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STEEL

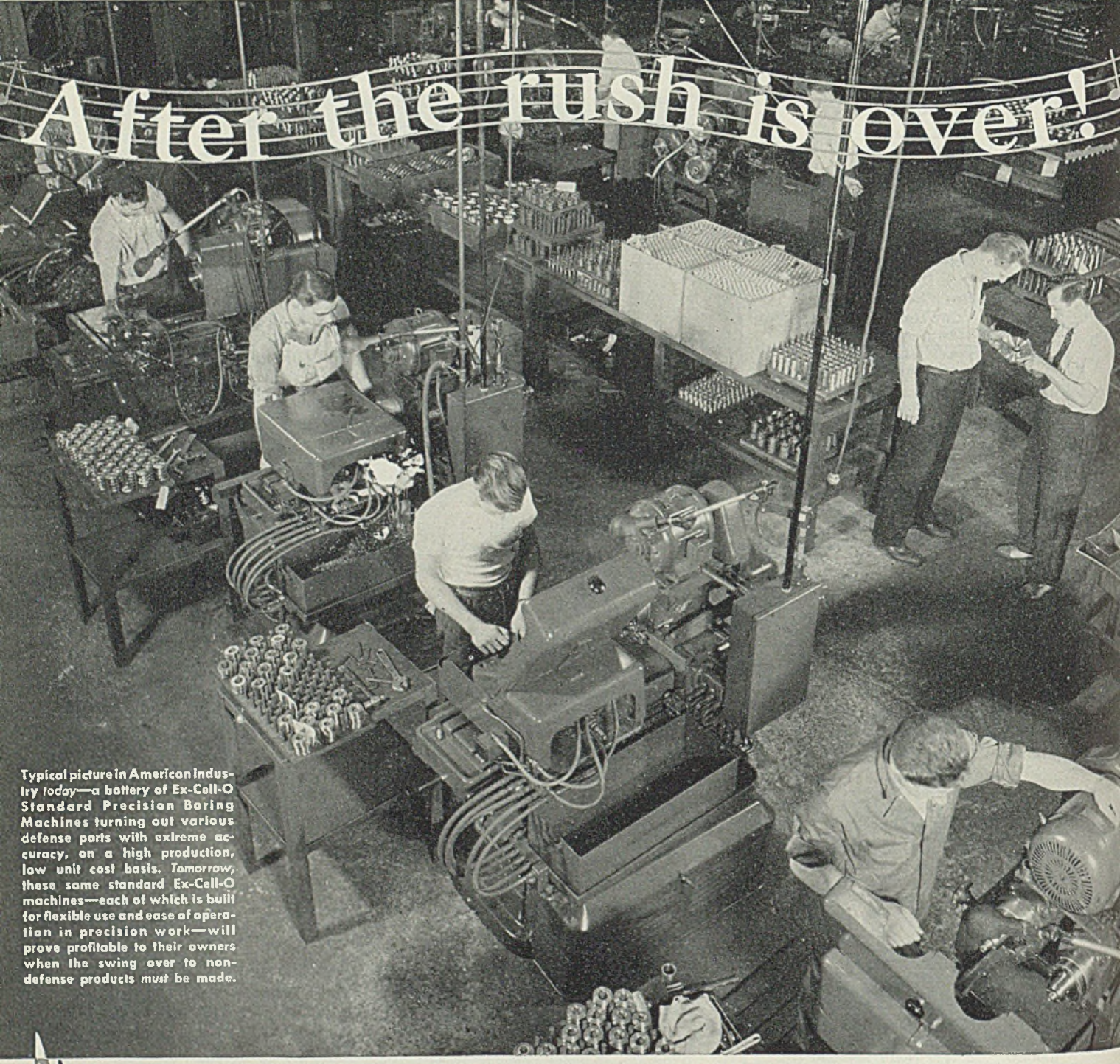
ESTABLISHED 1882

Contents

Volume 109—No. 18 **November 3, 1941**

PRODUCTION • PROCESSING • DISTRIBUTION • USE

After the rush is over!



Typical picture in American industry *today*—a battery of Ex-Cell-O Standard Precision Boring Machines turning out various defense parts with extreme accuracy, on a high production, low unit cost basis. *Tomorrow*, these same standard Ex-Cell-O machines—each of which is built for flexible use and ease of operation in precision work—will prove profitable to their owners when the swing over to non-defense products *must* be made.

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XLO

Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DRILL JIG BUSHINGS, PARTS

HIGHLIGHTING THIS ISSUE OF STEEL

■ LAST FRIDAY, SPAB requested OPM to devise a system for allocating steel. It gradually will replace (p. 29) the present priorities system. Under the allocation system needs of civilian industries will be cared for on a restricted scale to be worked out by OPM with industry committees—largely as the matter was handled, it is expected, during the first World war. One great advantage will be the eventual elimination of fears on the part of many manufacturers as to just how long they could stay in business under the priorities system. Under the allocation system they will know, after the system has been applied, exactly where they stand with reference to needed materials and equipment. For example, many uncertainties have been relieved of late as a result of pig iron and plate allocations.

. . .

Timely Truce

Continued failure on the part of the administration to place a restraining hand on labor again results in interruptions to defense production. The truce in the captive coal mine strike (p. 31) came just in the nick of time to avert large shutting down of iron and steelmaking facilities; but the truce is only for two weeks so that trouble in this direction still may lie ahead. In the meantime dues strikes closed important plants in the Pittsburgh district and there is no telling when similar strikes will be called elsewhere . . . In high quarters current strikes are played down as not being "significant"; E. L. Shaner, STEEL's editor-in-chief, holds (p. 62) an opposite view.

. . .

Steel Mills "Protected"

Steel mill repairs and maintenance (p. 30) are covered by an A-3 preference rating . . . SPAB (p. 40) will check steel's compliance with priorities . . . Prices on products made of copper and copper alloys (p. 41) will be stabilized; more credit is to be extended to Latin America; dairy equipment manufacturers have an A-5 rating; crane and hoisting equipment manufacturers' preference order has been extended; structural shape sizes (p. 44) will be simplified . . . Washer, ironer and ice box production (p. 45) is to be curtailed . . . Lack of high priority ratings (p. 132) threatens steelmaking expansion . . . Electric steel capacity (p. 60) will be further expanded . . . The steel industry is using less manganese (pp. 52 and 53) and aluminum . . . North American Aviation Inc. (p. 51) is opening a subcontracting office in Cleveland.

. . .

Reising Fast-Firing Gun

Professor Macconochie this week analyzes (p. 68) the Reising submachine gun and explains its operation. This is the much-discussed gun that fires 0.45-caliber bullets at rates up to 500 per minute. . . . Progressive dies (p. 78) speed manufacture of fuze parts and when parts are shaved permit meeting limits as close as plus 0.00005-inch, minus 0.0000-inch. Holes smaller in diameter than thickness of piece are punched satisfactorily. . . . Harold Lawrence details (p. 90) metallurgy, type of welds, recommended procedures for arc welding the aircraft alloy steel SAE X-4130 and desecribes an unique device for preventing crater formation when terminating the bead.

. . .

More Output From Abrasives

E. B. Gallagher tells (p. 74) how to increase the output from coated abrasives by 20 per cent and traces most troubles in use of this material back to one source, giving definite recommendations for proper control. . . . The 75-millimeter shell production line at Milwaukee plant of International Harvester Co. features an intricate conveyor system (p. 85) that speeds flow of work. . . . Modern contributions of titanium to steel production (p. 96) are discussed. . . . Recent refinements in shearing equipment (p. 67) have done much to speed stamping and forming operations by making available perfectly flat blanks sheared precisely to dimensions required.

"KEY PEOPLE"— *When You Need Steel*

Ryerson's function is not only to supply your steel, but to deliver it on time. From the moment the Ryerson switchboard flashes your incoming call until the steel is laid down in your plant, a corps of helpful, intelligent employees well-trained in the Ryerson "Immediate Steel" tradition are at your service.

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Allocation System Asked for Steel; Will Replace Priorities

Products most needed for defense to be affected first . . . Balancing of production of different types will be sought . . . Plan to insure service departments of adequate flow of materials

WASHINGTON

■ SUPPLY Priorities and Allocations Board last Friday asked the Office of Production Management to develop an allocation system for steel.

Substantial steps in that direction already have been taken in handling orders for steel plate and a system also has been in use for some time regarding pig iron.

Extension of this policy throughout the industry means that distribution of steel through priorities ratings will gradually be replaced by direct allocation with emphasis first on those types of steel most demanded for defense.

The system will be developed through joint operation by several groups within OPM, principally Division of Priorities, Division of Civilian Supplies and the Iron and Steel Branch of the Division of Materials. It was emphasized that because of the size and complexity of the cast it would take some time and a considerable staff to work out the respective allocations of the numerous varieties of steel products, and details regarding the precise manner in which the plan will be put into effect are still to be worked out.

SPAB's action was taken after Army and Navy officials pointed out that increasing problems in connection with deliveries of structural steel, nickel steel, high-speed steel, tool steel and steel plate for defense purposes could no longer be solved through the preference rating system alone.

Primary purpose of this step, it was stated, is to assure distribution of the available supply where it will do the most good. Operation of the existing priorities system does not provide an adequate check against hoarding and accumulation of excessive inventories; furthermore, under priorities there is no simple way by which the services and civilian consumers may be assured that overall steel production will be properly proportioned into the types of steel in most demand.

Presumably, operation of the allocation system would proceed first through a balancing of production of different types of steel. It would be possible thus to remedy the present situation in which shortages of certain steels like plates, strip and other products often are found with an actual surplus of certain types. Balancing of production would be achieved with service requirements uppermost insuring that the Army and Navy receive an adequate flow of steel. Allocation then could proceed by industries and by product in order that the nation's expanding steel capacity could be properly geared to expanding demand.

Shortages Developed

Difficulties regarding steel for defense were first encountered in January this year when there developed some delay in delivery of structural steel for defense plants. Shortly thereafter the situation regarding steel plate became bad and shortages occurred in nickel steel and high-speed tool steel. By May shortages of alloy steel caused some delay in aircraft production. On May 1 General Metals Order No. 1 was issued by OPM, designed to prevent undue increases in inventories and requiring consumers of steel to state whether inventories were normal.

On May 29 a General Steel Preference Delivery Order was issued giving defense and more essential civilian orders first call on steel production. On Aug. 10, as the situation continued difficult, OPM followed with General Order M-21 extending full priority control on steel in all forms, including alloy steel, and on Sept. 4 priority was extended to steel warehouses. An amendment to M-21 was issued Sept. 16 providing full priority control for all steel products.

SPAB recommended on Oct. 2 a 10,000,000-ton expansion in the annual ingot producing capacity, following an extensive study of the entire steel situation by OPM. Report on steel expansion was presented to Director General of OPM Knudsen by W. A. Hauck.

The Hauck report revealed that the demand currently exceeds the ability of the industry to produce and showed that the rate at which this deficit was growing exceeds the construction rate of new capacity. The report also showed that steel orders bearing A-1 to A-10 ratings had risen from 45 per cent of total production in July to 57 per cent of total production in September which meant that the amount available for civilian use was steadily declining.

Studies by the OPM Bureau of Research and Statistics indicated that during 1942 total steel production would be in the neighborhood of 89,000,000 tons of ingots. Defense orders for November are being received at a rate of 60 per cent of production. It was estimated that

if there were no restrictions on supply, civilian orders would call for 86,000,000 tons, a large increase over civilian consumption in recent years due to the rise in national income incident to the defense program.

A schedule of restricted civilian requirements was drawn up, indicating that on a restrictetd basis the civilian economy would need approximately 58,000,000 tons of steel. Consequently, OPM explained, a shortage of steel was indicated even with civilian requirements curtailed.

OPM has taken steps to drastically reduce the amount of steel going into civilian uses. A cut in automobile production reducing that industry's requirements for steel by 50 per cent was ordered for the 1942 model year and reduction programs were set up for mechanical refrigerators, washing and ironing machines. At the same time, SPAB ruled that steel plate could not be used to build a pipe from the Texas oil area to New York and established a policy sharply limiting building construction to defense and essential civilian uses.

Iron, Steel Industry Granted A-3 Rating for Repair, Maintenance

WASHINGTON

■ REPAIR and maintenance order for the iron and steel industry to keep all possible production units operating, including older, less efficient plants, was issued last Friday by the Priorities Division.

The order, termed P-68, is effective immediately and continues until June 30, 1942.

Order assigns basic preference rating A-3 for essential repair, maintenance and operating material; assigns emergency rating A-1-a for material necessary to repair actual breakdown; assigns rating A-1-c to advance purchases of materials to avert breakdowns and suspensions of equipment.

Higher breakdown rating can only be applied with express advance permission of the Director of Priorities. Plants covered under this order include those engaged in production of pig iron, steel, blast furnace coke and ferroalloys. Producers must file with the Iron and Steel Branch acceptance of order with statement of past inventories and consumption on Form PD-148 before applying basic preference rating A-3. Once authority has been received and a serial number assigned no further application is necessary to use this rating. Producer or supplier must endorse on purchase orders statement that the rating is being applied under P-68 and must also file periodic reports to OPM.

Ratings may be applied by a producer to repair maintenance operating items and by a supplier of material directly required by producer for such purposes or to material to be physically incorporated in other material for same use.

Producers are defined as producers of pig iron and ferroalloys and following iron and steel products: Alloys, ingots, blooms, including forged, billets, including forged, slabs, including forged, tube rounds, sheets and tin bars, structural shapes, piling, plates, universal and sheared; rails, tie plates, track spikes, splice bars, rail joints, hot-rolled bars, including hoops and bands, concrete reinforcing bars, cold finished bars, pipe and tubes, except conduit, wire rods, wire as drawn, not including further fabri-

(*Please turn to Page* 132)

Douglas Plant Dedicated; Size Will Be Doubled

■ While the huge B-19 bomber thundered overhead, Douglas Aircraft Co. Inc. dedicated its new blackout plant at Long Beach, Calif., announced expansion plans to double the already tremendous factory. When completed, the expanded plant will cover 2,750,000 square feet. For further details, see page 50

Dues Pickets Close Irvin Works, Cripple Operations at Homestead

Labor unrest in Pittsburgh district growing, despite truce in coal mine strike . . . Fuel stocks at low ebb

PITTSBURGH

■ ALTHOUGH the coal strike is temporarily halted, labor unrest is growing rather than diminishing in this district. Last week dues pickets closed the giant Irvin works of Carnegie-Illinois Steel Corp., beginning Thursday morning, and mass picketing also forced closure of the company's structural mills at Homestead. This latter action required almost immediate cessation of operations on 16 large open hearths at the Homestead plant. These units produce ingots to feed the blooming mill in the structural section.

The Irvin works, in addition to providing sheets, strip, and tin plate, has also been turning out a substantial tonnage of plate for tank and ship uses each week. The picketing has prevented production on these orders, as well as a large number of other defense tonnages including tin plate for cans for food for American and British forces.

Steelworks operations in the district for the week averaged 90 per cent of capacity, down nine points from the preceding week.

Full effects of the coal strike are not immediately apparent. Blast furnaces at Duquesne, Edgar Thomson, Isabella and Mingo Junction plants of Carnegie-Illinois were down. About eight days' production was lost. These furnaces were supplying iron to meet increasing demands due to lack of scrap, and in one case, that of Mingo, producing synthetic scrap. The shutdown came at a time when scrap supplies were at a new low.

Effects of the coal strike on coke supplies cannot be immediately foreseen. Estimates indicate the stocks of coking coal at Clairton works, principal by-product producer here and the world's largest, were about halved by the shutdown.

Beehive stocks were wiped out, since most beehive producers operate with coal directly from the mine. Stocks of coke at consuming points likewise were just about halved, and it will be difficult to rebuild them in the near future.

Producers here have been unable to replenish stocks since the strike of last spring. Shortage of railroad cars and rapid rate of consumption, with inadequate coal handling facilities have made it virtually impossible to "get ahead."

Chicago Rate Rebounds to New Peak

CHICAGO

The order for resumption of mining in captive coal mines came just in time to avert curtailment of steelmaking operations in this district. At weekend, all plants were operating at the scheduled rate.

Steelmaking operations actually increased 1½ points last week to 103.5 per cent of capacity, an all-time record by a full point. Previous high mark was 102.5 per cent in the weeks ended May 17, May 24 and June 28, this year. Uncertainty as to whether operations could be sustained at the scheduled level apparently was removed when the miners were ordered back to work.

Carnegie-Illinois Steel Corp. was faced with the most serious situation when the strike started last Monday. With its supply of fuel on hand limited, the company was preparing to reduce operations to 90 per cent from the scheduled 106 per cent—which, incidentally, was a new record for its plants here.

Carnegie-Illinois depends upon captive mines for its coal supplies and these mines were all idle. With a battery of coke ovens already down when the strike started, plant operations were dependent upon day-to-day shipments of coke from the Pittsburgh district.

In this district Inland Steel Co., Republic Steel Corp. and Continental Steel Corp., Kokomo, Ind., obtain their coal from commercial mines and supplies were not affected by the strike in captive mines. Youngstown Sheet & Tube Co. receives its coal partly from commercial mines and partly from captive mines, but operations have been unaffected so far. Wisconsin Steel Works of International Harvester Co. gets its coal from a captive mine, which, however, is manned by Progressive Mine Workers of the AFL, and therefore was not affected.

Stocks of coal in Chicago district's plants ranged from only one to four weeks when the strike started and were reduced sharply when shipments stopped last week.

Other Industrial Coal Consumers Well Stocked

NEW YORK

The truce in the captive coal mine dispute came before any curtailment was necessary in coke, blast furnace or steelmaking production in the East. However, Bethlehem Steel Co., only eastern steel company involved, would have

been forced to curtail had the walkout lasted another two weeks.

While there is no assurance as to what the outcome of the Mediation Board's decision will be, some significance is attached to the fact that industrial coal consumers in general are not accelerating efforts to build up inventories, as a safeguard in case steel companies compete later for coal in the open market. Most of these industrial consumers have built up inventories in recent months for winter requirements, mainly as a protection against possible car shortages. As a result of this buying, made possible by better-than-normal summer operations at the mines, these consumers have substantial stocks, notwithstanding the prolonged coal strike last spring.

Reopening of Mines Came "Just in Time"

Although last week's four-day strike in the captive coal mines did not curtail steel production, winter coal reserves of the producers affected were reduced to a seriously low level.

Producers said resumption of work in the mines under a 17-day truce came just in time to avert widespread shutdowns of blast furnaces and steelmaking facilities. Should the dispute not be settled when the truce expires Nov. 15 and a new strike occurs, the coal shortage would be quickly reflected in steel production.

National Defense Mediation Board met in full session last Friday to consider the case after John L. Lewis, head of the United Mine Workers, finally acquiesced to a government request that the mines be reopened. The findings of the mediation board, however, will not necessarily be binding on either the steel companies or the union.

Part of the Cost

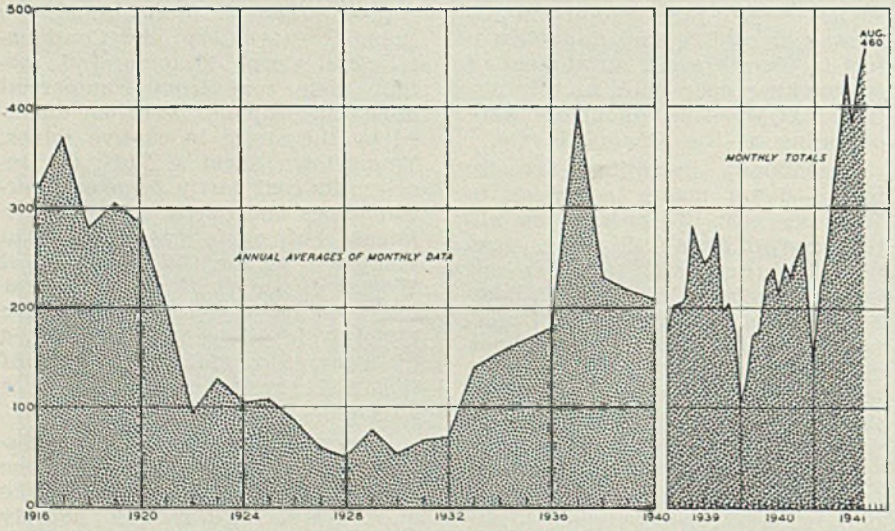
■ Irving S. Olds, chairman of the board, United States Steel Corp., discussed recent work stoppages in the corporation's steel mills, at a press conference last Wednesday, when the corporation's quarterly financial report was issued.

He said that such interferences from Sept. 1 to Oct. 15 accounted for the loss of production of 181,500 tons of ingots, the equivalent of steel sufficient for building 216 destroyers, or 181 submarines, or 72 cargo vessels, or 30 light cruisers.

