STEEL

ESTABLISHED 1882

Contents

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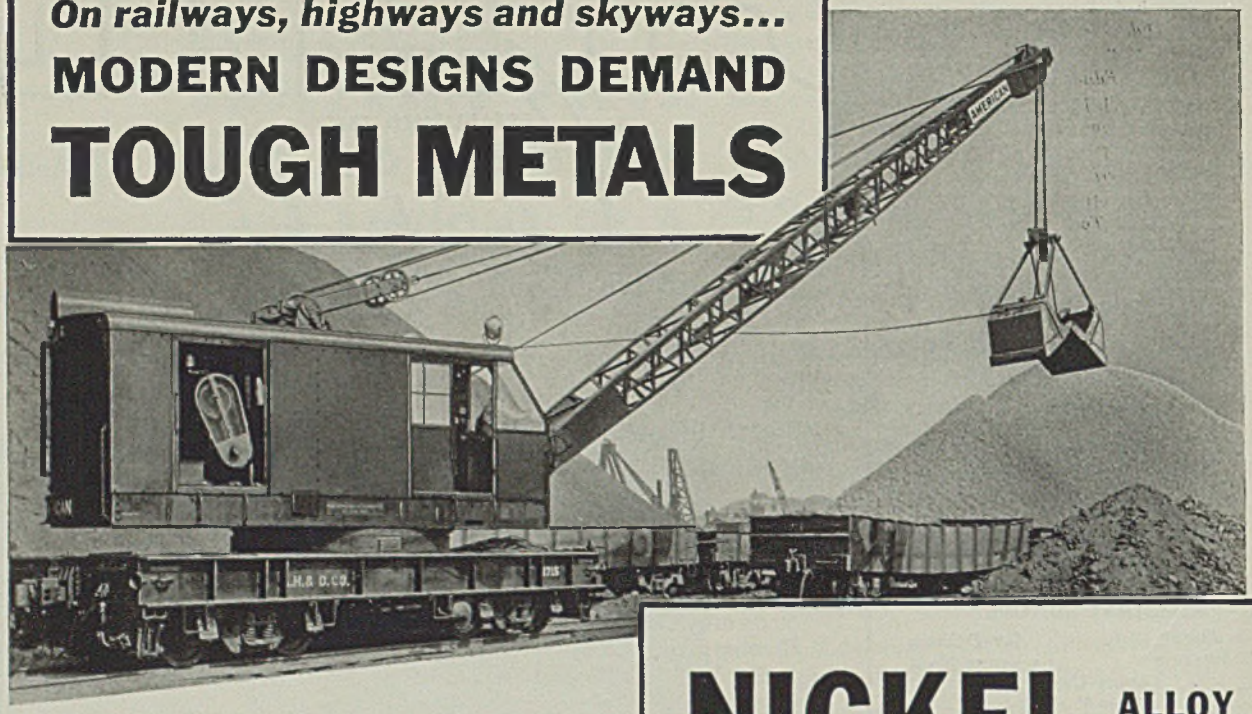
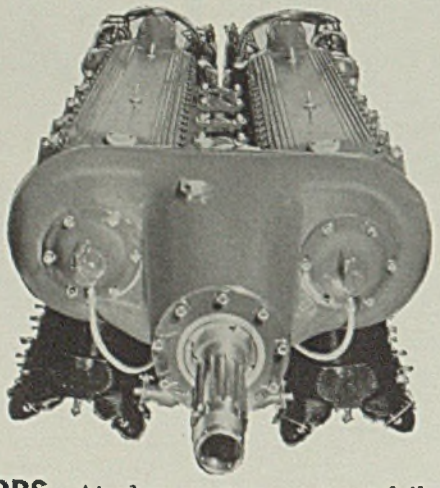
PRODUCTION · PROCESSING · DISTRIBUTION · USE

On railways, highways and skyways...

MODERN DESIGNS DEMAND TOUGH METALS

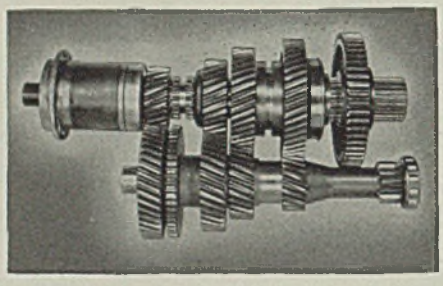


CRANES—Whether you build cranes, planes or truck transmissions, 1940 competition demands efficient, compact designs. Such designs are economically practical when you specify tough, long wearing Nickel alloy steels for stressed units. This modern locomotive crane manufactured by the American Hoist & Derrick Co., St. Paul, Minn., utilizes Nickel steels with tensile strengths up to 115,000 lbs. per square inch for stressed shafting, gears and pinions.



MOTORS—Airplane motors must not fail, so the Menasco Manufacturing Co., Los Angeles, Calif., assure dependability in their "Unitwin" motor by using tough, strong, long-serving Nickel alloy steels for all important parts. The new "Unitwin" consists of two separate in-line engines, generating 325 h.p. apiece, geared to drive a single propeller. The "Unitwin" is used in Vega six place "Starliner" planes.

NICKEL ALLOY STEELS



TRUCK TRANSMISSION PARTS

must withstand rough usage and abuse in service. Therefore, the manufacturers of the heavy duty transmission illustrated here, The Four Wheel Drive Auto Co., Clintonville, Wisconsin, specify Nickel alloy steels to assure safe extra strength and toughness in light weight stressed parts. This transmission is especially designed for heavy duty four-wheel drive service, having a torque capacity in excess of the largest engines available.

➡ Heat treatable, readily machinable steels containing Nickel may enable you to simplify design and speed up production. Our suggestions are based upon the practical experience of many plants. For information, without obligation, please address:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING THIS ISSUE

■ THE NATIONAL defense program is shifting at last from first to second gear. Government awards (p. 26) are mounting rapidly and involve many diversified requirements which, directly and indirectly, will call upon the production resources of thousands of manufacturing plants. This activity is merely of a preliminary character; it is a foretaste of the huge volume of business to be expected when armament production really gets into high gear. A major stumbling block is unwillingness of many managements to invest stockholders' money unless they are assured they are not gambling; congress is expected to dismiss this confusion (p. 23) by legalizing armament amortization over a five-year period.

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Mr. Grace (p. 23) voices what may be assumed as the attitude of industry in general toward the national defense program. "The defense dollar," he says, "should be made to stretch as far as possible." Prices must be kept at reasonable levels, he adds, and boom conditions avoided. . . . Careful scrutiny of the proclamation signed by the President July 26 reveals (p. 28) that export licenses for scrap need be obtained only for No. 1 heavy melting steel. Eastern steelmakers will ask that other grades which are shipped abroad in large tonnages be included. . . . Present concepts of foreign trade must be scrapped and industry must realize that a new order is coming, says Lynne M. Lamm, STEEL's Washington editor (p. 32.)

Economy In Defense

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Steel production last week advanced 1 point (p. 25) to 90.5 per cent of ingot capacity. Although production is almost at peak, steel mill orders backlogs (p. 89) still are expanding and prospects are that buying in the Fall will be still heavier. A feature of current business is the amount of tonnage being placed for construction of air fields and of buildings to augment capacity for producing airplanes and accessories. One bottleneck—that in heavy armor plate—has been eliminated. . . . First preview of 1941 model automobiles is scheduled for Aug. 13 with others (p. 37) to follow immediately. . . . A special committee (p. 32) will study the problem of recovering manganese from low-grade domestic ores.

Backlogs Expanding

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D. T. Hamilton (p. 44) discusses new ways of making fine-pitch gears. These reduce costs, increase production and improve accuracy. . . . Automobile bearings of a new type are expected to have at least 200 per cent longer life; they are formed (p. 46) by sintering powdered metals on steel backing strips and anchoring babbitt metal on the sintered surfaces. . . . Proper mechanical handling can improve the overall efficiency of any welding plant in a remarkable degree, says Harold Lawrence (p. 48); he cites examples. . . . John H. Loux (p. 54) describes an improved pipe normalizing furnace which, among other advantages, holds both lower and higher temperatures with close uniformity.

Bearing Life Lengthened

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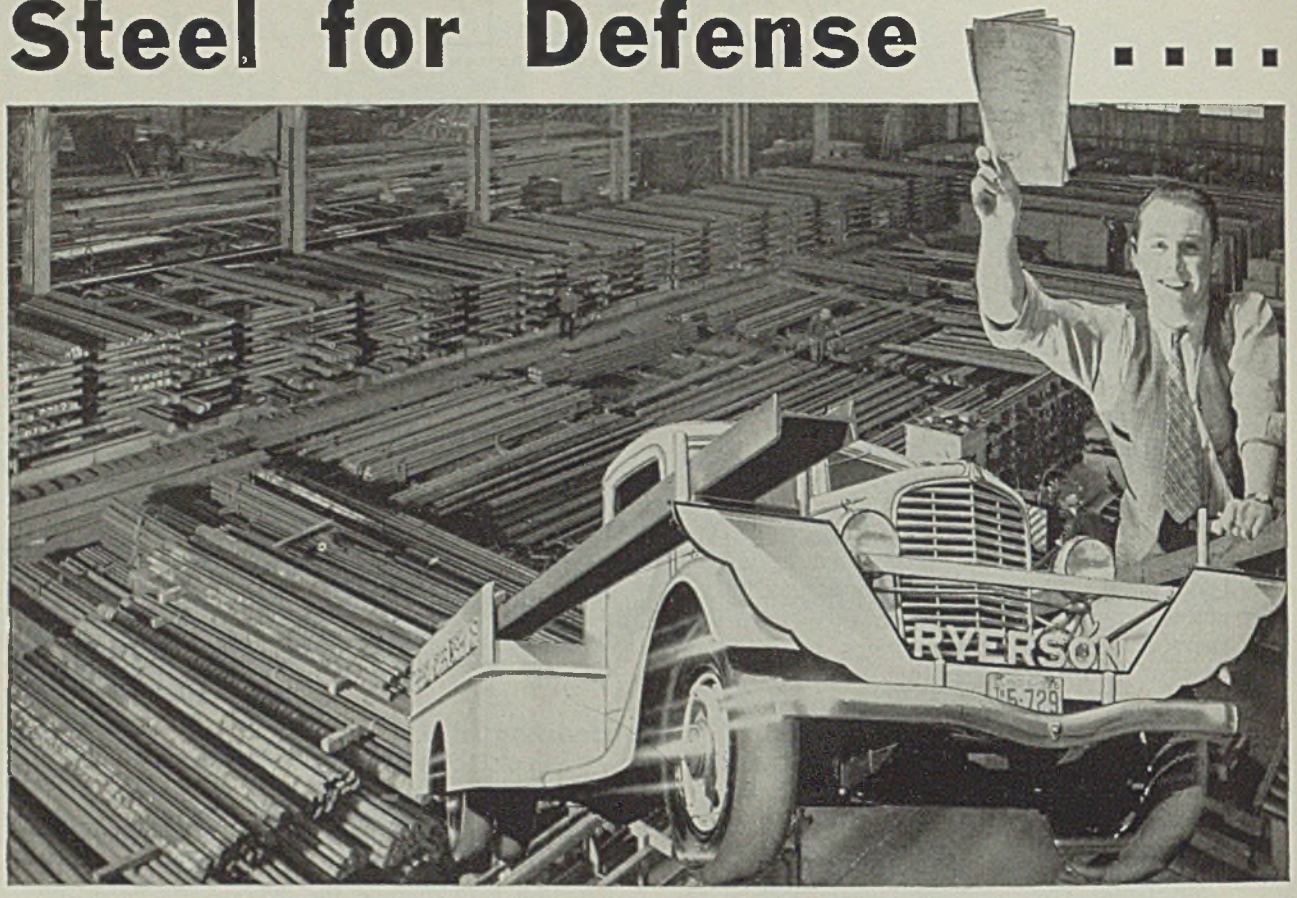
E. L. Bartholomew tells about a new heat treatment (p. 60) which sharply improves the physical properties of gray iron. . . . A new line of forging presses (p. 67) is designed for uninterrupted flow of the metal. Number of blows is reduced to a minimum and contact time between dies and hot metal is lowered. . . . The 3 per cent chromium-molybdenum steel that is being ordered extensively from abroad (p. 68) appears to have wide applicability here. . . . An Eastern open-hearth plant (p. 76) is using eight all-welded steel ladles of 190 tons capacity each. . . . New nonmagnetic, free-machining steel with improved mechanical properties (p. 52) is available to the electrical industry.

New Heat Treatment

E C Kreutzberg

Steel for Defense . . . .



is ready at RYERSON

OVER the wires to ten great Ryerson plants comes ever-growing demands for steel to meet the strict requirements of America's defense program. Industry knows, from 98 years of experience, that Ryerson is a strong first line of support when good steel is needed quickly.

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Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

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Welding Rod
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Concrete Reinforcing
Babbitt Metal and Solder

RYERSON

RYERSON CERTIFIED STEELS

Steel Producers' Net Earnings

309 Per Cent Over 1939

Industry Well Up in Profit Zone with Higher Rate of Operations in First Half. Gain in Second Quarter Over First Three Months Is Moderate, Due to Provision for Higher Taxes

■ NINETEEN leading steel producers, representing nearly 87 per cent of the industry's ingot capacity, earned an aggregate net income of $46,793,114 in the quarter ended June 30. This was their best second quarter since 1937, when 17 of the companies (Alan Wood and Copperweld excluded) had an aggregate net profit of $71,886,432.

Earnings in the quarter were slightly larger than in the quarter ended March 31. They were more than four times as large as the net income of the identical 19 in the second quarter last year.

For the first half this year their net income was $91,225,128, again more than four times as large as in the corresponding period in 1939, when it aggregated $22,340,862. Four incurred deficits in the first half, 1939, compared with two this year.

Most of the companies reported they were compelled to make provision for tax increases that had not been anticipated. In many instances provision for the increase over the entire first half was made from second quarter earnings, decreasing net income for the period considerably.

Several producers declared adjustments in their earnings statements for the half would be necessary later when the tax situation is clarified. Further provisions for that purpose are planned.

On the basis of the returns from the 19 producers indicated net income for the entire industry in the first half would be about $104,977,200, equal to $3.66 per ton of ingots produced in the period, compared with $1.26 per ton in the first half of 1939.

Steelworks operations averaged 72.64 per cent of capacity in the first half of 1940, compared with 52.98 per cent in the period last year.

Based on the assumption the current rate of operations will hold throughout the year, as the national defense program gets under way, indications are the industry will earn slightly more than 5 per cent on total capitalization. Since 1929 this

Steel Producers' Earnings Statements Summarized

	Second Quarter 1940	Second Quarter 1939	First Quarter 1940	First Half 1940	First Half 1939	Annual Capacity (a)
United States Steel Corp.	$19,201,008	$1,309,761	$17,113,995	$36,315,003	$1,970,311	28,885,000
Bethlehem Steel Corp.	10,807,318	3,822,927	10,891,139	21,698,457	6,231,986	11,247,040
Republic Steel Corp.	3,337,730	550,412	3,111,723	6,449,453	1,083,311	7,280,000
Jones & Laughlin Steel Corp.	2,141,645	471,287*	1,134,611	3,276,256	847,812*	4,099,200
National Steel Corp.	3,004,624	1,958,755	4,009,193	7,013,817	4,385,424	3,808,000
Youngstown Sheet & Tube Co.	1,169,283	329,086	1,253,929	2,423,212	546,193	3,494,400
Inland Steel Co.	2,873,655	1,760,459	3,059,844	5,933,499†	3,785,060	3,091,200
American Rolling Mill Co.	1,079,405	875,671	1,005,194	2,084,599	1,669,150	3,030,182
Wheeling Steel Corp.	1,019,426	809,995	644,652	1,664,078	1,538,656	1,960,000
Otis Steel Co.	196,630*	431,766*	165,513*	362,143*†	251,440*†	977,000
Alan Wood Steel Co.	224,312	30,276	297,246	521,558	264,255	739,200
Allegheny Ludlum Steel Corp.	1,008,121	147,740	966,598	1,974,719	354,322	605,360
Sharon Steel Corp.	79,327	148,157*	309,576	388,903	140,544*	560,000
Granite City Steel Co.	7,238†	21,610†	43,152	50,390	35,045	448,000
Continental Steel Corp.	141,339	253,128	211,456	352,795	532,307	364,000
Keystone Steel & Wire Co.	446,402†	380,738	279,386	725,788†	698,346†	280,000
Wickwire Spencer Steel Co.	177,470*	149,100*	262,701*	440,171*	307,853*	168,000
Copperweld Steel Co.	293,627	191,243	227,687	521,314	391,420	144,000
Rustless Iron & Steel Corp.	332,754	209,001	300,847	633,601	402,725	44,800
Total	$46,793,114	$11,450,492	$44,432,014	$91,225,128	$22,340,862	71,225,382

* Loss; † Indicated; (a) as reported by the companies, with exception of Copperweld Steel, for Dec. 31, 1939, in net tons.

figure was exceeded only in 1937, when percentage of net return on capitalization, before provision for interest or dividend requirements, was 6.07.

The accompanying tabulation presents, for comparative purposes, these 19 producers' net earnings and include some figures computed from figure was exceeded only in 1937,

AMORTIZATION POLICIES AWAITED BY U. S. STEEL

United States Steel Corp.'s net income for quarter ended June 30 was $19,201,008, equal after preferred dividends to $1.48 per common share. This compares with $17,113,995 earned in the first quarter this year and with $1,309,761 in the June quarter of 1939.

Directors declared a $1 dividend on common stock, payable Sept. 20 to record Aug. 20, in addition to the regular $1.75 preferred dividend, payable Aug. 20 to record Aug. 2.

Corporation's backlog now is 2,500,000 tons of finished steel, in addition to heavy orders for ships, cement and other products. This is equal to more than six weeks capacity. Operations currently are around 94 per cent of capacity and production is at the highest rate since August, 1929.

Irving S. Olds, chairman, said expenditures for new equipment to meet national defense requirements have been relatively small and that the corporation planned to move slowly until tax amortization policies are settled.

"We have been asked to increase armor plate facilities for which orders will run for probably not more than three to five years. For that reason the tax amortization problem is a serious one for us. If we have to amortize costs for 20 years, our profits during the order period would appear to be unusually large. There should be a much shorter time for amortization. . . .

Delays Shipyard Expansion

"The problem of amortization time also must be considered in the matter of expanding shipbuilding facilities, and no new ways will be constructed until the situation is clarified."

Mr. Olds said the corporation has no expansion of electric steel making facilities underway, although it is being considered.

Corporation officials, he said, have not yet discussed fourth quarter prices, pointing out that this generally is not decided until about one month before the period opens. Some raw material prices have increased, such as tin, but Mr. Olds pointed out that the corporation supplies its own iron ore, coal and limestone.

Discussing the influence of the national defense program, Mr. Olds said the corporation has not yet felt any noticeable effects aside from shipbuilding.

Exports for the first half were slightly under 15 per cent of total sales. Foreign demand, he said, has not varied greatly during the past six months and he anticipates third quarter exports at about the same rate.

Although the present operating rate is the highest since August, 1929, and capacity is larger now than then, actual production is slightly under that in April, 1929, when production exceeded theoretical capacity. Current ingot capacity is 28,885,000 net tons a year; in 1929, it was 27,104,000 net tons. At 94 per cent, weekly output now is about 522,000 tons; at 103 per cent in April, 1929, output was 536,000 net tons a week.

Shipments Up 4 Per Cent

Shipments of steel products during the second quarter showed an increase of 4 per cent over the shipments for the first quarter of 1940 and of 35 per cent over the same period of 1939. Earnings both for the second quarter of 1940 and for six months terminating June 30, reflected substantial improvement over the earnings for the corresponding periods a year ago.

A summary of net income and of shipments for the second quarter of 1940, and a comparison for the first six months of 1940 and the first six months of 1939 follow:

	Second Quarter ended June 30, 1940	First 6 Months ended June 30, 1940	First 6 Months ended June 30, 1939
Net income applicable to capital stocks	$19,201,008	$36,315,003	$1,970,311
Shipments of finished steel products:			
Net Tons	3,201,645	6,288,398	4,838,404
Per Cent Capacity	66.4	65.2	49.4

Capital outlays during the first half for additions to and betterments of properties, less credit for properties sold, were approximately $28,600,000. An amount of $130,000,000 of capital obligations also was retired through operation of sinking funds, at maturity or by refinancing, while $94,000,000 of capital obligations were issued, making a net reduction in outstanding capital obligations of $36,000,000.

Net current assets of the corporation and subsidiaries on June 30, after giving effect to such capital outlays and debt reductions and after deducting current dividend declarations, were $422,738,632, compared with $434,012,784 at March 31, 1940, and $403,881,707 at June 30, 1939, on a similar basis.

On July 1, unexpended balances on approved appropriations for property additions and betterments amounted to approximately $60,000,000.

Average number of employes for the first half this year was 242,144, an increase of 16.4 per cent over the first half, 1939, average of 208,113.

Total payroll for the first six months this year, $199,871,911, was 22.3 per cent higher than in comparable period last year, when it was $163,461,751.

In order to effect substantial reductions in annual interest costs certain bonds were refinanced. Provision was made for the anticipatory retirement of the $10,000,000 principal amount outstanding Elgin, Joliet and Eastern railway first mortgage gold bonds due May 1, 1941, bearing a 5 per cent interest rate. The $9,000,000 principal amount outstanding Chicago, Lake Shore and Eastern railway first mortgage gold bonds due June 1, 1969, bearing an interest rate of 4½ per cent were called. The issues were replaced by $19,000,000 principal amount Elgin, Joliet and Eastern railway company first mortgage bonds, series "A," due March 1, 1970, bearing an interest rate of 3¼ per cent.

The corporation called the United States Steel Corp. ten-year debentures due June 1, 1948, bearing an interest rate of 3¼ per cent of which there were outstanding $95,140,000 principal amount. Cash to accomplish this latter retirement was obtained from the cash resources of the corporation and from the issuance and sale of $75,000,000 principal amount of serial debentures of the corporation maturing $2,500,000 semiannually Nov. 1, 1940, to May 1, 1955, bearing an average interest rate of less than 2½ per cent. The net amount of extraordinary items connected with these refinancing operations such as amortization of bond discounts, premiums paid on bond retirements, was $5,394,212, which is being charged off during the year 1940.

AMERICAN ROLLING MILL CO.

American Rolling Mill Co., Middletown, O., reports its consolidated net income for quarter ended June 30 was $1,079,405, after provision for depreciation and federal taxes. It was equal to 20 cents per share on common and compared with net profit of $875,671 or 13 cents per common share in the period last year. Net earnings in quarter ended March 31 totaled $1,005,194 or 17 cents a

share on company's common stock.

Consolidated net profit for six months ended June 30 was $2,084,599 or 37 cents a share on common; in first half, 1939, net income was $1,669,150, equal to 23 cents per common share. Earnings last year, however, included approximately $400,000 non-recurring income in the first quarter; none such is reported for this year.

Dividend of $1.12½ per share on the company's 4½ per cent cumulative preferred stock was declared last week, payable Aug. 30 to record of Aug. 5. It will pay all accumulated and unpaid preferred dividends to July 15, 1940, the last dividend payment date. Previous dividend on preferred, $2.12½ per share, was paid July 1.

INLAND STEEL CO.

Inland Steel Co., Chicago, reports a net profit of $2,873,655 for the quarter ended June 30, after provision for depreciation, depletion, interest and federal income taxes. This was equal to $1.76 per share on the company's capital stock, and compared with $1,760,459 net income earned in the period last year. Net profit for first quarter, 1940, was $3,059,844 or $1.88 per share.

Indicated net profit for six months ended June 30 was $5,933,499, equal to $3.64 per share, compared with $3,785,060 or $2.33 per share in the corresponding period last year.

The company's report states that provision for federal taxes includes adjustments from Jan. 1, according to new rates under the revenue act of 1940. Further adjustment resulted from deducting from taxable income the proportion of unamortized bond discount and expense and premium on series D 3¾ per cent first mortgage bonds redeemed during the period.

PITTSBURGH STEEL CO.

Pittsburgh Steel Co., Pittsburgh, reports net profit for second quarter totaled $176,399, equal to 59 cents per share on 7 per cent class B preferred stock. This compared with a net loss of $232,615 incurred in the period last year. Net income for March quarter was $203,008 or $1.34 a share on the 7 per cent class B preferred.

Total net income for the first six months was $379,407, equal to $1.94 a share on the class B stock; in first half, 1939, net loss was $609,774.

WHEELING STEEL CORP.

Wheeling Steel Corp., Wheeling, W. Va., reports $1,019,426 net profit earned in the second quarter this year. This was equal to 95 cents per share on common after dividend requirements on the company's $5 prior preferred and 6 per cent preferred stock.

Adjusted net profit for the corresponding period last year was $809,995 or 58 cents per common share. For the March quarter earnings totaled $644,652.

First-half net profit totaled $1,664,078 or $1.24 cents a share on common, compared with adjusted net income of $1,538,656 or $1.02 per common share earned in the corresponding period last year.

NATIONAL STEEL CORP.

Second quarter net income of National Steel Corp., Pittsburgh, was $3,004,624, after provision for all charges and was equal to $1.36 per share on the company's outstanding capital stock. This compared with $1,958,755 net income, equal to 89 cents per share, earned in the corresponding period last year. Net profit for the first quarter, 1940, was $4,009,193 or $1.82 per capital share.

For six months ended June 30, National Steel's net profit totaled $7,013,817 or $3.18 per share, against $4,385,424 or $1.99 per share earned in the first half, 1939.

Consolidated income summary for six months ended June 30:

	1940	1939
Profit before depreciation, depletion, interest, federal income tax	$13,139,952	$9,740,540
Provision for depreciation, depletion	3,477,646	3,207,094
Interest charges	932,292	1,211,256
Provision for federal income tax	1,716,196	936,767
Net income	7,013,817	4,385,424

Subcommittee Approves Five-Year Amortization

■ A five-year amortization period for national defense plant expansions was tentatively approved last week by the house ways and means subcommittee and will be recommended to the full committee. The provision would become effective as of July 10, 1940, the date on which the White House announced agreement on the five-year period, according to Rep. Jere Cooper, committee chairman.

President Roosevelt told his Friday press conference that a general agreement has been reached to go ahead as rapidly as possible with the excess profits tax bill which, he said, will include the amortization provision and repeal the Vinson-Trammell act. The President said Senator Pat Harrison, chairman of the senate finance committee, believed the bill could be passed by congress within one month.

The President also said William S. Knudsen, defense commissioner, had told him industry is going ahead with $1,800,000,000 worth of defense program material.

Bethlehem Steel Trains Employes for Defense

■ A full quota of skilled workers for all its needs on defense work is assured by Bethlehem Steel Co. through the extension of its normal job-training program, as outlined in the company's employe magazine *Bethlehem Review* for August.

"The defense dollar should be made to stretch as far as possible," says E. G. Grace, president, in urging the need for efficient large scale production and in cautioning that prices must be kept at reasonable levels, and boom conditions avoided to prevent economic disruption.

"In ordinary times our training courses are so planned as to supply a steady influx of young blood with a broad training covering all aspects of a certain craft or trade.

"A large part of our present supervisory forces were with this organization during the period of similar activity at the time of the World war. They, together with the large body of skilled and seasoned craftsmen throughout the organization, are well qualified to analyze the requirements for each job and focus attention on the essentials and thus prepare the newer men for efficient service in the shortest possible time."

Underlying such intensive training is the policy of selecting as instructors skilled craftsmen from among the present working forces, chosen because of their ability to impart their craft knowledge to unskilled workers in the shortest possible time.

Donora Zinc Workers Strike, Violate Contract

■ Nearly 200 workers at the Donora, Pa., zinc works of the American Steel & Wire Co. last week were on strike in violation of contract and in reported defiance of national Steel Workers Organizing committee officials.

The local union demanded the company add a helper at each furnace, a total of 18 men. The company held that the manner in which the demand was made was not in accordance with "normal contractual procedure as followed by management and unions" and that "the matter of internal union procedure and adherence to labor agreement procedure is involved."

At Donora, it was reliably reported high officials of SWOC telegraphed the local lodge condemning the union's conduct and ordering strikers to return to work.

All departments of the zinc works, with the exception of the furnaces, were operating at week's end.

Daily Average Pig Iron Output Up 3 Per Cent: 6 Stacks Added

■ PRODUCTION of coke pig iron in the United States increased for the fourth consecutive month in July to 4,058,488 net tons, highest monthly total since December, 1939, when output was 4,219,718 tons.

With production at 86.1 per cent of capacity, last month's tonnage was the largest for any July since 1929, when 4,236,412 net tons was produced. It was 6.4 per cent greater than 3,813,092 tons in June. The July, 1939, figure was 2,638,760 tons.

Average daily production, 130,919 tons, was slightly more than 3 per cent greater than in June, when daily average was 127,103 tons. In July, last year, daily average was 85,121 tons.

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	4,058,488	2,638,760	1,358,645
Tot. 7 mo.	25,107,279	16,662,428	10,241,474
Aug.	.....	2,979,774	1,674,976
Sept.	.....	3,218,940	1,885,069
Oct.	.....	4,062,670	2,315,599
Nov.	.....	4,166,512	2,561,060
Dec.	.....	4,219,718	2,478,244
Total	.....	35,310,042	21,156,422

Aggregate production for the first seven months this year was 25,107,279 tons, more than 50 per cent greater than in the period last year and nearly two and a half times as large as in 1938. Total output for first seven months in 1937 was 26,065,417 tons, against 10,241,474 for the period in 1938 and 16,662,428 for the period in 1939.

Average daily production for the seven months was 117,875 tons, well above last year's 78,596 tons. It was lower, however, than 122,950 tons, daily average for the first seven months in 1937.

The industry's operating rate in July increased 2.5 points to 86.1 per cent of capacity. This compared with operating rate of 55 per cent in July last year.

Stacks in blast July 31 totaled 187, an increase of six over the previous month. It was the highest total since last December, when 191 furnaces were active, and compared with 171 in May and 155 in April.

In July, a year ago, 129 stacks were in blast, compared with 77 in July, 1938, and 192 in July, 1937.

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	130,919	85,121	43,827	126,501
Aug.	.....	96,122	54,031	130,677
Sept.	.....	107,298	62,835	127,604
Oct.	.....	131,053	74,697	104,450
Nov.	.....	138,883	85,369	74,929
Dec.	.....	136,119	79,943	54,319
Ave.	117,875	96,740	57,962	112,642

Eight blast furnaces resumed last month, and two were blown out or banked. Five merchant stacks resumed and none were blown out. In the nonmerchant or steelworks classification, three stacks resumed and two were blown out or banked

Furnaces resuming in July:

In Illinois: South Chicago No. 3, Wisconsin Steel Works. In Indiana: Gary No. 2, Carnegie-Illinois Steel Corp. In Massachusetts: Everett, Mystic Iron Works. In New York: Troy, Troy Furnace Corp., now operated by Republic Steel Corp. In Ohio: Anna, Struthers Iron & Steel Co.; Toledo A, Interlake Iron Corp. In Pennsylvania: Sharpsville, Pittsburgh Coke & Iron Co.; Monongahela No. 1, National Tube Co.

Stacks blown out or banked were:

In Indiana: Gary No. 5, Carnegie-Illinois Steel Corp. In Ohio, Campbell No. 3, Youngstown Sheet & Tube Co.

Steelton E furnace of Bethlehem Steel Co. is being removed from the list of potential furnaces, after the company reported last week the stack had been abandoned July 1.

Built in 1914-15, it was last relined in 1927. It had an annual capacity of 182,784 net tons of foundry, basic, bessemer, malleable and low phosphorus pig iron and used Cornwall sinter, Cuban, Chilean and other ores. With removal of this stack, total potential blast furnaces in the United States is reduced to 231.

JULY IRON PRODUCTION
Net Tons

	No. in blast last day of July	No. in blast last day of June	Total Tonnages—Merchant	Total Tonnages—Non-merchant
Alabama	17	17	113,456*	174,423*
Illinois	14	13	57,073	322,365
Indiana	16	16	125	456,889
New York	12	11	98,784	179,726
Ohio	41	40	157,496	734,947
Penna.	63	61	95,285*	1,183,338*
Colorado	3	3		
Michigan	4	4		
Minnesota	2	2	9,633*	168,635*
Tennessee	1	1		
Utah	1	1		
Kentucky	2	2		
Maryland	6	6		
Mass.	1	0	6,424*	299,892
Virginia	1	1		
West Va.	3	3		
Total	187	181	538,273*	3,520,215*

*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.	....	62.4	34.8	85.7
Sept.	....	69.7	40.5	83.7
Oct.	....	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.

Industrial Locomotive Sales Increase

Increase in shipments of mining and industrial locomotives during the first half of this year has been reported by the census bureau.

A total of 251 locomotives was shipped by manufacturers during the first six months this year compared with 194 during the corresponding 1939 period.

Shipments during the second quarter of 1940 numbered 110, compared with 141 in the first quarter. In 1939, shipments in the first quarter numbered 77 and 117 in the second quarter.

Sharp Reduction in Iron, Steel Imports

■ June imports of iron and steel products, excluding scrap, fell to 5504 gross tons valued at $530,343, from 7726 tons valued at $544,608 imported in May, according to bureau of foreign and domestic commerce. June, 1939, imports totaled 30,050 tons valued at $1,487,504.

For the first six months of 1940 imports totaled 38,788 tons valued at $4,499,577 compared with 162,191 tons valued at $10,026,306 for same period in 1939.

Canada supplied 3529 tons, Norway 1386 tons, Sweden 443 tons.

Principal import was spiegeleisen, amounting to 2260 tons, of which Canada sent 2220 tons and Norway 40 tons. Ranking second was 1346

tons of ferromanganese, furnished by Norway. Canada sent 643 tons of pig iron, 526 tons of rails and track material.

June scrap imports totaled one ton with a value of $9, compared with 33 tons in May valued at $895, and 2537 tons in June, 1939, valued at $23,745.

Scrap imports for first six months 1940 were 1260 tons valued at $37,346, compared with 14,803 tons valued at $155,595 in same period 1939.

UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	June 1940	May 1940	Jan. through June 1940
Pig iron	643	317	5,775
Sponge iron	.....	.....	609
Ferromanganese (1)	1,346	815*	7,944*
Spiegeleisen	2,260	5,877	8,501
Ferrochrome (2)	.....	.....	1
Ferrosilicon (3)	126	102*	663
Other ferroalloys (4)	.....	.....	190
Steel ingots, blooms	.....	3	3
Billets, solid or hollow	31	.....	437
Concrete reinforce. bars	1	.....	8
Hollow bar, drill steel	32	31	817
Bars, solid or hollow	80	82	1,718
Iron slabs	.....	.....	.....
Bar iron	.....	5	194
Wire rods	78	.....	3,926
Boiler and other plate (including skelp)	1	2	7
Sheets, skelp, saw plate	9	15	89
Die blocks, blanks, etc.	.....	1	12
Tin plate, taggers' tin and terne plate	6	14	57
Structural shapes	.....	107	687
Sashes and frames	16	.....	16
Sheet piling	.....	.....	.....
Rails, track material	531	44	885
Cast-iron pipe, fittings	.....	.....	419
Mall.-iron pipe fittings	.....	.....	2
Welded pipe	.....	.....	.....
Other pipe	135	91	2,008
Cotton ties	.....	.....	2
Other hoops and bands	.....	30	599
Barbed wire	.....	.....	44
Round iron, steel wire	18	1	786
Teleg., telephone wire	.....	.....	.....
Flat wire, steel strips	101	60	1,356
Wire rope and strand	56	50	426
Other wire	.....	1	1
Nails, tacks, staples	8	12	103
Bolts, nuts, and rivets	3	20	124
Horse and mule shoes	.....	.....	3
Castings and forgings	23	46	376
Total	5,504	7,726*	38,778*
Iron and steel scrap	1	33	1,260
GRAND TOTAL	5,505	7,759*	40,048*

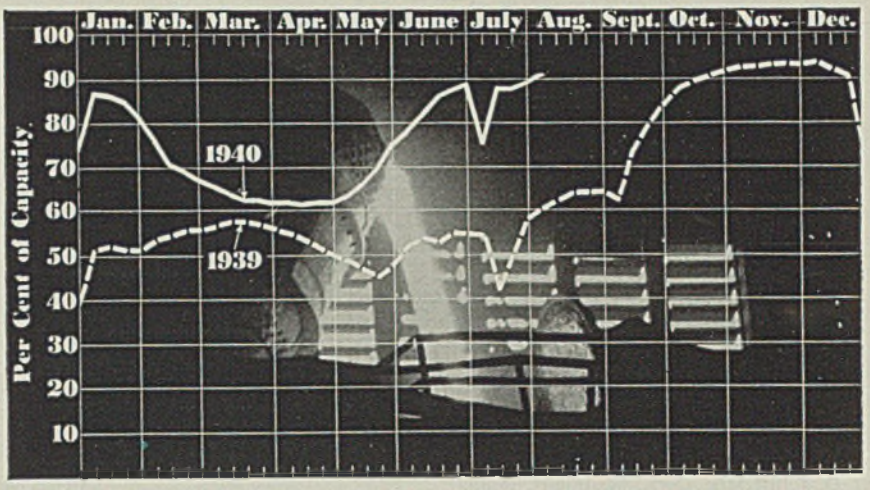
(1) Manganese content; (2) chrome content; (3) silicon content; (4) alloy content. *Corrected figures.

ORIGIN OF JUNE IMPORTS

Gross Tons

	Iron ore	Pig iron	Manganese ore	Ferromanganese
Sweden	7,801	.....	.....	.....
Canada	30,153	643	.....	.....
Cuba	6,700	.....	4,434	.....
Chile	99,500	.....	.....	.....
Yugoslavia	10	.....	.....	.....
Newfoundland	8,900	.....	.....	.....
Brazil	9,000	.....	2,820	.....
British India	.....	.....	5,562	.....
Soviet Russia	.....	.....	11,909	.....
South Africa	.....	.....	6,818	.....
Gold Coast	.....	.....	15,317	.....
Philippine Islands	.....	.....	2,000	.....
Norway	.....	.....	.....	1,346
Total	162,064	643	48,860	1,346

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
United Kingdom	1	...	23	...
Canada	7	...	...	...
Germany	1	...	...	...
Sweden	...	...	51	...
Total	9	...	74	...



PRODUCTION... Up

■ STEELWORKS operations last week rose 1 point to 90½ per cent. Five districts increased production, three declined slightly and four were unchanged. A year ago the rate was 60 per cent; two years ago it was 40 per cent.

Youngstown, O.—Steady at 85 per cent with three bessemers and 68 open hearths active. A decline to 82 per cent is scheduled this week.

Chicago—With a ½-point rise to 97 per cent an 11-year record was established. Two plants advanced production and three continued above rated capacity.

Birmingham, Ala.—Lost 4 points to 88 per cent as an open hearth at Gadsden, Ala., was shut down for repair and enlargement.

St. Louis—Receded 2½ points to 62½ per cent, an open hearth being taken off by an East Side mill.

Detroit—Steady at 99 per cent, one open hearth being idle part of the week. This is practical capacity.

Cincinnati—Repair work by one producer caused a drop of 4 points to 81 per cent.

New England—Addition of an open hearth caused the rate to rise 5 points to 80 per cent, which will be continued this week.

Pittsburgh—Unchanged at 86½ per cent, with indications for the same rate this week.

Wheeling—Advanced 4 points to 98 per cent. Schedule for this week is at the same rate.

Central eastern seaboard—Small independents enlarged production, pushing the rate up 2 points to 88 per cent. Further increase is indicated.

Buffalo—Steelmaking holds at 90½ per cent, for the fourth week, and is expected to continue at this level.

Cleveland—Resumption by one plant after vacation shutdown advanced the rate 15½ points to 80½ per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Aug. 3	Change	Same week 1939	Same week 1938
Pittsburgh	86.5	None	50	33
Chicago	97	+ 0.5	56	38
Eastern Pa.	88	+ 2	41	29
Youngstown	85	None	54	40
Wheeling	98	+ 4	79	54
Cleveland	80.5	+15.5	73	38
Buffalo	90.5	None	58	39.5
Birmingham	88	— 4	70	50
New England	80	+ 5	68	35
Cincinnati	81	— 4	31	58
St. Louis	62.5	— 2.5	47.5	30
Detroit	99	None	64	38
Average	90.5	+ 1	60	40

"And So To Sleep"

■ Believed to be one of the first film subjects of its kind devoted to sleep, the new sound slide film production, "And So To Sleep," has been made available for merchandising presentations to the bedding departments of furniture stores and retail department stores by the sponsor, American Steel & Wire Co., subsidiary of United States Steel Corp.

The story concerns Mr. and Mrs. Neale, an average American couple, whose comfortless and unsatisfactory attempts to sleep are transformed into sound and restful slumber through the efforts of a kindly little imp, Mr. Premier Tag, representing Premier spring wire.

"And So To Sleep" provides 15 minutes of enjoyable and instructive entertainment. The film is available on a loan basis from the American Steel & Wire Co. and stores and manufacturers featuring Premier spring wire.

Purchases Under Walsh-Healey Act

(In week ended July 20)

Iron and Steel Products

	Commodity	Amount
Lundquist Tool & Mfg. Co., Worcester Mass.	Telescope mounts	$39,240.00
H. Brinton Co., Philadelphia	Telescope mounts	17,961.57
Hart Mfg. Co., Louisville, Ky.	Army ranges	59,578.63
Wm. R. Bootz, Evansville, Ind.	Range units	50,724.24
Remington Rand Inc., Buffalo, N. Y.	Range cabinets	98,839.14
O. W. Merrell Supply Co., Columbus, O.	Reinforcing steel	17,043.99
Union Metal Mfg. Co., Canton, O.,	Steel sheet piling	10,796.00
National Malleable & Steel Castings Co., Cleveland	Cast steel cables	10,337.58
Struthers Wells-Titusville Corp., Titusville, Pa.	Crankshafts	16,950.00
Graybar Electric Co. Inc., Washington	Fittings, wire rope	77,411.25
National Forge & Ordnance Co., Irvine, Pa.	Propeller shafts	17,275.00
International-Stacey Corp., Columbus, O.	Searchlight towers	20,940.00
Crucible Steel Co. of America, New York	Steel	33,162.06
American Safety Razor Corp., Brooklyn, N. Y.	Safety razors	29,064.00
Steel Improvement & Forge Co., Cleveland	Steel forgings	11,435.00
Bendix Aviation Corp., Bendix, N. J.	On-carriage parts	267,491.00
Summerill Tubing Co., Bridgeport, Pa.	Steel tubing	16,023.37
C. O. Jelliff Mfg. Corp., Southport, Conn.	Wire cloth	13,095.00
Peco Mfg. Corp., Philadelphia	Eyebolt plugs	106,917.00
Steel Plate Corp., Kansas City, Kans.	Steel rack castings	29,156.00
North & Judd Mfg. Co., New Britain, Conn.	Tips, clasps, slides	35,431.00
Hunter Steel Co., Pittsburgh	Radial gates	202,000.00
F. A. Klaine Co., Cincinnati	Army ranges	16,705.92
United States Stove Co., South Pittsburgh, Tenn.	Range parts	11,204.20
Hart Mfg. Co., Louisville, Ky.	Stoves	17,326.65
Marshall Stove Co., Lewisburg, Tenn.	Stoves	25,002.00
St. Louis Furnace Mfg. Co., St. Louis	Room heaters	27,982.08
Phillips & Buttorff Mfg. Co., Nashville, Tenn.	Heating stoves	22,210.36
Hubbard Oven Co., Chicago	Bake ovens	11,339.00
National Forge & Ordnance Co., Washington	Plungers, cylinders	15,800.00
Graver Tank & Mfg. Co. Inc., East Chicago, Ind.	Steel tanks	157,040.00
Bethlehem Steel Co., Bethlehem, Pa.,	Steel tanks	222,892.00
Crown Iron Works Co., Minneapolis	Piers	56,235.00
Carnegie-Illinois Steel Corp., Baltimore	Tinplate	32,086.20
Jones & Laughlin Steel Corp., Pittsburgh	Tinplate	46,790.19
Bethlehem Steel Co., Bethlehem, Pa.	Tinplate	126,146.44

Nonferrous Metals and Alloys

Mueller Brass Co., Port Huron, Mich.	Heads	$139,143.75
Automatic Machine Products Co., Attleboro, Mass.	Primer bodies	Indefinite
Northwest Lead Co., San Francisco	Pig lead	18,412.80
Bart Laboratories, Belleville, N. J.	Mirrors	72,460.00
Aluminum Co. of America, Washington	Magnesium powder	20,995.00
Aluminum Cooking Utensil Co., New Kensington, Pa.	Ranges, kettles	†*78,129.34
General Fireproofing Co., Washington	Aluminum chairs	83,093.30
General Bronze Corp., Long Island City, N. Y.	Dolly assemblies	54,652.00
Revere Copper & Brass Inc., Baltimore	Brass tubing	48,902.78
Mattatuck Mfg. Co., Waterbury, Conn.	Battery cups	15,750.00
Calumet & Hecla Consolidated Copper Co., New York	Copper ingot	86,625.00
Scovill Mfg. Co., Waterbury, Conn.	Primer bodies	276,000.00

Machinery and Other Equipment

New Britain Machine Co., New Britain, Conn.	Chucking machine	$77,880.00
Lloyd Arms Inc., Philadelphia	Automatic mach.	10,782.00
Bodine Corp., Bridgeport, Conn.	Reaming machine	10,480.00
Ingersoll-Rand Co., Cincinnati	Air compressor	11,303.00
John Deere Plow Co., San Francisco	Tractors	10,952.60
International Harvester Co., Washington	Farm machinery	20,071.21
Steacy-Schmidt Mfg. Co., York, Pa.	Crimping machines	12,150.00
Standard Machinery Co., Providence, R. I.	Clip bearings	27,000.00
York Ice Machinery Corp., Philadelphia	Ice-cream mach.	35,051.16
Mergenthaler Linotype Co., Brooklyn, N. Y.	Typesetting mach.	*9,242.00
Enterprise Foundry Co., San Francisco	Marine engine	21,786.00
Electric Boat Co., Groton, Conn.	Mufflers, distillers	64,260.00
Jenkins Brothers, Bridgeport, Conn.	Valves	12,059.88
Yates-American Machine Co., Beloit, Wisc.	Borers	56,742.84
Norton Co., Worcester, Mass.	Grinders	28,758.50
Seifreat-Elstad Machinery Co., Dayton, O.	Honing machines	258,632.28
H. R. Krueger & Co., Detroit	Broaching machine	15,095.00
Stedfast & Roulston Inc., Boston	Rebuilding mach.	23,841.70
Onsrud Machine Works Inc., Chicago	Hand guard mach.	15,549.20
York Ice Machinery Corp., Philadelphia	Refrigerating plants	91,590.00
Lloyd and Arms Inc., Philadelphia	Precision lathes	18,576.00
Worthington Pump & Machinery Corp., New York	Engine parts	10,292.07
Foote Co. Inc., Nunda, N. Y.	Concrete paver	10,622.50
C. B. Skinner Co., New Orleans	Tractor, bulldozers,	39,380.00
Cincinnati Milling Machines & Cincinnati Grinders Inc., Cincinnati	Milling machines	16,720.00
De Laval Steam Turbine Co., Trenton, N. J.	Centrifugal pumps	64,745.00
Riley Stoker Corp., Cincinnati	Stokers, pulverizers	10,022.71
Ingersoll-Rand Co., Knoxville, Tenn.	Core drill	18,427.00
American Hoist & Derrick Co., St. Paul	Derricks, hoists	29,707.00
Jeffrey Mfg. Co., Columbus, O.	Conveyor mach.	15,982.70
Lee Rubber & Tire Corp., Youngstown, O.	Conveyor mach.	Indefinite
Webster Mfg. Co. Inc., Tiffin, O.	Conveyor mach.	Indefinite
Grand Total		$3,911,498.19

*Estimated. †Purchases to be made when and if needed.

War Department Awards $81,333,631 in Contracts

■ United States war department last week announced contract awards totaling $81,333,631 for the ordnance department, quartermaster corps, corps of engineers, chemical warfare service and medical department. Included were the following:

Ordnance Department Awards

Mattatuck Mfg. Co., Waterbury, Conn., ammunition parts, $1162.50.

McLaren Screw Products Co., Detroit, ammunition parts, $1478.70.

Standard Pressed Steel Co., Jenkintown, Pa., ammunition parts, $5260.70.

American Brass Mfg. Co., Waterbury, Conn., ammunition parts, $47,833.

Campbell Wyant & Cannon Foundry Co., Muskegon Heights, Mich, ammunition parts, $98,880.

Roselle Foundry Co., Roselle Park, N. J., ammunition parts, $4321.62.

Monroe Auto Equipment Co., Monroe, Mich., Assemblies for bomb fragmentation, $9898.96.

Eclipse Aviation division of Bendix Aviation Corp., Bendix, N. J., transmission system parts, $6495.98.

Hobart Bros. Co., Troy, O. generating units, $34,850.

J. Stevens Arms Co. division of Savage Arms Corp., Chicago, shotguns, $1263.

Lyman Gun Sight Corp., Middlefield, Conn., sights for rifle, $10,400.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., revolvers and parts, $10,695.

Thompson-Gibb Electric Welding Co., Lynn, Mass., seam welding machines, $5784.

H. R. Krueger & Co., Detroit, drilling and milling machines, $14,623.

Mattison Machine Works, Rockford, Ill., variety belt sanders, $3172.

F. J. Stokes Machine Co., Philadelphia, presses, $47,760.

Troy Tool & Gage Co., Detroit, gages, $1164.

Greenfield Tap & Die Corp., Greenfield, Mass., gages, $1499.80.

Barker Tool Die & Gage Co., Detroit, gages, $2870.50.

Modern Tool & Die Co., Philadelphia, gages, $2130.

Pratt & Whitney division, Niles-Bement & Pond Co. Inc., West Hartford, Conn., gages, $2509.10.

Greenfield Tap & Die Corp., Greenfield, Mass., gages, $1347.20.

American Brass Co., Waterbury, Conn., rotating bands, $34,000.

American Forge Co., Chicago, shell forgings, $203,480.

Bethlehem Steel Co., Bethlehem, Pa., shell forgings, $132,600.

Bridgeport Brass Co., Bridgeport, Conn., cartridge cases, $555,000.

Budd Wheel Co., Detroit, shells, $3,439,000.

Mueller Brass Co., Port Huron, Mich., primer heads, $58,500.

Scovill Mfg. Co., Waterbury, Conn., primer heads and cartridge cases, $781,500.

Standard Pressed Steel Co., Jenkintown, Pa., primer heads, $65,730.

U. S. Steel Corp., New York, projectiles, explosive, ammunition parts, $27,584,000.

Doehler Die Casting Co., Pottstown, Pa., die castings for fuse, $56,340.

Harrisburg Steel Corp., Harrisburg, Pa., explosive, ammunition and parts, $3,011,832.

Kilgore Mfg. Co., Tippecanoe, O., flare and signals, $493,890.

Revere Brass and Copper Co., New Bedford, Mass., ammunition parts, $155,300.

Thompson Products Co., Detroit, fuse adapters, $119,300.

Bausch & Lomb Optical Co., Rochester, N. Y., fire control instruments, $45,200.

Cummings Machine Works, Boston, range quadrants, $27,000.

Eastman Kodak Co., Rochester, N. Y., panoramic telescopes, $265,000.

Eclipse Aviation division Bendix Aviation Corp., Bendix, N. J., fire control, $43,330.

Gilbert & Barker Mfg. Co., Springfield, Mass., fire control instruments, $441,000.

Sperry Gyroscope Co. Inc., Brooklyn, N. Y., fire control, $2,185,323.60.

York Safe & Lock Co., York, Pa., gun carriages, $184,860.

General Electric Co., Schenectady, N. Y., pack howitzers, $175,086.51.

Bethlehem Steel Co., Bethlehem, Pa., breech ring forgings, $53,900.

Crucible Steel Co. of America, New York, tube forgings, $177,098.25.

Edgewater Steel Co., Pittsburgh, breech ring forgings, $51,887.31.

International Nickel Co. Inc., New York, rods and cylinders, $27,736.11.

International Harvester Co., Chicago, medium tractors, $32,873.54.

U. S. Steel Corp., New York, armor plate, $5,494,724.60.

National Forge & Ordnance Co., Irvine, Pa., gun tubes, $3240.

Breeze Corp. Inc., Newark, N. J., machine gun control sets, $129,500.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., arms, $1,072,369.18.

York Safe & Lock Co., York, Pa., machine gun cradle assemblies, $71,795.75.

E. W. Bliss Co., Toledo, O., cupping press, $25,796.

Kingsbury Machine & Tool Co., Keene, N. H., flexmatic machine, $28,675.

F. J. Stokes Machine Co., Philadelphia, compressing machine, $29,481.

Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, $195,525.88.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines, $208,280.

Excello Corp., Detroit, shell turning machines, $52,280.

Jones & Lamson Co., Springfield, Vt., shell turning machines, $104,697.

Kearney & Trecker Corp., Milwaukee, milling machines, $183,906.52.

New Britain Machine Co., New Britain, Conn., chucking machines, $77,880.

Kingsbury Machine & Tool Corp., Keene, N. H., drilling machines, $35,485.

National Acme Co., Cleveland, multiple spinning, turning machines, $94,675.

Warner & Swasey Co., Milwaukee, thread milling machines and turret lathes, $108,250.

National Broach & Machine Co., Detroit, profiling machines, $102,560.

Bullard Co., Bridgeport, Conn., boring and turning machine, $58,173.60.

Mesta Machine Co., Pittsburgh, planer, $135,000.

Henry Prentiss & Co. Inc., New York, horizontal boring mills, $111,286.

Lapointe Machine Tool, Hudson, Mass., broaching machine, $71,857.50.

H. A. Smith Machine Co., Syracuse, N. Y., lathes, $96,629.63.

Gulberson Diesel Engine Co., Dallas, Tex., diesel engines, $2,915,255.86.

Norris Stamping Co., Los Angeles, cartridge cases, $1,673,700.

Chase Brass & Copper Co. Inc., Waterbury, Conn., cartridge cases, $1,352,556.87.

