion. **(No. 130)**

A new switch has been developed for line voltages up to 160 KV, currents to 2,000 amperes, it is announced. Bolts, nuts, pins, and lock washers are of bronze, it is reported. **(No. 131)**

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.

Momentum in Steel Still Accelerating

No slackening in prospect for months. Rapid consumption prevents building up inventories. Rationing rules. Situation remains orderly.

MARKET IN TABLOID ★

Demand
Increasing constantly.

Prices
Strong, with minor advances.

Production
Up 1 point to 96½, coinciding with June, 1929.

■ NO SIGNS of slackening demand, specifications or shipments in the steel industry for many weeks to come are yet visible, with evidences of still greater sales volume and more extended deliveries before the end of the year. Consumers, realizing the possible dangers ahead, are co-operating more closely with producers by anticipating needs more thoroughly, specifying on contracts more promptly and refraining from mere speculative buying. Consumers, too, wish the steel industry itself to ration steel without the issuance of priorities by Washington.

Steel production advanced 1 point to 96½ per cent last week, best since June 1929 when an identical rate was attained.

Consumers are using up steel so fast that they are not able to build up substantial inventories. Occasionally delivery periods appear stabilized and in a few instances prompter deliveries than previously can be promised, such as light plates.

Prices are the firmest in many years. Automobile makers have been paying full published prices recently, as indicated by the purchase of 20,000 tons of cold-rolled sheets by the Chevrolet Motor Co. Even galvanized roofing sheets are firm.

For most makers and jobbers October sales were the best of this year, or even years. In a few cases September sales had been better but October shipments were much superior. Though commercial steel sales and production still dominate, defense business permeates more and more. A typical new inquiry is for molybdenum steel commodity strip for manufacture into soldiers' helmets. Many sales are for defense work when not apparent at the placing of the order, such as galvanized sheets for cantonment roofing. Much shell steel is being rolled on rail mills preliminary to forging and more is handled on large bar mills.

October production of coke pig iron is estimated by STEEL at 4,384,194 net tons as against actual September output of 4,172,551 tons, or 141,426 tons daily compared with 139,085 tons daily for September, the latter having been a record for September since figures were compiled. Production was at 93 per cent of capacity. There was a net gain of four stacks in October, only one having been withdrawn, 196 being active Oct. 31.

Four railroads ordered 63,000 tons of rails the past week, the largest in several weeks, the Southern Pacific having placed 25,000 tons in addition to 15,000 tons ordered the week before. The Missouri Pacific is inquiring for 31,750 tons, plus accessories. Thus the usual rail buying movement is getting off according to schedule but deliveries may be delayed longer than usual.

Automobile production for the week ended Nov. 2 was 118,092 units as against 82,690 for the same week in 1939, a gain of 1012 for the week and a new high for the year.

Indications are that 64,000,000 tons of Lake Superior iron ore will have been shipped down the lakes for the season ended about Dec. 1, the fourth largest on record. It is estimated that ore at lower lake docks and on furnace yards May 1, 1941 will be only 10,000,000 to 12,000,000 tons, among the lightest on record.

Pig iron producers generally have not followed the advance of $1.50 to $2 per ton made by a Pittsburgh producer on Oct. 25. A flurry of new demand followed the price announcement, but soon subsided.

Some large steel producers comment on the thoroughly diversified character of orders as regards products and the well rounded condition of order books. Slow moving commodities are rare, tin plate and oil country goods being among the few.

Exports of iron and steel, excluding scrap, in September were 965,444 tons as against 1,046,084 tons in August, an all-time high, and 244,933 tons in September, 1939. For nine months they have been 5,489,951 tons against 1,516,988 tons for the same period of 1939. Exports of scrap in September were 255,608 tons compared with 355,991 tons in August.

Steel operating rates last week gained in six areas, was lower in Detroit only, dropping 2 points to 95 per cent, and unchanged in five districts, a net general rise to 96½ per cent. Gains were: St. Louis, 2½ points to 85, Birmingham, 3 points to 100, Eastern Pennsylvania, 1 point to 94, Pittsburgh, 3 points to 95, Wheeling, 5 points to 98½ and Buffalo, 4½ points to 95. Unchanged areas were Cincinnati at 94, Cleveland at 90, New England at 90, Chicago at 98 and Youngstown at 91.

COMPOSITE MARKET AVERAGES

	Nov. 2	Oct. 26	Oct. 19	One Month Ago Oct., 1940	Three Months Ago Aug., 1940	One Year Ago Nov., 1939	Five Years Ago Nov., 1935
Iron and Steel....	$38.06	$38.07	$38.07	$38.07	$37.70	$37.50	$33.15
Finished Steel	56.60	56.60	56.60	56.60	56.60	55.90	53.70
Steelworks Scrap..	20.54	20.54	20.54	20.56	18.71	20.06	12.92

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

	Nov. 2, 1940	Oct. 1940	Aug. 1940	Nov. 1939
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	2.15	2.15
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	2.15	2.275
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00
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	2.00
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
Wre rods No. 5 to ⅝-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	Nov. 2, 1940	Oct. 1940	Aug. 1940	Nov. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$24.34
Basic, Valley	22.50	22.50	22.50	22.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	24.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	24.21
No. 2 foundry, Chicago	23.00	23.00	23.00	23.00
Southern No. 2, Birmingham	19.38	19.38	19.38	19.38
Southern No. 2 del. Cincinnati	23.06	23.06	23.06	23.06
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	25.215
Malleable, Valley	23.00	23.00	23.00	23.00
Malleable, Chicago	23.00	23.00	23.00	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melt. steel, Pitts.	$21.50	$21.30	$18.75	$21.90
Heavy melt. steel, No. 2, E. Pa.	19.75	19.75	18.35	19.25
Heavy melting steel, Chicago	19.75	19.85	18.15	17.45
Rails for rolling, Chicago	24.25	24.05	22.00	20.50
Railroad steel specialties, Chicago	23.25	23.25	21.05	21.50

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$5.00
Connellsville, foundry, ovens	5.75	5.75	5.75	6.00
Chicago, by-product fdry., del.	11.75	11.75	11.25	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. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold strp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
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

Bars

Soft Steel

(*Base, 20 tons or over*)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(*Base, 5 tons or over*)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.50c

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)	56
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

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy 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 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.20
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

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	68 off
Do., ⅛ and ⅜ x 6-in. and shorter	66 off
Do., ¾ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5-10 off; with nuts attached 72.5 off; bulk 82 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	66	70
⅝-1-inch	63	65
1⅛-1½-inch	61	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off	

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

Steel

In.	Blk.	Galv.
⅛	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

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

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

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—Pet 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 ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to ⅝-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

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.25- 5.50
Connell, prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	11.00
Chicago, delivered	11.75
Terre Haute, del.	11.25
Milwaukee, ovens	11.75
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del.	11.55
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.63

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
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.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birmingham, Ala.‡	19.38	....	18.38	24.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	22.00	....	....	....
*Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	....	23.50	....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher. *One producer quotes $2 higher on bessemer, $1.50 higher on other grades.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	....	23.66	....
Boston from Birmingham	24.12	....	....	....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	....	....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	....	....	....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	....
Cincinnati from Birmingham	23.06	....	22.06	....
Cleveland from Birmingham	23.32	....	22.82	....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	....	....	....
Newark, N. J., from Bethlehem	25.53	26.03	....	....
Philadelphia from Birmingham	24.46	....	23.96	....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	....
Pittsburgh district from Neville Island	(Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	26.00

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	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	19.00
Do. barge	18.00
No. 2 lump	20.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 36.00
Do., 26-28% 49.50

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., 2½ per cent carbon 118.00
2% carbon, 108.00; 1%, 133.00
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

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

Ferrotitanium, 40-45%, lb., con. tl., 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%, tl., 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% tl., 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. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c 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., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., spot 107.50
34-40%, 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	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.30	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.25	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	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.40	3.22	3.75	8.40	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.45	....	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.64	3.20	3.80	8.70	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	..	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.50	7.20
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.20	4.35	4.75	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	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	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	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	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	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	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.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	.. .	5.25	.. .	....	....	....
Seattle	4.00	3.85	5.20	3.65	3.75	5.75	3.70	6.50	5.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	...
Los Angeles	4.15	4.60	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.55	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.35	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	3.82	7.47	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	5.00	9.65	8.80	8.65	9.30

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; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia.

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.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Official Rates of Exchange

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports: £ s d	Continental Channel or North Sea ports gross tons‡‡: Quoted in dollars at current value	Continental Channel or North Sea ports gross tons‡‡: **Quoted in gold pounds sterling: £ s d
Foundry, 2.50-3.00 Si.	....	$33.23	3 18 0
Basic bessemer	....	.....	.....
Hematite, Phos. .03-.05	....	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	....	$48.99	5 15 0
Merchant bars	2.66c 11 15 0	2.77c	7 6 0
Structural shapes	2.48c 13 15 0	2.83c	7 9 0
Plates, ¼ in. or 5 mm.	2.68c 14 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	3.40c 18 17 6	2.98c	7 17 0[6]
Sheets, gal., 24 ga., corr	3.98c 22 2 6	3.94c	10 7 6
Bands and stripes	....	2.76c	7 5 0
Plain wire, base	....	3.15c	8 6 3
Galvanized wire, base	....	3.75c	9 17 6
Wire nails, base	....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.61 1 7 9	.....	.....

British ferromanganese $120 00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French ‡‡Francs		Belgian ‡‡Francs		Reich ‡‡Mar
Fdy. pig iron, Si. 2.5	$24.24	6 0 0(a)	$17.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	22.83	5 13 0(a)	.....	...	29.79	900	27.94	(b) 69 50
Furnace coke	6.77	1 13 5	4.91	225	10.92	320	7.64	19
Billets	42.42	10 10 0	26.62	1,221	42.20	1.275	38.79	96
Standard rails	2.30c	12 15 6	1.69c	1.692	2.06c	1.375	2.38c	132
Merchant bars	2.78c	15 8 6††	1.53c	1.530	2.06c	1.375	1.98c	110
Structural shapes	2.46c	13 13 0††	1.49c	1.487	2.06c	1.375	1.93c	107
Plates, ¼-in. or 5 mm.	2.55c	14 3 0††	1.95c	1.951	2.42c	1.610	2.29c	127
Sheets, black	3.49c	19 17 6§	2.30c	2.295‡	2.85c	1.900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4.07c	22 12 6	3.59c	3.589	4.80c	3.200	6 66c	370
Plain wire	3.83c	21 5 0	2.34c	2.340	3.00c	2.000	3.11c	173
Bands and strips	2.91c	16 3 6††	1.71c	1.713	2.48c	1.650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm, basic price

British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel.

(a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed.

††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. ‡‡No quotations.

IRON AND STEEL SCRAP PRICES

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

HEAVY MELTING STEEL

Birmingham, No. 1.	18.00
Bos. dock No. 1 exp.	17.00-17.25
New Eng. del. No. 1	17.00-17.50
Buffalo, No. 1	20.00-20.50
Buffalo, No. 2	18.00-18.50
Chicago, No. 1	19.50-20.00
Chicago, auto, no alloy	18.50-19.00
Cincinnati, dealers.	17.00-17.50
Cleveland, No. 1	20.50-21.00
Cleveland, No. 2	19.50-20.00
Detroit, No. 1	†16.25-16.75
Detroit, No. 2	†15.25-15.75
Eastern Pa., No. 1	20.50-21.00
Eastern Pa., No. 2	19.50-20.00
Federal, Ill., No. 2	16.25-16.75
Granite City, R. R. No. 1	17.25-17.75
Granite City, No. 2	16.00-16.50
Los Ang., No. 1 net	12.75-13.25
Los Ang., No. 2 net	11.75-12.25
N. Y. dock No. 1 exp.	†17.00
Pitts., No. 1 (R. R.)	23.00-23.50
Pittsburgh, No. 1	21.00-22.00
Pittsburgh, No. 2	19.50-20.00
St. Louis, No. 1	17.25-17.75
St. Louis, No. 2	16.00-16.50
San Fran., No. 1 net	13.00-13.50
San Fran., No. 2 net	12.00-12.50
Seattle, No. 1	15.00
Toronto, dlrs., No. 1	11.00-11.25
Valleys, No. 1	21.00-21.50

COMPRESSED SHEETS

Buffalo	18.00-18.50
Chicago, factory	19.00-19.50
Chicago, dealers	17.50-18.00
Cincinnati, dealers.	16.00-16.50
Cleveland	20.00-20.50
Detroit	†18.00-18.50
E. Pa., new mat.	21.00
E. Pa., old mat.	17.50-18.00
Los Angeles, net	9.25- 9.75
Pittsburgh	21.00-22.00
St. Louis	15.00-15.50
San Francisco, net.	9.50-10.00
Valleys	19.50-20.00

BUNDLED SHEETS

Buffalo, No. 1	18.00-18.50
Buffalo, No. 2	16.50-17.00
Cleveland	15.00-15.50
Pittsburgh	19.50-20.00
St. Louis	13.50-14.00
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	14.00-14.50
Cincinnati, dealers.	11.50-12.00
Detroit	†14.50-14.75
St. Louis	13.00-13.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	14.50
Buffalo, No. 1	18.00-18.50
Chicago, No. 1	18.50-19.00
Cincin., No. 1 deal.	13.00-13.50
Cincin., No. 2 deal.	7.25- 7.75
Cleveland, No. 2	14.00-14.50
Detroit, No. 1 new.	†17.25-17.75
Valleys, new, No. 1	19.50-20.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	7.50
Buffalo	13.50-14.00
Chicago	13.75-14.25
Cincinnati, dealers.	9.75-10.25
Cleveland, no alloy.	13.50-14.00
Detroit	†9.75-10.25
Eastern Pa.	14.50-15.00
Los Angeles	4.00- 5.00
New York	†9.00- 9.50
Pittsburgh	15.50-16.00
St. Louis	10.50-11.00
San Francisco	5.00
Toronto, dealers	7.25- 7.50
Valleys	14.00-14.50

SHOVELING TURNINGS

Buffalo	14.50-15.00
Cleveland	14.00-14.50
Chicago	14.00-14.50
Chicago, spcl, anal.	15.00-15.50
Detroit	†12.00-12.50
Pitts., alloy-free	17.00-17.50

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†7.75- 8.25
Buffalo	13.50-14.00
Cincinnati, dealers.	8.00- 8.25
Cleveland	14.00-14.50
Eastern Pa.	13.00-13.50
Detroit	†11.50-12.00
New York	†8.75- 9.00
Pittsburgh	14.00-14.50
Toronto, dealers	7.00- 7.25

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†12.00-12.50
Chicago, elec. fur.	19.00-19.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	13.75-14.25
Toronto	7.25- 7.50

CAST IRON BORINGS

Birmingham	8.50
Boston dist. chem.	†9.75-10.00
Buffalo	13.50-14.00
Chicago	13.50-14.00
Cincinnati, dealers.	8.00- 8.25
Cleveland	14.00-14.50
Detroit	†11.75-12.25
E. Pa., chemical	14.50-15.00
New York	†10.00-10.50
St. Louis	10.00-10.50
Toronto, dealers	7.25- 7.50

RAILROAD SPECIALTIES

Chicago	23.00-23.50

ANGLE BARS—STEEL

Chicago	22.00-22.50
St. Louis	20.00-20.50

SPRINGS

Buffalo	24.50-25.00
Chicago, coil	24.50-25.00
Chicago, leaf	23.00-23.50
Eastern Pa.	25.00-26.00
Pittsburgh	27.50-28.00
St. Louis	22.00-22.50