The number of stoppages from April 1 to Oct. 15 in the steel mills was 73 and in the coal mines, nine. He declared that all were direct breaches of contract.

The stoppages in the mines in that period accounted for a loss in production of 3,750,000 tons, a setback in coal inventories which the corporation has not been able fully to overcome.

Ascension of Labor Disputes



■ The number of industrial disputes during the first eight months of 1941 was greater than in any entire year since 1937. In August, the most recent month for which data are available, 190,000 workers were involved in strikes, accounting for a combined loss of about 1,825,000 man days of work.

For the first five months of this year, 52 per cent of the strikes were caused principally by issues involving union organization, while 34 per cent were caused by disputes over wage and hours, and 14 per cent arose from miscellaneous causes. In 1937, also a period of widespread industrial disputes, the relative importance of the major issues involved was as follows: Union organization, 58 per cent; wages and hours, 30 per cent; and miscellaneous, 12 per cent. Chart by National Industrial Conference Board, New York, based on data by United States Bureau of Labor Statistics.

Weird Political Alliance And Its After-Plague

Relationship between the New Deal administration and John L. Lewis, head of the United Mine Workers, may be marked down as one of the weird political alliances of this era.

Encouraged by passage of the Wagner act and its administration by the notoriously pro-CIO National Labor Relations Board, as well as many other favors for unions, Lewis' mine workers contributed a reported $467,000 to assist Mr. Roosevelt's 1936 campaign.

In January, 1937, Lewis sought to collect what he considered a political debt by asking the President to win a strike for the United Automobile Workers, then attempting to organize the booming automobile industry. In an amazing statement, Lewis said "the workers expect the administration to support them"—in view of the fact that labor had helped elect Roosevelt. This drew from the White House only a mild rebuke, and the administration continued to support the CIO in its attempts to organize the automobile and steel industries.

By 1938, Lewis' enthusiasm for the administration had cooled somewhat over what he considered its failure to lend all-out aid to CIO's organizational campaigns. He still was appreciative enough of the New Deal's support of unionism to ask labor to support New Deal candidates in 1938 elections.

By the beginning of 1940 a definite rupture had appeared, and Lewis, speaking to the United Mine Workers, predicted the "ignominious defeat" of the President should the latter seek a third term. In October, 1940, he asked all labor to oppose the President's re-election, support Wendell Willkie, and stated that if Roosevelt were re-elected, he, Lewis, would resign as president of the CIO.

Bitterness increased with Roosevelt's re-election and Lewis' resignation as CIO head. Lewis openly and successfully defied the National Defense Mediation Board during the coal strike negotiations early this year, winning concessions which the board had recommended be not granted.

CIO Hires Former Labor Board Member To Organize Oil Industry

Edwin S. Smith, former member of the National Labor Relations Board, last week was employed by the CIO to direct an organizing cam-

paign among the country's 500,000 oil workers.

Smith's term with the NLRB expired Aug. 27 and the CIO urged President Roosevelt to reappoint him. The American Federation of Labor opposed the appointment on the ground that Smith's decisions had favored the CIO. Mr. Roosevelt appointed Gerald D. Reilly who had been solicitor in the Labor Department.

Bendix Seizure Incident In Widespread Discord

Plant of Air Associates Inc., Bendix, N. J., last week was taken over by the United States Army by order of the President who charged the company had "failed to carry out its part" of the recommendations made by the National Defense Mediation Board.

Plant is the third to be seized by the military forces. The first was the North American Aviation Co. plant at Inglewood, Calif., taken over by the Army after a communist-inspired strike had halted plane production. Second was the Federal Shipbuilding & Drydock yards of the United States Steel Corp. at Kearny, N. J., which was seized and still is being operated by the Navy. Issue in the Kearny strike was maintenance of union membership and the shipbuilding company's insistence that union membership should not be made a condition of employment.

Under instructions from the President, Secretary of War Stimson ordered troops from Governor's Island to move into the Air Associates plant, working on $5,000,000 in defense orders.

The dispute at the Bendix plant started with a walkout last July, which was patched up by the mediation board. A second strike occurred Sept. 30, and the board recommended that the company take back all strikers immediately. Company, which was continuing operations with other employes, insisted that 30 days would be necessary to reinstate all strikers, if defense production was not to be disrupted and if the nonstrikers were not to be displaced.

Plant has been picketed by members of the United Automobile Workers.

Return of the striking union members to the plant occasioned a flurry of violence and a brief work stoppage by nonstrikers. First union man to re-enter the plant was badly beaten by the nonstrikers.

Striking welders in Pacific Coast shipyards were asked to return to their jobs last week by Sidney Hillman, labor member of OPM. Strike is jurisdictional.

Repairs on at least 14 merchant ships were halted by a strike of 5800 CIO workers at the Robins Drydock & Repair Co. Issue was a wage increase. Mediation board officials warned both union and company to use the "utmost caution" pending mediation by the board.

Wolverine Tube Co., Detroit, strikebound since Sept. 18, last week acknowledged certification of the dispute to the mediation board, and offered complete co-operation. Company officials said they hoped to resume operations Nov. 4, continuing work while the board hearings are in progress.

Federal Farm Security "Goes In" for Stainless

NEW YORK

■ Nickel and chromium, as everyone knows, are strategic materials. Defense industries, including aircraft, with the highest priority ratings, find it difficult to obtain stainless steel tubing. In view of this the following inquiry last week from the Business Manager, Farm Security Administration, Department of Agriculture, Longfellow building, Washington, is puzzling:

"Tubular metal furniture, including six stainless steel davenports, 24 stainless steel easy chairs, for Vallejo, Calif.; eight stainless steel davenports or settees, 32 stainless steel easy chairs, Pulaski, Va.; five stainless steel davenports or settees, 20 stainless steel easy chairs, Middle River, Md.; Inv. FSA-DH-56, bids Oct. 28."

For beds, which also must be of the tubular type, although probably not stainless steel, there was "Invitation FSA-DH-53, bids Oct. 28." This calls for "1248 metal beds, 4-pc., tubular type, complete with coil springs, various deliveries; Acting Business Manager, Farm Security Administration."

After a hard day in the fields, relaxation is needed. For this there should be bed lamps, so under "Invitation FSA-DH-46, Oct. 29," bids were asked on "420 bed lamps, Vallejo, Calif.; 528 ditto, Pulaski, Va.; 30y ditto, Middle River, Md."

■ More than 2000 CIO members paraded in front of the Air Associates Inc. plant at Bendix, N. J., last week in a mass picketing demonstration shortly before the plant was taken over by the United States Army. NEA Photo

Steel's Profits in First Nine Months

At Annual Rate of 7.6 Per Cent

Third quarter earnings down nearly 8 per cent from 1940 period . . . U. S. Steel's order backlog at new peak, with defense tonnage increasing

■ COMBINED net income reported for the quarter ended Sept. 30 by 18 major steel producers, representing more than 83 per cent of the industry's ingot capacity, was $66,604,841. This was nearly 8 per cent less than $72,087,184, aggregate net profit earned by the same companies in the corresponding period last year. Profit for the 18 producers in the June quarter, 1941, was $61,621,180.

In the first nine months this year, their combined net income was $206,114,836. Increase from $159,251,328 reported by the same group in the corresponding months in 1940 was 29.4 per cent.

Eight producers reported a lower profit in the third quarter than in the same period last year, due to increased provisions for federal income and excess profits taxes in accordance with the revenue act of 1941, passed in September.

Twelve of the 18 had a lower third quarter profit than had been reported for the June quarter this year. In several instances, extremely heavy tax provisions had to be made from third period earnings to cover not only September quarter accruals, but also increased taxes for the first half.

Most of the companies reported total tax provisions for both the third quarter and nine months were substantially greater than net income after all charges had been met.

Combined net income of the 18 companies in the first nine months was at an annual rate of about 7.6 per cent on their aggregate capitalization, as reported for Dec. 31, 1940. This was approximately equal to the rate earned in the entire year 1940 by 23 companies representing 90 per cent of the industry's ingot capacity.

Accompanying table presents a summary of the producers' earnings. Keystone Steel & Wire Co., for which all the comparable figures were not available, is not included in the totals.

U.S. Steel Corp.

United States Steel Corp., New York, reported last week that third quarter consolidated net income was $34,313,345 after all charges includ-

Steel Producers' Earnings Statements Summarized

	Third Quarter 1941	Third Quarter 1940	Second Quarter 1941	Nine Months 1941	Nine Months 1940	Capacity (Net Tons)
United States Steel Corp.	$34,313,345	$33,103,067	$24,814,751	$95,688,091	$69,418,070	30,108,900
Bethlehem Steel Corp.	7,910,569	12,462,288	5,651,457	23,998,054‡	34,160,745	12,112,000
Republic Steel Corp.	4,378,379	6,183,880	5,428,748	17,997,095	12,633,333	8,325,000
Youngstown Sheet & Tube Co.	3,103,650	2,842,280	4,765,997	12,445,843‡	5,265,492‡	3,870,000
National Steel Corp.	4,411,466	3,827,311	5,291,430††	12,922,272	10,841,128	3,580,000
Inland Steel Co.	3,675,724	4,918,818††	4,102,572	11,247,342‡	9,888,484	3,350,000
American Rolling Mill Co.	1,547,784	1,804,511	3,068,735	8,215,760	3,889,110	2,884,580
Wheeling Steel Corp.	1,878,355	1,611,108	2,708,187	6,567,551	3,275,186	1,960,000
Crucible Steel Co. of America	1,677,640	1,988,854‡	1,404,282	4,275,064	3,554,698	1,311,360
Otis Steel Co.	345,711	464,665#	493,072	1,433,966‡	102,523	977,000
Alan Wood Steel Co.	259,153	318,939	283,267	791,214	840,497	739,200
Sharon Steel Corp.	412,899	365,975	285,988	1,266,140‡	754,878	596,000
Allegheny Ludlum Steel Corp.	904,379	1,300,582	1,449,183	3,989,236	2,781,285	552,240
Granite City Steel Co.	85,009‡	51,635‡	24,828‡	203,032	102,025	403,200
Continental Steel Corp.	294,592	139,312	324,435	932,149	492,107	364,000
Keystone Steel & Wire Co.§	352,414	280,409	(b)	(b)	1,006,197	276,500
Wickwire Spencer Steel Co.	556,305†	125,861	460,256	1,247,733‡	314,310*	224,000
Copperweld Steel Co.	304,141	277,423	481,229	1,224,093	798,737	171,600
Rustless Iron & Steel Corp.	545,740	300,675	582,763	1,710,201	767,340	120,000
Total	$66,604,841	$72,087,184	$61,621,180	$206,114,836	$159,251,328	71,649,080

†Before provision for federal taxes; ‡indicated; §fiscal year ends June 30; #before excess profits tax; *loss; ††as then reported; (b) not available.

ing a $37,685,500 provision for federal excess profits and income taxes. Equal to $3.21 per common share, this compared with $33,103,067 net profit earned in the corresponding period last year, equal to $3.07 per common share.

In the second quarter, 1941, net profit totaled $24,814,751; provision for federal income and excess profits taxes was $32,800,000.

Net income in the first nine months totaled $95,688,091, or $8.82 per common share, against $69,418,070, equal to $5.80 per share on common, in the first three quarters last year. In the corresponding period in 1939, net profit was $12,390,756.

Federal income and excess profits tax provision for the three quarters totaled $82,285,500, against $18,828,349 in the nine months ended Sept. 30, 1940. Total tax accrual in the three quarters this year was $135,882,791. Accompanying summary presents highlights of the corporation's report.

	Third Quarter 1941	Second Quarter 1941	Nine Months 1941
Net income	$34,313,345	$24,814,751	$95,688,091
Earnings per share on common	$3.21	$2.12	$8.82
Shipments of finished steel:			
Net tons	5,084,559	5,101,606	15,137,436
Per cent capacity	101.1	102.4	101.4
Provision for taxes:			
State, local, social security	$22,635,620	$20,158,292	$53,597,291
Federal income, excess profits	37,685,500	32,800,000	82,285,500
Total taxes	$60,321,120	$52,958,292	$135,882,791
Average number of employes	313,250*	295,047	295,919
Total payroll	$156,470,058*	$147,905,290	$430,119,861

*Excludes employes at shipyard of Federal Shipbuilding & Dry Dock Co., which has been operated by Navy Department since Aug. 24, 1941.

Dividend of $1 per share on common was declared, payable Dec. 20 to record of Nov. 19. Regular quarterly of $1.75 per share on the preferred was also declared, payable Nov. 19 to record of Oct. 31. These declarations were the third on both common and preferred, of $1 and $1.75 respectively, this year.

Shipments of finished steel products in the third period were reported at a new peak for a September quarter, totaling 5,084,559 net tons, against 5,101,606 in the second period, and were at 101.1 per cent of capacity. Shipments in the nine months, at 101.4 per cent of capacity, aggregated 15,137,436 net tons.

The corporation's net current assets as of Sept. 30, and after deducting current dividend declarations, totaled $532,700,000, compared with $505,800,000 June 30, 1941, and $453,700,000 at the end of the third quarter, 1940.

The corporation's backlog of steel orders is at the peak of recent months, but has not been extended recently, according to Chairman Irving S. Olds, at a press conference, following the quarterly directors' meeting. Backlog continues at five to six months of rolled and finished steel capacity. At present, incoming orders are not as heavy as shipments, he said.

This, he indicated, may be attributed partly to a better timing of specifications to actual needs on the part of those engaged in defense work and to a certain curtailment in commercial buying under existing governmental restrictions. However, the leveling off in orders "may be only temporary."

Over recent months the trend of defense steel business on the corporation's books has been steadily upward, now amounting to about 29 per cent of all steel orders; the average for the first nine months was 20 per cent. This includes lease-lend orders. Considering all types of business on the corporation's books, defense work is much heavier, amounting to about 50 per cent of its present backlogs.

Steel exports are down considerably this year. During the first nine months, on a tonnage basis, exports amounted to about 8.5 per cent of all shipments against 20 per cent for all of last year. On a dollar basis, exports during the first nine months amounted to about 7.5 per cent, with lease-lend shipments taking about 3 per cent, he said.

Mr. Olds believed that priorities were working somewhat more smoothly, adding that there are many difficult problems to be worked out.

Mr. Olds commented on the effect of strikes in corporation plants, including the coal situation (See page 32).

He said the company continues in a comfortable position with respect to most other materials, mentioning tin and manganese in particular, and added that so far steel production has not been curtailed because of lack of scrap. He explained that the company was a large producer of scrap.

The average number of employes on the corporation payrolls during the third quarter was 313,250 and the total payroll was $156,470,058, all-time peaks.

The quarterly meeting was attended by all directors, except Junius Morgan, son of J. P. Morgan. The coal strike crisis was the dominant subject of discussion.

Bethlehem's Third Quarter Billings, Shipments Set All-Time Record

An all-time record for Bethlehem Steel Co. in both steel shipments and billings was established in the third quarter, President Grace said last Friday following the directors' meeting. For the quarter, steel shipments aggregated 2,311,387 net tons and billings $260,052,000; figures for the first nine months were 6,673,300 tons and $663,334,000, respectively, also all-time records for any comparable period.

Despite present record-breaking business, earnings are relatively light. Mr. Grace pointed out that notwithstanding the $663,334,000 billings in the first three quarters of this year, Bethlehem earned only $24,000,000, or around 3.6 per cent on total billings.

Total tax bill for the first nine months amounted to $62,950,000 and represented 72.4 per cent of all earnings before taxes. Income and excess profit taxes alone represented 65.7 per cent for the period, and amounted to $15 a common share. This is at the rate of $20 per share for the year.

Backlogs at $1,336,600,000, as of Sept. 30, were $31,000,000 below June 30. This reflects principally an improved position in shipbuilding, with the program generally running ahead of schedule.

Steel backlogs are higher, and 77 per cent, in point of tonnage, represents direct priority business.

Bethlehem's capital expenditures for the third quarter were $11,500,000 and brought the total for the first nine months up to $30,000,000. At the beginning of the present quarter, the company had $35,000,000 additional expansion under way or authorized. All of this, Mr. Grace said, represented the company's own money. He then added that, in addition, there was an expansion program involving $150,000,000 of government money, of which $52,000,000 has been spent.

The latter program includes increased shipbuilding facilities, large forging and ordnance shops, additional plate capacity, facilities for producing airplane cylinders and a large coke oven expansion.

Bethlehem has more than a year's supply of manganese, and is also

comfortably fixed on tin, he said.

Discussing steel supply, Mr. Grace remarked that he believed there was "still plenty of steel in the country." He also believes there had been quite a bit of hoarding, some by government agencies.

New employment and payroll records were established by the company in the third quarter. Average number employed during the period was 177,943, with a peak of 181,452 in September. This was about double the employment in 1929, he added. The third quarter figure this year compared with 158,499 in the second quarter and 124,774 in the period last year.

Payroll last quarter amounted to $99,289,723, against $84,963,903 in the preceding quarter and $54,984,320 in the third quarter of 1940.

Questioned concerning work stoppages, Mr. Grace said the company has had no major disturbances since the Lackawanna difficulty some time ago and the shipyard disturbance on the Pacific coast.

Bethlehem's ingot production in the last quarter averaged 99.9 per cent.

National Steel Corp.

National Steel Corp., Pittsburgh, earned $4,411,466 net profit in the quarter ended Sept. 30, after depreciation, depletion and applicable federal income and excess profits taxes. This was equal to $2 per share on the capital stock outstanding and compared with net income of $3,827,311 or $1.74 per share in the corresponding quarter last year. In the second period, 1941, reported net profit was $5,291,430 or $2.41 per capital share.

Total net income earned in the first nine months, after adjustment of the federal income and excess profits tax provisions for the six months ended June 30 to the basis provided in the revenue act of 1941, was $12,922,272. This was equal to $5.86 per share, and compared with $10,841,128 or $4.92 per share in the corresponding period in 1940.

Republic Steel Corp.

Consolidated net profit reported by Republic Steel Corp., Cleveland, for the third quarter was $4,378,379 after all charges, and was equal to 68 cents per share on common after dividend requirements on the corporation's 6 per cent prior preference and 6 per cent preferred stocks. Estimated provision for federal income and excess profits taxes for the three months, including additional provision for the first half, totaled $11,975,000.

In the September quarter last year, net profit was $6,183,880 or 96 cents per share on common after preferred dividend requirements. Earnings in the three months ended June 30, 1941, totaled $5,428,749 or 87 cents per common share.

For the first nine months, net profit was $17,997,095, equal to $2.90 per share on common after preferred dividend requirements. Total federal income and excess profits tax provision for the three quarters was $29,975,000. In the corresponding period last year net profit was $12,633,333 or $1.86 per common share.

American Rolling Mill Co.

Third quarter net profit reported by American Rolling Mill Co., Middletown, O., was $1,547,784 after all charges, including provision of $5,382,554 for federal income and excess profits taxes. This was equal to 36 cents per share on common, after preferred dividend requirements and compared with $1,804,511 net profit in the quarter last year, equal to 45 cents per common share. Net income in the June quarter, 1941, was $3,068,735.

Substantial reduction in third period profit, according to Charles R. Hook, president, was due to necessity of accruing federal taxes applicable to the entire year to date. Provisions were made for this purpose in the first half, but the 1941 revenue act which was passed in September necessitated an additional heavy accrual in the third quarter.

Total earned in the first nine months was $8,215,760 after all charges. Equal to $2.33 per share on common after preferred dividend requirements, this compared with $3,889,110 or 83 cents per common share in the period in 1940.

Dividend of 35 cents per share on common was declared, payable Dec. 12 to record of Nov. 12.

Wheeling Steel Corp.

Wheeling Steel Corp., Wheeling, W. Va., reports third quarter net profit, after all charges including federal income and excess profits taxes, was $1,878,355. This was equal, after dividend requirements on the corporation's $5 prior preferred stock, to $2.50 per share on common.

It compared with $1,611,108 net

Canadian-Built Cargo Vessel and What It May Carry

■ Second Canadian cargo vessel to be built since the war is launched at Vancouver, British Columbia. The first was launched recently at Montreal. What the new vessel means in the Battle of the Atlantic may be appraised by its trip capacity, as follows: Enough flour, cheese, bacon, ham, canned and dried fruits to feed 225,000 persons in Britain for a week; 2150 tons of steel bars and slabs; enough Bren gun carriers, trucks and motorcycles to motorize an infantry battalion; enough bombs to load 950 medium bombers or 225 heavy bombers; enough lumber and plywood, wallboard and nails to build 90 four-room cottages; two complete bombers stowed on the after deck and enough aluminum in the hold to build 310 medium bombers or 640 fighter planes in England. NEA photo from Office of Public Information, Ottawa. Passed by censor.

profit earned in the period in 1940, when income was equal to $1.99 per share on common after dividend requirements on the $5 prior preferred and 6 per cent preferred stocks then outstanding. In the June quarter, 1941, net profit was $2,708,187, equal to $3.96 per common share.