Continental Motors Corp., Muskegon, Mich., gasoline engines, $1,342,681.

Allis-Chalmers Mfg. Co., Milwaukee, tractors, $1,234,137.

Budd Wheel Co., Detroit, shell $447,037.50.

Gilbert & Barker Co., Springfield, Mass., fire control instruments, $440,831.70.

Scovill Mfg. Co., Waterbury, Conn., cartridge cases, $242,000.

Bohn Aluminum & Brass Corp., Detroit, metal parts for booster, $123,625.80.

Tredegar Co., Richmond, Va., target practice projectiles, $99,855.50.

Eclipse Aviation, division of Bendix Aviation Corp., Bendix, N. J., parts for data transmission system, $43,331.

Bausch & Lomb Optical Co., Rochester, N. Y., flank spotting instruments, $39,000.

Federal Screw Works, Detroit, metal parts for practice base fuses, $32,622.30.

H. Brinton Co., Philadelphia, telescope mounts, $5808.25.

Quartermaster Corps Awards

H. H. Moeller, San Antonio, Tex., building superstructure, Duncan Field, Tex., $142,258.

James H. Haslem, Salt Lake City, Utah, officers' quarters, Hill Field, Utah, $63,395.

Peter Kiewit Sons' Co., Omaha, Nebr., depot supply building, Hill Field, Utah, $890,175.

Skilken Brothers, Columbus, O., airplane repair dock, Patterson Field, O., $672,641.

John K. Ruff Co., Baltimore, hospital, alterations and additions, Fort Monroe, Va., $73,880.

E. L. Dalton, Dallas, Tex., gas distribution system, Kelly Field, Tex., $15,504.50.

Manhattan Construction Co., Muskogee, Okla., standard ammunition magazines, Proving Ground, Ill., $1,452,850.

Ebersbach Construction Co., Tampa, Fla., runway and apron MacDill Field, Fla., $630,272.

Mead & Mount Construction Co., Denver, hangar, Hill Field, Utah, $494,000.

George A. Bass, Detroit heating plant, Westover Field, Chicopee Falls, Mass., $404,281.

Acme Railroad Construction Co., Cleveland, standard gauge railroad track, Proving Ground, Ill., $337,323.

Edward M. Rocho, Freeport, Ill., underground magazines, Proving Ground, Ill., $299,841.30.

H. H. Moeller, San Antonio, Tex., building, Duncan Field, Tex., $142,258.

Sjostrom & Sons Inc., Rockford, Ill., loading plant, Proving Ground, Ill., $139,964.

E. H. Marhoefer Jr. Co., Chicago, sewage disposal system, Fort Niagara, N. Y., $48,950.

Ryan Construction Co., Tampa, Fla., oil storage and dispensing system, MacDill Field, Fla., $10,830.

Chrysler Airtemp Sales Corp., 1119 Leo St., Dayton, O., field range cabinets, $235,000.

A. J. Honeycutt Co. Inc., Birmingham, Ala., officers quarters MacDill Field, Fla., $71,454.

Brown & Schrepferman Inc., Denver, building, Lowry Field, Colo., $21,957.

F. J. Kirchhof, Denver, schools, Lowry Field, Colo., $676,480.

Contracts for miscellaneous equipment, accessories, utensils and component parts for field ranges, were awarded as follows:

William Scrimgeour, Washington, $60,675.

Cleveland Wire Spring Co., Cleveland, $3600.

Presto Gas Mfg. Co., Chicago, $12,203.76.

Russel Harrington Cutlery Co., Southbridge, Mass., $1110.

William R. Bootz, Evansville, Ind., $16,458.

Wuest Bros., Louisville, Ky., $6900.

Village Blacksmith Folks, Watertown, Wisc., $2700.

E. C. Atkins & Co., Indianapolis, $2910.

Edward Katsinger Co., Chicago $6237.

Reeves Steel & Mfg. Co., Dover, O., $16,650.

James P. Marsh Corp., Chicago, $18,960.

Bryant Heater Co., Cleveland, $13,833.

Waterbury Button Co., Waterbury, Conn., $2805.

Signal Corps Awards

Graybar Electric Co., Washington, radio sets, $2,004,930.15.

Corps of Engineers Awards

Tophams Inc., Washington, parts for pontoon bridge, $114,805.

Century Boat Co., Manistee, Mich., assault boats, $111,510.

Sullivan Machinery Co., Michigan City, Ind., air compressors, $498,298.

Barco Mfg. Co., Chicago, gasoline hammers, $42,885.

Wallace & Tiernan Co. Inc., Newark, N. J., portable water purification units, $67,587.

Caterpillar Tractor Co., Peoria, Ill., tractors, $67,531.37.

Electric Wheel Co., Quincy, Ill., trailer sets for pontoon bridge, $314,114.40.

American Car & Foundry Co., New York, pontoon bridge sets, $521,280.

Virginia Bridge Co., Roanoke, Va., portable highway bridges, $156,921.64.

The Buda Co., Harvey, Ill., earth-boring machines, $273,744.

Ransome Concrete Machinery Co., Dunellen, N. J., portable concrete mixers, $42,834.

Chemical Warfare Service Awards

Steel & Wire Products Co., Baltimore, strapping, $3540.

Doehler Die Casting Co., New York, angletubes, nozzles, disks, dies, $85,115.

Carnegie Illinois Steel Corp., Pittsburgh, metal, $32,086.20.

Jones & Laughlin Steel Corp., Pittsburgh, metal, $46,790.19.

Federal Tin Co. Inc., Baltimore, metal, dies, $40,658.19.

Chas. Mundt & Sons, Jersey City, N. J., metal, $32,564.

Harrington & King Perforating Co., New York, metal, $6639.

Bethlehem Steel Co., Bethlehem, Pa., metal, $126,146.44.

Larson Tool & Stamping Co., Attleboro, Mass., eyerings, $11,796.

National Stamping Co., Detroit, angletubes, $14,850.

Bridgeport Brass Co., Bridgeport, Conn., retainers, sleeves, $1937.

Revere Copper & Brass Inc., New York, dies, tools, $2178.

United Wire & Supply Corp., Cranston, N. Y., aluminum tubing, $6647.22.

Harrington & King Perforating Co., Chicago, aluminum, $3028.20.

Reynolds Metal Co., Louisville, Ky., aluminum, $5425.92.

Mid West Spring Co., Chicago, springs, $4905.

Hill-Chase & Co., Philadelphia, steel, $2411.68.

Maryland Steel Products Co., Baltimore, steel, $5488.65.

Stanley Works, New Britain, Conn., outlet valve guards, $16,000.

Walker Mfg. Co., Cromwell, Conn., buckles, $24,750.

North & Judd Mfg. Co., New Britain, Conn., tips, clasps, slide, $35,431.

United Carr Fastener Corp., Cambridge, Mass., fasteners, $2145.

Continental Can Co. Inc., Baltimore, tin cans, $3432.

Seaboard Steel & Iron Corp., Baltimore, steel, $1948.

Arcway Equipment Co., Philadelphia, arc welding machines, $3874.45.

Morgan Machine Co. Inc., Rochester, N. Y., box mailing machines, $3863.

United Carr Fastener Corp., Cambridge, Mass., dies, $1827.

Erdle Perforated Co., Rochester, N. Y., perforated metal, $8340.

Crystal Soap & Chemical Co., Philadelphia, metal dust, $1856.25.

Geo. W. Gates & Co. Inc., New York, electric fixtures, $1471.12.

D. C. Elphinstone, Inc., Baltimore, portable mixer, $1030.

Geo. W. Warner, New York, tools, $1049.35.

Carroll-McCleary Co., Brooklyn, N. Y., nails, $2327.56.

Medical Department Awards

W. H. Compton Shear Co., Newark, N. J., scissors, $4987.50.

J. Sklar Mfg. Co., New York, surgical instruments, $128,750.

Motor Vehicle Awards

American Bantam Car, Butler, Pa., 70 trucks, $171,185.75.

Autocar Sales & Service Co., Allentown, Pa., 15 tractor trucks, $45,495.

Educational Orders Awards

Line Material Co., Milwaukee, shell, $104,432.49.

Norwalk Lock Co., South Norwalk, Conn., shot, $125,998.19.

Kilby Steel Co., Anniston, Ala., shell forging, $113,228.62.

Henry Vogt Machine Co., Louisville, Ky., shell, $185,155.85.

Contracts Awarded By Navy Department

■ United States navy department, bureau of supplies and accounts, last week awarded the following contracts:

General Electric Co., Schenectady, N. Y., diesel-electric locomotive, $18,800.

Copeland Refrigeration Corp., Sidney, O., portable electric refrigerators, $19,752.15.

Bullard Co., Bridgeport, Conn., vertical turret lathes, $26,142.80.

Minneapolis Honeywell Regulator Co., Minneapolis, aircraft inclinometers $9900.

Collyer Insulated Wire Co., Pawtucket, R. I., copper wire, $121,072.50.

General Electric Co., Schenectady, N. Y., electric motor coils, $7841.50.

Defoe Boat & Motor Works, Bay City, Mich., harbor tugs, $786,078.

Vermont Tap & Die Corp., Lyndonville, Vt.; taps and dies, $5184.59.

Mills-Morris Co., Washington, die-stocks, threading sets, $5513.70.

Dana Tool-D Nast Machinery Co., Philadelphia, dies and taps, $21,722.96.

Pratt & Whitney division, Niles-Bement-Pond Co., West Hartford, Conn., drilling machines, $38,008.

Westinghouse Electric & Mfg. Co., Washington, turbo-generator sets, $248,804.92.

Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y., airplanes, $7,954,980.28.

Electric Auto-Lite Co., Moto Meter Gauge & Equipment division, LaCrosse, Wis., aircraft engine gages, $46,200.

McCampbell & Co., selling agents for Graniteville Co., New York, drill, $20,680.

E. F. Hodgson Co., Boston, portable surgery buildings, $18,814.96.

York Ice Machinery Corp., Philadelphia, cold storage equipment, $8345.

Bureau of yards and docks awarded:

One freight elevator, navy yard, Philadelphia, to Murphy Elevator Co. Inc., Louisville, Ky., $13,400.

Galley equipment, naval operating base, San Diego, Calif., to Mangrum, Holbrook & Elkus, San Francisco, $21,187.

Seaplane ramp, naval air station, Seattle, to Valley Construction Co., Seattle, $24,950.

Heating system for new hangars, naval air station Pensacola, Fla.; to Industrial Heating and Engineering Co., Milwaukee, $16,500.

Rifle range, naval operating base, San Diego, Calif., to Griffith Co., Los Angeles, $64,900.

Steelmakers Seek Broader Scope On Scrap Export License Order

■ REGULATIONS accompanying the President's proclamation extending license control of exports to iron and steel scrap puzzled steel producers and scrap dealers. While the proclamation proper specified "iron and steel scrap," the regulations limited this to No. 1 heavy melting scrap.

Reliable scrap authorities estimate that only a small percentage of scrap exports are No. 1 heavy melting, and that most of this goes to England or the Continent and relatively little to Japan—against whom the proclamation generally is believed to have been directed.

A number of independent steel producers will petition the government to place additional restrictions on sales of steel scrap to foreign countries, according to Robert W. Wolcott, president, Lukens Steel Co.

The ban on exporting No. 1 heavy melting steel except by license has done nothing to relieve the "dearth of scrap," as the No. 2 grade may be shipped abroad without limitation, he said. Only one-fourth to one-third of scrap exports are the No. 1 grade, and he further remarked that it would be impracticable, if not impossible, to enforce the license ruling which applies only to No. 1 scrap. It is certain, he declared, No. 1 scrap could be labeled No. 2 and slipped through the ports as exports.

"All scrap dealers accept the order of the President that exports of No. 1 heavy melting steel be licensed, and are co-operating wholeheartedly with him," the Institute of Scrap Iron and Steel stated.

"Collectors of customs have been supplied by the government with the official specification for this grade, and they will scrutinize all shipments in the same manner that they check all commodities.

"Now, as at all times, domestic consumers have first opportunity to purchase all scrap that is available, and domestic mills and foundries as well as the government are assured of our co-operation."

Paid Defense Commission Proposed in Congress

■ House resolution 10220 to create a new national defense administration to co-ordinate the federal government's defense activities was introduced in the house last week by Representative Cox, Georgia.

The bill provides for appointment of an administrator of national defense with a salary of $20,000 and seven deputy administrators with salaries of $12,500 each.

Bill provides for establishment of a bureau of planning and statistics; a bureau of transportation; a bureau of communications; a bureau of mobilization; a bureau of production; a bureau of distribution; and a bureau of natural resources, each to be in charge of a deputy.

In the bureau of production the bill sets forth that there should be a division of manufacture, a division of raw materials, a division of agriculture, a division of order priorities, and a division of prices.

It is further provided in the bill that 30 days after it becomes operative the council of national defense and the advisory commission to the council are to be abolished.

June Machinery Exports Remain at a High Level

■ United States exports of industrial machinery in June amounted to $35,694,943, compared with $36,682,663 in May, according to department of commerce. June exports, 1939, totaled $22,573,175.

Exports of power driven metalworking machinery totaled $18,564,300 in June, 3 per cent below May total of $19,142,255 and 13 per cent below April's record of $21,281,332.

Metalworking machinery, other than power driven, amounted to $596,917, a 12 per cent drop from May total of $681,920.

Mining, well and pumping machinery exports were $3,788,489 in June, 14 per cent below the $4,421,827 in May.

Construction and conveying equipment June exports were $3,115,301, 7 per cent increase above the $2,922,010 in May.

Power generating machinery, excluding electrical, totaled $2,126,581 in June, a 30 per cent increase above the $1,633,174 in May.

Textile, sewing and shoe machinery worth $2,139,707 was exported in in June, a 30 per cent increase above May exports of $1,702,736.

June exports of miscellaneous industrial machinery totaled $5,363,648, against $5,940,006 in May.

Printing and bookbinding machinery exports totaled $420,417, compared with $568,879 in May.

Canada To Use Only American Materials, Designs in Aircraft

TORONTO

■ NEW AIRCRAFT orders are to be placed immediately with Canadian companies by the British and Canadian governments. Ralph P. Bell, director of aircraft production in the dominion, and Morris W. Wilson, representing Lord Beaverbrook, British minister of aircraft production, have worked out plans whereby all plane manufacturing facilities will be employed at capacity for at least 18 months.

To achieve maximum production as rapidly as possible only materials, equipment and designs available in North America will be used.

Six French engineers headed by Col. A. Lhomme have placed their services at the disposal of the department of munitions and supply. These engineers, C. D. Howe, minister of munitions and supply stated, will help develop the Canadian munitions program.

Mr. Howe said work will be started immediately on the construction of a $1,000,000 plant for the manufacture of sulphuric acid. It will be erected close to one of the major explosives projects now under construction, and will be built for British account under the supervision of the department of munitions and supply by Nichols Chemical Co. It will be completed early in 1941.

60 Companies Making Shells

Orders placed for shells and shell manufacturing facilities in Canada now amount to $57,000,000. Of this, about $12,000,000 represents cost of equipment and extensions to plants. Six different types of shells now are being produced, and with the expanding orders from Great Britain further types will be turned out here shortly. During the past three months 48 shell contracts have been placed. These went to 38 firms. About 60 companies are engaged in manufacture of shells, cases and their components. Arrangements have been made with the primary steel industry whereby the major firms will produce the blanks for production of the various types of shells.

For the past week the department of munitions and supply awarded 1434 contracts having value of $7,161,321. Awards include:

Aircraft supplies—National Steel Car Corp., Malton, Ont., $405,203; Noorduyn Aviation Ltd., Montreal, Que., $38,550; Instruments Ltd., Ottawa, $36,628; Link Mfg. Co. Ltd., Gananoque, Ont., $34,307.

Mechanical transport—The General Supply Co. of Canada Ltd., Ottawa, $95,531; General Motors Products of Canada Ltd., Oshawa, Ont., $25,000; Massey-Harris Co. Ltd., Toronto, $28,500; W. D. Beath & Son Ltd., Toronto, $19,000; La-France Fire Engine & Foamite Ltd., Toronto, $5022; Canadian Top & Body Corp. Ltd., Tilbury, Ont., $50,540; Brantford Coach & Body Ltd., Brantford, Ont., $38,000; Cockshutt Plow Co. Ltd., Brantford, $38,000; Ford Motor Co. of Canada Ltd., Windsor, Ont., $25,000; Gar Wood Industries Ltd., Windsor, $19,000; Barry Steel Products Ltd., Montreal, $28,500; Eastern Steel Products Ltd., Montreal, $19,000.

Machinery and tools—Canadian General Electric Co. Ltd., Ottawa, $32,370; Canadian Fairbanks-Morse Co. Ltd., Ottawa, $11,300; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $7068; Bata Shoe Co. of Canada Ltd., Frankford, Ont., $5736; International Equipment Co. Ltd., Montreal, $8585; Bausch & Lomb Optical Co., Rochester, N. Y., $221,252.

Electrical equipment — Canadian Marconi Co. Ltd., Montreal, $215,174; Aviation Electric Ltd., Montreal, $48,300; Canadian General Electric Co. Ltd., Ottawa, $95,024; Outboard Marine & Mfg. Co. Ltd., Peterboro, Ont., $7110; Exide Batteries of Canada Ltd., Toronto, $8028; Burlec Ltd., Scarboro Junction, Ont., $23,268.

Munitions—Engineering Products of Canada Ltd., Montreal, $337,041; Consolidated Mining & Smelting Co. of Canada Ltd., Montreal, $43,000; Merck & Co. Ltd., Montreal, $34,110; A. C. Leslie & Co. Ltd., Montreal, $7077; Aluminum Co. of Canada Ltd., Toronto, $18,550; International Nickel Co. of Canada Ltd., Toronto, $27,008; Alexander D. Porter and Associates, Toronto, $90,087; Dominion Foundries & Steel Ltd., Hamilton, Ont., $14,254; Bata Shoe Co. of Canada Ltd., Frankford, Ont., $6201; T. W. Hand Fireworks Co. Ltd., Cooksville, Ont., $5978.

Ordnance—The Parker Fountain Pen Co. Ltd., Toronto, $39,040; Hugh Carson Co. Ltd., Ottawa, $13,750.

Miscellaneous — Aluminum Co. of Canada Ltd., Montreal, $20,750; Canadian Johns-Manville Co., Ltd., Montreal, $17,927; Gillette Safety Razor Co. of Canada Ltd., Montreal, $20,000; Paton Mfg. Co. Ltd., Sherbrooke, Que., $130,636; Coulter Copper & Brass Co. Ltd., Toronto, $9600; General Steel Wares Ltd., Toronto, $10,640; Safety Supply Co., Toronto, $53,937; Slingsby Mfg. Co. Ltd., Brantford, Ont., $74,790; S. S. Holden Ltd., Ottawa, $54,900; Wood Mfg. Co. Ltd., Ottawa $54,900; J. J. Turner & Sons Ltd., Peterboro, Ont., $15,757; Aluminum Goods Ltd., Toronto, $8250; Metal Stampings Ltd., Toronto, $13,200; Duro Aluminum Ltd., Hamilton, $11,550; J. Spencer Turner Co. Ltd., Hamilton, $39,675.

Construction—Alex. I. Catvock, Ottawa, $267,269; Carter-Halls-Aldinger Co. Ltd., Toronto, $214,733; Bennett & White Construction Co., Calgary, Alta., $141,655; Northern Construction Co., and J. W. Stewart Ltd., Vancouver, B. C., $79,792.

CANADIAN STEEL OUTPUT DOWN SLIGHTLY IN JUNE

June steel and iron production in Canada was slightly lower than in May, mainly because of the shorter month. Output was much greater than in June, 1939, and the total for six months far exceeded that of first half, 1939. Comparisons, in gross tons, follow:

	Steel ingots	Pig iron	Ferro-alloys
June, 1940....	166,213	88,656	10,128
May, 1940....	174,417	93,254	10,272
June, 1939....	107,902	52,805	10,015
6 mos., 1940..	958,246	549,627	58,244
6 mos., 1939..	580,141	296,521	30,904

Canada's iron and steel imports in May totaled $27,041,000, compared with $16,873,000 in May, 1939. Steel and iron imports from the United States aggregated $24,028,000 against $14,111,000 in the corresponding month last year. The May total included: Automobiles and parts, $5,771,000; machinery, except agricultural, $5,388,000; farm implements, $4,227,000; tractors and parts, $3,366,000; rolling mill products, $3,506,000; iron and steel scrap, $683,000; engines and boilers, $946,000; castings and forgings, $242,000.

Iron and steel exports in May totaled $11,018,000, nearly double the $5,870,000 exported in May, 1939. Exports to the United States totaled $635,000, compared with $470,000.

Steel Employment and Payrolls Increase

■ Employment in the steel industry rose during June to an average of 535,000 employes, according to the American Iron and Steel institute. In May an average of 510,000 were on the payrolls, while in June, 1939, employment averaged 451,000.

Payrolls increased to $77,388,000 for June, compared with $75,184,000 in May and $61,150,000 in June, 1939.

Wage-earning employes earned an average of 85.9 cents per hour in June, against 85.1 cents in May, and 84.8 cents in June a year ago.

The number of hours worked per week by steel wage earners averaged 35.9 in June, compared with 35.7 in May and 33.5 in June, 1939.

MEN of INDUSTRY

■ B. F. FAIRLESS, president, United States Steel Corp., announced last week that in the interest of further co-ordinating the corporation's activities arising from the national defense program, G. Cook Kimball, executive vice president, United States Steel Corp. of Delaware, with headquarters in Chicago, will temporarily make his headquarters in Washington, effective Aug. 15.

During Mr. Kimball's absence from Chicago, Charles H. Rhodes, vice president, United States Steel Corp. of Delaware, will take over the activities and duties that now come under Mr. Kimball's direction.

Mr. Rhodes has been associated with United States Steel subsidiaries over 40 years. He was first employed with American Steel & Wire Co. in 1899. In 1909 he was appointed purchasing agent, Canadian Steel Corp., Ojibway, Ont. He went to Chicago in 1917 as purchasing agent of the Illinois Steel Co., and beginning in 1933, was for several years a sales executive of Illinois Steel in Chicago. Mr. Rhodes was elected vice president, United States Steel Corp. of Delaware in December, 1937. He also is a director and a member of its executive committee.

♦

LaMar J. Vieau has been named general sales manager, tin plate division, McKeesport Tin Plate Corp., McKeesport, Pa.

♦

James H. Jewell, since 1939 assistant manager, agency sales department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been promoted to manager of agency sales. After completing the Westinghouse graduate student course in 1922 he worked in the small motor section at the East Pittsburgh works. He then went to Philadelphia as sales assistant, later becoming a salesman in the building section. In 1930 he was made manager, construction industry section. Returning to East Pittsburgh in 1938 as manager, public works and communications sections, Mr. Jewell was shortly transferred to Philadelphia as manager of agency sales, Middle Atlantic district.

James H. Jewell

G. Cook Kimball

Charles H. Rhodes

♦

Leon B. Rosseau, formerly industrial heating specialist for General Electric Co., has joined Ajax Electric Co. Inc., Philadelphia, as district sales manager.

♦

Clinton E. Stryker has been appointed vice president and assistant to the president, Nordberg Mfg. Co., Milwaukee. He formerly was a partner in McKinsey, Kearney & Co., Chicago, management engineers, having been with that firm five years. Before that he was with Fansteel Metallurgical Corp. a number of years.

♦

Albert P. Myer, vice president, Pittsburgh Coke & Iron Co., Pittsburgh, has been named a director, Struthers Iron & Steel Co., Struthers, O.

♦

Roy F. Lab is now chief chemist, Copperweld Steel Co., Warren, O. He formerly was with United Alloy Steel Co., Central Alloy Steel Co., Republic Steel Corp., and Barium Stainless Steel Co.

♦

John P. Moran, heretofore vice president in charge of production, Gemmer Mfg. Co., Detroit, has been elected president, to succeed the late Edward P. Hammond.

♦

Merle C. Nutt has been elected president, Moline Iron Works, Moline, Ill. He succeeds his father, L. E. Nutt, who has become chairman of the board. Other officers are: Vice president and treasurer, B. V. Nutt; vice president in charge of operations, J. L. Miles; secretary, J. F. Engstrom.

♦

A. T. Greiner, who has been in charge of Salem Engineering Co.'s work in France, and Thomas Breene, heretofore with Salem Engineering Co. Ltd., London, England, have recently returned to this country, and both are now associated with the company's sales department, working out of the home office at Salem, O.

♦

Robert A. Hill, recently mid-continent manager for Regan Forge & Engineering Co., San Pedro, Calif.,

Robert A. Hill

has been appointed branch manager in the southwest territory which includes Texas, Oklahoma, Louisiana, lower Mississippi and oil producing sections of New Mexico, for John A. Roebling's Sons Co., Trenton, N. J. He will make his headquarters in Houston, Tex.

♦

Frank Purnell, president, Youngstown Sheet & Tube Co., Youngstown, O., has been appointed to fill a vacancy in the directorship of the United States Chamber of Commerce. He will be a director-at-large for the term ending in 1942.

♦

Warren Carter has been elected president, Carter, Donlevy Co., Philadelphia. He succeeds the late Harold B. McFarland. Michael Riter Rupp has been named vice president, and Michael M. Riter, secretary-treasurer.

♦

John A. Brown, associated with Heppenstall Co., Pittsburgh, 40 years, has retired. The past ten years he served as special service

Harry E. Reith

representative. Harry E. Reith, formerly with Brooks Oil Co., has been named special service representative to succeed Mr. Brown.

George I. Allen, manager of Heppenstall's Cleveland office, also has retired. Mr. Allen, who joined Heppenstall in 1913, is succeeded by his son, Jack R. Allen, a graduate of Case School of Applied Science.

♦

A. Oakleigh Bush has been appointed assistant chief sales engineer, abrasive division, Norton Co., Worcester, Mass. Mr. Bush has been with Norton about 16 years, first in the electric furnace plant at Niagara Falls, N. Y., and then in the research and sales engineering departments at Worcester. In 1937 he was transferred to the Norton

J. Eugene Jackson

Who has been named metallurgical engineer, Copper Iron & Steel Development association, Cleveland, as noted in STEEL, July 15, p. 29

London office and later to the plant at Welwyn, becoming its acting general manager in 1939. He returned to Worcester about a month ago with other American members of Norton's European staff.

♦

W. Russell Greer, vice president, Porcelain Enamel & Mfg. Co., Baltimore, has been named chairman of the committee to co-ordinate the porcelain enameling industry for national defense. Other members of the committee are George Blome, vice president, Baltimore Enamel & Novelty Co., Baltimore, and C. E. Meisner, Carnegie-Illinois Steel Corp., Washington.

♦

M. A. Carpenter, associated with Falk Corp., Milwaukee, 16 years, has been elected executive vice president and a director. He started in the advertising department and successively served as advertising manager, sales promotion manager, sales manager, and secretary and director of sales. He will continue as director of sales and advertising.

Jack R. Allen

MEETINGS

MACHINE TOOL DEALERS' CONVENTION IN DAYTON

■ ASSOCIATED Machine Tool Dealers of America will hold its annual convention in Dayton, O., Oct. 21-22. Headquarters will be at the Dayton Biltmore hotel.

GEARMAKERS' SEMIANNUAL MEETING AT SKYTOP, PA.

American Gear Manufacturers association will conduct its twenty-third semiannual convention at Skytop Lodge, Skytop, Pa., Oct. 14-16.

TIME STUDY CLINIC IN CHICAGO IN NOVEMBER

Industrial Management society will conduct its third national time and motion study clinic at the Chicago Towers club, Chicago, Nov. 8-9. Headquarters of the society are 421 Engineering building, Chicago.

Convention Calendar

Sept. 3-6—American Society of Mechanical Engineers. Fall meeting at Hotel Davenport, Spokane, Wash. C. E. Davies, 29 West Thirty-ninth street, New York, is secretary.

Sept. 9-13—American Chemical society. 100th national meeting in Detroit. Charles L. Parsons, 728 Mills building, Washington, is secretary.

Sept. 16-19—American Mining congress. Seventh annual metal mining convention and exposition, Colorado Springs, Colo. Julian D. Conover, 309 Munsey building, Washington, is secretary.

Sept. 18—University of Pennsylvania. Symposium on "Development of Metal as a Structural Element in Architecture," at the university, Philadelphia.

Sept. 18-20—National Industrial Advertisers association. Eighteenth annual conference at Hotel Statler, Detroit. Mildred R. Webster, 100 East Ohio street, Chicago, is secretary.

Sept. 20—Chicago Section, American Ceramic society, and Department of Ceramic Engineering, University of Illinois. Symposium on acid, basic and neutral refractories at auditorium, Civic Opera building, Chicago.

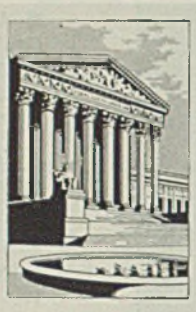
Sept. 23-26—American Transit association. Fifty-ninth annual meeting at Greenbrier hotel, White Sulphur Springs, W. Va. Guy C. Hecker, 292 Madison avenue, New York, is general secretary.

Sept. 24-27—Association of Iron and Steel Engineers. Thirty-sixth convention and exposition at Stevens hotel, Chicago. Brent Wiley, 1010 Empire building, Pittsburgh, is managing director.

Sept. 30-Oct. 1—National Lubricating Grease institute. Eighth annual convention at Stevens hotel, Chicago. George W. Miller, 498 Winspear avenue, Buffalo, is executive secretary.

■ Airlines of the United States flew 101,172,222 revenue passenger miles in June, a record for all time, according to Air Transport association, Chicago.

Windows of WASHINGTON



By L. M. LAMM
Washington Editor, STEEL

Committee To Study Manganese Recovery Processes.

$10,000,000 To Be Loaned for Steel Mill in Brazil.

Council To Appraise Inventions for Defense Purposes.

TVA Receives $25,000,000 for Power Expansion.

WASHINGTON

■ MINERALS division of the industrial materials department of the national defense advisory commission has announced that it has arranged with the national academy of sciences to appoint a technologic committee of ranking scientists and engineers to review the many projects for the development of new processes for recovery of manganese from low grade domestic ores now before various government agencies.

The committee has been designated as the technologic committee on manganese of the national academy of sciences and the national research council. Its membership includes: Clyde Williams, director, Battelle Memorial institute, Columbus, O., chairman; A. C. Fieldner, chief, technologic branch United States bureau of mines, secretary; Dr. Fred G. Cottrell, Washington; James Critchett, vice president, Union Carbide and Carbon Research laboratories, New York; John V. N. Dorr, Dorr Co., Westport, Conn.; Charles H. Herty Jr., metallurgist, Bethlehem Steel Co., Bethlehem, Pa.; Donnel F. Hewett, principal geologist, United States geological survey, Washington; John Johnston, director of research, United States Steel Corp., Kearny, N. J., and Gilbert Seil, director of research, E. J. Lavino Co., Philadelphia.

This committee will study a wide range of concentrating and metallurgical processes in our industry.

Col. Robert A. Roos, president, Roos Brothers Inc., San Francisco, has been appointed special assistant to Donald M. Nelson, who is attached to the national defense advisory commission as co-ordinator of defense purchases.

Colonel Roos is author of the Roos Plan which has been widely adopted throughout the country, providing payment of wages by employers to employes taking national guard or reserve training for military service. Under this plan they take training without impairment of their employe status.

Ralph Budd, member of the national defense advisory commission in charge of co-ordinating transportation, has announced appointment of C. R. Smith, president, American Airlines Inc., as an advisor on problems involving air transport.

Sidney Hillman, member of the commission in charge of labor supply, has announced appointment of Dr. H. C. Ramsower as an administrative assistant to Floyd W. Reeves, Mr. Hillman's executive assistant in charge of labor supply. Dr. Ramsower's services will be loaned by Ohio State university, where he is director of the agricultural extension service.

He will assist in planning defense training program as it relates to agricultural workers and rural youth.

Loan of $10,000,000 is to be granted to the Brazilian government by the Export-Import Bank, it was reported here, to be used for the purchase of equipment in this country for the proposed steel plant in Brazil. The loan will be guaranteed by the Bank of Brazil.

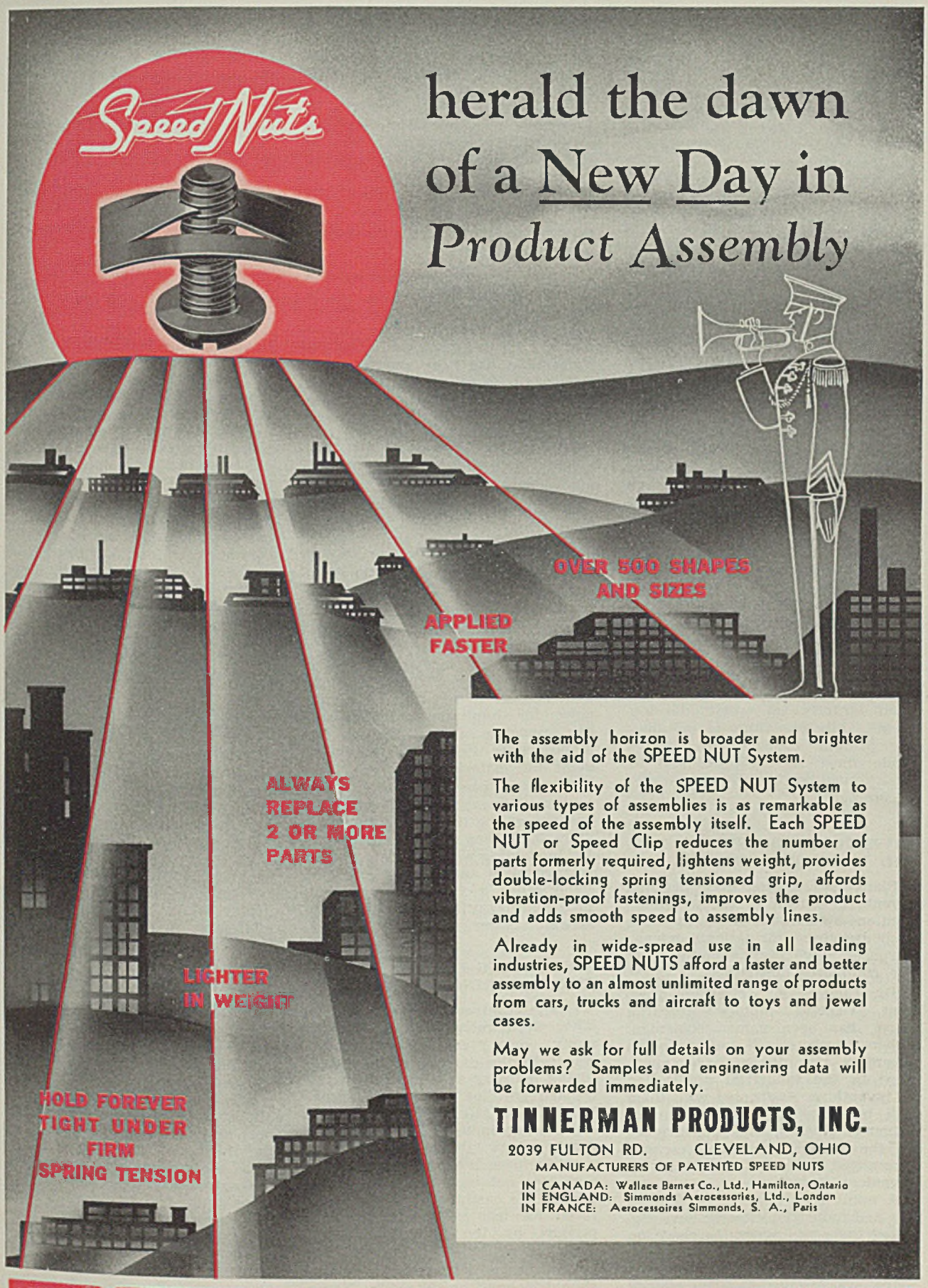
Erection of a new steel plant in Brazil has been reported off and on for some months, but details are not available here at this time.

LISTS TOOLS EXPORTABLE WITHOUT A LICENSE

State department announced last week that pending the issuance of further instructions, the following equipment may be exported without a license: All used or re-built machine tools of any description; pipe threading machines; metal cutting band saws; power-driven hack saws; keyseating machines; disk grinding machines; car wheel and locomotive wheel presses; burring machines (gear); chamfering machines (gear); burnishing machines (gear); planers (crank); bench power presses; saw sharpening machines; filing machines; pipe bending machines; thread chaser grinders; burnishing machines; tool and cutter grinders—universal and plain (hand feed); riveting machines; grinding machines (portable with flexible shaft); centering machines; grinders (face milling cutters); arbor presses (hand, air and hydraulic); grinding machines (drill); grinding machines (taps); grinding machines (hob); nibbling machines; grinders lathe (tool); gear tapping machines; gear shaving machines; polishing machines; heat treating furnaces; and foundry machines.

ENTIRELY NEW ORDER SEEN FOR INTERNATIONAL TRADE

A great difference of opinion exists in the administration as to handling the Western Hemisphere trade situation. State, commerce and treasury departments are all vitally interested, but there is no


Speed Nuts
herald the dawn of a New Day in Product Assembly
OVER 500 SHAPES AND SIZES
APPLIED FASTER
ALWAYS REPLACE 2 OR MORE PARTS
LIGHTER IN WEIGHT
HOLD FOREVER TIGHT UNDER FIRM SPRING TENSION
The assembly horizon is broader and brighter with the aid of the SPEED NUT System.
The flexibility of the SPEED NUT System to various types of assemblies is as remarkable as the speed of the assembly itself. Each SPEED NUT or Speed Clip reduces the number of parts formerly required, lightens weight, provides double-locking spring tensioned grip, affords vibration-proof fastenings, improves the product and adds smooth speed to assembly lines.
Already in wide-spread use in all leading industries, SPEED NUTS afford a faster and better assembly to an almost unlimited range of products from cars, trucks and aircraft to toys and jewel cases.
May we ask for full details on your assembly problems? Samples and engineering data will be forwarded immediately.
TINNERMAN PRODUCTS, INC.
2039 FULTON RD. CLEVELAND, OHIO
MANUFACTURERS OF PATENTED SPEED NUTS
IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario
IN ENGLAND: Simmonds Aerocessories, Ltd., London
IN FRANCE: Aerocessoires Simmonds, S. A., Paris
OVER 900 MILLION ALREADY USED—OVER 500 SHAPES AND SIZES

unanimity of thought among the various departments and there is also difference within the three departments.

The President's proposal for a Pan American cartel to control all foreign trade between the Americas and the rest of the world indicates the drastic changes the war will cause in the international trade. The virtual embargo on exports of machinery and certain other materials, classed as defense requirements, is another indication.

State department is taking a firmer grip on foreign trade activities by the formation of a new division charged with economic, financial, tariff and general trade questions. It is assumed this new division will be responsible for carrying out any possible Pan American-international program.

International developments indicate complete revision of the American tariff system. What form the new system will take cannot even be guessed now. Washington observers believe that legislation will be needed to give real protection to American industry. Some believe that the present apparent need is for legislation to prevent dumping to combat depreciation of foreign currency and to revise radically the present tariff rate structure. What further changes will be required, particularly in the administrative operation of the tariff law, will depend entirely on world developments. Only one thing is certain—the present concepts of foreign trade must be scrapped and industry must realize that a new order is coming.

INVENTORS' COUNCIL TO AID DEFENSE PROGRAM

Plans for creation of a national inventors' council to encourage inventions by civilians and to appraise their usefulness for national defense purposes, have been announced by the commerce department.

Dr. Charles F. Kettering, president, General Motors Research Corp., has been named chairman. Other members will include noted inventors and men of wide experience in the industrial application of inventions. Associated with them will be Conway P. Coe, commissioner of patents, who is a member of the national defense research committee, recently established by President Roosevelt.

A number of world-famed inventors and industrial experts have signified their willingness to serve on the council without compensation. Their names will be announced when plans are completed. The council will co-operate closely with the national research committee, headed by Dr. Vannevar Bush, president, Carnegie institution of Washington. The trained personnel of the patent office will be placed at the services of the council in an advisory capacity.

Organization of the council is prompted by a need for a central agency to appraise inventions of civilians other than the patent office to which applications for official patents must be made.

CONGRESS APPROVES $25,000,000 APPROPRIATION FOR TVA

Congress last week passed the $25,000,000 appropriation to enable the Tennessee Valley authority to supply more electric power for the national defense program. The appropriation had been requested by Edward R. Stettinius Jr., and William S. Knudsen, national defense commissioners. President Roosevelt has signed the bill.

Total cost of the TVA program is to be $65,800,000, the $25,000,000 being an initial appropriation. It will enable TVA to provide additional electrical generating capacity to meet the present and projected requirements for power for plants engaged and to be engaged in the manufacture of materials and supplies for national defense.

It is understood a survey of power resources by the national defense commission has indicated that the TVA area offers a quick solution with respect to securing additional power for aluminum production and the provision of facilities for the manufacture of other defense equipment and materials.

Defense commissioners urged congress to act quickly, primarily because of the time factor of water storage. It was pointed out that delay in starting work on the proposed storage plant and making contracts could cause a year's loss of time in the initial utilization of additional water power.

DIE CASTING INDUSTRY WAGE HEARING SCHEDULED

Public contracts board of the labor department will take testimony on prevailing minimum wages in the die casting manufacturing industry at a hearing in the Department of Labor building, Washington, Aug. 8 at 10 a. m. The die casting industry is defined by the board as "that industry which manufactures die castings for sale and does not include the manufacture of die castings when manufactured for use as part of another product by the manufacturer of such other products."

The board suggests testimony should include the following: Name of firm; plant address; total number of employes and number of male and female employes; classification of employes by occupations, including number engaged in each operation; hourly wages in each operation with designation of applicable time period; if paid on piece work basis, weekly earnings in each class of employes; hours worked per week. Other pertinent information also may be submitted.

Both employers and employes have been invited to testify. Briefs of telegraphic communications may be filed, but should be offered before the hearing date.

ROAD BUILDERS' ASSOCIATION SURVEYS NATION'S HIGHWAYS

To determine what changes in highways are needed to meet economic and national defense requirements of the United States, the American Road Builders' association is conducting a general survey of this country's road system. The association says steel, automobile, oil, equipment and other companies have endorsed the program.

To illustrate the importance of an adequate highway system, the association points out that 48,000 communities are completely dependent on truck service, being served by no railways. In addition to peacetime factors, the survey aims to make available to the war department information on present and possible highways that would serve military purposes.

JAPANESE EXTEND CONTROL OF STEEL PRODUCTION

New Japanese regulations covering iron and steel production and distribution and effecting more intensive control of the industry have been promulgated, according to a report from the office of the American commercial attache, Tokyo. The new control measures authorize the ministry of commerce and industry to fix individual production allotments for manufacturers of pig iron, cast iron pipes, steel blooms, rolled steel billets, sheet bars, and rolled steel materials. The regulations also provide for the distribution of such materials through specified distribution control organs.

It has been reported that because of the rising price of imported materials, particularly scrap iron, the official price of iron and steel products in Japan were increased as of the middle of June. It is understood the government was considering subsidizing the iron and steel industry to prevent price increases, but as the cost of such subsidy was estimated at between 200 and 300 million yen the plan was abandoned in favor of an increase in official quotations. Reports also indicate that the government will insist on further reduction in dividends of iron and steel companies.

Tin Consumption for Plate Up 55% in 1939

■ Tin consumed in tin plate and terne plate manufacture in the United States increased 55 per cent, from 25,585 gross tons in 1938 to 39,541 tons in 1939, according to the bureau of mines. This is attributed mainly to a 92 per cent gain in tin plate exports, and building of inventories by can companies.

Stocks of virgin tin held by tin plate manufacturers increased 12 per cent, the quantity on hand at the end of 1939 being 15,467 tons, the equivalent of about 4.7 months' supply at the year's consumption rate. Tin purchases in 1939 included 40,476 gross tons of virgin pig tin, 1304 tons of secondary pig tin and 1171 tons of tin in terne metal. In 1938 the corresponding figures were 26,142 tons of virgin pig tin and 787 tons of tin in terne metal. Primary tin purchases in 1939 included: Straits, 34,410 tons; English, 4170 tons; Chinese, 153 tons; Banka, 905 tons; Tulip, 545 tons; Katanga, 1167 tons; others, 142 tons; total 41,492 tons.

Stocks held by the tin and terne plate industry increased during 1939, although some plants reduced inventories. Companies accounting for 18 per cent of total tin purchases reported 59 per cent decline in virgin pig tin stocks, while the remainder increased holdings 54 per cent. Stocks at the end of 1939 were 18,780 gross tons, in 1938, 16,718 tons, in 1937, 16,242 tons.

In processing 40,889 gross tons of tin in 1939 by-products containing 6321 tons of tin were produced, of which 4973 tons were shipped as scrap. In 1938, in processing 26,453 tons, 4304 tons of tin were recovered 3436 tons being re-used and 868 tons shipped as scrap.

In tin plate manufacture in 1939 87,936 gross tons of by-products were obtained, including waste-waste, strips and cobbles. In 1938 the figure was 59,492 tons.

PRODUCTION QUOTA RAISED; PROVIDES FOR U. S. RESERVE

World tin production in June is reported by International Tin Research and Development council, Greenford, Middlesex, Eng., as 19,600 gross tons, compared with 17,500 tons in May. Six months' output, 1940, was 102,900 tons, against 63,200 tons in first half, 1939.

United States deliveries in first half this year totaled 50,609 tons, an increase of 68½ per cent from 30,000 tons in first half, 1939. United Kingdom consumption in first half was 15,740 tons, compared with 10,341 tons in the corresponding portion of last year, an increase of 52 per cent.

International tin committee in July revised the tin production quota from 100 to 130 per cent of standard tonnages, the revision to remain in force for one year from July 1. The higher rate of production provides for accumulation of a reserve of 75,000 tons in the United States.

Tin Consumption Summary

Gross Tons

	1938	1939
Total tin on hand Jan. 1	16,242	16,718
Net purchases during year	26,929	42,951
Supply available for use	43,171	59,669
Minus tin on hand Dec. 31	16,718	18,780
Total tin processed during year	26,453	40,889
Minus tin content of scrap shipped	868	1,348
Total tin consumed in manufacturing	25,585	39,541
Deduct plant losses	18	20
Tin content of manufactured products	25,567	39,521
Tin plate	23,545	36,640
Terne plate	1,007	1,454
Other products	1,015	1,427

TIN CONTENT OF TIN PLATE, WASTE-WASTE, STRIPS, COBBLES, ETC.

	Quantity manufactured Gross Tons		Tin Content Total Gross Tons		Pounds per gross ton of tin plate	
	1938	1939	1938	1939	1938	1939
Tin plate						
Cokes:						
Standard	1,389,367	2,132,175	21,493	32,816	34.7	34.5
Special	48,564	116,867	851	2,013	39.3	38.6
Best	1,205	4,723	24	91	43.9	43.3
Total	1,439,136	2,253,765	22,368	34,920	34.8	34.7
Charcoals	11,874	19,642	281	402	53.0	45.8
Total tin plate	1,451,010	2,273,407	22,649	35,322	35.0	34.8
Waste-waste, strips, cobbles, etc.	59,492	87,936	896	1,318	33.7	33.6
Grand total	1,510,502	2,361,343	[2] 23,545	[2] 36,640	34.9	34.8

[2] Includes a small tonnage of secondary pig tin.

TIN CONTENT OF TERNE PLATE PRODUCED IN THE UNITED STATES

	Quantity manufactured, gross tons		Tin Content (Gross tons) Total		Purchased as Pig tin		Terne metal		Pounds of tin per ton of terne plate	
	1938	1939	1938	1939	1938	1939	1938	1939	1938	1939
Short ternes	115,303	162,463	739	1,009	157	181	582	828	14.3	13.9
Long ternes	70,312	93,676	268	445	107	136	161	309	8.5	10.6
Total	185,615	256,139	1,007	1,454	264	317	743	1,137	12.1	12.7

Industry Co-Operates In Military Training

■ Co-operation with military training programs has been pledged by a number of industrial companies. Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., is granting leaves of absence without prejudice or loss of pay to employes who are members of the Alabama national guard during a 21-day encampment in August. Company will pay each employe the amount of money he would have received had he worked during the encampment period, less the amount paid the employe by the state or the federal government for the military service.

International Business Machines Corp., New York, has informed employes absence for military training with the national guard or the United States army reserve corps "will not affect continuous service, vacation allowance or group insurance carried by the company. A salaried or hourly employe will receive his regular pay for a maximum training period of 30 days, less the total of his service pay for the training period."

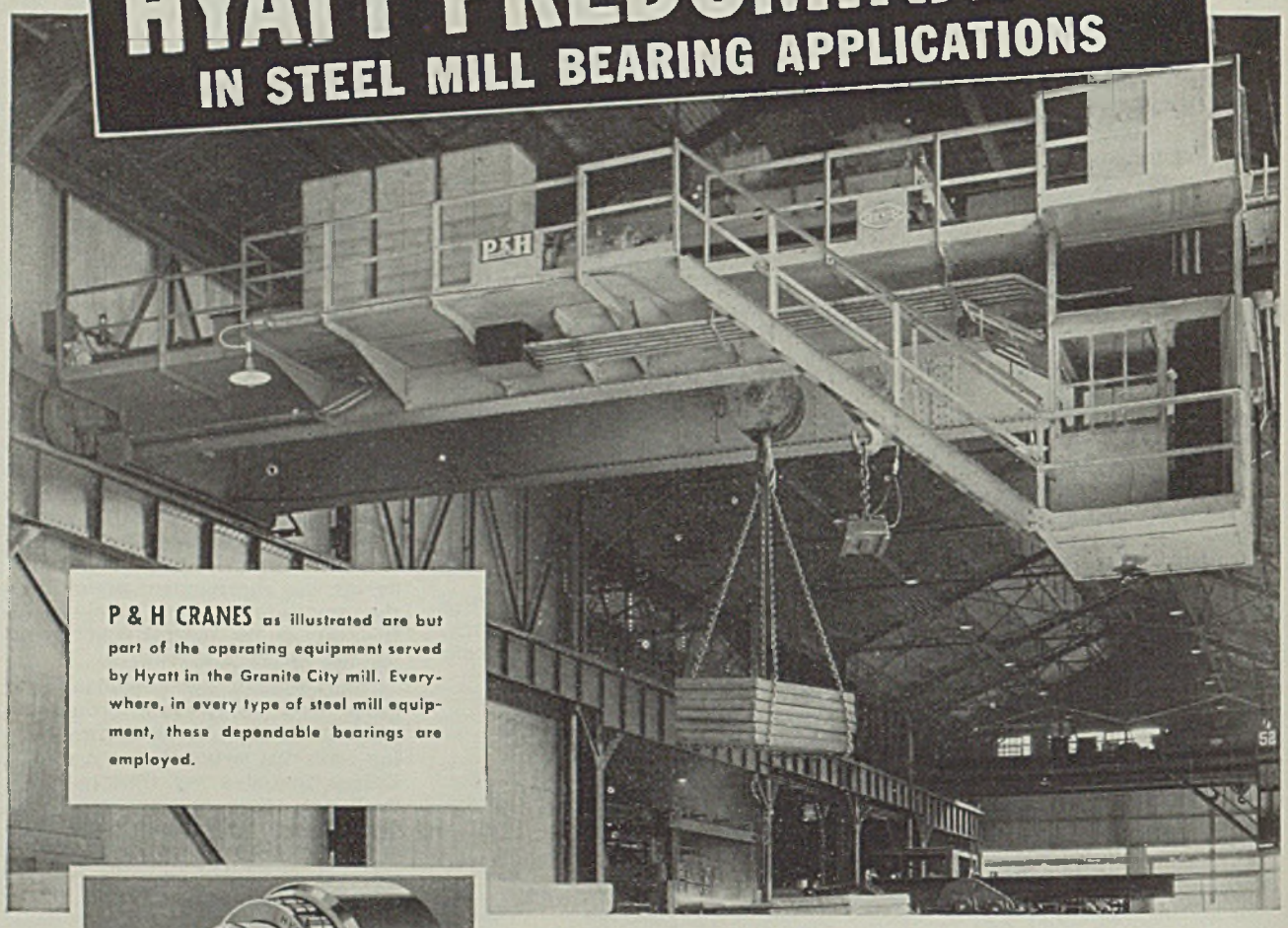
Appliance Sales Near Record in First Half

■ June household washer shipments were 112,134, compared with 118,987 in May and 120,076 in June, 1939, according to the American Washer and Ironer Manufacturers' association, Chicago. For the first half shipments totaled 777,576, third largest for any first half and 5.93 per cent above the 734,030 reported for the comparable 1939 period.

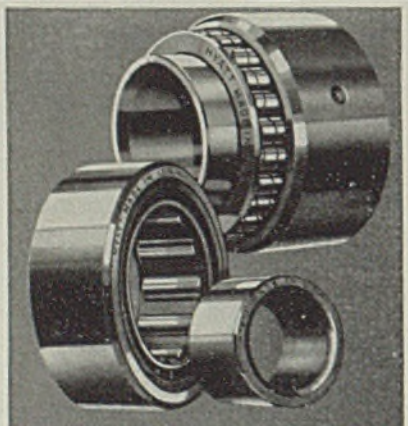
Ironer shipments in June were 8571, compared with 8317 in June, 1939. For the first six months, ironer shipments were 63,749, a gain of 3.05 per cent over 1939 first half figure of 61,121.

Household vacuum cleaner sales in June were the highest in history for that month, totaling 144,237, an increase of 44.74 per cent over the June, 1939, figure of 99,674. January-June sales were 931,012, an increase of 28.25 per cent over 706,353 sold in the first half last year.

ANOTHER EXAMPLE OF HYATT PREDOMINANCE IN STEEL MILL BEARING APPLICATIONS



P & H CRANES as illustrated are but part of the operating equipment served by Hyatt in the Granite City mill. Everywhere, in every type of steel mill equipment, these dependable bearings are employed.



HYATT ROLLER BEARINGS

As further evidence of the fact that Hyatt Roller Bearings are everywhere in steel mill service we cite outstanding applications at the Granite City Steel Company plant. Ingot and charging cars, tilting tables, lineshafts and table rolls in the hot strip mill, cranes ...all running smoothly and carefree on Hyatt Roller Bearings.