STEEL RAILS, SHORT

Birmingham	19.50
Buffalo	25.50-26.00
Chicago (3 ft.)	22.75-23.25
Chicago (2 ft.)	24.00-24.50
Cincinnati, dealers.	23.75-24.25
Detroit	†23.00-23.50
Pitts., 2 ft. and less	27.00-27.50
St. L. 2 ft. & less	23.50-24.00

STEEL RAILS, SCRAP

Birmingham	17.00
Boston district	†14.50-15.00
Buffalo	22.00-22.50
Chicago	19.50-20.00
Cleveland	24.00-24.50
Pittsburgh	24.00-24.50
St. Louis	20.50-21.00
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	13.00-13.50
Cincinnati, dealers.	12.75-13.25

RAILROAD GRATE BARS

Buffalo	14.00-14.50
Chicago, net	14.00-14.50
Cincinnati, dealers.	12.25-12.75
Eastern Pa.	18.00-18.50
New York	†12.00-12.50
St. Louis	14.00-14.50

RAILROAD WROUGHT

Birmingham	16.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	20.00-20.50
St. Louis, No. 1	15.00-15.50
St. Louis, No. 2	17.50-18.00

FORGE FLASHINGS

Boston district	†12.00-12.25
Buffalo	18.00-18.50.
Cleveland	19.00-19.50
Detroit	†16.25-16.75
Pittsburgh	19.50-20.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	24.00-24.50

LOW PHOSPHORUS

Cleveland, crops	23.50-24.00
Eastern Pa., crops	25.00-25.50
Pitts., billet, bloom, slab crops	28.00-28.50

LOW PHOS. PUNCHINGS

Buffalo	24.00-24.50
Chicago	22.75-23.25
Cleveland	21.50-22.00
Eastern Pa.	25.00-25.50
Pittsburgh	26.50-27.00
Seattle	15.00
Detroit	†19.75-20.25

RAILS FOR ROLLING
5 feet and over

Birmingham	20.00
Boston	†17.50-18.00
Chicago	24.00-24.50
New York	†18.50-19.00
Eastern Pa.	25.00-26.00
St. Louis	23.50-24.00

STEEL CAR AXLES

Birmingham	18.00
Boston district	†18.50-19.00
Chicago, net	24.00-24.50
Eastern Pa.	25.00-25.50
St. Louis	23.50-24.00

LOCOMOTIVE TIRES

Chicago (cut)	22.50-23.00
St. Louis, No. 1	20.50-21.00

SHAFTING

Boston district	†19.00-19.25
New York	†20.00-20.50
Eastern Pa.	25.00-25.50
St. Louis, 1¼-3¾".	19.75-20.25

CAR WHEELS

Birmingham, iron.	15.00
Boston dist., iron.	†15.50-16.00
Buffalo, steel	24.50-25.00
Chicago, iron	21.00-21.50
Chicago, rolled steel	23.50-24.00
Cincin., iron deal.	20.00-20.50
Eastern Pa., iron	21.50-22.00
Eastern Pa., steel	25.50-26.00
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	27.50-28.00
St. Louis, iron	20.50-21.00
St. Louis, steel	22.00-22.50

NO. 1 CAST SCRAP

Birmingham	17.00
Boston, No. 1 mach.	†17.00-17.25
N. Eng. del. No. 2	15.50-16.00
N. Eng. del. textile.	20.00-21.00
Buffalo, cupola	18.50-19.00
Buffalo, mach.	20.00-20.50
Chicago, agri. net.	15.50-16.00
Chicago, auto net.	18.00-18.50
Chicago, railr'd net	16.50-17.00
Chicago, mach. net.	17.75-18.25
Cincin., mach. deal.	20.75-21.25
Cleveland, mach.	22.50-23.00
Detroit, cupola, net.	†16.75-17.25
Eastern Pa., cupola.	22.50-23.00
E. Pa., No. 2	19.50
E. Pa., yard fdry.	19.50-20.00
Los Angeles	16.50-17.00
Pittsburgh, cupola.	20.50-21.00
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	19.25-19.75
St. L., No. 1 mach.	20.00-20.50
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†15.50-15.75
New England, del.	16.25-16.75
Buffalo, break	17.50-18.00
Cleveland, break, net	16.50-17.00
Detroit, auto net.	†17.00-17.50
Detroit, break.	†14.75-15.25
Eastern Pa.	21.50
Los Ang., auto, net.	13.00-14.00
New York break.	†16.00-16.50

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†12.50-12.75
Buffalo	17.00-17.50
Chicago, net	13.00-13.50
Cincinnati, dealers.	12.75-13.25
Detroit, net	†11.50-12.00
Eastern Pa.	18.00-18.50
New York fdry	†13.50
St. Louis	14.50-15.00
Toronto dealers, net	12.00

MALLEABLE

New England, del.	22.00-23.00
Buffalo	22.50-23.00
Chicago, R. R.	23.50-24.00
Cincin. agri., deal.	18.25-18.75
Cleveland, rail	23.50-24.00
Eastern Pa., R. R.	22.50-23.00
Los Angeles	12.50
Pittsburgh, rail.	25.00-25.50
St. Louis, R. R.	20.50-21.00

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.	$23.50-24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c
F.O.B. Rio Janeiro.	
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, cif.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	.....
So. African, 50-52%	54.00-55.00
Indian, 49-50%	54.00
Brazilian, 46%	50.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	80.75

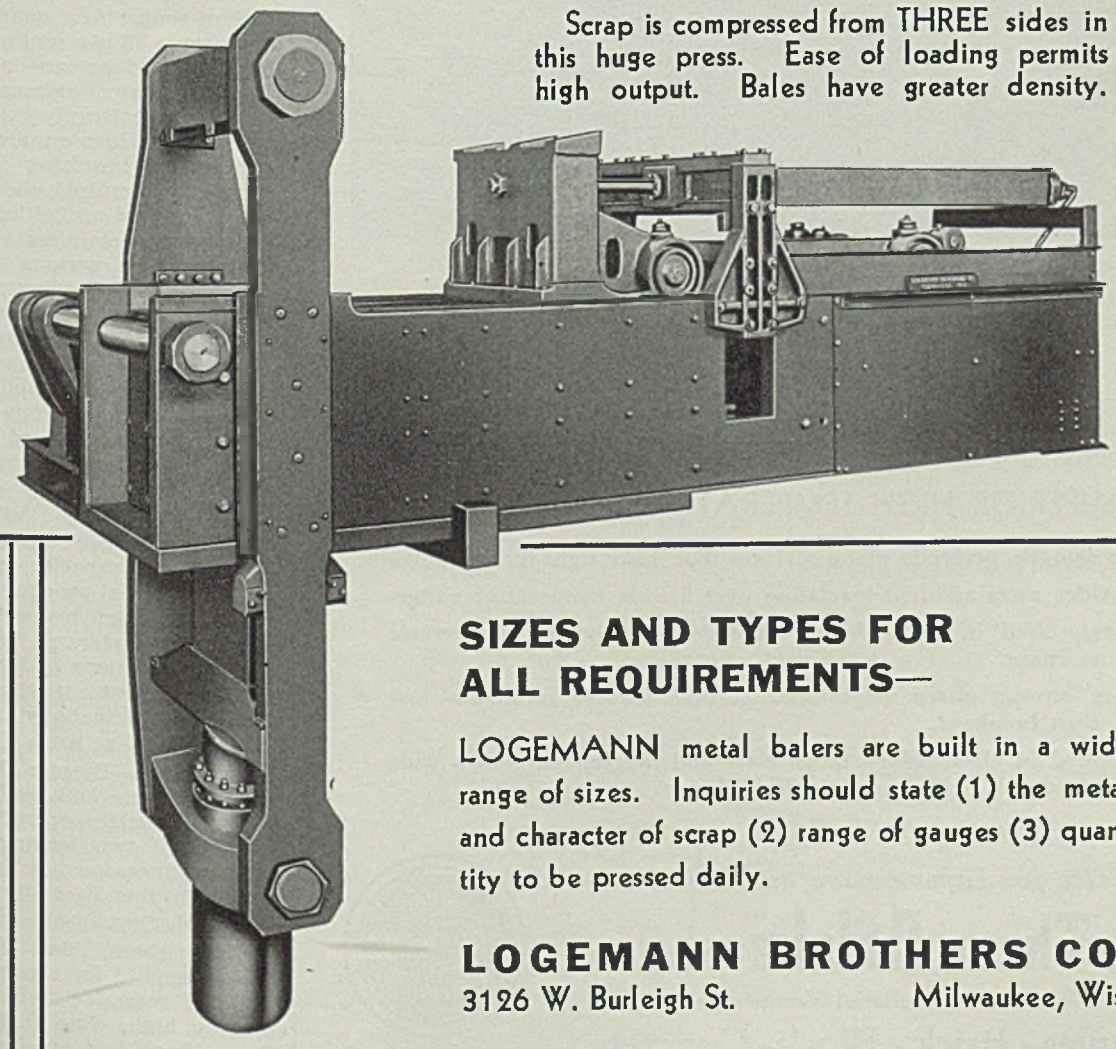
SHEET SCRAP?

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.
3126 W. Burleigh St. Milwaukee, Wis.

Sheets, Strip

Sheet & Strip Prices, Pages 100, 101

Cleveland—Auto makers are buying cold-rolled sheets and strip and paying full prices. Chevrolet last week placed 20,000 tons of sheets and other makers also bought. Though deliveries generally lengthen hot-rolled sheets can be had for three weeks shipment. Salesmen still canvass the trade actively.

Pittsburgh — Heavy buying representing larger inventory purchasing by miscellaneous buyers, as well as substantial releases from automotive concerns, continues to swell sheet bookings. Operating rate has passed 80 per cent. Domestic business represents almost the entire total. Galvanized sheet production also holds at 80 per cent, while the narrower strip mills are running steadily at 70 per cent.

Chicago—Considerable sheet demand is coming from automotive partsmakers and the household appliance industry. In connection with the latter, it is understood that demand for electric ranges is particularly good with the government expecting to install large numbers in permanent army cantonments. Mills are booked into late December and accepting first-quarter business at prices then in effect.

Boston—Cold strip rollings are being routed through mills, with defense contracts and products given preference. Suppliers of hot material follow the same practice, with voluntary priorities operative. Buying is unabated. Bookings are ahead of heavy shipments and backlogs are mounting.

New York—Sheet deliveries have become more or less stable, in the experience of some leading sellers. The average on hot and cold-rolled sheets is about six weeks, with some specifications available in less, particularly in heavier gages, on which some producers can still make delivery within three weeks. Galvanized sheet schedules do not appear to be quite as rigid as they were, notwithstanding substantial government buying.

Philadelphia—Sheet buyers show growing concern over delays in mill shipments, indicated by expanding volume of forward orders. Some sellers report first quarter business represents 75 per cent of total bookings. Backlogs are accumulating despite heavy shipments. Pittsburgh Steel Drum Co., Pittsburgh, is reported low on army gasoline containers requiring about 4000 tons of galvanized sheets, bids recently opened at Baltimore. Heavy demand for stainless sheets is developing for various war department needs, including several hundred tons for field ranges.

Buffalo—With backlogs mounting, shipments of sheet and strip steel are expected to establish new records in fourth quarter. With mills working at top speed six days a week, deliveries held about the same with common grades extended no more than three to four weeks.

Cincinnati—Sheet mills are operating near capacity, with orders matching this production. Orders for national defense needs are growing in importance. Inquiries for delivery positions in the first quarter are almost entirely confined to the Atlantic seaboard. Galvanized is especially active.

St. Louis—Despite heavy shipments sheet and strip backlogs grow. Capacity operations are reported by two leading producers, with business on hand sufficient to maintain this pace during November and December.

Birmingham, Ala.—Widely diversified demand for sheets, both roofing and manufacturers, keeps production high, close to 85 per cent. Some backlogs are accumulating

in sheets, due to the need for raw steel in other departments.

Toronto, Ont.—Sheet sales are heavy with current booking for delivery in 1941. Automotive buying is larger, particularly for truck production. Miscellaneous purchases have shown improvement.

Plates

Plate Prices, Page 100

Pittsburgh — Producers are planning to increase tonnage of plates rolled on wide continuous mills. Regular plate facilities are still running at full blast. Backlogs continue to mount, as bookings are heavy.

Cleveland—Plates 90 inches and wider are most difficult to get for reasonable delivery. Shipbuilders and tank makers will buy heavily for many months yet. Plates are among the tightest among steel products. Exceptionally, certain plates have sold recently for next week delivery. Warehouses are anxious to lay in larger stocks, but extended deliveries handicap them.

Chicago — Plate requirements continue to expand with increasing activity of heavy construction industries. Railroad car builders, tank and boiler fabricators and heavy machinery builders are ordering heavily and pressing for early deliveries. Mills, heavily booked and with large backlogs, are extending deliveries.

Boston — Except for structural shops, plate fabricators maintain purchases, with deliveries lengthening. On light tank plates average shipment has lengthened to four weeks and more; on wide and alloy material, eight weeks, dependent on rolling schedules. Heads, flanged work and semi-fabricated are slightly more active and pressure for deliveries severe.

New York—Plate specifications are heavier and increasingly diversified. Deliveries are being pushed back steadily as a result of buying not only for definite needs but for stock. On plates up to 42 inches or so, especially universal plates, customers can still get shipments in three weeks and less. On plates of medium width ranging up to 84 inches, they can do anywhere from four to six and seven weeks, depending in part on luck in obtaining rollings, and on anything above seven and eight weeks is the rule.

Philadelphia — Plate capacity for remainder of the year is expected to be completely sold by mid-November, as orders continue in

excess of production. Plates generally must be ordered for specific jobs, this preventing extensive forward coverage. However, some small tonnages have been entered for first quarter delivery. Most miscellaneous users are busy though defense work still is the backbone of demand. Floor plates are active.

Birmingham, Ala.—Plate production is at capacity, with deliveries being further advanced, due to needs of shipbuilding, car production, tank output and for miscellaneous uses.

Seattle—Awards are pending for equipment required for plant additions for Puget Sound Pulp & Timber Co., Bellingham, Wash. Other pulp plants in this area are also considering expansion. Plant of Commercial Boiler Works, Seattle, has been acquired by Associated Shipbuilders, Seattle, and will be moved to the latter firm's yard on Harbor Island.

Toronto, Ont.—Plate bookings are heavier, largely due to immediate increase in war tank production and shipbuilding activities. The first heavy war tanks will be completed early next month at the Angus shops of Canadian Pacific Railway Co., near Montreal.

Plate Contracts Placed

4800 tons, two C-3 type cargo vessels for United States maritime commission, to Seattle-Tacoma Shipbuilding Corp., Tacoma, Wash.

2940 tons, five seaplane tenders for navy, to Lake Washington Shipyards, Houghton, Wash.

1960 tons, four seaplane tenders for navy, to Associated Shipbuilding Co., Seattle, Wash.

1590 tons, 30-inch diameter pipe for installation in New York state, to American Rolling Mill Co., Middletown, O.

160 tons, 51½-inch welded steel pipe, Seattle, to Puget Sound Machinery Depot, Seattle.

120 tons, 30-inch pipe, St. Louis, to American Rolling Mill Co., Middletown, O.

Plate Contracts Pending

1899 tons, fabricated high-strength, low-alloy steel plates with eye-bolts, bolts and cap screws, Panama, schedule 4486, bids Nov. 15, Washington.

Unstated, 500,000-gallon elevated tank for Elmendorf Field, Anchorage, Alaska; bids in at Seattle.

Unstated, one steel hull for drill barge, Panama, schedule 4462; bids Nov. 12, Washington.