Net income in the nine months ended Sept. 30 was $6,567,551, equal to $9.10 per common share after preferred dividend requirements, against $3,275,186 or $3.23 per share on common in the corresponding period in 1940.

Provision for federal taxes, income and excess profits, in the nine months this year was $4,112,182. Federal taxes in the period in 1940 totaled $1,010,749.

Dividend of $1.25 per share on the common was declared, payable Dec. 15 to record of Nov. 21, making total payments per share on common this year $2.

Inland Steel Co.

Net profit earned in the three months ended Sept. 30 by Inland Steel Co., Chicago, totaled $3,675,724 after depreciation, depletion and all other charges including a $5,871,299 provision for federal income and excess profits taxes. Equal to $2.25 per share on the company's capital stock, this compared with net income of $4,918,818 or $3.02 per share reported for the corresponding quarter last year. In the three months ended June 30, 1941, net profit was $4,102,572, equal to $2.51 per share.

Total indicated net income in the nine months ended Sept. 30, computed from quarterly reports, was $11,247,342 or $6.89 per share on the capital stock, against $9,888,484 or $6.07 per share in the three quarters in 1940.

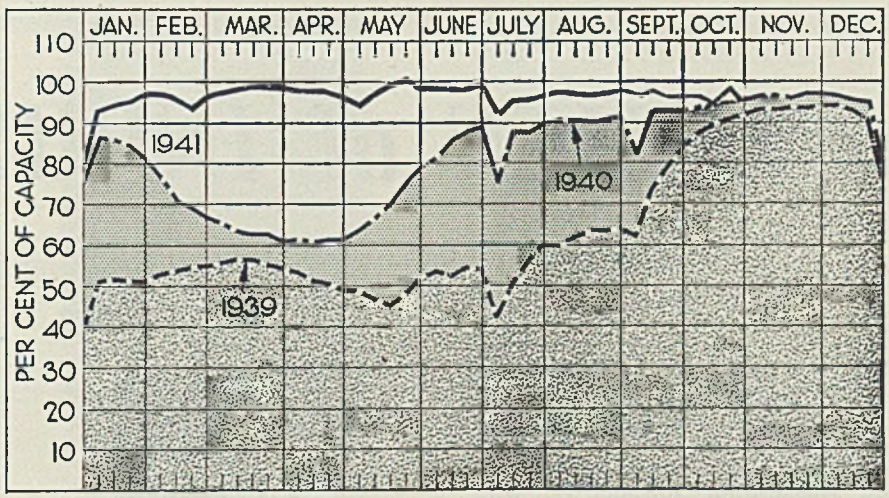
Dividend of $1 per share plus an extra declaration of $1 was reported last week, payable Dec. 1 to record of Nov. 14.

Otis Steel Co.

Otis Steel Co., Cleveland, in a preliminary statement of operations in the third quarter, reported net income after all charges was $345,711. Combined provision for federal taxes on income in the period was $821,000 and comprised $644,000 set aside for estimated accruals in the period plus $177,000 required to cover a deficiency in estimate of federal taxes on income in the first six months this year.

In the third quarter last year, net income was $464,665, and $493,072 in the second period, 1941.

Net income in the first nine months of 1941, calculated from quarterly reports, was $1,433,966, and compared with $102,523 in the period last year.



PRODUCTION . . . . Steady

■ PRODUCTION of open-hearth, bessemer and electric furnace steel last week was unchanged at 95½ per cent of capacity. Three districts advanced, three declined and six were unchanged. A year ago the rate was 96½ per cent; two years ago it was 93 per cent.

Central eastern seaboard—Down 1 point to 92 per cent as scrap shortage limited production.

St. Louis — Unchanged at 83 per cent, with the same schedule for this week.

Cincinnati—Held at 91½ per cent, with only slight variation expected this week.

Birmingham, Ala. — Continued at 95 per cent, with 23 open hearths in production.

New England — At 90 per cent for the fourth week.

Pittsburgh — Strike of cranemen at Homestead works of Carnegie-Illinois Steel Corp., cutting off 16 open hearths, reduced the rate 9 points to 90 per cent.

Wheeling—Increased 1 point to 95 per cent.

Chicago — Up 1½ points to 103½ per cent, an all-time record by a full point. One producer is operating at 106 per cent of capacity.

Buffalo — Scrap shortage caused curtailment, the rate dropping 2½ points to 81 per cent.

Cleveland — Production continued at 97 per cent.

Detroit — Resumption by Great Lakes Steel Corp. after a strike caused the rate to rebound 59 points to 91 per cent.

Youngstown, O.—Unaffected by the captive coal mine strike, production continued at 98 per cent, with 76 open hearths and three bessemers active.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Nov. 1	Change	Same week 1940	Same week 1939
Pittsburgh	90	— 9	95	93
Chicago	103.5	+ 1.5	98	91
Eastern Pa. ...	92	— 1	94	80
Youngstown ..	98	None	91	92
Wheeling	95	+ 1	98.5	93
Cleveland	97	None	90	90
Buffalo	81	— 2.5	95	93
Birmingham ..	95	None	100	94
New England..	90	None	90	100
Cincinnati	91.5	None	94	90
St. Louis	83	None	85	80
Detroit	91	+59	95	100
Average	95.5	None	96.5	93

Plant for Mass Output of Cartridge Cases Opened

■ The nation's "first mass production type cartridge case plant" at 1000 West 120th street, Chicago, operated by Ingersoll Steel & Disc Division of Borg-Warner Corp., was dedicated Oct. 28 before army ordnance officers, company officials and employes. The plant can turn out 15,000 brass cartridge cases for 105-millimeter howitzers in three eight-hour shifts. Full production is expected this month.

6000 Invited to Clinic

■ Nearly 6000 invitations were issued for a defense production clinic scheduled Nov. 5 in the Netherland Plaza hotel, Cincinnati.

Priorities problems and subcontracting will be discussed by John Martin and Mason Manghum, of Washington. Bruce W. Burroughs, Cincinnati district OPM manager, will preside.

Sponsors include the Chamber of Commerce, Industrial Association of Cincinnati, Associated Foundries of Cincinnati, and the Metal Trades Association.

MEN of INDUSTRY

■ **J. V. FREEMAN,** associated with United States Steel Corp. subsidiaries since 1908, has been appointed assistant to vice president in charge of coke by-product sales of all corporation subsidiaries, with headquarters at 71 Broadway, New York. Since 1925 he has been identified with the New York office of United States Steel as assistant in the technical and by-product sales department.

♦

James R. Scully has been named a general line salesman, New York office, Reynolds Metals Co., Richmond, Va.

♦

John T. Pheatt has resigned as advertising manager, Walker-Turner Co. Inc., Plainfield, N. J. Until further notice **Walter Antener** will act as advertising manager.

♦

Albert Leon, manager, export department, Reynolds Metals Co., Richmond, Va., has transferred his headquarters to the company's New York office at East Forty-fourth street.

♦

Paul H. Jones has been elected president, S. M. Jones Co., Toledo, O., to succeed his brother, the late Percy C. Jones. **Mason B. Jones** has been named vice president and secretary.

♦

Damon Wack, formerly associated with American Brake Shoe & Foundry Co. at San Francisco, has been

J. V. Freeman

appointed assistant to the vice president in charge of sales, National Bearing Metals Corp., St. Louis, a subsidiary of American Brake Shoe.

♦

Walter R. G. Baker, Chester H. Lang, David C. Prince, Elmer D. Spicer and **Harry A. Winne** have been elected vice presidents, General Electric Co., Schenectady, N. Y., in connection with a major change in the company's organization.

Under the new setup, the company will have four major operating departments: Appliance and Merchandise, under Vice president **Hardage L. Andrews;** Radio and Television, under Mr. Baker; Lamp, under Vice president **Joseph E. Kewley;** and the Apparatus department, which will be staffed by five vice presidents, including Mr. Lang, in charge of defense activities and also continuing as manager of apparatus sales; Mr. Prince, in charge of application engineering; **Earl O. Shreve,** in charge of commercial activities; Mr. Spicer, in charge of manufacturing, and Mr. Winne, in charge of design engineering.

William R. Burrows, formerly vice president in charge of general manufacturing operations, and **Roy C. Muir,** heretofore vice president in charge of general engineering operations, will become members of the president's staff, carrying out assigned duties in these respective fields.

♦

William H. Bennett, representative of small tools in western New York state for Brown & Sharpe Mfg. Co., Providence, R. I., and later for Brown & Sharpe of New York Inc., retired Oct. 1 after 43 years of active service.

♦

Harold S. Vance, chairman of the board, Studebaker Corp., South Bend, Ind., and **C. Donald Dallas,** president, Revere Copper & Brass Inc., New York, have been elected to the board of trustees, Illinois Institute of Technology, Chicago.

♦

Harold M. Lochrane, a designing and operating engineer for more than 20 years, has joined Kaydon Engineering Corp., Muskegon, Mich., where he will be in charge of meth-

Chester H. Lang

Elmer D. Spicer

David C. Prince

W. R. G. Baker

Harry A. Winne

ods and standards. He formerly had been associated with the Gary Tube Mill, White Motor Co., Liberty Motor Vehicle Co., Thompson Products Inc., and Ferry Cap & Set Screw Co.

♦

C. A. Heil, district sales manager at Cleveland for Carpenter Steel Co., Reading, Pa., has retired, after 32 years of service with the company in the Cleveland territory. He is succeeded by **James S. Bailey Jr.,** associated with the Cleveland sales staff 13 years.

♦

Philip C. Rosenthal has joined the research staff of Battelle Memorial Institute, Columbus, O., and will direct investigations in metallurgy. He formerly was on the faculty of the department of metallurgy, University of Wisconsin.

♦

Charles H. Armstrong has been appointed assistant district manager at Detroit for Clark Con-

Charles H. Armstrong

troller Co., Cleveland. A graduate of the University of Michigan, Mr. Armstrong spent a year in the Cleveland plant and office of Clark Controller, and since June, 1936, has been active in the Detroit area.

♦

William E. Banford Sr., the past 25 years consulting engineer in the automatic screw machine products industry, recently was appointed production engineer in charge of all munitions plants and subsidiaries of S. F. Bowser & Co. Inc., Fort Wayne, Ind.

♦

R. Russell Fayles has joined Lukens Steel Co., Coatesville, Pa., as combustion engineer in the open-hearth department. Following graduation from the University of Alabama in 1936 he joined the engineering department, Vandergrift Works, Carnegie-Illinois Steel Corp., Vandergrift, Pa. Later he became assistant fuel and power engineer at that plant, which position he held

C. A. Heil

until January, 1941, when he became associated with the South Chester Tube Co., Chester, Pa.

♦

William H. Burnett has been appointed superintendent, Ohio works blast furnaces, Carnegie-Illinois Steel Corp., Youngstown, O., succeeding the late Carl H. Glaser. He had been assistant superintendent of blast furnaces the past five years, and before that was superintendent of the Clairton works.

♦

P. G. Boyd has been appointed district sales manager of the newly established Washington district of Youngstown Steel Products Co., Youngstown, O., which includes the District of Columbia, northeastern section of North Carolina, and Virginia except Bristol, all of which have been, heretofore, in the Philadelphia district. The office is located at 920 Shoreham building.

♦

C. E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., has been re-elected president, Ohio Ceramic Industries Association. Other officers elected are: **Harry D. Callahan,** vice president; **E. E. Hillyer,** treasurer, and **Prof. H. E. Nold,** secretary.

♦

James S. Knowlson, president and chairman of the board, Stewart-Warner Corp., Chicago, has been granted an indefinite leave of absence without pay to act as deputy director of priorities under Donald M. Nelson. Mr. Knowlson's leave became effective Oct. 1 when the appointment was announced. During his absence, **Frank A. Ross,** senior vice president, will act as head executive.

♦

K. C. Stevens has been elected president, Pittsburgh & Conneaut Dock Co., Conneaut, O., and president of the Pennsylvania & Lake Erie Dock Co., Fairport, O., United States Steel Corp. subsidiaries. He succeeds the late **Gordon S. Meek. Clyde L. Ross** has been elected vice president and will continue as auditor and assistant secretary, and **George H. Bruce** has been appointed assistant to general superintendent.

MEETINGS

Papers Announced for Founders Convention

■ EIGHT papers are scheduled for presentation at the forty-fifth annual meeting of the National Founders Association, Waldorf-Astoria hotel, New York, Nov. 12-13. Four of the addresses will be "American Labor Policy and Its Effects on Industry," by Dr. L. Wolman, professor of economics, Columbia University, New York; "The Foreman's Role in Management," by H. O. Menck, general manager, Harnischfeger Corp., Milwaukee; "Recent Developments in Cast Metals," by Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, O.; and "Priorities," by E. L. Shaner, editor-in-chief, STEEL, Cleveland.

Hoover Medal To Be Awarded At ASME Annual Meeting

D. R. Yarnell, mechanical engineer, Philadelphia, has been selected as the fifth recipient of the Hoover medal. This will be presented to Mr. Yarnell during the annual meeting of the American Society of Mechanical Engineers, New York, Nov. 1-5.

Ampco Welcomes New Employes with Booklet

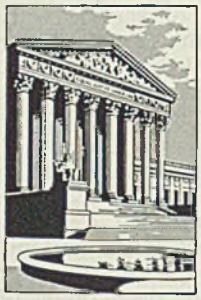
■ Ampco Metal Inc., Milwaukee, through its personnel department has issued a booklet, *How To Enjoy Your Work with Ampco,* as part of its shop employe relationship program. In addition to rules and regulations it gives background to new employes, who receive it when they are hired, enabling them to understand something of the company's past history and its place in the industrial world.

A description is included of employes' social and recreational activities, giving new employes an idea of the sort of environment in which they are to work.

■ Production work on a $3,000,000 order for binoculars for the United States Army will start shortly at the Westinghouse Electric & Mfg. Co.'s plant in Mansfield, O. This is the first direct war emergency order undertaken by the Mansfield factory, which produces electric refrigerators and other appliances.

Windows of WASHINGTON

Substitutions for critical materials allowed in new specifications established by Quartermaster Corps for Army procurement . . . SPAB checking steel companies' compliance with priorities orders, while asking system be replaced by direct allocations . . . Steel consumption for ice boxes, washing and ironing machines curtailed . . . OPA pushes investigation of overcharges by scrap dealers



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ TENTATIVE specifications have been established by the Quartermaster Corps to permit contracting officers to accept in whole or in part satisfactory substitutes for critical materials in many articles of equipment and supplies procured for the Army.

The service is developing as many substitutes as possible. Canvas field bags which formerly had buckles, snaps and rings of solid bronze, now are permitted to have such parts of malleable iron or stamped steel, parkerized, the same with baked enamel or black japan finish; or malleable iron, brass plated finish.

To date malleable iron and steel have been substituted in 96 items of equipment procured in large quantities by the Quartermaster Corps. In place of nickel there is now being adapted wood, vitrified clay, cast iron, galvanized iron, steel and glass, all given a special finish to make them suitable for such uses as table tops in Army kitchens, laboratories of hospitals, and in electric fixtures, kettles and other items.

Zinc has been replaced by substitutes in the process of galvanizing and copper is being replaced in some articles with steel, glass and porcelain. Enamelware and steel are being used in place of aluminum for cooking utensils; plastics are finding new uses; fiber glass and rock cork are taking the place of cork in some instances; wood and concrete are replacing steel in construction.

Defense Agencies Announce New Personnel Appointments

George A. Landry, manager of the central office division of Western Electric Co.'s Hawthorne works at Chicago, has been appointed head of the staff branch of the OPM Production Division.

Following appointments to the industrial and agricultural machinery section of the price division, OPA, were announced last week: Carl Adams Baer, president of Thermoseal Products Inc., New York; Weir M. Brown, former research fellow at Brookings Institution; C. Lawrence Christenson, Indiana University, Bloomington, Ind.; Arthur E. Clark, former treasurer of Peter Clark Inc., New York; Maurice W. Lee, Utah State Agricultural College; Floyd J. Lucas, Chicago machinery dealer; Paul W. McGann, research assistant at the University of Chicago; and Jacob L. Mosak, University of Chicago.

Emmett Allen, formerly with the Pittsburgh Coke & Iron Co., Pittsburgh, has become associated with the OPA scrap unit.

George C. Randall, of the Association of American Railroads, has been appointed consultant on port clearance in the Transportation Division, OEM.

Highspots in the Week's Washington News

Washing machine and ironer production curtailed by 17.3 per cent (p. 45); 35 per cent reduction in steel used in ice boxes ordered (p. 45).

Dairy equipment manufacturers granted A-5 rating for steel to make cans and machinery to handle the anticipated increase in milk production (p. 41).

Crane and hoisting equipment manufacturers' preference rating order extended (p. 41).

Copper products price stabilization program undertaken by OPA (p. 41).

Airframes, aircraft engines and propellers preference ratings extended through November and December (p. 45).

Civilian airplane repair parts assigned A-10 rating (p. 45).

Iron and steel industry granted basis preference rating of A-3 for repair and maintenance materials; higher rating for breakdown repair materials (p. 30).

Brass sheet, rod and tube manufacturers have agreed with OPA to hold prices at current levels (p. 130).

Chlorinated rubber placed under rigid priority control (p. 131).

Four more scrap dealers agree to refund overcharges (p. 131).

SPAB borrows FTC examiners to check steel companies' compliance with priorities orders (p. 40).

Fire-Fighting apparatus manufacturers granted A-2 rating (p. 131).

Railroads asked by government agencies to reduce rates on iron and steel products to Pacific Coast (p. 131).

Allocation system for steel, to replace present preference ratings, requested by SPAB (p. 29).

SPAB Checking Steelmakers' Priorities Orders Compliance

Supply Priorities and Allocations Board last week borrowed 35 examiners from the Federal Trade Commission and dispatched them to the country's steel centers for a checkup on the compliance of steel companies with priorities orders.

The steel company survey follows a checkup of aluminum plants made by men borrowed by SPAB from the wage and hour division.

Plumbing, Heating Advisory Committee Is Appointed

Formation of a plumbing and heating defense industry advisory committee was completed last week by OPM. Members include: George

Hoffman, manager, plumbing division, Crane Co., Chicago; William M. Byrd, vice president, Alabama Pipe Co., Anniston, Ala.; E. S. White, president, United States Radiator Corp., Detroit; W. L. McGrath, vice president, Williamson Heater Co., Cincinnati; E. C. Sammons, vice president, Iron Fireman Co., Portland, Oreg.; J. A. Doucett, vice president, Revere Copper & Brass Co., New York; R. L. O'Brien, president, Detroit Brass Malleable Co., Detroit; O. L. Swats, assistant sales manager, Grinnell Co., Providence, R. I.; M. W. Dennison, Braman, Dow & Co., Boston; L. F. Hudepohl, president, I. S. Conner Co., Cincinnati; H. M. Reed, president, American Radiator & Standard Sanitary Corp., New York; Charles D. Wessells, president, Wessells & Sons, Detroit; M. F. May, vice president, Young Radiator Co., Racine, Wis.; Frank C. Packer, Payne Furnace & Supply Co., Beverley Hills, Calif.; Howard Sweatt, president, Minneapolis-Honeywell Regulator Co., Minneapolis; N. H. Wiewel, Jones & Laughlin Steel Corp., Pittsburgh; R. L. Stewart, vice president, Stockham Pipe & Fittings Co., Birmingham, Ala.; G. E. Mumma, assistant supervisor, plumbing division, Sears, Roebuck & Co., Chicago; Edward Costello, Costello Engineering Co., Washington.

An oil burner and stoker subcommittee of the plumbing and heating committee also was named. Members include: E. C. Sammons, vice president, Iron Fireman Co., Portland, Oreg.; J. R. Rainbault, General Electric Co., Bloomfield, N. J.; J. H. Simpson, vice president, Hershey Machine & Foundry Co., Manheim, Pa.; Ross Sherman, president, Silent Glow Burner Corp., Hartford, Conn.; L. A. Welsh, president, Hart Oil Burner Co., Peoria, Ill.

OPA Seeks To Stabilize Prices of Copper Products

Comprehensive program for stabilizing prices of all products made of copper, brass or other copper base alloys has been announced by OPA.

Action is being taken as result, first, of the generally tight situation in copper due to heavy defense demands, and second, of the conservation order issued Oct. 21 by the OPM which restricts sharply the supply of many products made of copper.

Program will bring under scrutiny many thousands of manufactured products at both manufacturing and distribution levels with a view to imposition of price ceilings if necessary. The program will be carried out by commodity sections already established, including those handling nonferrous metals, durable consumers goods, building materials, industrial machinery and chemicals. Immediate steps in the new program include:

1—A price schedule establishing present prices as a maximum for building hardware will be issued shortly, preparatory to detailed studies looking to a reduction of such prices substantially below the present level. This will be followed by schedules establishing ceilings for other building products made of copper as they may be necessary.