In mill after mill, in every section of the country, on all kinds of equipment, you will find Hyatt Roller Bearings used just as extensively. If you are contemplating the purchase of new equipment or changeovers, let us help you on your bearing applications. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Detroit, Chicago, Pittsburgh and San Francisco.

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

1941 Models To Be Previewed This Month.

Die Shops Seek Defense Work To Hold Labor.

Report Briggs Has Packard Body Contract.

Ford Continues Aircraft Engine Developments.

Quarterly Reports Reflect New Tax Demands.

DETROIT

■ INVITATIONS to previews of new models are fluttering down on offices of newspaper and magazine writers and advertising men, who are going to be kept busy this month shuttling from one introduction to the next. Buick will show Aug. 13, Hudson on the 14th, Plymouth on the 15th; others will follow in rapid succession.

For the first time in three years, the Plymouth preview is scheduled separately from the rest of the Chrysler line, custom of the past two years being to unveil Plymouth, Dodge, De Soto and Chrysler simultaneously. Chief reason for the early Plymouth showing seems to be that the other divisions do not have cars ready as yet, while Plymouth has made a good start on 1941 models, pilot cars coming off the lines this week and volume production to start shortly thereafter.

Studebaker, Packard, Nash and Lincoln are practically at the production stage on new models. Others are putting the finishing touches on change-overs.

With preparatory work on 1941 models nearing a finish, tool and die shops are finding their schedules fairly well cleaned up, particularly the die shops. Normally, when automotive programs have been concluded, a layoff period ensues, but it was hoped this year that the needs of the national defense program would develop to the point where no serious interruptions would be occasioned in these plants. As yet, however, no tool and die work in large volume has matured, and more than one die shop is actively investigating the possibility of acquiring some defense business, to avoid having to curtail working forces.

Many of the tool shops still have ample backlogs, but they are reinforced with business from other than automotive customers—machine tool and aircraft parts, for example. At any event, a speeding up of releases for dies, jigs, fixtures and other incidentals to defense production would clarify the outlook for die shops.

To release skilled men in these shops now may mean that when they are needed urgently they will have made other connections and an acute shortage of such labor might develop. So shop managers are trying their best to hold on to trained men and to keep them busy in the present interval between conclusion of automotive work and receipt of hoped-for armament business.

A considerable amount of raiding of sources of skilled labor in these types of plants is reported.

Briggs Rapidly Expanding

Briggs, for one, is moving forward with rapid expansion of its new aircraft division and will require a large number of men. Further, it is understood, Briggs has taken body contract for the Packard 6-cylinder or 110 model for 1941 and needs additional help for this project.

Hitherto Packard has built all its own bodies. Whether the Briggs contract covers just body stampings, bodies-in-white or finished bodies is not known. Presumably Briggs was able to demonstrate to Packard its ability to supply either parts or bodies at a lower figure than Packard could realize in its own plant, and hence was awarded the business. Last year at this time reports were current that the Budd interests had offered to build Packard bodies at less cost than Packard was incurring, but nothing ever came of this.

Briggs could use some body business nicely to fill in the vacancy created by withdrawal of nearly all Ford body work. A large volume still is handled for Chrysler divisions, but the plant is geared beyond its present output. The Chrysler body contract, incidentally, is said to be on a five-year basis, with Chrysler renewing every year. If Chrysler should decide to cancel the contract, it still would have four years to run after notification of cancellation.

Officially, the contract for production of Rolls-Royce aircraft engines has not been accepted by Packard, according to replies to direct questioning of spokesmen. Nevertheless, preparatory work continues, and Packard officials are now busy lining up sources of supply of a wide variety of parts and materials needed in construction of the engine. Release of space required for whatever body work Briggs is taking over probably could be turned to engine manufacture, although considerable rearrangement of equipment would be dictated.

Apparently Ford has not dropped plans to build high-power aircraft engines, if statements made by Mr. Ford to newspaper reporters on the occasion of his 77th birthday last week can be credited. He said the company was continuing development work on a 1500-horsepower V-12 liquid cooled airplane engine, with light alloy block and adaptable to quantity production. This sounds

nearly identical with basic characteristics of the Rolls-Royce engine on which Ford did considerable experimental work, but no doubt includes a number of variations from this design.

It would be the height of something or other if Ford should proceed with tooling for such an engine and start production late this year so that several hundred units were completed and ready for installation before Packard had even built the first Rolls-Royce. The latter will require ten months tooling from date contract is signed, and apparently the contract is not yet signed. The look of chagrin on the faces of British buyers awaiting their first engine from Packard while Ford had already supplied a quantity of similar engines to the American government would be startling to say the least.

The Crosley car appears to have taken a new lease on life for 1941 with announcement by the company of seven new models and a new distribution policy. After building about 1800 cars last summer, Crosley undertook a redesign of his diminutive vehicle, put larger bearings in the motor, improved the oiling system, added universal joints to the driveshaft, adopted bonderized and baked finishes instead of air-dry finish and worked up some new body styles.

Crosley Seeking New Outlets

Now available are a convertible sedan at $399, coupe at $299, station wagon at $450, a "covered wagon" at $399, parkway delivery unit at $375, panel delivery at $435 and pickup delivery at $485. Mr. Crosley has added some new automotive talent to his engineering and sales personnel and concluded that sales will be pepped up by changing to an automotive type of distribution, instead of through regular Crosley retail radio and appliance dealers. Mr. Crosley states that some 600 of his distributors will continue to serve as a nucleus of the sales organization, but additional independent outlets are wanted. The fact that commercial types of vehicles predominate the new line also indicates that the manufacturer has concluded best opportunities for profit lie in this field and not in the passenger car market.

■ WHILE the uncomfortable heat of the past two weeks has made nearly any job a millstone, workmen in the strip mill of Great Lakes Steel Corp. here found it exceptionally tough the other day when the mill temperature rose to 136 degrees. Despite this terrific heat, only 16 men had to be sent home and none was seriously prostrated. The company reports a daily lemon bill during the heat wave of $400-$500, and salt tablets disappeared as fast as dispensers could be filled.

Most of the heat victims were younger men, less experienced at such working conditions. Too many inexperienced workmen, it is reported, rushed home after a hot day in the mill, ate cold salads and drank ice tea by the gallon, with the result that the interior shock proved excessive. Veterans of the heat ate warm meals, drank hot coffee, suffered no serious adverse effects.

Despite the heat, Great Lakes continues at capacity operations, pouring steel from 16 open hearths without interruption. Initial automotive releases account for a large part of this production, but a large bank of other orders, including some export tonnage, serve to keep pressure on open-hearth and rolling departments. The Ford open hearth has been operating nine out of ten furnaces, pouring 13,186 tons in the week ended July 27.

Motor company financial statements for the six months ended June 30 reflect a much improved position resulting from sharp increase in sales this year, but also reflect the beginnings of an enormous drain on corporate earnings which will result from the new revenue act. For example, in the three months ended June 30, General Motors had net income of $46,546,999, better than a million dollars under the same period of 1939, despite a 34 per cent increase in sales. This is explained by allocation of $15,000,000 to a special contingency reserve fund to cover possible additional taxes applicable to earnings in 1940, as well as possible future losses in view of continuation of disturbed conditions abroad; a provision of $6,200,000 to cover vacation pay for all hourly workers under terms of a recently negotiated contract; and a further $5,500,000 to cover additional federal corporate income taxes. Thus over one-third of second quarter earnings had to be set aside in order to more adequately cover special contingencies.

Reported earnings of GM for the second quarter do not include $1,183,858 realized abroad which cannot be transferred to the United States because of exchange restrictions, and furthermore these earnings do not include any realized by Adam Opel A. G. in Germany. This, the report prosaically states, is "due to the inability to obtain information from Germany."

Studebaker profits for six months of this year were close to one million, better than 20 per cent ahead of last year. Nash-Kelvinator increased its profit in the quarter almost nine times over last year, the total being $901,939. Nine-month profit of the current fiscal year beginning Oct. 1 practically duplicated the figure of the preceding fiscal nine months—$1,330,934—the only difference being that the latter was a loss.

New Pontiac Foundry Opens

Pontiac foundry modernization program, mentioned here recently, has now been completed and daily iron capacity boosted to 785 tons. Superintendent Omer L. Allen must be having his hands full in keeping the new equipment running smoothly, for he is too busy to see callers. Core sand handling and drying equipment has been installed to treat 400 tons every eight hours. In the foundry proper, 3700 square feet have been added to accommodate two 27-tons per hour cupolas. Slag from cupolas is removed by a conveyor and immediately quenched in water so as to break it up thoroughly.

Thirty years of progress in Buick cars was strikingly demonstrated last Wednesday in Detroit when a parade of the 1910 Buick Bug was followed by Harley J. Earl's car of the future (see STEEL, April 8, p. 27) and the standard 1940 Buick. Event was in honor of the Flint, Mich., motor festival, in session this week. Special guests included Louis Chevrolet, whose namesake now comes off assembly lines at a rate of about 1,000,000 a year, and E. A. deWaters, chief engineer at Buick when the old Bug model was built.

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
6 mos.	1,305,501	2,055,744	*2,539,440
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

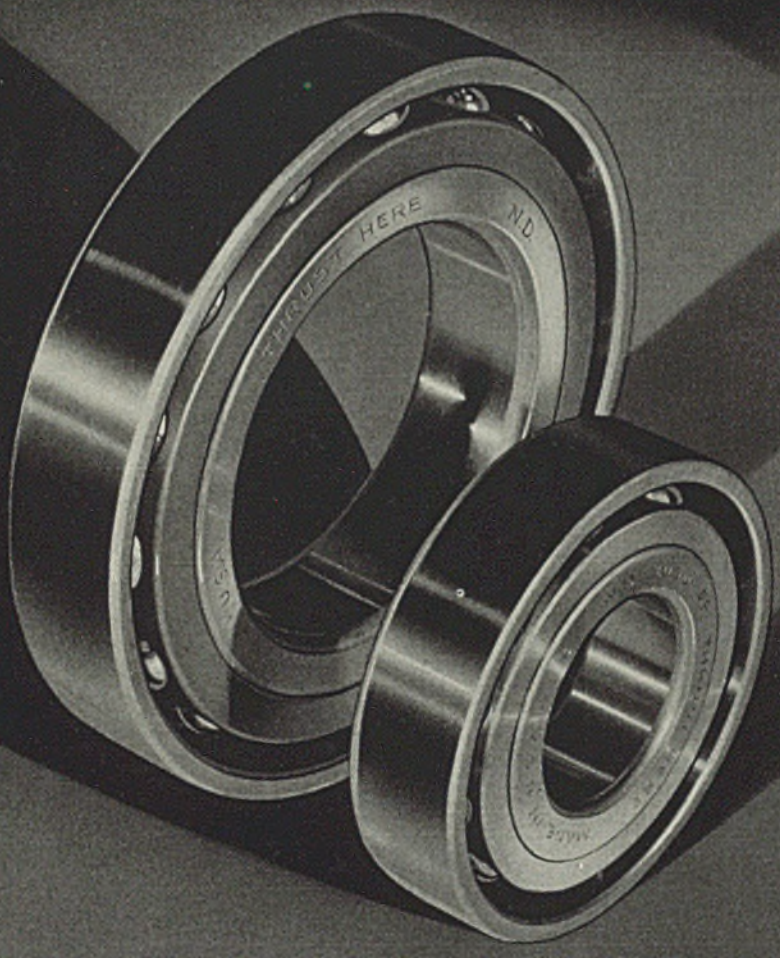
*Revised.

Estimated by Ward's Reports

Week ended:	1940	1939†
July 6	51,975	42,784
July 13	62,176	61,610
July 20	53,020	47,420
July 27	34,822	40,595
Aug. 3	17,373	28,250

†Comparable week.

No Substitute for *EXPERIENCE*



NEW DEPARTURE has helped solve so many bearing problems and has created so many "new departures" in ball bearings, that almost never do manufacturers encounter problems on which New Departure has not had actual *experience — for which there is no substitute.*

New Departure, Division of General Motors, Bristol, Connecticut.

NEW DEPARTURE

THE FORGED STEEL BEARING

Congressmen Should Know

■ ALL MANUFACTURERS of durable goods should obtain a copy of a booklet entitled "Capital Goods Industries and Federal Income Taxation," and study it carefully. It was prepared by the Machinery and Allied Products institute and may be obtained by addressing the institute at 221 North LaSalle street, Chicago.

This booklet analyzes the frequently-heard complaint that the existing federal income tax law discriminates against the durable goods industries in that a two-year carryover period for equalizing losses against profits is not sufficient for these industries. This is because purchases of durable goods are postponable, so that the durable goods industries are much more subject to cyclical swings than the consumption goods industries. That is, while in times of depression the public continues to buy food, clothing, drugs, gasoline and cigarettes, industry promptly discontinues or minimizes its purchases of machine tools and construction of new plant buildings.

Study Shows Two-Year Loss Equalization Term Penalizes Durable Goods Producers

MAPI studied the earnings histories of a large number of companies, including durable goods and consumption goods companies, over the ten-year period of 1929-1938.

It found, on the basis of 100 per cent for 1929, the durable goods companies' profits percentages were 50.1 in 1930, 5.9 in 1934, 23.4 in 1935, 51.9 in 1936, 69.8 in 1937 and 14.2 in 1938. Their deficits averaged —8.5 per cent in 1931, —38.2 in 1932 and —12.6 in 1933.

On the other hand, also on the basis of 1929 as 100 per cent, the consumption goods companies averaged the following percentages in profits: 85.1 in 1930, 64.2 in 1931, 45.3 in 1932, 60.8 in 1933, 64.2 in 1934, 64.2 in 1935, 77.6 in 1936, 69.1 in 1937, 55.3 in 1938.

Over 1931-1938, 77.1 per cent of the consumer goods manufacturers paid out less than one-fifth of their profits as taxes, whereas only 46.5 per cent of the capital goods manufacturers were so fortunate. On the other hand, 21 per cent of the capital goods manufacturers paid out more than two-fifths of their profits over the eight-year period, as against 5.3 per cent of the consumer goods companies. Some capital goods manufacturers actually paid in taxes more than their entire profit over this eight-year period.

With New Tax Bill Imminent Business Should Demand Proper Remedial Action

How long a carryover period should be allowed to capital goods manufacturers? MAPI's finding is that if the two-year period had been in effect during the 1929-1938 decade only 19.2 per cent of the capital goods manufacturers would have offset their losses completely. It would have taken a little more than nine years for all of them to equalize losses. In six years about two-thirds of them, 66.2 per cent, would have offset losses. MAPI's conclusion is that a six-year period would be fair to the majority—and is supported in this conclusion by Great Britain's adoption of the six-year period in 1926.

MAPI's booklet has been prepared specifically for the purpose of making these facts clear to members of congress. Durable goods manufacturers should immediately follow through by calling on their congressmen for fair treatment in the matter of the loss carryover. Such action is vitally important right now in view of the fact that congress—at a time when huge additional revenues are needed by the government—is about to pass a new tax bill.

The BUSINESS TREND

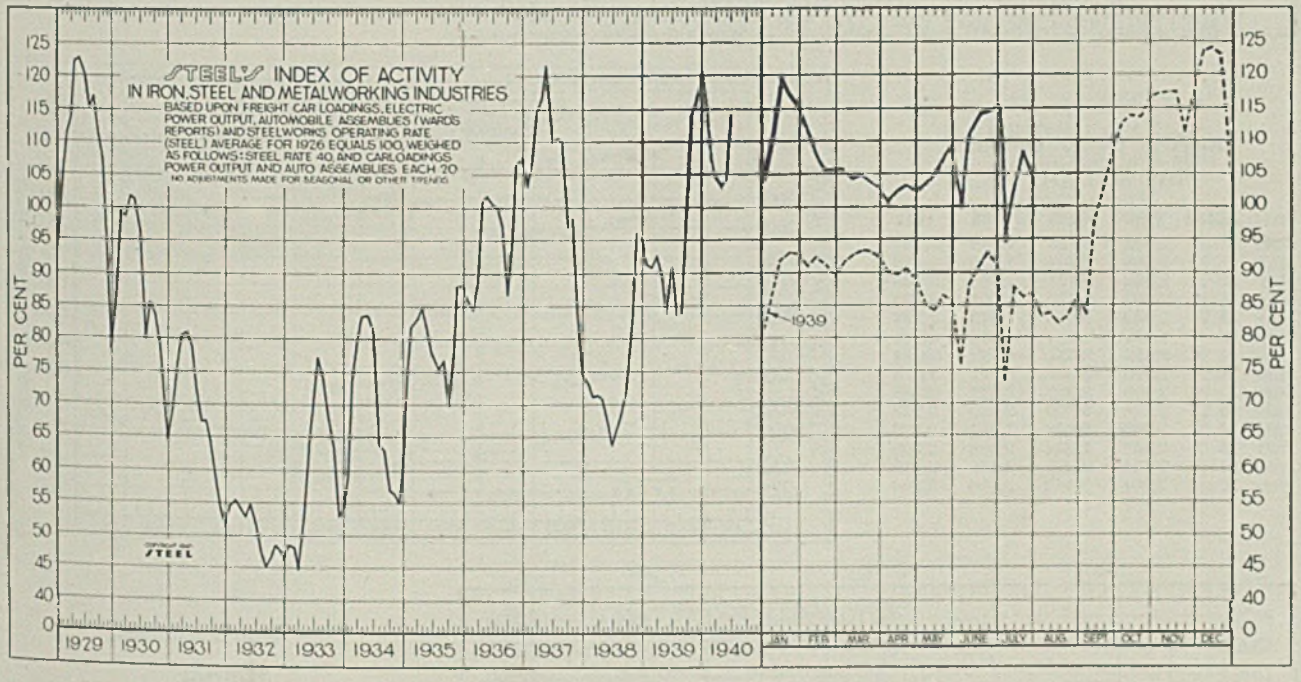
Further Gains Noted in Some Industrial Lines

■ LARGE order backlogs and continued inflow of new business in some instances are sustaining industrial activity at encouragingly high levels, particularly in the heavy industries. Near capacity operations are maintained in the shipbuilding, machine tool, aircraft, steel and heavy equipment industries, with no letup in prospect for the immediate future.

Reflecting the sharp seasonal decline in automobile production in recent weeks, STEEL'S index of activity lost ground during this period. For the week ended July 27 the index eased 2.6 points to 103.4, compared with 106 recorded the previous week, and 86.8 in the corresponding period of last year.

Steelmaking operations advanced to a new 1940 high during the week of July 27, and current indications point to further gains. The national steel rate stood at 89.5 per cent in that week, a gain of 1½ points over the previous week's average. A year ago the steel rate was at the 60 per cent level.

Electric power consumption during the latest period increased 11.1 per cent over the previous week's total, and compared favorably with the 2,641,458,000 kilowatts consumed during the week of Dec. 23, 1939, the all-time record.



STEEL'S index of activity declined 2.6 points to 103.4 in the week ended July 27:

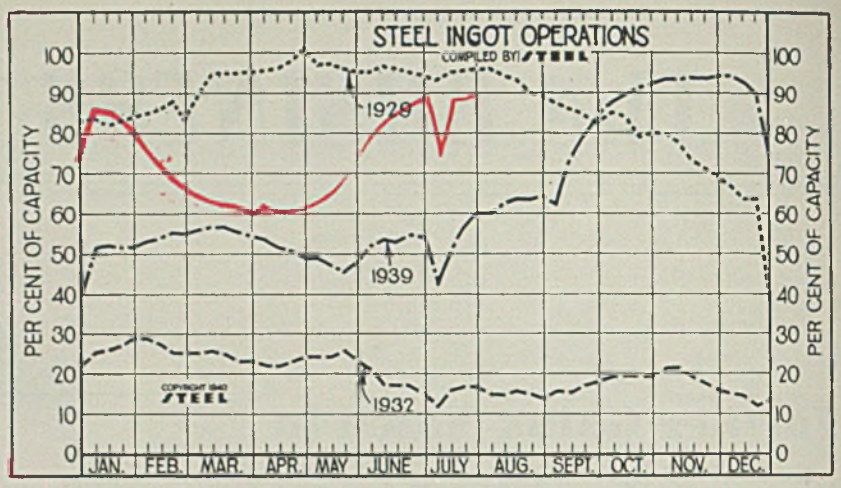
Week Ended	1940	1939
May 18	106.8	86.6
May 25	109.1	85.4
June 1	99.2	75.9
June 8	111.9	88.2
June 15	114.6	90.9
June 22	114.8	93.0
June 29	115.3	91.0
July 6	94.2	73.4
July 13	108.5	87.8
July 20	106.0	86.0
July 27	103.4	86.8

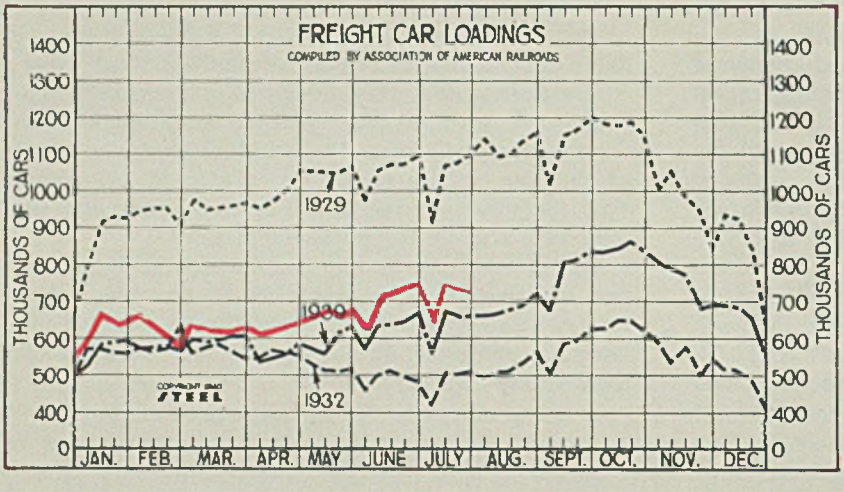
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	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	114.2	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63 7	77.1	47.1	67.3	79.9	115.2
Aug	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	....	98.0	72.3	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

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Apr. 27....	61.5	49.0	32.0	91.0
May 4....	63.5	49.0	31.0	91.0
May 11....	66.5	47.0	30.0	89.0
May 18....	70.0	45.5	30.0	91.5
May 25....	75.0	48.0	28.5	75.0
June 1....	78.5	52.0	25.5	75.0
June 8....	81.5	53.5	25.5	74.0
June 15....	86.0	52.5	27.0	75.5
June 22....	88.0	54.5	28.0	74.0
June 29....	89.0	54.0	28.0	77.5
July 6....	75.0	42.0	24.0	74.0
July 13....	88.0	50.5	32.0	82.0
July 20....	88.0	56.5	36.0	81.0
July 27....	89.5	60.0	37.0	84.0





Freight Car Loadings

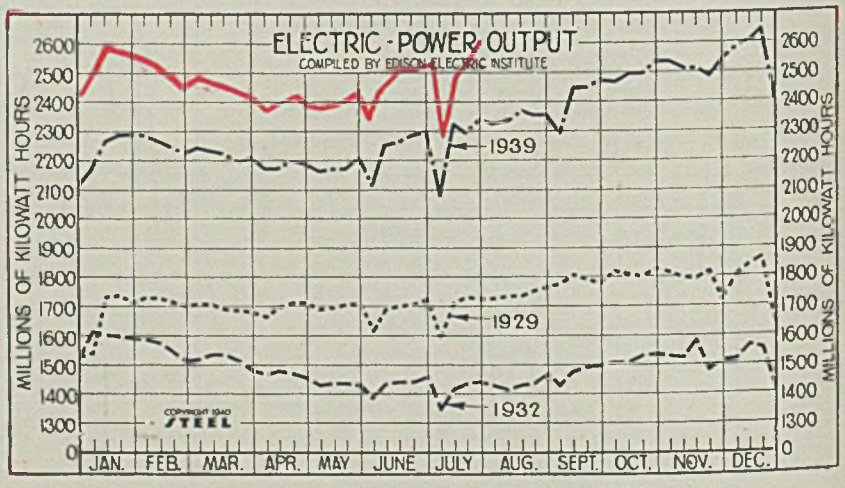
(1000 Cars)

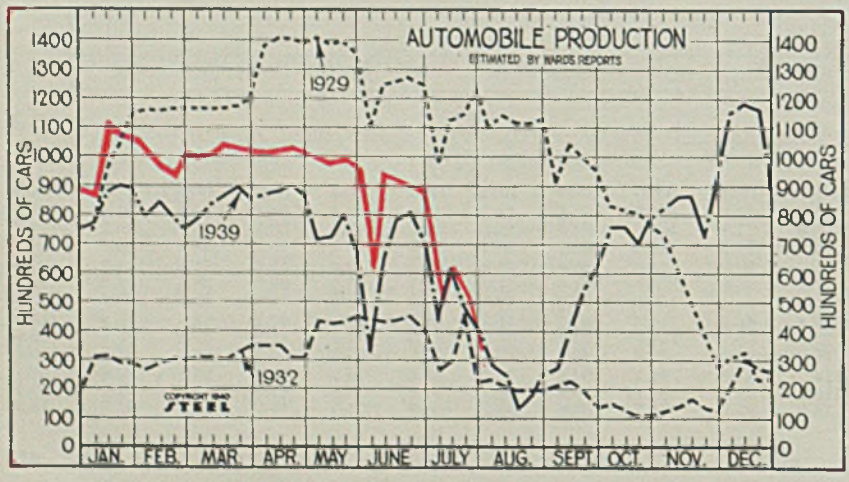
Week ended	1940	1939	1938	1937
Apr. 27.....	645	586	543	782
May 4.....	666	573	536	767
May 11.....	681	555	542	774
May 18.....	679	616	546	779
May 25.....	687	628	562	795
June 1.....	639	568	503	692
June 8.....	703	635	554	754
June 15.....	712	638	556	756
June 22.....	728	643	559	774
June 29.....	752	666	589	806
July 6.....	637	559	501	682
July 13.....	740	674	602	770
July 20.....	730	656	581	771
July 27.....	718	660	589	783

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Apr. 27...	2,398	2,183	1,939	2,194
May 4....	2,386	2,164	1,939	2,176
May 11...	2,388	2,171	1,968	2,195
May 18...	2,422	2,170	1,968	2,199
May 25...	2,449	2,205	1,973	2,207
June 1...	2,332	2,114	1,879	2,131
June 8...	2,453	2,257	1,992	2,214
June 15...	2,516	2,265	1,991	2,214
June 22...	2,509	2,285	2,019	2,238
June 29...	2,514	2,300	2,015	2,238
July 6...	2,265	2,088	1,881	2,096
July 13...	2,483	2,324	2,084	2,298
July 20...	2,524	2,295	2,085	2,259
July 27...	2,601	2,342	2,094	2,256

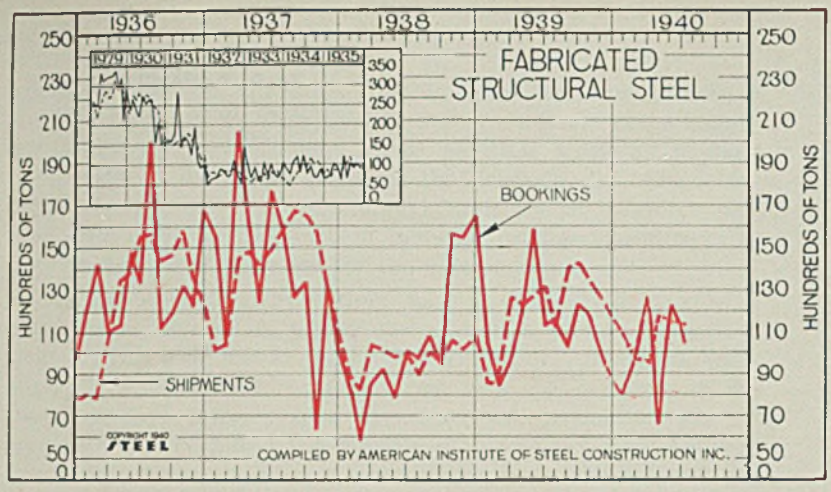




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Apr. 27....	101.4	86.6	50.7	139.5
May 4....	99.3	71.4	53.4	140.2
May 11....	98.4	72.4	47.4	140.4
May 18....	99.0	80.1	46.8	131.3
May 25....	96.8	67.7	43.1	131.4
June 1....	61.3	32.4	27.0	101.7
June 8....	95.6	65.3	40.2	118.8
June 15....	93.6	78.3	41.8	111.6
June 22	90.1	81.1	40.9	121.0
June 29....	87.6	70.7	40.9	122.9
July 6....	52.0	42.8	25.4	101.0
July 13....	62.2	61.6	42.0	115.4
July 20....	53.0	47.4	32.1	88.1
July 27....	34.8	40.6	30.4	86.4



Fabricated Structural Steel

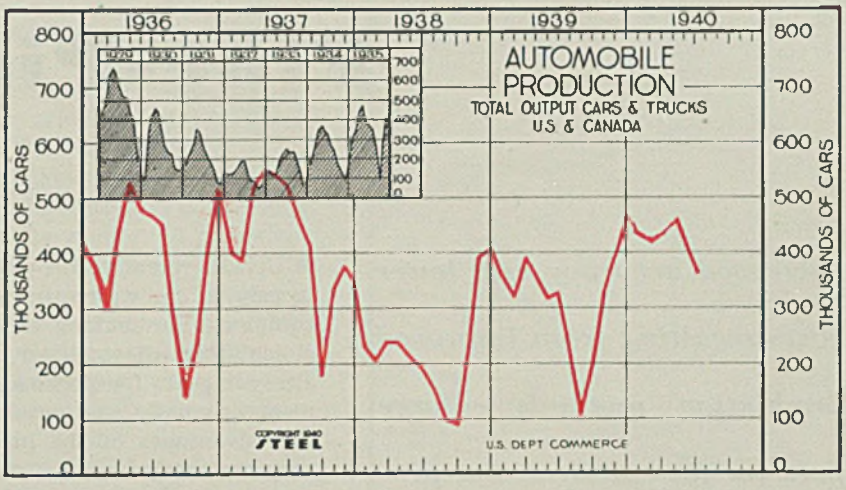
(1000 tons)

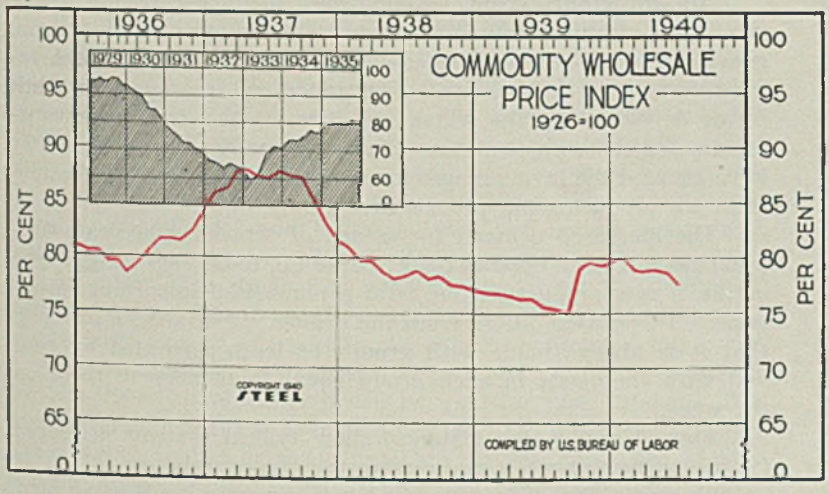
	Shipments			Bookings		
	1940	1939	1938	1940	1939	1938
Jan.	110.9	84.3	87.8	81.7	101.7	80.3
Feb.	97.2	84.4	81.2	98.9	82.7	57.1
Mar.	95.9	125.3	103.3	128.3	95.1	84.3
Apr.	115.9	120.9	100.0	67.1	118.3	91.2
May	112.0	125.9	96.4	121.4	156.9	77.3
June	111.2	130.1	98.6	103.1	111.6	99.9
July	.....	110.5	88.0	....	114.1	96.0
Aug.	.....	139.7	98.6	....	100.9	106.8
Sept.	.....	140.8	93.5	....	121.4	92.5
Oct.	.....	133.8	105.0	....	118.8	154.8
Nov.	.....	128.2	99.9	....	99.3	153.1
Dec.	.....	116.2	106.5	....	84.4	163.4
Total	....	1440.1	1158.8	....	1305.0	1256.6

Automobile Production

(Unit: 1000 Cars)

	1940	1939	1938	1937	1936
Jan.	449.3	357.0	227.1	399.2	377.2
Feb.	421.8	317.5	202.6	383.9	300.8
March	440.2	389.5	238.6	519.0	438.9
April	452.4	354.3	238.1	553.4	527.6
May	412.5	313.2	210.2	540.4	480.5
June	362.6	324.2	189.4	521.1	469.4
July	.....	218.5	150.4	456.9	451.2
Aug.	.....	103.3	96.9	405.1	275.9
Sept.	.....	192.7	89.6	175.6	139.8
Oct.	.....	323.0	215.3	338.0	230.0
Nov.	.....	370.2	390.4	376.6	405.8
Dec.	.....	469.0	407.0	346.9	519.1
Ave.	.....	311.0	221.3	418.0	384.7





All Commodity Wholesale Price Index U. S. Bureau of Labor

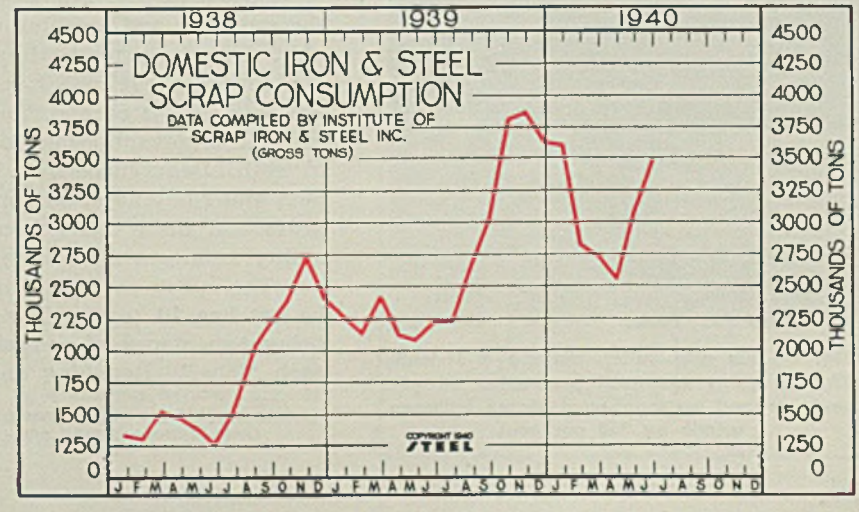
(1926 = 100)

	1940	1939	1938	1937	1936
Jan.	79.4	76.9	80.9	85.9	80.6
Feb.	78.7	76.9	79.8	86.3	80.6
March	78.4	76.7	79.7	87.8	79.6
April	78.6	76.2	78.7	88.0	79.7
May	78.4	76.2	78.1	87.4	78.6
June	77.3	75.6	78.3	87.2	79.2
July	....	75.4	78.8	87.9	80.5
Aug.	....	75.0	78.1	87.5	81.6
Sept.	....	79.1	78.3	87.4	81.6
Oct.	....	79.4	77.6	85.4	81.5
Nov.	....	79.2	77.5	83.3	82.4
Dec.	....	79.2	77.0	81.7	84.2
Ave.	....	77.1	78.6	86.3	80.8

Iron and Steel Scrap Consumption

(Gross Tons)

	1940	1939	1938
		(000 omitted)	
Jan.	3,581	2,257	1,331
Feb.	2,812	2,124	1,306
Mar.	2,728	2,419	1,543
Apr.	2,548	2,114	1,477
May	3,061	2,079	1,387
June	3,482	2,221	1,257
July	.....	2,247	1,520
Aug.	.....	2,675	1,953
Sept.	.....	3,018	2,218
Oct.	.....	3,809	2,393
Nov.	.....	3,858	2,732
Dec.	.....	3,613	2,411
Total	....	32,434	21,528
Mo. Av.	3,035	2,703	1,794



By D. T. HAMILTON
Fellows Gear Shaper Co.
Springfield, Vt.

New Ways to Make

Fine-Pitch Gears

Increased accuracy and lower costs resulting from improved production methods enlarge field for fine-pitch gears; production up 66 per cent, rejections reduced 19.5 per cent in typical examples

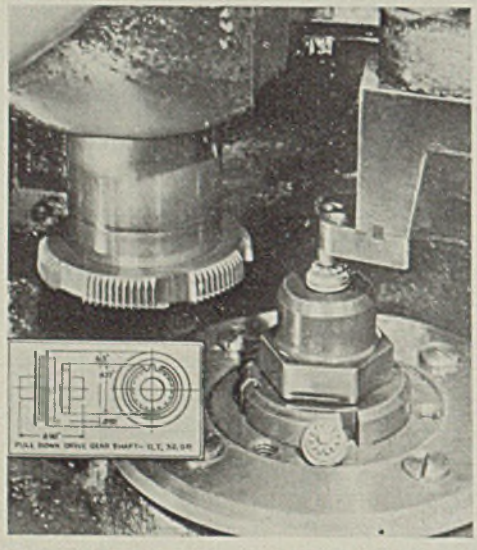


Fig. 1—This gap cutter, making a 11-tooth 32-pitch gear, increased production 66 per cent, stepped up number of pieces between grinds by 800 per cent

■ UNTIL recently, fine-pitch gears (30 pitch and finer) were used largely in the watch and clock industries where these gears and equipment for making them were initially developed. The epicycloidal form of tooth, or variations of it, have been used extensively in gears for clocks and watches, possibly because when equipment originally was developed for cutting these fine-pitch gears, the advantages of the involute system were not so apparent as they are today.

An important recent development is the rapidly increasing use of fine-pitch gears in such products as motion picture cameras, geared camera shutters, projectors, recording devices, meters, indicators, range finders, etc. For functional reasons, the tooth forms developed by the watch industry are not considered satisfactory for these applications. Therefore many of these industries have adopted the involute system, using generating tools and equipment for producing fine-pitch gears.

The increased demand for means of producing accurate fine-pitch gears led the Fellows Gear Shaper Co. to develop the gap-type cutter, a new production tool with a number of important advantages. This cutter differs from the ordinary gear shaper cutter in that it is always made with groups of teeth separated by gaps and with the teeth in each group equal in number to those on the work.

Figs. 2 and 3, for instance, show typical systems developed for producing fine-pitch gears using the gap-type cutter.

Shown in Fig. 2 is a "series" gap, separate teeth being used for roughing and finishing when two cuts are necessary or desirable. This particular cutter is designed to take one roughing and one finishing cut and is provided with two gaps so two gears are produced at each complete revolution of the cutter. In some cases it is advantageous to divide the cutting among three sets of teeth. Gears made from brass and soft materials such as aluminum and zinc alloys, etc., are finished in one cut. High-precision gears and those made from "stringy" material of poor machinability usually require more than one cut.

The cutter in Fig. 3 has a total of 60 teeth. The pinion to be cut has 10 teeth. The cutter is made with two gaps, there being two stages of roughing and one set of finishing teeth on each "lobe." Roughing and finishing teeth are made the same

Abstract from paper presented at 24th annual meeting of the American Gear Manufacturers' association, Asheville, N. C., May 20-22, 1940

length but differ in thickness, the finishing teeth being only a few thousandths of an inch thicker than the second stage roughing teeth. This arrangement leaves as little stock as possible on the sides of the pinion teeth for the finishing cut. Hence deflection is reduced to a minimum. On gears of 40 pitch and finer, from 0.001 to 0.002-inch of material usually is sufficient to leave on the side of the teeth for the finishing cut.

Typical work done by cutters such as these is in producing a pull-down drive shaft pinion for a motion picture projection shutter. This gear has 21 teeth, 48 normal pitch, 30-degree helix angle. When manufacture of this gear was changed over to the use of gap-type cutter system just described, production was increased 70 per cent and the number of pieces produced between grinds was increased 400 per cent. Rejections formerly 30 per cent were cut to only 1 per cent.

The mating gear for the above is made from brass, staked onto a steel shaft prior to cutting the shaft. When changed over to gap-type cutters, production on this gear was increased 44 per cent and number of pieces between cutter grinds stepped up some 800 per cent. Rejections were cut from 20 to 0.5 per cent.

Fig. 1 shows a small shoulder gear made from steel, cut one at a time and finished in one cut. It has 11 teeth and is 32 pitch. Production was increased 66 per cent and the number of pieces between grinds was increased 800 per cent when changed over to gap-type cutting. These are only a few of the many examples on which production costs were reduced. One user saved over $20,000 in a single year through the application of gap-type cutters.

The only change necessary in the regular gear shaper to apply gap-type cutters is the addition of a cam-operated limit switch to stop rotation of the cutter at the desired point relative to the gap in the cutter. The gap-type cutter has the additional advantage in that no overtravel is necessary to complete the gear.

The regular high-speed gear shaper has a much larger capacity than that required by the majority of users of fine-pitch gears. To meet the insistent demand for equipment especially adapted to the cutting of small gears, two new machines have recently been developed—a straightline gear generator and a fine-pitch gear shaper. Use of the first machine is confined exclusively to cutting external gears, but the second can be employed for cutting both external and internal, spur and helical gears, and both machines can be equipped with automatic loading devices, etc., to obtain high production rates at low cost. The fine-pitch gear shaper thus meets requirements of those manufacturers who have a large variety of gears to cut in relatively small lots.

The straightline gear generator is more limited in capacity but has the advantage that it can be used for finer pitches. The rack cutter can be made of finer pitch than the pinion-type cutter, and it can be applied more easily where the gear teeth are of non-involute shape or are to be "topped," a necessary requirement in the fine-pitch field.

The rack-type cutter used on a straightline gear generator can be made with several groups of teeth separated by gaps. For example, one such cutter is intended for cutting three different gears and has four groups of teeth—the first group for cutting a 40-tooth gear, the next 30 teeth and the last two groups of 11 teeth each. This particular cutter is 100 pitch.

While it might be assumed that this type of cutter is imprac-

(*Please turn to Page* 85)

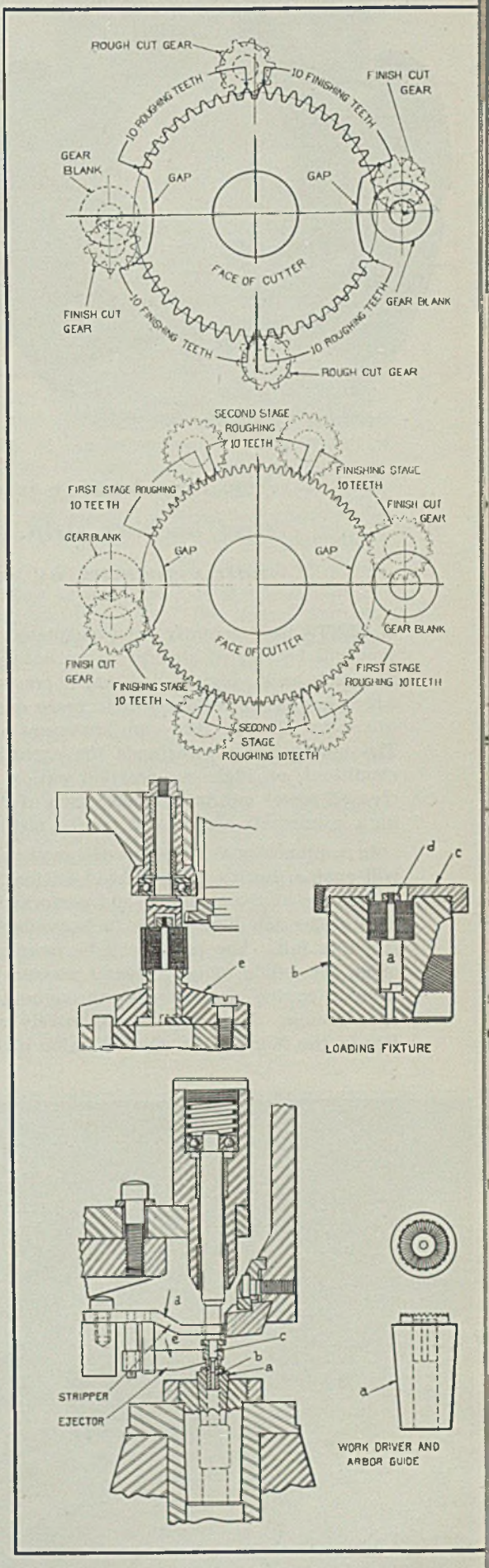
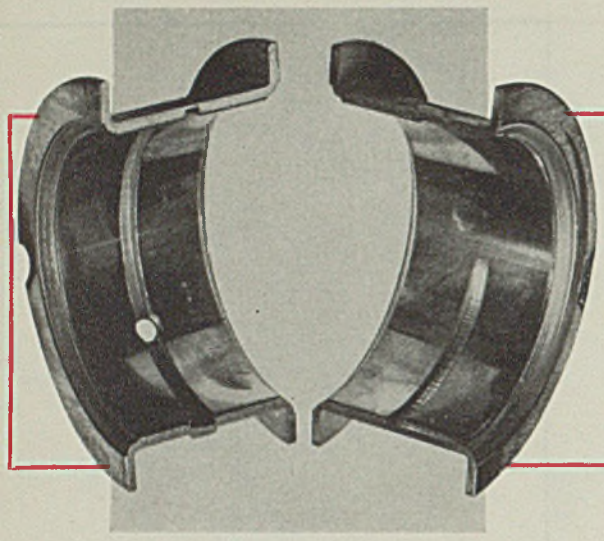


Fig. 2. (Top)—Series gap cutter, used when two cuts are desired. Fig. 3. (Next to top)—Three cuts are provided here, two roughing and one finishing stage

Fig. 4. (Next to bottom)—Thin blanks held in a loading fixture. Fig. 5. (Bottom)—Handling a small pinion with a comparatively small hole, using serrated lower drive bushing and arbor



POWDERED METALS In Composite Bearings

New type bearing is made by sintering powdered metals on to a steel backing strip. High-grade babbit then is anchored into matrix formed by sintered surface. Bearing life upped 200%

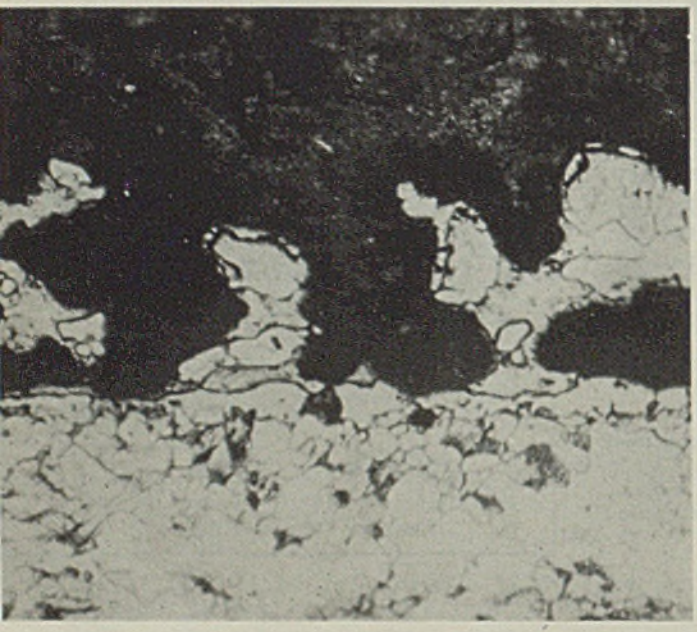
■ TESTS have recently been completed and production will be started shortly on an entirely new type of steel back, high-lead babbitt precision bearing which engineers declare will increase engine bearing life over 200 per cent—an important development. The new bearing withstands the extreme operating conditions of high compression ratios, greatly increased power output per cubic inch of displacement, high crankshaft speeds and terrific piston pressures.

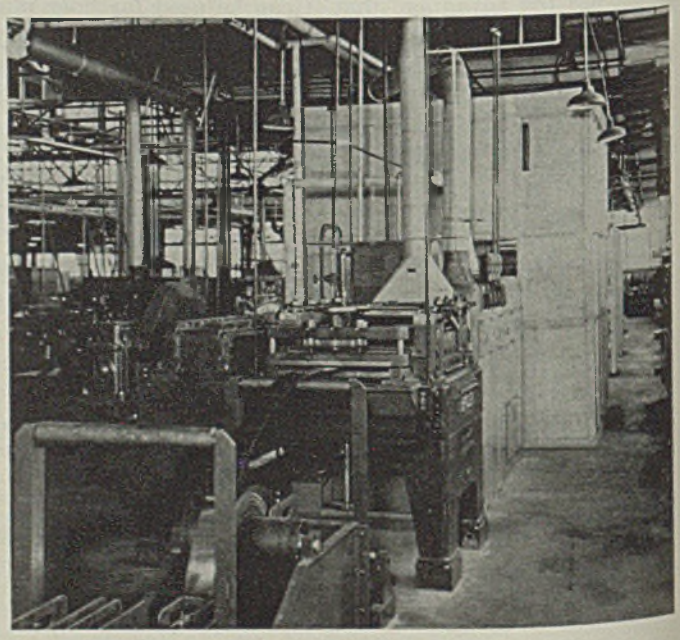
In conjunction with other design developments, it will enable Buick's valve-in-head engines to take full advantage of the economy and performance possibilities of the new high-octane fuels available to motorists this fall. The result will be more power, more miles per gallon of gas, greater acceleration and all around engine performance throughout the entire speed range. Developed co-operatively with specialists of the Moraine Products division of General Motors, the bearing will be used exclusively in Buick engines.

More than two years' intensive test work shows convincing evidence that the new bearing provides an increase of at least 200 per cent in useful life over the best bearings heretofore available as well as other desirable properties vital to trouble-free engine performance.

Dramatic fact about this new bearing material is that its final development had beginnings in an idea—a basis theory regarding an ideal bearing structure. Stated briefly, it was felt that a precision type steel-back bearing should provide a porous matrix

Fig. 1. (Left)—Micrograph shows how the babbitt is held mechanically in voids of the matrix
Fig. 2. (Right)—Coiled steel strip at lower left passes through roller leveler to room where matrix powders are fed onto surface for moving strip





or foundation which would be firmly bonded to the steel backing; provide a corrosion-resistant bearing material which would impregnate the "spongy" matrix, thus developing an everlasting bond both metallurgical and mechanical in nature.

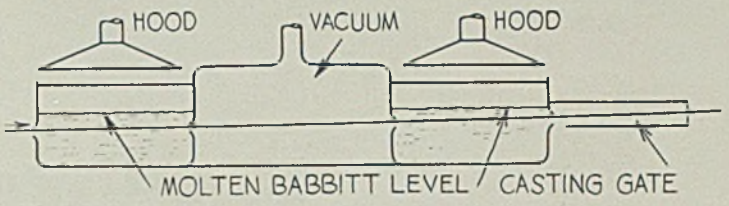
That was the ideal conception. Its realization had to await the results of parallel studies to determine the exact nature of the matrix structure and the exact metallurgical character of the bearing material itself.

Then finally, the laboratory product had to be translated into a production reality by the development of a unique manufacturing process.

A mass of experimental evidence and service history indicated that the most suitable alloy for bearing material is the high-lead babbitt type which has high wear and corrosion resistance. In addition, it was agreed that the alloy should be relatively soft to prevent rapid wear of crankshaft journals and pins, thus retaining the original bearing fits and, consequently, maintaining fine balance and smooth running characteristics of the engine in which it is used.

Fatigue: While high-grade high-lead babbitt material has been used for many years, its most useful properties were not completely realized up to this time because of a tendency toward fatigue failure. Fortunately, accumulated service history showed unmistakably that fatigue failure, as evidenced by cracking and actual breaking out of portions of the bearing surface, was related to the use of a relatively thick layer of babbitt.

Studies revealed that practically all fatigue cracks were typically of about the same depth. Incipient fatigue failure begins in the form of fine radial



cracks or fissures in the surface, growing in depth with time. Eventually, at a certain depth these radial cracks are joined by short circumferential cracks deep in the structure of the metal. And when this network of cracks is completed, fairly large areas of metal loosen and tear or melt out of the bearing with damaging results.

Further work showed that if an extremely thin layer of bearing material were employed, incipient fatigue cracks no longer developed. Moreover, if radial cracks did develop under certain conditions, there was no opportunity for the development of the connecting circumferential cracks responsible for the tearing out of chunks of the bearing material.