Unstated, 300,000-gallon elevated water tank, Raritan arsenal, Metuchen, N. J.; bids Nov. 8, inv. 95, commanding officer.

Unstated tonnage, eight dump scows, Panama, schedule 4432, Dravo Corp., Pittsburgh, low, $1,196,000; bids Oct. 29, Washington.

Unstated, 500,000-gallon elevated steel tank, piping and accessories, Fort Dix, N. J.; bids Nov. 14, constructing quartermaster.

Unstated, one 500,000-gallon elevated steel water tank and one 50,000-gallon elevated tank, Fort Bliss, Tex.; bids Nov. 7, inv. 6289-2, constructing quartermaster.

Bars

Bar Prices, Page 100

Cleveland—Some diversified makers find bar delivery slipping. Though consumers try to build up inventories continued heavy consumption prevents this. Makers are resolved to change rolls less often than formerly, which further delays deliveries. Large rounds and small bar angles are difficult to get promptly. Shell steel monopolizes many rail mills and heavy bar mills. Rarely priority slips are presented to makers, usually tracing back to machine tool builders. Firmness of prices goes unchallenged.

Chicago — Bars show the greatest strength of all steel products, so heavy and diversified is demand. Most mills are well booked for the balance of the year, although it is still possible to give reasonable de-

livery on certain grades and sizes. Some business is being booked for first quarter at the price then prevailing.

Boston — Bar specifications are brisk, notably alloys, and some tonnage is being placed for delivery next quarter at open prices. Heavy consumption, including defense materials, is bringing out buying. Deliveries are lengthening on all finishes.

New York—Bar buying is heavy and with much additional work in sight consumers and jobbers are endeaving to increase stocks. In some lines of specially treated alloy stock, little can be had for shipment before second quarter of next year. Some producers are deliberately reserving some capacity on first quarter rolling schedules for possible emergencies.

Philadelphia — Bar mill backlogs are sustained by steady accumulation of forward tonnage. Buyers are little concerned over first quarter prices but anxious to obtain protection on deliveries for that period.

Birmingham, Ala.—Bar buying is steady. While much tonnage is for concrete reinforcing, merchant bar buying is heavy. Some backlog is reported in bar specifications which are currently at better than 80 per cent of capacity.

Toronto, Ont.—Under pressure of widely diversified buying by manufacturers throughout the Dominion, merchant bar sales are increasing steadily with delivery dates well into next year. Inquiries indicate there will be sharp increase in merchant bar business immediately after Jan. 1.

Pipe

Pipe Prices, Page 101

Pittsburgh — New pipe line business is light. However, standard pipe demand is strong and mechanical tubing continues to increase with new miscellaneous buying active.

Cleveland — Demand for merchant pipe is good and well distributed. Operations are satisfactory and prices unusually firm. Line pipe for gas and oil is extremely dull and casings are moving slowly.

New York — Heavy orders are being placed for steel pipe and tubing. Notwithstanding a moderate seasonal slackening in the building field, there is increased volume for government work and inventories. An active demand for bed tubing for army cots is noted. Mechanical tubing moves well, due to high pace in the machinery industry. Shipbuilding takes much boiler tubing.

San Francisco—While only one large inquiry is in the market, small lots of less than 100 tons, are in great demand and distributors are hard pressed to keep their stocks up. An award is expected to be made within a few days on 2500 tons for Los Angeles, to be distributed between United States Pipe & Foundry Co., American Cast Iron Pipe Co. and National Cast Iron Pipe Co. Awards this year total 38,715 tons, compared with 34,314 tons for the same period a year ago.

Boston—Merchant steel pipe demand is broadening for cantonments, industrial plants and housing projects. This causes lowering of distributor stocks and on replacements mill prices are firmer. Resale prices are stronger. Industrial demand for tubing holds generally, increasing with aircraft

plants. Wrought pipe is some better. Cast pipe buying slackens.

Cast Pipe Placed

1200 tons, 6 to 16-inch, class 150, Fort Devens, Mass., to Warren Pipe Co., Everett, Mass.

400 tons, 8 and 10-inch, Bangor, Me., to R. D. Wood & Co., Florence, N. J.

325 tons, 8-inch, cement-lined, Taunton, Mass., to Warren Pipe Co., Everett, Mass.

Cast Pipe Pending

2470 tons, class B, department of public works, Chicago; bids Nov. 7; includes 1140 tons 8-inch, 1232 tons 12-inch, 98 tons 30-inch.

800 tons, naval air station, Quonset Point, R. I.

450 tons, West Myrtle street extension, Seattle; bids Nov. 7.

350 tons, two Seattle water system extensions; general contracts awarded.

Steel Pipe Placed

Unstated tonnage, 5600 linear feet 24-inch steel pipe for water main extension, Washington, D. C., to Maryland Culvert Co., Baltimore; Warren F. Brenizer Co., Washington, general contractor.

Rails, Cars

Track Material Prices, Page 101

Atchison, Topeka & Santa Fe furnished the high light last week with purchase of 2800 freight cars, 20 light-weight stainless steel passenger cars, two 4000-horsepower diesel-electric passenger locomotives and 18,000 tons of rails. Chicago, Rock Island & Pacific has been given court approval for purchase of four diesel-electric locomotives. Two will be of 2000 horsepower for use on a streamlined all-Pullman train operated jointly with the Southern Pacific.

Iran State Railways has distributed more than 175,000 tons of rails and accessories among several American producers on an inquiry which had been pending several months.

Car Orders Placed

Atchison, Topeka & Santa Fe, 2000 fifty-ton wood-lined box cars, to Pullman-Standard Car Mfg. Co., Chicago; 20 lightweight stainless steel passenger cars, to Edward G. Budd Mfg. Co., Philadelphia; 300 ballast cars to Rodger Ballast Car Co., Chicago; 500 cars, gondolas, flats and hoppers, to General American Transportation Corp. Chicago.

Baltimore & Ohio, 250 sixty-five-ton gondolas to Bethlehem Steel Co., Bethlehem, Pa.

War department, 260 10,000-gallon gasoline tank cars, to American Car & Foundry Co., New York.

Car Orders Pending

Bureau of supplies and accounts, navy department, two 50-ton box cars, bids Nov. 15, schedule 3911, for White Plains, Md.

Lehigh & New England, 300 fifty-ton hopper cars.

Seaboard Air Line, 500 fifty-ton all-steel box cars and 200 seventy-ton hoppers; bids Nov. 18.

Rail Orders Placed

Atchison, Topeka & Santa Fe, 18,000 tons, 112-pound rails, to Colorado Fuel & Iron Corp., Denver.

Chicago, Milwaukee, St. Paul & Pacific, 11,200 tons to Carnegie-Illinois Steel Corp., 4800 tons to Inland Steel Co., Chicago.

Southern Pacific, 40,000 tons; 25,000 tons to Colorado Fuel & Iron Corp., Denver, 15,000 tons to Columbia Steel Co., previously reported.

Wheeling & Lake Erie, 4000 tons to Carnegie-Illinois Steel Corp., Pittsburgh.

Rail Orders Pending

Missouri Pacific, 31,750 tons, plus accessories; court permission granted; includes 27,410 tons 112-pound and 4340 tons 90-pound rails.

Locomotives Placed

Atchison, Topeka & Santa Fe, two 4000-horsepower diesel-electric locomotives, one each to Electro Motive Corp., La

Grange, Ill., and American Locomotive Co., New York.

Illinois Central, one 2000-horsepower, two 2700-horsepower, one 1000-horsepower diesel-electric locomotives to Electro-Motive Corp., La Grange, Ill.

Locomotives Pending

Chicago, Rock Island & Pacific, four diesel locomotives; two of 2000 horsepower and two of 1000 horsepower.

Chief of Engineers, army, Washington, seven 8-ton, type 2, gasoline-mechanical drive locomotives, bids Nov. 7, Inv. 121; also one 45-ton standard gauge electric drive for Ogden, Utah, Inv. 122, bids Nov. 7.

Texas Pacific-Missouri Pacific Terminal railway, Ft. Worth, Tex., one 660-horsepower diesel-electric switcher; bids asked.

Wire

Wire Prices, Page 101

Pittsburgh — Merchant wire business continues to expand in the domestic market and manufacturers' releases are gaining steadily. Share of business going to the export marmarket has dropped off considerably and represents less than 10 per cent, against nearly 40 per cent during third quarter.

Cleveland—A wiremaker who produces commodity strip has received an attractive inquiry for molybdenum steel strip for manufacture into soldiers' helmets.

Boston — Demand for wire products, notably specialties, is not subsiding and volume continues heavy, new orders increasing as consumers seek protection and pressing for shipment. Deliveries are lengthening and backlogs mounting.

New York — Covering a broadening range of products, wire buying is heavier with consumers striving for a place on mill books. Load being carried by rope mills is especially heavy with all capacity utilized. Spring wire is active, but to a less extent.

Birmingham, Ala.—All wire specifications are moving well, especially nails and fencing. Backlogs are accumulating in most wire products.

Tin Plate

Tin Plate Prices, Page 100

Pittsburgh — Operations remain unchanged at 44 per cent of capacity, with production slightly better than shipments over the past week. The flurry in the export market has lessened. Specifications on general line cans from domestic buyers continue to gain. Small consumers of tin plate are anxious concerning supplies for first quarter and are trying to place orders for that period at whatever quotations may be ruling then. Large consumers, however, are willing to await formal opening of books for that period. Business is dull but prices are firm at $5 per base box.

Shapes

Structural Shape Prices, Page 100

Pittsburgh — Inquiries continue to exceed placements, with mills operating at 100 per cent or better and backlogs increasing. Since the tonnage is now principally for industrial expansion, shape producers believe the bulge will be reached before the end of the year. Specifications in the shipbuilding program are active, with new tonnages being released daily.

Chicago — Fabricators are exceedingly busy and are well booked for the balance of the year. Most present business is for public construction in connection with national defense production.

Boston—Expansion of shipbuilding promises substantial tonnage, the largest being for the Fore River

yards, Quincy, Mass. Contracts aggregating 1800 tons include 560 tons for a hospital to a Somerville, Mass., shop and several industrial plant additions. Fabricators have the largest backlogs in years.

New York — Shape lettings continue brisk, several large tonnages having been placed. Inquiries continue heavy and promise continued activity.

Fabricated structural steel bookings in September, 221,991 net tons, were the largest for any month since April, 1931, according to the American Institute of Steel Construction. In August bookings were 112,222 tons and in September, 1939, they were 121,357 tons. Bookings for nine months were 1,143,314 tons, 14 per cent above 1,002,509 tons booked in the corresponding period last year. September shipments were 132,773 tons, the largest this year, compared with 140,828 tons in September, 1939.

Seattle—Inquiry is active, new projects developing large tonnages. Fabricating shops have large backlogs and are working to capacity. Bids are expected to be called soon for additional proposed units of the Aluminum Co. of America's plant at Vancouver, Wash.

Philadelphia—Inquiries are sustained at a brisk pace, preventing reduction in heavy mill backlogs. Brisk shipments are assured into next quarter with six to eight weeks current delivery promised.

Buffalo—With bookings and inquiries increasing, structural deliveries are being extended two months or more. An award of 9500 tons for the new Curtiss aeroplane plant went to Bethlehem Steel Co.

San Francisco — The structural market was the most active one of the week and 23,213 tons were placed. Important lettings included 3200 tons for two additional C-3 type cargo vessels for the United States maritime commission, awarded to Seattle-Tacoma Shipbuilding Corp., 990 tons for six seaplane tenders for the navy, taken by Lake Washington Shipyards, and 660 tons for four tenders, placed with Associated Shipbuilding Co.

Toronto, Ont.—Tapering in structural steel awards developed the past week or two, largely the result of slowing down in the government's construction program. However, private building undertakings are furnishing a fair amount of new business and fabricators generally are carrying backlogs that will keep plants running at capacity well into the coming year.

Shape Contracts Placed

6250 tons, buildings, Aluminum Co. of America, Lafayette, Ind., 5500 tons to Bethlehem Steel Co., Bethlehem, Pa., 750 tons to Indiana Bridge Co., Muncie, Ind.

6185 tons, plant addition, Curtiss-Wright Corp., St. Louis, to Mississippi Valley Structural Steel Co., Decatur, Ill.

4500 tons, manufacturing plant, North American Aviation Inc., Dallas, Tex., to Muskogee Iron Works, Muskogee, Okla.; bids Oct. 12.

3200 tons, two C-3 type cargo vessels, United States maritime commission, to Seattle-Tacoma Shipbuilding Corp., Tacoma, Wash.

2000 tons, section 6, Atlantic avenue improvement, Brooklyn, N. Y., for Long Island railroad, to American Bridge Co., Pittsburgh.

Shape Awards Compared

	Tons
Week ended Nov. 2	37,890
Week ended Oct. 26	69,875
Week ended Oct. 19	50,330
This week, 1939	27,360
Weekly average, year, 1940	28,386
Weekly average, 1939	22,411
Weekly average, Sept.	66,171
Total to date, 1939	999,804
Total to date, 1940	1,248,756

Includes awards of 100 tons or more.

1800 tons, plant for Boeing Aircraft Co., Wichita, Kans., Austin Co., Cleveland, contractor, to Kansas City Structural Steel Co., Kansas City, Mo.

990 tons, six seaplane tenders for navy, to Lake Washington Shipyards, Houghton, Wash.

800 tons, factory and boiler house, for Eclipse Machine Co., Elmira, N. Y., to American Bridge Co., Pittsburgh.

800 tons, plant addition, Timken Roller Bearing Co., Canton, O., to Joseph T. Ryerson & Son Inc., Chicago.

730 tons, boiler house and factory building, New York City to American Bridge Co., Pittsburgh.

700 tons, apartment building, East Fourteenth street, New York, to Dreier Iron Works, Inc., New York.

700 tons, addition, artillery case shop, Frankford arsenal, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

660 tons, four seaplane tenders for navy, to Associated Shipbuilding Co., Seattle.

600 tons, mess hall, United States air corps, Chanute Field, Rantoul, Ill., to Duffin Iron Co., Chicago; bids Oct. 21.

600 tons, St. Vincent's hospital, New York, to Harris Structural Steel Co., New York, through Vermilyea-Brown Co., New York.

560 tons, Evans Memorial hospital building, Boston, to Grossier & Shlager Iron Works, Somerville, Mass.; Sawyer Construction Co., Boston, contractor.

520 tons, Chicago-Commercial Edison Coal Co., Illinois, to Lackawanna Steel Construction Co., Buffalo.

450 tons, Mayes county bridge SAP913-A, Oklahoma, to Capitol Steel & Iron Co. Inc., Oklahoma City, Okla.

435 tons, bridge FAGM 619-A(1), Linn county, Missouri, to Stupp Bros. Bridge & Iron Co., St. Louis.

400 tons, doors, sash, etc., Boeing Airplane Co. plant addition, Seattle, to Truscon Steel Co., Youngstown, O.; Austin Co., general contractor.

340 tons, factory building, High Standard Mfg. Co., Hamden, Conn., to Bethlehem Fabricators, Bethlehem, Pa.; Dwight Building Co., New Haven, contractor; defense expansion.

325 tons, addition, Edward G. Budd Mfg. Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, diesel engine plant, Marshalltown, Iowa., to Illinois Steel Bridge Co., Jacksonville, Ill.

295 tons, aviation field, Texas, to Mosher Steel Co., Houston, Tex.

280 tons, spillway bridge, stage 1B construction, Kentucky Dam, to Duffin Iron Co., Chicago; Tennessee valley authority, Knoxville, Tenn.; bids Oct. 16.