2—A meeting will be held soon with manufacturers of wire and cable to discuss proposals now being prepared by OPA for reduction of present prices on these products. In the past year such prices have risen 20 to 30 per cent.

3—Field investigations under way for some time on the prices of nonferrous foundry products will be rushed to completion with a view to issuing a price schedule establishing maximum prices for such products unless the industry voluntarily agrees to reduce prices. One conference has already been held with a branch of the industry. Products in this category include valves, fittings and other copper or copper alloy castings.

4—The present informal agreements in effect with operators of mills producing brass sheets, rods and tubes and producers of brass ingots will be continued in their present form unless formal ceiling action becomes necessary. Prices for products fabricated from brass will be brought under ceilings as rapidly as necessary.

5—Attention of the office will also be directed at prices of all durable goods and their parts made largely of copper. These include such items as radios, stoves, cooking and table utensils, plated flatware, fire extinguishers, generators, motors, signal apparatus, transformers, certain automobile and truck parts. Ceilings will be placed on such products if necessary.

Export-Import Bank To Extend More Credit to Latin America

Jesse Jones, federal loan administrator, has announced the Export-Import Bank is arranging to cooperate with the central banks of South and Central America for the purpose of financing exports from the United States to their respective countries.

To facilitate trade with countries of the Western Hemisphere and to enable those countries to procure essential requirements for the development of their resources and the stabilization of their economies, the Export-Import Bank will establish special lines of credit for banks in Central and South America to supplement existing lines, and under these special lines will assume the uninsurable risks incidental to making deliveries to ports of destination.

It is contemplated that such special credit lines will be handled by commercial banks in the United States under the instructions and responsibility of the Export-Import Bank.

A-5 Rating Granted to Dairy Equipment Manufacturers

Preference rating of A-5 has been granted to makers of milk cans and a limited rating of A-5 to manufacturers of hot-dip tinned and tin plate dairy equipment. The ratings are designed to make available equipment necessary to handle an 8,000,000,000-pound increase in milk production next year.

Only enough steel will be allocated to produce the cans and equipment necessary to take care of the increase in production and for normal replacements.

Crane Builders' Preference Rating Order Extended

Priorities Division last week announced extension of a new preference rating order P-5-b to manufacturers of cranes and hoisting equipment working on vital defense orders, effective Nov. 1, and replacing P-5-a.

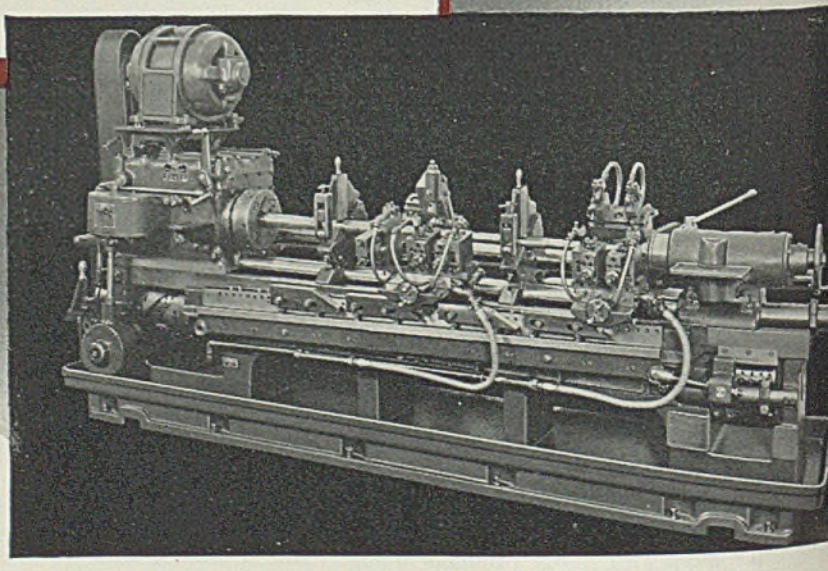
Where the latter granted a rating of A-1-a to deliveries of specified materials, the preference order does not grant the same rating to all manufacturers. Ratings are assigned in accordance with defense needs for particular types of crane or hoisting equipment.

In applying the rating, the producer and supplier must do so only in the case of materials and equipment needed to fill a defense contract as listed in the following: Motors, other electrical accessories, alloy and carbon steels in bars or forgings, castings, plates, sheets, shapes and tubes, ferrous and nonferrous castings, machine parts and accessories, cutting tools including cemented carbides, abrasives, measuring instruments, gages, brass, brakes, gasoline and diesel engines, copper and steel tubing and fittings, oil resisting hose, hydraulic bridge and accessories, paints, lacquers and finishing materials, maintenance and shop supplies for producers' requirements only, steel rail, other steel scrap, silvery pig iron, regular pig iron, coke, ferrosilicon, ferromanganese, vanadium, nickel, molybdenum and chromium.

If any of these components may be secured without priority assistance or substitution is possible the available rating cannot be applied.

A Sap-Hole at 12 Rods-

In 1838 Dr. Story of West Parish, Windsor, Vermont, gave his nephew, young Dick Lawrence, permission to recondition the doctor's old squirrel rifle and mount a peep sight on it. When the job was finished they tested the rifle by firing three shots at a 3/4" sap hole in a maple 12 rods away. Finding no new bullet holes in the tree trunk, the indignant doctor thought his rifle had been ruined — until he discovered to his amazement that all three bullets were in the sap hole itself! Thus Richard Lawrence won his first opportunity to rise to leadership in the gun shop of Nicainor Kendall, early direct predecessor of the modern Jones & Lamson Machine Company.

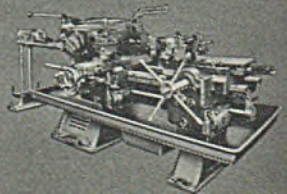


Jones & Lamson 12" x 81" Fay Automatic Lathe tooled to machine an aircraft cannon.

AUTOMATIC THREAD GRINDERS

OPTICAL COMPARATORS

RAM TYPE UNIVERSAL TURRET LATHE



or a Tank at Half-a-Mile

In 1838 it may have been quite a feat to turn out a rifle that would put three bullets in a sap hole at 12 rods, but today's emergency demands accurate machine gun fire at 1500 yards, cannon that can hit a fast moving tank over half a mile away and antiaircraft guns that destroy five-mile-a-minute targets at 20,000 feet.

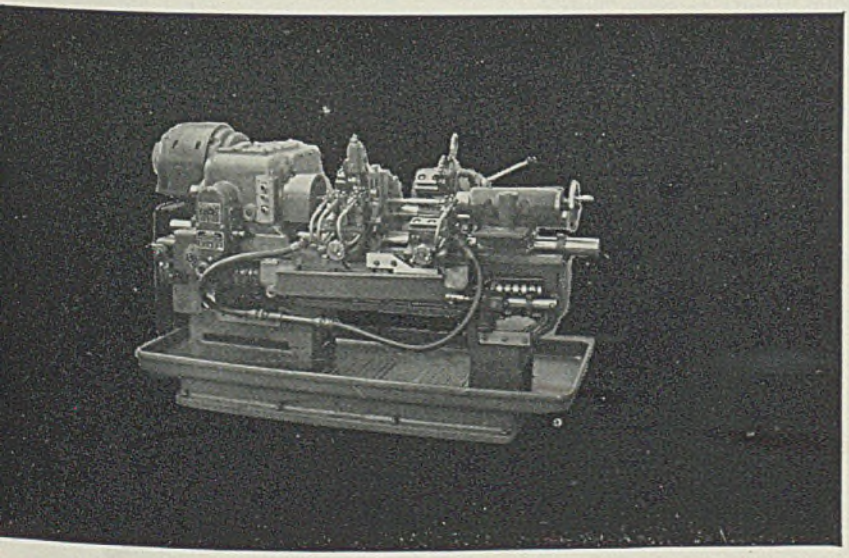
In any day and time, the technique of producing weapons that hit precisely where you aim them demands similar fundamentals of machine tool engineering and workmanship. Just as Lawrence understood those fundamentals and applied them in his generation, so did Robbins, Hubbard, Howe, Lamson, Hartness and scores of other engineers in Jones & Lamson Machine Company and its predecessor shops.

So do present day Jones & Lamson engineers design equipment that sets new standards of speed and accuracy today. Such are the Jones & Lamson Fay Automatic Lathes, pictured here on multiple tooled precision work on weapon barrels, capable also of cutting costs on peace-time tasks like shafts and spindles.

Here is another timely example of why it pays two ways to put production problems up to Jones & Lamson engineers. Why not see what they can do to help you? Inquiries from large plants or small receive thorough study here.

JONES & LAMSON

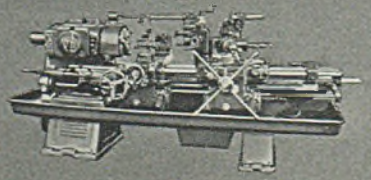
MACHINE COMPANY · Springfield, Vermont, U. S. A.



Jones & Lamson 8″ x 33″ Fay Automatic Lathe tooled to machine an automatic rifle barrel.

Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

SADDLE TYPE UNIVERSAL TURRET LATHE



FAY AUTOMATIC LATHES

AUTOMATIC OPENING DIE HEADS

PROFIT PRODUCING MACHINE TOOLS

Simplification in Structural Shape Sizes Recommended by OPM

WASHINGTON

■ PROGRAM for simplification of structural steel shapes, to avoid tying up mills with small miscellaneous rollings for odd sizes infrequently ordered, was announced last week by OPM.

The action was taken in a request by A. D. Whiteside, chief, Iron and Steel Section, OPM, after consultation with Army, Navy and Maritime Commision and other defense agencies.

All shapes regularly used in ship, car and building construction are retained. Number of angle shapes will be reduced by 50 per cent, and beams, channels and other shapes ordinarily used in various types of steel construction will be reduced almost as much.

The request will become effective Feb. 1, 1942, allowing time for producers to get rid of present stocks. Producers have been asked to extend notification to their customers.

Sizes of shapes to be retained after Feb. 1 follow:

SIMPLIFICATION OF STRUCTURAL STEEL SHAPES

(Revised as of Sept. 29, 1941)

This List Effective from Feb. 1, 1942

Nominal Dimensions	Weight per Foot				
WIDE FLANGE BEAMS					
36 x 16½	300	280	260	240	230
36 x 12	194	182	170	160	150
33 x 15¾				220	200
33 x 11½		152	141	132	125
30 x 15			210	190	172
30 x 10½			124	116	108
27 x 14				163	145
27 x 10			106	98	91
24 x 14				150	130
24 x 12				120	100
24 x 9			87	80	74
21 x 13				132	112
21 x 9				96	82
21 x 8¼		73	68	63	59
18 x 11¾			114	105	96
18 x 8¾		85	77	70	64
18 x 7½				55	50
16 x 11½				96	88
16 x 8½		78	71	64	58
16 x 7		50	45	40	36
14 x 16	426	398	370	342	320
	314	287	264	246	228
	211	193	176	158	142
14 x 14½	136	119	103	95	87
14 x 12				84	78
14 x 10			74	68	61
14 x 8			53	48	43
14 x 6¾			38	34	30
12 x 12	190	161	133	106	92
			79	72	65
12 x 10				58	53
12 x 8				45	40
12 x 6½			36	28	25
10 x 10	112	100	89	77	66
				54	49
10 x 8				41	33
10 x 5¾				26	21
8 x 8	67	58	48	40	35	31
8 x 6½				27	24
8 x 5¼				21	17
LIGHT BEAMS					
12 x 4			22	19	16½
10 x 4			19	17	15
8 x 4				15	13
6 x 4				16	12

JOISTS	
12 x 4	14
10 x 4	11½
8 x 4	10
6 x 4	8½
JUNIOR BEAMS*	
12 x 3	11.8
11 x 2⅞	10.3
10 x 2¾	9.0
9 x 2⅜	7.5
8 x 2¼	6.5
7 x 2⅛	5.5
6 x 1⅞	4.4

*Rolled by Jones & Laughlin Steel Corp.

STANCHIONS					
6 x 6	27½	25	22½	20	18
					15½
5 x 5			18½	16	13½
4 x 4				13	10
H-BEAMS					
8 x 8					34.3
6 x 6					25
6 x 6					20
5 x 5					18.9
SUBWAY COLUMNS					
5¾ x 9½					40
BEARING PILES					
14 x 14½	117	102	89	73	
12 x 12			74	53	
10 x 10			57	42	
8 x 8				36	
STANDARD BEAMS					
24 x 7⅞				105.9	
24 x 7			100	90	79.9
20 x 7				95	85
20 x 6¼				75	65.4
18 x 6					54.7
15 x 5½				50	42.9
12 x 5¼				50	40.8
12 x 5				31.8	35
10 x 4⅝				35	25.4
8 x 4				23	18.4
7 x 3⅝					15.3
6 x 3⅜				17.25	12.5
5 x 3					10
4 x 2⅝				9.5	7.7
3 x 2⅜				7.5	5.7
STANDARD CHANNELS					
18 x 4	58	51.9	45.8	42.7	
15 x 3⅜	55	50	40	33.9	
12 x 3		30	25	20.7	
10 x 2⅝	30	25	20	15.3	
9 x 2½		20	15	13.4	
8 x 2¼		18.75	13.75	11.5	
7 x 2		14.75	12.25	9.8	
6 x 2		15.5	10.5	8.2	
5 x 1¾			9	6.7	
4 x 1⅝		7.25	6.25	5.4	
3 x 1½		6	5	4.1	
CAR BUILDING CHANNELS					
13 x 4	50	40	35	31.8	
12 x 4	50	45	40	35	
4 x 2½				13.8	
3 x 1⅞				7.1	
SHIP BUILDING CHANNELS					
12 x 3½		37	32.9	30.9	
10 x 4		41.1	33.6	28.5	
10 x 3½			28.3	24.9	
10 x 3½			25.3	21.9	
9 x 3½			25.4	23.9	
8 x 3½			22.8	21.4	
8 x 3			19.3	18.7	
7 x 3½			22.7	19.1	
6 x 3½				18	
6 x 3½				15.3	
6 x 3			16.3	15.1	
6 x 2½				12	
7 x 4				18.8	
7 x 3				17.6	
LIGHT WEIGHT CHANNELS*					
12 x 1½				10.6	
10 x 1½				8.4	
10 x 1⅛				6.5	

*Rolled by Jones & Laughlin Steel Corp.

SHIP BUILDING BULB ANGLES	
10 x 3½	32.3 29.9 27.2 24.8 22.4
9 x 3½	23.8 21.6 19.4
8 x 3½	24.3 20 16
7 x 3½	21.1 17.1 13.6
6 x 3½	17.4 13.9 10.7
5 x 2½	9.8 7.3
3 x 2	3.8
CAR BUILDING BULB ANGLES	
5 x 4½	19.1
5 x 3½	13
4 x 3½	14.3
4 x 3½	11.9
ZEES	
6⅛ x 3⅝ x ½	21.1
6 x 3½ x 3/8	15.7
5 x 3¼ x ½	17.9
5⅛ x 3⅜ x 7/16	16.4
5 1/16 x 3 1/16 x 3/8	14.0
5 x 3¼ x 5/16	11.6
4 1/16 x 3¼ x ½	15.9
4⅛ x 3 3/16 x 3/8	12.5
4 1/16 x 3⅛ x 7/16	10.3
4 x 3 1/16 x ¼	8.2
3 x 2 11/16 x ½	12.6
3 x 2 1/16 x 3/8	9.8
3 x 2 1/16 x ¼	6.7
EQUAL TEES*	
4 x 4 x ½	13.5
3 x 3 x 3/8	7.8
3 x 3 x 5/16	6.7
2½ x 2½ x 3/8	6.4
2½ x 2½ x 7/16	5.5
2½ x 2½ x ¼	4.6
2¼ x 2¼ x ¼	4.1
2 x 2 x 5/16	4.3
2 x 2 x ¼	3.56
UNEQUAL TEES*	
5 x 3⅛ x ½ (fl) x 13/16 (st)	13.6
5 x 3 x 3/8 (fl) x 11/16 (st)	11.5
4 x 4½ x 3/8	11.2
4 x 3 x 3/8	9.2
4 x 2½ x 3/8	8.5
3 x 2½ x 5/16	6.1
MISC. CAR BLDG. SECTIONS (Center Sill Section)	
12 x 3¼—7 x 13/16	40.3
12 13/16 x 6 3/16—4 1/16 x 15/16	41.2
12⅞ x 6 11/16—4 x 13/16	36.2
12 13/16 x 6 3/16—3 1/16 x 9/16	31.3
W. SIDE PLATE SECTION	
7 7/16 x ¼	9.9
3 x 5/16	5.1
3⅜ x ¼	8.3

*Any Standard or Wide Flange Beams 6 inches or over in depth can be split to form Tees.

Nominal Dimensions	Gage				
EQUAL ANGLES					
8 x 8	1⅛	1	⅞	¾	⅝	½
6 x 6	1	⅞	¾	⅝	½	3/8
5 x 5		⅞	¾	⅝	½	3/8
4 x 4	¾	⅝	½	3/8	5/16	¼
3½ x 3½		⅝	½	3/8	5/16	¼
3 x 3		½	3/8	5/16	¼	5/16
2½ x 2½		½	3/8	5/16	¼	5/16
2 x 2			⅜	5/16	¼	5/16
UNEQUAL ANGLES					
8 x 6	1⅛	1	⅞	¾	⅝	½
8 x 4	1	⅞	¾	⅝	½	7/16
7 x 4	⅞	¾	⅝	½	7/16	3/8
6 x 4	⅞	¾	⅝	½	7/16	3/8
5 x 3½		¾	⅝	½	3/8	5/16
4 x 3½		⅝	½	3/8	5/16	¼
4 x 3		⅝	½	3/8	5/16	¼
3½ x 3		⅝	½	3/8	5/16	¼
3½ x 2½			½	3/8	5/16	¼
3 x 2½			½	3/8	5/16	¼
3 x 2		½	3/8	5/16	¼	5/16
2½ x 2			3/8	5/16	¼	5/16
2½ x 1			½	5/16	¼	5/16

■ Production and shipments of molybdenum were 3,816,600 and 3,093,900 pounds, respectively, in September, compared with 3,780,300 and 4,264,700 pounds in August, according to the Bureau of Mines. Average monthly rate of production and shipments in 1940 was 2,859,400 and 2,110,800 pounds, respectively.

Washer, Ironer Production Ordered Reduced 17.3 Per Cent by OPM

WASHINGTON

■ CURTAILMENT in production of domestic washers and ironers from Aug. 1 through Dec. 31, 1941, by 17.3 per cent below average monthly factory sales in the 12 months ended June 30, 1941, was ordered last week by OPM.

Program, if continued without revision for a year, will reduce steel consumption by 32,000 tons. It will effect substantial savings in copper, brass, iron, zinc, rubber, chromium, nickel, aluminum, tin, and bronze.

Estimated demand for washers and ironers to replace those wearing out during the coming year is 750,000 units. Expected production will cover this by a wide margin and still leave a substantial number of units for new installations.

Thirty-four plants employing approximately 13,000 workers are affected by the order. Among the larger producing centers are Newton, Ia., Ripon, Wis., Peoria, Ill., Bloomington, Ill., St. Joseph, Mich., Bridgeport, Conn., Cleveland, South Bend, Ind., Syracuse, N. Y., and Chitago.

Under the limitation program, average monthly quotas for the industry will total 164,410 units for the period from August 1 through December 31, a decline of 17.3 per cent below average monthly factory sales of 198,856 units in the 12 months ended June 30, 1941.

Extent of the reductions is graduated. Four different classifications and the percentage reductions to be applied to each group in the current five months are as follows:

Class A, average monthly sales of 12,000 units or more, 20 per cent reduction; class B, average sales of 5000 to 12,000 units, 16 per cent reduction; class C, sales of 1200 to 5000 units, 12 per cent reduction; class D, sales up to 1200 monthly, no reduction.

To avoid possible inequities, provision was made that a class A manufacturer may, instead of adopting the 20 per cent reduction, produce not more than 50,400 units during the five-month period, which ever will give him the greater output. Likewise, class B manufacturers may choose between the 16 per cent reduction and a ceiling of 22,000 units and class C builders between the 12 per cent reduction and a maximum of 6000 units.

Ice Box Consumption of Steel Reduced 35 Per Cent

Thirty-five per cent reduction in the amount of steel used in the manufacture of nonmechanical refrigerators or ice boxes has been ordered by the Division of Priorities.

The order, which affects 11 companies, will result in annual savings of between 5000 and 5100 tons of steel, in addition to brass, cork, nickel, rubber and zinc.