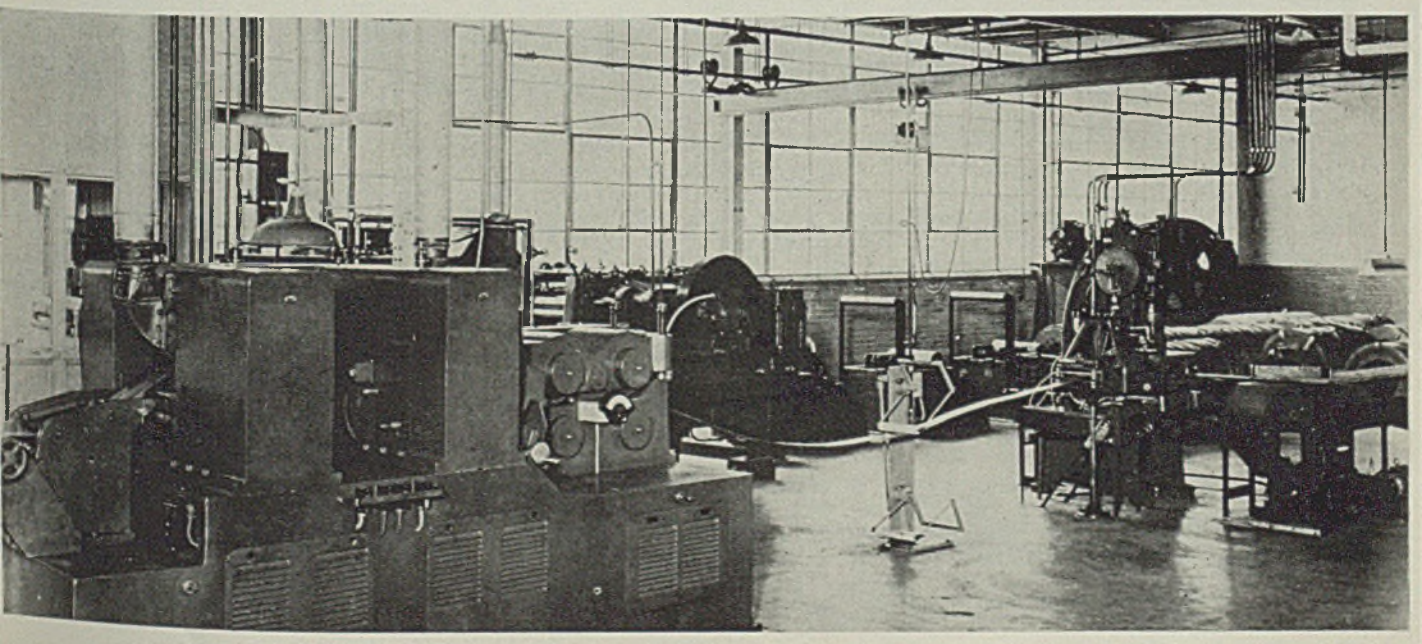
Bonding: Obviously some difficulty can be anticipated in bonding and securing permanently an extremely thin layer of babbitt. Here enters the "matrix" which plays such a vital part in the new bearing. This matrix consists of a mixture of pure powders of copper and nickel in the proportions of 60 per cent copper, 40 per cent nickel. This powder coating is applied under accurately controlled conditions, then "sintered" by subjecting to a temperature of 2000 degrees Fahr. in a special electric furnace.

The practical effect of this treatment is to produce a durable bonding of the matrix to the steel back—an actual chemical bond which becomes a part of the steel strip. The powder particles are fused to the steel, becoming a strong sponge-like structure containing myriads of interlaced pores or voids and hook-like ends which the babbitt impregnates while in the molten state. Fig. 1 shows clearly how the babbitt fills all of the voids and pores in the matrix.

(*Please turn to Page* 78)

Fig. 3. (Upper right)—After sintering and compressing matrix, strip passes through 3-stage babbitting machine from left to right in this diagram. Thickness sizing station at extreme right

Fig. 4. (Below)—Final stage on second process line. Milling machine at extreme left has conventional down-cut tools in first stage, climb-cutting cutters for second stage. Blanking press at extreme right



Handling for Welding

Low-cost high-quality work dependent upon proper handling equipment. Overhead and jib cranes supplemented by positioners essential. Caster tables at shear found valuable

By HAROLD LAWRENCE

ALTHOUGH a good many years have passed since some 2,300,000 limestone blocks of 2½ tons each were assembled by manual effort to form the great pyramid, there is still too much archaic thought about materials handling. Proper mechanical handling can improve the overall efficiency of any welding plant to a remarkable degree.

The backbone of the materials handling system in the weldery usually is the traveling crane. Combining high speed movement of raw materials and finished products with ample lifting capacity, this unit may perform a multitude of important functions. Usually the crane starts work at the receiving end of the plant where plates and shapes are unloaded from freight cars or trucks. From this point the steel is carried to stock or to layout.

Work Delivered by Crane

Assume the crane has carried the raw steel from the gondola to the layout bench, the first point where the material must be handled for men to perform certain operations upon it. Often the steel is placed upon the floor where layout men work on hands and knees. However, this is not the best practice. Layout benches and tables at proper working level should be supplied wherever possible to eliminate cramped working positions.

From layout department, a traveling crane usually delivers the material to the torch cutting department, shears or machine shop. Where these other departments are not in a direct line with the bay through which the crane operates, narrow gage cars may be used to transport the pieces or the work may be skidded to an adjoining crane bay for transportation by a second crane.

In torch cutting, there is need for further materials handling equipment. Steel horses or supports provide many points of contact, while leaving the largest possible amount of free space for slag to drop through—quite necessary for efficient cutting.

If hose and electric cable are suspended from light overhead frames, it is posible to reduce difficulties from kinked hose and cable that always manages to interfere with the operator.

Tote Boxes Increase Efficiency

Large gas cut pieces may be handled individually by traveling crane. Small pieces may be carried a number at a time in a tote box. Large welding shops often utilize tote boxes in a wide variety of sizes and shapes to hold all classes of small parts. Use of a tote box permits the crane to carry nearly capacity loads on every trip. Thus expensive equipment is worked to best advantage.

At the shear is an opportunity to use effectively another important piece of handling apparatus, the caster table. Casters on swivel joints at the level of the shear blades will enable the shear men to handle large pieces without making the crane wait to feed the shear. Properly designed tables actually will permit the men to handle shearing with greater speed than when the crane holds the plate in front of the shear. Too, use of similar tables at discharge side of the shear makes for ease of piling for further crane lifts.

Jib cranes are found to be valuable helps throughout the entire welding shop. Often loads must be held in one position for a long time.

If the traveling crane is used for surh work, it is tied up so some sections of the shop do not receive proper crane service. For such work, the jib crane is unsurpassed. Jibs of adequate capacity can be located at strategic points in the welding and other departments to allow the welder or machine operator to position his own work as he desires. In this manner workmen are free of the temptation to lift loads by hand that are too heavy. Thus accidents often can be reduced in number and frequency.

Present plant practice dictates the welding of as many subassemblies as possible before completing the weldment. Here again, jib cranes may be used to full capacity, reserving heavier overhead cranes for final assemblies.

Oven Cars Facilitate Work

Heating furnaces for stress relieving, forging and pressing are essential units. Here efficient handling equipment will do much to permit quick, easy movement of large masses, many at high temperatures. Roller tables and refractory lined cars help here. From heating furnaces to forging hammers and presses, roll tables will provide simple and effective conveyance. Reduction of operator fatigue and lessening of overheating from the heavy manual work of moving hot bulky objects quickly pays for the small cost of power-driven roller tables. For stress relieving of completed units, oven cars appear the best solution although some shops use furnaces with removable roofs or ends. Type of product influences the choice somewhat. Large weldments most always involve car-type ovens.

Often, vessels are removed from the heating furnace while they are red hot. Here ingenious crane hooks may be attached to the vessel so a crane may carry it to a point where it may be cooled in still air. Similarly, some stainless steel assemblies are removed from the furnace hot and either sprayed with water for annealing or if of

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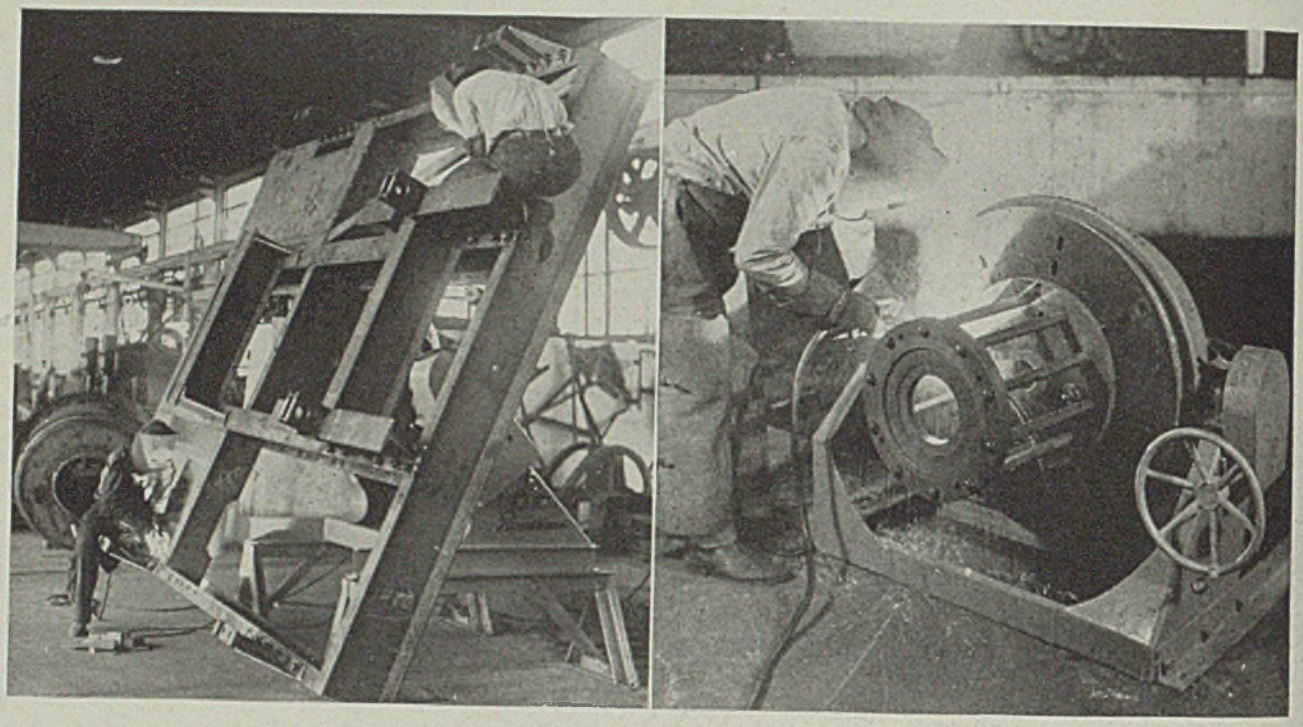

Left, positioner may handle large work by supporting unit from floor as shown here. Right, positioner is especially helpful in welding circular or cylindrical objects. Courtesy Ransome Concrete Machinery Co., Dunellen, N. J.

thin section, allowed to cool in air.

All these handling devices have been found helpful as a means of increasing the efficiency of a welding plant. There is one outstanding mechanism, however, that really warms the cockles of the cost-conscious superintendent's heart more than any other. That is the positioner. Direct labor savings of from 30 to 50 per cent are every day happenings where the positioner is employed. A further material savings of 5 to 7 per cent in welding rod consumption may result.

Cuts Costs in All Directions

From the viewpoint of the designer, a stronger weld may be deposited by flat-position electrodes. Here, again, the welder may select the electrode that it the easiest to apply. Electrodes can be burned to a short stub with almost no waste. Also the work can be positioned to keep all welds at proper working height, adding to ease of controling the arc and deposited high quality metal. Resulting increased production and quality saves overhead as well as direct labor.

Improvement of weld appearance also comes about from strict attention to work positioning. Revolving turntables easily allow circular and cylindrical products to be kept in position while weld metal is being deposited. Even welds of uniform appearance keep finishing expenses to a minimum, too.

Positioning tables eliminate need for excessive crane service as they allow the welder to manipulate the work to suit his convenience without calling upon the overhead crane.

Size of part to be welded is not limited to the size of positioning platen as larger parts may overhang the table without causing any difficulty. Where extremely large parts must be positioned, the positioner may be raised some distance off the floor for most effective operation. See accompanying illustrations.

Gantries for positioning automatic welding heads are important new devices as they position the welding head over the work in addition to traversing the welding unit

(*Please turn to Page 87*)

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Improves Jetal Process To Give Deeper Color

■ By Converting the Jetal process (for applying a black, corrosion and rust-resistant finish to steel) to a 2-bath system, Hanson-Van Winkle-Munning Co., Matawan, N. J., has improved the process to such an extent that now a deeper black coating is possible, with simpler manipulation and control of the solution.

For Jetalizing, two steel tanks are required. Tank A should be kept at 280 to 290 degrees Fahr., and tank B at 305 to 315 degrees Fahr. Three water-rinsing operations are now involved, which may be carried out in one or more steel tanks. The water containing the drag-out should be used to replace evaporation losses from both Jetal tanks, but the iron in this drag-out water must be removed before it is returned to the system. This may be done either by filtration or by allowing the iron precipitate to settle and siphoning off the clear water. It is customary to use a final hot rinse to speed up the drying operation but drying in warm air is practicable.

The process can color all steels except those high in nickel and chromium.

However, cast iron and some special steels may require deviations from the routine process.

The first step of the process is to remove excess grease or oil from the work. Then the work is dipped in the alkaline rinse water containing the drag-out. In many cases, as with hardened steel surfaces, it is advisable to give the cleaned work a short dip in cold dilute acid to secure a deeper black in a shorter time.

Heavy scale or rust should be removed in a pickle. The acid dip must be followed with a water rinse before placing it in the drag-out rinse. From the drag-out rinse, the wet work is placed immediately in the Jetal B solution where it remains until the desired depth of black is obtained. This operation is followed by a rinse in the cold drag-out tank, and then with another cold rinse, and finally the hot rinse, to remove the final traces of the solution.

The time required for the Jetal dips varies with the class of work, but in general, ranges from about 2 to 5 minutes in each one of the tanks.

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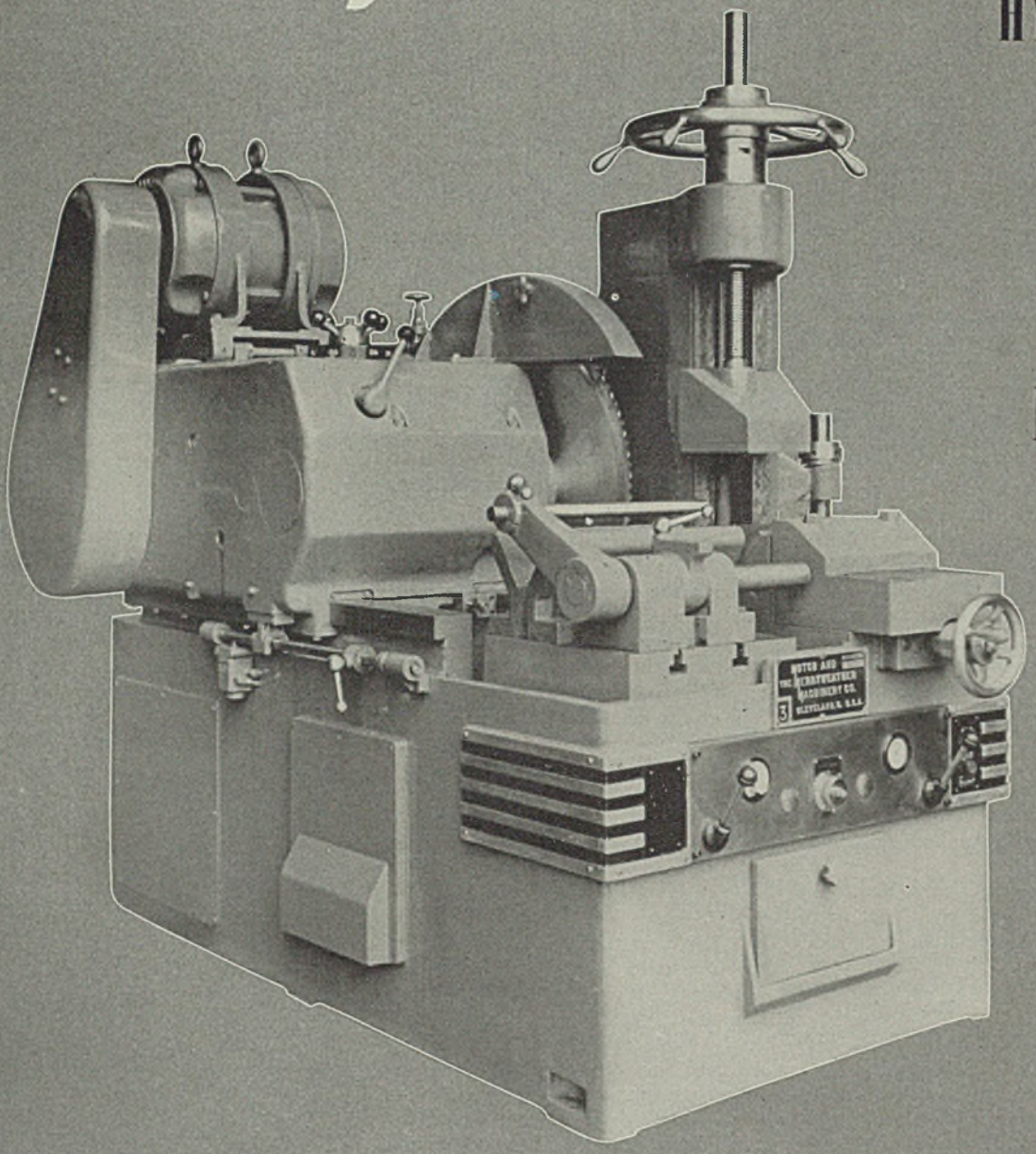

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BETWEEN HEATS WITH *Shorty*

■ Say fellers:

Down in the rail mill the other day the gang was discussin' the term "fishplate." They were havin' a heck of a time gettin' the question settled but they finally came to a conclusion that was agreeable to all concerned.

Where did they get the name of fishplate for that short flat steel bar that's used for holdin' the ends of two rails together? And they talked, 'n argued, 'n sputtered with one another over the question 'till you'da thought most anytime there would 'ave come a real blowup. But the atmosphere cleared 'way finally when one of the ol' hands 'vanced his explanation.

"You guys wanna know where the name of fishplate comes from?", asked Squinty Garvin. "Well, sir, I'll give y' my 'pinion: It 's a plate they hang outside fish markets to advertise their minnies, if y' ask me."

Quick as a wink Red Brown who tends the hot bed grabbed the beak of Squinty's cap 'n yanked 'er down over 'is eyes.

"Your all haywire," sez Red. A fishplate 's that thing they pass over the counter to y' down at the hash house on Fridays . . ."

Jus' Escapes a Duckin'

Red didn't have time to finish his explanation. The "Blitzkrieg" broke. The gang pounced on 'im, 'n down he went. "Gold fish bowl for you, son," one of 'em shouted, and they picked 'im up 'n started carryin' 'im 'cross the aisle toward the water tank over at the hydrant.

It wasn't his kickin' 'n wigglin' that saved Red from a duckin'. It was ol' Dad Harlan.

"Hey, you guys," Dad sez. "What in 'lls goin' on here? You think you're practicin' that thing they calls 'safety first?' Huh? Y' want the big boss down on your necks? Now tell me what you fellers are up to. Come on—out with 'er."

Before any of the strong-arm squad could answer, Red speaks up, 'n sez: "I was jus' givin' the boys my version of the term fishplate but I guess they misunderstood me, Dad."

"Yeh, Dad, he was tryin' to spout off somethin' 'bout a fish bein' out of water and we wanted to 'commodate 'im. He'd 'av been in the tank surer 'll if you hadn't come along."

"You guys serious, or aren't y'?" inquired ol' Dad.

"Serious as they make 'em," replied Squinty, winkin' at the rest of the bunch.

Ol' Man Had the "Dope"

"Yeh?" sez Dad. "Well then I'll tell y' somethin' you're tryin' to learn. The first fishplates were cast in the form of a fish that had been split through the middle. When they were put together they looked for all the world like a model of a fish. Can't recall who first made 'em but he patented 'em under the name of fishplate. The mills abandoned the fish-form of plate some years ago in favor of the rectangular bar now used to connect the ends of rails but retained the original name. Now y' got the story."

"Much 'bliged, Dad ol' Topper. That answers the question."

And as ol' Dad continued on his way, Squinty sez, "They don't make 'em any finer than the ol' man. Jus' when a feller needs a friend, 'long he comes 'n gives y' a lift. Tellya somethin', guys, we're goin' to miss ol' Dad one of these days when they pension 'im off. Pity we don't 'av more like 'im 'round the mill. He's one of the old school that sent many a rail 'cross that there hot bed straight as a die. An' what 's more—the ol' locomotives whizzed over them rails like nobody's business. Yes, sir, wish we 'ad more like ol' Dad in our country."

"Be modern, Squinty. Be modern, why don't y', huh? What in 'll do y' want an ol' guy like Dad struttin' 'round the mill for, when y' can get a lotta good kids out of school, rarin' to go—a lotta kids that can put more rails 'cross the hot bed than the ol' man ever thought he could. An' speakin' 'bout locomotives. Say son, there's many a young 'locomotive' waiting for 'is chance to hook on to a train load of work and he'll still be pullin' when the ol' man is stoppin' at the tank to take on water."

"Let me tell y' somethin', Red," sez one of the mill hands. "There is many an ol' locomotive puffin' her way toward the west that'll pull jus' as hard toward the east when she's uncoupled and turned 'round toward the Atlantic. Get what I mean, Red? Get me, huh? Well, Dad's one of them kind. Soft pedal that stuff you're spoutin' 'bout the ol' man. That 'fifth column' stuff belongs 'cross the water—not over here, understand?"

"Yeh, guess you're right. Guess we do need some of the advice like the ol' man passes out now 'n then. Used to 'av an ol' Dad like 'im myself who steered me right when he was livin'.

"Now you're talkin' sense, son. Y' got you're feet on the ground now. First, y' were talkin' like the poor fish we thought y' were. You'd 'av kept up you're nonsense we'd 'av ducked y' in the tank sure as 'll, son. But you're down to earth now, so let's drink out of the same dipper, put on the hand-leathers ag'in and be rarin' to go after the first rail when the mill blows up ag'in. Whatda say?"

And after they went to their stations in the mill, I picked up the same dipper out of the water pail, took a big swig, and sez to myself: "Not a bad gang to 'av runnin' your mill, huh?"

Well, so long fellers. Much obliged for your letters. I'll be seein' you.

"Shorty" Long

Develops Steel Alloy For Electric Industry

■ A nonmagnetic, free-machining alloy steel possessing low magnetic permeability with improved mechanical properties developed especially for the electrical industry is announced by Jessop Steel Co., Washington, Pa. It has a magnetic permeability of only 1.003 to 1.006 at 1000 Oersteds magnetizing force at temperatures from sub-zero to boiling.

Another desirable property of this steel is its high electrical resistance (69 to 71 microhms per centimeter) which reduces current eddy loss considerably. In the annealed condition, it has tensile strength of 80,000 to 110,000 pounds per square inch; yield point of 35,000 to 60,000 pounds; elongation in 2 inches 25 to 50 per cent; reduction of area 30 to 60 per cent. Its Izod impact value at room temperature is 80 foot-pounds.

The steel can be formed, welded, machined or blanked readily, and it can be used in numerous parts of electrical equipment.

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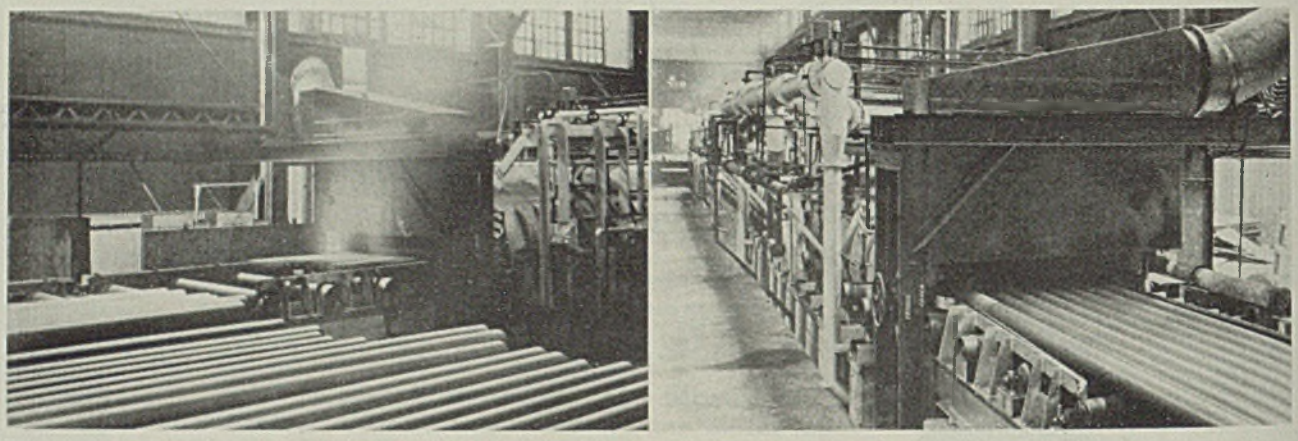
A Tubular Furnace

New type furnace, a horizontal cylinder, affords great uniformity of heating over temperature range sufficiently large to encompass normalizing as well as tempering work



Left, discharge end of new tubular furnace. Right, entrance end of same unit

By JOHN H. LOUX
Engineer
Salem Engineering Co.
Salem, O.

■ A RECENT development is a new and improved type of tubular furnace used for normalizing up to 1750 degrees Fahr., and for drawing at temperatures as low as 800 degrees Fahr. It handles steel pipe from 2 to 14 inches in diameter. An outstanding feature is that the furnace is capable of holding the same close temperature uniformity at both the lower and higher temperatures.

The furnace makes use of a driven roller hearth and all bearings are air cooled. In the past, the large majority of furnaces for this work have been designed using the standard vertical walls and sprung arch construction. Difficulty has been experienced with this type of furnace in maintaining temperature uniformity, particularly at the lower temperatures. It is seldom that such furnaces can be used satisfactorily for both normalizing and drawing.

Actual operating practice of the tubular furnace indicates that the gases swirling in the tubular chamber are responsible for the excellent uniformity found during the drawing treatment. The contour of the heating chamber eliminates difficulties previously encountered in operating rectangular furnaces at low temperatures. It is obvious that this improvement carries over into the normalizing treatment as well.

The furnace is a horizontal cylinder. The circular shell requires no buckstays yet has superior strength. The lining is held rigidly in place due to the circular construction.

Burners are placed both above and below the driven alloy rollers. They fire tangentially into the chamber, thus providing the swirling action of gases that has proved so desireable and advantageous. Lower burners fire into a specially designed combustion chamber which serves a double purpose: It protects the alloy rollers from direct flame impingement and, by virtue of its design, prevents localized heating of material passing through the furnace.

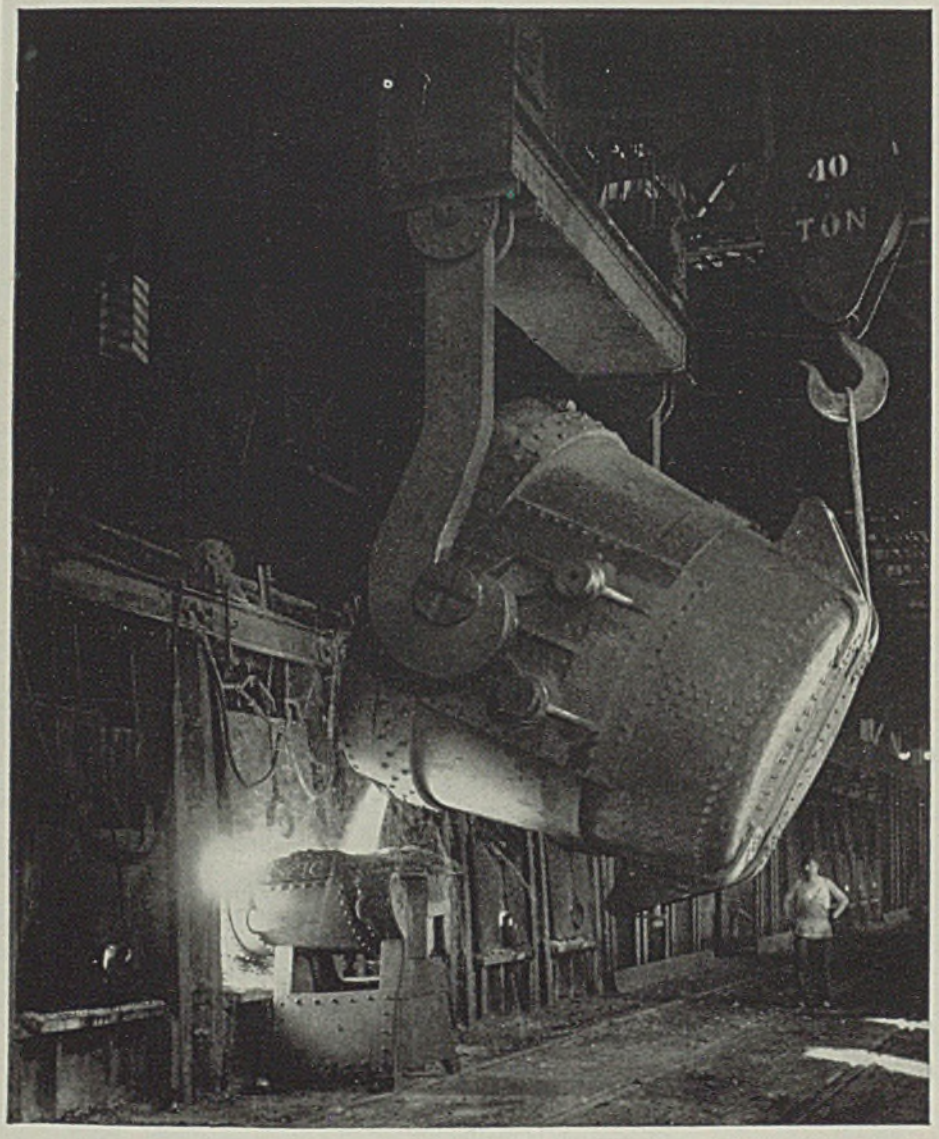
Heating rates have been considerably increased over past practice, and this is attributed to the fact that the hot gases circulate around and around the material a great many times before leaving the heating chamber.

Fuel economy appears to be excellent and initial tests showed a consumption of 750 cubic feet of natural gas per ton when normalizing and considerably less when drawing.

The furnace, which has a heating chamber a little over 100 feet long, is capable of handling pipe up to 14 inches in diameter. The lining is designed to permit rapid change from one type of work to another. The furnace may be raised from draw temperature to normalizing temperature in one hour. It may be lowered from normalizing temperature to drawing temperature in two hours. When lowering the temperature, cold pipe need not be put through the furnace to cool in two hours. It heats about 20 tons per hour when normalizing and around 18 tons per hour when drawing.

A 100-foot long roller table is provided at each end of the furnace

LEAVE IT TO *Experts*



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proper. Both of these tables are driven and equipped with variable speed control. All rollers outside of the furnace are made of steel pipe and are supported on a heavy framework.

Five zones of temperature control are used to bring the material up to a uniform heat. Each zone of control is equipped with an automatic recording controlling instrument which operates in conjunction with a proportioning-type gas valve.

Each zone is further equipped with an automatic air-gas ratio controller. The ratio controller actuates a valve in the air line in synchronism with the gas control valve. Therefore, a constant ratio of air to gas is maintained over all rates of firing. This ratio control can be set for any type of atmosphere desired. It is an important feature because surface conditions must be controlled with great care.

At two points along the length of the heating chamber, adjustable dampers are provided so a definite temperature difference can be maintained on each side of these points for special annealing work. On ordinary drawing and normalizing treatments, these dampers are merely locked in place and remain so during that particular run of the material.

The furnace lining consists of a light weight refractory material, backed up with high grade insulation.

Special hardburned brick are used for a short distance above the rollers to prevent gouging should a tube happen to work out of line on the roller hearth.

Although the furnace was originally designed to have a capacity of 15 tons per hour when normalizing, it has proved quite capable of heating satisfactorily 18 tons per hour while drawing, with an even greater capacity at normalizing temperature.

One of the most interesting features of the furnace is the Leeds & Northrup Ravotube used at the discharge end. The Rayotube is mounted on a moving mechanism which causes it to sweep slowly across the furnace chamber back and forth sighting first on one tube and then on another.

The temperatures of the tubes are recorded on a chart type instrument which makes a continuous record and checks immediately any slight discrepancy in the temperatures of the tubes. It has been found that so long as the tubes are kept at least 6 inches away from the walls of the furnace a highly satisfactory degree of uniformity is maintained from the center tubes to the extreme outside tubes.

This furnace, along with all auxiliary tables, drives, and temperature controls was designed and installed by the Salem Engineering Co., Salem, O. Only two men are required for its operation, one at each end of the unit. The automatic control is grouped on a panelboard where an operator can easily see at a glance the condition of the furnace throughout its entire length. Temperatures and speeds can be changed from this control location.

New Cover Increases Efficiency Of Soaking Pit Operations

■ BETTER CONTROL of ingot heating and greater economy in soaking pit operation are features of a new pit cover developed by Blaw-Knox Co., 2002 Farmers Bank building, Pittsburgh. It provides a new way of obtaining a gas-tight seal.

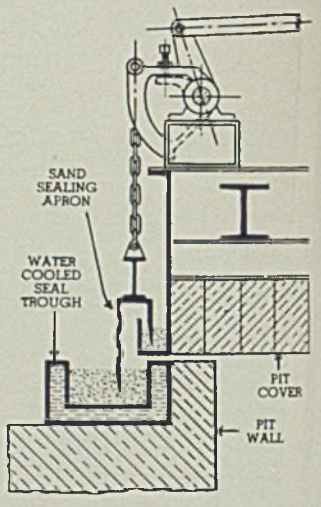
A suspended movable apron or sealing curtain around the periphery of the cover effects the seal by engaging two sand troughs. Then, instead of lifting or lowering the entire cover to make or break the sand seal, only the curtain is moved.

The sealing curtain, as shown in the sketch, is shaped like an inverted U. The legs of the U being of unequal length. The shorter of these engages a sand seal in a portion of the lower edge of the main frame of the cover itself while the longer leg engages a sand seal in a water cooled trough mounted on top of the pit walls. The seal in the upper trough is maintained even when the curtain is raised, thereby preventing the passage of hot gases on the inside of the curtain when the cover is partially withdrawn from the hole.

Since the movement of the seal curtain requires less than 2 horsepower, the mechanism for sealing is relatively light in weight. The curtain itself weighs less than 1000 pounds.. It moves downward by gravity so any foreign material tending to prevent full lowering will not cause any stress on the sealing mechanism.

Because of the chilling effect from the water cooled trough, the sand in the seals does not cake but stays in a loose and fluid condition. This permits the curtain to penetrate the sand readily, maintaining a consistent seal. The seal also prevents leaking flame from impinging on metal parts of the cover and track girders. Warpage, often the source of much maintenance expense, is thus avoided.

The essential novelty of the pit cover is the movement for sealing is divorced from the movement of the cover. The cover is like a movable roof that rolls smoothly to cover or uncover the pit. Since it travels on horizontal rails with roller bearing axles, requiring not over 5 horsepower for the motive drive, there is little wear on the cover mechanism as well as on the sealing mechanism.



Above sketch shows details of the new pit cover

The combined movements are controlled through only one master switch.

The two motor controls are interlocked so that the seal apron can move only when the cover is positioned over the hole. The clearance between cover and top of pit walls can be set by adjusting screws.

The cover itself can be designed for the use of either suspended or crowned arch brick.

Announces Layout Dope For Tool Makers

■ A new layout dope, suitable for use by tool and die makers is announced by Tamms Silica Co., 228 North LaSalle street, Chicago. It comes in a liquid form ready for immediate use. Blue in color, it is quick drying and will not rub off.

A scribe or layout tool shows a clear, distinct line on the dope without chipping or scraping. The product is low priced, and samples are available. Also available is a new type of blue chalk for checking leaks in castings.

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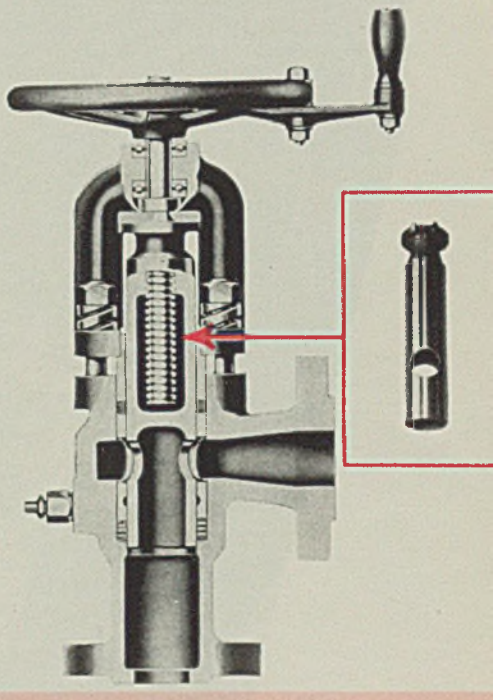

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★ *A FEW TYPICAL APPLICATIONS OF NITRALLOY* ★

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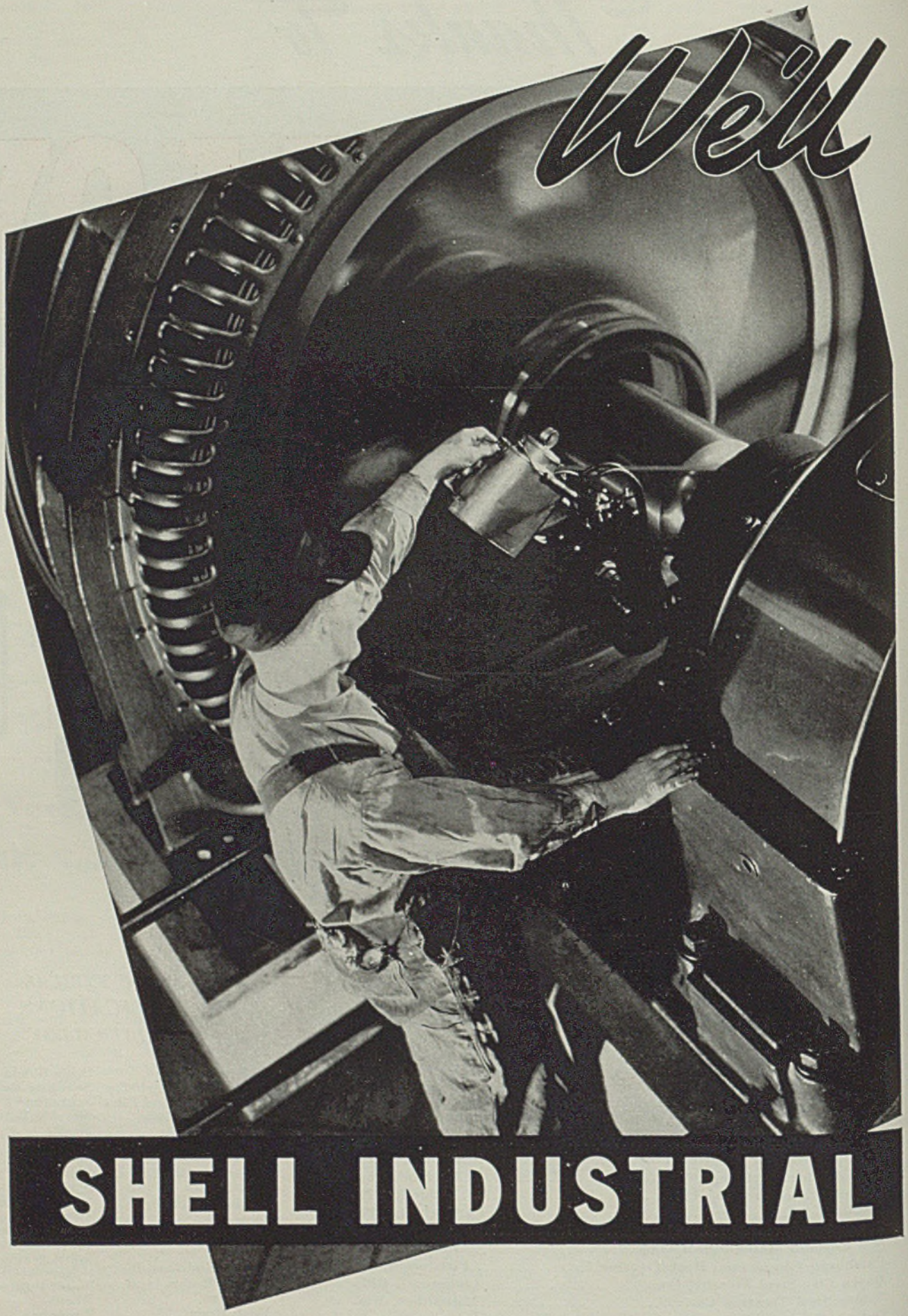
Shafts
Sockets
Spindles
Splines
Sprockets
Steering Worms
Tappets
Valve Gauges
Valve Seat Rings
Valve Stems and Sleeves
Water Pump Shafts
Worms
Wrenches
Wrist Pins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A New Heat Treatment For Gray Cast Iron

An interrupted or hot quench is found to raise tensile strength of gray cast iron from 47,500 to 75,500 p.s.i., jumps impact values from 44 to 61 foot pounds, hardness upped 120 brinell

By E. L. BARTHOLOMEW
Chief Engineer
United Shoe Machinery Corp.
Beverly, Mass.

■ INTEREST in the "austempering" of steel led to the recent discovery that application of an interrupted quench treatment is useful in improving physical and wear-resistant properties of cast iron.

In fact, there is indication that using an interrupted quench tends to produce the same acicular structure or "Bainite" but the austenite in cast iron is not fully transformed after normal holding time in the hot quenching bath. Furthermore, at room temperature the austenite is retained indefinitely until subjected to either cold work or temperatures above the quenching bath temperature. Unlike steel, the rate of cooling cast iron from the bath temperature makes no difference, the austenite still remaining.

Fig. 1 shows a typical structure resulting from the treatment. The needle-like structure is Bainite, the white structure austenite.

Fig. 2 shows the same sample after 6 months at room temperature. The heat treatment given this sample began with heating to 1550 degrees Fahr. Work was held at this temperature for 15 minutes, quenched to 510 degrees Fahr. and held at that temperature for 15 minutes. From this point, the work was cooled in air to room temperature.

Analyses of the irons used are shown in Table I.

Fig. 3 is a micrograph of the No. 53 iron as cast with a hardness of 220 brinell. Fig. 4 shows the same iron after the interrupted-quench treatment with a resulting hardness of 388 brinell.

Figs. 5, 6 and 7 show structures of the No. 53 iron resulting from various methods of cooling from the quenching temperatures. Fig. 5 shows structure resulting from standard cooling treatment in air. Fig. 6 was when cooled in asbestos, and Fig. 7 shows results of cooling in brine. From these it appears the rate of cooling from the quenching temperature has little effect on the resulting structure.

The molybdenum iron whose analysis is given in Table I was found as cast to have a hardness of 223 brinell, tensile strength of 47,500 pounds per square inch, impact strength of 44 foot pounds. When given the heat treatment outlined above, this same iron was found to have a hardness of 341 brinell, a tensile strength of 75,500 pounds per square inch and impact strength of 61 foot pounds. The physical properties thus are seen to be increased significantly.

Impact tests were made on a Charpy-type machine using an unnotched bar 1.125-inch diameter broken on 6-inch center.

The heat treated iron is readily machinable up to 300 brinell hardness. Because of the small amount of distortion, the parts can be machined before heat treatment where a hardness above 300 brinell is required.

As in the case of steel, this small amount of distortion is one of the important advantages of this heat treatment method. A 2-inch section can be treated successfully, but size is not necessarily a limitation where surface wear resistance is desired.

Recognizing the fact that austenite is plastic and also breaks down rapidly from cold work, the possibilities of the structure for wear resistant surfaces were considered. An accelerated service test was conducted to determine the comparative wearing characteristics of metal as cast, as hardened and drawn, and in the form of austenitic metal.

Three cams of the same analysis and from the same melt were set up in the machine where they ordinarily would be used and the machine run at double normal speed.

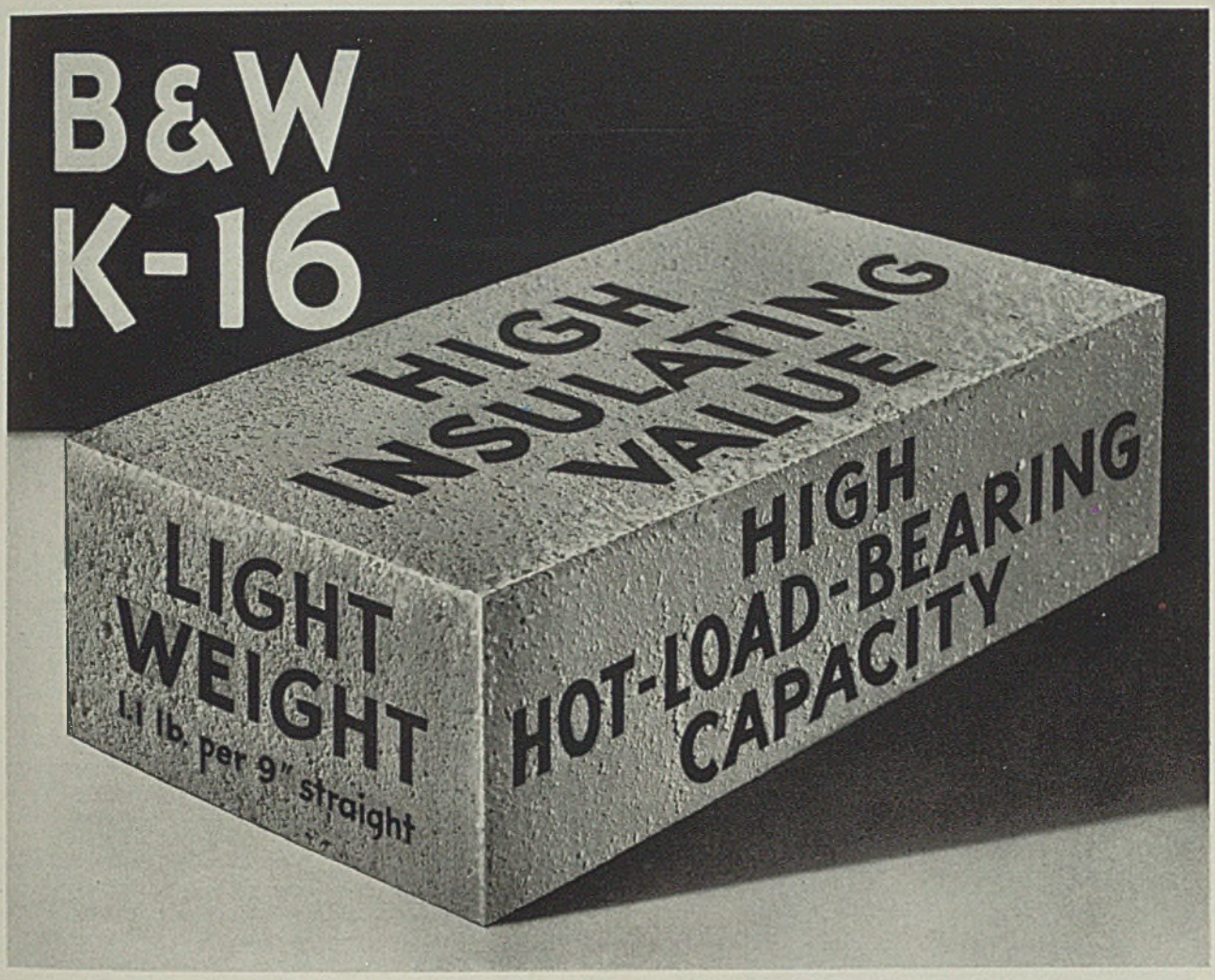
The first cam, as cast with a hardness of 228 brinell, broke down in 30 minutes. The second cam, quenched in oil and drawn to a hardness of 360 brinell, broke down in 17 hours. The third cam, which was hot quenched to a hardness of 360 brinell was run 105 hours and exhibited very little wear at the end of that run. Fig. 8 shows structure

TABLE I—Analyses of Irons Used

	No. 53	No. 54	Molybdenum Iron
	Per Cent		
Total Carbon	3.35	3.35	3.25
Silicon	1.30–1.40	1.30–1.40	1.75
Manganese	0.50–0.80	0.50–0.80	.80
Sulfur	0.13–0.15	0.13–0.15	0.10
Phosphorus	.30 max.	.30 max.	.30 max.
Nickel	2.00	1.50	....
Molybdenum	....	....	.50
Chrome	....	0.50	....

TABLE II—Surface Endurance Tests

Safe Applied Load in Lbs.	Condition of Iron	Hardness
1000	As cast	230 BHN
2000	Oil quenched	300 BHN
3000	Hot quenched	300 BHN
With 9% slip		
1200	As cast	190 BHN
2000	Hot quenched	280 BHN



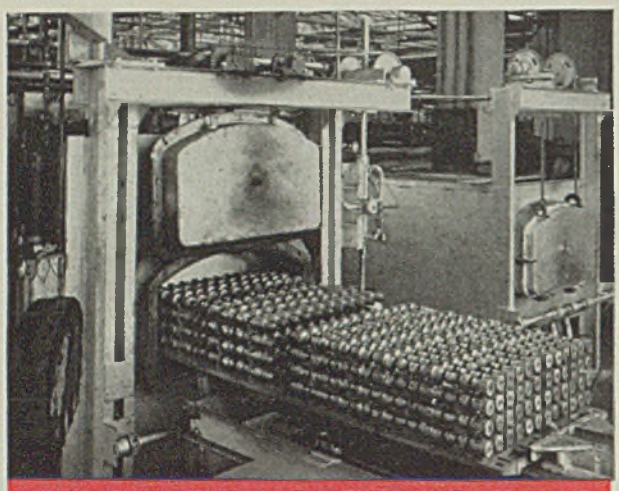
In a single light-weight refractory insulator, B&W K-16 Insulating Firebrick combine all the properties shown above. For direct exposure to 1600 F., and for backing up where interface temperatures do not exceed 2000 F., these brick assure exceptional economy in furnace operation and maintenance.

Moreover, the low density and low thermal conductivity of B&W K-16's make possible the construction of thinner and lighter walls, without loss of thermal efficiency. The heat-storage capacity of furnaces is thus reduced to the minimum, resulting in appreciable fuel savings, flexible control of furnace temperatures, and increased productive capacity.

Write for Bulletin R-18, which describes B&W K-16 Insulating Firebrick in detail. R-111

The Babcock & Wilcox Company . . . . . *Refractories Division* . . . . . 85 Liberty Street, New York, N. Y.

BABCOCK & WILCOX



Carburizing camshafts in a modern automobile plant.

Fabrication by welding.

featuring

NATIONAL METAL EXPOSITION

CLEVELAND PUBLIC AUDITORIUM, OCTOBER 21-25

PARTICIPATING SOCIETIES

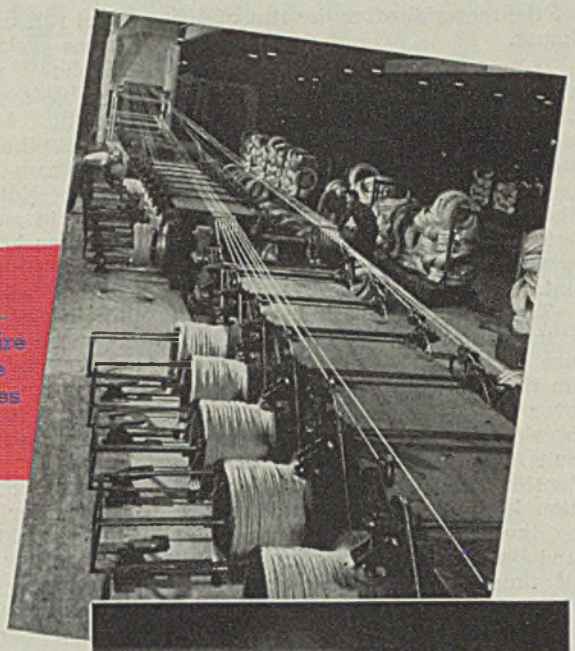
American Society for Metals
Wire Association
Institute of Metals Division, A.I.M.E.
Iron and Steel Division, A.I.M.E.
American Welding Society

Metal Show Issue

OCTOBER 14, 1940

Studying metal structure microscopically.

Electro-galvanizing wire at the rate of 578 miles per day.



Open-hearth pouring.

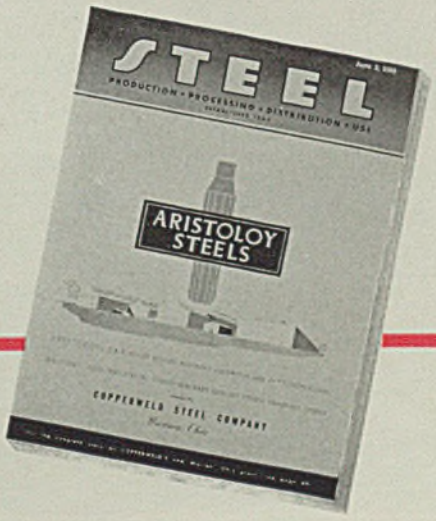
■ The latest methods, materials, equipment and metals will be on display when the twenty-second National Metal Congress and Exposition is in session at the Public Auditorium, Cleveland, Oct. 21 through 25. The papers presented at the business sessions will reflect the best thinking and most exhaustive research done over the past year. This is truly the "metal man's" greatest opportunity for an interchange of ideas and to learn of the latest developments.

Following its usual custom, STEEL will devote a large part of the October 14 issue to the same interests as the various societies participating in the National Metal Congress. This issue, dated just a week prior to the opening of the show, will carry complete advance details so that you can lay your plans as to the papers you wish to hear, the things you wish to see and the booths you would like to visit.

Our October 14 issue will contain a combined advertising and editorial insert section printed in two colors on special coated stock. This insert section will carry the complete program and list of exhibitors. In addition, it will feature pertinent comments by men known and respected throughout the industry. It will have a profusely illustrated section depicting the progress and achievements of the past year.

The advertising pages will inform you of the newest money saving equipment; of better methods; of improved materials and metals. If you attend the show, STEEL'S October 14 issue will help you to profitably plan your time. If you can't attend, this issue will bring the show to you.

Companies supplying equipment, materials, methods or metals are invited to write for information relative to advertising possibilities.



STEEL

PRODUCTION . PROCESSING . DISTRIBUTION . USE

ESTABLISHED 1882

Penton Building Cleveland, Ohio

of the material after the run of 105 hours.

It is felt that the excellent wear resistance properties indicated by this test may be attributed to the combination of austenite and Bainite. Where austenite is produced in conjunction with martensite and then the austenite is broken down into martensite by cold work, the wearing qualities are not so apparent.

The mechanism of inducing wear resistance is furthered by the actual use of the part. As work is done on the surface of the cam or whatever the part may be, the austenite breaks down on the surface to result in a combination layer of martensite and Bainite. This combination layer is cushioned underneath by the core of unworked austenite and Bainite. If wear over a period of time acts to r e m o v e a portion of the surface, the austenite breaks down further into the section and hence lengthens the wearing life of the part.