275 tons, bridge, Nelson and Larue counties, Kentucky, to Midland Structural Steel Co., Cicero, Ill.

270 tons, combination repair shop, New London, Conn., to Jones & Laughlin Steel Co., Pittsburgh.

265 tons, bridge, Tioga county, Pa., to Lackawanna Steel Construction Corp., Buffalo.

260 tons, hangar, Fort Ord, Salinas, Calif., to Herrick Iron Works, Oakland, Calif.

230 tons, spare lock unit, United States engineers, St. Louis, to Lakeside Bridge & Steel Co., Milwaukee; rebid Oct. 17.

210 tons, bridge, Woodford, Vt., to Vermont Structural Steel Corp., Burlington, Vt. Ryan & Densmore, Claremont, N. Y., contractors.

205 tons, two suspension towers, Richmond, Va., to American Bridge Co., Pittsburgh.

200 tons, ammunition buildings, Keyport, Wash., torpedo station, to Isaacson Iron Works, Seattle; Daily Construction Co., Seattle, general contractor.

180 tons, bridge state highway route 39, sections 1B and 10A, New Jersey, to Bethlehem Steel Co., Bethlehem, Pa.; Joseph Nesto & Co., Newark, contractor, bids Oct. 11, Trenton.

160 tons, steel piling bridges, State of Washington, Angelus Gravel & Supply Co., contractor, to Bethlehem Steel Co., Bethlehem, Pa.

155 tons, Tampa-Newberry store building, Tampa, Fla., to Bushnell Lyons Iron Works Inc., Tampa, Fla.

150 tons, bridge, Berks county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, building, Oswego Falls Corp., Fulton, N. Y., to Rogers Structural Steel Co., Corry, Pa.

150 tons, doors, sash, etc., assembly shop Puget Sound navy yard, to Truscon Steel Co., Youngstown, O.

150 tons, rotor and stator platform, Grand Coulee dam, Odair, Wash., for bureau of reclamation, to American Bridge Co., Pittsburgh.

140 tons, power house addition, Louisville, Ky., Louisville Bridge & Iron Co., Louisville, Ky.

120 tons, ice rink, Stockton, Calif., to Palm Bridge & Iron Works, Sacramento, Calif.

100 tons, physics building, Purdue University, Lafayette, Ind., to Indiana Bridge Co., Muncie, Ind., through A. E.

Behind the Scenes with STEEL

Vest Pocket Mags

■ You can thank your lucky stars you're in America or you might be reading this in 5-point type, printed on tissue paper, and a poor grade at that. We were just now looking at an ad in a foreign machinery mag that should have taken double rates—because it was visible on both sides.

Neck Out

■ STEEL's Presidential Poll at the Metal Show is still being talked about and an analysis this week on page 38 gives you the full story. This issue of STEEL should be in your lap either right before "Thanksgiving Day" or if you're on down the routing slip a ways, shortly after the election night hangovers are responding to treatment. We're simply making sure we get full credit for this startling prediction—based partly on the last two polls STEEL has made at the Metal Shows, partly on what our barber told us in strict confidence week before last, and partly on the pig iron statistics for 1909. The cat's out of the bag—Willkie is the winner, with a popular vote of only 49.90 per cent, but with an electoral vote that just sneaked him in. Okay, set up just one more round, Joe, and then we have to beat it home.

The Winner

■ Incidentally, J. C. (G. M. Basford Co.) Clawson, grand prize winner in the above mentioned Poll, is still gasping unbelievably at the check we sent him for twenty-five bucks. Jim says that when he was a youngster he remembers winning a blanket at a county fair, but that since then kings, queens and even jacks have laughed—actually sneered—at him in poker games. Under his magic touch, the dominoes that gallop for others slow down to a walk. The one-arm bandits use two arms on him and even when he won on the Cincinnati Reds his losses on the pools cancelled all his winnings. We ask you, now—you surely don't begrudge a guy like that any part of it, do you?

■ They tell us the first American patent which presaged the modern automobile was granted to one Oliver Evans back in 1789. His dream boat was a 21-ton nightmare amphibian, called the *Urukter Amphibolis.* Translated into modern slang, this predecessor of present day cars, which walked, swam or exploded on the streets of yesteryear, is our old pal the "Puddle Jumper."

Parable

■ Once upon a time there was a man who didn't believe in safety regulations. They were so much bunk to him. He'd been at the game a long, long time. He'd been working on machine tools when there were no safety guards or enclosed gear boxes and it really took a *man* to run those things, so he said. And then one day, in his usual belligerent mood he "fixed" the buttons on the solenoids controlling his huge hydraulic press, and it came to pass that he got too close to the ram on its downstroke. Once upon a time there was a man . . .

Wanna Cow?

■ You probably remember the picture we ran here several months ago of what we insist is a cow and also that we all had a lot of fun figuring it out. For the Metal Show we had "Maude" printed up in a little four-page folder, 5000 of which were snapped up before the middle of the week. We re-ordered and ended up with a few left over. If you want some to have fun with your friends and provoke your enemies just drop us a postal card and say about how many.

SHRDLU.

Kemmer, contractor, Lafayette, Ind.

100 tons, shapes and bars, service station, show room and garage, International Harvester Co., Portland, Me., to Megquier & Jones Co., Portland, and Concrete Steel Co., Boston; Brown Construction Co., Portland, contractor.

Shape Contracts Pending

5500 tons, DNT and TNT plant, Kankakee ordnance works, Wilmington, Ill., for government.

3500 tons, addition to Huntley station of Buffalo Niagara Electric Corp., Buffalo.

1900 tons, aircraft manufacturing buildings, for Stearman division, Boeing Airplane Co., Wichita, Kans.

1000 tons, 756-foot, three-span, cantilever state bridge, Spokane river, Washington state; C. & F. Teaming & Trucking Co., Butte, Mont., general contractor.

950 tons, factory building, for Lima Locomotive Works, Lima, O.

946 tons, Mokelumne river bridge, Sacramento and San Joaquin counties, California, for state; bids rejected.

900 tons, double hangar, invitation 6812-41-14, Hickam Field, T. H.; Robt. McKee, 4700 San Fernando boulevard, Los Angeles, awarded general contract at $359,500.

800 tons, St. Raphael's hospital, New Haven, Conn.

800 tons, additional structures, Picatinny arsenal, New Jersey; John Lowry Inc., New York, contractor.

750 tons, grade crossing elimination, Schenectady county, New York; Fred Berkanti & Son Inc., Harrison, N. Y., low, at $361,654; bids Oct. 30, at Albany.

700 tons, sheet piling, Cuyahoga river straightening, city of Cleveland; bids early December.

600 tons, two 6000-men mess halls, Chanute field, Rantoul, Ill., for government.

600 tons, repairs to freight house switching track, for Chesapeake & Ohio railway, Cincinnati.

600 tons, addition to artillery case shop building 58, Philadelphia, for government.

575 tons, four Pennsylvania state bridges; bids at Harrisburg, Pa., Nov. 8.

500 tons, St. Clair's hospital, New York.

500 tons, plant addition, Autocar Co., Ardmore, Pa.

450 tons, recreational facilities, project 13, Quonset Point, R. I., for navy.

425 tons, warehouse, for Owens-Corning Glass Corp., Newark, O.

350 tons, plant addition, Hercules Powder Co., Radford, Va.

300 tons, addition to boiler room, for San Diego Consolidated Gas & Electric Co., San Diego, Calif.

275 tons, building, naval observatory, Washington.

250 tons, barracks building, naval research laboratory, Bellevue, D. C.

225 tons, extension to hot metal building, for A. M. Byers Co., Ambridge, Pa.

200 tons, coaling pier, Sodus Point, N. Y., for Pennsylvania railroad.

200 tons, Seattle, transportation commission garage; Gjarde Construction Co., Seattle, general contractor.

190 tons, truss bridge, Snyder county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 8.

178 tons, stop log guides and trash racks, spillway, Cherokee dam, Tennessee Val-

ley Authority; bids Nov. 18, Knoxville, Tenn.

175 tons, building 18, for Hilton-Davis Chemical Co., Cincinnati.

165 tons, building, for Air Associates Inc., Bendix, N. J.

165 tons, underpass bridge, Butler county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 8.

150 tons, building, for Sisters of Immaculate Conception, West Paterson, N. J.

150 tons, additional storehouse, Frankford arsenal, Philadelphia; Henry W. Horst Co., Philadelphia, general contractor.

145 tons, 217-foot state bridge, Chelan county, Washington state, C. & F. Teaming & Trucking Co., Butte, Mont., general contractor.

140 tons, addition to gear and axle plant 4, for Chevrolet Motor Co., Detroit.

125 tons, service building, for 1900 Corp., St. Joseph, Mich.

120 tons, railroad trestle, Binghamton, N. Y., for state.

120 tons, I-beam bridge, Franklin county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Nov. 8.

110 tons, coal bunker, for Jersey Central Power & Light Co., Sayreville, N. J.

105 tons, state bridge over Provo river, Provo, Utah.

102 tons, state undercrossing, Spokane county, Washington; Charles A. Powers, Spokane, Wash., general contractor.

100 tons, addition to factory, Dow & Co., Buffalo.

Unstated, plant additions for Aluminum Co. of America, Vancouver, Wash.; bids soon.

Unstated tonnage, rails and electric rack track materials, Panama, schedule 4417, U. S. Steel Export Co., Washington, low $29,804.74.

Reinforcing

Reinforcing Bar Prices, Page 101

Pittsburgh—Weak spots have developed in various parts of the country, although in eastern markets the variations from quoted prices are negligible. Inquiry is not as heavy as it has been over the past few weeks, which is considered normal in view of seasonal factors.

Cleveland — Projects in this area have fallen off, the largest bid opening involving 102 tons for a housing project at Columbus, O. Prices are fairly firm.

Chicago — Increased activity is noted in reinforcing bars. Considerable work is pending, but most jobs require less than 100 tons and are for highways and miscellaneous building construction.

Boston — Stocks of reinforcing bars for prompt delivery are getting low, notably new billet stock, as mill deliveries are lengthening beyond 60 days. However, there is some decline in buying as pressure increases for deliveries against recent purchases.

Seattle—Rolling mills are operating to capacity. Demand for merchant bars continues. Prices are firm. Several large navy projects are pending involving important tonnages, including a pier at the Puget Sound yard.

Concrete Bars Compared

	Tons
Week ended Nov. 2	10,936
Week ended Oct. 26	9,838
Week ended Oct. 19	15,934
This week, 1939	16,514
Weekly average, year, 1940	9,694
Weekly average, 1939	9,197
Weekly average, Sept.	10,611
Total to date, 1939	436,604
Total to date, 1940	426,546

Includes awards of 100 tons or more.

Reinforcing Steel Awards

1360 tons, housing project, Vallejo, Calif., to Columbia Steel Co., San Francisco.

1130 tons, cold storage building, naval supply depot, Oakland, Calif., to Soule Steel Co., San Francisco.

1127 tons, additions, naval ammunition depot, Hawthorne, Nev., to Columbia Steel Co., San Francisco.

975 tons, treasury department, invitation 10733, Los Angeles, divided between Columbia Steel Co., San Francisco, Bethlehem Steel Co., Los Angeles, and Judson Steel Corp., San Francisco.

800 tons, housing project, Cleveland, James McHugh & Son., Chicago, contractor, to Calumet Steel Co., Chicago.

700 tons, English Woods housing, Cincinnati, to Pollak Steel Co., Cincinnati, through J. & E. Warm Co., contractor.

500 tons, two store houses, invitation

10034, naval supply depot, Oakland, Calif., to Gunn-Carle & Co., San Francisco.

500 tons, reinforced concrete piles, naval supply depot, two store houses, invitation 10034, Oakland, Calif., to Raymond Concrete Pile Co., San Francisco.

400 tons, Eastman Kodak Co., factory, Rochester, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through A. W. Hopeman & Sons, contractor.

340 tons, administration, cafeteria and heating plant, naval supply depot, Oakland, Calif., to Ceco Steel Products Corp., San Francisco.

300 tons, contract 33, Marginal street project, New York, to Truscon Steel Co., Youngstown, O.

280 tons, physics building, Purdue University, Lafayette, Ind., to Hugh J. Baker & Co., Indianapolis, through A. E. Kemmer, Lafayette, contractor.

250 tons, wire mesh, additions to naval ammunition depot, Hawthorne, Nev., to Columbia Steel Co., San Francisco.

200 tons, naval training facilities, Great Lakes naval training station, to Calumet Steel Co., Chicago.

200 tons, warehouse and miscellaneous construction, navy barracks, Great Lakes, Ill., Henry Ericsson & Co., Chicago, contractor, to Calumet Steel Co., Chicago.

187 tons, Panama Canal, schedule 4406, to Laclede Steel Co., St. Louis.

175 tons, Northeast school, Lincoln, Neb., to Bethlehem Steel Co., Bethlehem, Pa.

168 tons, highway construction, Washington county, Kans., to Sheffield Steel Corp., Kansas City, Mo.

155 tons, highway construction, Pennington county, S. Dak., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, factory, Charles Bruenning Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

135 tons, Evans Memorial hospital building, Boston, to Concrete Steel Co., Boston; Sawyer Construction Co., Boston, contractor.

130 tons, paving, Wabaunsee, Kans., to Laclede Steel Co., St. Louis.

130 tons, Delaware aqueduct, contract 367, Neversink, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through D. W. Winkleman, contractor.

124 tons, chimney, United States ordnance plant, Charlestown, Ind., to Laclede Steel Co., St. Louis.

113 tons, building, Commonwealth Edison Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

107 tons, highway construction, Riley county, Kans., to Laclede Steel Co., St. Louis.

100 tons, shop building, High Standard Mfg. Co., Hamden, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Dwight Building Co., New Haven, contractor, defense contract expansion.

100 tons, addition to Seattle College, to Bethlehem Steel Co., Seattle; Howard S. Wright & Co., Seattle general contractor.

100 tons or more, total requirements undetermined, extensions, buildings and roads, navy department (marine corps), Parris island, S. C., to Truscon Steel Co., Youngstown, O.; Charles W. Angle Inc., Greensboro, N. C., contractor; structural and miscellaneous steel awarded Kline Iron & Metal Co., Columbia, S. C., and Iron & Steel Products Co., New Orleans.

Unstated tonnage, bridge, Woodford, Vt., to Strope Steel Co., Albany, N. Y.; Ryan & Densmore, Claremont, N. H., contractors: Vermont Structural Steel

Co., Burlington, Vt., awarded 210 tons, structural steel, 3-span WF beam structure.

Reinforcing Steel Pending

5000 tons, Atlas Powder Co., ammunition loading plant, Portage County, O.; Hunkin-Conkey Construction Co., Cleveland, contractor.

2500 tons, housing project, Hartford, Conn.

2000 tons, sewer section, Queens, department of sanitation, New York; bids Nov. 4.

1500 tons, Jamaica Plain and Roxbury housing, Boston; bids Nov. 15.

923 tons, international boundary commission, New Mexico; bids Nov. 7.

900 tons, building for veterans' administration, Marion, Ill., Ring Construction Co., Minneapolis, low.

600 tons, bureau of sewers, contracts, 1, 2 and 3, Queens, N. Y.; bids Nov. 4.

500 tons, four hangars, CQM 6708-41-22, Albrook field, Canal Zone.

450 tons, contract S-10E, Chicago subway, bids Nov. 20.

450 tons, Quinnipiac housing project, New Haven, Conn.; W. T. Connors Co., Hartford, Conn., low.

296 tons, two bridges in Kern county, California, for state; bids Nov. 13.