Amount of the reduction will be based on the monthly average of steel used in the 12 months ended June 30, 1941.

Extend Ratings on Airframes, Aircraft Engines, Propellers

Priorities Division last week extended through November and December the preference ratings covering manufacturers of airframes, aviation engines and propellers. Engine and propeller manufacturers are assigned rating of A-1-c; airframe makers, a rating of A-1-d.

The orders were extended to the end of the year to preclude a lapse in aircraft production while a new type of order is formulated by OPM.

A-10 Rating Assigned for Civilian Plane Repair Parts

A preference rating of A-10 has been granted for the delivery of necessary repair parts and accessories for registered and certificated civilian airplanes. Action is intended to assist dealers supplying operators of such aircraft in addition to previous beneficiaries, including more than 84,000 qualified pilots.

Metal Products Prices Show Slight Advances

Wholesale prices for metals and metal products showed slight rises this year, according to Department of Labor figures just released.

Taking the year 1926 as 100 the report showed the following indexes: Metals and metal products, for August, 1941 and 1940, 98.6 against 98.5; agricultural implements, 92.9 against 92.5; farm machinery, 93.9 against 93.5; iron and steel, 96.9 against 96.8; nonferrous metals, 84.4 against 84.7.

Priorities Division Opens Four New Field Offices

Priorities Division of OPM last week announced the opening of four new field offices. Addresses of the new offices and district managers: Dayton, O., 32 North Main street, Harold B. Doty; Tulsa, Okla., Alfred E. Ballin; Milwaukee, First National Bank building, Frank J. Tharinger; Hartford, Conn., 805 Main street, Edwin L. Howard.

Lewis E. Crandall, former district manager at St. Louis, has been appointed regional co-ordinator for the Southwest. He is succeeded at St. Louis by W. H. Goodloe.

OPM Division of Contract Ditribution has opened a new office at Youngstown, O., 1002 Union National Bank building.

Herbert Payson Jr., has been appointed state director for the Contract Distribution Division in Maine.

Zinc Pool Requirements For November Established

November zinc pool requirements, were announced last week by the Priorities Division. Producers of metallic zinc are directed to set aside an amount equal to 31 per cent of their August production. Zinc oxide pool requirements call for an amount equal to 10 per cent of the August output. No zinc dust need be set aside in November.

Government Forms Are Available

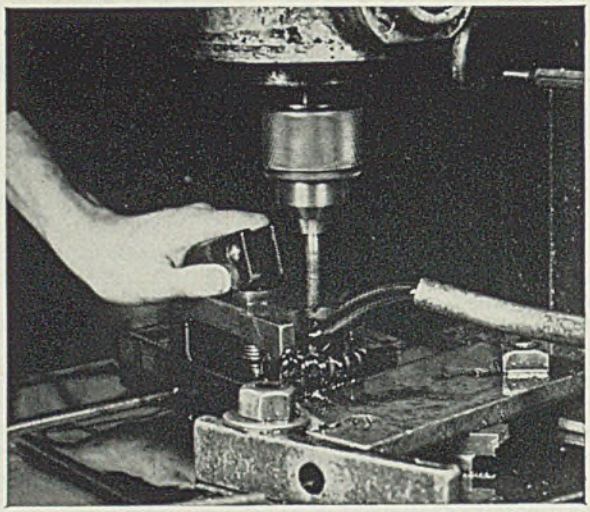
■ Forms P-22, PD-73, PD-25-C, PD-25-D are available to STEEL's readers, shipments being made 24 hours after orders are received.

These forms can be obtained from STEEL, Readers' Service Department, Penton Building, Cleveland, at the following prices:

Quantity of			
100	$1.00, additional hundred 50c per to 500		
500	$3.00	1,000	$3.55
2,500- 5,000	$3.25 per M		
5,000-10,000	$2.95 per M		

NOTE: Postage is not included in above prices. If your order originates in Ohio, please include sales tax.

Make Your Taps LAST LONGER!



The right lubrication helps. It will give faster production, better size control and smoother threads, too. Here are a few tips.

First: Use plenty of lubricant. Put it where it will do the most good. Force it into the hole parallel with the axis of the tap if you can — use two streams on horizontal tapping. For deep tapping and finer pitches, use light or diluted oil to insure reaching the point of the tool. Be sure it's flowing when the tap starts to cut. This helps wash out the chips, too.

Second: Keep the lubricant clean. When it becomes dirty or gritty, replace it with new, clean lubricant.

Third: — and very important, different materials require different lubricants for most efficient tapping. Your oil company's lubrication engineer will give you specific advice, but here are some useful general hints.

This is one of a series of advertisements published by Greenfield Tap and Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known

SUGGESTED TAPPING LUBRICANTS

Material Being Tapped	*Lubricant*
Allegheny Metal	Sulphur Base Oil
Aluminum	Kerosene & Lard Oil
Bakelite	Dry
Brass	Compound or Light Base Oil
Bronze	Compound or Light Base Oil
Bronze—Manganese	Light Base Oil
Copper	Light Base Oil
Die Castings—Aluminum	Kerosene & Lard Oil
—Zinc	Compound
Duralumin	Compound or Kerosene & Lard Oil
Fiber	Dry
Iron—Cast	Dry or Compound
—Malleable	Compound or Sulphur Base Oil
Monel Metal	Sulphur Base Oil or Kerosene & Lard Oil
Nickel Silver	Sulphur Base Oil or Kerosene & Lard Oil
Rubber Hard	Dry
Steel Cast	Sulphur Base Oil
Steel Chromium	Sulphur Base Oil
Steel Machinery	Compound or Sulphur Base Oil or Kerosene & Paraffin
Steel Manganese	Compound or Sulphur Base Oil or Kerosene & Paraffin
Steel Molybdenum	Sulphur Base Oil
Steel Nickel	Sulphur Base Oil
Steel Stainless	Sulphur Base Oil
Steel Tool	Sulphur Base Oil or Kerosene & Lard Oil
Steel Tungsten	Sulphur Base Oil
Steel Vanadium	Sulphur Base Oil

GREENFIELD TAP AND DIE CORPORATION
GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 2102 West Fort St.
WAREHOUSES in New York, Chicago and Los Angeles
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Mirrors of MOTORDOM

Metal trim on autos blacked out after Dec. 15, and use of copper sharply restricted . . . Industry plans to pool resources and talents on critical materials problem . . . Sales slow, with some dealers reported storing new cars . . . General Motors and Ford planning to start tank production on large scale. New tank engines are in prospect

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ ECONOMIC screws on the motor industry were given another expected turn last week with official announcement by the Priorities Division of the ban on bright work after Dec. 15. The decree provides that after the deadline the use of bright finish, bright work, metal finish of body trim containing aluminum, copper, nickel or chromium shall be discontinued in the production of new passenger cars, except where permission is granted for use on bumpers and bumper guards, which likely will be universal.

Furthermore, there shall be no more production of such bright work (and this includes stainless steel), effective immediately, except in amounts necessary to complete passenger automobiles scheduled for assembly before Dec. 15.

How this is going to affect car builders with stocks of bright metal trim now on hand in sufficient quantity to last beyond Dec. 15, no one will venture a guess. Apparently these stocks will have to be scrapped or possibly sold to dealers as replacement parts, or conceivably even painted over so that the plated surfaces will not show. A buyer, then, at his discretion, could use a little paint remover and still have plated trim.

All the motor companies naturally have anticipated the ban on bright trim and are now about ready for a changeover to paint. One executive said last week that after looking over the revised models he thought they presented a better appearance than the former "bright" series.

Prelude to restrictions on bright work was order M-9-c covering civilian use of copper, likewise having a major effect on automobile construction. Specifically the order appears to forbid the use of copper in garage and repair equipment, headlamps and parts, heaters, horns, hub and gasoline tank caps, miscellaneous fittings and trim, moldings, rear view mirrors and hardware. The metal is permitted for electrical purposes and, at least for the present, in radiators, though here again the motor industry is prepared for the worst.

Replacement of copper in tube and fin radiator cores logically has turned to tin plate and terne plate which can be soldered readily. However, with both, heat conductivity is considerably reduced. One estimate is that if terne plate were used for fins only an 18 per cent larger radiator would be needed, while if used for both tubes and fins a 40 per cent larger core would be necessary. Terne plate would not be too satisfactory in sections of the country where water has a high alkaline content.

The copper-restricting order is not believed likely to have any effect on the use of copper-coated steel tubing such as is used in fuel lines and brake lines in automobiles. This tubing is 97 per cent steel, and the copper required to coat the steel should be available.

Alternate Materials Suppliers Capitalizing on Limitations

As might be expected, suppliers of alternate materials are seizing on the opportunity created by government bans on certain metals to further the cause of new materials. For example, Dow Chemical Co. points out that its flexible, semi-transparent tubing of thermoplastic Saran is available as an alternate for copper and other metal tubings, in sizes 1/8 to 5/16-inch outside diameter with wall thicknesses varying from 0.030 to 0.062-inch. The tubing may be joined by Parker standard tube couplings and S.A.E. or other flare-type fittings. As an example of strength of the plastic tubing, a fatigue test is cited in which Saran was flexed through an angle of 15 degrees 1750 times per minute for 2,500,000 cycles without failure.

Parker-Wolverine Co., Detroit, announces it has acquired rights to apply a new type of enamel finish known as Weldcraft. It is offered primarily as a finish for interior automobile hardware, household appliances and office equipment, and is obtainable both in transparent and opaque forms; the transparent being used for bright metals, die castings and electroplated surfaces and the opaque for either plastic or metal surfaces.

Under direction of a committee on critical materials, made up of eight prominent engineers, the automobile industry is moving toward combining technological resources in an industry-wide effort to conserve scarce materials. Steering committee includes J. C. Zeder of Chrysler, R. E. Cole of Studebaker, J. M. Crawford of Chevrolet, F. F. Kishline of Nash, H. M. Northrup of Hudson, J. L. McCloud of Ford, C. R. Paton of Packard and D. G. Roos of Willys.

Major purpose of the pooling program is to insure the maximum conservation, on an industry basis, of the strategic materials required for armament production. Under the procedure developed at a recent meeting of the committee, small subgroups of experts will undertake the task of assembling factual data relating to problems in the use of scarce materials.

The conservation program, it is pointed out, involves many complex problems in research, design and production. Alternate materials have been made available readily in some cases, but in others they may come only after painstaking research. By free interchange of experience and information, the auto companies not only will serve defense but will also maintain for the industry as a

whole the maximum quality of motor vehicles produced.

New Automobile Sales Continue at Slow Rate

The automotive sales picture continues not too encouraging and this is perhaps fortunate for manufacturers harassed by materials shortages and restrictions of the types just mentioned. Production quotas do not begin to take effect on a monthly basis until Dec. 1, car builders being permitted to lump together production for four months starting in August. In most cases, totals for these four months will come pretty close to the OPM limits.

High prices and unwillingness of dealers to do any bargaining on trade-ins appear the chief obstacles in the way of better retail sales. There is talk of dealers warehousing cars for sale after the first of the year, but the belief has been expressed that this policy may prove fatal for any but exceptionally well-financed dealers.

Many a regular annual buyer of a new car this fall is finding that his car is going to cost him $650 instead of the customary $400 or $450 and hence is investing in a new set of tires and forgetting about a new model.

Packard reports the unexplained instance of a complete sell-out of its "old-style" line of cars, continued this year on a limited basis for the so-called "carriage" trade. Though out of date on the basis of style the cars have been snapped up quickly this fall. One explanation, not confirmed however, is that some wealthy buyers are preferring to keep inconspicuous by purchasing a new car which is "old" before it leaves the showroom.

Packard is moving ahead steadily in transferring men from automobile plants to the Rolls-Royce airplane engine plants. Of 17,000 men now on the payroll, 6000 are in the plane engine plant, 11,000 in auto work, and 1000 in marine engine. The plane engine activity will require another 11,000 before peak production can be reached—sometime next summer or fall, it is hoped.

The Rolls-Royce plant is 75 per cent fully equipped for peak production, and another 20 per cent of the tooling is in the processing stage.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
Sept.	192,679	284,583	248,751
9 mos.	2,570,370	3,160,060	4,031,191
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
Oct. 4	76,820	105,153
Oct. 11	79,065	107,957
Oct. 18	85,600	114,672
Oct. 25	91,855	117,080
Nov. 1	92,879	118,092

†Comparable week.

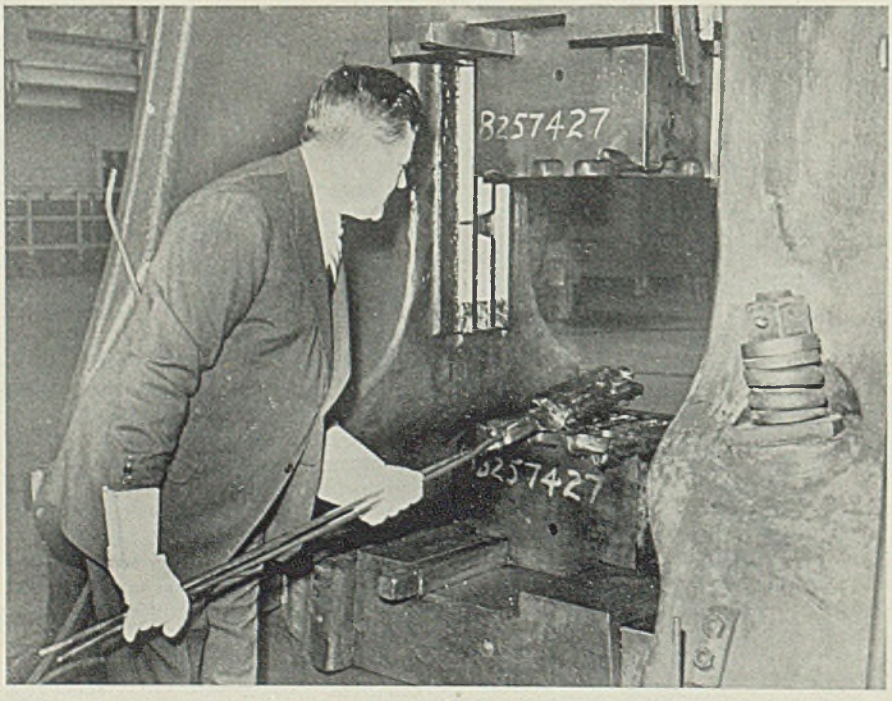
Huge Expansion in Tank Production Due Soon

Principal discussions of forthcoming defense activity in the Detroit district center around tanks in which there is to be a fabulous expansion of production. Both General Motors and Ford shortly will announce receipt of tank contracts for a type to be known as M-4, a medium tank like those Chrysler is now building but with some design refinements including location of the 75-millimeter gun on top in a full-swing turret. The Ford contract probably will include a number of 60-ton tanks, none of which are in production in this country as yet. The GM tanks will be assembled in Flint, according to the grapevine, with Buick and Fisher Body doing a substantial amount of manufacturing work. The betting is that Ford will be in tank production well ahead of General Motors, and possibly may supply important parts for the latter's production. Ford also is going to pioneer some new ideas in armor castings for tanks, as well as in assembly of these castings.

Sharp expansion of the tank program is going to call for some new engines for tanks. Engine now used in the Chrysler-built M-3 tank is a Wright 400-horsepower radial, selected, according to some experts, because it was the only suitable engine available. For use in tanks, it is said to be inferior on a number of counts, principally the difficulty of cooling adequately. Although diesels have been proposed for tank installation, and in fact a plant is now being built to supply tank diesels, they complicate the fuel supply problem in the field, and also are much bulkier than a radial engine of the same horsepower.

An idea for tank power on which Ford is now reported working is two large-bore V-8 automotive-type engines in tandem.

Chrysler President Makes Aircraft Forging



■ K. T. Keller, president of Chrysler Corp., Detroit, tries his hand at making the first aluminum alloy forging to come from the 11 steam hammers installed in the corporation's new 34,500-square foot forge plant adjacent to the Dodge forge plant in Detroit. About 5000 forgings, ranging in weight from 0.1-pound to 10 pounds, will be produced in the plant for use in Martin bombers. Five hundred sets of dies are required for the various parts which will be heat treated and cleaned before shipment to Martin assembly plants in Akron, O., Omaha, Nebr., and to Chrysler's Warren avenue plant in Detroit which will build nose and center fuslage sections

A 15-TON KISS MEASURED IN *Thousandths of an Inch*

Straightening short, hardened steel shafts to correct irregularities of a few ***thousandths*** of an inch is a delicate job — and a tough one!

But this is an easy, commonplace task for this Denison HydrOILic Equipment. It's a standard-type 15-ton HydrOILic press with special straightening centers, designed for an automotive manufacturer. Here's how it works . . .

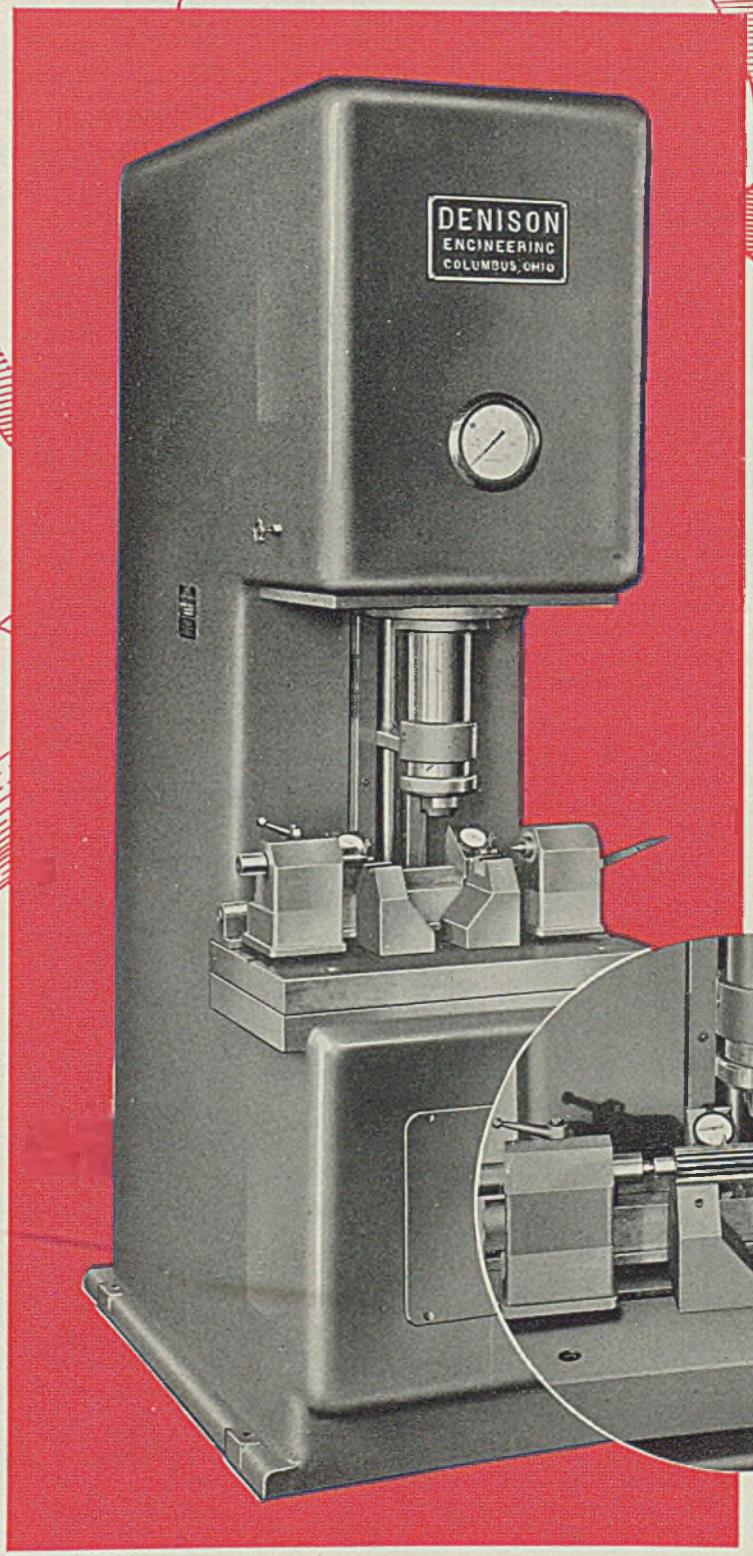
With the ram of the press raised, a shaft is fixed between centers. Gauges, calibrated in thousandths of an inch, are moved along the shaft until they indicate a point where straightening is needed. Then the press ram, operated by the control lever, is advanced to the shaft, and centers are lowered with the shaft to the straightening block. Additional movement of the control lever applies the tonnage that straightens the shaft.