Surface endurance tests carried out by Professor Buckingham of Massachusetts Institute of Technology afford a more quantitative indication of the wearing properties of the hot-quenched iron. In these tests, samples in the form of rolls were mated with a hardened alloy steel roll under various loads and a stress cycle curve developed. Table II shows values of safe loads on the basis of 10,000,000 cycles with no slip. It indicates more quantitatively the same results as the practical cam service tests described above. Note the important improvement in safe applied load for the hot-quenched metal.

There appear to be many practical applications for parts heat treated by this method. A few of them include cams, gears, wiping plates, clutch disks, cylinder liners, piston rings, planer and lathe ways, bearings, etc. Already most of the above mentioned parts are giving satisfactory service in actual use.

Research in the development of S curves for cast iron is being conducted at Massachusetts Institute of Technology and at the University of Wisconsin. Some work has been done at the University of Michigan.

Dilatometer work has been carried out by Stanley Rockwell of Hartford, Conn. and P. R. Kosting of the Watertown arsenal. The damping capacity of the hot quenched iron and other work has been studied by Climax Molybdenum Co., 500 Fifth avenue, New York. This study shows that no appreciable change has taken place in the damping capacity of the cast iron because of the hot-quench method.

Much research work still remains to be done with cast iron. As this progresses, it is expected that the working properties of cast iron will be found capable of considerable improvement over those obtainable at present.

•

Punch Set Transfers Drill Holes Readily

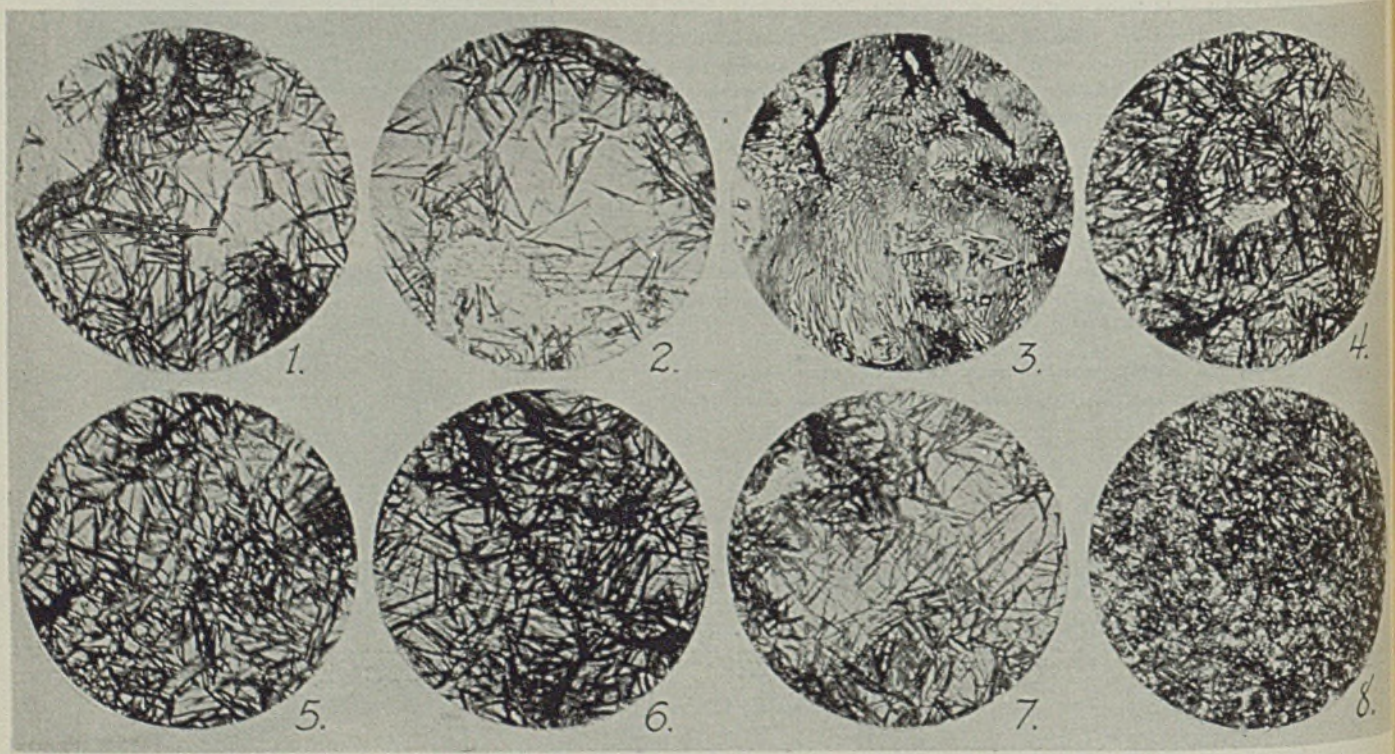
■ A new method for transferring screw and stud holes as well as blind drill holes from a drilled surface to another that is to be drilled in duplicate is made possible by transfer screw and punch sets announced by Nielson Tool & Die Co., Berkley, Mich.

The layout punches are made to transfer drill holes through a drilled section in diameters from 17/64 to 59/64-inch. They are made with a case hardened tip that is removable for replacement. In using one of these punches, it is inserted through the drilled hole to be duplicated and then struck a solid blow on its head. The blow transfers both drill center and drill circle. The latter are capable of penetrating steel to a depth of 0.010-inch.

The transfer screw incorporates a shoulder support of uniform height, enabling original blind screw holes of various sizes to be transferred in the same plane at one impression. It is inserted in the hole to be transferred, tightened and likewise struck a solid blow, recording the true center.

Left to right, top row. Fig. 1—Typical structure resulting from an interrupted quench. Fig. 2—Same sample but after six months at room temperature. Fig. 3—Micrograph of the No. 53 iron as cast—hardness 220 brinell. Fig. 4—No. 53 iron after interrupted quench—hardness 388

Second row. Fig. 5—No. 53 iron, air cooled from quenching temperature. Fig. 6—Same but cooled in asbestos. Fig. 7—Same but cooled in brine. Fig. 8—Structure of third test cam (hot quenched to 360 brinell) after test run of 105 hours



Advertisement

AUGUST, 1940

COPPER ALLOY BULLETIN

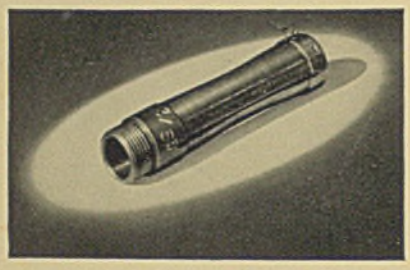
REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

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

Duronze Feed Fingers Decrease Scratching

Less tendency to scratch the stock is an outstanding advantage of Duronze* I feed fingers for automatic screw machines, according to Henderson Manufacturing Company, which makes feed fingers from Duronze I rod.

It has been found, moreover, that the Duronze feed fingers are equal in wear resistance to feed fingers made from conventional materials.



Duronze I is one of the group of high-strength silicon bronzes manufactured by Bridgeport Brass Company. All of the alloys in this group are characterized by high tensile strength and resistance to severely corrosive conditions.

Bronze Welding Best For Joining Cast Iron

Bronze welding of cast iron has important advantages that result from the low temperatures required, it was pointed out in a paper recently presented before a section of the Institute of British Foundrymen.

Cast iron, during the cooling process, undergoes phase transformations at definite temperatures. These phases have different densities, and the transformation consequently is accompanied by a change in volume that is entirely distinct from normal thermal contraction. The rate of cooling determines whether the phase change is partial or complete. In welding methods that require high temperatures, it is essential that the rate of cooling after welding should be the same as the rate of cooling of the original casting. These cooling conditions cannot be obtained in practice, with the result that some part of the casting after welding will frequently have a volume different from the original.

This difficulty is eliminated, it was said, by bronze welding, because the critical temperatures are unlikely to be reached. Another advantage of bronze welding is the ease with which it can be employed in the repairing of broken cast iron parts.

Bridgeport will gladly give readers further information on the use of bronze rods in welding cast iron.

Tensile Strength of Copper Alloys Opens Many Fields of Application

Ease of Fabrication of Strong Alloys is Factor In Broadening Range of Engineering Usefulness

Because of the astonishingly rapid succession of new inventions and developments that have occurred in the last few generations, it is very easy to discount the properties of everyday materials such as copper and its alloys. What is there about copper, bronze and brass which has exerted such a powerful influence on the development of civilization?

When, a hundred centuries ago, the Stone Age man discovered the superiority of copper over stone for making weapons, then tools, utensils and ornaments, he held in his hands the key which was to open the door to modern civilization.

Early metal workers soon learned how to hammer and then roll sheets which were beaten and later spun and drawn into utensils and other copper articles. As manufacturing developed, the uses of copper, brass and bronze became more diversified, and these metals took their place in building construction as roofing, boat sheathing and piping materials. With the development of electricity, copper was quickly adopted because of its high electrical conductivity and good mechanical properties. However, the fact must not be overlooked that copper and its alloys are *strong* materials.

In the table below, giving comparative tensile strength of copper and other materials, it will be noted that copper alloys stand very high among engineering materials. Furthermore, during the last decade intensive research has brought about the development of the silicon bronzes sold by Bridgeport under the trade name "Duronze Alloys" which range from 45,000 to 85,000 lbs. per sq. in. in the annealed state to over 100,000 lbs. per sq. in. in the cold drawn or rolled condition. Here is a series of remarkable corrosion-resisting alloys which vie with carbon steels in tensile strength.

Particularly interesting to the fabricator is the broad range of physical properties—strength, ductility, toughness, corrosion resistance, easy workability and lasting qualities—which is covered by the copper alloys. A selection of the proper alloy, temper, and surface may most economically meet the service requirements of his product. Bridgeport metallurgists will be glad to cooperate with fabricators interested in the use of brass, bronze, copper, or Duronze in place of present materials which are not entirely satisfactory. This cooperation, an important aspect of Bridgeport's service to industry, is available to Bridgeport customers.

Material	*Average Tensile Strength, Lbs./Sq. In.*
Aluminum	10-25,000
Aluminum Alloys	20-65,000
High Brass Sheet	
Annealed	45,000
4 Nos. B & S Hard	87,000
Copper Sheet	
Annealed	36,000
4 Nos. B & S Hard	60,000
Duronze I Rod	
Annealed	43,000
Hard	90,000
Duronze II Sheet	
Annealed	55,000
4 Nos. B & S Hard	92,000
Duronze III Rod	
Annealed	85,000
Hard	95,000
Duronze V Rod	
Annealed	42,000
Hard	90,000
Lead	3,000
Magnesium Alloys	25-40,000
Monel	
Annealed	70,000
Monel	
Hard Rolled or Drawn	100-125,000
Phosphor Bronze Sheet	
95-5 Annealed	50,000
95-5 4 Nos. B & S Hard	82,000
92-8 Annealed	60,000
92-8 4 Nos. B & S Hard	92,800
Steel, Low Carbon	
Annealed	45,000
Drawn	70,000
Steel, Stainless (18-8)	
Annealed	80-90,000
Cold Rolled	100-180,000
Steel, Structural	62,000
Wrought Iron	48,000
Zinc Die Castings	35-48,000
OTHER MATERIALS	
Bricks (best hard)	400
Concrete, Portland	400
Plastics	
Phenolic	4,500-12,000
Cellulose Acetate	3,000-4,000
Urea Compounds	4,000-7,000
Hard Rubber	4,000-8,000

ALLOYS OF COPPER

This is the fourteenth of a series of articles on the properties and applications of the copper alloys, and begins the subject of Muntz Metal.

MUNTZ METAL

The term Muntz Metal is frequently used to designate the group of copper-zinc base alloys containing about 60% copper. Actually, however, only the alloy containing simply copper and zinc in that ratio should be regarded as true Muntz Metal. When other elements are present in addition to copper and zinc, the alloy is a modification of Muntz Metal.

Early Applications

Muntz Metal originally came into use in England as a sheathing for wooden boats at and below the water line. Its use for this purpose has decreased with the decreased use of wooden vessels. Moreover, the modifications that have been made in the alloy to improve it have resulted in a decreased use of true Muntz Metal.

One of the reasons for the adoption of Muntz Metal for sheathing boats was the ease with which it could be fabricated in large plates by hot rolling. This ease of hot working has been an important factor in the application of the alloy to other uses.

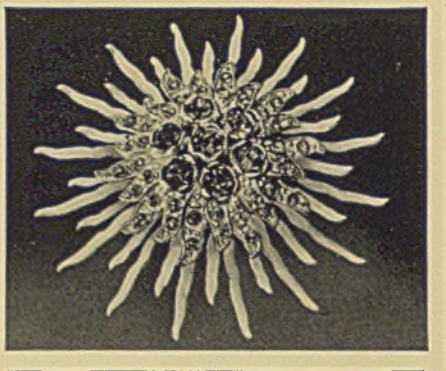
Hot Working Properties

Because of its copper content, Muntz Metal is a two-phase alloy under most of the conditions encountered in commercial processing. The two solid phases, alpha and beta, differ from each other particularly in their relative hardness and plasticity. At room temperatures beta is considerably harder than alpha. At elevated temperatures, however, beta is softer and more plastic than alpha. In addition to the difference in properties of the two phases, there is also an increase in the amount of the beta phase as the temperature is increased. These two facts combine to produce an alloy that has excellent hot working properties, but is somewhat harder and less ductile at room temperatures than most of the commercial copper-zinc alloys. Most of the applications of Muntz Metal are the result of ease of hot working, combined with the low cost of the alloy.

The subject of Muntz Metal will be concluded in next month's issue, with special reference to the physical properties of the alloy and its resistance to various types of failure.

Brass is Adaptable To Intricate Jobs

The readiness with which brass can be adapted to the production of complex shapes is indicated by its wide use in jewelry manufacture, where many jobs are exceptionally intricate. The pin illustrated represents an unusual stamping, cutting, and forming job, made from Bridgeport brass.



Memos on Brass—No. 12

Where quantity production justifies the cost of special tools, brass forging rod offers opportunities for the fabrication of parts having excellent physical properties. In general, hot forgings are more than twice as strong as castings, freer from porosity, more precise in dimensions, have a smooth, clean surface.

Brass and Copper Tubes Shield Insulated Wire

The shielding of insulated wire to prevent inductive coupling in electronic equipment is a novel use of brass and copper tubing.

The shielded wire, which is made by Precision Tube Co. of Philadelphia, and known as Metal Shielded Wire, has many other advantages which may suggest its use in other fields than electronic design. The tubing serves to protect the insulation from the deteriorating effects of acids, alkalis, and solvents, and furnishes mechanical protection as well. The shielding provides additional stiffness, yet the ductility of brass and copper makes it possible to bend the wire on extremely short radii for intricate wiring jobs.

NEW DEVELOPMENTS

A new composition for buffing and coloring is said to make it possible to produce a high lustre. It is reported that the composition contains no free grease, thus eliminating the need of scrubbing or excessive cleaning. (No. 70)

A testing service has been established to make time and method studies of polishing and buffing operations, it is reported. Recommendations on samples submitted to the testing laboratory are made without charge, it is said. (No. 71)

A portable cutting machine is reported to be suitable for sheet metal up to 3/32" thick. Machine has an abrasive wheel 8" in diameter, is driven by a 1/3 HP motor. Total weight is said to be 71 pounds. (No. 72)

Plating solutions are analyzed by a new laboratory service, and an airmail report is furnished, according to a recent announcement. It is said that a 4-ounce sample is required. (No. 73)

Rubber putty is said to be satisfactory for use in connection with equipment for pickling, cleaning, electroplating, and similar operations. Putty is said to adhere strongly to wood, glass, or steel, to produce air-tight and water-tight seals, and to resist the action of many gases and fumes that destroy ordinary putty. (No. 74)

A masking tape offers opportunities for obtaining clean, sharp edges on products that are to be lacquered in certain portions. The tape is said to give instant adhesion, and to be highly resistant to paints, lacquers, and solvents. (No. 75)

New filters for plating solutions are said to represent an entirely new approach, and to handle as large a volume of solution as conventional filters of a much larger size. It is also said that the new filters offer ultra-fine filtration and superior clarification. (No. 76)

A new band saw is provided with a work feed that allows the curvature of the cut to be controlled by mechanical means, eliminating the necessity for guiding the work by hand, according to the manufacturer. (No. 77)

A portable Brinell tester is said to weigh only 26 pounds, yet is capable of doing practically any testing that can be done on a standard Brinell machine. Machine, it is claimed, can be operated in any position, can be conveniently transported to work that is difficult to move to a standard machine. (No. 78)

Hose couplings of cast bronze are said to be suitable for quick connection and disconnection in lines carrying air, gas, steam, or water. Couplings are said to lock on a quarter-turn, and to be so designed that they will not open accidentally. (No. 79)

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.

Forging Presses Are Designed for Uninterrupted Flowing of Metal

■ STUDIES and experiments by engineers of the National Machinery Co., Tiffin, O., on the fundamentals of metalworking involved in the forging process, have influenced the design of a new line of forging presses developed by this company. These presses are designed to increase production by reducing to a minimum the number of blows required per forging, incidentally increasing die life by cutting down the time during which the hot metal is in contact with the dies.

Among the important conclusions which these engineers reached through their experiments and through experience with older types of forging machines was that the best results are obtained in die forging by continuing the "flow" of the metal uninterruptedly until each die impression is filled completely. In other words, once it is started, the metal should be kept moving steadily just as long as possible.

Under such conditions the maximum of molecular heating effect is attained which means that the stock flows into the die impressions under a minimum amount of unit pressure.

Once the flow of the metal is allowed to stop, it almost immediately "sets", whereupon greatly increased amount of unit pressure is then required to start it flowing again.

To make possible the required high speed of operation coupled with steady—rather than intermittent—metal flow, two things were found necessary. One was a reduction in the amount of dead weight in the moving parts which must be stopped and started. The other was greatly increased rigidity in the structure of the press as a whole.

Drive Clutch Changed

The first requirements were met primarily by locating the drive clutch on the cam shaft instead of on the back gear shaft. An air cylinder working on the up stroke further assists in quick, shockless stopping—at the same time providing compressed air for operating the clutch. The press shown in Fig. 1, which is the equivalent of a 5000-pound steam hammer or a 6500-pound board drop hammer, operates at a speed of 80 strokes per minute.

To meet the requirement for maximum stiffness and rigidity, a massive, "straight line" steel frame is used. This is further strengthened to resist stretch and deflection by a set of four steel tie bars of unusually large diameter which extend through the corners of the frame from top to base. The bottom die rests on a patented double wedge support which provides for exact vertical adjustment but which gives absolutely solid support for the die under the enormous forging pressures which are employed.

The extreme rigidity of these new presses and the solidarity of their accurately adjustable die mounting makes it practical to bring the moving die to extreme bottom position at each stroke without any impact.

Therefore perfect matching of dies is easy and permanent; only one blow per die impression is necessary; and the amount of flash is reduced. At the same time it is entirely feasible to use insert dies such as are shown in Fig. 2. This makes it possible to use the finest quality of steel in the working portions of the dies without running up unduly the cost of the die set as a whole. Incidentally, no special skill is required of the operators of these presses.

Fig. 2 is a close-up of the setup in one of these new presses for the two-at-a-time forging of front steering spindles from prepared blanks. This is a three-impression die, one blow only being required at each stage. There are knockout pins both in the bottom and top dies which instantly free the work on the up stroke, thus insuring its quick transfer and minimizing the heating of dies. It will be seen from the sample of work in the foreground of Fig. 2 that the lugs on the forgings have been completely filled out.

These new high-speed presses are built in six sizes corresponding in forging power to 800, 1200, 2000, 3500, 5000 and 6500-pound board drop hammers. Operating speeds range from 130 strokes for No. 1½, which is the smallest one, to 80 strokes per minute on No. 6, which is the machine illustrated at the bottom of the page.

This No. 6 press weighs 300,000 pounds and has ram face area of 42 by 42 inches.

Fig. 1—This powerful forging press is capable of unusually high speed, primarily because clutch is on its camshaft instead of being on the back gear shaft

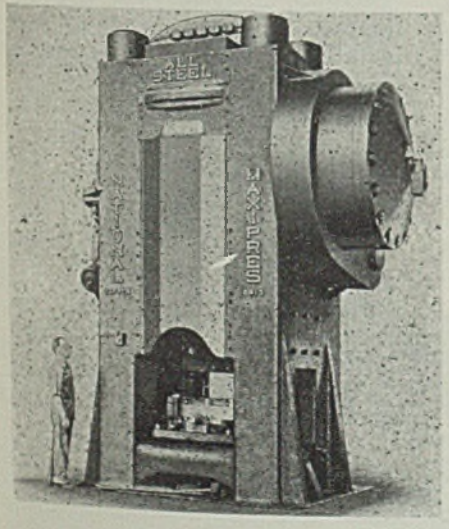
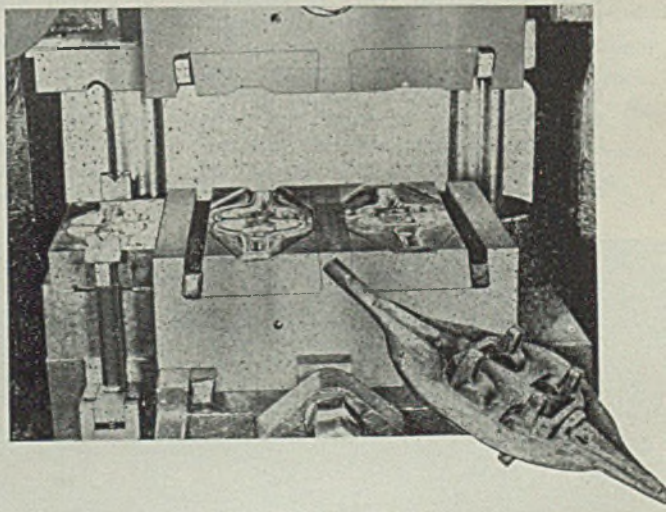


Fig. 2—With press running at 80 strokes per minute, two at a time, forging of front steering spindles from prepared blank is accomplished in three blows—one at each stage of this three-impression insert-type die



3 Per Cent Chromium Molybdenum Alloy Steel

. . . exhibits outstanding combination of strength, hardness and toughness. High impact strength and absence of mass effect also important. Wide European acceptance contrasts with meager use here

■ LARGE foreign orders over the past several months have focused increasing attention upon a chromium-molybdenum steel which has encountered fairly wide acceptance abroad but comparatively little application so far in this country.

This steel, analyzing approximately 3.0 per cent chromium and 0.50 per cent molybdenum, is reported to be exceptionally versatile from the standpoint of properties and applications. It has been used for some time in castings in this country but is said to be well adapted to use in wrought form.

More than 10 years ago, as a result of extensive laboratory investigations, an open hearth heat of a steel containing approximately 3 per cent chromium and 0.3 per cent carbon was rolled into rails and laid in the track of a number of railroads. The combination of strength, hardness, and toughness of these rails in the as-rolled condition led to the belief that they would give exceptional results in service. This belief has been fully confirmed by the results of test installations.

Castings of the 3 per cent chromium composition, in either the as-cast condition or after a relatively simple heat treatment, have been used for several years in substantial tonnage for applications requiring good wear resistance coupled with considerable strength and toughness. The physical properties of these steels warrant their use in cases requiring special wear resistance. With the introduction of molybdenum more or less generally in the steel industry, and with the specific developments of chromium-molybdenum steels for still tubes containing about 2.0 to 6.0 per cent chromium, there developed considerable interest in the 3 per cent chromium steels as modified by molybdenum, especially in Europe.

Used in England

In 1938, the 3 per cent chromium, 0.50 per cent molybdenum steels for engineering purposes had taken hold both in England and in Germany. At that time one of the British aircraft manufacturers standardized on this steel for connecting rods and crakshafts and the Germans were reported to be using it extensively in plates. A special analysis of locomotive drive pins in Austria and Czechoslovakia was reported at that time to contain 3 per cent chromium, 0.3 per cent molybdenum, 0.1 per cent vanadium and 0.2 per cent carbon.

In 1939 more than half of the steel used in England in certain special plates, forgings and the like was made of this analysis. Aircraft engine cylinders were added to the list of applications and representatives of the various steel companies quoted strength and impact values of a very high order as shown in Table I.

While no difficulty is experienced in making this steel, very definite procedures must be followed to obtain the high impact values. The steel for large forgings is regularly made in England in the acid open hearth. Smaller heats are made in the basic electric furnace. It is understood that one steel company in the United States has carried out some experimentation with similar good results.

A prominent American aircraft engine manufacturer, on the basis of these European reports, has run experiments on 4 per cent chromium, 0.5 per cent molybdenum steel in both the 0.10 and 0.30 per cent carbon grades, the former as carburized. Uniformity of carburization appeared excellent and the properties after heat treatment were better than those obtained in some steels now being used, particularly with respect to impact.

Tables II and III from "Special Steels and Their Application to Engineering and Shipbuilding," by T. Swinden published by The North East Coast Institution of Engineers and Shipbuilders, 1938, show the practical absence of mass effect. Table II is for a low carbon steel analyzing 0.22 per cent carbon, 0.50 manganese, 3.16 chromium, 0.55 molybdenum, grain size, 8, sections oil hardened from 1650 degrees Fahr. Table III is for a medium carbon steel analyzing 0.29 per cent carbon, 0.55 manganese, 3.14 chromium, 0.62 molybdenum, grain size 8, oil hardened from 1650 degrees Fahr.

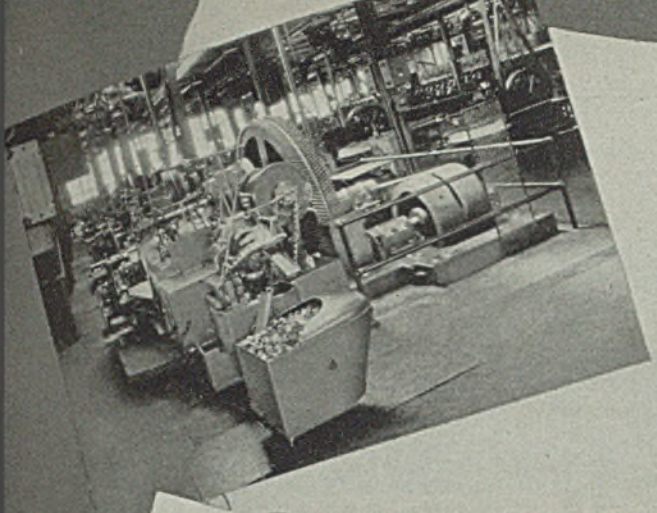
H. H. Burton in an article entitled, "Steels for Power Plants," in Metallurgia, July 1939, recommends for pressure vessels a steel having the following analysis: Carbon, 0.22 to 0.28 per cent; manganese, 0.40 to 0.60; chromium, 3.0 to

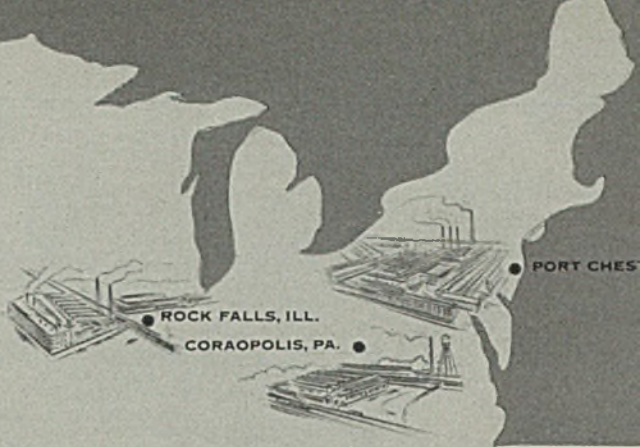
TABLE I—Strength and Impact

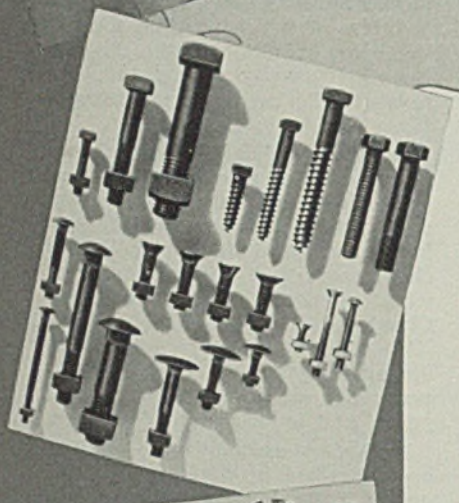
Ult. Strength lbs. per sq. in.	Minimum Impact Specified ft.-lbs. Izod	Impact Actual
150,000	40	80
190,000	35	40
240,000	15	25

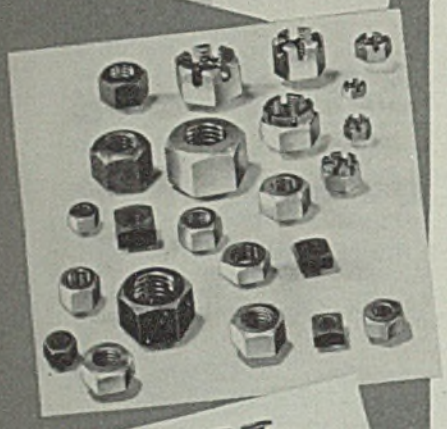
TABLE IV—Values at 680 Degrees Fahr.

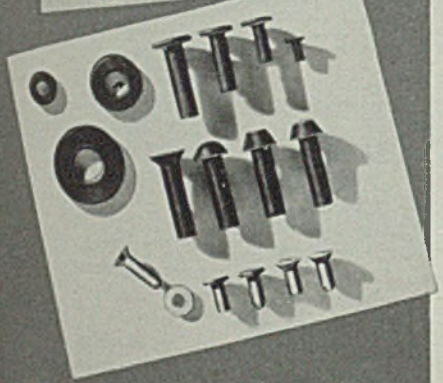
	Tempered at 1112° Fahr.	Tempered at 1328° Fahr.
0.05 per cent Proof Stress	64,500 p.s.i.	59,400 p.s.i.
0.2 per cent Proof Stress	70,300 p.s.i.	63,800 p.s.i.
Maximum Stress	92,300 p.s.i.	88,300 p.s.i.
Elongation (in 8 inches)	18 per cent	19 per cent
Reduction of Area	48.5 per cent	52.4 per cent











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BOLTS: Carriage - Machine - Lag - Plow - Stove - Elevator - Step - Tap - Wheel & Rim - B - U-Bolts - Tire - Automotive - Drilled - Faced - Special Heat Treated, etc. - **NUTS:** Cold Punc Semi-Finished - Hot Pressed - Case Hardened - Slotted - Castle - Machine Screw - Marsden - Low Sulphur - **RIVETS:** Standard - Tinners' - Coopers' - Culvert - Clevis and Hinge **SCREWS:** Cap - Machine - Hanger - Sheet Metal - Phillips Recessed Head - **WASHERS:** Burrs - **MATERIALS:** Steels - Alloys - Non-ferrous Metals - Brass - Bronze - Everdur - Herc and others - **RODS:** Stove - Seat - Ladder - **PLATED PARTS:** Cadmium - Zinc - Chromium - N - Hot Galvanized - Copper - Tin - **SPECIAL UPSET & PUNCHED PRODUCTS.**

BOLTS EMPIRE NUTS-RIVETS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.

TABLE II—Mechanical Properties of Low Carbon Alloy

Sections in.		Tempering temperature °F.	Max. Stress lb. per sq. in.	Yield Point lb. per sq. in.	Elongation Per cent in 2 in.	Reduction of area Per cent	Average Izod Impact Figure, ft.-lb.
1 to 1/16 dia.		390	222,000	208,000	15.0	47.2	36
		570	221,000	210,000	15.0	54.1	23
		840	204,000	193,000	16.0	54.8	23
		930	202,000	183,000	16.0	54.8	22
		1020	189,000	171,000	19.0	59.2	36
		1110	156,000	145,000	20.0	61.6	66
		1200	136,000	126,000	21.5	68.0	81
		1245	127,000	112,000	23.0	68.0	82
		1290	108,000	92,000	25.0	71.6	90
		1340	105,000	85,000	26.5	71.6	99
3 dia.	C	1020	182,000	173,000	17.0	59.2	24
	O	1020	190,000	185,000	17.5	59.2	24
	C	1110	138,000	129,000	20.0	68.0	75
	O	1110	141,000	133,000	20.0	68.0	72
	C	1200	125,000	107,000	22.0	70.0	87
	O	1200	126,000	108,000	21.5	70.0	83
	C	1245	119,000	99,000	23.5	71.6	93
	O	1245	118,000	103,000	23.5	71.6	88

Note: C—Center, O—Outside.

3.5; molybdenum, 0.45 to 0.60. The physical properties specified for this steel in plate are: 0.05 per cent proof stress, 62,700 pounds per square inch minimum, maximum stress, 94,100 to 107,500 pounds per square inch; elongation in 8 inches, 18 per cent minimum.

Values at 680 degrees Fahr. (360 degrees Cent.) in material taken from a large hollow forging are shown in Table IV.

Burton further states that the possibility of this steel for boiler drums is not based solely on laboratory experiments "as a steel of this type has been extensively employed by the author's firm and others in vessels for chemical plants operating at high temperatures and pressures," and that it is his "firm conviction based on considerable experience and research that the chromium-molybdenum steel has marked advantages over some of the more complicated steels with respect to proneness to crack during manufacture and likewise to brittleness after a period of service," and that the austenite-pearlite change occurs at quite a high temperature in the chromium-molybdenum steels. Further, "So far as embrittlement is concerned there is ample evidence to show that a steel of the type under consideration is particularly free from this peculiarity which is regarded by many engineers as being a point of major importance." Actually many large vessels have been made of this steel for hydrogenation processing in England. Some of these have had at least 2½ years service. Also, vessels of this analysis have been made in Germany.

From all of the above it is apparent, that the steel possesses advantages over certain currently used alloy grades, especially in heavy sections where mass effect is eliminated and high strength is accompanied by high impact. Rotor shafts for heavy machinery are among the European applications which would appear to be promising for the United States and are illustrative of the type of large forging in which the steel might find early application.

TABLE III—Mechanical Properties of Medium Carbon Alloy

Sections in.		Tempering temperature °F.	Max. Stress lb. per sq. in.	Yield Point lb. per sq. in.	Elongation Per cent in 2 in.	Reduction of area Per cent	Average Izod Impact Figure, ft.-lb.
1 to ¾ dia		390	263,000	237,000	16.0	46.8	26
		570	246,000	237,000	14.7	46.8	21
		750	232,000	221,000	16.7	46.8	20
		840	222,000	215,000	15.5	46.8	20
		930	213,000	202,000	15.0	49.6	23
		1020	210,000	204,000	16.0	57.2	24
		1110	159,000	147,000	19.0	63.6	73
		1200	144,000	126,000	21.0	68.0	91
		1245	127,000	110,000	24.5	70.0	94
		1290	123,000	105,000	25.5	90.0	111
3 to ¾ dia.	C	1110	162,000	146,000	20.0	63.6	66
	O	1110	161,000	147,000	19.5	66.0	76
	C	1200	138,000	123,000	21.5	68.0	81
	O	1200	138,000	129,000	21.5	68.0	87
	C	1245	122,000	107,000	24.0	70.0	99
	O	1245	121,000	102,000	25.5	71.6	101
6 sq.	C	1200	130,000	110,000	20.5	57.2	68
	M	1200	132,000	115,000	21.5	59.2	69
	O	1200	134,000	115,000	22.0	68.0	71

Note: C—Center, M—Middle, O—Outside.

Complete Treatise on Die Casting Procedure

■ *Die-Castings*, by Arthur Street; cloth, 160 pages, 4-3/4 x 7-1/4 inches; distributed by the Chemical Publishing Co. Inc., New York, for $1.75.

This volume essentially is directed to users of die castings who are concerned with design, purchase or application. It is divided into 26 chapters of which the first four relate to a definition of the die casting, the gravity die casting, the pressure die casting, and choice of the alloy.

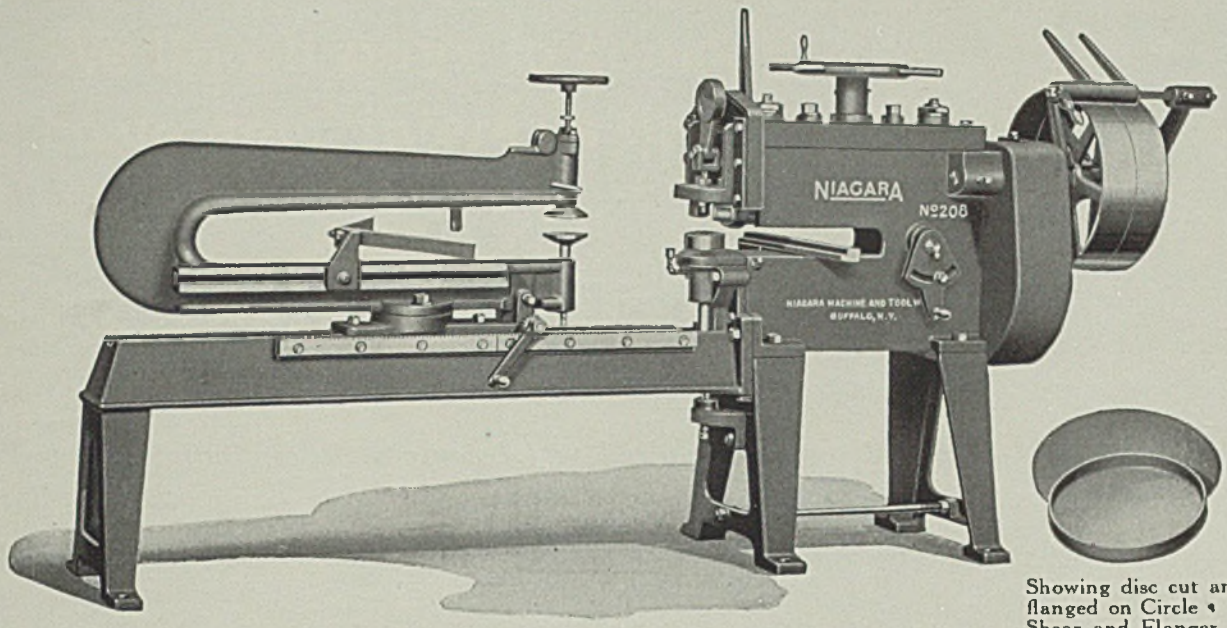
Chapters V, VI, VII and VIII give information on zinc-base, aluminum-base, brass and aluminum bronze die castings. Designing for die casting is discussed in chapter IX and chapters X and XI are concerned with cored holes and undercuts. Chapters XII, XIII, XIV, XV and XVI relate to factors relating to die opening, inserts, choice of section, die casting of threads and gears, and lettering and decoration.

Methods of assembling die castings are described in chapter XVII and die life is discussed in chapter XVIII. Cost of die castings and machining are discussed in chapters XIX and XX. The remaining chapters are concerned with plating of zinc-base die castings, combination of plastics with die castings, inorganic and organic finishes for zinc-alloy die castings, finishing of aluminum alloy die castings, inspection, and a discussion on, "Should a User Make His Own Pressure Die Castings?" The book concludes with a bibliography of nine pages.

Material Facilitates Checking of Forgings

■ For checking cavity dimensions in newly made die castings, forgings, forming and similar work, it often is the custom to pour lead into the cavity to obtain a piece which can be checked for dimensions. In many instances this lead casting then is shipped to another plant for checking. Shipping and handling pieces of lead are cumbersome and expensive motions.

To replace lead in this work, Nukem Products Corp., 70 Niagara street, Buffalo, has developed a new material called Plasul-Basolit. This is said to solidify outside in contraction, leaving voids in the center, thus giving out a contour which duplicates die cavities exactly. While the material's price per pound is about the same as for lead, it weighs only 1/5 as much.

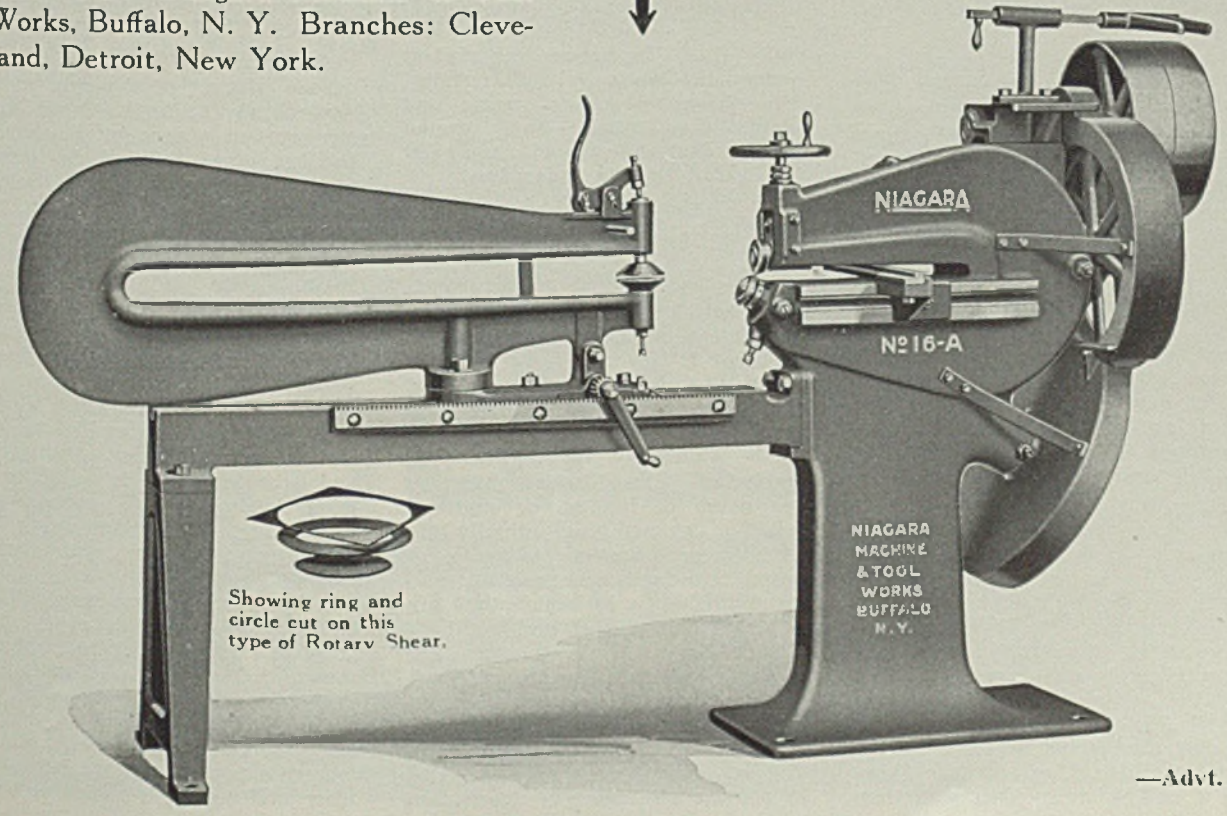


Showing disc cut and flanged on Circle Shear and Flanger.

Niagara Circle Shear and Flanger produces circles and turns smooth, high flanges for true, round heads for tanks, drums, furnaces, lawn rollers, etc. Used extensively in quantity production.

Niagara Rotary Shears are built in a wide range of sizes and capacities for making smooth, clean cuts and producing plain and flanged circles and rings that are commercially true in roundness, diameter and depth. Power operation, quick setting and convenient handling of material make them ideal for limited and volume production without die expense. Write for Bulletin 70-D. Niagara Machine & Tool Works, Buffalo, N. Y. Branches: Cleveland, Detroit, New York.

Niagara Ring and Circle Shears shown below, cut both rings and circles. Without circle attachment they also slit material into strips. In addition, they cut irregular contours within certain practical working limits.

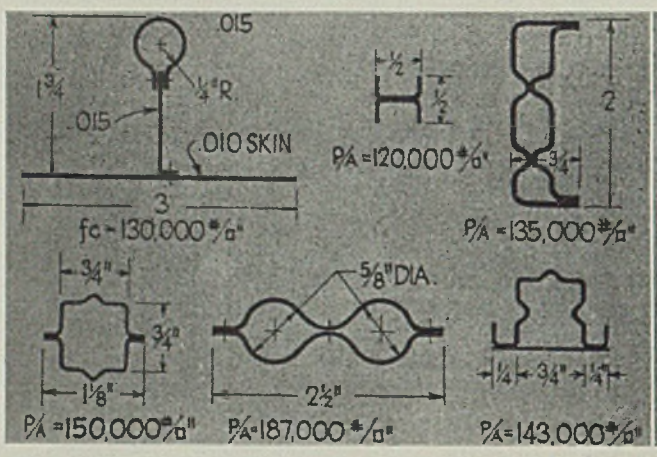


Showing ring and circle cut on this type of Rotary Shear.

—Advt.

Stainless Steel in Aircraft Fabrication

Special tooling required to fabricate stainless found absorbed by first 50 duplicate parts Thereafter, a 10 to 15 per cent saving can be made in lots of 100 or more, compared with aluminum alloy



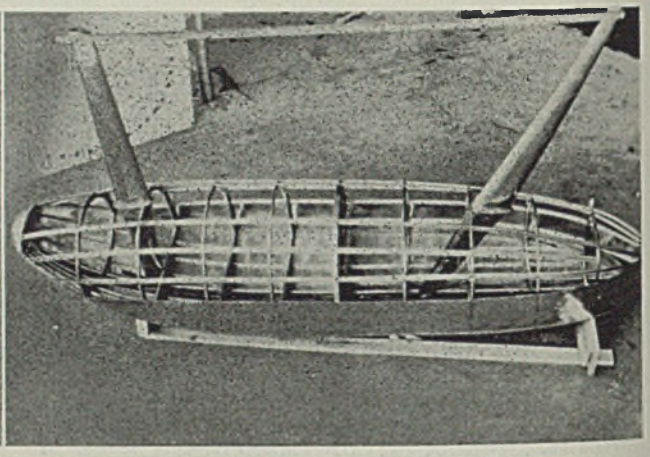


Fig. 1. (Left)—Typical sections of short compression columns of stainless steel with dimensions and allowable unit stresses. Fig. 2. (Right)—Partly covered wing-tip float of stainless for the coast guard Dolphin flying boat

By H. W. PERRY

■ STAINLESS steel weighs 2.86 times as much per unit volume as aluminum alloy but has 3.10 times the strength ,hence stainless approximately one-third as thick is as light as and stronger than aluminum. This means that extremely thin gages can and must be used and that, as they have almost no lateral stiffness, the pitch of flat widths (ratio of width to cross-section area) must be small. Therefore special engineering designs are required to utilize the strength of the metal and suitable tools must be developed to manipulate it readily and economically.

Structural members subjected to compression and torsion are made tubular or as built-up box elements such as beams, stringers and columns, usually of stainless 0.005 to 0.015-inch thick. An I-beam is made by drawing numerous cup-shaped depressions in strip material, placing the strips so the depressions are in contact back to back, and welding the strips together at the apex of the depressions, thus forming a hollow web. This web then is welded along its edges to relatively wide channel flange strips to complete the I.

A box beam is made of corrugated side strips welded to tubular edge pieces and wrapped at the ends with bands welded to the corrugations and tubes. Closed hollow stringers are made of lengths of material rolled or crimped longitudinally into channels or V-sections to break up broad flats and have narrow outstanding flanges by which they are welded to lengths of flat metal.

Such beams and stringers are used for building the truss framework of fuselage, hull, wing, airlerons, elevator, rudder, pontoons and floats of land and water planes. The covering metal is corrugated to provide stiffness. A description of the making of the skin of the wing panels for the Air Corps Seversky pursuit planes by Fleetwings, Inc., as given by Carl de Ganahl, vice president, and W. L. Sutton, chief engineer, will explain the general procedure followed in constructing the skin for many aircraft parts.

This wing panel has a flat-form area of 350 square feet, measures 30 feet from root to tip, and has a 16-foot root chord and 8-foot tip chord. Maximum thickness at the root is 34.56 inches and at the tip 8.64 inch, tapering both lengthwise and crosswise. It is built for a wing loading of 25 pounds per square feet. The wings weigh 762 pounds, or 2.175 pounds per square feet.

It is important that corrugations be formed in the metal to give greatest stiffness. Tests have shown that the ratio of radius of the corrugations to thickness of the material must be kept to a low value, so the form decided upon is reverse semicircles, tangent to each other and having a radius of one-

half the pitch from center to center. Thus, 2 x 5-foot sheets of 0.005-inch thickness are pressed into corrugations measuring 3/8-inch deep and 1-inch from crest to crest.

Some difficulty was encountered at first in forming the corrugations with the necessary nicety as they had to fit together accurately to make a strong joint when ends of the sheets were overlapped. This accuracy now is accomplished by notching the ends of the sheets at carefully spaced distances and placing locating pins on the corrugating press to fit into the notches and to hold the sheets against displacement. A specially made die in the press then forms the part of the corrugations where the semicircles become tangent, thus assuring proper formation at this line.

Flanges Tapered to Wing Panel

A second die then forms the corrugations to correct radius. This method holds the variation for a given number of corrugations to 0.005-inch in 24 inches of developed material. Flanges on the sides of the corrugated sheets are tapered to correspond to the chordwise and spanwise taper of the wing panel. Corrugations extend spanwise the wing to give the greater stiffness in the longer dimension.

So the covering will be stiff and present a smooth outer skin, the corrugated sheets are spot welded to flat outer sheets of the same thickness. This is done in a welding machine specially developed by Fleetwings Inc. for this work, and shown in Fig. 3. It has a large copper grid mounted on a table that rolls crosswise on tracks so it can be moved at right angles to the corrugations which are placed lengthwise on table. A roller welding machine hung on an overhead track moves parallel with the corrugations (lengthwise the table) and is driven by a pinion engaging in a rack.

First, a corrugated sheet is laid on the grid, then a sheet of flat steel is placed on top of it and stretched between jacks to smooth out all sags and wrinkles. Next a pair of heavy rollers are brought down on the sheet to prevent any possibility of its twisting. Finally, the welding electrodes are lowered into contact with the flat sheet and welding starts. Lines of spot welds are made where the corrugations contact the flat sheet. A variable-speed drive provides welding rates of 240, 480 and 960 spots per minute.

When a covering so made was first bent around the wing nose ribs mounted in a jig, small flats were formed in the outer skin between crests of the corrugations, giving it a ribbed appearance. This effect is now eliminated by laying slightly oversize rods in the corrugations on both sides of the under sheet in the welding machine before welding the flat sheet to it. Rods are withdrawn after welding. This produces slightly curved ridges of raised material between the crests of the underlying corrugations, giving a wavy appearance. Bending the covering around the nose ribs then smoothes out these waves so the skin follows the contour of the nose in an unbroken curve, forming a nose that is exceptionally smooth back to 30 per cent of the wing chord.

Little air drag is caused by overlapping of the sheets as the overlap is only 0.01-inch thick. The drumming effect that might be produced by flutter of small areas of the flat sheet is prevented by the support given by the corrugations, the crests of which are 1 inch apart and to which the skin is welded at 3/8-inch intervals.

A novel feature of the wing design is that the fuel tanks form part of the lower wing covering and are built to absorb the imposed stresses.

These tanks are fabricated of stainless steel, corrugated for stiffness and carry 80 gallons more fuel than those they replace. Liquid-tight joints are made by seam or spot welding, then filling the joints with solder.

Such a tank, however, weighs approximately ¾ pound per gallon of capacity.

Wings of the design and construction described have proved satisfactory under every test, being exceptionally rigid torsionally and quite stiff against bending. The elastic center of the panel is close to the center of air pressure so that in flight the wing is subjected to almost pure bending rather than torsional bending stress. Corrugations of the covering are shear resistant, and the smooth outer skin takes part of the shear load.

Cost of a first structure in stainless steel is relatively high owing to special tooling required. The extra cost, however, is absorbed in the first 50 duplicate parts produced and thereafter a saving of from 10 to 15 per cent can be made on lots of 100 or more as compared with aluminum construction, according to de Ganahl and Sutton.