250 tons, miscellaneous buildings, CQM 6708-41-23, Albrook field, Canal Zone.

225 tons, highways and bridges, Connecticut; bids Nov. 12, Hartford.

210 tons, highway project, contract 4013, Lincoln-North Smithfield, R. I.; M. A. Gammino Construction Co., Providence, R. I., low, $239,879.37, bids Oct. 23, Providence.

160 tons, Seattle transportation commission garage; Gjarde Construction Co., Seattle, general contractor.

150 tons, school, Lawrenceville, N. J.

143 tons, Mokelumne river bridge, Sacramento and San Joaquin county, Calif., for state; bids rejected.

140 tons, bridge in Lake county, and highway work in Grant, Josephine, Lincoln and Multnomah counties, Oregon, for state; bids Nov. 13.

135 tons, four Washington state highway projects; general contracts awarded.

120 tons, Twelfth street bridge over Kaw river, Kansas City, Kans.

110 tons, barracks, Fort Ethan Allen, Burlington, Vt.

105 tons, farmers' exchange building, Concord, N. H.

102 tons, Lincoln Park housing project, Columbus, O.; bids Oct. 30.

100 tons, highway project, contract 4019, Westerly-Charlestown, R. I.; M. A. Gammino Construction Co., Providence, R. I., low, $167,527.24, bids Oct. 23, Providence.

Unstated, Seattle naval reserve armory; bids soon.

Ferroalloys

Ferroalloy Prices, Page 102

New York — While ferromanganese shipments during October showed an appreciable increase, which trend is expected to continue through the remainder of the year, total movement in October was not as large as the trade generally anticipated. Apparently, consumers laid in more stock at

the time of the contract price advance July 1 than generally realized at the time.

Ferromanganese prices are strong at $120, duty paid, Atlantic and Gulf ports. The market on spiegeleisen and other leading ferroalloys also continues strong but unchanged.

Pig Iron

Pig Iron Prices, Page 102

Pittsburgh — Prices in this district continue to be cloudy with no additional producers following the action of Pittsburgh Coke & Iron Co. in increasing prices. Contracts have been made at the higher price by the Pittsburgh company and the coke market, which apparently holds the key to the entire situation, is becoming stronger almost daily. Spot cars are bringing $5 per ton, as against supply contracts ranging from $4.25 to $4.75. Some sellers indicate first-quarter price will be $5 on regular supply contracts, although sales have been made for material to be delivered during the first quarter as high as $5.75.

Cleveland—So far no pig iron makers have followed the Pittsburgh Coke & Iron Co. in raising prices $1.50 to $2 per ton. Immediately following this action a flurry of new inquiries appeared and some producers withdrew from the market temporarily. In a few days demand subsided and other producers sold freely again and at old prices. Producers predict there will be no shortage this quarter, but steelmaking iron, particularly low phos, is tight.

Chicago — Pig iron and coke are active here and prices are strong, but no talk is heard of an advance in line with action of one producer in the Pittsburgh district. Iron merchants are well booked for the balance of the year. Foundries, while still increasing operations, are not purchasing ahead beyond reasonable limits and inventories are near normal. The situation for coke is somewhat tighter than for iron.

Boston—Growing tension in pig iron is intensified by lower stocks at Beacon, N. Y., for usual distribution to New England from that point, heavy releases against fourth quarter orders and mounting melt with foundries producing castings for the machine tool trade. Current quarter coverage is being specified at a higher rate than expected, with consumers more anxious to put down tonnage. Melt-

ers in more instances are being limited to actual needs.

New York—Eastern pig iron producers have not followed the lead of a Pittsburgh producer late last week in advancing prices $1.50 and $2 a ton. Certain sellers who temporarily withdrew from the market have resumed quoting at unchanged prices. Virtually all sellers, however, are confining quotations to regular customers. An inquiry for 100,000 tons for Japan is arousing no interest among American producers, because of this situation.

Philadelphia—Pig iron sellers are withholding revisions in current quotations. In occasional instances first quarter business is booked at prices in effect at time of shipment. Buyers are not disturbed over possibility of price increase as they are protected through the year and part of first quarter. October shipments are at a new peak for the year with as heavy a movement indicated for November and December.

Buffalo—Producers report ample pig iron available to cover present requirements. Sellers are endeavoring to fill orders of consumers in immediate need of stock rather than speculative buying. October shipments are estimated 10 to 15 per cent larger than in September.

Cincinnati—Pig iron prices are unchanged and may remain so for the quarter. No intimation is given on policies for first quarter. Shipments were unabated in October at levels at least as high as any this year.

St. Louis—Pig iron shipments are being maintained at unusually high levels, insuring a total for October approximately one-fourth greater than in September. Despite the recent heavy movement, producers have considerable tonnages to ship this year, and are reluctant to take on business from any but regular customers.

Birmingham, Ala.—For the first time in months, pig iron production has slowed down, due to Sloss-Sheffield Steel & Iron Co. taking a blast furnace off for repairs, leaving 17 of 18 active.

Toronto, Ont.—Merchant pig iron sales show improvement and specifications are increasing in number and tonnage. Merchant melters are entering the market regularly although only a few of the larger firms seek to build up inventories.

Semifinished Steel

Semifinished Prices, Page 101

Pittsburgh—There has been a definite slackening in semifinished buying for export and a corresponding increase in domestic demand.

Shipments to nonintegrated mills have been heavy, with the principal delay in wire rods and skelp.

Scrap

Scrap Prices, Page 104

Pittsburgh — Local market is quiet. Railroad specialties are weaker, although lists which will close this week and next probably will have a stabilizing effect on these prices. Open-hearth grades are unchanged.

Cleveland—Scrap buying is light, neither mills nor foundries being interested, though taking shipments. Several railroad lists will close this week. Quotations, largely nominal, are steady.

Chicago — Although a somewhat easy situation obtains in iron and steel scrap, prices remain firm. Trading activity is only moderate. Foundries are buying scrap in good volume as melts continue to increase.

Boston—Iron and steel scrap prices fluctuate over narrow ranges with the few minor upward changes in buying prices. For domestic shipment, No. 1 machinery cast and blast furnace material is slightly stronger while for export, dock delivery, lack of bottoms is slowing up buying with a moderate decline in No. 2 melting steel. No. 2 cast and stove plate are mildly stronger.

New York — Domestic shipments are heavy, mostly against contracts, with scattered buying by steelworks and foundries. No. 1 heavy melting steel brings $16, f.o.b., and is subject to pressure from one large eastern consumer. Prices are mostly unchanged and firm. Lack of shipping retards exports, both grades of heavy melting steel being down 50 cents. Not in months has so little material been loaded but 1500 tons moved against orders in a recent week.

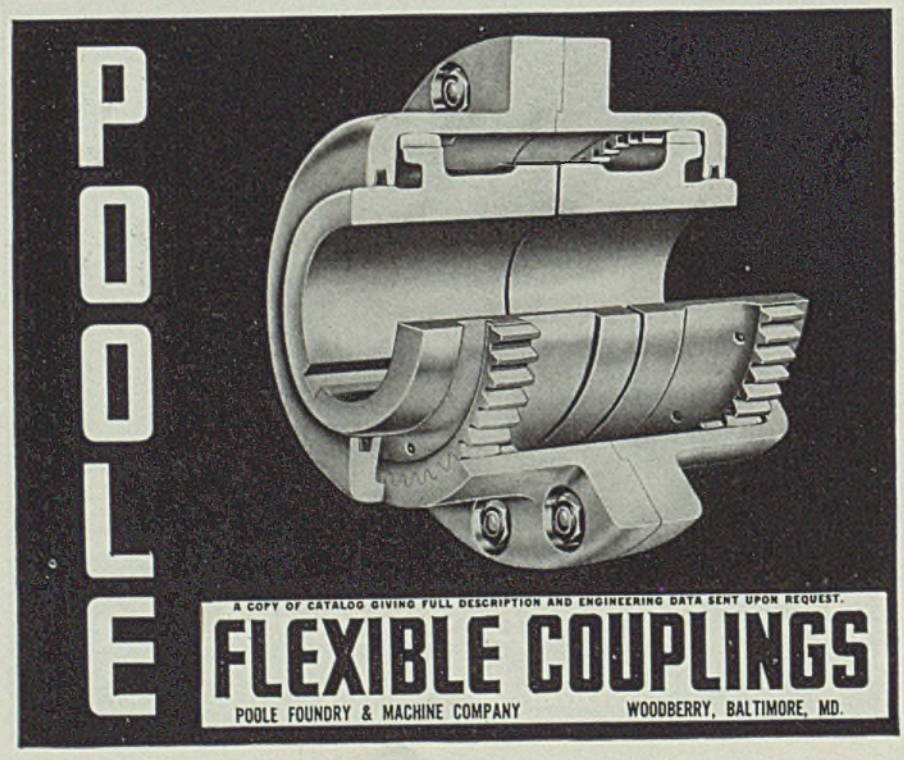
Philadelphia—Additional sales of No. 1 steel hold this grade at $20.50 to $21, a range prevailing since mid-September. Scrap is coming out fairly even with demand, but dealers are moving material as rapidly as acquired and have little opportunity to add to yard stocks. Shipments continue active in both steelmaking and foundry grades, with all quotations unchanged.

Buffalo—A strong undertone prevails as dealers refuse to recognize bids from mills within quoted ranges. Water shipments, meanwhile, continue heavy as the close of navigation nears.

Detroit—Intensive coverage by mills in the past few months has built backlogs to a comfortable level. A slight weakening is noted, reductions of 25 cents per ton being made on nearly all grades. Stockpiles are sufficient in some cases until July at capacity operations and melters await more attractive offers, Usually a 25-cent reduction will attract buyers.

St. Louis—Iron and steel scrap prices show considerable irregularity, with some grades higher and others lower. Consumer buying is quiet, but considerable activity exists among dealers who have contracts to fill.

San Francisco—Further weakness in scrap prices in the Los Angeles metropolitan area is noted and No. 1 and No. 2 heavy melting steel and compressed sheets are off 25 cents. No weakness has occurred in the San Francisco district, but prices in the Seattle area continue to weaken, primarily because there are only two prominent open-hearth operators in that territory.



Warehouse

Warehouse Prices, Page 103

Pittsburgh—Sellers report stocks remain virtually unchanged from a week ago, with mill shipments on schedule. Demand is heavy in practically all products, with structural shapes moving especially well.

Cleveland—Sales have been equal to or ahead of September, with structurals far in the lead and cold-finished steel prominent. A large aggregate of small orders rather than conspicious large orders predominates. More mill type business now comes to jobbers. Retailers are still well stocked, though they are concerned because four weeks are required to replenish plates from mills.

Chicago—Warehouse sales for October are well ahead of September and are the best this year. All warehouse products are in good demand, with alloy bars and certain grades of carbon bars leading.

New York—Advance of 25 cents per 100 pounds on No. 24 galvanized sheets to 4.55c, covering 150 to 1499 pound orders, has been made by warehouses. Nails to dealers are raised to $3.10 per keg for one to 10 kegs and $3.00 for larger lots, an advance from $2.85. Merchant steel pipe resale prices are firmer.

Boston — Hot and cold-rolled alloy bars, SAE 2300, have been advanced 25 cents. Orders booked in October were largest in number since October, 1929, but dollar sales were generally lower. Deliveries are increasingly slow.

Detroit—Despite the current slack season for tool, die, jig and fixture shops, warehouse sales are in good volume, with the trend upward. Forward ordering has appeared in a number of cases, some requests being received for shipments as far ahead as March 1.

Cincinnati—Buying from warehouses this month started in a way to point to no letup from the heavy October demand but somewhat under the tonnage one year ago.

Steel in Europe

Foreign Steel Prices, Page 103

London — (*By Cable*) — Hematite pig iron stringency in Great Britain is about to be relived by impending imports. Supplies of semifinished and finished steel are arriving from America at increased rate. An increase of approximately ten per cent in steel prices is expected at any moment. Tin plate exports are slightly improved. Black and galvanized sheet exports are severely restricted, owing to domestic priority requirements.

Reclaiming Tungsten Scrap Is Economy Move

New York — Although tungsten ores are not difficult to obtain, tool steel manufacturers have taken steps to conserve tungsten to the point of getting the so-called "squeal."

Practically all, it is learned here, are accumulating their high speed mill scale and grindings and having them converted into what may be termed a super high speed scrap, the tungsten content being not less than twice the tungsten analysis of scale or grindings.

This development is regarded here as extremely timely, for, while high speed steel is being consumed at a high rate, toolmakers and users have not taken time to return the scrap to the tool steel manufacturers, thus causing temporary high prices for tungstetn scrap and turnings.

Scrap is an essential part of the

charge in making steel and the necessity for having it has created a demand which has forced prices entirely out of line with the market for virgin tungsten, it is declared.

However, the new mill scale alloy is relieving the situation to a large extent, it is said, and with the year-end inventory approaching a large tonnage of scrap should be released for use.

In 1937, tungsten scrap reached new heights, but with the uniform prices of ferrotungsten over the past year, it is believed that prices are now at the top, especially with the new mill scale alloy scrap easing the situation, as it is now doing.

One leading trade interest, commenting on this situation recently, said: "All users of tool steel should co-operate closely with the tool steel manufacturers by returning their scrap and turnings promptly to insure continuation of the present low prices on high speed steel.

"Conservation of tungsten," he continued, "is the patriotic duty of every American, whether steel manufacturer, toolmaker or consumer. 'Return your scrap' should be the slogan of all patriotic Americans."

Equipment

New York — Preferential priority classifications covering machine tool deliveries involved in defense program orders as recently devised by the national advisory commission, army, navy and equipment builders on a voluntary basis is operating more satisfactorily than the previous system by which defense contractors were given general, but broad and undefined preference. Essential needs by some builders of defense equipment are placed ahead of others. A-1-A classification, or No. 1 priority, goes to the machine tool industry, No. 2 to aircraft builders while following are the army, navy and contractors and sub-contractors engaged directly on armaments. Former regulation of deliveries was more loosely drawn, all buyers of machines for defense work being generally included.

Coke Oven By-Products

Coke By-Product Prices, Page 101

New York — High production of coke oven by-products is being absorbed with little accumulation, shipments being largely against contracts, with available spot lots easily moved. An exception among distillates is benzol, supplies of which are freer than toluol, xyloi and solvent naphtha. Prices are unchanged and firm. Chemical demand for phenol and naphthalene is active, although household requirements for the latter are seasonally light. New prices are expected to be announced about Nov. 15. Contracting for by-products for next season has been light thus far. Shipments of sulphate of ammonia to the fertilizer and chemical trades are heavy, mostly against contracts, with scattered small spot lots commanding $30 per ton, bulk, Atlantic ports.

Low on Tunnel Rings

New York—Bethlehem Steel Co., Bethlehem, Pa., is low on 48,050 tons of large cast iron segment rings for the Battery-Brooklyn tunnel, bids opening Oct. 29 with the New York tunnel authority. This is one of several contracts for tunnel supplies, including additional cast steel rings and a large quantity of bolts and nuts to be bought under separate contract.