The gauges measure the shaft *after* tonnage has been applied, and *before* the shaft is released. They work swiftly, with unerring accuracy. Feather-light pressure on the operating lever controls the movement of the ram, and the tonnage applied is in direct proportion to the movement of the lever.

And even though this press is readily adaptable to many other types of straightening work, it is only one example of the numerous ways HydrOILics can be applied to specific production jobs.

Because it is so amazingly versatile in application, Denison HydrOILic Equipment will give you the POWER, SPEED and CONTROL *you* want and need. It has solved many a knotty production problem for America's biggest industries, proving its efficiency on all types of jobs.

You'll want to consider HydrOILics for any production problem you may have. So why not consult us or a Denison representative *now*? Your inquiry will receive our prompt attention . . . no obligation, of course.



HydrOILics finds the spot to straighten . . . how much to straighten it . . . and does the straightening with precision and perfect, hair-line control.

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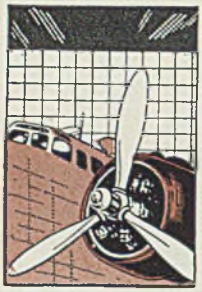


Use motor scooters to tour new parts plant of Consolidated Aircraft. Company has one-eighth of entire industry's business on order books . . . San Diego getting complete face-lifting. . . . Douglas will double size of new Long Beach plant . . . North American opens new sub-contracting office in Cleveland. Installs X-ray system for template duplication in Coast plant

■ "BIGGEST machine shop west of the Mississippi" is what they are calling the vast new parts plant of Consolidated Aircraft Corp., recently placed in operation in San Diego. Known as Plant 2, it is connected with Consolidated's Plant 1 by a private interplant road down which special wide-tread trucks and trailers will haul completed subassemblies from the new plant to final assembly in Plant 1. Together the two plants provide something like 3,000,000 square feet of floor space, are now employing 28,000 and within 12 months will add another 17,000.

So enormous is the Consolidated manufacturing enterprise that supervisory and executive personnel has had to give up the idea of walking around the plants and has taken over a fleet of 25 motor-scooters. These gasoline scooters, with side car, are used by department heads, inspectors, plant police, as well as by army and navy representatives, to keep tab on operations in the plants. They cover as much as 400 miles a day at a speed of 25 miles per hour, but are not permitted inside buildings.

$800,000,000 Backlog

Consolidated now figures it is carrying about 12 per cent of the aviation industry's entire business on its books, or about 30 per cent of the orders awarded California companies. Backlog is approaching the record total of $800,000,000. Principal output is patrol bombers or flying boats for the Navy and B-24 four-motor bombers for the Army. Both are also being supplied Great Britain. Recent order for Army bombers—$226,000,000—was believed to be the largest single order ever placed for military aircraft.

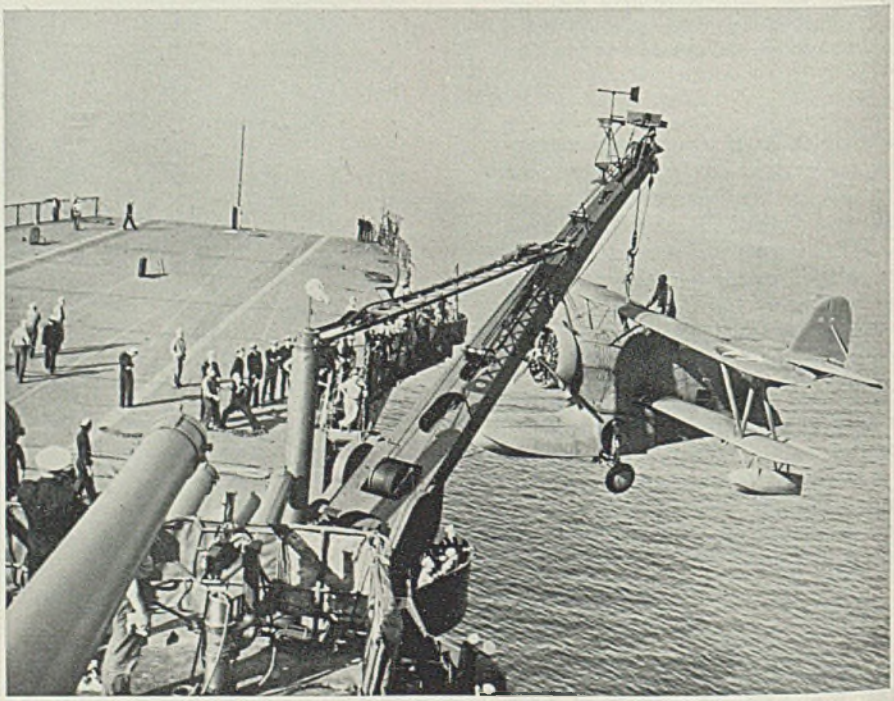
This B-24 bomber, incidentally, is the one which Ford will build at its Ypsilanti, Mich., plant and which will be assembled in new plants at Fort Worth, Tex., operated by Consolidated, and at Tulsa, Okla., operated by Douglas, both supplied parts and subassemblies by Ford. The Texas and Oklahoma plants cover about 2,000,000 square feet each.

Feature of the colossal new Consolidated parts plant in San Diego is a 13-mile monorail system for movement of parts and subassemblies through all departments. A similar 13-mile system is in use in the No. 1 plant, making a complete system of over 26 miles in length.

As if the 16-fold expansion at Consolidated in the past two years were not enough, the city of San Diego is further reeling from the impact of a $65,000,000 naval construction program, involving new piers, additional facilities at marine, naval and air bases; low-cost housing developments spread all over the map, hospitals, ammunition depots, barracks, drydocks and the like. About the middle of this month, Linda Vista, largest defense housing project in the country and being built to house principally the workmen and their families employed at Consolidated, will be finished. The site, on Kearny Mesa, six miles from San Diego's center, is now known to the local citizenry as Consolidated Hill and will provide homes for 15,000 persons.

Meanwhile, over at Long Beach, Calif., where the final touches are

Aircraft Carrier Lexington Takes on an Amphibian



■ Heavy crane hoists a Grumman Amphibian aboard the United States Navy's aircraft carrier LEXINGTON, as the big ship heads for San Diego after being in dry dock in San Francisco. Enroute the LEXINGTON made a speed run of 32 knots. NEA photo

being applied to Douglas Aircraft Corp.'s new "blackout" plant, a new expansion program has been launched which will double the size and capacity of the plant, not yet in full operation. Designed to augment present engineering, production and service facilities and to step up production of four-engine bombers which Douglas will build at Long Beach as its share of the B-V-D program for B-17-E bombers, new buildings will bring the plant's covered working area to 2,750,000 square feet and increase total cost to nearly $25,000,000. Present eleven structures will be supplemented with an engineering building, a service hangar, two subassembly and final assembly units, a mill building, maintenance building and an addition to the receiving department.

In Burbank, Calif., the Lockheed-Vega plants have celebrated the signing of the 50,000th employe to the payroll. Lockheed now has 39,000, Vega 11,000. About 30,000 of these employes have been hired since the first of this year, and current payrolls are something over $6,000,000 a month.

North American Aviation Inc., Ingelwood, Calif., has announced Jan. 10, 1942, as the date for dedication of its new bomber assembly plant at Kansas City, Kans., with actual production of B-25s scheduled to start this month. The 26-acre assembly unit will be supplied with better than half its parts by Fisher Body division of General Motors, and a crew of several hundred has been engaged for weeks in setting up machinery and tools.

Will Increase Subcontracting

To speed up subcontracting activities in the East and Middle West, North American this month opens a Cleveland office at 805 Hippodrome building, in charge of Albert Gianelli whose chief function will be survey plant facilities in the district with a view to subcontracting more of NA production. At present, company officials estimate their three plants in Inglewood, Dallas and Kansas City are farming out around 30 per cent of their production, to some 65 major subcontractors and to 900 suppliers of parts and materials. The new Cleveland office likely will result in raising this percentage to 35 or better and also will take over outside production follow-up activities previously handled by Fisher Body in Detroit.

North American has installed at its Inglewood plant an X-ray photo-template duplicating system which permits duplication of any master pattern in the shop in an hour's time, and in some cases saves several days over the old manual reproduction method. In addition to duplicating regular metal templates, the process can reproduce lines for masonite dies used in forming sheet metal parts, and can duplicate the lines on wood jigs used with profiling machines.

Several aircraft companies have turned to photography as the means of speedy duplication of templates. By taking a picture of the original template and then enlarging it on metal to actual size, it is possible to make a duplicate by cutting along the photographic lines, However, a certain amount of shrinkage was involved in the enlarging process.

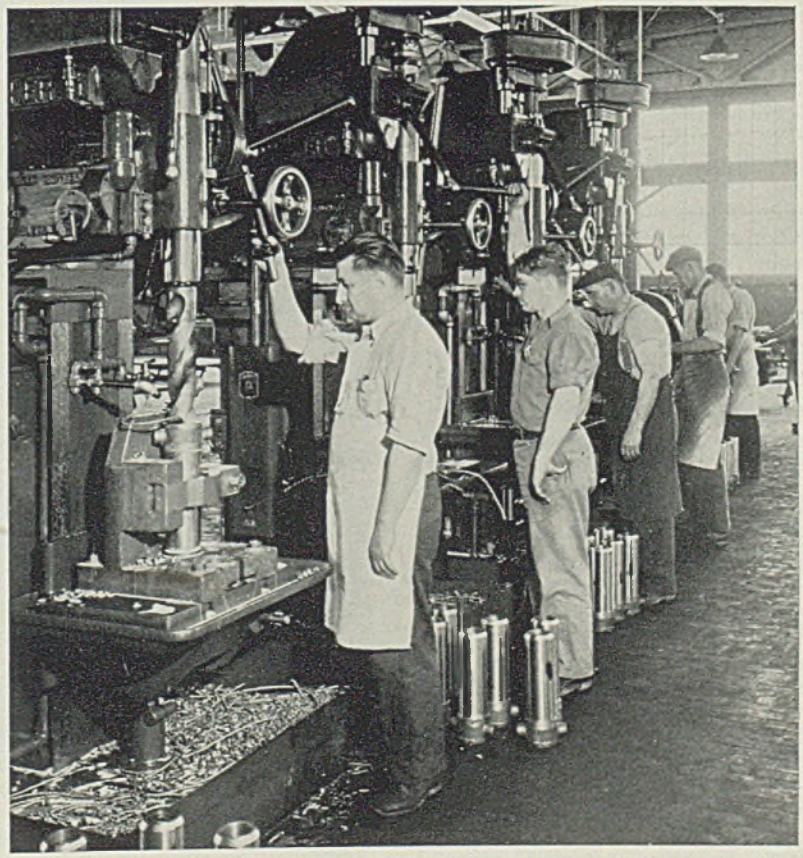
With the co-operation of General Motors research engineers and Eastman Kodak Co., North American has carried the process one step further, eliminating camera equipment in favor of the X-ray.

Develop New Drafting Boards

The process is about as follows: On metal sheets that have previously been treated with fluorescent lacquer, a loftsman scribes the template design, effect of the lacquer being destroyed where he scribes. The layout then is placed under the X-ray which causes the lacquered surface to glow. Since the lacquer's effect has been eliminated where lines have been scribed, they remain dark. Then any practical surface coated on one side with film, is placed next to the original template design, using a vacuum pressure arrangement to hold it firmly. When the afterglow of the scribed template reacts on the film, an opaque negative results. After the transfer process has been completed, the negative is developed by ordinary photographic means and the finished product is ready to be trimmed and sent to the shop for production use. The system produces either positive or negative prints.

Engineers of Glenn L. Martin Co. in Baltimore have developed a new type of engineering drafting board which, by means of a small window-type crank may be tilted up to any convenient angle, dispensing with the need for bending over a horizontal board. When not being used, the board lies flat on its desk top. The draftsman, seated in his chair, twirls the small crank which raises the board to the desired level. Then, by means of a horizontal bar, beneath the edge of the board, he adjusts his board to the proper angle, the board being kept firmly in position by a dog controlled by the bar which drops into a notched locking sector.

New Naval Ordnance Plant Builds Antiaircraft Guns



■ Spring casings are being drilled for the Oerlikon 20-millimeter antiaircraft gun, at the new $20,000,000 United States naval ordnance plant at Centerline, Mich., near Detroit. Plant is operated by Hudson Motor Car Co. and was dedicated last week by Frank Knox, Secretary of Navy

Report Steelmakers' Consumption of Manganese Can Be Reduced

■ A SURVEY of the steel industry's manganese consumption shows that substantial reductions in manganese requirements can be made without introducing critical changes in steel-producing practices. This report has been made at the request of the National Academy of Sciences by an informal committee of metallurgists selected from the technical committees of American Iron and Steel Institute.

The committees consisted of: C. H. Herty Jr. (chairman), Bethlehem Steel Co.; R. S. Archer, Republic Steel Corp.; A. C. Badger, Youngstown Sheet & Tube Co.; Carl Henning, Jones & Laughlin Steel Corp.; J. K. Killmer, Bethlehem Steel Co.; R. W. Simon, Carnegie-Illinois Steel Corp.

It is estimated that an immediate saving of about 10 per cent from average amounts of manganese used heretofore can be made without undue hardship, but that no more than 20 per cent can be saved without serious effects on both production and use of steel products.

"Use of a given amount of manganese in the manufacture of any steel product is governed primarily by specifications set by steel producers which are designed to contribute to the physical properties of the finished steel or to enhance the surface quality obtained in rolling, forging or casting," the report states. "Equally important are the standard specifications set by steel consumers in which the manganese ranges specified are designed to contribute to certain definite physical property requirements or to heat treatment processes.

Specifications Often Duplicated

"In many cases specifications in the two classes duplicate one another, in other cases they are independent of one another. For example, the manganese ranges set forth in standard specifications for steel plates may be identical with what would be set up by steel producers were there no consumer specifications. On the other hand, consumer specifications for sheet steel and strip steel are rarely found and the manganese content of the product is determined almost entirely by the steelmaker based on his experience as to rolling performance and desired physical properties.

"The quantity of ferromanganese consumed in the manufacture of various products has been estimated from a study of each product based on 1940 production records. Table 1 gives the results of that study.

"In order to clarify the problem further, products were so grouped in respect to manganese content as to distinguish between specifications set by consumers and specifications set by producers; each according to the percentage of the total ferromanganese consumed. When a product fell into both classifications the percentage of ferromanganese consumed was arbitrarily divided into halves and one-half placed in each category. Results of that study are given in Table 2.

Responsibility Is Mutual

"On the basis of the latter table it is fair to conclude that the responsibility for manganese conservation is the mutual problem of steel producer and steel consumer. Among the problems to be solved by steel producers is the determination of the limits to which reduction of the manganese content of steel can be carried without impairing surface quality, production rates or both.

"On the part of consumers a similar effort is recommended particularly among those which customarily purchase bars, semifinished products, wire rods and wire to chemical specifications. Efforts already made by one steel producer indicate that most consumers are willing to consider a voluntary reduction in their specified manganese, purely from a patriotic point of view. Some consumers have reduced their minimum manganese requirements by 5 points (0.05 per cent) and the extreme has been a consumer who changed his manganese requirements from a range of 0.60 to 0.90 per cent to a range of 0.30 to 0.60 per cent."

A plan for evaluating conservation efforts is suggested and individual products are discussed in accordance as follows:

Class A products are those in which a definite conservation of manganese can be made with little or no effect on quality. These include some commercial high-manganese steels, a great majority of the commercial steel bar tonnage, sheets and strip, pipe, plate, structural shapes, piling, rods, wire and standard rails.

Class B products are those in which conservation can be made with a probable adverse effect on production and quality. These include certain commercial high-manganese steels, sheets and strip (if manganese content were lowered 5 points), tin plate, carbon bars (involving heat treatment), rods and wire (when physical properties and grain sizes are involved).

Class C products are those in which conservation of manganese would have a definitely adverse effect on both production and quality. These include alloy steel bars, wheels, axle and heavy forgings, certain rods and wire. Because steels used in making wheels, axles and heavy forgings take such a small proportion of total manganese consumption and in view of the importance of these products in the fields of public safety, no changes in specifications covering manganese are recommended.

High manganese shell steel is listed under Class A, but the committee stated that because it has

Table 1
ESTIMATED CONSUMPTION OF FERROMANGANESE BY PRODUCTS

	Approximate 1940 Ingot Equivalent, Net Tons	Total Fe Mn Consumed, Pounds	Fe Mn per Ton of Ingots, Pounds	Fe Mn Consumed—Per Cent of Total
Bars	10,800,000	288,700,000	26.6	29.3
Sheets and Strip	19,430,000	193,700,000	10.0	19.8
Shapes and Piling	6,550,000	107,000,000	16.3	11.0
Semifinished Products	5,650,000	81,200,000	14.4	8.3
Plates	5,950,000	74,400,000	12.5	7.6
Rods and Wire	5,990,000	62,100,000	10.4	6.3
Tin Plate	4,990,000	52,000,000	10.5	5.3
Rails	2,310,000	49,600,000	21.5	5.1
Pipe	3,730,000	43,050,000	11.5	4.4
Wheels, Axles, Forgings	1,530,000	28,700,000	18.8	2.9
Total	66,930,000	980,450,000	*	100.0

*Pounds of ferromanganese per ton of ingots—14.8.

Table 2
CONSUMPTION OF FERROMANGANESE
(Per Cent of Total)

Consumer Specifications		Producer Specifications	
Bars	29.3	Sheets and Strip	19.8
Rails	5.1	Shapes and Piling	11.0
Semifinished Products	4.1	Rods and Wire	6.3
Plates	3.8	Tin Plate	5.3
Wheels, Axles, Forgings	2.9	Semifinished Products	4.2
Pipe	2.2	Plates	3.8
		Pipe	2.2
Total	47.4	Total	52.6

not yet learned the present and future requirements for all types of shells as described by various specifications details, no definite changes in specifications for shell steel are proposed. However, it is suggested that careful consideration be given to physical properties required, manufacturing procedure and machining problems involved, with a view toward saving substantial amounts of manganese.

Find Further Cut in Aluminum for Steel Industry Would Have Adverse Effect

■ ALUMINUM consumption for deoxidation of steel declined from a rate of 0.698 pounds per ton of steel ingots produced in the last half of 1940 to 0.562 pounds per ton in June, 1941, but any further marked decrease will adversely affect steel production.

This is stated in a report made at the request of OPM by an informal committee of metallurgists selected from the technical committees of American Iron and Steel Institute.

The committee included C. H. Herty Jr. (chairman), Bethlehem Steel Co.; T. F. Olt, American Rolling Mill Co.; C. F. W. Rys, Carnegie-Illinois Steel Corp.; E. C. Smith, Republic Steel Corp.; E. T. Walton, Crucible Steel Co. of America.

During 1940 the steel industry consumed aluminum at the rate of about 4,880,000 pounds per month, it was ascertained. This aluminum was used primarily as a deoxidizer of steel. Importance of aluminum in steelmaking is illustrated by the following examples:

At two different plants blooming mill production is decreased 36 per cent and 40 per cent, respectively, on medium carbon steels when such steels are made to a coarse grain specification produced with insufficient aluminum addition, instead of to a fine grain specification.

For steels which are manufactured to exacting requirements for segregation it has been found that in certain grades there is an increase of about 15 per cent in rejections on top billets of nonaluminum treated steels over aluminum treated steels.

For many applications where welding is performed, sufficient aluminum properly to kill the steel is absolutely essential, otherwise an extremely high percentage of defective welds will be encountered.

"From a general survey of the industry it is apparent that if there is a marked decrease from the present rate of consumption of aluminum, steel quality will suffer unless there is a totally new and general understanding with the consuming industries regarding specifications and quality requirements, and that there will be an increase in rejections at both producers' and consumers' plants," the report states.

"Moreover, the loss of production through rejection of steel because of lack of control of deoxidation which will manifest itself in bad surface and high segregation will amount to not less than 5 per cent for the industry, which on a yearly production of 80,000,000 tons of ingots would mean a total of 4,000,000 tons of steel per year."