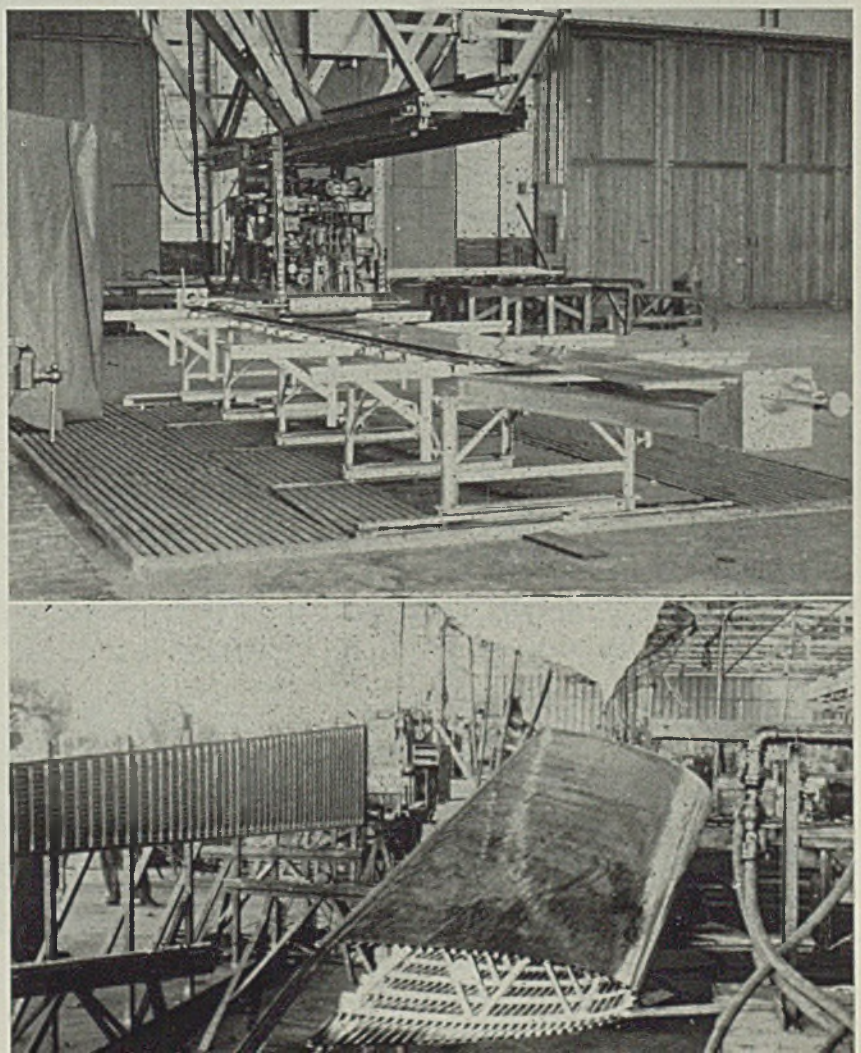
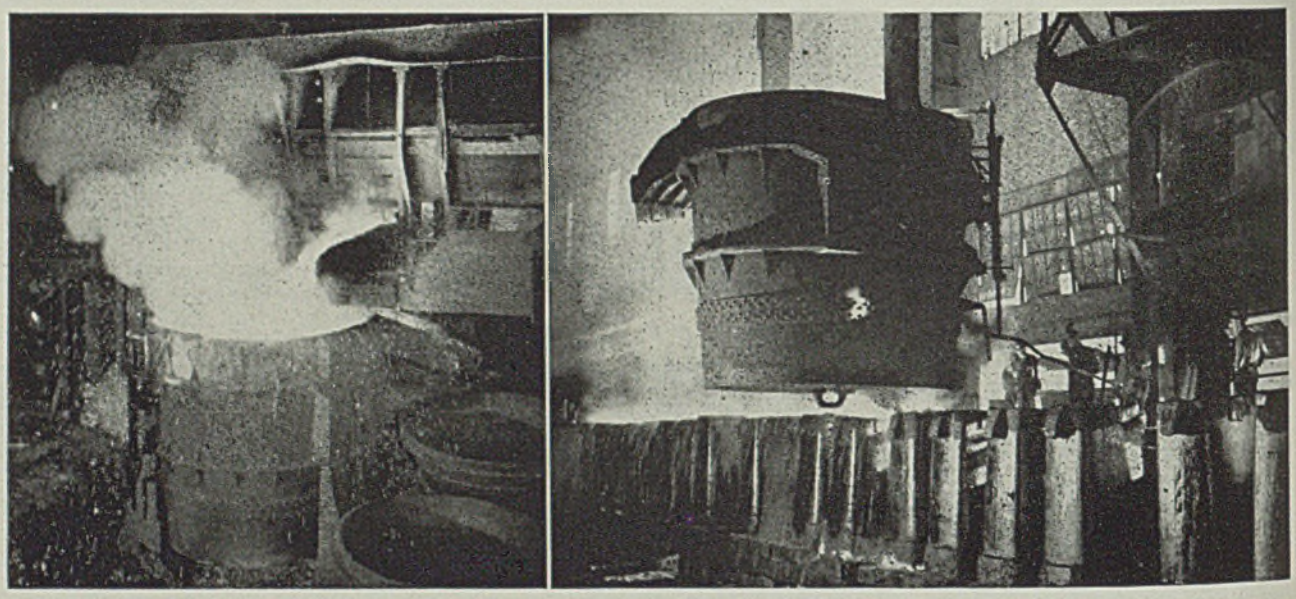


Fig. 3. (Upper)—Special welder makes spot welds to join corrugated stainless to flat stainless for wing surfaces at rates up to 960 per minute. Fig. 4. (Lower)—Applying skin to nose ribs of a wing panel—all of stainless steel

Welded Steel Ladles

Necessity for enlarging crane capacity at Eastern open-hearth shop is eliminated by the adoption of 190-ton elliptical ladles which are made of two heat-treated sections joined by riveting



Left. Tapping open-hearth heat into 190-ton all-welded steel ladle. Right. Teeming heat from 190-ton elliptical welded ladle

■ EIGHT all-welded steel ladles with a capacity of 190 tons of molten steel—the largest of their kind ever made have recently been placed in operation in the open-hearth department of the Bethlehem Steel Co., Sparrows Point, Md. The performance of 35 ladles of the same construction, although somewhat smaller in size, 135 tons each, is ample guarantee that all-welded ladles can be used with perfect safety. Some of these ladles have been in continuous service for seven years and not a single failure has ever occurred.

Manufacture of all-welded ladles calls for extreme care in design and fabrication and requires skilled and highly experienced welders. Adequate equipment for heat treating is absolutely essential as the completed ladles must be stress relieved at 1150 to 1250 degrees Fahr.

The weight of the 190-ton ladles, including stopper rigging, is 58,300 pounds. Estimated weight of the brick lining is 50,500 pounds, making a total weight including the hot metal of 489,600 pounds (assuming 380,800 pounds of metal). They are replacing ladles of conventional construction, of 168 tons capacity, weighing 96,000 pounds without brick lining. This is a saving of 37,700 pounds, or 18.9 tons, which roughly figured offsets the increase in live load of 22 tons of molten steel, and eliminates the necessity for increasing the capacity of cranes, hooks, and runways.

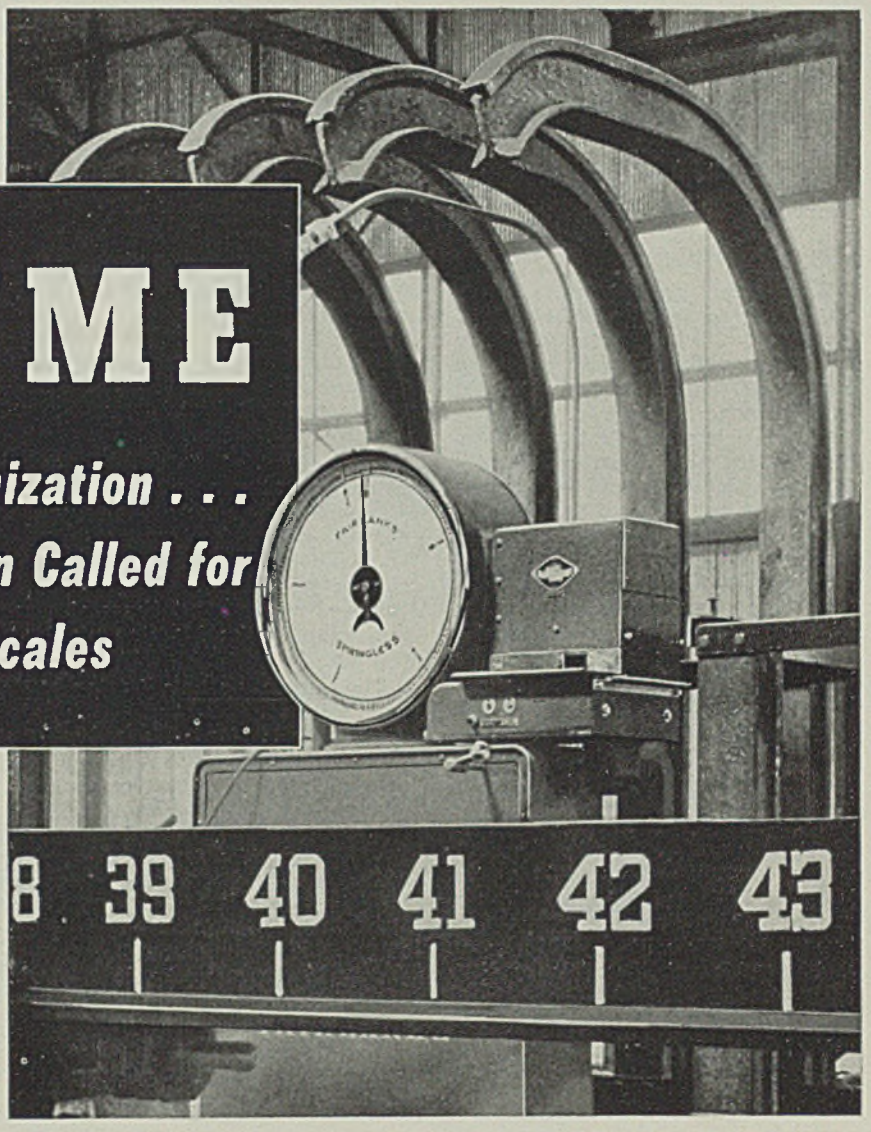
The new ladles are of elliptical design and have the following dimensions: Largest diameter, 15 feet 6 ⅜ inches at top, 12 feet 4 3/16 inches at bottom; smallest diameter, 12 feet 2 inches at top, 9 feet 4 3/16 inches at bottom; overall depth 12 feet 9 ½ inches; center to center of lifting hooks, 13 feet. The two trunnions are 13 inches diameter and are made of special forged steel, normalized and annealed for 70,000 pounds per square inch tensile strength, 40,000 pounds per square inch yield point and consistent ductility. The shell plate is I ¼ inches thick, is made in two halves, buttwelded together with a vertical, double V-weld.

The ladles were fabricated at Bethlehem's Steelton plant, where furnaces for heat treating work of this size are available. However, as the finished ladles were too large for shipping, it was necessary to make them in two sections, a top section 9 feet 6 inches high, and a bottom section 3 feet 3¼ inches high. Even then it was necessary to go to special routings in shipping the ladles to the Maryland plant.

At the point of destination the two sections were riveted together

VOLUME

Called for Modernization . . . and Modernization Called for Fairbanks Scales



Colorado Fuel and Iron Corporation's Minnequa plant uses six Fairbanks Scales, five of which are equipped with Printomatic Weighers. The scale shown is a Fairbanks Type "S," four-section, 50-ton-per-section Platform Scale equipped with Printomatic Dial.

WHEN increased volume made it necessary for the Colorado Fuel and Iron Corporation to enlarge their Minnequa plant, the modernization program called for new equipment to insure speed and accuracy in weighing. Specifications were rigid—so six Fairbanks Scales were chosen.

Two 4-section, 50-ton-per-section Fairbanks Type "S" Platform Scales were installed in the finishing department. Three Fairbanks Plate Fulcrum Scales equipped with Printomatics were put in the merchant shipping and finishing departments to check-weigh finished products. At the south end of the plant, a Fairbanks Type "S" 4-section, 100-ton-per-section Railroad Track Scale weighs carload orders, scrap, transfer, and trap cars. Weighing inaccuracies cost money—and it costs money to be *slow*. Fairbanks Scales have eliminated those drains in hundreds of plants—just as they can in yours. Write Fairbanks, Morse & Co., Department 96, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

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DIESEL ENGINES
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WASHERS-IRONERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

FAIRBANKS SCALES

Scales

with a horizontal splice band 22 inches wide. Riveting was used instead of welding because no heat treating furnaces large enough to handle the ladles are available at the Maryland plant.

Powdered Metals

(*Concluded from Page* 47)

Babbitt for this bearing is a special alloy containing 92 per cent high-purity lead. Thickness of the babbitt actually exposed over the surface of the matrix is only 0.001 to 0.002-inch.

This bearing has, first, a sponge-like matrix which has an affinity for the steel back and becomes a permanent part thereof and, second, an extremely thin layer of the bearing material, securely bonded and mechanically locked into the matrix. Can the spongy matrix support the terrific pounding due to the inertia loads of a modern high-compression high-performance engine? Actually it can support much higher loading due to the Moraine process of "embossing" or preloading. At one stage during manufacture, the steel strip with its bonded matrix is squeezed between a set of large polished chromium - plated rollers which compress the matrix under loads as high as 10,000 pounds per square inch, achieving a permanently preloaded structure, still porous and capable of carrying several times the greatest loading found in engine operation.

Features of the Durex No. 100 bearing described here included: fatigue resistance to satisfactorily withstand the imposed load at the operating temperature, mechanical strength resist extrusion and pounding, good bonding characteristics, high melting point to retain its mechanical strength under operating conditions, low friction and non-scoring characteristics to prevent galling or overheating, conformability so the bearing can adjust itself to shaft deflections and deformation under maximum loads, embedability so the bearing can absorb dirt and worn off metallic particles to prevent such foreign materials from contaminating the pressure lubricating system, high corrosion resistance.

Production of this bearing involved an entirely new process, new equipment and new problems in control of temperatures, synchronization of speed of each stage, precise metallurgy — objectives now achieved in the special manufacturing setup in the Moraine plant at Dayton, O.

The entire process begins with long coils of strip steel received in reels, straightened by passing through roller levellers, then fed through equipment where the matrix powder is properly mixed and deposited in measured depth upon the strip, see Fig. 2.

Coated with matrix powder, the strip enters a 4-stage electric furnace where the matrix is permanently bonded to the steel, and upon cooling becomes a part of it. Strip then is recoiled and transferred to a second line where it is again straightened and successive coil ends welded together to produce a continuous strip fed into a controlled-vacuum tunnel type machine, Fig. 3. Here the babbitt alloy, held under exacting temperature conditions, is flowed over the strip and into its matrix in a series of three separate stages, or chambers. The high vacuum maintained in the central chamber exhausts the air from the myriad of pores, permitting the babbitt to flow into the pores and voids of the matrix to fill the spong-like structure completely.

Final stage of this machine has an ingenious mechanism which holds the thickness of the babbitt coating to an accurately determined value while it "freezes" due to rapid chilling by jets of cold water.

The strip continues to a special milling machine in which the total thickness of the strip from under side of the steel back to top surface of babbitt, is held to desired limits by trimming the soft babbitt with two milling cutters. This leaves an excess of 0.005 to 0.010-inch on the babbitt for finishing and mirror-burnishing operations.

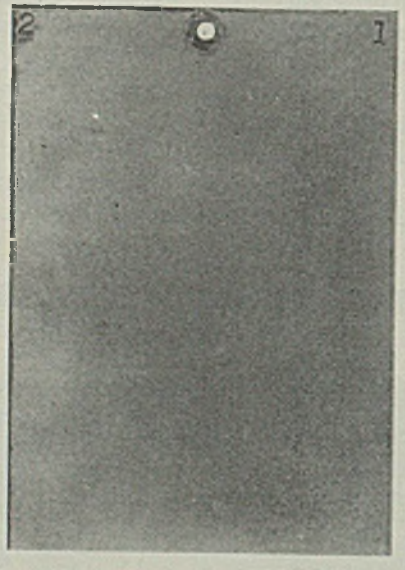
Final stage is a punch press, Fig. 4, in which the strip is die cut into rectangular pieces of proper size for forming into bearing half-shells. Transferred to the machine shop, blanks then are formed, sized, finished and inspected to end up as half-shells ready for assembly into automobiles.

Zinc Dust-Zinc Oxide Paint Withstands Crudes

■ Zinc dust-zinc oxide pigment combinations, as a result of a series of tests in Ellsworth county, Kans., are found to have high value as protective coatings of tanks used for highly corrosive crude oils.

The formula employed was: 20 per cent vehicle (25-gallon phenolic resin) and 80 per cent pigment which, in turn, was composed of 80 per cent zinc dust and 20 per cent of XX-50 zinc oxide.

Steel panels coated with this mixture were suspended for one year in a "sour" crude tank, three feet below the gage hole. During that period changes in oil level were frequent, resulting in periodic exposure of panels to air-gas mixtures as well as to oil-salt water combinations. At conclusion of the test it was found that relatively little or no lifting of the coating had taken place along the edges of the panel or around the fastening hole as



shown above. Courtesy New Jersey Zinc Co., 160 Front street, New York.

Paper-Insulated Cable Features Longer Life

■ A new type of paper-insulated cable is announced by Phelps Dodge Copper Products Corp., 40 Wall street, New York. It eliminates the formation of voids, and the elastic paper used for the outer portion provides a means of applying a compressing force to the more highly stressed interior of the insulation during contraction of the insulation during the cooling phase of its daily heat cycle.

Cables are made in both single and multiconductor designs and in belted and shielded types. The elastic paper used for the outer layers of the cable has considerably higher impulse dielectric strength than normal paper.

Airdrying Enamel Is Acid Resistant

■ Rogear Co., 11 Water street, New York, announces an airdrying enamel, type 9N9, which is unaffected by commercial concentrated sulphuric, nitric, hydrochloric or hydrofluoric acids, gases or alkalis. It is noncorrosive and is applied by brush or spraygun, drying in about 10 or 15 minutes. The enamel can be applied either to porous or nonporous surfaces.

THOUGHTS ON POPULAR COATS NO. 3 *By Haulon-Gregory Galvanizing Co.*

JOSEPH'S COAT OF MANY COLORS

Our train of reflection on popular coats brings us to one that fascinated us many years ago—Joseph's coat of many colors. We recall vaguely that Jacob loved his son Joseph so much he made him a coat that would have knocked your eye out; it must have been a dandy, since mention of it has survived through three thousand years or more. What kind of a coat was it? Alas, Joseph's contemporaries in the fashion designing field have left us absolutely nothing concerning sleeve length, busheling, pockets, collar or any other pertinent information. All we know is that Joseph's coat was the zingiest trapping that ever wrapped a human form, before or since. If he had taken it with him to Egypt, we might have seen its counterparts on statues of Pharaohs up and down the Nile from Cairo to Khartoum; even King Tut might have had a copy hung up in the clothes closet of his tomb. While it was the hottest coat ever made, it couldn't compare with the HOT DIP GALVANIZED COATING that HANLON-GREGORY puts on ferrous products today. The HANLON-GREGORY GALVANIZING CO. operates on the fact that galvanizing is essential for the protection of ferrous metal products. Its HOP DIP PROCESS is a death blow to corrosion. When manufacturers think of galvanizing, many of them think of HANLON - GREGORY. Will YOU think of us, too?

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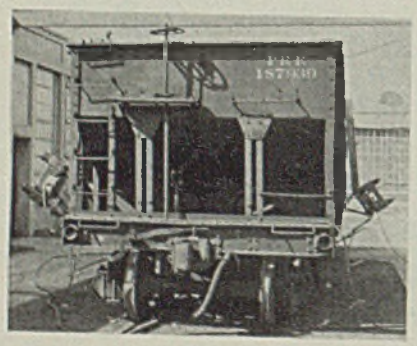
PITTSBURGH PENNA.

Cabinet Lathe

■ Rivett Lathe & Grinder Inc., Brighton, Boston, has introduced a new Rivett 1020 cabinet lathe. It is a full precision back-geared screw cutting lathe with integral motor drive. Designed by Lawrence Blazey, Designers for Industry Inc., with Rivett engineers, all its controls are on the front and readily accessible. The slanted panel at base of headstock affords full visibility of electrical controls which are insulated from the lathe proper. The lathe is mounted on welded steel cabinet with insulated deck and rimmed top surface, and is designed to permit standing or setting operation. The head stock is totally enclosed. The cabinet itself contains two drawers, one with collet board and one with sliding shelf, and two compartments for storage of attachments. It takes up 53 x 26 inches of floor space and is 46½ inches high.

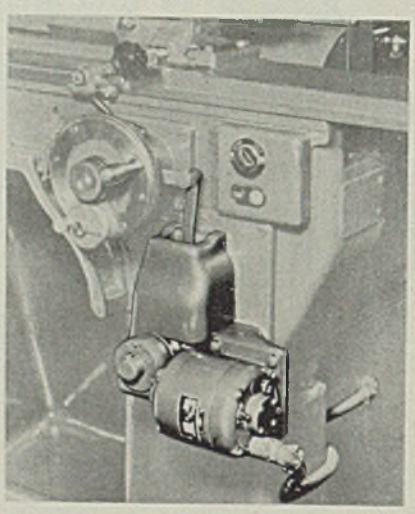
Car Vibrator

■ Syntron Co., Homer City, Pa., has developed a large vibrator, fitted with hooks for attaching to hopper bottomed railroad cars to speed up the emptying process. It consists of a huge pulsating electro-magnet striking 3600 times per minute. This together with the hook, weighs 950 pounds. The vibrators also are designed to be used, without the car hook, on big bunkers and storage bins. Each unit has a separate electrical control panel that contains a thermionic valve for changing alternating current to pulsating current, operating switches and a variable resistance for controlling the vibrator's amplitude or power. It is designed for operation on 220 volt, single phase, alternating current. A pair of these vibrators are recommended for each car as shown in the illustration.



Cross Feed Arrangement For Grinding Machines

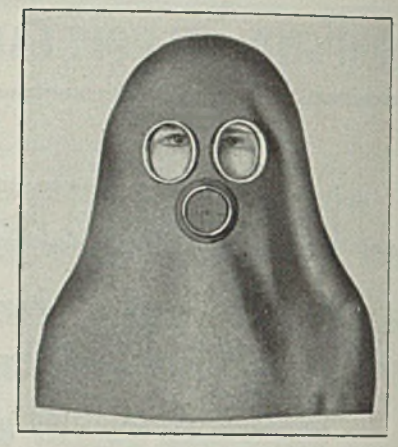
■ Brown & Sharpe Mfg. Co., Providence, R. I., has developed an independent, automatic cross feed arrangement for its No. 5 plain grinding machines, enabling automatic straight-in-feed grinding and giving the machine all the advantages of power plunge-cutting with no change in its regular capacities or operating convenience. The arrangement furnishes 172 plunge-cut feeds or picks per minute, with the amount of feed adjustable by quarter-thousandths from 0.00025 to 0.0045-inch per pick. The stopping point can be set by



increments of 0.0001-inch. The arrangement is driven by a separately controlled 1/20-horsepower gearhead motor mounted at the right front of the machine. The arrangement also includes a vertical link which transmits motion to the cross feed pawl from either of the two crank mechanisms. Selections of feed for traversing or straight-in-feed grinding is made by connecting the link to the proper crank mechanism. Amount of feed per pick of the pawl is selected simultaneously by a pointer and a scale on the rotating member before the screw is tightened.

Dust and Spray Hoods

■ Industrial Products Co., 800 West Somerset street, Philadelphia, announces new dust and spray hoods to provide respirator and head protection during dust and spray operations. They are made of strong weave cloth, fitted with respirator and laminated safety lenses in demountable rings. Patterned to fit comfortably, they may be taken



completely apart for washing. All parts are replaceable.

Electric Truck

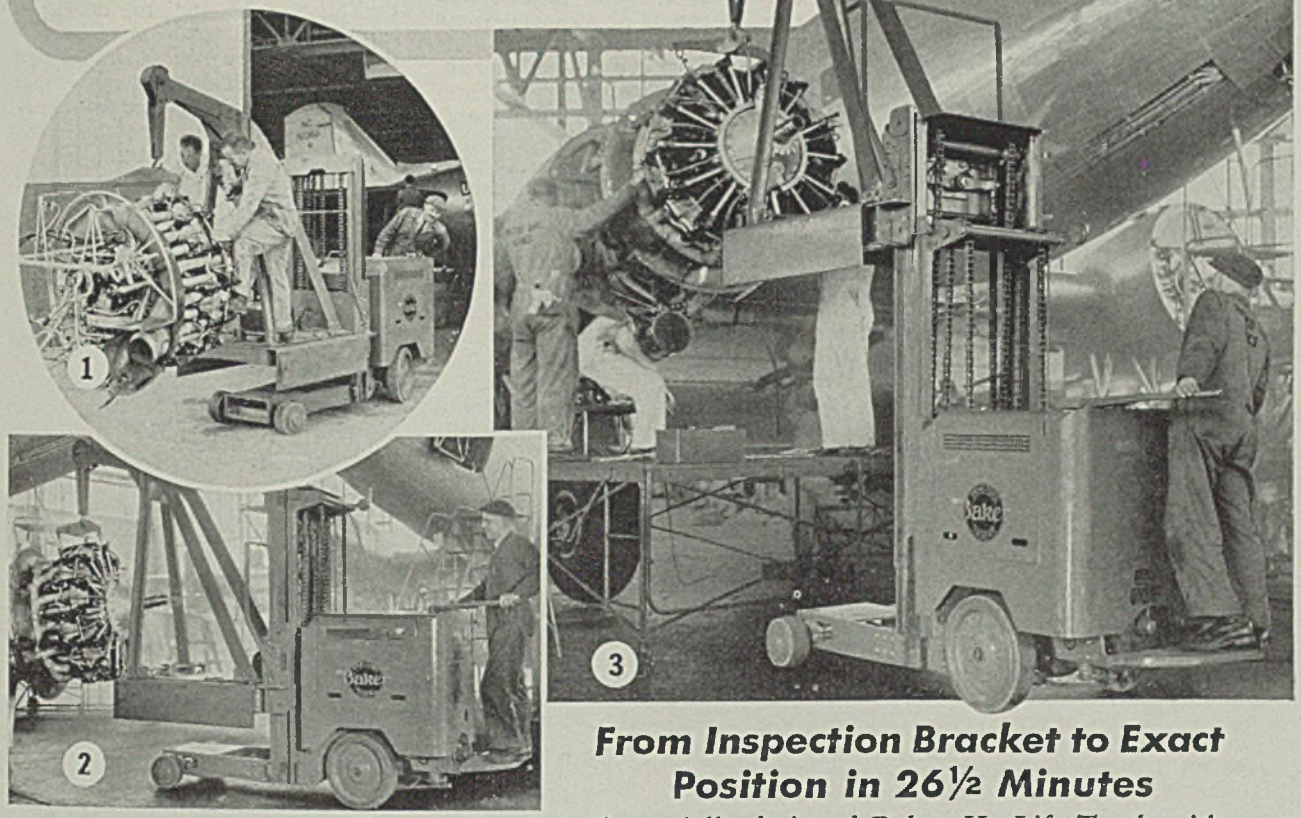
■ Yale & Towne Mfg. Co., 4530 Tacony street, Philadelphia, has introduced a new KM-26 electric industrial truck which has a capacity of 3000 pounds. A general utility truck, it may be loaded by hand, chain hoist, electric hoist, overhead crane or ship's tackle. Small and compact, it features a frame of welded steel plate. In addition, a 4-wheel steer and small overall dimensions make it adaptable for use in narrow aisles and other congested quarters. For the operators safety, the control platform is protected by a bumper. Cushioned foot pedals also are incorporated.

Whiteprint Machine

■ Ozalid Corp., Johnson City, N. Y., announces a new fast-printing model "F" whiteprint machine which combines a printer and dry-developer in one unit. It can be installed easily and is capable of producing finished dry-developed whiteprints in less than two minutes. A new type high pressure mercury-vapor lamp with an output of 40 watts per inch and an active length of 46 inches gives printing speeds ranging up to 56 inches per minute, with uniform light distribution over the entire printing surface. The lamp is guaranteed for 1000 hours. Original and sensitized materials are held in contact with a 4¼-inch diameter glass cylinder which revolves around the stationary high pressure mercury-vapor lamp. The glass cylinder, tracing and sensitized material revolve at the same rate of speed. An adjustable light shade permits varying the exposure without changing the rate of printing speed.

Cooling of the lamp is provided by a 2-stage blower and a special air duct. This forced-air cooling system effectively prevents high temperature differentials between the right and left sides. The ma-

UNITED AIR LINES Speeds up Maintenance Schedules with BAKER TRUCKS



From Inspection Bracket to Exact Position in 26½ Minutes

A specially designed Baker Hy-Lift Truck with crane attachment carries engines to and from the planes being serviced at United Air Lines' Cheyenne, Wyoming, base. Extremely accurate control, greater speed and maneuverability cut important minutes from idle ship time—another difficult handling problem solved with Baker Trucks.

1 Starting for the hangar, after Baker Truck has lifted engine from final test inspection bracket.

2 Approaching the ship after having traveled 800 ft. around other planes —under wings, through a labyrinth of activity.

3 Engine hoisted to exact position and fastened to mounting ring. Total elapsed time only 26½ minutes.

Let Baker show you how similar time and money savings are possible in your plant.

BAKER INDUSTRIAL TRUCK DIVISION
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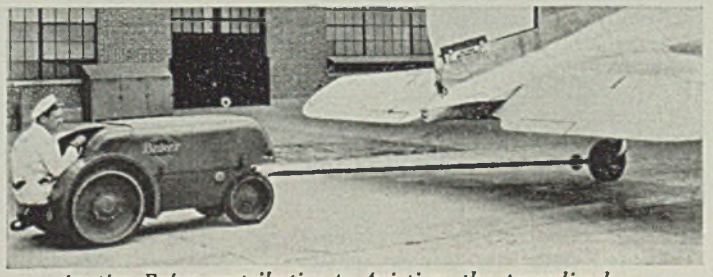


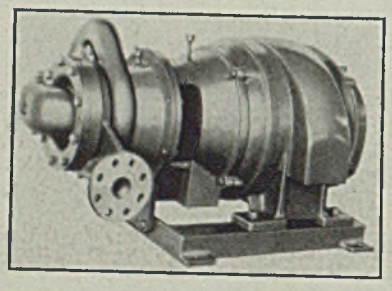
Another Baker contribution to Aviation—the streamlined electric tractor which can be made to tow today's large transports and still not require more than 48" headroom.

Baker INDUSTRIAL TRUCKS

chine is driven by a resiliently mounted split-phase ¼-horsepower motor. The developer is driven by the motor through a 50:1 reduction gear, and the printer through a friction disk type, variable speed transmission. A special reactive type transformer equipped with condensers provides power factor correction to 87.5 per cent. On the terminal board of the transformer are 12 taps which permit adjustments for line voltage variations between 200 and 240 volts.

Multi-Stage Pumps

■ Allis-Chalmers Mfg. Co., Milwaukee, has extended its line of multi-stage SSUnit pumps to include a new 2-stage unit with 4-inch suction and 2-inch discharge. It can be rated up to 275 gallons per minute against heads up to 500 feet at a speed of 3550 revolutions per minute. The pump has cast-iron casing and cover, and is bronze fitted throughout. The impellers are placed back to back to provide



axial balance. The cover can be readily taken off, permitting the inside parts to be removed without disconnecting the suction and discharge piping. The stuffing box on the pump is only subjected to suction pressure. Unit can be furnished with either an open, splash-proof, totally enclosed or explosion-proof motor. It is suitable as a small boiler feed pump, mine pump, or pipe line pump, and can be used in air conditioning service.

High-Pressure Boilers

■ York Oil Burner Co. Inc., York, Pa., has placed on the market high pressure boiler units for industries requiring quick, automatic steam. They are available in sizes 1½ to 25 horsepower, fired by a York-Heat burner. Designed to burn ordinary fuel oils, each boiler is a full length vertical unit of extra heavy boiler plate, riveted and calked at all joints. Controls are conveniently located near the burner which consists of a primary stack and a high-pressure boiler limit control. Special heat resisting steel turbulators or helical baffels are inserted in the boiler tubes to increase the overall boiler efficiency. Also included are a low water cutoff to shut down the burner in case of low water, an automatic water feeder and a steel base which serves as the boiler base and combustion chamber housing.

Combination Butt Welder, Burr Grinder

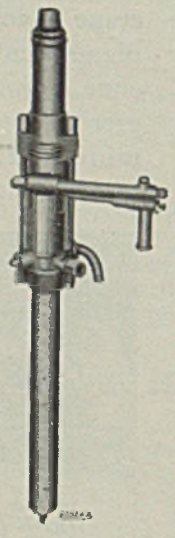
■ Eisler Engineering Co., Newark, N. J., has developed a new No. 95 HFS portable butt welder with a burr grinder and annealer mounted on a fabricated case. It may be used in the repair of stranded wire where this unit is used to burn out (electrically) the faulty section and fuse all the strands. The welder's grinder has an accurate adjustment to compensate for the wear in the abrasive, and there are two special bushings to guide the stranded wire.

All of the unit's wiring is concealed within the case, and a draft tube is provided to remove the grinding dust from the vicinity of the work. The butt welder is supplied with a 3-kilovolt-ampere, air-cooled transformer and 8-point variable switch for current regulation. It is foot-operated and the butt jaws may be water-cooled for continuous service.

Metals from 1/16 to 3/16-inch in diameter can be welded. For butt welding other sizes of wire or metals, units are available with transformers from 1 to 7½ kilovolt-amperes.

Stopehammer

■ Ingersoll-Rand Co., Phillipsburg, N. J., announces a new 116-pound stopehammer with automatic rotation, known as the R-58. Its center of gravity is such that it assumes a



natural drilling position when picked up. Other features include feed-leg control which permits fine variations in feeding power, short over-all height of only 59 inches, a plate-type throttle valve which provides half throttle position for "collaring" holes, and the location of the exhaust on the opposite side of the cylinder from the operating controls. It also is equipped with an automatic chuck cleaning system which keeps the drill free from cuttings and water, providing ample lubrication for all fronthead-bearing surfaces.

Dust Collector

■ American Foundry Equipment Co., Mishawaka, Ind., has developed a high efficiency, long cone Cyclone dust collector which separates dust from the air stream by centrifugal force. It is constructed of heavy gage metal to withstand the scouring action of the dust being collected, and is available in sizes ranging

from 1000 to 10,800 cubic feet per minute capacity, of standard air. For great capacities a multiple number of units can be utilized. Overall dimensions of the 1000-cubic foot-per-minute unit is 22 inches in diameter by 8 feet 4 inches high.

Spot Welders

■ Acme Electric Welder Co., Huntington Park, Calif., announces an improved line of foot-operated rocker-arm spot welders featuring all welded steel bases. The type 0 with stationary lower horn holder and the type 1 with swivel lower horn holder are manufactured in 10, 15 and 20 kilovolt-ampere capacities and in throat lengths of from 12 to 36 inches, complete with water-cooling equipment. A clamping block device retains the horns in the horn holders with good electric contact, yet a half turn of a ⅝-inch diameter set screw instantly releases the horn for a change of set up.

Horns are universal double and reversible, one end machined to hold electrodes at 90-degree angle, and opposite end 22½-degree angle.

Count the machine tools in your plant equipped with A-B control!

Leading Machine Tool Builders Use Allen-Bradley Control As Their Standard

If you want to know what make of motor control is preferred by the leading machine tool manufacturers, check the starters on the new machines that come into your plant. You'll find the familiar A-B nameplate on a surprisingly large number of them. There must be a reason for this preference!

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ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Solve those tough control problems with CUSTOM-BUILT solenoid control panels

If you have a control problem involving, perhaps, complicated automatic sequence operations, consult your Allen-Bradley representative. Since the time Allen-Bradley pioneered the solenoid starter, they have been recognized as leaders in the design of special control panels. You will find Allen-Bradley's experience helpful in solving your toughest control problems. Write for data.

Allen-Bradley Company
1320 S. Second St., Milwaukee, Wis.

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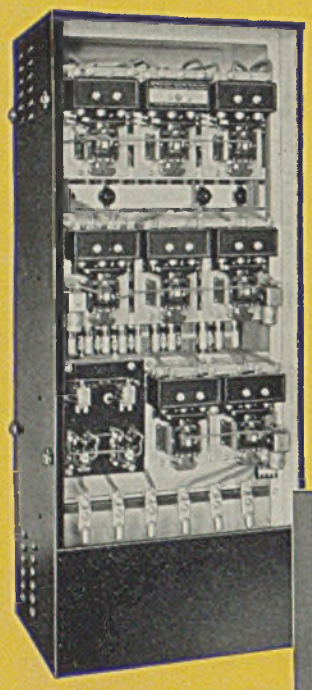
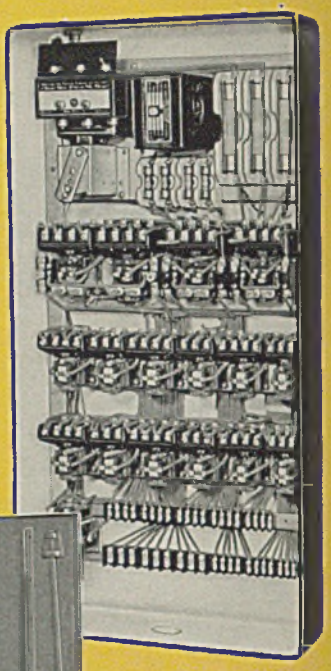
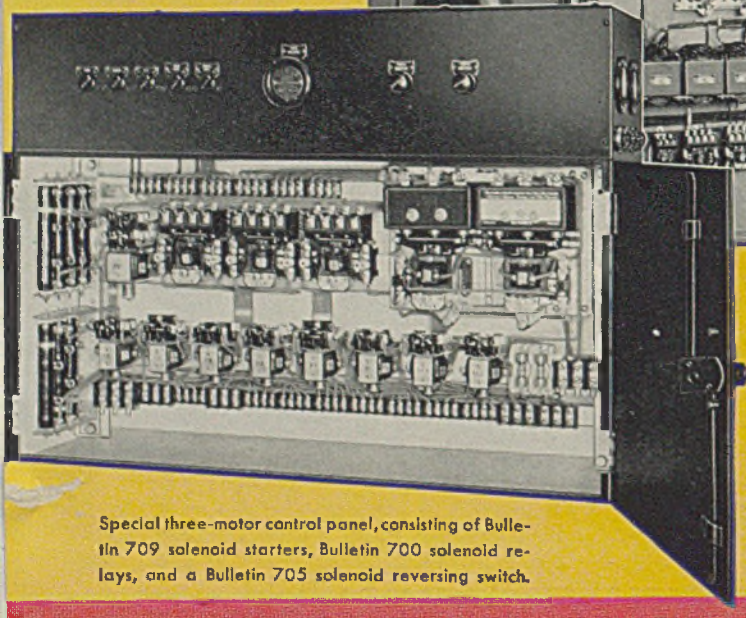


Reduced-voltage automatic resistance control panel for starting motors on network systems.

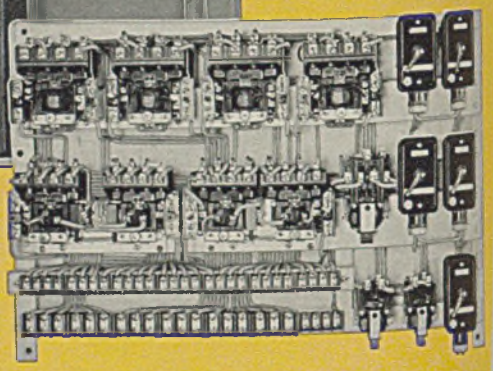


Special solenoid control panel, with disconnect switch, Bulletin 709 starters, Bulletin 702 contactors, time delay relay, and step-down transformer.



Special three-motor control panel, consisting of Bulletin 709 solenoid starters, Bulletin 700 solenoid relays, and a Bulletin 705 solenoid reversing switch.

Special panel for automatically controlling drilling and boring operations on automobile engine blocks.



Special automatic six-motor control panel for a drilling and tapping machine. This compact panel is designed for mounting at the base of the machine.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Fine-Pitch Gears

(*Continued from Page* 45)

tical in that it is applied in a manner similar to a gap-type cutter, this is not the case. A 30-tooth cutter, for instance, can cut any gear of 30 teeth or less. As the teeth on these rack-type cutters are form ground, they can easily be made non-involute in shape or "topping."

The fine-pitch gear shaper uses a circular cutter. A typical cutter is 48-pitch, others up to 98 pitch. Not long ago, 32-pitch gear-cutting tools were the finest that were being ground accurately. Then came 48-pitch, 60-pitch and finer. Now we are grinding 125-pitch from the solid to a satisfactory accuracy and in the near future will grind to approximately 200 pitch. Gears produced on these machines are within close limits of accuracy, both for involute profile and tooth spacing.

Holding Devices Vary

The nature and shape of the work governs to a large extent the means for holding and cutting the teeth. Due to the comparatively greater accuracy demanded in cutting fine-pitch gears, the question of work-holding methods is a vital one and requires careful consideration. Where only a small number of gears of any one size are required, it is not economical to equip the machine with an automatic magazine. On the other hand, if a large number of gears of any one size are required and particularly if they are of small diameter, automatic magazining is to be recommended. The time required for loading and ejecting the work through a magazine feed is from 1 to 1½ seconds. Hand-operated loading and ejecting devices can be employed, but their operation usually requires around 5 seconds.

Where work is small and slender and clamping pressure as well as cutting pressure is a factor, special methods sometimes must be developed. For instance, in cutting a small gear having extended shafts on both ends, one end is cone shaped and the other has a square shoulder. Due to the small area of contact, a dead center can be used for supporting the upper end of this blank. It is driven at the lower end by serrations which drive from the small shoulder. On another gear with cones at both ends, the driving is done with a serrated cone at the lower end. The female serrated cone centers are made so the serrations contact the upper portion of the cone on the work, thus contacting the largest possible diameter and avoiding impairment of the cone end used as a locating point in the assembled mechanism.

Still another example is in a gear having a stem pinion of a delicate nature and with a comparatively small driving area insufficient to support a drive against any considerable amount of friction. To handle this piece, a live center is used at top with balls in the center reducing the resistance to rotation of the work. In this instance, the driver in the lower work support has a flat serrated head to contact and revolve the blank.

The cutting of teeth on thin blanks presents a problem because it is generally advantageous to operate on several blanks at one time. Therefore some sort of loading or holding device must be employed to align the blanks properly as well as to clamp them when the teeth are being cut. In some cases it is possible to use a hole in the work in addition to the centering hole, the second hole providing means for locating and driving the blanks. In this case, the lower plate carries a stud fitting the holes in the blanks and extending through them to a slot in the upper holder to act as a driver. The work is supported at the upper end by a plunger mounted in bushings and held tightly by a compression spring which holds the work against the lower support.

In extremely small work where the center hole is smaller and where there are no holes for driving purposes, work can be forced onto a slender arbor in an arbor press and the lower plate of the fixture furnished with a pin which acts as a driver.

Fig. 4 shows another method for handling thin blanks. Here blanks are so thin that it was felt that forcing them onto an arbor would not guarantee a sufficiently tight fit. Some of the blanks also may have holes slightly larger than others, consequently additional clamping means is desirable. A loading fixture also is considered advisable because of the nature of the work. This is shown in detail. It will be noted that the work arbor A is placed in the loading fixture B, the work inserted over the small stem of the arbor and then tightened by screwing down the cap C. Work then is held in place by nut D. Also it will be noticed that the lower end of the arbor is slotted and is driven by a key in plate E.

Because this arbor could not be supported directly at the top, it was felt that considerable clamping pressure would be necessary. Therefore

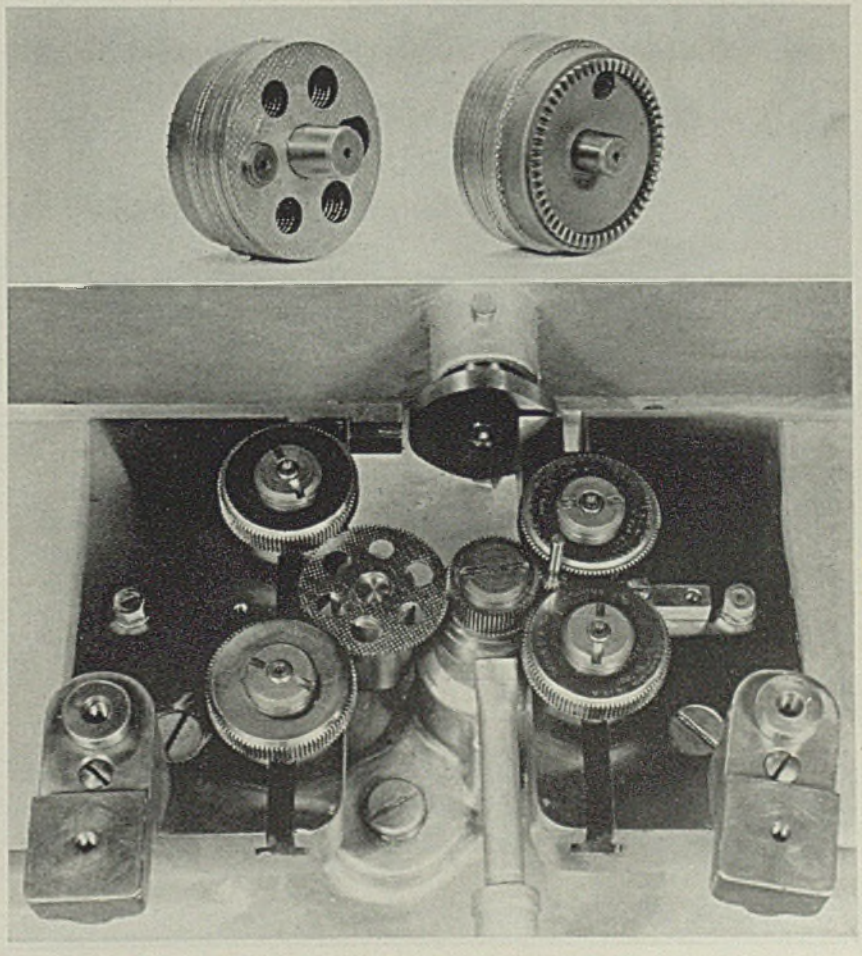


Fig. 6. (Upper)—Another type of work holder for thin blanks. Fig. 7. (Lower)—Mating gear and pinion can be burnished simultaneously here

a ball thrust bearing was inserted into the arbor support so considerable pressure could be exerted and at the same time resistance to rotation reduced to a minimum. The arbor support rotates with the work.

Fig. 5 presents an interesting means for handling a small pinion with a comparatively small hole. In this particular case, because the part was to be handled by magazine feed —not hand loaded—the conventional method of holding on an arbor could not be employed. Therefore the support also acts as an arbor. It will be noted that the lower serrated driving bushing A as shown in the detailed view carries a locating bushing B which accurately fits the lower stem of the arbor C. This arbor is supported in bushings and at the top end by a ball bearing. A compression spring exerts sufficient clamping pressure to drive the work through the serrations. When the gear has been completed, the arbor support rises and carries the work with it so a stripper D is provided to eject the work from the arbor. At the same time, another ejector E removes the work from the top of the work adaptor.

Fig. 6 shows another type of work holder for handling a number of thin blanks at one time. The blanks are located by pins as illustrated, and the outfit is provided with face gear teeth which act as drivers. The work holders are fed automatically through the magazine.

An interesting development in fine-pitch gears is in connection with sound projection apparatus. Such equipment handles sound frequencies up to 8000 cycles per second and gears cannot be tolerated even with minute variations in angular velocity. Incorrect tooth conjugation disturbs uniformity of film travel which in turn distorts the sound photographed on the film. Also any roughness in the gear action is transmitted as noise.

To meet such severe requirements, a burnishing machine has been developed especially for fine-pitch gears. The burnishing operation is not intended to correct errors in profile or spacing but merely to finish the surfaces of the teeth to make them smoother running and quieter in operation.

Burnishing two gears at a time makes it possible to handle a mating gear and pinion at the same time as shown in Fig. 7. Also, it increases production. As the burnishing action is the combined result of speed and pressure, both gear and pinion can be rotated at the same time and more pressure used for the gear. This accomplishes the desired result on both gear and pinion simultaneously. The machine is provided with an automatic safety guard and produces excellent results both as to the finish obtained and low cost of operation.

Although fine-pitch gears have been produced for years in large quantities, the development of modern production equipment, tools, inspection devices, etc., has lately received added impetus. It is possible that standardization in this field may be a forthcoming development. While it is true that only a small number of the present members of the American Gear Manufacturers' association are engaged in the production of small fine-pitch gears, the future may see great development in this line.

•

Leaks Now Stopped In a Few Seconds

■ By the use of a new ingredient in Flextite, a material for stopping leaks in concrete structures, it is now capable of stopping leaks in a matter of seconds instead of minutes according to Flexrock Co., Twenty-third and Manning streets, Philadelphia.

This improved product can be forced against water pressure, being held there only a few seconds to become effective.

Handling for Welding

(*Concluded from Page* 50)

at a proper welding speed. One shop has a gantry arrangement that allows an automatic welder to be worked over 3000 feet of floor area.

Progress in welding demands attention to efficient materials handling methods. Accomplishment is certain through the use of overhead cranes fully complemented by an adequate supply of jib cranes and positioners. The latter are great cost savers through the greater speeds possible with less electrode material. Larger diameter electrodes with increased current and welding speed may be adapted where work is positioned. Many shops are working jib cranes and positioners in harmony to establish remarkable production records. Truly, low-cost high-quality welding depends on proper attention to materials handling.

Died:

■ HERBERT W. WOLFF, 67, senior vice president in charge of sales, American Car & Foundry Co., July 27 at his summer home on Lake Margrethe near Grayling, Mich. He began as an employe of the Michigan Car Co., Detroit, which later was consolidated with Peninsular Car Co. When American Car & Foundry was organized in 1899 Mr. Wolff went to St. Louis as its chief mechanical engineer, subsequently becoming assistant to vice president, vice president in charge of sales in the Chicago district, and in 1925 was placed in charge of sales for the entire company.

♦

John Lowell Fyke, 55, general superintendent, electrical and steam turbine shops, Allis-Chalmers Mfg. Co., Milwaukee, in that city recently.

♦

Charles H. Heller, 65, chairman of the board, Bower Roller Bearing Co., Detroit, July 26. He was one of the organizers of the company.

Fred C. Gardner, 77, secretary-treasurer, E. C. Atkins & Co., Indianapolis, recently at his home in that city. He had been associated with the company 59 years, and had been secretary-treasurer 40 years.

♦

Donald M. Smith, assistant district sales manager, in the Chicago office of Allegheny Ludlum Steel Corp., at his home in Chicago, June 21. Before the merger with Ludlum, Mr. Smith was district sales manager for Allegheny Steel Co.

♦

John Michael Callow, 73, mining engineer and metallurgist, recently at his home at Redhill, Surrey, England. He was the inventor of several metallurgical processes and in 1925 received from the American Institute of Mining and Metallurgical Engineers the James Douglas gold medal. Mr. Callow retired in 1933 as president and manager, General Engineering Co., New York.

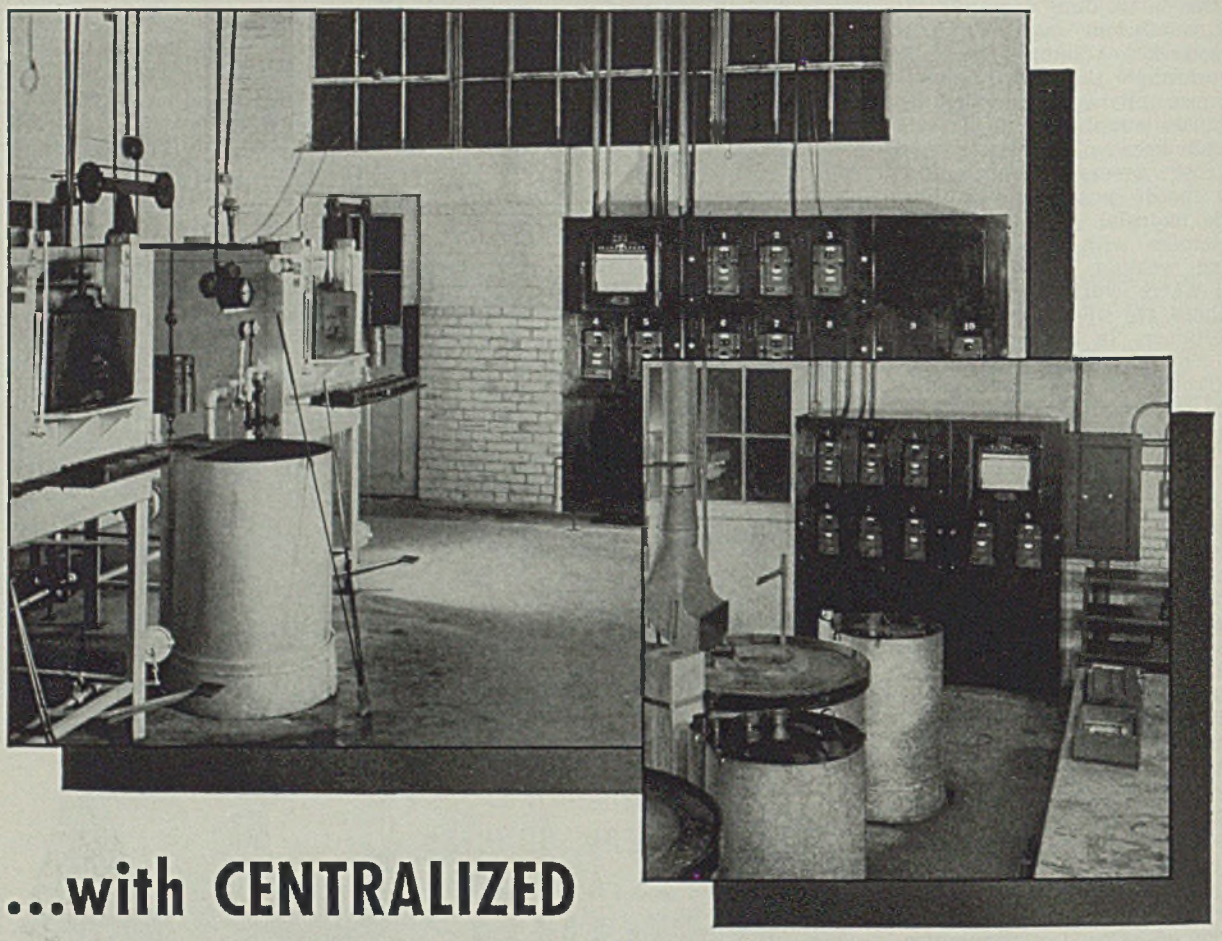
♦

William Henry Harrington, 48, eastern sales manager, New Departure division of General Motors Corp., Bristol, Conn., July 13. He joined New Departure as an engineer and became chief engineer in 1917. Previously he had been with Sigourney Tool Co. and Arrow Electric Co., Hartford, Conn. In 1921 he left New Departure to return to Arrow, Hart & Hegeman Co., Hartford, rejoining New Departure in 1934 as eastern sales manager.

♦

O. W. Buenting, vice president in charge of manufacture, Westinghouse Air Brake Co., Wilmerding, Pa., and also vice president, Union Switch & Signal Co., Swissvale, Pa., July 27 at Lewes, Del. He had been with the air brake company since 1901, and was a past president, Army Ordnance Association of Pittsburgh and National Association of Manufacturers.

LABORATORY SPECIFICATIONS
maintained in production



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Renewed Steel Demand Shows Market Strength

Heavy products more active, with deliveries little changed. Scrap decline checked. Prices firmer

MARKET IN TABLOID ★

Demand
Turns upward after lull.

Prices
Steady; scrap ends decline.

Production
Up 1 point to 90½ per cent.

■ HEAVIER steel products, bars, plates, shapes and semifinished, are being bought more freely, the low point apparently being passed. In spite of almost peak production mill backlogs are increasing, with prospects for heavier buying in the fall.