Nonferrous Metal Prices

Oct.	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
26	12.00	12.00	12.50	51.62½	50.37½	5.50	5.35	7.25	18.00	14.00	35.00
28	12.00	12.00	12.50	51.50	50.50	5.50	5.35	7.25	18.00	14.00	35.00
29	12.00	12.00	12.50	51.50	50.50	5.50	5.35	7.25	18.00	14.00	35.00
30	12.00	12.00	12.12½	51.37½	50.37½	5.50	5.35	7.25	18.00	14.00	35.00
31	12.00	12.00	12.12½	51.25	50.25	5.50	5.35	7.25	18.00	14.00	35.00
Nov. 1	12.00	12.00	12.12½	51.00	50.20	5.50	5.35	7.25	18.00	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) 19.23
Copper, hot rolled 20.62
Lead, cut to jobbers 7.75
Zinc, 100 lb. base 12.50

Tubes

High yellow brass 21.98
Seamless copper 21.12

Rods

High yellow brass 14.76
Copper, hot rolled 17.12

Anodes

Copper, untrimmed 17.87

Wire

Yellow brass (high) 19.48

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 8.00-8.25
Cleveland 8.62½-9.12½
Chicago 8.00-8.50
St. Louis 8.37½

Heavy Copper and Wire

New York, No. 1 ..... 9.62½-9.87½
Cleveland, No. 1 ..... 9.37½-9.87½
Chicago, No. 1 ..... 9.62½-9.87½
St. Louis 9.37½

Composition Brass Turnings

New York 7.62½-7.87½

Light Copper

New York 7.62½-7.87½
Cleveland 7.37½-7.87½
Chicago 7.62½-7.87½
St. Louis 7.37½

Light Brass

Cleveland 4.12½-4.37½
Chicago 5.50-5.75
St. Louis 4.87½

Lead

New York 4.75-4.85
Cleveland 3.75-4.00
Chicago 4.20-4.45
St. Louis 3.50-3.75

Zinc

New York 3.87½-4.12½
Cleveland 3.25-3.50
St. Louis 3.50-3.75

Aluminum

Mis., cast, Cleveland 9.25-9.50
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.25
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 13.25
Standard No. 12 aluminum 15.00-15.50

Aluminum Price Reduced

Pittsburgh — Aluminum Co. of America, Gulf building, announces a reduction of one cent per pound in aluminum, effective Nov. 18, bringing the price to 17 cents per pound for aluminum ingot.

Metallurgical Coke

Coke Prices, Page 101

Philadelphia—Influence of higher coal prices is reflected in by-product coke, the foundry grade being increased Nov. 1 to $11.63, delivered, Philadelphia.

Nonferrous Metals

New York—For the third time this year, Aluminum Co. of America lowered its quotations on virgin aluminum one cent a pound, effective on Nov. 18. The market will be quoted on the delivered basis of 17.00c for ninety-nine per cent plus and 15.00c for metallurgical, 94 per cent minimum, ingot. Producers of other major nonferrous metals are sold well ahead and welcome

the letup in demand which developed last week.

Copper—Total October sales came to 125,485 tons, bringing the total for the last two months to 380,795 tons. While mine producers held firm price views at 12.00c, Connecticut, metal was offered at 12.37½c by custom smelters and at 12.25c to 12,62½c by brokers.

Lead—Prices held at 5.35c, East St. Louis, and 5.50c, New York, as producers continued to balance their intakes and some again drew on their reserves.

Zinc — Producers are pressed to make deliveries, although buying pressure has eased slightly. While demand has not been satisfied fully, consumers' urgent requirements have been met. Prime western held firm at 7.25c, East St. Louis.

Tin—Prices declined steadily from 51.62½c to the closing level of 51.00c. Tension in the market has been relieved by quietness in the Far Eastern political situation as well as by the continued uninterrupted flow of metal to consuming centers. United States stocks are equivalent to about one year's requirements.

CONSTRUCTION and ENTERPRISE

Ohio

CANTON, O.—Timken Roller Bearing Co., is having plans prepared by C. W. Maratta, of its engineering staff, for manufacturing addition and tube storage building covering about 60,000 square feet floor space. Tube storage will be three stories 80 x 125 feet.

CANTON, O.—Hoover Co., will build plant addition costing $625,000 for manufacture of shell fuses. Machine tool equipment will cost about $500,000 and building $125,000. Will be four stories, 80 x 120 feet.

CLEVELAND—Z-W Machine Products Inc., 5151 St. Clair avenue, is increasing shop space by an addition of 5280 square feet.

CLEVELAND—Globe Machine & Stamping Co., 1250 West Seventy-sixth street, is adding 10,000 square feet floor space by rearrangement of equipment, to accommodate fabrication of large government order.

CLEVELAND—Jack Heintz Inc., airplane parts manufacturer, formerly of Palo Alto, Calif., has located in Bedford, a suburb. Has taken building 100 x 400 feet, which will be remodeled on plans by W. H. Hatch, architect, Hippodrome building, Cleveland.

CLEVELAND—Monarch Aerial Co. is being organized by Fred H. Hise of Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, I. A. Higgins, Cleveland, and Harry G. Beck, Delaware, O. Plans to assemble new type of five-passenger airplane. Delaware and Wooster, O., are being considered for plant, first unit of which will be 200 x 600 feet.

CLEVELAND — Cleveland Pneumatic Tool Co., 3734 East Seventy-eighth street, is starting expansion program, has let contract to Sam W. Emerson Co., for addition to heat treating department, 36,000 square feet, at 3696 East Seventy-sixth street. Contracts will be let soon on two other extensions.

CLEVELAND—Signode Steel Strapping Co., Chicago, with Cleveland office at 1200 West Ninth street, will move warehouse from 4010 Lakeside avenue to 1515 Fairfield avenue. Some new equipment will be needed, including stacking and tiering machine.

CLEVELAND—Standard Oil Co., Midland building, is taking bids on a chemical laboratory building at No. 2 plant, one story 31 x 96 feet.

SPRINGFIELD, O.—Steel Products Engineering Co., J. E. McAdams, president, 20 North Dakota avenue, will build a plant extension costing about $250,000.

WARREN, O.—American Welding & Mfg. Co., Howard Kaighin, manager, Griswold avenue, will build one-story

■ **Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 114 and Reinforcing Bars Pending on page 117 of this issue.**

addition 58 x 216 feet, with five-ton crane. Plans are being drawn by John W. Little, architect, 2036 East Twenty-second street, Cleveland.

WARREN, O.—Youngstown Pressed Steel division of Mullins Mfg. Co., George E. Whitlock, president, is purchasing about $500,000 worth of stamping equipment and annealing furnaces to execute $5,000,000 government order for anti-aircraft shells.

WELLINGTON, O.—Sterling Foundry Co. will ask bids about Nov. 18 for a one-story 70 x 100-foot steel coreroom addition to its foundry, costing about $40,000.

Connecticut

BRIDGEPORT, CONN. — Bridgeport Brass Co., 774 East Main street, has given general contract to Harry Maring Jr. Inc., 536 Lindley street, Bridgeport, for a one-story 130 x 130-foot plant at Walter and Pembroke streets, to cost about $43,000. (Noted, Sept. 30.)

HARTFORD, CONN.—Maxim Silencer Co., 85 Homestead avenue, has given general contract to Industrial Construction Co., 721 Main street, for a two-story 42 x 55-foot factory building to cost about $40,000.

Massachusetts

CAMBRIDGE, MASS.—United Shoe Machinery Corp., 140 Federal street, Boston, will build a one-story research laboratory 110 x 112 feet. General contract given to Aberthaw Co., 80 Federal street, Boston, at about $75,000.

HANOVER, MASS.—National Fireworks Co., M. Clark, Hanover, in charge, will build a shell loading plant of ten or more units, costing $500,000, to execute government contract.

New York

FARMINGDALE, N. Y.—Republic Aviation Corp., Conklin street, will build a one-story brick and steel manufacturing building at East Farmingdale, to cost about $9,000,000. Albert Kahn Inc., New Center building, Detroit, is architect.

SYRACUSE, N. Y.—W. C. Lipe Inc. is building an addition to plant No. 1 to provide expansion of its machine tool division for larger lathe production. To be completed in December.

New Jersey

NEW BRUNSWICK, N. J.—Wallace Laboratories, 300 Communipaw avenue, Jersey City, N. J., will build a one and two-story 150 x 370-foot, mezzanine, manufacturing plant and a 25 x 33-foot boiler house. Albert Kahn, New Center building, Detroit, is engineer.

WELLINGTON, N. J.—Tube Reducing Corp., 292 Madison avenue, New York, is asking bids on a one-story 100 x 320-foot factory building. N. N. Rice, Spruce street, Philadelphia, is engineer.

Pennsylvania

FRANKLIN, PA.—Chicago Pneumatic Tool Co. has let $50,000 contract for plant addition to W. L. Dunn, Cochranton, Pa.

HARRISBURG, PA.—Harrisburg Steel Corp. is building five plant additions, including electric shop, saw mill, open hearth building, steel mill and machine shop. Cost is estimated at $50,000.

NEW BRIGHTON, PA.—Townsend Co., rivet manufacturer, will build addition 90 x 150 feet, two stories, with freight elevator. Plans being drawn by H. K. Ferguson Co., Hanna building, Cleveland.

READING, PA.—Reading Sheet Metal Products Co. Inc., Walter L. Merkel, president, has bought a site on Third street from Bethlehem Steel Co. and will build modern plant.

UNION CITY, PA.—W. J. Mercer and associates have started development of 45,000 acres of natural gas area in Crawford and Erie counties. Will drill 4000-foot wells and lay gathering and connecting pipe lines, costing $40,000.

Michigan

DETROIT—Aeronautical Products Inc., formerly Machining & Grinding Co., will build addition to increase capacity 50 per cent.

DETROIT—Prest-O-Matic Products Co., 13244 Linwood avenue, has been incorporated with $10,000 capital, by Donald H. Bacon, 15455 Stahelin avenue, to conduct a general manufacturing business.

DETROIT—City Pattern Works, 1161 Harper avenue, has let general contract

for a plant addition to Atkin-Fordon Co. Norman Krecke, Detroit, is architect. (Noted Oct. 28.)

DETROIT—Colonial Broach Co., 147 Joseph Campau avenue, has awarded general contract for a plant addition to William F. Demske, Detroit.

DETROIT—Eureka Tool & Die Co., 3430 East Fort street, has let contract to Atkin-Fordon Co., for a 50 x 100-foot plant addition. (Noted Oct. 21.)

MUSKEGON, MICH.—West Shore Machine Works, recently organized by Joseph Zura Jr. and Harold Puehler, is erecting a shop building.

GRAND RAPIDS, MICH. — Phoenix Heater & Heating Co., has been incorporated with $1000 capital, by John H. Bryant, 700 Michigan Trust building, to manufacture automatic sprinklers.

GRAND RAPIDS, MICH.—National Brass Co. is having plans prepared by Harry Mead, architect, Grand Rapids, for an addition and alterations.

MENOMINEE, MICH.—Signal Electric Mfg. Co. is building a plant addition covering 20,000 square feet floor space to enlarge production of fans, ventilators, electric drills and motors.

Illinois

CHICAGO—Marine Oil Terminal Co., I. L. Schurman, president of Consumers Oil Co., an officer, has been organized to build $250,000 plant at Cicero avenue and West Forty-first street, on sanitary district canal, for storage of petroleum products. Capacity of 15 to 20 million gallons, for gasoline, fuel oil and other products.

CHICAGO—Illinois Tool Works, 2501 North Keeler avenue, manufacturer of metal cutting tools and fastening products, will build two-story office and engineering building with 34,838 square feet floor space. Austin Co., Cleveland, contractor.

CHICAGO—Republic Steel Corp., Republic building, Cleveland, will build one-story building 160 x 250 feet at its South Chicago wire mill for handling fencing and wire products.

CHICAGO—American Boiler & Tank Co., 2722 South Hillock avenue, will build a plant addition costing about $40,000, including equipment. Latter includes shears, two traveling cranes and air compressors. Capacity will be increased about 15 per cent. Company manufactures boilers, steel tanks, smokestacks and breechings.

CHICAGO—Excelsior Steel Furnace Co., 1226 North Hooker street, will expand capacity about 25 per cent after Jan. 1 by installing additional equipment in present plant, to which two additions were made recently. Company manufactures furnaces, pipe and fittings, stovepipe and elbows.

Indiana

ELKHART, IND. — Routson Brass Foundry Inc. has been incorporated with $10,000 capital to manufacture, brass, aluminum and nickel castings and hardware, by Reta B. Routson and associates, 2605 South Main street.

MISHAWAKA, IND.—American Foundry Equipment Co. will build several extensions, including 19,000-square foot addition to steel fabricating plant, new storage plant and office building enlarged.

TERRE HAUTE IND.—Commercial Solvents Corp., T. P. Walker, president, 17 East Forty-second street, New York, will rebuild burned portion of its plant at cost of $100,000 or more, including equipment.

Missouri

ST. LOUIS—Board of aldermen has leased 35 acres at Lambert St. Louis municipal airport to Curtiss-Wright Corp., 30 Rockefeller Plaza, New York, as site for $8,000,000 addition to its plant.

ST. LOUIS—John C. Kupferle Foundry Co., 2822 North First street, will let contract soon for a one-story 45 x 78-foot top addition costing about $40,000 with equipment. William Wedemeyer & Son, Wainwright building, are architects.

WELDON SPRINGS, MO.—War department has selected 20,000-acre site in St. Charles county about 20 miles from St. Louis for erection of TNT plant to be operated by Atlas Powder Co., Wilmington, Del. Cost estimated at $15,000,000.

Minnesota

FRANKLIN, MINN.—Village, William J. Fleischer, clerk, has approved $19,000 bond issue to finance sewage disposal plant. J. J. Davy, 502 Main street, La Crosse, Wis., is engineer.

WADENA, MINN.—Todd-Wadena power and light co-operative, Earl Schultze, president is awaiting REA approval of 2400 miles rural transmission lines, bids to be taken when approved. Banister Engineering Co., 1586 University avenue, St. Paul, is consulting engineer.

WHEATON, MINN.—Village, M. J. Fridgen, clerk, will vote Nov. 5 on proposal to construct municipal light and power plant and distribution system, including boiler and accessories. G. M. Orr & Co., 452 Baker Arcade, Minneapolis, is consulting engineer. Same engineer is making plans for sewage disposal plant.

Texas

BAYTOWN, TEX.—Humble Oil & Refining Co., Humble building, Houston, Tex., has been awarded a contract totaling $11,857,000 for facilities for production of toluol in plant to be erected at Baytown. Company will advance funds, to be repaid by government in five annual installments.

BORGER, TEX.—Phillips Petroleum Co., Bartlesville, Okla., will build an experimental and commercial plant at its refinery here for extraction of butadiene from butane, at cost of $100,000.

HOUSTON, TEX.—Deere & Co., Moline, Ill., have plans and specifications ready for bids, for an addition to plant here. Opening probably Nov. 18.

Iowa

BROOKLYN, IOWA—Village, Jennie Schmitz, clerk is taking bids to Nov. 12 for improvements to electric light and power distribution system. Stanley Engineering Co., Muscatine, Iowa, is consulting engineer.

CEDAR RAPIDS, IOWA—Iowa Electric Light & Power Co. will build a $1,000,000 diesel engine power plant at Marshalltown, Iowa. Building will cost about $120,000 and equipment $880,000.

DUNKERTOWN, IOWA—City, C. M. Bailey, mayor, is taking bids for deep well turbine pump with magnetic starter, with alternates of oil or water lubricated pumps. E. E. Schenk, 214 Waterloo building, Waterloo, Iowa, is engineer.

LE MARS, IOWA—Plymouth electric co-operative, A. M. Forsberg, superintendent, has given contract to Eberhardt Construction Co., Guttenberg, Iowa, for 220 miles rural transmission lines. K. R. Brown, 802 Valley Bank building, Des Moines, Iowa, is consulting engineer.

MARSHALLTOWN, IOWA—Iowa Electric Light & Power Co., Security building, Cedar Rapids, will build a power plant here at cost of about $1,000,000.