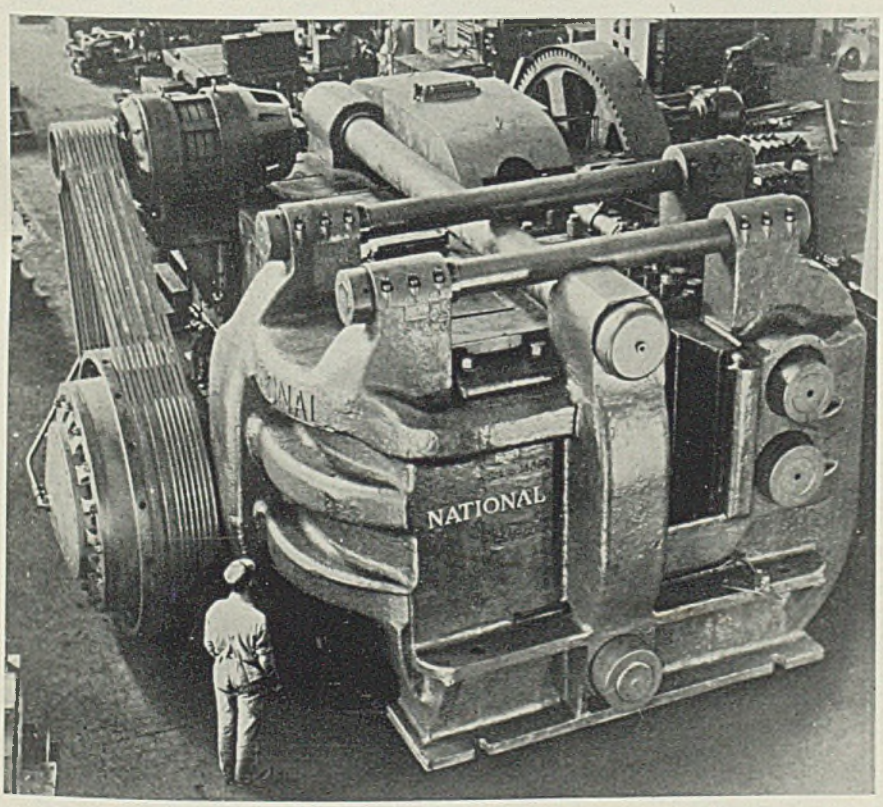
The decrease effected in aluminum consumption so far this year was accomplished through the general substitution of other deoxidizers, in many cases more expensive than aluminum, and through the efforts of the industry to produce a satisfactory product with a minimum of aluminum.

Should Provide Needed Tonnages

It is the opinion of the committee that in distributing aluminum to the steel industry, it is absolutely essential to provide all the aluminum which the industry feels to be necessary for the proper production of certain grades. These grades include Nitralloy, Alnico, tool steel, stainless and heat resisting steels, all other electric furnace steels, excluding castings, all alloy open-hearth steels (including low-alloy, high-tensile steels), semikilled steel for plates, killed steels for plates, forgings, bars and semifinished products. In certain cases substitutes for aluminum have been used in making these.

For the other grades where the use of substitutes has been more general, the committee says it may be possible to limit the industry to not less than 50 per cent of its 1940 aluminum requirements, provided that the necessary substitutes continue available in required quantities.

Forging Machine Weighs 500,000 Pounds



■ Turn-Tubes Inc., Louisville, Ky., has purchased two heavy forging machines to be used in the production of airplane engine forgings and other armament items. Machines are rated at 9-inch capacity and each weighs more than 500,000 pounds. Compact design is made possible because the flywheel shaft is mounted in the neutral axis in the bed frame, and the overarm heading slide permits locating the main shaft farther forward without sacrifice of tool alignment. As a result all the bed frame weight is effective in providing rigidity which insures freedom from "spring"

Steel for Sale Off 3.4 Per Cent in September

■ Steel produced for sale in September totaled 5,384,817 net tons, 188,849 tons, or 3.4 per cent, less than 5,573,666 tons in August, according to the American Iron and Steel Institute.

Exports in September were 560,720 tons, 44,180 tons more than 516,540 tons exported in August, a gain of 8.6 per cent. Shipments to other members of the industry for further conversion totaled 325,788 tons, 13,891 tons, or 4.1 per cent, less than 339,679 tons so shipped in August.

September production was 938,262 tons greater than 4,446,555 tons in September, 1940, up 21.1 per cent. Details for the month are presented in the accompanying table.

Production in nine months this year totaled 48,436,943 tons, compared with 42,749,649 tons in the corresponding period in 1940, an increase of 5,687,294 tons, 13.3 per cent. During 1940 the 181 companies included below represented 97.8 per cent of the total production of finished rolled steel products. For the fourth month percentage of production exported continued to rise, reaching 10.4 per cent, compared with the low point of 5.8 per cent in May.

Production for sale, less shipments to members of the industry for further conversion, related to estimated yield from ingots of 71.1 per cent, was 5,059,029 tons, 103.6 per cent. For nine months it was 45,239,848 tons, 101.7 per cent.

1940	Output	Exported	Pct. Exported
Sept.	4,446,555	951,555	21.4
Oct.	4,937,388	783,652	15.87
Nov.	4,760,948	562,587	11.82
Dec.	4,909,448	713,802	14.5
Year	48,584,860	7,683,858	15.8
1941			
Jan.	5,163,912	558,198	10.8
Feb.	4,864,936	560,035	11.5
March	5,411,319	491,519	9.07
April	5,269,748	331,942	6.29
May	5,444,235	317,442	5.8
June	5,086,210	327,357	6.4
July	5,226,102	430,493	8.2
Aug.	5,573,666	516,540	9.3
Sept.	5,384,817	560,720	10.4

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

September - 1941 (PERIOD)

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	41	1	xxxxxxx	718,889	xxx	295,881	165,399	5,023,894	xxx	1,402,575	1,512,054
	Heavy structural shapes	9	2	5,167,200	372,266	87.8	11,213	xxxxxxx	3,430,208	88.8	133,895	xxxxxxx
	Steel piling	4	3	422,000	28,090	81.1	4,177	xxxxxxx	266,735	84.6	26,555	xxxxxxx
	Plates—Sheared and Universal	19	4	5,692,560	524,434	112.2	25,114	5,634	4,238,184	99.5	255,751	29,584
	Skelp	8	5	xxxxxxx	75,426	xxx	11,276	29,773	764,762	xxx	125,396	314,043
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	112,896	38.1	478	xxxxxxx	1,313,650	48.6	49,304	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	12,896	51.9	3,886	xxxxxxx	130,776	57.7	48,398	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,166	13.9	76	xxxxxxx	19,246	25.2	2,551	xxxxxxx
	Splice bar and tie plates	15	9	1,312,200	43,211	40.1	540	xxxxxxx	539,962	55.0	11,457	xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	485,264	xxx	27,004	55,312	4,752,696	xxx	360,738	571,002
	Concrete reinforcing—New billet	18	11	xxxxxxx	150,767	xxx	18,011	xxxxxxx	1,175,225	xxx	158,607	xxxxxxx
	Rerolling	18	12	xxxxxxx	30,023	xxx	1,951	xxxxxxx	175,604	xxx	11,748	xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	94,911	xxx	2,393	xxxxxxx	936,831	xxx	18,587	xxxxxxx
	Alloy—Hot rolled	18	14	xxxxxxx	144,380	xxx	5,674	19,578	1,413,345	xxx	116,374	208,954
	Cold finished	17	15	xxxxxxx	17,281	xxx	1,418	xxxxxxx	137,589	xxx	23,250	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	9,132	xxx	271	xxxxxxx	88,705	xxx	3,009	xxxxxxx
	TOTAL BARS	62	17	13,007,345	932,758	87.3	56,722	74,890	8,679,995	89.2	692,363	779,956
	Tool steel bars (rolled and forged)	17	18	180,470	14,093	95.1	501	xxxxxxx	111,469	82.6	5,723	xxxxxxx
	Pipe and tube—B. W.	16	19	2,242,040	155,049	84.2	6,658	xxxxxxx	1,294,145	77.2	90,795	xxxxxxx
	L. W.	8	20	895,260	40,881	55.6	1,863	xxxxxxx	372,832	55.7	23,013	xxxxxxx
	Electric weld	5	21	551,020	46,398	102.6	7,334	xxxxxxx	407,263	98.8	22,790	xxxxxxx
	Seamless	15	22	2,997,160	179,037	72.8	10,340	xxxxxxx	1,609,411	71.8	142,944	xxxxxxx
	Conduit	8	23	174,140	13,025	91.1	482	xxxxxxx	118,883	91.3	3,514	xxxxxxx
	Mechanical Tubing	10	24	392,370	29,582	91.8	1,488	xxxxxxx	255,328	87.0	18,632	xxxxxxx
	Wire rods	22	25	xxxxxxx	121,069	xxx	27,061	16,773	1,146,645	xxx	149,968	192,266
	Wire—Drawn	41	26	2,343,170	203,387	105.7	10,049	2,357	1,757,920	100.3	110,126	17,209
	Nails and staples	18	27	1,153,930	62,606	66.1	5,241	xxxxxxx	598,902	69.4	53,133	xxxxxxx
	Barbed and twisted	16	28	474,210	20,515	52.7	5,328	xxxxxxx	205,880	58.0	46,839	xxxxxxx
	Woven wire fence	16	29	777,785	21,661	33.9	126	xxxxxxx	236,504	40.7	1,661	xxxxxxx
	Bale ties	11	30	110,970	7,582	83.2	30	xxxxxxx	63,517	76.5	171	xxxxxxx
	All other wire products	7	31	41,380	2,018	59.4	-	xxxxxxx	15,887	51.3	3	xxxxxxx
	Fence posts	12	32	126,165	4,709	45.5	68	xxxxxxx	54,480	57.7	794	xxxxxxx
	Black plate	11	33	340,030	39,035	159.8	2,185		324,506	127.6	28,664	43
	Tin plate—Hot rolled	7	34	515,620	39,385	93.0	7,495	xxxxxxx	250,051	64.8	34,568	xxxxxxx
	Cold reduced	11	35	3,542,040	285,966	98.3	21,226	xxxxxxx	2,284,090	86.2	205,703	xxxxxxx
	Sheets—Hot rolled	30	36	xxxxxxx	575,257	xxx	29,493	13,129	5,673,049	xxx	233,164	161,582
	Galvanized	16	37	xxxxxxx	122,151	xxx	5,958	xxxxxxx	1,292,122	xxx	85,272	xxxxxxx
	Cold rolled	18	38	xxxxxxx	211,831	xxx	6,860	xxxxxxx	2,362,079	xxx	55,745	xxxxxxx
	All other	13	39	xxxxxxx	57,458	xxx	1,523	xxxxxxx	586,913	xxx	17,650	xxxxxxx
	TOTAL SHEETS	31	40	13,298,490	966,697	88.5	34,834	13,129	9,914,163	99.7	391,931	161,582
	Strip—Hot rolled	24	41	3,244,680	152,097	57.1	5,927	17,833	1,533,739	63.2	58,490	190,555
	Cold rolled	40	42	1,618,070	103,629	78.0	1,842	xxxxxxx	980,428	81.0	16,550	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,820	22,305	64.3	334	xxxxxxx	190,409	60.2	1,458	xxxxxxx
	Axles	5	44	480,350	16,365	41.5	522	xxxxxxx	140,132	39.0	2,551	xxxxxxx
	Track spikes	11	45	325,770	11,839	44.3	321	xxxxxxx	128,679	52.8	1,691	xxxxxxx
	All other	6	46	67,600	3,854	69.4	102	xxxxxxx	34,268	67.8	1,195	xxxxxxx
	TOTAL STEEL PRODUCTS	161	47	xxxxxxx	5,384,817	xxx	560,720	325,788	48,436,943	xxx	4,161,156	3,197,095
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	659,342	xxx	36,061	257,467	5,896,276	xxx	415,927	1,833,462
	Ingot moulds	4	49	xxxxxxx	63,888	xxx	458	xxxxxxx	862,768	xxx	3,248	xxxxxxx
Iron Products	Bars	12	50	172,915	9,065	63.9	27	424	73,256	56.6	651	4,012
	Pipe and tubes	3	51	109,300	6,629	73.9	340	xxxxxxx	51,213	62.6	2,131	xxxxxxx
	All other	2	52	71,000	2,347	40.3	458	-	16,594	31.2	2,966	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	14	53	288,715	18,041	76.1	834	424	141,063	63.3	5,748	4,012

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 %, *which applied to their total ingot capacity equals* 59,493,000 *net tons of finished rolled products.*
Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield:

Current month 5,059,029 *N. T.;* 103.6 %
Year to date 45,239,848 *N. T.;* 101.7 %

$220,283,812 National Defense Awards Placed by War Department in Week

■ DEFENSE awards reported last week by the War Department totaled $220,283,812, a substantial increase from the preceding week. Ordnance Department, with combined orders totaling more than $150,000,000, and the Air Corps with more than $55,000,000, comprised a large percentage of the week's aggregate. Most awards were small, and in many instances are beginning to show effect of the new policy of spreading defense work as widely as possible to prevent dislocations in industry. The orders included:

Ordnance Department Awards

Almac Die & Tool Works, Chicago, jigs and fixtures, $1666.
Aluminum Co. of America, Pittsburgh, aluminum alloy, $1641.
American Brake & Shoe Foundry Co., American Forge Division, Chicago, shell forgings, $161,399; American Manganese Steel Division, Chicago Heights, Ill., castings, $18,288.
American Brass Co., Waterbury, Conn., cartridge case cups, $320,305.
American Optical Co., Philadelphia, lens curve generators, $3000.
Arens Controls Inc., Chicago, parts for tanks, $2729.
Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y., tools, $5568.
Bethlehem Steel Co., Bethlehem, Pa., steel, $14,660.
Blakeslee, G. S., & Co., Cicero, Ill., washing machines, $3174.
Bliss, E. W., Co., Brooklyn, N. Y., presses, $3687.
Broadway Office Supply & Equipment Co., Springfield, Mass., steel desks, $2310.
Brown & Sharpe Mfg. Co., Providence, R. I., adapters, $4279.
Carnegie-Illinois Steel Corp., Pittsburgh, steel, $4107.
Cincinnati Milling Machine Co., Cincinnati, milling machines, $11,118.
Cleaver Brooks Co., Milwaukee, boilers, $4906.
Colton, Arthur, Co., Detroit, pelleting presses, $258,076.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., components for assembling trigger and safety in backplate, $2433.
Consolidated Packaging Co., Buffalo, idler pulleys and brackets and thread cleaning machines, $4504.
Continental Motors Corp., Muskegon, Mich., parts for tanks, engine parts, $23,173.
Cutter Wood & Sanderson, Cambridge, Mass., wrenches, $2709.
Denison Engineering Co., Columbus, O., presses, $120,000.
Duro Metal Products Co., Chicago, ratchets, $4770.
Essley, E. L., Machinery Co., Chicago, surface grinders, $9814.
Evan's, John, Sons Inc., Philadelphia, firing pin springs, $1696.
Finkl, A., & Sons Co., Chicago, forgings, $1875.
Firth-Sterling Steel Co., McKeesport, Pa., carbide blanks, machine working tools, dies, $5975.
Fox Munitions Corp., Philadelphia, gages, $4924.
General Motors Corp., Detroit, parts for tanks, $17,800.
Gibson, G. M., Co., Bellevue, Iowa, gun pins, $4570.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $2844.
Guiberson Diesel Engine Co., Chicago, parts for tanks, $8430.
Highway Steel Products Co., Chicago Heights, Ill., packing accessories, $138,516.
Jones & Lamson Machine Co., Springfield, Vt., cams, $4446.
Kux-Lohner Co., Chicago, pelleting presses, $126,250.
Lima Armature Works, New York, gearshift motors, $1849.
Link-Belt Co., Indianapolis, bursters, $101,261.
Lowell Wrench Co., Worcester, Mass., wrenches, $16,368.
Lukens Steel Co., Coatesville, Pa., steel, $4699.
Lux Clock Mfg. Co., Waterbury, Conn., gears, $106,491.
Mattison Machine Works, Rockford, Ill., belt sanders, $1598.
Molded Insulation Co., Philadelphia, parts for tanks, $4680.
National Enameling & Stamping Co., Milwaukee, parts for ammunition, $170,430.
National Mineral Co., Chicago, chests, $52,674.
National Twist Drill & Tool Co., Detroit, cutters, $1673.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., barrel drilling machines, adapters, drill tips, taps, $57,582.
Northern Trading Co. Inc., New York, cathodes, $103,923.
Norton Co., Worcester, Mass., grinder machines, $14,034.
O. K. Tool Co., Shelton, Conn., tool holders, end mills, blades, cutters, and tool bits, $3291.
O'Leary, Arthur J., & Son Co., Chicago, springs and die charges, $12,047.
Olson, Samuel, Mfg. Co. Inc., Chicago, roller gravity conveyors, $2527.
Otis Elevator Co., Buffalo, steel castings, $85,268.
Otis Steel Co., Cleveland, steel, $3016.
Peoria Tractor & Equipment Co., Peoria, Ill., parts for tractors, $29,731.
Pipe Machinery Co., Cleveland, gages, $13,742.
Pullman-Standard Car Mfg. Co., Butler, Pa., forgings, $336,432.
Ramsohoff, N., Inc., Cincinnati, tumbling and cleaning machines, $1925.
Reasoner Tool & Supply Co., Boston, twist drills and reamers, $1586.
Revere Copper & Brass Inc., New York, brass rods; bronze bars, $28,904.
Roller-Smith Co., Bethlehem, Pa., balances and pans, $70,800.
Rollway Bearing Co. Inc., Syracuse, N. Y.,

50-Caliber Antiaircraft Gun in Action

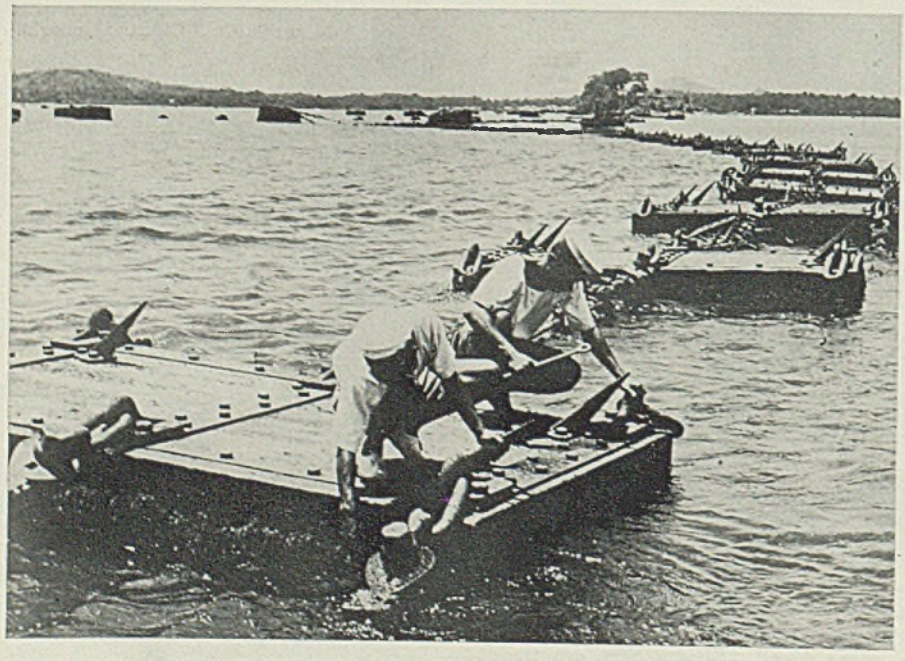
■ Antiaircraft guns, like this 50-caliber unit designed to protect troops and other surface objectives from enemy air raiders, are being manufactured in increasing numbers as the national defense program gains speed. Shown here are troops of the 68th Coast Artillery, attached to the Sixth Corps, operating one of the guns from a cliff overlooking a highway near Albemarle, N. C., during maneuvers of the First Army. NEA photo

bearings, $11,760.
S K F Industries Inc., Philadelphia, ball bearings, $9006.
Standard Machinery Co., Providence, R. I., bearings, $2113.
Standard Pressed Steel Co., Jenkintown, Pa., firing plugs, $1712.
Stewart-Warner Corp., Chicago, parts for tanks, $2125.
Stokes, F. J., Machine Co., Philadelphia, pelleting presses, $313,570.
Thurston Mfg. Co., Providence, R. I., milling cutters, $6381.
Timken Roller Bearing Co., Canton, O., bearings, tubing, $3896.
Titeflex Metal Hose Co., Newark, N. J., tube assemblies and adapter elbows, $3301.
Union Hardware Co., Torrington, Conn., rifle cleaning rods, $6591.
Universal Crusher Co., Cedar Rapids, Iowa, cradle assemblies, $17,696.
Vickers Inc., Waterbury Tool Division, Waterbury, Conn., relief valves, $19,000.
Voss Bros. Mfg. Co., Davenport, Iowa, carrying cases and spare parts, $64,115.
Warren, J. M., & Co., Troy, N. Y., drill presses, motors, manual starters, and mounting parts, $1731.
Wheeling Stamping Co., Wheeling, W. Va., parts for ammunition, $5503.
Wright Aeronautical Corp., Paterson, N. J., repair tools and equipment, $3576.
Yankee Metal Products Corp., Norwalk, Conn., parts for tanks, $11,604.
Zipit Corp., Philadelphia, gages, $2840.