Flat-rolled steel orders are light, though some material for 1941 automobile models is being placed for frames and bodies and partsmakers are covering part of their needs. Practically all low-priced sheets have been shipped, only small lots under special arrangement remaining on books.

Deliveries are lengthening in some products, but on the whole shipments are fairly close to specifications. Tonnage of heavy armor plate, over six inches, is estimated sufficient to last mills into 1946. Production facilities assure deliveries as fast as shipbuilders can prepare ship frames for its use.

Indicative of efforts to meet consumer requirements steel mills are pushing production close to practical capacity, the rate advancing 1 point last week to 90½ per cent, highest since mid-December. Cleveland rose 15½ points to 80½ per cent as one producer ended vacation idleness, New England was up 5 points to 80 per cent, Wheeling 4 points to 98, Eastern Pennsylvania 2 points to 88 and Chicago ½-point to 97. Three districts went to lower levels because of necessity for furnace repairs, Birmingham 4 points to 88, Cincinnati 4 points to 81 and St. Louis 2½ points to 62½. Rates were unchanged at Detroit, 99 per cent, Buffalo, 90½, Pittsburgh 86½ and Youngstown 85.

July pig iron production totaled 4,058,488 net tons, 6.4 per cent over June. The daily rate in July was 130,919 tons, compared with 127,103 tons in June. Stacks active the last day of July numbered 187, a gain of six over the end of June.

Placing of 10,000 tons of reinforcing bars for a government air station in New England at no more concession than the heavy tonnage warranted indicates a strong situation in this product, which has shown weakness in the past. This is one of the largest awards of this material in recent weeks. Carnegie-Illinois Steel Corp. has issued a revised list of extras and deductions on reinforcing bars, effective July 15, superseding that issued Oct. 1, 1939. Bending extras are reduced 10 per cent and the trucking extra has been changed from 10 cents to all points to 5 cents to all points except metropolitan New York and within switching districts of Pittsburgh, Youngstown, Buffalo, Chicago, Gary, Cleveland, Sparrows Point and Birmingham, where the 10-cent extra still applies.

A feature of the structural market is the tonnage going into airplane manufacturing plants and hangars and other buildings for government air fields. Vega Aircraft Co., Los Angeles, has awarded 4800 tons and Vultee Aircraft Corp., Los Angeles, 1400 tons for plant additions, Government airport awards include 1650 tons for depot supply buildings and 1300 tons for hangars at Hill Field, Ogden, Utah, 2900 tons for hangars and 1500 tons for shop additions and storehouse at Jacksonville, Fla., and 1200 tons for hangars at Miami, Fla. Other large structural awards include 4000 tons for a power plant addition at Venice, Ill., and 3500 tons for 44 ammunition magazines at Savanna, Ill.

Scrap prices have firmed and some advances have been registered, the composite of steelmaking grades advancing 12 cents to $18.29, the first upward move since the recent decline started in mid-June. One factor of strength is clarification of the export license order, which involves only No. 1 heavy melting steel. A large part of export shipments are No. 2 heavy melting and compressed bundles, running as high as 70 per cent in the case of Japan. Stronger scrap prices caused an advance of 7 cents in the iron and steel composite, to $37.60.

Railroad buying has failed to hold the high rate of recent weeks and the only car award of importance last week was 500 box cars placed by the Norfolk & Western. Further placements are indicated by several inquiries now being figured. Rail buying this fall is expected to be smaller than usual unless export demand fills in the gap left by lack of domestic demand.

Automobile production shows the effect of early change of models and last week totaled 17,373 units, almost exactly half the 34,822 of the preceding week. This compares with 28,250 cars produced in the comparable week last year. Output is likely to remain low until new models get into regular production, which will not be for several weeks.

COMPOSITE MARKET AVERAGES

	Aug. 3	July 27	July 20	One Month Ago July, 1940	Three Months Ago May, 1940	One Year Ago Aug., 1939	Five Years Ago Aug., 1935
Iron and Steel	$37.60	$37.53	$37.57	$37.63	$37.33	$35.95	$32.68
Finished Steel	56.60	56.60	56.60	56.60	56.60	55.60	54.02
Steelworks Scrap..	18.29	18.17	18.42	18.56	17.18	15.30	12.05

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

	Aug. 3, 1940	July 1940	May 1940	Aug. 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	2.25	2.05
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	2.15
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	2.40

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	Aug. 3, 1940	July 1940	May 1940	Aug. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	125.33	125.33	105.33	85.33

Scrap

Heavy melt. steel, Pitts.	$18.75	$19.55	$18.00	$16.15
Heavy melt, steel No. 2, E. Pa.	17.50	17.50	16.00	14.40
Heavy melting steel, Chicago	17.25	17.25	16.65	13.75
Rails for rolling, Chicago	21.25	21.25	20.45	17.75
Railroad steel specialties, Chicago	20.25	20.25	19.75	15.50

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

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 stp.	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

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring 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.

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	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 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	67	70
⅝-1-inch	64	65
1⅛-1½-inch	62	62
1¾ 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.
½	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
9 and 10	64½	55
11 and 12	63½	54

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
10-inch lap weld	63½
12-inch, lap weld	62½

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, cut-lengths 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 ⅝-inch incl. (per 100 lbs.)	$2.00
Do., over ⅝ to 11/16-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.	5.00- 5.75
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.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

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.

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	21.00
Do. barge	21.00
No. 2 lump	22.00

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	8.63	7.23
New York (Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.31	4.09	8.59	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.00	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	4.00	3.22	3.75	8.15	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	4.42	3.20	3.75	8.15	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.25	4.30	4.64	3.20	3.80	8.45	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	7.10
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	3.30	4.35	4.75	3.83	4.34	8.84	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	3.40	3.50	5.75	3.70	6.50	4.75	....	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	4.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	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	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	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	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	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	9.40	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, 1500-3499 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	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 0
Standard rails	.....	$48.99	5 15 0
Merchant bars	2.66c 14 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*
Sheets, gal., 24 ga., corr.	3.98c 22 2 6	3.94c	10 7 6
Bands and strips	.....	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	15.00
Bos. dock No. 1 exp.	16.00-16.25
New Eng. del. No. 1	15.50-16.00
Buffalo, No. 1	18.00-18.50
Buffalo, No. 2	16.00-16.50
Chicago, No. 1	17.00-17.50
Chicago, auto, no alloy	16.00-16.50
Cincinnati, dealers	14.50-15.00
Cleveland, No. 1	17.50-18.00
Cleveland, No. 2	16.50-17.00
Detroit, No. 1	†14.50-15.00
Detroit, No. 2	†13.50-14.00
Eastern Pa., No. 1	19.00
Eastern Pa., No. 2	17.50
Federal, Ill., No. 2	14.50-15.00
Granite City, R. R. No. 1	15.00-15.50
Granite City, No. 2	14.00-14.50
Los Ang., No. 1, net	13.50-14.00
Los Ang., No. 2, net	12.50-13.50
N.Y. dock No. 1 exp.	15.00-15.50
Pitts., No. 1 (R.R.)	19.50-20.00
Pittsburgh, No. 1	18.50-19.00
Pittsburgh, No. 2	17.50-18.00
St. Louis, No. 1	15.00-15.50
St. Louis, No. 2	14.00-14.50
San Fran., No. 1, net	13.50-14.00
San Fran., No. 2, net	12.50-13.00
Seattle, No. 1	15.00
Toronto, dirs., No. 1	11.00
Valleys, No. 1	18.50-19.00

COMPRESSED SHEETS

Buffalo, new	17.00-17.50
Chicago, factory	16.50-17.00
Chicago, dealers	15.00-15.50
Cincinnati, dealers	13.50-14.00
Cleveland	17.00-17.50
Detroit	†16.00-16.50
E. Pa., new mat.	18.50-19.00
E. Pa., old mat.	15.50
Los Angeles, net	10.50-11.00
Pittsburgh	18.50-19.00
St. Louis	12.00-12.50
San Francisco, net	10.50-11.00
Valleys	18.00-18.50

BUNDLED SHEETS

Buffalo, No. 1	16.00-16.50
Buffalo, No. 2	14.50-15.00
Cleveland	14.00-14.50
Pittsburgh	17.50-18.00
St. Louis	11.00-11.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	12.50-13.00
Cincinnati, dealers	9.00- 9.50
Detroit	†12.50-13.00
St. Louis	10.00-10.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1	16.00-16.50
Chicago, No. 1	16.00-16.50
Cincin., No. 1 deal.	11.00-11.50
Cincin., No. 2 deal.	5.50- 6.00
Cleveland, No. 2	12.00-12.50
Detroit, No. 1 new	†15.00-15.50
Valleys, new, No. 1	18.00-18.50
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	12.00-12.50
Chicago	12.00-12.50
Cincinnati, dealers	7.00- 7.50
Cleveland, no alloy	11.50-12.00
Detroit	†9.50-10.00
Eastern Pa.	13.00-13.50
Los Angeles	4.00- 5.00
New York	†8.50
Pittsburgh	13.50-14.00
St. Louis	8.50- 9.00
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	11.50-12.00

SHOVELING TURNINGS

Buffalo	13.00-13.50
Cleveland	12.00-12.50
Chicago	12.50-13.00
Chicago, spcl, anal.	14.50-15.00
Detroit	†11.00-11.50
Pitts., alloy-free	15.50-16.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†6.00- 6.25
Buffalo	11.50-12.00
Cincinnati, dealers	5.50- 6.00
Cleveland	12.00-12.50
Eastern Pa.	11.00-11.50
Detroit	†10.50-11.00
New York	†7.00
Pittsburgh	12.50-13.00
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.00-16.50
Boston district	†9.50-10.00
Chicago, elec. fur.	17.50-18.00
East. Pa. elec. fur.	17.50-18.00
St. Louis	11.25-11.75
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	8.00
Boston dist. chem.	†8.50- 8.75
Buffalo	11.50-12.00
Chicago	10.75-11.25
Cincinnati, dealers	5.50- 6.00
Cleveland	12.00-12.50
Detroit	†10.50-11.00
E. Pa., chemical	14.50-15.00
New York	†7.50- 8.00
St. Louis	8.00- 8.50
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	20.00-20.50

ANGLE BARS—STEEL

Chicago	19.50-20.00
St. Louis	17.25-17.75

SPRINGS

Buffalo	22.50-23.00
Chicago, coil	21.50-22.00
Chicago, leaf	20.00-20.50
Eastern Pa.	24.00-24.50
Pittsburgh	24.50-25.00
St. Louis	19.00-19.50

STEEL RAILS, SHORT

Birmingham	17.00
Buffalo	23.00-23.50
Chicago (3 ft.)	20.00-20.50
Chicago (2 ft.)	20.50-21.00
Cincinnati, dealers	21.50-22.00
Detroit	†20.50-21.00
Pitts., 3 ft. and less	24.00-24.50
St. L. 2 ft. & less	20.75-21.25

STEEL RAILS, SCRAP

Birmingham	15.00
Boston district	†14.50-15.00
Buffalo	21.00-21.50
Chicago	17.50-18.00
Cleveland	23.00-23.50
Pittsburgh	20.50-21.00
St. Louis	18.50-19.00
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	12.50-13.00
Cincinnati, dealers	11.00-11.50

RAILROAD GRATE BARS

Buffalo	13.00-13.50
Chicago, net	13.50-14.00
Cincinnati, dealers	10.00-10.50
Eastern Pa.	15.50-16.00
New York	†11.50-12.00
St. Louis	12.00-12.50

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	19.50-20.00
St. Louis, No. 1	12.00-12.50
St. Louis, No. 2	13.50-14.00

FORGE FLASHINGS

Boston district	†11.00-11.50
Buffalo	16.00-16.50
Cleveland	16.50-17.00
Detroit	†14.75-15.25
Pittsburgh	16.50-17.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	21.50-22.00

LOW PHOSPHORUS

Cleveland, crops	23.00-23.50
Eastern Pa., crops	25.00-25.50
Pitts., billet, bloom, slab crops	25.00-25.50

LOW PHOS. PUNCHINGS

Buffalo	21.00-21.50
Chicago	20.50-21.00
Cleveland	20.00-20.50
Eastern Pa.	25.00-25.50
Pittsburgh	24.00-24.50
Seattle	15.00
Detroit	†16.50-17.00

RAILS FOR ROLLING

5 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	21.00-21.50
New York	†17.50-18.00
Eastern Pa.	23.00-23.50
St. Louis	19.50-20.00

STEEL CAR AXLES

Birmingham	18.00
Boston district	†18.00-18.50
Chicago, net	21.50-22.00
Eastern Pa.	24.50
St. Louis	21.00-21.50

LOCOMOTIVE TIRES

Chicago (cut)	21.50-22.00
St. Louis, No. 1	17.75-18.25

SHAFTING

Boston district	†18.50-18.75
New York	†19.00-19.50
Eastern Pa.	24.50-25.00
St. Louis, 1¼-3¾"	18.25-18.75

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†14.75-15.00
Buffalo, steel	22.50-23.00
Chicago, iron	18.50-19.00
Chicago, rolled steel	20.50-21.00
Cincin., iron, deal.	18.00-18.50
Eastern Pa., iron	21.00-21.50
Eastern Pa., steel	24.00-24.50
Pittsburgh, iron	19.50-20.00
Pittsburgh, steel	24.50-25.00
St. Louis, iron	16.50-17.00
St. Louis, steel	19.00-19.50

NO. 1 CAST SCRAP

Birmingham	15.50
Boston, No. 1 mach.	†15.50-16.00
N. Eng. del. No. 2	14.50-14.75
N. Eng. del. textile	18.75-20.00
Buffalo, cupola	18.00-18.50
Buffalo, mach.	19.50-20.00
Chicago, agri. net	14.50-15.00
Chicago, auto net	16.50-17.00
Chicago, railroad net	15.50-16.00
Chicago, mach. net	16.50-17.00
Cincin., mach. deal.	18.75-19.25
Cleveland, mach.	21.25-21.75
Detroit, cupola, net	†17.00-17.50
Eastern Pa., cupola	21.00-21.50
E. Pa., No. 2 yard	18.00
E. Pa., yard fdry	18.00-18.50
Los Angeles	16.50-17.00
Pittsburgh, cupola	19.00-19.50
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	18.00-18.50
St. L., No. 1 mach.	18.75-19.25
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†14.00-14.25
New England, del.	15.50-16.00
Buffalo, break.	16.50-17.00
Cleveland, break, net	16.50-17.00
Detroit, auto net	†17.25-17.75
Detroit, break.	†15.00-15.50
Eastern Pa.	19.00-19.50
Los Ang., auto, net.	13.00-14.00
New York break	†15.00
Pittsburgh, break.	16.00-16.50

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†11.00-11.50
Buffalo	15.00-15.50
Chicago, net	11.50-12.00
Cincinnati, dealers	10.50-11.00
Detroit, net	†11.00-11.50
Eastern Pa.	15.50-16.00
New York fdry	†12.25
St. Louis	†11.50-12.00
Toronto dealers, net	12.00

MALLEABLE

New England, del.	21.50-22.00
Buffalo	22.00-22.50
Chicago, R. R.	21.50-22.00
Cincin. agri., deal.	15.50-16.00
Cleveland, rail.	21.50-22.00
Eastern Pa., R. R.	22.00-22.50
Los Angeles	12.50
Pittsburgh, rail.	23.50-24.00
St. Louis, R. R.	18.50-19.00

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, c.if.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	66.00
So. African, 50-52%	58.00-59.00
Indian, 49-50%	56.00
Brazilian, 46%	50.00-53.00
Cuban, 50-51%, duty free	71.00-73.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 90, 91

Pittsburgh — First automotive releases have begun to come in against specifications for 1941 automobile models, and sheet mill backlogs have begun to move up again. Operations are estimated at about 75 per cent of capacity as some hand mills are still idle. Miscellaneous buying is active. Galvanized sheet operations continue to move up, being placed this week at 72 per cent. Strip mill operations have leveled. Total sales for July showed heavy increases over June.

Chicago—Recent buying has been light. Many large users already have comfortable inventories or heavy forward coverages. Several mills report all low-price April tonnage has been shipped though some interests probably will be shipping some as late as fourth quarter.

Boston — Narrow cold-rolled strip orders for fourth quarter delivery are being booked by some producers at open prices. Buying for third quarter shipment is slightly more active, partly due to better specifications from automobile partsmakers, although a substantial part of the total volume for 1941 models is yet to be placed. Deliveries about equal incoming volume with rerolling schedules close to 90 per cent. Strip consumption on the whole is increasing. Sheet buying is slow, consumers and distributors having ample stocks.

New York—The deadline on delivery of galvanized sheets booked at $4 concessions in the late spring and early summer has been generally clamped down, with the expiration of July. On hot and cold sheets, however, shipments on such business will be permitted to extend over the remainder of the quarter. The market appears generally steady at 2.34c, delivered, New York, for hot-rolled sheets; 3.39c for cold-rolled; and 3.74c for galvanized.

Cold strip buying is well diversified and shows slight improvement, with automotive partsmakers specifying more freely. Consumption tends upward in several industrial lines and some users are successfully placing covering orders for fourth quarter at open prices. Due to sustained high operations shipments are substantial, but incoming volume is sufficient to maintain backlogs.

Philadelphia — E. G. Budd Mfg. Co. has started production of 1941 Chevrolet frames, requiring 60,000 tons of steel for the model year. The same interest has renewed contracts with several automotive interests for bodies, fenders and hoods, with total steel requirements placed at 175,000 tons, not including 75,000 tons bought directly by Ford for commercial bodies. Budd has purchased 600 tons of stainless steel for 49 railroad cars now on order, including 10 for the Pennsylvania, 18 for the Pennsylvania and Seaboard Air Line and 21 for the Atlantic Coast Line. Miscellaneous buying is improving slightly. Some interests can make deliveries in two to three weeks.

Buffalo—While less urgent demand is noted for sheet and strip steel, diversified industrial buying holds rolling schedules around brisk levels. Orders from automotive manufacturers are awaited to offset slackening which may develop from consumers who find themselves amply supplied to meet national defense needs.

St. Louis—Sheet production has receded slightly since mid-July, owing mainly to seasonal influences. Manufacturing and building demands for galvanized sheets hold recent levels, but movement to rural areas is delayed by late

harvests. July shipments, according to preliminary reports, were slightly in excess of bookings.

Cincinnati — Backlogs of sheet mills, considerable of the tonnage representing contracts taken at concessions several months ago, are sustaining operations above 75 per cent. New buying is less, due to seasonal influences and well-stocked consumer positions.

Toronto, Ont. — With sheet mills booked solid to the end of September there has been minor tapering in buying. The automotive industry is planning to issue specifications for 1941 models and large buying on this account is expected. Demand on war production account is sustained and some producers now are accepting contracts into fourth quarter. Imports to meet increasing demands in this country are at a high rate and further extensive buying in the United States is predicted.

Birmingham, Ala.—The past week has brought some increased bookings in sheets, both manufacturers' and roofing. The local sheet mill, together with that at Gadsden, is operating at virtual capacity.

Plates

Plate Prices, Page 90

Pittsburgh—Plate mills continue at capacity, with demand heavy from commercial sources and for armor plate. Armor plate backlogs are heavy. Backlogs of industrial orders are also large, and new business continues to come in at a rate exceeding production.

Chicago — Plate demand is heavy. Needs of fabricators and heavy machinery makers are outstanding, but current inquiry also includes substantial tonnages for government needs, armament, export, petroleum storage tanks. Railroad requirement for repair work and new cars is strong.

Boston — Gradual, but mild improvement in plate buying from miscellaneous fabricators continues with demand on a somewhat broader scale. Construction needs supply the greatest lift, with shipyard specifications expanding. Deliveries on wider sizes are slightly more extended. Tank, large diameter pipe, railroad and specified work are disappointing.

New York — Further expansion in plate buying here is anticipated this month. Most district sellers reported a gain in July, despite a lag in the closing few days, and look for expanding industrial construction, a greater volume of ship and railroad work and more machinery requirements to maintain improvement. Tank work, however, was off a bit last month and the outlook for August is uncertain. Delivery on lighter gages and narrower widths is available within 7 to 10 days if needs are pressing; however, two to three weeks and beyond are being quoted on the larger plates.

Philadelphia — About 11,500 tons of plates and shapes will be required for 32 towing vessels for the navy for laying and tending submarine nets. These craft have been placed as follows: American Shipbuilding Co., Cleveland, 12; General Engineering & Dry Dock Co., Alameda, Calif.; Marietta Mfg. Co., Point Pleasant, W. Va.; John H. Mathies Co., Camden, N. J.; Lake Washington Ship Yard, Houghton, Wash., and Commercial Iron Works, Portland, Oreg., four each. The Pennsylvania has asked quick shipment on part of its new car program. The Reading Co. also has a carbuilding program pending.

Seattle — Ship construction and reconditioning promise increased demand for plates, with private yards obtaining new work and planning expansion. Puget Sound navy yard operations are the most active in years. Oil and fuel storage fa-

cilities for army and navy air bases in Alaska involve considerable tonnages. No important private projects are up for figures.

Birmingham, Ala.—Plate output continues heavy. Bookings include some 18,000 to 20,000 tons for railroad car building at Bessemer, Ala., and considerable tonnage is going to the Pacific Coast and to tank manufacturers.

San Francisco—Consolidated Steel Corp. secured 3500 tons for a portion of the work on the Orange county feeder line for the metropolitan water district, Los Angeles. Awards totaled 7080 tons and brought the year's aggregate to 52,872 tons, compared with 19,344 tons for the same period a year ago.

Toronto, Ont. — Sharply increased demand for plates of various types is indicated by announcement in the House of Commons that Canada is arranging for big production of war tanks and other vehicles, and also immediate speeding up of ship construction. While some of the plate will be obtained from Canadian mills, the greater part of demands will be met from United States sources.

Plate Contracts Placed

3500 tons, part of Orange county feeder line for metropolitan water district, Los Angeles, to Consolidated Steel Corp., Los Angeles.

280 tons, pipe, specification 1377-D, Ogden River project, Utah, to Southern Pipe & Casing Co., Azusa, Calif.

Plate Contracts Pending

15,000 tons, fabricated steel plates, steel bolts and miscellaneous parts, third lock, Panama, schedule 4171; bids postponed from July 29 to Aug. 6.

Unstated tonnage, 150,000-gallon elevated steel tank, navy yard, Norfolk, Va.; bids Aug. 8, spec. 10005, public works officer, yard.

Unstated tonnage, 250,000-gallon elevated steel tank, veterans' hospital, Marion, Ill., Chicago Bridge & Iron Co., Chicago, low, $22,640; bids July 16, rejected, as were bids on general contract, heating, etc.

Semifinished Steel

Semifinished Prices, Page 91

Pittsburgh — Semifinished producers continue to push tonnage as rapidly as possible. Backlogs are heavy in practically every product. Export buying is good. Releases from local nonintegrated mills over the past week were slightly heavier than the preceding week. A slight increase is expected over July in sheet bars going to local nonintegrated mills. Demand from tin mills has dropped slightly as stocks of plate are heavy in most quarters. Largest backlogs are still in wire rods.

Bars

Bar Prices, Page 90

Pittsburgh — Buying increased somewhat in merchant bars over the past week. Volume for July was considerably ahead of June, although the tendency was toward a leveling off at the close of the month. Export business is heavy. Industrial demand is again beginning to pick up. Miscellaneous buying is somewhat lighter, but first releases from the 1941 automotive program have begun to appear.

Chicago—Activity in alloy steels is high and in some quarters continues to show improvement. Carbon bar purchasing is holding at a good rate though no improvement has been noted since buying eased off several weeks ago. Alloy bar demand is supported in large part by special government direct and indirect needs.

Boston — Influence of the defense program is reflected to a relatively greater degree in bars, notably alloys, than other steel products. Additional contracts for machine guns are reaching shops in this district, rifle production and bar consumption at the Springfield armory is heavier. A shoe machinery company has an order for small caliber arms, taking a large alloy tonnage.

New York—Commercial bar demand has been steady for the past several days. Machine tool builders and manufacturers of airplane parts continue to specify heavily, but the general miscellaneous run of business has been spotty and in the aggregate has shown little improvement.

While some producers are able to work in specifications on hot carbon bars for delivery in two to three weeks, this is exceptional as most sellers can do little under four to five weeks. Shipments on cold drawn bars also range around four to five weeks, while those on alloy bars run around seven to nine weeks, with little change in this respect recently. Special heat treated bars are scarce for delivery before the latter part of November.

Philadelphia — Bar demand is improving, some consumers entering specifications as far ahead as six months. Government arsenals account for a large tonnage, with more pending. Contracts placed with private interests include 5000 155-mm. shells with a leading automotive interest. The British inquiry for 150,000 twelve-inch shells is still pending. Equipment builders, machine tool maufacturers and the screw machine trade are active buyers.

Birmingham, Ala.—Although merchant bars are fairly active, most bar buying is for reinforcing. Production in this specification is estimated at better than 85 per cent.

Buffalo — Demand for steel bars shows a mild seasonal leveling off, consumption remains substantial. Releases are sufficient to hold rolling schedules on a capacity five-day week basis. Some deliveries on specialty steel for toolmaking are behind specified dates.

Toronto, Ont. — Demand is well sustained in merchant bars and much greater improvement is predicted. Tool builders are making heavy purchases, and other branches of industry are taking larger supplies.

Wire

Wire Prices, Page 91

Pittsburgh — Jobber buying of merchant wire and wire products has increased somewhat as stocks are being built up for anticipated

heavy agricultural demand this fall. Current movement in the merchant market is not so heavy, however, although it is aided somewhat by demand for export.

Chicago—Leading producing interests are optimistic as July sales generally bettered June, while outlook for August is bright. So far automotive buying has been light but this week may be expected to bring the first indications of volume covering.

Boston — New wire orders about equal shipments, demand having leveled off on some products, including manufacturers' wire, although buyers are pressing for delivery on some specialties. Mill finishing schedules hold near capacity in some departments, but progress in reducing backlogs is slow.

New York—First of several large purchases of wire rope for submarine nets are being made by the navy. This aid to rope demand is in addition to active buying in recent weeks for marine and miscellaneous use. Orders for other wire products are about on par with shipments, which are heavy.

Birmingham, Ala.—Wire products, all specifications included, are in exceptionally good demand, fencing and nails leading. It is estimated production is better than 90 per cent.

Pipe

Pipe Prices, Page 91

Pittsburgh — Specifications continue heavy for standard pipe. Mechanical tubing is moving rapidly and pipe production is estimated at close to 80 per cent. Construction accounts for most current pipe business. Little stocking has been noticed, the consuming rate running equal to or above production.

Boston—Accumulation of construction contracts is being reflected in mounting demand for merchant steel pipe for heating and plumbing. Several housing projects are included and work being figured for bids in the near future is heavy. Holyoke Valve & Hydrant Co., Holyoke, Mass., is furnishing the pipe for a gasoline fueling system, Westover Field, Chicopee, Mass.

New York — While devoid of large tonnages, demand for commercial pipe is fairly active, with prospects encouraging. Several large pending building projects will require substantial tonnages of plumbing and heating pipe. Much of current activity is attributed to anticipatory buying by jobbers and utility companies, who fear delivery

may become worse. Mechanical tubing demand in July was better than in June and further improvement is expected in August.

Birmingham, Ala.—Pipe plants average five days a week, largely on government orders for naval bases, and most of the tonnage is specified for rush delivery. Some business continues to come from the Pacific Coast.

Seattle — Demand is slack but out of stock business is fair. J. E. Hazeltine, Portland, is apparently low at $21,900 for furnishing Bonneville project with several thousand feet of wrought iron pipe for North Bonneville, Vernita and Napavine substations.

San Francisco—The largest cast iron pipe award of the year has been placed with American Cast Iron Pipe Co. and calls for 8300 tons of 28 and 32-inch pipe for the metropolitan water district, Los Angeles, for a line between Burbank and Santa Monica, Calif. Awards aggregated 8500 tons and brought the total to date to 30,423 tons as compared with 21,041 tons for the corresponding period in 1939.

Cast Pipe Placed

8300 tons, pipe line, Burbank to Santa Monica, Calif., for metropolitan water district, Los Angeles, to American Cast Iron Pipe Co., Birmingham, Ala.

500 tons, mainly 6 and 10-inch, cement lined, Panama, schedule 4150, to Lynchburg Foundry Co., Lynchburg, Va., and American Cast Iron Pipe Co., Birmingham, Ala., larger part to latter.

Cast Pipe Pending

300 tons, 2 to 8-inch, Spokane, Wash.; bids Aug. 8.

100 tons, soil pipe and fittings, Panama, schedule 4156; Construction Supplies Co., New York, low.

Unstated, 28,500 feet, 2 to 8-inch cast iron pipe for Spokane, Wash.; bids Aug. 8.

Rails, Cars

Track Material Prices, Page 91

Domestic freight car orders in July involved 5736 units, according to tentative estimates. Business was featured at the close by the placing of 500 all-steel box cars by the Norfolk & Western, with the Ralston Steel Car Co., Calumbus, O. This brought the Norfolk & Western's purchases during the month up to 1550 cars. The largest single distribution was that of the Illinois Central, 3000 steel box cars, the largest purchase of box cars by that road in the last 25 years. The Pennsylvania railroad will open bids Aug. 7 on various car and locomotive repair parts.

Locomotive buying is featured by placing of twenty 4-8-4 locomotives by the Southern Pacific with the Lima Locomotive Works, Lima, O.

Locomotives Pending

Ordnance department, Aberdeen proving ground, Maryland, one 65-70-ton diesel-electric locomotive; bids Aug. 9.

Car Orders Placed

Louisville & Nashville, twenty-five 70-ton covered cement hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Newburgh & South Shore, sixty 75-ton ore cars, to Pullman-Standard Car Mfg. Co., Chicago.

Norfolk & Western, 500 all-steel box cars, to the Ralston Steel Car Co., Columbus, O.

Locomotives Placed

Southern Pacific, twenty 4-8-4 steam locomotives, to Lima Locomotive Works, Lima, O.

Tin Plate

Tin Plate Prices, Page 90

Pittsburgh — Operations were lower last week, estimated at 71 per cent of capacity. Producers in-

dicate heavy stocks account for this. Productive capacity is slightly out of line with consumption, although heavy packs coming up currently are expected to eliminate this soon. Export business is still heavy.

Shapes

Structural Shape Prices, Page 90

Chicago — Mill backlogs are substantial and recent bookings high, though some fabricators report a downward tendency in inquiries, practically all recent project inquiries being of less than 100 tons each. Awards, however, are more impressive, and involve several lots of over 1000 tons each.

Boston — Construction contracts placed by the government on a cost-plus basis are frequently reaching the steel-bid stage ahead of expectations and more are being actually closed, including an 800-ton project, Newport, R. I., awarded to an Allentown, Pa., shop. For the industry as a whole, a survey indicates activity has not climbed beyond 50 per cent of capacity, although incoming tonnage is mounting and bookings for July are unofficially estimated at around 155,000 tons.

New York — While a heavy volume of structural steel is on the books for estimates to be figured within the next few weeks, a lull has developed in current contracting with awards limited to scattered small and medium-sized projects. Close to 8500 tons of buildings, including two schools, New York city, and held up, result of contractors insisting on a clause guaranteeing against higher material and labor costs.

Philadelphia — New business continues to appear and mills are well booked ahead. Du Pont is inquiring for 1000 tons for a powder plant near Charleston, Ind.

San Francisco—The most active market of the week was that for structural shapes and 11,106 tons were placed, bringing the aggregate for the year to 149,618 tons, over double the tonnage placed for the corresponding period in 1939 of 72,869 tons.

Toronto, Ont. — With construction work steadily increasing, demand for structural shapes is at the highest level in years. Announcement has just been made that new war construction projects totaling more than $13,000,000 will be started soon for which upwards of 20,000 tons of steel will be required. Awards for the past week were about 8000 tons. Fabricators report backlogs highest since 1929.

Shape Awards Compared

	Tons
Week ended Aug. 3	49,720
Week ended July 27	45,939
Week ended July 20	47,479
This week, 1939	16,866
Weekly average, year, 1940	21,216
Weekly average, 1939	22,411
Weekly average, July	33,958
Total to date, 1939	694,559
Total to date, 1940	657,694

Includes awards of 100 tons or more.

Shape Contracts Placed

5100 tons, addition, Lockheed Aircraft Corp., Burbank, Calif.; allocated as follows; 2500 tons to Consolidated Steel Corp., Los Angeles, 2300 tons to Bethlehem Steel Co., Los Angeles, and 300 tons to Apex Steel Co., Los Angeles.

4800 tons, buildings, for Vega Aircraft Co., Los Angeles; 2400 tons to Bethlehem Steel Co., Bethlehem, Pa., and 2400 tons to Consolidated Steel Corp., Los Angeles.

4000 tons, power station No. 2, Venice,

Ill., to Stupp Bros. Bridge & Iron Co., St. Louis.

3581 tons, gates, schedule 4085, Panama Canal, to United States Steel Export Co., New York.

3500 tons, 44 ammunition magazines, Savanna, Ill., for government, to Bethlehem Steel Co., Bethlehem, Pa.

2900 tons, hangars, naval air station, Jacksonville, Fla., to Steel Construction Co., Birmingham, Ala.

1650 tons, depot supply building, Hill field, Ogden, Utah, to Kansas City Structural Steel Co., Kansas City, Mo.

1500 tons, addition to shop building and storehouse, air station, Jacksonville, Fla., to Jones & Laughlin Steel Corp., Pittsburgh.

1400 tons, addition to plant, for Vultee Aircraft Corp., Los Angeles, to Consolidated Steel Corp., Los Angeles.

1300 tons, hangar and annexes, Hill field, Ogden, Utah, for government, to Bethlehem Steel Co., Bethlehem, Pa.

1200 tons, three double hangars, Miami, Fla., to Virginia Bridge Co., Roanoke, Va.

1200 tons, state bridge, Franklin Park, Ill., to Midland Structural Steel Co., Cicero, Ill.

1075 tons, factory addition, Caterpillar Tractor Co., Peoria, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

900 tons, engineering shop expansion building, Dayton, O., for government, to R. C. Mahon Co., Detroit.

800 tons, store house and explosives manufacturing building, naval station, Newport, R. I., to Lehigh Structural Steel Co., Allentown, Pa.; Tredennick-Billings Co., Boston, contractor.

730 tons, steel piling, Diversey-Fullerton parkway grade separation, Chicago park district, to Inland Steel Co., Chicago.

620 tons, hospital and school, West Salem, N. C., to Carolina Steel & Iron Co., Greensboro, N. C.

615 tons, power house, Pickwick dam, Tennessee valley authority, req. 199586, to Milwaukee Bridge Co., Milwaukee.

600 tons, plant addition, Bausch & Lomb Optical Co., Rochester, N. Y., to F. L. Heughes & Co., Rochester, N. Y.

550 tons, steel piling, Diversey-Fullerton parkway grade separation, Chicago park district, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, state highway bridge, Clearfield, Pa., to American Bridge Co., Pittsburgh.

460 tons, technological institute, for Northwestern university, Evanston, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

450 tons, building and warehouse extension, for Babcock & Wilcox Tube Co., Beaver Falls, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

440 tons, bridges, Fullerton parkway, Chicago, for Chicago Park district, to Bethlehem Steel Co., Bethlehem, Pa.

425 tons, intake gate, rail support towers, Kentucky project, Tennessee valley authority, Knoxville, req. 239387, to Hunter Steel Co., Pittsburgh; bids July 15.

400 tons, building, Bakelite Corp., Bound Brook, N. J., to American Bridge Co., Pittsburgh.

400 tons, general utility shop, navy yard, Washington, to Barber & Ross Co., Washington; Harwood-Nebel Construction Co., Washington, contractor.

400 tons, double hangar, Green Cove Springs, Fla., to Virginia Bridge Co., Roanoke, Va.

362 tons, steel girder highway bridge, Gila river, Graham county, Arizona, to Bethlehem Steel Co., Bethlehem, Pa.; Martin Construction Co., Tucson, Ariz., general contractor.

350 tons, guide wall extensions, Mississippi river locks 16, 18, 20 and 21 for government, to Mississippi Valley Structural Steel Co., Decatur, Ill.

345 tons, boiler house, Public Utility Engineering & Service Corp., Pueblo, Colo., to Muskogee Iron Works, Muskogee, Okla.

330 tons, extensions and additions to buildings, for General Electric Co., West Lynn, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, land plane hangar, Dahlgren, Va., to Fort Pitt Bridge Works, Pittsburgh.

300 tons, state bridge over Tioga river, Mansfield, Pa., to Fort Pitt Bridge Works, Pittsburgh.

295 tons, barrel racks, Dundalk, Md., to International Steel Co., Evansville, Ind.

290 tons, store building, Hotels Statler Inc., Buffalo, to Ernst Iron Works, Buffalo.

284 tons, state highway bridge Clallam county, Washington, to Pacific Car & Foundry Co., Seattle; Macri & Colucio, Seattle, general contractors.

260 tons, addition to plant, for Garlock Packing Co., Palmyra, N. Y., to F. L. Heughes & Co., Rochester, N. Y.

255 tons, shop building, ordnance school, Aberdeen, Md., to Belmont Iron Works, Eddystone, Pa.

250 tons, state highway project RC-40-50 and 60, grade elimination over New York Central, Wassaic, Dover Plains-

Pawling town line, Dutchess county, New York, to Bethlehem Steel Co., Bethlehem, Pa.; D. W. Winkelman Co., Syracuse, N. Y., contractor, $235,440.65, bids July 10, Albany.

235 tons, building, Employers Mutual Insurance Co., Wausau, Wis., to Wausau Bridge Co., Wausau, Wis.

235 tons, deck plate girder bridge, Seaboard Air Line, Bracey, Va., to Virginia Bridge Co., Roanoke, Va.

230 tons, state bridge RC-40-51, Addison, N. Y., to American Bridge Co., Pittsburgh.

205 tons, bascule bridge, Dewey Beach, Del., to Phoenix Bridge Works, Phoenixville, Pa., through George E. Shockley, Rehobeth Beach, Del.

200 tons, crude oil heater units, Standard Oil Co., Bayonne, N. J., to Pittsburgh Bridge & Iron Co., Pittsburgh; Arthur G. McKee & Co., Cleveland, engineers.

200 tons, manufacturing building, for Harville Co., Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

180 tons, McKean county court house, Smethport, Pa., to Ernst Iron Works Inc., Buffalo, Border Building Co., Buffalo, contractor.

175 tons, structure, for Tidewater Associated Oil Co., Bayonne, N. J., to Savery & Glaeser Co.

175 tons, duPont laboratory, Buffalo, to Ernst Iron Works, Buffalo.

170 tons, soaking pit furnace, Bethlehem, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

150 tons, state bridge over Scantic river, South Windsor, Conn., to American Bridge Co., Pittsburgh.

145 tons, residence, for Henry Sears, Greenwich, Conn., to White Plains Iron Works.

145 tons, trash racks, Wheeler dam, Alabama, Tennessee valley authority, Knoxville, req. 243853 and 243926, to Treadwell Construction Co., Midland, Pa.

140 tons, bridge 0.226, Roslyn, N. Y., for Long Island railroad, to American Bridge Co., Pittsburgh.

140 tons, plant extension, for Aetna Standard Engineering Co., Ellwood City, Pa., to Truscon Steel Co., Youngstown, O.

130 tons, factory building, for Sunbeam Electric Co., Evansville, Ind., to International Steel & Iron Co., Evansville, Ind.

125 tons, bridge, Mineola, N. Y., to American Bridge Co., Pittsburgh.

125 tons, recreation building and pedestrian bridge, East River park, New York, to Belmont Iron Works, Eddystone, Pa.

125 tons, bridge, New York, New Haven & Hartford railroad, Westport, Conn., to American Bridge Co., Pittsburgh.

125 tons, St. Robert's church, Chester, Pa., to Belmont Iron Works, Eddystone, Pa.

125 tons, pier sheds and building, Merchants' & Miners' Line, Providence, R. I., to Dietrich Bros., Baltimore.

120 tons, bridge SP-5690, Vernon county, Wisconsin, to A. C. Woods Co., Rockford, Ill.

120 tons, radial gates, specification 1353-D, Ignacio, Colo., for bureau of reclamation, to Phillips & Davies Inc., Kenton, O.

120 tons, piling and accessories, cable crossing ice breakers, Delaware Power & Light Co., Deep Water, N. J., to Bethlehem Steel Co., through Thomas Earl & Sons, Inc., Philadelphia.

115 tons, bridges, various locations, for Chicago, Milwaukee, St. Paul & Pacific railroad, to Milwaukee Bridge Co., Milwaukee.

115 tons, alterations, Poinsett Hotel, Greenville, S. C., to Southern Engineering Co., Charlotte, N. C.

115 tons, 13 beam spans, Iowa and Illinois, Chicago Great Western railroad, to American Bridge Co., Pittsburgh.

115 tons, bridge overpass, National airport, Arlington, Va., for government, to American Bridge Co., Pittsburgh.

108 tons, 218.61-foot, three-span continuous deck plate girder bridge, Westminster, Vt., to American Bridge Co., Pittsburgh; William H. Morse, Bennington, Vt., contractor, $24,304.30, bids July 19, Montpelier.

100 tons, steel piling, lagoon outlets, Chicago park district, to Inland Steel Co., Chicago.

100 tons, plant addition, Buffalo Foundry & Machine Co., Buffalo, to R. S. McMannus Steel Construction Co. Inc., Buffalo.

Shape Contracts Pending

9000 tons, eight hangars, naval air base, Quonset Point, R. I.

8200 tons, shapes, piling and miscellaneous steel, pressure conduit and appurtenant structures, Park river, Hartford, Conn.; bids Aug. 23 to U. S. engineer, Providence, R. I.

6500 tons shapes and 2500 tons piling, bridge, East Hartford, Conn.; plans available Aug. 15, bids about Sept. 15.

3500 tons, Kingsboro housing project, New York, bids postponed from Aug.

1 to 7.

2316 tons, Pennsylvania bridges, bids Aug. 9, to state highway department, Harrisburg, Pa.

2200 tons, extension to machine shop 171, Norfolk, Va., for U. S. navy.

1400 tons, hospital building, Willowbrook, Staten Island, N. Y.; bids Aug. 14.

1400 tons, through truss bridge, Bradford county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Aug. 9.

750 tons, power house, for West Penn Power Co., Power, W. Va.

550 tons, state highway bridge, Clinton County, N. Y., Louis Longhi Co., Torrington, Conn., low on general contract.

450 tons, machine shop alterations, navy yard, Portsmouth, N. H.

440 tons, manufacturing building, for Continental Can Co., Passaic, N. J.

430 tons, medical school building, Carlisle barracks, Pa., for government.

400 tons, apartment, 42 East Sixty-seventh street, New York; bids in.

400 tons, extension inside machine shop, Portsmouth, N. H., for navy.

400 tons, addition, Robinson Clay Products Co., Pottstown, Pa., bids Aug. 7.

360 tons, bridge 469, Malta, Mont., for Great Northern railway.

334 tons, flood wall, Portland, Oreg., for United States engineer office; bids Aug. 1.

265 tons, truss bridge, Northumberland county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Aug. 9.

250 tons, state prison building No. 11, Greenhaven, N. Y.

250 tons, state highway work, Lycoming county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Aug. 9.

240 tons, bridge over Pennsylvania railroad, Marginal street, New York, for city.

240 tons, tunnel supports, Ducherne tunnel, Provo River project, Utah; bids Aug. 21.

230 tons, building, for Borden Milk Co., Bainbridge, N. Y.

220 tons, building, for Denison university, Granville, O.

200 tons, addition, municipal hangar No. 3, LaGuardia Field, New York, bids Aug. 3.

200 tons, miscellaneous structural steel and piling, dike and Dwight pumping station, Chicopee, Mass.; B. A. Gardetta Inc., Boston, low, bids July 25, United States engineer, Providence, R. I.

175 tons, recreational building, for Backer Bros., Schenectady, N. Y.

160 tons, warehouse, for Jackson & Perkins, Newark, N. Y.

150 tons, field house, for Gould academy, Bethel, Me.

150 tons, exchange platform and crane runway, for Gulf Oil Corp., Philadelphia.

125 tons, building, Lowe Paper Co., Richfield, N. J.

125 tons, Panama, schedule 4155; International-Stacey Corp., Columbus, O., low.

120 tons, building, Borden Milk Co., 130th street, New York.

120 tons, state bridge 259, Caledonia, Wis.

120 tons, factory building, for Apex Machine & Tool Co., Dayton, O.

Unstated, Kettle river gorge superstructure and two railroad bridges, Columbia river; bids to reclamation bureau, Coulee, Wash., Aug. 19; Spec. 924.

Unstated, extension to dry dock, Philadelphia navy yard; cost plus contract to J. A. Brenneman, Philadelphia, and Kaufman Construction Co., Philadelphia.

Reinforcing

Reinforcing Bar Prices, Page 91

Pittsburgh — Construction attributable to the arms program is appearing in all sections of the country and swelling the list of new concrete bar tonnages. Highway work is also at its peak, and practically all mills now have substantial backlogs. Deliveries are being met in most cases, although there has been some delay in certain sections. Prices are steady and at the full quoted level.

Boston — In view of the tonnage involved, prices on 10,000 tons of concrete bars, for the Quonset Point, R. I., air station project, were firm enough to encourage sellers seeking to maintain quotations. While the full listed 2.15c, Sparrows Point, Md., was not obtained, there was no

open break. This is probably the largest reinforcing bar tonnage ever placed in New England, at least in recent years. Inquiry is heavier with flood control projects along the Connecticut taking close to 5000 tons of bars and piling.

Chicago — Demand has improved somewhat and awards and inquiries are heavier. Though the latter chiefly involve small tonnages individually the aggregate is substantial and comprises considerable school, hospital, housing project and garage work in addition to numerous government needs.

New York — Bids have been postponed on the Kingboro housing project, Brooklyn, involving approximately 2500 tons of reinforcing bars with an alternate on structural steel, closing Aug. 7. Largest inquiry in the East is 8000 tons for a Hartford, Conn., conduit, closing Aug. 23 with the United States engineer, Providence, R. I.

Philadelphia — Most business is now being placed at full 2.15c. Several moderate-sized jobs are pending.

Seattle — Demand for small lots of 50 tons or less has increased. Rolling mills still have considerable idle capacity. No large projects have developed this week. Merchant bars are moving in fair volume as jobbers replenish stocks. A Minneapolis jobbing house has taken 750 tons or more involved in the addition to the Spokane, Wash., postoffice.

San Francisco—A fair volume of reinforcing business was booked, 6589 tons, bringing the aggregate for the year to 104,642 tons, compared with 98,696 tons for the same period last year.

Reinforcing Steel Awards

10,000 tons, naval air station, Quonset Point, R. I., to Jones & Laughlin Steel Corp., Pittsburgh; George A. Fuller Co. and Merritt-Chapman & Scott Corp., New York, joint general contractors.

2900 tons, store house, naval air base, specification 9686, Alameda, Calif., to Bethlehem Steel Co., San Francisco.

900 tons, United States army ordnance depot, ammunition magazines, Savanna, Ill., to Truscon Steel Co., Youngstown, O., through Manhattan Construction Co., contractor.

637 tons, John Hay Homes housing, Springfield, Ill., to Missouri Rolling Mill Corp., St. Louis, through John Felmley Co., contractor.

510 tons, Southfield village housing, Stamford, Conn., to Truscon Steel Co., Youngstown, O., through John H. Eisele Co., contractor.

350 tons, bridge over San Joaquin River, Fresno and Madera county, Calif., for state, to Soule Steel Co., San Francisco.

324 tons, housing unit, Phoenix City, Ala., to Ceco Steel Products Corp., Montgomery, Ala., through Upchurch Construction Co., same city; also 45 tons shapes to Birmingham Ornamental Iron Works, Birmingham, Ala.

300 tons, DuPont office building addition, Wilmington, Del., to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., New York, contractor.

296 tons, six bridges in Solano and in Yolo county, Calif., for state, to Kyle & Co., Fresno, Calif.

200 tons, bridge, Elgin, Ill., to Illinois Hydraulic Stone Co., Elgin, Ill.

199 tons, men's dormitory, University of Illinois, Champaign, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

155 tons, highway and bridge, Bristol Mill, N. H., to Concrete Steel Co., Boston; Littleton Construction Co., Littleton.

Concrete Bars Compared

	Tons
Week ended Aug. 3	18,521
Week ended July 27	15,420
Week ended July 20	8,402
This week, 1939	11,775
Weekly average, year, 1940	8,745
Weekly average, 1939	9,197
Weekly average, July	8,543
Total to date, 1939	316,377
Total to date, 1940	271,090

Includes awards of 100 tons or more.

Behind the Scenes with STEEL

On vacation—see you next week.

SHRDLU

ton, N. H., contractor.

150 tons, belt parkway, contract E-1, Brooklyn, N. Y., to Joseph T. Ryerson & Son Inc., Chicago, through Ross Galvanizing Works Inc., contractor.

150 tons, addition, Rhode Island hospital, Providence, R. I., to Truscon Steel Co., Providence, R. I.

150 tons, mesh, five hangars, Westover Field, Chicopee, Mass., to Concrete Steel Co., Boston, Tuller Construction Co., Red Bank, N. J., contractor; 375 tons bars to Truscon Steel Co., Youngstown, O., as previously reported.

140 tons, culverts, Blackhawk and Crawford counties, Iowa, to Pittsburgh Des Moines Steel Co., Pittsburgh.

140 tons, store building, 7 North Wabash avenue, Chicago, to Concrete Steel Co., Chicago.

130 tons, Panama, schedule 4164, bids July 17, to Colorado Fuel & Iron Corp., Denver; Central Iron & Steel Co., Harrisburg, Pa., low on 460 floor plates, schedule 4166, opening same date.

130 tons, housing project, Savannah, Ga., to Bethlehem Steel Co., Bethlehem, Pa.; Artley Co., Savannah, contractor; Decatur Iron & Steel Co., Decatur, Ala., took 40 tons of structural steel.

125 tons, mesh, highway project RC-40-54, Seneca county, New York, to American Steel & Wire Co., New York; John Bellardino, Seneca Falls, N. Y., contractor.

120 tons, Mt. Vernon memorial highway bridge, Arlington county, Va.; to Bethlehem Steel Co., Bethlehem, Pa., through Diamond Construction Co., contractor.

110 tons, steel girder highway bridge, Gila river, Graham county, Arizona, to Allison Steel Mfg. Co., Phoenix, Ariz., Martin Construction Co., Tucson, Ariz., general contractor.

105 tons, grade separation, Hutchinson parkway, N. Y., to Capitol Steel Co., New York.

100 tons or more, Continental Can Co. plant, Walla Walla, Wash., to Truscon Steel Co., Youngstown, O.; The Austin Co., Seattle, general contractor.

100 tons, general utility shop, navy yard, Washington, to Taylor-Davis Inc., Philadelphia; Harwood-Nebel Construction Co., Washington, contractor.

100 tons, highway project, Harriscena-Fort Ann, New York, to Truscon Steel Co., Youngstown, O.; Belmar Co., Troy, N. Y., contractor.

100 tons, mesh, highway project RC-40-52, Cayuga county, New York, to American Steel & Wire Co., New York; Rochester Concrete Construction Co. Inc., Rochester, N. Y., contractor.

Unstated tonnage, addition, shop building, Magor Car Co., Passaic, N. J., to J. G. Schmidt Iron Works Inc., Passaic, N. J.; Samworth-Hughes Co., Paterson, N. J., contractor.

Reinforcing Steel Pending

8000 tons, Park river conduit, United States engineers, Hartford, Conn.; bids Aug. 23.

2900 tons, superstructure, Kingsboro housing, Brooklyn, N. Y.; bids Aug. 7.

2000 tons, veterans hospital buildings, Perry Point, Md.; bids Aug. 7.

2000 tons, power station, Union Electric Co. of Illinois, at Venice, Ill.

1500 tons, South End housing project, Bridgeport, Conn.; bids Aug. 12.

1000 tons, bridge, East Hartford, Conn.; plans available Aug. 15, bids about Sept. 15.

900 tons, veterans hospital, Marion, Ill.; bids rejected July 25; to be rebid, no date set.

505 tons, dike, south bank of Chicopee river and Dwight pumping station, Chicopee, Mass., B. A. Gardetta Inc., Roxbury (Boston), Mass., low, $279,324.50; bids July 25 to United States engineer, Providence, R. I. Tampa Shipbuilding & Engineering Co., Tampa, Fla., low on pumping station equipment, pumps, engines and gear units.

500 tons, housing project RI-2-1, Pawtucket, R. I., E. Turgeon, Providence, R. I., low.

350 tons, state highway projects, New York; bids Aug. 7, Albany, N. Y.

280 tons, Vineyard housing, Wheeling, W. Va., Don J. Byrum Inc., low.

250 tons, Pennsylvania state highway project No. R-14, Bradford county, Pa.; bids Aug. 9.

250 tons, Brooklyn shaft, Battery-Brooklyn tunnel, New York.

235 tons, mesh, highway project RC-40-66, Clinton county, New York; Louis Longhi & Son, Torrington, Conn., contractor, $255,919.30, bids July 10, Albany.

200 tons, prison building No. 11, Greenhaven, N. Y.

170 tons, mesh, highway project, route S-3, section 1-A, 1.461 miles, Bergen county, New Jersey; bids Aug. 16, E. Donald Sterner, state highway commissioner, Trenton, N. J.

166 tons, wasteways, Boise, Idaho, reclamation project, Vernon Bros., Boise, low; materials by bureau.

150 tons, General Motors Corp., Aero Products division building, Vandalia, O.; bids July 30.

130 tons, mesh, highway project RC-40-29, Schenectady county, New York; S. A. Scullen Inc., Cohoes, N. Y., contractor, $133,725.30, bids July 10, Albany.

129 tons, bridge, Orange county, Calif., for state; bids Aug. 15.

110 tons, grade elimination over Erie railroad, Johnson City, N. Y.; bids July 24.

100 tons, bars and joists, state teachers' college, Albany, N. Y.