POSTVILLE, IOWA—Allamakee-Clayton electric co-operative, Kermit M. James, superintendent, has given contract to Hoak Construction Co., Des Moines, Iowa, for 330 miles rural transmission lines. K. R. Brown, 802 Valley Bank building, Des Moines, Iowa, is engineer.

SHENANDOAH, IOWA—Iowa-Nebraska Light & Power Co. will install a 2000-horsepower diesel engine at its local

light and power plant.

Montana

KALISPELL, MONT.—City will receive bids Nov. 13 for material and equipment for proposed sewage disposal plant and sewer system.

California

INGLEWOOD, CALIF.—Aircraft Plating Co. has been established by Gerard Brandt and Angelo Fratelo, with works at 415 Redondo boulevard.

LOS ANGELES—Allegheny Ludlum Steel Corp., Pittsburgh, will build a concrete warehouse on Pacific boulevard to accommodate increasing business in Pacific Coast territory.

LOS ANGELES — Pacific Machine Works, 1315 South La Brea avenue, has been formed by M. Aron and Roland Blomgren.

LOS ANGELES—Aviation Development Co., 148 South Figueroa street, has been formed by C. G. Perrault to manufacture aviation supplies.

LOS ANGELES—Christy Tool Engineering Co., 3120 West Florence avenue, has been formed by Daniel Freeman and associates to manufacture mechanical devices.

LOS ANGELES—Precision Buffing Co. has been organized by Ernest V. Berry and has established a shop at 1649 East Slauson avenue.

LOS ANGELES—Supreme Metal Products Co. has been organized by Morris J. Schlom and has established business at 5261 West Jefferson boulevard.

LOS ANGELES—Utility Fan Corp., 4851 South Alameda street, is building an addition 24 x 99 feet, costing about $17,500.

SAN BERNARDINO, CALIF.—Morrow Aircraft Corp. is building an airplane plant on East Third street, steel frame, metal exterior, costing about $65,000.

SAN DIEGO, CALIF.—Weaver Aircraft Corp. has been incorporated with $200,000 capital. Sloane & Steiner, Bank of America building, San Diego, are representatives.

Washington

SEATTLE—Lake Washington Shipyards has been given contract by navy department for six seaplane tenders. Associated Shipbuilders has similar contract for four.

SEATTLE — Associated Shipbuilders will spend $500,000 on shipbuilding plant on Harbor Island, installing modern cranes and other equipment. Navy hulls will be built at this yard and completed at plant of Lake Union Dry Dock & Machine Works.

Canada

WINNIPEG, MAN. — Department of munitions and supply, Ottawa, Ont., C. D. Howe, minister, has let general contract to Fraser Brace Engineering Co. Ltd. for erection of chemical plant near here, estimated to cost $12,000,000.

LONDON, ONT.—Kelvinator of Canada Ltd., Dundas street East, has let general contract to Hyatt Bros., 290 Edgerton street, for a one-story addition 34 x 110 feet.

MILTON, ONT.—P. L. Robertson Screw Mfg. Co. has plans and will build at once a 60 x 60-foot addition, to cost about $45,000.

MONTREAL, QUE.—Canadian Industries Ltd. plans erection of $1,500,000 plant for manufacture of nylon yarns and similar products. Sites are being considered.

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Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
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Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
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Bliss & Laughlin, Inc., Harvey, Ill.
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Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 10-A, P. O. Box 6800-A, Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
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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.
*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.
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Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
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Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Landis Machine Co., Inc., 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., 2934 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*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.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
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 & Rockwell Sts., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
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.

BOLTS (Stove)
Central Screw Company, 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.
Townsend Co., New Brighton, Pa

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, Cooperative Training Div., Box 9379, Scranton, Pa.

BORING MACHINES (Precision)
Barnes, W. F. & John, Co., 201 S. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
National-Erie Corp., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Union Steel Casting 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.
Petroleum Iron Works Co., Sharon, Pa.

BRAKE SHOES
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BRAKE LININGS
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
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., 2698 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 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 (Ladle)
Globe Brick Co., The, East Liverpool, O.

BRICK (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, 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.
Petroleum Iron Works Co., Sharon, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
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. SC, 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.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Beatty Machine & Mfg. Co., 944 150th St., 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., 1106 So. Central Ave., 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-1014, 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.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

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.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Sales Corp., 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.

CAR PULLERS and SPOTTERS Con.
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.
Differential Steel Car Co., Findlay, 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.
Differential Steel Car Co., Findlay, O.
Petroleum Iron Works Co., Sharon, Pa.
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)
American Brake Shoe & Fdry Co., The, 230 Park Ave.,
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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 Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

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-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O., Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting 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-1014, 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.
Shoop Bronze Co., The, 344-60 W. 6th Ave. Tarentum, 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 Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Pattern & Mfg. Co., The, Andrews Pl. S.W., Canton, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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.
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)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Electro-Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel 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.
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 Co., 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 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)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CEMENT (Acid Proof)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S-8, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, 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
Chromium Mining & Smelting Corp., Ltd., 700 Bank of Commerce Bldg., Hamilton, Ont.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANING EQUIPMENT (Metal)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

CLIPS (Packaging)
Consumer's Steel Products, 6454 E. McNichols Rd., Detroit, Mich.

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., 664 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.
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.
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.

WHERE-TO-BUY

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 Sales Corp., 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., 2698 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.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S-8, 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.
Worthington Pump & Machinery Corp., Harrison, N. J.

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)
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., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
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)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

CONVEYORS (Roller—Power and Gravity)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 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 Co., Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Cooperative Training Div., Box 9379, Scranton, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 419 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.
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 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.

COUPLINGS (Pipe) Con.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Dravo Corp. (Engin'r'g 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 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shenard 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 Depot 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.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Shenard 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 Depot St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shenard 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 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
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.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Industrial Equipment Corp., Pittsburgh, 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., 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)

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-1014, 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 HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., 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.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.

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.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAFTING ROOM EQUIPMENT
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
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)
Petroleum Iron Works Co., Sharon, Pa.
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., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., Graybar Bldg., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 1st 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., 509 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Cooper-Bessemer Corp., Mt. Vernon, O.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Crane Cab)
Graybar Electric Co., Graybar Bldg., New York City.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Exhaust Ventilating)
Graybar Electric Co., Graybar Bldg., New York City.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (High Temperature)
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.

FANS (Portable)
Graybar Electric Co., Graybar Bldg., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, 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.

WHERE-TO-BUY

FENCING (Wire) Con.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Sales Corp., 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.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

FERROCHROME
Electro Metallurgical Sales Corp., 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 Sales Corp., 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 Sales Corp., 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.

FERROTITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILING CABINETS (Blueprint, Drawing and Tracing)
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

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., 5027 Beaumont Ave., Philadelphia, Pa.

FLOOR RESURFACING
Flexrock Co., 2330 Manning St., Philadelphia, Pa.
United Maintenance Sales Co., 311 Ross St., Pittsburgh, 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.
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
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGING ROLLS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop)
(*Also Stainless)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
*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)
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)
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
*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.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
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 Co., 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)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
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.

» » » WHERE-TO-BUY « « «

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

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.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
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.
Swindell-Dressler Corp., P. O. Box 1888, 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., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

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., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, 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.
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.
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., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 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.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
McKee, Arthur G., & Co., 2422 Euclid 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.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
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.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.

GAGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

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.
Cattle, 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., 2525 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Fanner Mfg. Co., The, Cleveland, O.
John Finn Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Columbus, O.
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 PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, 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., 1st National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-1014, 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., 5027 Beaumont Ave., 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)
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
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
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
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. 96, 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.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
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.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

WHERE-TO-BUY

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

GRINDERS (Pedestal, High Speed)
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDERS (Swing Frame)
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.

GRINDING COMPOUNDS
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton 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.
Landis Tool Co., Waynesboro, Pa.
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 (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.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING WHEELS
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-1014, 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 (Steam)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
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.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.
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.
Drava 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.
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 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit Mich,
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 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
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., 1996 Kienlen Ave., St. Louis, Mo.
Northern Engineering Works, 2609 Atwater St., 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 American Brass Co., The, Waterbury, Conn.

HOSE (Rubber)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
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.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Temperature)
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.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E. Inc., Sharpsburg Branch, Pittsburgh, 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)
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., 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.
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.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S-8, Chrysler Bldg., New York City.
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.
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.
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.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th 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.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Petroleum Iron Works Co., Sharon, Pa.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KILNS (Rotary Sintering)
Smidth, F. L., & Co., 225 Broadway, New York City.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

LABORATORY WARE
Norton Company, Worcester, Mass.

LADLES
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-K, 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.
Differential Steel Car Co., Findlay, O.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-11, 2694 Madison Rd., Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 864 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 864 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 (Railroad Car & Driving Wheel)
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Chemical, Corroding, Desilvered)
St. Joseph Lead Co., 250 Park Ave., New York City.

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)

LIFTERS (Rubber Vacuum)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-K, Nela Park, Cleveland, O.
Graybar Electric Co., 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.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Differential Steel Car Co., Findlay, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

WHERE-TO-BUY

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., 3813 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The,
35 E. Wacker Dr., Chicago, Ill.
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.
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 (Second Hand)
Marr-Galbreath Machinery Co.,
53 Water St., Pittsburgh, Pa.
West Penn Machinery Co.,
1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works,
Philadelphia, Pa.
Barnes, W. F. & John, Co.,
201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Inc., Sharpsburgh 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., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Sellers, Wm., & Co., Inc.,
1622 Hamilton St., Philadelphia, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
United Engineering & Fdry Co., First National Bank 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.,
664 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co.,
664 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 Sales Corp.,
30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, & Co., Inc., The,
Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MARKING DEVICES
Helmer-Staley, Inc.
321 W. Huron St., Chicago, Ill.

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.

METAL FINISHES
American Nickeloid Co.,
1310 Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
American Brass Co., The,
Waterbury, Conn.
International Nickel Co., Inc., The,
67 Wall St., New York City.
Titanium Alloy Mfg. Co., The,
Niagara Falls, N. Y.

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.

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.
Sellers, Wm., & Co., Inc.,
1622 Hamilton St.,
Philadelphia, Pa.

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 Depot St., Wickliffe, O.
Northern Engineering Works,
2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp.,
358 Schuyler Ave.,
Montour Falls, N. Y.

» » » WHERE-TO-BUY « « «

MOTORS (Electric)
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. 96,
600 So. Michigan Ave.,
Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Graybar Electric Co., 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.
Sawyer Electrical Mfg. Co.,
5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., The,
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.

NAILS (Special Only—All Metals)
Townsend Co., New Brighton, Pa.

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.,
2934 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp.,
2340 A Vauxhall Rd., Union, N. J.
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.
Tinnerman Products, Inc.,
2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co.,
Bethlehem, Pa.
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.
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.,
2340 A Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co.,
Bethlehem, Pa.
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.

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.
Garlock Packing Co., The,
S 3-40, Palmyra, N. Y.

OILS (Cutting)
Gulf Oil Corp. of Penna.,
Gulf Refining Co.,
3813 Gulf Bldg., Pittsburgh, Pa.
Penola, Inc., 34th & Smallman Sts.,
Pittsburgh, Pa.
Pure Oil Co., The,
35 E. Wacker Dr., Chicago, Ill.
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.,
1106 So. Central Ave.,
Chicago, Ill.

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.
Garlock Packing Co., The,
S 3-40, Palmyra, N. Y.
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.
Garlock Packing Co., The,
S 3-40, Palmyra, N. Y.

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)
Helmer-Staley, Inc.,
321 W. Huron St., Chicago, Ill.
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.

PAINT (Stick Form)
Helmer-Staley, Inc.,
321 W. Huron St., Chicago, Ill.

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, 6017 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.
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING EQUIPMENT
International Nickel Co., The,
67 Wall St., New York City.
Youngstown Welding & Engineering Co., The, Youngstown, O.

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
Atlas Mineral Products Co., of Pa.,
Mertztown, Pa.
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.
Wisconsin Steel Co., 180 No.
Michigan Ave., Chicago, Ill.

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 Co.,
Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The,
300 Koppers Bldg.,
Pittsburgh, Pa.

PILLOW BLOCKS (Roller Bearing)
Link-Belt Co., 519 N. Holmes Ave.,
Indianapolis, Ind.
Shafer Bearing Corp.,
35 E. Wacker Drive, Chicago, Ill.

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 (Clevis)
Townsend Co., New Brighton, 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.,
Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The,
540 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.
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., Inc.,
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.
Worthington Pump & Machy. Corp.,
Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co.,
Bethlehem, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.

PIPE MILL MACHINERY
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

PIPE ROLLS (Magnetic)
Dings Magnetic Separator Co., 664 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.
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.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

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., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 540 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.
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 and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 419 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.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
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.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
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., 611 N. Mechanic St., Jackson, Mich.

PRESSES (Bending)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
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.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The Steelweld Machinery Div., Wickliffe, O.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
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.
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., 3031 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
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., 3031 E. Outer Drive., Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
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., 664 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.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Worthington Pump & Machinery Corp., Harrison, N. J.
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. 96, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

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.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Worthington Pump & Machinery Corp., Harrison, N. J.

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., 944 150th St., Hammond, Ind.
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.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
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.

RAILS (New and Relaying)
Industrial Equipment Corp., Pittsburgh, Pa.
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.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Petroleum Iron Works Co., Sharon, Pa.
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)
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
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
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.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Babcock & Wilcox Co., The. Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
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)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-8, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
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.
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., 2698 E. 79th St., Cleveland, O.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., 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.

RIVETERS (Hydraulic—Portable and Stationary)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 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.
*Townsend Co., New Brighton, Pa.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*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.
*Republic Steel Corp., Dept. ST, Cleveland, O.
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.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLER LEVELERS (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.
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.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, 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.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Rubber Covered)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

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 Rolls Div. of Blaw-Knox Co., Pittsburgh, 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 (Corrugated and Plain)
American Rolling Mill Co., The, 540 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.
Johns-Manville Corp., 22 E. 40th St., New York City.
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.

ROOFING & SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

RUBBER GOODS (Mechanical)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Flood Co., The, 6217 Carnegie Ave., Cleveland, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PROOFING PROCESS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES
Kimball Safety Products Co., 7314 Wade Park Ave., Cleveland, O.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
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 and Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.

SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

WHERE-TO-BUY

SCHOOLS
International Correspondence Schools, Cooperative Training Div., Box 9379, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, 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., 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., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Cap, Set, Safety-Set)
Cleveland Cap Screw Co., 2934 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., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Townsend Co., New Brighton, Pa.

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.
Townsend Co., New Brighton, Pa.

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.
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.
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.
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.

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.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 664 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 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.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
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.

SHAPES, SPECIAL (Steel)—Con.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
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, The, 3917 St. Clair Ave., Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

SHEARS
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hanniffin 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.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
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.

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.
Industrial Equipment Corp., Pittsburgh, Pa.

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.
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-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 540 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, 540 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.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, 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, 540 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.
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, 540 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.
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 (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 (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 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.

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, 540 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.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., Graybar Bldg., New York City.

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 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 Sales Corp., 30 E. 42nd St., New York City.
Revere Copper & Brass Co., 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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

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.
Criswell, James, Co., Keenan 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)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

WHERE-TO-BUY

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS

Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
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.

SPELTER (Zinc)

St. Joseph Lead Co., 250 Park Ave., New York City.

SPIEGELEISEN

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., The, 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.

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)

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 419 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 (Oil Tempered—Flat)

Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.

SPRINKLERS (Automatic)

Grinnel Co., Inc., Providence, R. I.

SPROCKETS

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

SPRUE CUTTERS

Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS

Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 419 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.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

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., 2698 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.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

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.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrun 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.

STEEL (Alloy, Cold Finished)—Con.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

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.
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.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
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.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
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.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 540 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.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, 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.
Republic Steel Corp., Dept. ST, Cleveland, O.
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)
Crucible Steel Company of America, 405 Lexington Ave., New York City.
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 (Drill)
Crucible Steel Company of America, 405 Lexington Ave., New York City.

STEEL (Electric)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
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., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
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.
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., 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.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
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.
Wisconsin Steel So., 180 No. Michigan Ave., Chicago, Ill.
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.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
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., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 540 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.
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.
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.
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.
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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
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.
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.
*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.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., 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.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
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 St., 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.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, 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.
Canton Pattern & Mfg. Co., The, Andrews Pl. S. W., Canton, O.

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)

» » » WHERE-TO-BUY « « «

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., 2698 E. 79th St., Cleveland, O.
General Electric Co., Dept. 166-S-K, Nela Park, Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
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.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
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.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Petroleum Iron Works Co., Sharon, Pa.
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)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

TANTALUM CARBIDE
Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Inc., 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., 1640 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMOMETERS
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.

THREAD CUTTING TOOLS
Landis Machine Co., Inc., 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., 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 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.
Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tantalum Carbide)
Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.

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.

TOY PARTS
Townsend Co., New Brighton, 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.
Industrial Equipment Corp., Pittsburgh, Pa.
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.
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 (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 Depot 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.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc. York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

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.

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 (Lift)
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.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., 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.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
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 & Tubes Division, Republic Steel Corp., 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 Co. Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 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.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of American Brass Co., The, 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 & Tubes Division, Republic Steel Corp., Cleveland, O.
Standard Tube Co., The, 14600 Woodward Ave., Detroit, Mich.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 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.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST. Cleveland, O.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUMBLING BARRELS (Coke Testing)
Broslus, 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)
Carboloy Co. Inc., The 11141 E. 8 Mile Rd., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp., 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.

VACUUM CLEANERS
Sturtevant, B. F., Co., Hyde Park, Boston, 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.
Broslus, 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)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Marre, 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 Sales Corp., 30 E. 42nd St., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

WALKWAYS—See FLOORING—STEEL

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 419 Central Ave., Pontiac, Mich.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WASHERS (Lock)
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The, Newark, N. J. and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester, Mass.

WASHERS (Spring)
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, O.
Eaton Mfg. Co., Massillon, O.
National Lock Washer Co., The Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WELDERS (Electric—Arc)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-114, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Progressive Welder Co., 3031 E. Outer Drive, Detroit, Mich.

WELDERS (Electric-Resistance)
Federal Machine & Welder Co., Dana St., Warren, O.
Taylor-Winfield Corp., Warren, O.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Koch, George, Sons, Inc., 2112 Pennsylvania St., Evansville, Ind.
Lincoln Electric Co., The, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

WELDING (Welded Machine Steel Bases)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Electric)
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-114, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Wilson Welder & Metals Co., 60 E 42nd St., New York City.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

WELDING RODS (Alloys)
American Agile Corp., 5806 Hough Ave., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.

WELDING RODS (Bronze)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.

WELDING RODS OR WIRE
Air Reduction, 60 E. 42nd St., New York City.
American Agile Corp., 5806 Hough Ave., Cleveland, O.
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., Dept. ST-114, 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.
Metal & Thermit Corp., 120 Broadway, New York City.
Page Steel & Wire Div. of American Chain & Cable Co. Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Revere Copper & Brass Co. 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.

WHEELS (Car and Locomotive)
Bethlehem Steel Co., Bethlehem, Pa.
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.

WINCHES (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

WIRE (Alloy Steel) (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
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.
*Republic Steel Corp., Dept. ST. Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City

WIRE (Annealed, Bright, Galvanized)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
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.
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)
Bethlehem Steel Co., Bethlehem, Pa.
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)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
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.
Republic Steel Corp., Dept. ST, Cleveland, O.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

WHERE-TO-BUY

WIRE (Music)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE (Round, Flat, Square, Special Shapes)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., Los Angeles, Calif.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
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 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.
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., 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.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE (Threaded)
Townsend Co., New Brighton, Pa.

WIRE (Welding)—See WELDING RODS OR WIRE

WIRE AND CABLE (Electric)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Graybar Electric Co., Graybar Bldg., New York City.

WIRE CLOTH
Cyclone Fence Co., Waukegan, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE FORMS, SHAPES AND SPECIALTIES
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 9 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Seneca Wire & Mfg. Co., Fostoria, O.
Townsend Co., New Brighton, Pa.

WIRE FORMING MACHINERY
Nilson, A. H., Machine Co., The, Bridgeport, Conn.

WIRE MILL EQUIPMENT
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.

WIRE NAILS—See NAILS

WIRE PRODUCTS (*Also Stainless)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Hubbard, M. D., Spring Co., 419 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.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Townsend Co., New Brighton, Pa.
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.

WIRE ROPE AND FITTINGS (*Also Stainless)
American Cable Div. of American Chain & Cable Co. Inc., Wilkes-Barre, Pa.
*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.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

WIRE ROPE SLINGS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Broderick & Bascom Rope Co., 4203 N. Union St., St. Louis, Mo.
Leschen, A., & Sons Rope Co., 5909 Kennerly Ave., St. Louis, Mo.
Macwhyte Co., 2912 14th Ave., Kenosha, Wis.

WIRE STRAIGHTENING AND CUTTING MACHINERY
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Shuster, F. B., Co., The, New Haven, Conn.
Williams, J. H., & Co., 225 Lafayette St., Buffalo, N. Y.

WRENCHES (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

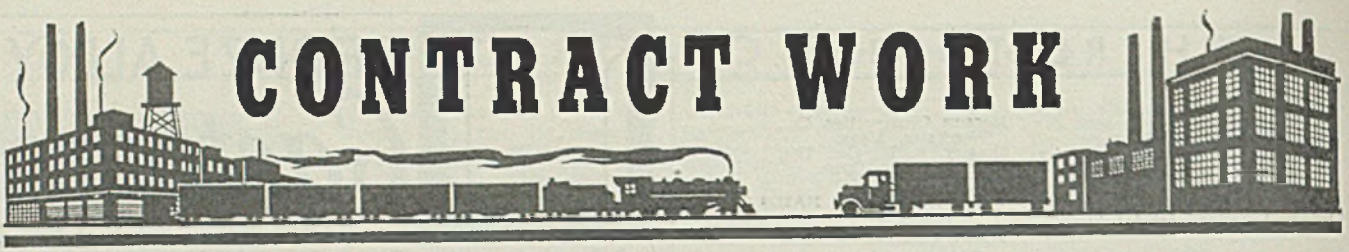
ZINC
New Jersey Zinc Co., 160 Front St., New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

ZINC ALLOYS
New Jersey Zinc Co., 160 Front St., New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

ZINC (Rolled Sheets, Strips, Coils)
New Jersey Zinc Co., 160 Front St., New York City.
St. Joseph Lead Co., 250 Park Ave., New York City.

ZIRCONIUM METAL AND ALLOYS
Electro Metallurgical Sales Co., 30 E. 42nd St., New York City.

CONTRACT WORK



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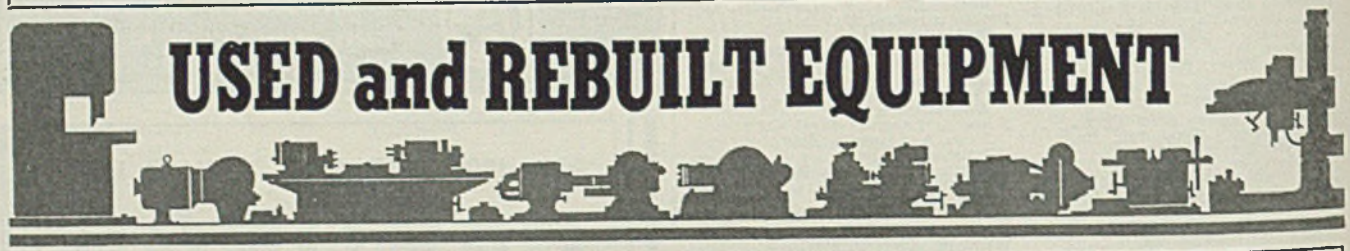

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One 36" good used, second hand electric magnet. Communicate with Erie Scrap Iron Co., Box No. 904, Erie, Pa.

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NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.

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200 K.W., 250/275 volt D.C., motor generator set, 3-Ph 60-Cy 2300-V A.C., complete in fine shape. Low price.

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FOR RENT OR SALE

Modern 10" Rolling Mill including 16" break down rolls For Rent or Sale with all necessary equipment in New York Metropolitan District. Address Box 330, STEEL, Penton Bldg., Cleveland.

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4 Practically new Monel pickle crates and hangers, welded construction, 126 in. x 45 in., suitable for weights up to 15,000 pounds. Write for dimensions. Bargain for quick buyer. Address Box 344, STEEL, Penton Bldg., Cleveland.

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We are interested in the purchase of two turret lathes.

One similar to No. 2 Cincinnati Acme Universal cross sliding hollow hexagon turret lathe.

Also, one similar to either Gisholt or other reputable manufacturer. Size 27" x 6¼".

In answering, advise age of machine and where it can be inspected. Address Box 348, STEEL, Penton Bldg., Cleveland.

Boring Mills 42" Bullard, 72" Niles, B.D.
Baler, 22-P Logemann, Pump and motor.
Draw Bench, 30,000 lbs. W-F, 22' draw, M.D.
Grinder, Knife 10' Bridgeport, M.D.
Grinder, Roll 30" x 76" Farrel, M.D.
Press, Forging 150 ton United Steam Hyd.
Pipe Machs, 2-4-6-8-12" Williams, M.D.
Shears Plate, 10' x ¼"—48" x ½"—96" x ½", M.D.
Sheet Levellers, 48"-60"-84" McKay, 17 roll, M.D.
Slitters Gang, 18" W-F, 36" Yoder, M.D.

WEST PENN MACHINERY CO.

1208 House Bldg. Pittsburgh, Pa.

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Used or Surplus Machinery and Equipment. Send in your copy instructions for an advertisement in this column. Your ad will reach the important men in the metalworking and metal-producing industry. Write to STEEL, Penton Bldg., Cleveland.

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PLANT OR GENERAL MANAGER; 25 years experience light to medium metal industries also foundry. Capable engineer, alert and progressive manager seeks negotiations with live moderate size industry. Protestant, married, age, 45. You may have the facts, there is no obligation. Address Box 334, STEEL, Penton Bldg., Cleveland.

TWENTY YEARS EXPERIENCED STRUCTURAL and plate shop, superintendent. Seeking position either as superintendent, general foreman or estimating sales engineer. Moderate Salary until proven results. Address Box 335, STEEL, Penton Bldg., Cleveland.

POSITION WANTED — SALESMAN OF machine tools, accessories, or metal working equipment. Fourteen years experience this field. Willing go anywhere. Age thirty-five, married. Employed at present. Definitely not afraid to work. Box 324, STEEL, Penton Bldg., Cleveland, O.

SUPERINTENDENT OR SHOP FOREMAN 21 years' experience in fabrication of various high tensile alloy sheets including eighteen-eight. Know trailer and body industry thoroughly, also hotel and kitchen equipment, age 37, Protestant, perfect health. Address Box 346, STEEL, Penton Bldg., Cleveland.

MECHANICAL ENGINEER, NOW EMployed, wants executive position as Chief or Plant Engineer with industrial concern. College graduate, 25 years experience in steel and allied industries. Address Box 255, STEEL, Penton Bldg., Cleveland.

FURNACE ENGINEER—TWENTY YEARS experience in engineering and sale of industrial furnaces for iron, metal, chemical, glass ceramic industry. For design, setting furnaces in motion, etc. Excellent knowledge of the theory of the heat and application of fire-bricks. Address Box 327, STEEL, Penton Bldg., Cleveland.

Help Wanted

EXCEPTIONAL OPPORTUNITY FOR EXperienced man with some technical training and successful sales record, for executive sales position with seamless steel tube mill. Exclusive territory, office, personnel. State salary and full details of training and experience. Address Box 338, STEEL, Penton Bldg., Cleveland.

HELP WANTED

Distributor of tin plate, black plate and tin mill specialties with warehouse in New York metropolitan area, is expanding sales organization. Primary consideration will be given to applicants having thorough knowledge of tin mill products and their consumer applications. Clientele in metropolitan district of secondary importance. Requests for interview outlining qualifications will be held in confidence. Address Box 345, STEEL, Penton Bldg., Cleveland.

WANTED—A MAN CAPABLE OF SUPERvising the operation of a steel plant. Must have open hearth and electric furnace experience. Address Box 343, STEEL, Penton Bldg., Cleveland.

WANTED: STRUCTURAL STEEL DESIGNER: Must have ability design buildings, bridges and plate work. First-class references important. State salary expected in first letter. Address Box 347, STEEL, Penton Building, Cleveland.

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words, 6.50, each additional word .13; all capitals, leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05; all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge.

Classified pages are 3 columns, each column 2¼ inches wide.

Forms close Wednesday preceding publication date.

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This thoroughly organized advertising service of 30 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

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Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Oct. 30, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Nov. 29, 1940, for construction of the U. S. P. O., Oak Park Station, Flint, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $10 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

Accounts Wanted

MANUFACTURERS' AGENT ESTABlished in Chicago industrial area, now general U. S. selling agent of seasoned line in milling machinery field, desires representation soundly engineered machine tool of broad applicability to combine with present active sales campaigns. Modern production tools or productive materials also considered. Address Box 328, STEEL, Penton Bldg., Cleveland.

ESTABLISHED MANUFACTURER'S REPresentative Pittsburgh area desires full or part time account. Prominent Office. Engineer. Acquainted manufacturers, refineries, utilities. Address Box 329, STEEL, Penton Bldg., Cleveland.

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FOR SALE

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FOR SALE, THE FOLLOWING USED structural steel: 12 pieces 28" Bethlehem beams 47' 6", 2 pieces 28" Bethlehem beams 33' 7½", 10" flange, .500 web, wght. 104 lbs. per foot. Write to
SEFFREN SUPPLY COMPANY
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CHICAGO MANUFACTURER OF RUST preventives desires representation in Detroit, Cleveland, and Pittsburgh districts for marketing an excellent line of rust preventives. Have wide acceptance by the largest industrial concerns. Reply full details, experience, age, territory desired. Address Box 326, STEEL, Penton Bldg., Cleveland.

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ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

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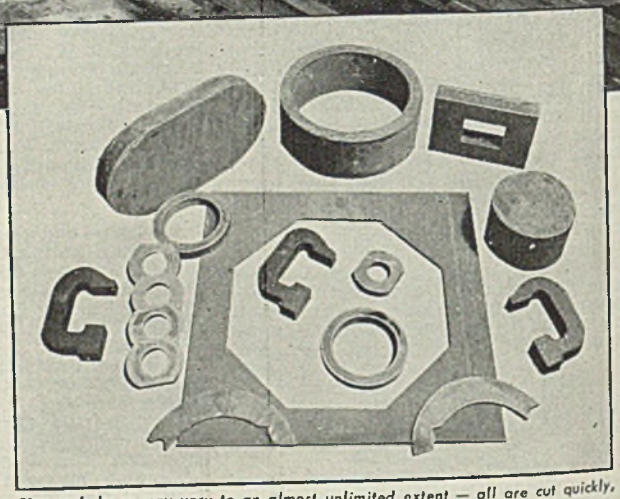

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