Unstated tonnage, prison building, Greenhaven, N. Y.; William Berbusse, White Plains, N. Y., low.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 91

New York—Bolt and nut business increased last month and with prospects of automotive buying substantially heavier a further gain in general volume is anticipated. Both construction and railroad requirements have been greater and jobbers have been replacing stocks more freely. Prices are firmer.

Pig Iron

Pig Iron Prices, Page 92

Pittsburgh — Pittsburgh district pig iron production during July showed a substantial increase over June and it is expected the gain will continue through August. No furnaces have been added, and 40 are active out of 50. Increasing iron production brings the focus of attention on coke. Some observers here see the possibility of a coke shortage because beehive producers intend to proceed cautiously to prevent being caught with stocks, as was the case last fall when the market dried up after substantial increases in beehive operations had appeared. Iron prices are firm.

Chicago — Most foundries and steel mills took in more pig iron during July than in June, but because of automotive and agricultural implement plant shutdowns the total tonnage shipped in July was slightly lower. Because many consumers, fearing shortages and possible price advance, ordered heavily for third quarter, considerable tonnage may be carried over into fourth quarter.

Boston—Pig iron activity has slackened, with buying light and shipments to consumers lower. On the whole, however, foundry melt is maintained. Shops supplying the machine tool trade are steadily engaged and stovemakers are more active. Lag in buying and shipments is attributed to consumers having covered heavily and having taken deliveries on some tonnage in excess of current production schedules.

New York — Buying is relatively light as most melters are well covered. Specifications are heavy, though slightly smaller than in June and most producers are shipping some tonnage from stock to meet demand. Except for shipments to England export is less and there is not much inquiry, most of current export demand coming from South Africa. Application of minimum bituminous coal prices may be a factor in increasing coke prices and possibly also pig iron prices for fourth quarter.

Philadelphia — Shipments to domestic consumers increased 10 to 15 per cent in July, compared with June and August releases indicate further increases up to 50 per cent. Average melt now is estimated at 75 per cent. Furnaces are dipping into stocks and in some grades supplies are light.

Buffalo—July pig iron shipments exceeded the June volume by approximately 10 per cent, despite a falling off during the past week. While the recent tapering is not

alarming, producers claim a rebound must develop to move all third quarter tonnages now on the books.

Cincinnati—Previous pig iron coverage precludes active sales, but deliveries are being maintained near previous volume. A slight decline last month, in comparison with June, was laid to seasonal influences. The Hamilton division of American Rolling Mill Co. will blow out one of two blast furnaces for rebuilding and enlargement. Merchant iron is being piled in anticipation.

St. Louis—Increase in pig iron shipments during the first half of July over the like interval in June has been much reduced in the last two weeks, with result that total July movement will show little change from June, according to preliminary reports of sellers. The melt likewise has receded slightly, but shows less than expected seasonal decline. Buying is confined to small lots, all for prompt shipment. Sellers report principal buyers well covered, and expansion in sales is not expected.

Toronto, Ont. — Demand for merchant pig iron is well sustained and spot demand is gaining. Melters are buying at frequent intervals in lots of 100 to 500 tons. The daily melt has passed 85 per cent with further improvement promised for last quarter.

Scrap

Scrap Prices, Page 94

Pittsburgh — The scrap market took a definite turn last week toward a stronger position, although only one sale of importance was made. This was in blast furnace material, and raises the quotation on borings and turnings $1. Prices on open-hearth material remain unchanged and probably will show little activity this week in the face of extremely heavy railroad offerings.

Cleveland—Scrap is dull with prices irregular but heavier lines fairly steady. Railroad lists closings afford the only feature.

Chicago — Market firmed up toward the end of last week and dealer-broker trading in No. 1 steel was reported at $17.50. Meantime, however, a leading consumer bought at this level. Foundry buying and out-of-town transactions have increased somewhat and decidedly more activity is expected.

Boston—At unchanged and for the most part untested prices, domestic buying of scrap is slow for both New England and eastern Pennsylvania delivery. For export most heavy melting steel

grades are bringing $16 and $14.50 with most purchases against orders for Great Britain. However, at least one Japanese cargo was completed by Aug. 1.

New York — Scrap prices are assuming a firmer tone following clarification of export licensing regulations, which are less drastic than expected. Domestic buying is steady, but light, although one broker has sold a substantial tonnage of heavy melting steel to an eastern Pennsylvania mill. Most steelworks are taking shipments against contracts. Stove plate is stronger. Apparently most tonnage booked for Japan will be shipped, fully 70 per cent of purchases by that country having been bundles or No. 2 steel, which are not included in the license order.

Philadelphia — Japan is reported negotiating for an additional tonnage of heavy melting steel. While No. 1 now is subject to export license it is believed no early ban is in prospect. A domestic consumer has bought 6000 tons originally destined for Italy. Brokers currently are paying $17.50 for No. 1 and $16.75 for No. 2, with premiums for quick shipments, often necessary under British method of scheduling boats. Domestic mills are more interested as reserves have been materially reduced.

Buffalo—On a sale of approximately 6000 tons of No. 2 heavy melting steel recent nominal price reductions of 50 cents a ton were confirmed. The range on No. 2 steel is $16 to $16.50, with No. 1 at $18 to $18.50. A boatload of about 5000 tons of No. 1 heavy melting from Duluth and another vessel with 7000 tons of borings from Detroit arrived for local mill consumption during the past week.

Detroit — Scrap market is spotty, lists closing showing strength in some items and weakness in others. Chrysler tonnage for August apparently will be up only slightly. Mills have sufficient stocks and show little interest in adding to backlogs at present prices.

Cincinnati — The iron and steel scrap market is rather dull despite fair tonnage to mills on contracts. Licensing of exports weakened sentiment but not enough to send prices down, a counter-influence being belief more market activity will develop in the early fall.

St. Louis—While trading in iron and steel scrap is virtually at a standstill, undertone is stronger and several specific increases have been made. Dealers believe that the next week or ten days will witness purchases by at least two leading mills.

Birmingham, Ala. — Scrap prices are lower on several grades although the district's largest buyer is temporarily in the market. No. 1 heavy melting steel is off $1, to $15 a ton.

Seattle — Announcement of export embargo regulations effective Aug. 1 on shipments of metal scrap to Japan did not catch the market unawares as possible action of this character has been anticipated, accounting for a fairly steady volume of Japanese buying during recent months. Export prices vary from $14.50 to $16, at about the same levels of a month ago. Exporters are making efforts to clean up their shipments.

Toronto,, Ont. — Trading in iron and steel scrap shows improvement and dealers report better offerings. Larger tonnages are coming in from northern areas. Both steel and iron grades are in brisk demand from consumers, and in addition to taking all offerings for spot delivery inquiries are numerous for large future bookings.

San Francisco — While scrap prices still remain unchanged, a reduction is looked for next week. No. 1 heavy melting steel is priced at $13.50 to $14, f.o.b. cars, metropolitan area of San Francisco and Los Angeles with No. 2 at $12.50 to $13.

Warehouse

Warehouse Prices, Page 93

Chicago—Sales volume is still high, though off slightly in the past week. Curtailment was not noted in any particular product. July bookings were on a par with June and in some cases slightly better.

New York—Volume with steel warehouses is improving, tonnage and dollar totals showing substantial gains last month compared with June with most jobbers. Alloys, notably bars, and seamless tubing are moving well, with demand increasing. Heavier products, including plates and shapes, are more active and buying in general is well diversified.

Philadelphia — July sales were 10 to 15 per cent larger than in June. August trade starts slowly but the number of orders is holding well and it is believed mill delivery extensions will divert more business to warehouses.

St. Louis—Steel warehouse sales in July exceeded expectations of most interests. While declining somewhat during the last two weeks, under seasonal influences, volume is estimated to be about equal to that of June and to exceed

that of July last year by at least 10 per cent.

Buffalo — Better sentiment prevails as aggregate sales for July were the best for the year, and 5 to 10 per cent larger than the June total. Encouragement was also found in the mild gain in heavy lines.

Detroit—Cartage strike, now in its second week, has forced suspension of some warehouse steel shipments, but business in general is at a fair level. Unloading and delivery of several hundred railroad cars has been delayed because of the strike.

Cincinnati—Warehouse sales during July were sustained by active industrial demand. Seasonal effects were thereby modified. Deliveries in July point to the same levels. Prices are steady.

Seattle — Sales continue satisfactory, much business due to federal projects. The market is generally firm but there is no indication of immediate rise in prices.

Iron Ore

Iron Ore Prices, Page 94

Cleveland — Iron ore shipments from upper lake ports in July, railroad weights, totaled 10,433,488 gross tons, third highest July in history. The total to Aug. 1, considered half way of the navigation season, was 27,707,178 tons, according to the Lake Superior Iron Ore association, Cleveland. The increase during July over the comparable month last year was 65.35 per cent and for the season to date 78.25 per cent. In July, 1937, ore movement was 10,704,457 tons, and in July, 1929, it was 10,670,882 tons.

New York—Metals Reserve Co., Washington,has brought 59,000 tons of manganese ore, in addition to 68,000 tons bought a fortnight ago. This brings the total to 127,000 tons. The federal government had previously bought about 80,000 tons, giving an aggregate of 207,000 tons for future emergencies. Ore in the latest purchase will come principally from India and South Africa, as was the case with the preceding purchase. Prices in both cases are believed to have been about 60 cents per unit, before duty, for 50 per cent ore. The company is negotiating for 10,000 tons of manganese ore from Chile.

Ferroalloys

Ferroalloy Prices, Page 92

New York—As some excess stock laid in by consumers in June prior to the price advance has been worked off, leading sellers believe that ferromanganese shipments will probably show improvement this month. However, the effect of this forward covering in June will likely be reflected to a certain degree for another few weeks to come. Consumption continues heavy, particularly for this season of the year, and this applies to most ferroalloys.

Steel in Europe

Foreign Steel Prices, Page 93

London—(*By Cable*)—Deliveries of steel to ordinary commercial users in Great Britain have been drastically reduced but larger tonnages are available for export, especially in sheets. War contracts position is satisfactory as imports of iron ore and American semifinished steel are improving. Manufacture of tin plate containers has been prohibited except in certain standard sizes. Considerable inquiry for tin plate is coming from Australia.

Equipment

New York — Influx of machine tool orders, with inquiry mounting, continues to tax assembly shops and despite full time and extra production schedules deliveries are further deferred. Aircraft, shipyard and other industries involved in defense contracts are buying for expanding production schedules, and, in some instances having taken work somewhat foreign to regular lines are seeking tools for the fabrication of new materials. British have taken over most of the tools on order for the French in this district, although one list placed before the arrival of the joint commission is being offered in the open market with some doubt as to delivery on some units. Priority on deliveries will be avoided with co-operation of builders if possible, but in the matter of steel supplies, machine tool builders will be given preferential consideration should shortages or long delays develop later.

Boston — Steadily mounting inquiry for machine tools for government shops accompanies heavy buying by private industry, notably from branches connected with the production of armaments and defense supplies. Aircraft shops and shipyards are seeking as early delivery as possible on many tools. Shop backlogs are gaining and there is little improvement in deliveries. Springfield armory has bids on 30 drill presses; navy closes Aug. 13 on four horizontal heavy duty milling machines for Portsmouth, N.

H., and ten engine lathes for Newport, R. I. National Acme Co., Cleveland, took a screw machine for Springfield at $19,767.30 and Bullard Co., Bridgeport, Conn., boring mill for Frankford, Pa., arsenal at $20,467.

Seattle — Dealers report increased interest, particularly for pumping machinery and electrical equipment. General Electric Co., Schenectady, N. Y., is low at $570,159 to reclamation bureau for furnishing six outdoor type transformers for Unit L2, Coulee power house. Pacific Pumping Co., Portland, Oreg., is low to Bonneville project for furnishing equipment. Tacoma will call bids soon for three 1500-kva transformers, $15,000 available. York Ice Machine Co. is low at $14,642 to reclamation bureau for furnishing equipment at the Leavenworth, Wash., hatchery cold storage plant. Seattle will open bids Aug. 5 for six disconnecting switches and miscellaneous equipment. Electric & Fixture Co., Seattle, has the contract at $71,958 for extending the fire protection system at Keyport, Wash., naval base.

Nonferrous Metals

New York — Consumers bought copper actively last week on a rising market but failed to give the strong tin market much support. Only moderate business was booked in lead and zinc at unchanged prices.

Copper — With refiners' scrap intake small for the second week the tight spot supply situation was aggravated, resulting in a runup of ⅝-cent in outside copper prices. Custom smelters quoted 11.25c, Connecticut valley, at the close, compared with 11.50c by leading mine producers. Brass ingot, casting copper, and red metal scrap prices also moved higher. Sales for the week totaled nearly 25,000 tons, the largest turnover since mid-June.

Lead — Sellers at least balanced their week's intake and in some instances exceeded their quota for the period on moderate day-to-day business. Prices held at 4.85c, East St. Louis. Total stocks declined 3221 tons during June, strengthening the statistical position of the industry.

Zinc — The steady advance in the galvanized sheet output rate to new highs for the year to date has bolstered sentiment in the face of continued light demand. Prime western held at 6.25c, East St. Louis.

Tin — Straits spot rose to a high of 52.87½c on substantial buying here and then declined as consumers failed to support the higher levels. The market closed at 52.12½c. Metals Reserve Co. has bought 2975 tons for the government's reserve supply but has been able to get very little recently at its 50-cent level. Caswell Strauss again was the successful bidder on the navy's inquiry for 500,000 pounds.

Antimony — Only routine business was booked on the basis of 14.00c, New York, for American spot.

■ Ransome Concrete Machinery Co., Dunellen, N. J., has appointed the following exclusive sales representatives for its line of welding tables and positioners: Wessendorff, Nelms & Co., Houston, Tex., and Welding Sales & Engineering Co., Detroit. Ransome has also entered into a non-exclusive selling arrangement with Jones-Sylar Supply Co., Chattanooga, Tenn.

Nonferrous Metal Prices

July	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
27	*10.62½	11.50	10.50	51.62½	50.50	5.00	4.85	6.25	19.00	14.00	35.00
29	*10.87½	11.50	10.50	52.00	50.75	5.00	4.85	6.25	19.00	14.00	35.00
30	*11.00	11.50	10.62½	52.50	51.25	5.00	4.85	6.25	19.00	14.00	35.00
31	*11.25	11.50	10.87½	52.87½	51.62½	5.00	4.85	6.25	19.00	14.00	35.00
Aug.											
1	*11.25	11.50	10.87½	52.62½	51.25	5.00	4.85	6.25	18.00	14.00	35.00
2	*11.25	11.50	10.87½	52.62½	50.87½	5.00	4.85	6.25	18.00	14.00	35.00

*Based on sales by custom smelters; mine producers unchanged at 11.50c.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.56
Copper, hot rolled 20.12
Lead, cut to jobbers 8.25
Zinc, 100 lb. base 11.50

Tubes

High yellow brass 21.31
Seamless copper 20.62

Rods

High yellow brass 13.53
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.81

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 7.12½-7.37½
Cleveland 7.75-8.00
Chicago 7.00-7.25
St. Louis 7.75

Heavy Copper and Wire

New York, No. 1 ..... 8.75-9.00
Cleveland, No. 1 ..... 8.75-9.00
Chicago, No. 1 ..... 8.25-8.50
St. Louis 8.75

Composition Brass Turnings

New York 6.75-7.00

Light Copper

New York 6.75-7.00
Cleveland 6.75-7.00
Chicago 6.25-6.50
St. Louis 6.75

Light Brass

Cleveland 4.00-4.25
Chicago 4.25-4.37½
St. Louis 4.25

Lead

New York 4.50-4.60
Cleveland 3.90-4.15
Chicago 3.75-4.00
St. Louis 3.75-4.00

Zinc

New York 3.50-3.75
Cleveland 3.00-3.25
St. Louis 3.25-3.50

Aluminum

Misc., cast, Cleveland 8.00
Borings, Cleveland 6.50
Clips, soft, Cleveland 14.00
Misc. cast, St. Louis 7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .. 11.75
Standard No. 12 aluminum 13.50

Price of Aluminum Is Again Reduced

■ In line with the policy of a continuing lower trend in its prices, Aluminum Co. of America made another price reduction of 1 cent a pound for aluminum, effective Aug. 1. March 25 the company lowered its price for aluminum from 20 cents to 19 cents a pound. The price now is 18 cents.

In discussing the company's price policy last November, Roy A. Hunt, president, said: "The benefits of research and development, with expansion of plants and facilities, permit the company to expect lower costs. . . It intends to share such economies with consumers."

Construction and Enterprise

Pennsylvania

BRISTOL, PA.—Fleetwings Inc. will build an airplane manufacturing plant addition costing over $40,000.

ELLWOOD CITY, PA.—Aetna Standard Engineering Co., R. D. Lake, purchasing agent, Home Savings & Loan building, Youngstown, O., has let general contract to J. L. Joyce Construction Co., 154 Roslyn drive, Youngstown, for a one-story addition and boiler house 100 x 350 feet.

EMAUS, PA.—Boro council, O. T. Iobst, clerk plans sewage disposal plant to cost $55,000. Boro engineering department in charge.

ERIE, PA.—Johnson Metal Products Co., R. S. Van Cleve, president, 1316 Holland street, will build a one-story factory and office building 125 x 556 feet, costing $80,000. H. Nelson, 1731 Oxford street, is engineer.

READING, PA.—Metropolitan Edison Co., Washington street, will build a power plant addition 100 x 150 feet, costing about $150,000. General contract to L. H. Focht & Son, Baer building. Utility Management Corp., Washington street, is engineer.

TITUSVILLE, PA.—Robert A. Locke, Middletown, Pa., is developing 84 acres crude oil land and will drill 12 or more deep wells, lay pipelines and erect steel storage tanks and pressure plant. Cost over $50,000.

YORK, PA.—Penn Tool & Mfg. Co., Hartman and Wellington streets, will build an addition 50 x 60 feet, costing $40,000 with equipment. General contract has been let to Dietz A. Smith, York.

Maine

BATH, ME.—Bath Iron Works Corp., A. M. Main, vice president, Bath, will build a shipbuilding plant addition costing over $150,000. Morton C. Tuttle Co., 862 Park Square building, Boston, is engineer.

■ **Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 103 and Reinforcing Bars Pending on page 106 of this issue.**

New York

LONG ISLAND CITY, N. Y.—American Valve Co. has bought a site 81 x 100 feet here and will build a warehouse and garage.

VALHALLA, N. Y.—Owner, care board of supervisors Westchester county, W. F. Bleakely, county executive, is buying a site for an airplane manufacturing plant. Total investment to be over $500,000.

New Jersey

BOUND BROOK, N. J.—Bakelite Corp., 247 Park avenue, New York, will let contract soon for a 2½-story, 80 x 260-foot manufacturing and laboratory building on River road. Francisco & Jacobus, 511 Fifth avenue, New York, are architects.

MAHWAH, N. J.—American Brake Shoe & Foundry Co., Ramapo Valley road, is taking bids on a one-story 50 x 108-foot manufacturing building addition. F. M. Poe, care company, is engineer.

NEWARK, N. J.—Mueller Brass Co., Port Huron, Mich., has let general contract to David C. Evans, 1445 North Broad street, Hillside, N. J., for a manufacturing building, one-story, 100 x 200 feet, costing about $50,000. Ballinger Co., 105 South Twelfth street, Philadelphia, is architect.

Ohio

AKRON, O.—B. F. Goodrich Co. will undertake considerable remodeling and enlargement. Includes work on Philadelphia rubber plant building No. 8, mill No. 3. Latter work will cost about $38,000.

AKRON, O.—American Scrap Iron & Metal Co. has been incorporated, Harry Trottner, president, with 100 shares no par stock. Richard T. McCullough is attorney.

AKRON, O.—B. F. Goodrich Co. is building a three-story plant with 12,000 square feet floor space at Niagara Falls, N. Y., for manufacture of Koroseal, a synthetic rubber material.

CLEVELAND—H. Leff Electric Co., 5123 Woodland avenue, has plans by Simon & Simon, 5300 Chester avenue, for a two-story factory, warehouse and office, 48 x 130 feet, costing about $45,000.

CLEVELAND—Ramsey Bros. Inc. is being formed by Fred T. and E. R. Ramsey, 13125 Shaker square, and R. W. Bennett. It will conduct an air conditioning and refrigeration equipment business.

CLEVELAND—Columbia Axle Co., 850 East Seventy-second street, Roy Faulkner, president, will remodel and enlarge present plant for manufacture of new product.

ELYRIA, O.—Romec Pump Co., freed

of federal receivership, will buy $20,000 worth of new equipment to meet demands for product. Paul E. Ryan is president.

MARION, O.—Universal Cooler Co., Detroit, F. S. McNeal, president, will move here, occupying remodeled Susquehanna Silk Mills plant.

Michigan

ANN ARBOR, MICH.—Mercury Steel Corp., 1344 North Main street, has been incorporated with $50,000 capital to deal in fabricated steel products, by Charles A. Verschoor, 708 Wolverine building, Ann Arbor, Mich.

DETROIT—Peninsular Grinding Wheel Co., 729 Meldrum street, has let general contract for two-story 50 x 120-foot plant addition to Krieghoff Co., 6661 French road, costing about $40,000. H. G. Ilgenfritz, 468 Prentis avenue, is architect. (Noted June 10.)

PLYMOUTH, MICH.—Ra Mfg. Co. has been incorporated with $25,000 capital to manufacture and sell automobile and airplane parts, by Rhoda M. Mack, R.F.D., Plymouth, Mich., and associates.

PONTIAC, MICH.—Wilson Foundry & Machine Co., South Saginaw street, is having plans drawn by L. J. Heenan, 609 Peoples State Bank building, for a foundry plant addition and alterations, 80 x 145 feet, to cost about $200,000.

YPSILANTI, MICH.—Motor Sale Products Co. is having plans prepared by R. S. Gerganoff, 206 North Washington street, for a plant addition to cost about $40,000.

Illinois

CHICAGO—Bastian-Blessing Co., Lewis G. Blessing, president, 240 East Ontario street, will build new plant, one story, 165,000 square feet floor space, at Fairbank court and Ontario street. Site is sufficient to allow future expansion.

Missouri

MARYVILLE, MO. — Nodaway-Worth electric co-operative, Gerald Noedeker, co-ordinator, is making plans to build 412 additional miles rural transmission lines to serve 1075 customers. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are consulting engineers.

ST LOUIS—American Car & Foundry Co., 2800 DeKalb street, will take bids soon for car paint shop on Dorcas avenue between Second street and Iron Mountain railroad, one-story, 1000 feet long, containing modern power equipment and machinery to handle railway cars. Cost about $400,000. E. C. Stolberg, 30 Church street, New York, is in charge.

Wisconsin

NEENAH, WIS.—J. W. Hewitt Machine Co. will build shop addition 30 x 49 feet on North Commercial street, costing about $6500. Fluor Bros. Construction Co., Oshkosh, Wis., is general contractor.

PORT WASHINGTON, WIS. — Wisconsin Electric Power Co., 231 West Michigan avenue, Milwaukee, will build a power plant addition and install equipment at cost of more than $7,000,000. F. Luber, care owner, is architect.

Minnesota

GRAND RAPIDS, MINN.—REA has allotted $233,000 to Dairyland electric co-operative for 266 miles of rural transmission lines, serving 880 customers.

HERON LAKE, MINN.—Village, H. G. Pratt, clerk, will make survey for municipal electric light plant.

LANESBORO, MINN.—Village, J. C. Austin, clerk, taking bids Aug. 9 on construction of pump house, pumping equipment, electric wiring and piping. Toltz, King & Day, 1509 Pioneer building, St. Paul, are consulting engineers.

OWATONNA, MINN. — Public utility commission, W. J. McDonnell, secretary, takes bids to Sept. 10 for steam generating unit and auxiliaries. Pillsbury Engineering Co. and W. S. Burlingame, Minneapolis, are consulting engineers.

ST. PAUL—H. W. Austin, city purchasing agent, 253 Court House, takes bids Aug. 6 on one Kewanee type C, stoker-fed boiler with 8500-feet rating, and one underfeed stoker.

VIRGINIA, MINN.—REA has approved contract by Northern electric co-operative, Fritz E. Anderson, superintendent, to Zontelli Bros., Ironton, Minn., at $231,552 for 301 miles transmission lines to serve 750 customers. H. S. Bliss, 2944 Cedar avenue, Minneapolis, is consulting engineer.

Texas

CORPUS CHRISTI, TEX. — Central Power & Light Co., J. T. Persons, chief engineer, plans addition to house 15,000-kw turbine, boilers and accessories. Sar-

gent & Lundy Inc., 140 South Dearborn street, is designing engineer.

Kansas

BURLINGTON, KANS.—Coffey county rural electric co-operative has filed application with REA for funds for 366 miles of rural transmission lines in Franklin, Anderson, Woodson and Coffey counties. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are consulting engineers.

CLAY CENTER, KANS.—City, Clay C. Smith, mayor, holds election Aug. 5 on $150,000 bond issue for municipal power plant improvements. Burns & McDonnell, 107 West Linwood boulevard, Kansas City, Mo., are consulting engineers.

COUNCIL GROVE, KANS.—Flint Hills rural electric co-operative, L. G. Olson, president, has applied to REA for funds for 278 miles rural transmission lines in six counties. Paulette & Wilson, 1006 Kansas avenue, Topeka, Kans., are consulting engineers.

GODDARD, KANS.—REA has allotted $108,000 to Sedgwick county electric co-operative, J. W. Guthrie, superintendent, for 185 miles rural transmission lines. E. T. Archer & Co., 609 New England building, Kansas City, Mo., are consulting engineers.

NEODESHA, KANS.—City, C. R. Mong, mayor, holds election Aug. 6 on $112,000 bond issue for installation of 700-kilowatt, 1000-horsepower and a 600-kilowatt engine and other improvements at municipal power plant.

NORTON, KANS. — Norton-Decatur electric co-operative has let contract to Crawford Electric Co., North Platte, Nebr., at $57,808 for 104 miles rural transmission lines and two power substations. Raymond H. Reed, Case building, Abilene, Kans., is consulting engineer.

North Dakota

GRAND FORKS, N. DAK.—Minn-Kota power co-operative takes bids to Aug. 9 on three diesel-engine-driven generating units. Ellerbe & Co., E-1021 First National Bank building, St. Paul, consulting engineer.

South Dakota

WATERTOWN, S. DAK.—City, F. J. Hubbard, auditor, is making survey for municipal light plant. Ralph D. Thomas & Associates, 1200 Second avenue South, Minneapolis, are consulting engineers.

Iowa

CRESCO, IOWA—Howard county electric co-operative, E. G. Skarshoug, superintendent, will ask bids early in August on 377 miles rural transmission lines to cost about $343,000. K. R. Brown, 803 Valley Bank building, Des Moines, Iowa, consulting engineer.

ESTHERVILLE, IOWA—REA has allotted $155,000 to DEK rural electric co-operative, B. B. Shreck, superintendent, to finance construction of 180 miles rural transmission lines, serving 425 customers.

GLIDDEN, IOWA—REA has allotted $95,000 to Glidden rural electric co-operative, Thomas Conner, superintendent, for 118 miles rural transmission lines to serve 300 customers.

IOWA FALLS, IOWA—Hardin county rural electric co-operative, Ben Jaspers, superintendent, will ask bids early in August for 269 miles rural transmission lines, serving 600 customers. K. R. Brown, 803 Valley Bank building, Des Moines, is consulting engineer.

POCAHONTAS, IOWA—REA has allotted $200,000 to Pocahontas county rural electric co-operative, George M. Stockdale, superintendent, for 258 miles rural transmission lines to serve 530 customers.

WOODBINE, IOWA—Town, C. S. King, clerk, is taking bids to Aug. 5 on brick and tile power plant building, three diesel generating units 600 to 750-BHP to operate at 327 rpm or slower, switchboard and power wiring and complete distribution system. A. S. Harrington, 501 Baum building, Omaha, Nebr., consulting engineer.

California

ALAMEDA, CALIF.—Bureau of yards and docks, navy department, Washington, has given cost plus contract to Johnson, Drake & Piper, 1415 Latham Square building, Oakland, Calif., for aviation facilities at the naval air station here, to cost about $9,800,000.

DOWNEY, CALIF.—Vultee Aircraft division of Aviation Mfg. Corp., 842 Lakewood boulevard, will add 470,000 square feet floor space at cost of about $2,900,000, including equipment.

LOS ANGELES — Aluminum Co. of America, 5151 Magnolia street, will build new heat treating, runout, shipping, press and remelting buildings, costing $182,000 at its new plant here.

LOS ANGELES—Harville Aircraft Die Casting Co. will build new steel-frame factory building costing $131,000.

SAN DIEGO, CALIF.—Ryan Aeronautical Co., T. Claude Ryan, president, is practically doubling plant facilities at cost of $200,000 and will install 1000-ton hydraulic press and other equipment.

Oregon

PORTLAND, OREG.—United States engineer has called bids for Aug. 8 for construction of pumping plant at the Deer Island drainage project, involving transformers, 42-inch discharge pipe, gates, valves and pumps.

PORTLAND, OREG.—Bonneville project will receive bids Aug. 12 for reinforced concrete service and control building, 99 x 107 feet at Salem, Oreg. Includes traveling crane for handling transformers and equipment.

PORTLAND, OREG.—United States engineer will open bids Aug. 13 for construction of pumping plant for Sandy drainage district and for equipment, including motors and pumps.

Canada

VANCOUVER, B. C.—Boyles Bros. Drilling Co. Ltd., 1291 Parker street, has given general contract to Dominion Construction Co. Ltd., 509 Richard street, for a $20,000 plant addition.

FAIRVIEW, N. S.—Canadian National Railways, 360 McGill street, Montreal, Que., has called bids for a terminal building and locomotive erecting shop here to cost $50,000.

HALIFAX, N. S.—Department of munitions and supply, Ottawa, Ont., has asked bids on an ordnance workshop here. C. D. Howe is minister.

OTTAWA, ONT.—Department of national defense, Ottawa, L .R. LaFleche, deputy minister, plans an addition to government machine shop at Barriefield, Ont., costing $80,000, and construction of steel and brick buildings at London, Ont., at cost of $1,250,000.

PETERBORO, ONT.—Canadian General Electric Co. Ltd. has had plans prepared by John M. Lyle, Toronto, who will call bids immediately, for a $1,000,000 plant addition 160 x 800 feet. C. A. Salmonson is works manager.

TORONTO, ONT.—Hamilton Gear & Machine Co. Ltd., 76 Van Horne street, will build an addition to plant and a new building, costing about $100,000. Bradford & Hoshal, 1170 Yonge street, have the general contract.

SUDBURY, ONT. — Sudbury Hydro Electric commission, Elgin street, is having plans prepared by P. J. O'Gorman, 4 Durham street South, for a substation building costing $15,000 to house equipment costing $65,000.

VILLE ST. LAURENT, QUE.—Gurney Foundry Co. Ltd., 100 Principale street, has let general contract to Foundation Co. of Canada Ltd., 1538 Sherbrooke street West, Montreal, Que., for a plant addition costing about $65,000.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Blast Cleaning)

American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 61st St. and A. V. R. R., Pittsburgh, Pa.

ABRASIVE CLOTH

Abrasive Products Co., 511 Pearl St., So. Braintree, Mass.

ABRASIVES (Polishing)

Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS

Elmes, Chas. F., Engineering Wks., 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.

ACETYLENE

Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

ACID-PROOF LININGS

Atlas Mineral Products Co. of Pa. The, Mertztown, Pa.
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ACIDS (Pickling)

American Chemical Paint Co., Dept. 310, Ambler, Pa.
Armco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT

Lintern Corp., The, 7960 Lorain Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

AIRLESS BLAST CLEANING EQUIPMENT

American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

ALKALI CLEANING COMPOUNDS

Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS

Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

AXLES

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL

Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAGS (Cotton)

Ames Bag Machine Co., 1991 E. 66th St., Cleveland, O.

BALING PRESSES

Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS

Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)

SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)

SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)

(*Also Stainless)

*Strom Steel Ball Co., 1850 So. 54th Ave., Cicero, Ill.

BAND FILES (Metal)

Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BAND SAWS (Metal Cutting)

Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BAR BENDERS

Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BAR DRAWER AND STRAIGHTENING MACHINES

Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

BARGES (Steel)

American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Steel)

Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)

Amoco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 8-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.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BARS (Brass, Bronze or Copper)

Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.

BARS (Concrete Reinforcing)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)

(*Also Stainless)

*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*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.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BATTERIES (Storage)

Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.
Graybar Electric Co., 420 Lexington Ave., New York City.

BATTERY CHARGING APPARATUS

Cutler-Hammer, Inc., [illegible] St. Paul Ave., Milwaukee, Wis.

BEAMS, CHANNELS, ANGLES, ETC.

(*Also Stainless)

Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Ball)

Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)

Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.

BEARINGS (Brass, Bronze)
Amoco Metal, Inc., Dept. S-715, 3836 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.

BEARINGS (Journal)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.

BEARINGS (Oilless)
Rhoades, R. W., Metalline Co., 50 Third St., Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The Canton, O.

BEARINGS (Roll Neck)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Shoop Bronze Co., The, 344-60 W. 6th Ave., Tarentum, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Rolling Mill)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BELTING (Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
United States Rubber Co., 1230 Sixth Ave., New York City.

BENDING AND STRAIGHTENING MACHINES
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Alliance Machine Co., The, Alliance, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

BILLETS AND BLOOMS
(*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage)
Petroleum Iron Works Co., Sharon, Pa.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BLUE PRINTING MACHINES
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

BLUE PRINTING SUPPLIES and EQUIPMENT
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave., Cleveland, O.
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.

BOLTS (Track)—See TRACK BOLTS

BOOKS
International Correspondence Schools, Box 9376, 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.

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.

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)
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
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 (Acid Resisting)
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

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, Steelgript 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.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
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)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
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)
Amoco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., 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., 50 Third St., 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
Alliance Machine Co., The, Alliance, O.
Industrial Brownhoist Corp., Bay City, Mich.

CAR PULLERS and SPOTTERS
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Cullen-Friestedt Co., 1308 So. Kilbourn St., Chicago, Ill.
Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

CARBIDE
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Carbide Corp., 60 E. 42nd St., New York City.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Cinder Pot)
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
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.,
Amoco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., 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.
Meehanite Metal Corp., 311 Ross St., Pittsburgh, Pa.
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.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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)
Amoco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., 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.
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Brass, Pressure)
Titan Metal Mfg. Co., Bellefonte, 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.
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.
Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
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)
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.

WHERE-TO-BUY

CASTINGS (Steel)—Con.
(*Also Stainless)

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.
Meehanite Metal Corp., 311 Ross St., Pittsburgh, Pa.
Shenango Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)

Ameco Metal, Inc., Dept. S-715, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 28th and Smallman Sts., 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.
Norton Company, Worcester, Mass.

CEMENT (High Temperature Hydraulic)

Atlas Lumnite Cement Co., Dept. S-4, Chrysler Bldg., New York City.

CEMENT (Refractory, High Temperature)

Johns-Manville Corp., 22 E. 40th St., 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.

CHAIRS (Steel)

Harter Corp., The, Sturgis, Mich.

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

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.

CLEANER (Floor-Oil Absorbent)

Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

CLEANING SPECIALTIES

American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.
Sta-Brite Mfg. Co., 3914 So. Wabash Ave., Chicago, Ill.

CLIPS (Packaging)

Consumer's Steel Products, 6454 E. McNichols Rd., Detroit, Mich.

CLUTCHES (Friction)

Jones, W. A. Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Twin Disc Clutch Co., 1379 Racine Ave., Racine, Wis.

CLUTCHES (Magnetic)

Cutler-Hammer, Inc., 1211 St. Paul Ave., 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.

» » » WHERE-TO-BUY « « «

COAL OR COKE—Con.

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.

COKE—See COAL OR COKE

COKE OVEN MACHINERY

Alliance Machine Co., The, Alliance, O.
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.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE (Heat Resistant)

Atlas Lumnite Cement Co., Dept. S-4, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Ingersoll-Rand Co., 11 Broadway, New York City.
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 (Hydraulic)

Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

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., 142 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., 142 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., 142 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., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)

Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)

National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

COPPERING COMPOUND

American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES

International Correspondence Schools, Box 9376, Scranton, Pa.

COTTER PINS

Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES

Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLERS

Hunt, C. B., & Son, Salem, O.

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.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)

Alliance Machine Co., The, Alliance, O.
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)

Alliance Machine Co., The, Alliance, O.
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 (Creeper, Erection)

Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)

Alliance Machine Co., The, Alliance, O.
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.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

CRANES (Gantry)

Alliance Machine Co., The, Alliance, O.
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.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)

Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
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.
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., 4532 Tacony St., Philadelphia, Pa.

CRANES (Jib)

Alliance Machine Co., The, Alliance, O.
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., 4532 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.
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)

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.

WHERE-TO-BUY

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.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
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
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Amoco Metal, Inc., Dept. S-715, 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 CASTINGS
Titan Metal Mfg. Co., Bellefonte, 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.
Hydraulic Press Mfg. Co., Mt. Gilead, O.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

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.

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 (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

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 Co., P. O. Box 1586, 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 (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant 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., 3882 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Ruemelin Mfg. Co., 3882 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., 420 Lexington Ave., 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., 310 S. Michigan Ave., Chicago, Ill.
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.
Uhl Construction Co., 6001 Butler St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

» » » WHERE-TO-BUY « « «

ENGINEERS (Consulting)—Con.
Lindemuth, Lewis B., 134 E. 47th 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.
Ingersoll-Rand Co., 11 Broadway, New York City.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Trufio 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., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Trufio Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Trufio 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.
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.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON (Aluminum)
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., 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 Sales Co., 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.

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., 4201 W. Wrightwood Ave., Chicago, Ill.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave., Cleveland, O.
Alliance Machine Co., The, Alliance, O.
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
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-715, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.
Titan Metal Mfg. Co., Bellefonte, Pa.

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.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Mildvale 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.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 310 So. Michigan Ave., Chicago, Ill.
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.
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.
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)
Brassert, H. A., & Co., 310 S. Michigan Ave., Chicago, Ill.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 134 E. 47th 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 1883, Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNITURE (Tubular Steel)
Harter Corp., The, Sturgis, Mich.

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 (Draft)
Peabody Engineering Corp., 580 Fifth Ave., New York City.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
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.
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.

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., 310 So. Michigan Ave., Chicago, Ill.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
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.

GAUGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-715, 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.

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.
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.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.

GEARS AND GEAR CUTTING—Con.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
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
Electric Generator & Motor Co., 4519 Hamilton Ave., Cleveland, O.
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., Dept. Y-25.
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.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDERS (Pedestal, High Speed)
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

GRINDERS (Portable—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

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.

GRINDING COMPOUNDS
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

GRINDING DISCS
Abrasive Products Co., 511 Pearl St., So. Braintree, Mass.

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.

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-715, 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 (Chipping, Riveting, Caliking)
Ingersoll-Rand Co.,
11 Broadway, New York City.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, O.
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)
Alliance Machine Co., The, Alliance, O.
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)
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)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

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.

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., 4532 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. 4532 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., 4532 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Ingersoll-Rand Co., 11 Broadway, New York City.
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 (Rubber)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Alliance Machine Co., The, Alliance, O.
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.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, 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.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa

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.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INJECTORS (Lead)
Dietzel Lead Burning Co., Coraopolis, 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., 420 Lexington Ave., 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-4, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

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.

INSULATION (Building)
Carey, Philip, Co., The, Dept. 71. Lockland, Cincinnati, O.

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.

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. 8-E, 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.
Norton Company, Worcester, Mass.

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, 859 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.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co. P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LEAD (Chemical, Corroding, Desilvered)
St. Joseph Lead Co., 250 Park Ave., New York City.

LEAD (Tellurium)
National Lead Co. 111 Broadway, New York City.

LEAD WORK
Dietzel Lead Burning Co., Coraopolis, Pa.

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. 8-E, Nela Park, Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., 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.

WHERE-TO-BUY

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.
Ingersoll-Rand Co., 11 Broadway, New York City.

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., 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 Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Second Hand)
Emerman, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, O.
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.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Broslus, 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.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
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.
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.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
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.

MANIPULATORS (Forging)
Alliance Machine 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., 61st St. and A. V. R. R., 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)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

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.

» » » WHERE-TO-BUY « « «

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

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington 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.

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., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
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.

NOZZLES (Descaling)
Aldrich Pump Co., The, Allentown, Pa.

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., 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.
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)
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction Sales Co., 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.
United States Rubber Co., 1230 Sixth Ave., 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.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

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 COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
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 Co., P. O. Box 1586, 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.
Keagler Brick Co., 1443 W. Market St., Steubenville, 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)
American Rolling Mill Co., The, 720 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.

WHERE-TO-BUY

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.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
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 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.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

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.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*American Rolling Mill Co., The, 720 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., 413 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.
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Hydraulic)
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

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
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
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.

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.

» » » WHERE-TO-BUY « « «

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.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
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.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
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.

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.
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

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.

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)
Aldrich Pump Co., The, Allentown, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Aldrich Pump Co., The, Allentown, Pa.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City.
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)
Aldrich Pump Co., The, Allentown, Pa.
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.
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.

PUMPS (Reciprocating)
Aldrich Pump Co., The, Allentown, Pa.
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)
Ingersoll-Rand Co., 11 Broadway, New York City.
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 Co., P. O. Box 1588, 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)
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.
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.

REAMERS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REAMERS (Sand, Ingot Mold—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

REBUILT EQUIPMENT
Emerson, Louis E., & Co., 1760 Elston Ave., Chicago, Ill.
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.
Keagler Brick Co., 1443 W. Market St., Steubenville, O.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-4, Chrysler Bldg., 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 (Jam, Pedestal, Staybolt, Squeeze, Stationary, Yoke—Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

RIVETERS (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Acme Machinery Div., Hill Acme Co., 4535 St. Clair Ave., Cleveland, O.
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

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.
Titan Metal Mfg. Co., Bellefonte, Pa.

RODS (Drill)
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*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

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

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
Alliance Machine Co., The, Alliance, O.
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 Fdry. & Mach. Co., P. O. Box 1586, 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.
Streine Tool & Mfg. Co., New Bremen, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

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 Co., P. O. Box 1586, 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 Co., P. O. Box 1586, 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, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

ROOFING (Plastic and Liquid)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUBBER GOODS (Mechanical)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

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.
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 (Electric)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Lintern Corp., The, 7960 Lorain Ave., 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., 5737 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machy. Co., Penton Bldg., Cleveland, 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., 5737 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.

SCALING TOOLS (Pneumatic)
Ingersoll-Rand Co., 11 Broadway, New York City.

SCHOOLS
International Correspondence Schools, Box 9376, 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.
Titan Metal Mfg. Co., Bellefonte, Pa.

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. Keelor 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. Keelor 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.
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. 8A, 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 (Brass, Bronze, Nickel Silver)
Titan Metal Mfg. Co., Bellefonte, Pa.

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pitsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
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.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
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.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.
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.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

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-715, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 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, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.

SHEETS (Deep Drawing and Stamping)—Con.
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)
American Rolling Mill Co., The, 720 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, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.
Weirton Steel Co., Weirton, W. Va.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 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)
American Rolling Mill Co., The, 720 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, 720 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 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.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., 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.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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.

WHERE-TO-BUY

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
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., 4201 W. Wrightwood Ave., Chicago, Ill.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

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.
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 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
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.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 413 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp, Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Coil and Elliptic)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

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., 413 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keelor 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.

STEEL (Alloy)—Con.

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. 8A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
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. 8A, 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, 720 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.
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)

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.
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)

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. 8A, 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 Co., 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.
Fort Pitt Spring Co., P. O. Box 1377, 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, 720 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.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, 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.
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.

STEEL PLATE CONSTRUCTION—Con.
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.

STOPPERS (Cinder Notch)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., 50 Third St., Long Island City, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Lewis Foundry & Machine Co., P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3125 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., Schenectady, N. Y.
General Electric Co., Dept. S-2, Nela Park, Cleveland, O.
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.
United States Rubber Co., 1230 Sixth Ave., New York City.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
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)
Dietzel Lead Burning Co., Coraopolis, Pa.
United States Rubber Co., 1230 Sixth Ave., New York City.

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.

TESTING MACHINERY (Materials)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

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

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.

TITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

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)
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.

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.
Ingersoll-Rand Co., 11 Broadway, New York City.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

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 Sales Co., 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.
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., 4532 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., 4532 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)
Johns-Manville Corp., 22 E. 40th St., New York City.
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., 4532 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.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Towmotor, Inc., 1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4532 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel & 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)
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.
*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)
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 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.
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
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., 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.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

VALVES (Brass, Iron and Steel)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES (Check)
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Reading-Pratt & Cady Div. of American Chain & Cable Co. Inc., Bridgeport, Conn.

VALVES (Control—Air and Hydraulic)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hunt, C. B., & Son, Salem, O.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

VALVES (Electrically Operated)
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Hunt, C. B., & Son, Salem, O.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Marre, Pa.
Ross Operating Valve Co., 6474 Epworth Blvd., Detroit, Mich.

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.
Hunt, C. B., & Son, Salem, O.
Hydro-Power Systems, Inc., 604 Grant Bldg., Pittsburgh, Pa.

VALVES (Hydraulic De-Scaling)
Hunt, C. B., & Son, Salem, O.

VALVES (Lead)
Dietzel Lead Burning Co., Coraopolis, 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 (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.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

VIADUCTS (Steel)—See BRIDGES, ETC.

VISES (Bench)
Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.

WALKWAYS—See FLOORING—STEEL

WASHERS (Iron and Steel)
Hubbard, M. D., Spring Co., 413 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. Keelor 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. Keelor Ave., Chicago, Ill.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

WELDERS (Electric—Arc, Spot, Seam, Flash, Butt, Automatic Projection, Hydromatic, Etc.)
Federal Machine & Welder Co., Dana St., Warren, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Dept. ST-840, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Taylor-Winfield Corp., Warren, O.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING
Bartlett-Hayward Div. Koppers Co., Baltimore, Md.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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-840, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Wilson Welder & Metals Co., 60 E 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

WELDING AND CUTTING APPARATUS AND SUPPLIES (Oxy-Acetylene)
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

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., Dept. Y-25.
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 Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS (Bronze)
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.

WELDING RODS OR WIRE
Air Reduction Sales Co., 60 East 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-840, Troy, O.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
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.
Welding Equipment & Supply Co., 2720 E. Grand Blvd., Detroit, Mich.
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.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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 (Brass)
Titan Metal Mfg. Co., Bellefonte, Pa.

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.

WHERE-TO-BUY

WIRE (High Carbon)—Con.
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.

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)
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., 420 Lexington Ave., 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., 413 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 MILL EQUIPMENT
Lewis Foundry & Machine Co., P. O. Box 1586, 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., 413 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 Co., P. O. Box 1586, 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.

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REPRESENTATION—CLEVELAND AREA Want another exclusive, repeat line of materials or production supplies to sell manufacturers. Must be quality product. Address Box 251, STEEL, Penton Bldg., Cleveland.

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CONSTRUCTION ENGINEER.—PLANT Supt. 24 years on industrial construction as field and office executive for contractors and owners. Well rounded experience includes supervision and expediting ship construction, erection and maintenance of structural, architectural, and mechanical plant; layout; production; inspection; cost analysis; purchasing and personnel management. Registered Engineer, age 42, excellent habits, active and with ability to meet people and obtain results. Can furnish responsible references. With present employer 10 years. Desire connection with a growing industry. Address Box 274, STEEL, Penton Building, Cleveland, Ohio.

RELIABLE SALES REPRESENTATIVE with excellent industrial and distributor contacts of long standing throughout Wisconsin wishes connection with reliable manufacturer either as direct factory representative or manufacturers agent. Finest of references furnished as to ability and character. Address Box 265, STEEL, Penton Bldg., Cleveland.

POSITION WANTED—PLATE OR ROLLING Mill Sup't. Long experience in manufacturing of Government Materials, such as Hull, Marine Boiler and Protective Deck Plating. Can furnish best of references. Married, sober and industrious, good education. Address Box 266, STEEL, Penton Bldg., Cleveland.

STEEL FOUNDRY CLEANING ROOM Superintendent, 12 years successful experience, have never been unemployed. Skilled. Address Box 254, STEEL, Penton Building, Cleveland.

Classified

HELP WANTED
Single Insertion—50c per line
Three to Six Insertions—48c per line
Six or more Insertions—45c per line

Seven words of ordinary length make a line
FIRST LINE IN BOLD FACE TYPE
A box number address counts as one line

POSITIONS WANTED
Single Insertion—25c per line
Three to Six Insertions—24c per line
Six or more Insertions—23c per line

Help Wanted

SHOP SUPT. FOR PLANT PRODUCING heavy work and to have general supervision over following departments. Steel Fabricating Shop—Machine Shop—Fitting Up Assembly and Testing Shop. Give complete details in first letter as to Age—Education — Experience — Nationality — Family — Size — Weight — Positions held in last 10 years — Salary Expected — and References. Good position open to a man who can produce good work at reasonable costs. Address Box 264, STEEL, Penton Bldg., Cleveland.

ENGINEERING REPRESENTATIVES

Several territories are still available for the sale of Welded Steel Duplicate Parts. Manufacturers' agents with an engineering background and who are desirous of adding a fast growing line, are asked to write immediately. There is a greatly expanded market for these products but high calibre and energetic representatives are required in selling them. If you feel that you can secure a substantial volume of business in selling these parts, write Fusion Process Division, Box 358, Evansville, Indiana.

WANTED — EXPERIENCED MANAGER, well acquainted with Steel Trade to take over management of Plant and Sales. Old established Fire Brick Plant in Central Pennsylvania. Give experience. Address Box 270, STEEL, Penton Bldg., Cleveland.

SALES ENGINEER

Experienced sales engineer industrial and machine tool trade. Knowledge of distributors essential. National traveling on salary plus expense basis. State age and qualifications in application. Address Box 280, STEEL, Penton Bldg., Cleveland.

DRAFTSMEN THOROUGHLY EXPERIenced in steel plant layout and design. Applicant is to state age, education, and experience in detail, giving names of companies for whom he has worked, dates when with these companies, and upon what particular kind of work employed. Address Box 281, STEEL, Penton Bldg., Cleveland.

Accounts Wanted

MANUFACTURER'S REPRESENTATIVE, Graduate Engineer M.I.T., established in the New England Area wants additional accounts. Address Box 275, STEEL, Penton Bldg., Cleveland.

Is It Your Job . . .

to see that the personnel of your company is tip-top in efficiency and that all departments are sufficiently staffed to function to the best advantage?

If you need a man to fill a specific job—that is where STEEL can help.

Our readers include trained and experienced men in all branches of the metalworking industry who are ever on the alert for new opportunities. Tell them what you have to offer through an advertisement in the Help Wanted columns of STEEL.

Equipment For Sale

Used
SHEET MILL EQUIPMENT

1—Mesta 1500 H.P., Gear Drive, 9.75-1 Ratio.
1—G. E. 1500 H.P. Motor, 300 R.P.M., 4600 V, 3 Phase, 60 Cycle.
7 Pairs Mesta 28" Hot Mill Housings, 7 ft. 0" Spread.
5 Pairs Hyde Park 28" Hot Mill Housings, 7 ft. 0" Spread.
2—32" Mesta Picklers, Pneumatic, 6 Arms, 6 ft. 3" Stroke, 13 ft. 6" Radius.
1—No. 3 Mesta Lever Shear.
2—54" Mesta Steam Doublers.
2 Sets Wean Semi-Automatic Feeding and Catching Tables.
1—Schulte Sheet Grinding and Polishing Machine.
1—Aetna-Standard Automatic Top and Bottom Roll Polisher.
1—Freyn Electric Regenerative Mill Drag.
28" x 36", 44", 54" Freyn Electric Roll Heaters.
And many other items—all in excellent condition—Write for complete list.

GREAT LAKES STEEL CORP.
ECORSE — DETROIT — MICHIGAN

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys. Semi-steel. Superior quality machine and hand molded sand blast and tumbled

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., July 15, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Aug. 16, 1940, for construction of the U. S. P. O. at Gambier, Ohio. 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 $5 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.

Equipment For Sale

PLATE SHEAR

No. 6 Hilles & Jones. Capacity 94" x ¾". Throat 38". Hold-down. Motor drive. On turn-table. A-1.

LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

Rails—"1 Ton or 1000"

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
Buy from One Source—Save Time and Money
'Phone, Write, or Wire

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BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers.
Centrifugals for gas and oil burning.
Sand blast, grinder and dust exhausters.
Ventilating fans and roof ventilators.

GENERAL BLOWER CO.
404 North Peoria St. Chicago, Ill.

42" and 62" Vertical Boring Mills.
48" x 30" New Haven Lathe, 22' cc, B.D.
30" x 76" Farrel Roll Grinder, M.D.
10' Bridgeport Knife Grinder, M.D.
150 ton United St.-Hyd. Forging Press.
2"-4"-6"-8"-12" Wm. Pipe Mach., M.D.
No. 5 H&J Guill. Shear 4-1/2" rd., M.D.
10'x1/4" Bliss Sq. Shear 18" gap.
18" W-F & 36" Yoder Gang Slitters, M.D.
48" Aetna-Std. Straightener 17-3 3/4" M.D.

WEST PENN MACHINERY CO.
1208 House Bldg. Pittsburgh, Pa.

Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., July 23, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Aug. 21, 1940, for laboratory equipment, etc., in Buildings Nos. 4 and 5, National Institute of Health at Bethesda, Md. Upon application, two sets 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 $5 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.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

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Acme Steel Co.
Ajax Flexible Coupling Co.
Allis-Chalmers Mfg. Co.
American Can Co.
American Chain & Cable Co.
American Gas Furnace Co.
American Laundry Mach. Co.
American Locomotive Co.
Anaconda Copper Mining Co.
Anchor Post & Fence Co.
Appleton Electric Co.
Armstrong Machine Works
Atlas Lumnite Cement Co.
Atlas Powder Co.
Bakelite Corp.
Baldwin Belting & Leather Co.
Baldwin-Duckworth Div.
Baldwin-Southwark Corp.
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Cuno Engineering Corp.
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Duff-Norton Mfg. Co.
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Fairbanks Morse & Co.
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Foster Wheeler Corp.
Foxboro Co.
Frick Co.
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