Corps of Engineers Awards

A. B. Sheet Metal Co., Chattanooga, Tenn., ventilators, $3089.
Air Conditioning Engineers, Mobile, Ala., water coolers, $17,690.
Alban Tractor Co. Inc., Baltimore, harrows, disk and tractor plows, $15,141.
Albert & Davidson Pipe Corp., Brooklyn, N. Y., pipe and fittings, $21,037.
American Brake Shoe & Foundry Co., Ramapo Ajax Division, New York, gage rods, $83,700.
American Machine & Metals Inc., East Moline, Ill., laundry equipment for hospitals, $92,545.
American Monorail Co., Cleveland, monorail conveyor system, aviation mechanics' training school, Keesler field, Biloxi, Miss., $12,600.
American Saw Mill Machinery Co., New York, saw mills and parts, $3364.75.
Anaconda Wire & Cable Co., New York, lamp cords, cable, $6287.
Anchor Equipment Co., New York, coffee urns, griddles, pans, $8013.
Anstice, Josiah, & Co. Inc., Rochester, N. Y., potato peelers, $6936.
Aqua Systems Inc., New York, gasoline fueling system, observation squadron airfield, Tullahoma, Tenn., $42,059.
Armco International Corp., Middletown, O., steel buildings, ammunition storage units, galvanized pipes with fittings, welders, $199,226.
Atlas Fence Co., Philadelphia, fence, U. S. engineer reservation, Mayport, Fla., $1611.
Austin-Western Road Machinery Co., Aurora, Ill., rollers, $15,728.
Barber-Greene Co., Aurora, Ill., mixing plants, finishing machines, $33,130.
Blaw-Knox Co., Pittsburgh, airplane hangars, steel road forms, concrete finishers, $127,364.
Bowser, S. F., & Co. Inc., Ft. Wayne, Ind., gasoline pumps and parts, $3018.30.
Bruning, Charles, Co. Inc., New York, drawing instruments, levels, $16,113.
Buckeye Portable Tool Co., Dayton, O., pneumatic drills, aircraft assembly plant, Kansas City, Kans., $4395.
Buckeye Traction Ditcher Co., Findlay, O., shovels with equipment, $129,253.
Buda Co., Harvey, Ill., parts for engines, $3575.
Buffalo Bolt Co., North Tonawanda, N. Y., bolts and boat spikes, $6351.
Buffalo Forge Co., Buffalo, power benders, V-bolts, bar-cutters and shear blades, $27,275.
Capital Steel & Iron Co., Oklahoma City, Okla., hangar doors, Advanced Twin Engine Flying school, Columbus, Miss., $9800.
Carey Machinery & Supply Co., Washington, chucks, presses, vises, and drilling machines, lathes, $29,068.70.
Carver Pump Co., Rock Island, Ill., pumping sets, $60,895.
Case, J. I., Co., Racine, Wis., tractors, $3217.
Caterpillar Tractor Co., Peoria, Ill., diesel engines and tools for marine engines, tractors, graders, parts, $733,701.15.
Cen-Tennial Cotton Gin Co., Columbus, Ga., duct work, smoke stacks, caps, smoke pipe hoods, Grimes Advanced Single Engine Flying School, Dothan, Ala., $20,532.
Chicago Freight Car Parts Co., Chicago, flat cars, $33,250.
Chicago Pneumatic Tool Co., Philadelphia, air compressors, $16,055.
Clamshell Bucket Sales Corp., Long Island City, N. Y., buckets and replacement parts, $12,892.
Cleveland Trencher Co., Cleveland, ditchers and parts, $20,137.
Cole Supply Co. Ltd., Tuscaloosa, Ala., range boilers, hot water tanks and heaters, gate valves and valve boxes, $12,757.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., dishwashers, $2531.
Columbian Steel Tank Co., Kansas City, Mo., metal tanks, $11,091.
Columbia Steel Co., Pittsburg, Calif., galvanized steel sheets, $2065.
Construction Machinery Co., Waterloo, Iowa, concrete mixers, $18,200.
Contractors Machinery Co. Inc., Batavia, N. Y., rollers and parts, $5540.
Crane Co., Chicago, plumbing supplies, steel pipe, $56,689.
Cullen-Friestedt Co., Chicago, cranes, $13,819.
Danes, Dancker, Lane Inc., New York, office equipment, $7551.
Danston Monotype Machine Co., Philadelphia, cameras, $34,137.
Darby Corp., Kansas City, Kans., welded steel work barge, $3444.
DeWalt Products Corp., Lancaster, Pa., framing and crosscut saws, $4987.
Dietzgen, Eugene, Co., Chicago, engineer's transits, $27,187.
Ehrbar, Edward, Inc., Brooklyn, N. Y., portable generating sets, floodlight stands and wire cables, $4063.
Electric Arc Inc., Newark, N. J., arc welding machines, $3330.
Ensign-Bickford Co., Simsbury, Conn., primacords and fuses, $122,280.
Etnyre, E. D., & Co., Oregon, Ill., distributors, $11,550.
Fairmont Railway Motors Inc., Fairmont, Minn., railway cars, $5206.
Faspray Corp., Red Bank, N. J., dishwashers, $11,625.
Federal Mfg. Co., Brooklyn, N. Y., roasting kettles, $2480.
Franceschi Construction Co., San Francisco, storage spur track, Bakersfield, Calif., flying field No. 2, $7650.
Fries, Beall & Sharp Co., Washington, wire rope, $24,537.
Fruehauf Trailer Co., Detroit, trailers, $30,427.
General Cable Corp., New York, cable and wire, $7709.
General Electric Co., Schenectady, N. Y., locomotives, $65,500.
General Electric Supply Corp., Washington, electrical supplies, $21,490; Dayton, O., Division, floodlights and obstruction lights, Patterson field, Fairfield air depot, Osborn, O., $4941.
General Motors Corp., Cleveland Diesel Engine Division, Cleveland, spare parts for diesel engines, $8993; Chevrolet Division, Detroit, automobiles, $5560.
Gloekler Mfg. Co., Erie, Pa., refrigerators, $6999.
Goulds Pumps Inc., Seneca Falls, N. Y., pumping sets and parts, $34,500.
Graybar Electric Co. Inc., New York, cable, ground rods, ground clamps, transformers and safety switches, $5125.
Hall, Peacock & Moore, Marianna, Fla., Ford trucks, Grimes Addvanced Single Engine Flying school, Dothan, Ala., $5000.
Harris Seybold Potter Co., Cleveland, lithographic presses, $73,000.
Homelite Corp., Port Chester, N. Y., generating sets, $2655.
Huber Mfg. Co., Marion, O., rollers, $38,271.
Hudgins, J. H., Atlanta, Ga., dump trucks, Grimes Advanced Single Engine Flying school, Dothan, Ala., $14,000.
Hussmann-Ligonier Co., St. Louis, refrigerators, $14,913.
Independent Pneumatic Tool Co., Chi-

Steel-Spike Floats Guard Singapore Harbor



■ Malay seamen inspect the floats, equipped with steel spikes, in the defense system guarding the channels to Singapore harbor against surprise attacks. NEA photo, passed by British censor

cago, drills, hammers, bursters, wrenches, rivets and chisels, $2162.
Ingalls Iron Works Co., Birmingham Tank Co. Division, Birmingham, Ala., metal tanks, $17,340.
Ingersoll-Rand Co., New York, air compressors, riveters, $144,966.
International Harvester Co., Chicago, motor trucks, $19,400.
Interstate Electric Co., New Orleans, electrical supplies, $4556.
Invincible Vacuum Cleaner Mfg. Co., Dover, O., vacuum cleaners, $3982.
Iron & Steel Products Inc., Chicago, railroad cars, $16,659.24.
Irwin Auger Bit Co., Wilmington, O., ship auger bits, $14,322.
Jahn, C. R., Co., Chicago, trailers and semitrailers, $20,353.
Johnson Electric Supply Co., Cincinnati, cables, $5505.
Johnson Motors, Waukegan, Ill., conversion kits, $7400.
Jorss, A. F., Iron Works Inc., Washington, equipping searchlight shop units, $25,337.
Koehring Co., Milwaukee, shovels, $43,493.
Kohler Co., Kohler, Wis., electric plant, air circuit breaker, $9535.
LaCrosse Trailer & Equipment Co., LaCrosse, Wis., trailers, $27,870.
Le Blond, R. K., Machine Tool Co., Cincinnati, lathes, $2603.
Lee & Thatro Equipment Co., Los Angeles, street sweepers, aircraft assembly plant, Tulsa, Okla., $6300.
LeTourneau, R. G., Inc., Peoria, Ill., rollers, rooters, scrapers, cranes, $86,195.
Littleford Bros., Cincinnati, distributors and parts, heating kettles, $56,444.
Majestic Mfg. Co., St. Louis, ranges, $6322.
Martin Electric Co., Dayton, O., switchboards, cable, $12,364.
May Hardware Co., Washington, door locks, bolts, hasps, hinges and window locks, $5181.
McMaster Carr Supply Co., Chicago, saws, rail tongs and benders, pumping units, suction and discharge bases and couplings, $12,233.20.
McWane Cast Iron Pipe Co., Birmingham, Ala., pipe and fittings, $14,020.
Merrill, John, Dayton, O., trucks, $2880.
Milburn, Alexander, Co., Baltimore, carbide lamps, $3320.
Moore-Handley Hardware Co., Birmingham, Ala., steel split rings, $2191.
Muth, George F., Co. Inc., Washington, drawing instruments, $50,744.
Mutual Mfg. & Supply Co., Dayton, O., pipe, fittings, $3337.
National Sales Co., Jackson, Miss., steam kettles, $9870.
Nichols Electric Co., Dayton, O., cable, $6168.
Noland Co., Montgomery, Ala., pipe fittings, plumbing supplies, fire hydrants, $24,599.
Novo Engine Co., Lansing, Mich., centrifugal and diaphragm pumps, $6560.
Ohio Locomotive Crane Co., Bucyrus, O., locomotive crane, $134,490.
O'Leary, Arthur J., & Son Co., Chicago, pile rings, $3821.
Onan, D. W., & Sons, Minneapolis, generator sets, $213,042.
Osgood Co., Marion, O., repair parts for shovels, $22,366.
Pacific Corrugated Culvert Co., Alhambra, Calif., copper steel base metal, $25,244.
Palhemus, P. B., Co. Inc., Washington, salad and dessert pans, steam tables and display stands, New Bolling Aviation field, Anacostia, D. C., $2304.
Paving Supply & Equipment Co., Washington, tractor cranes, hammers, parts for graders, pumping sets, $75,795.
Peerless Bread Machinery Corp., Sidney, O., dough mixing machines and water meters, aviation mechanics' training school, Keesler field, Biloxi, Miss., $4965.
Penn, H. O., Machinery Co. Inc., New York, parts for harrows, drum rollers and cranes, $7015.
Pioneer Engineering Works Inc., Minneapolis, rock crusher, $19,289.20.
Pitman, J. C., & Sons Inc., Lynn, Mass., deep fat fryers, $4103.
Priggen Steel Buildings Co., Cambridge, Mass., steel building frames, $25,000.
Pullman Co., Chicago, hospital, ward cars, $104,991.
Ransome Concrete Machinery Co., Dunellen, N. J., concrete mixers and parts, $12,920.
Read Machinery Co. Inc., York, Pa., puree mixers, $13,580.
Revere Copper & Brass Inc., Baltimore, copper sheet and bar, $4755.
Reynolds Wire Co., Dixon, Ill., copper wire cloth, $24,673.
Roebling's, John A., Sons Co., Trenton, N. J., portable military cableways, Ft. Belvoir, Virginia, $57,128.
Round, David, & Son, Cleveland, jib cranes and chains, $4853.25.
Ryerson, Joseph T., & Son Inc., Chicago, reinforcing steel, $3040.
Savory Inc., Newark, N. J., toasters, $5451.
Sheriff Motor Co., Washington, tractor-type trucks, $19,121.
Smith, David, Steel Co. Inc., Brooklyn, N. Y., steel bar stock, $12,384.
Smith's, John E., Sons Co., Buffalo, electric food and meat choppers, $4602.
Somerville, Thomas, Co., Washington, water supply equipment, $14,728.
Southwest Industrial Equipment Co., Dallas, Tex., casters, aircraft assembly plant, Kansas City, Kans., $9681.
Standard Gas Equipment Corp., New York, ranges and ovens, $3978.
Steinmetz, S. W., Washington, oil burning ranges and kitchen utensils, cafeteria equipment, $10,616.
Stewart-Warner Corp., Chicago, portable service stations, $6612.
Sullivan Machinery Co., New York, drills and parts, items for air compressors, repair parts and accessories, $386,378.25.
Texas & Pacific Railway Co., Dallas, Tex., locomotives, $91,470.
Thew Shovel Co., Lorain, O., moto cranes, $34,480.
Timber Engineering Co., Washington, connectors, $2328.
Timpte Bros., Denver, trailers, $9335.
Truscon Steel Co., Youngstown, O., steel windows, hangar doors, $11,700.
Union Steel Products Co., Albion, Mich., dough troughs, bread racks, pan trucks, aviation mechanics' training school, Keesler field, Biloxi, Miss., $2259.
United States Pipe & Foundry Co., East Burlington, N. J., cast iron pipes and fittings, $24,996.22.
United States Steel Export Co., New York, steel reinforcing, $3763.
United Steel Fabricators Inc., Wooster, O., culvert pipes, $9258.
Virginia Steel Co. Inc., Richmond, Va., contraction and expansion joint assemblies, $11,386.
Vulcan Iron Works, Wilkes-Barre, Pa., locomotives, $27,565.
Wallace & Tiernan Co. Inc., Belleville, N. J., water purification units, $35,337.
Wayne Iron Works, Wayne, Pa., control towers, $29,090.
Wesco Construction Co., Chattanooga, Tenn., rollers, spreaders.
Westinghouse Electric Supply Co., Washington, electrical supplies, $2255.
White, I. J., Co., New York, proofers, rounders, moulders, dividers, aviation mechanics' training school, Keesler field, Biloxi, Miss., $4803.
Wilson & Bennett Mfg. Co., Jersey City, N. J., steel drums, $7978.
Woodings-Verona Tool Works, Verona, Pa., lock nuts, anticreepers, (Woodings rail anchors), $84,536.
Wood Roadmixer Co., Alameda, Calif., roadmixers, $29,961.

Air Corps Awards

Aero Spark Plug Co. Inc., New York, spark plugs, $248,188.
American Bosch Corp., Springfield, Mass., maintenance parts for magnetos, $230,713.
American-LaFrance-Foamite Corp., Elmira, N. Y., fire protection equipment, $531,959.
Aviation Mfg. Corp., Lycoming Division, Williamsport, Pa., propeller blades, $776,000.
Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y., magnetos, maintenance parts, $473,129; Burbank, Calif., Division, filters, $50,643; Eclipse Aviation Division, Bendix, N. J., maintenance parts, generator, starter, switch and solenoid assemblies, $1,936,338; Pioneer Instrument Division, Bendix, N. J., air-speed indicators, $802,200.
B. G. Corp., New York, spark plugs, $180,747.
Crosley Corp., Cincinnati, post assemblies, release assemblies, $598,571.
Electric Storage Battery Co., Cleveland, batteries, $664,842.
Electronic Laboratories Inc., Indianapolis, inverters, $104,760.
Elwell-Parker Electric Co., Cleveland, electric trucks, $78,660.
General Motors Corp., AC Spark Plug Division, Flint, Mich., spark plugs, $695,078.
Grimes Mfg. Co., Urbana, O., lamp assemblies, $922,531.
Jack & Heintz Inc., Cleveland, starter assemblies, $808,500.
King-Seeley Corp., Ann Arbor, Mich., eliminators and valves, $241,392.
Leece-Neville Co., Cleveland, panel assemblies and generator assemblies, relay generator control switches, $965,897.
Lufkin Rule Co., Saginaw, Mich., calipers, gages and dividers, $147,292.
Manning, Maxwell & Moore Inc., Bridgeport, Conn., suction gages, $147,120.
North American Aviation Inc. of Texas, Dallas, Tex., carburetor assemblies, $56,101.
Ryan Aeronautical Co., San Diego, Calif., airplanes, $103,000.
Seeburg, J. P., Corp., Chicago, control assemblies, $343,150.
United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., maintenance parts for aeronautical engines, $478,646.
Webster Electric Co., Racine, Wis., solenoid assemblies, $248,299.
Wright Aeronautical Corp., Paterson, N. J., maintenance parts for aeronautical engines, $559,972.

Signal Corps Awards

Alden Products Co., Brockton, Mass., keys, cord, $69,512.
American Automatic Electric Sales Co., Chicago, handsets, receiver units, transmitter units, $699,849.
American Phenolic Corp., Chicago, cable, $140,200.
Boom Electric & Amplifier Co., Chicago, tool sets, $88,270.
Burgess Battery Co., Freeport, Ill., batteries, $31,498.
Climax Engineering Co., Clinton, Iowa, power units, $138,444.
Collins Radio Co., Cedar Rapids, Iowa, radio equipment, $37,200.
Commercial Stamp Co., Philadelphia, tool equipment, $3877.
Connecticut Telephone & Electric Corp., Meriden, Conn., headsets, receivers, headbands, switchboards, $68,733.
Crosby Co., Buffalo, spools, $52,325.
Diamond Wire & Cable Co., Chicago Heights, Ill., cordage, $15,810.
Edison, Thomas A., Inc., West Orange, N. J., electrical equipment, $3500.
Ehrick, Fred, Co., Brooklyn, N. Y., covers, $3519
Eicor Inc., Chicago, dynamotor units, $5531.
Follett Time Recording Co., Newark, N. J., stamps, $6912.
Folmer Graflex Corp., Rochester, N. Y., photographic equipment, adapters, $6294.
Friez, Julien P., & Sons, Baltimore, anemometers, indicators, supports, $302,046.
Frolland Mfg. Co., Springfield, Mass., couplings, $7500.
General Dry Batteries Inc., Cleveland, batteries, $44,191.80.
General Electric Co., Schenectady, N. Y., radio equipment, switches, $34,945.
Graybar Electric Co., New York, switch-

boards, jacks, terminals, bolts, wire, cable and reels, $73,655.
Hallicrafter Co., Chicago, radio equipment, $71,560.
Jackson Electrical Co., Dayton, O., test oscillators, battery sets and test indicators, $7534.
Jacobsen Mfg. Co., Racine, Wis., reel units, $60,852.
Kellogg Switchboard & Supply Co., Chicago, switchboards, anchor stakes, $81,896.
Kennecott Wire & Cable Co., Phillysdale, R. I., cable switches, $9800.
Leich Electric Co., Genoa, Ill., switchboards, $30,701.
Murdock, William J., Co., Chelsea, Mass., headsets, headbands, cushions and receivers, $119,660.
National Carbon Co. Inc., New York, batteries, $78,860.
Neumade Products Corp., New York, racks, $3170.
Phelps Dodge Copper Products Corp., New York, wire, $16,280.
Philco Corp., Philadelphia, hydrometers, meter sets, batteries, thermometers, radio equipment, $599,549.
Radio Receptor Co. Inc., New York, rectifier power equipment, $7297.
Ray-O-Vac Co., Madison, Wis., batteries, $487,910
Remler Co. Ltd., San Francisco, plugs, $29,280.
Sickles, F. W., Co., Springfield, Mass., coil sets, $201,322.
Simplex Wire & Cable Co., Boston, cable and reels, cordage, $8590.
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., switchboards, telephones, $74,789.
Teletype Corp., Chicago, teletype sets, $7988.
Triplett Electrical Instrument Co., Bluffton, O., test sets, $28,538.
Tung-Sol Lamp Works Inc., Newark, N. J., tubes and lamps, $24,787.
Ulmer, A. J., New York, insulators, control boxes, cases, terminals, terminal blocks, cord, $35,333.
United States Electric Mfg. Corp., New York, flashlights, $13,697.
Wall, P., Mfg. Supply Co., Pittsburgh, torches, $13,860.
Wallace & Tiernan Products Inc., Belleville, N. J., lamp mountings and signal lamps, $16,131.
Wells-Gardner & Co., Chicago, antennae, $5743.
Western Electric Co., Kearny, N. J., switchboards, $33,290.
Westinghouse Electric & Supply Co., Chicago, bolts, sleeves, crossarms, pins, brackets, $3899.
Widin Metal Goods Co., Garwood, N. J., wire pikes, $3809.

Defense Contract Opportunities . . . .

■ Subcontract opportunities for items essential to the national defense program, open to manufacturers possessing requisite facilities and not already fully engaged in defense production, have been issued by the Division of Contract Distribution, OPM. Following opportunities were released last week and have not heretofore been published in STEEL. Further information concerning any subcontract work available may be secured from the regional office, which has on display drawings or actual samples. The opportunities:

Division of Contract Distribution, OPM, Federal Reserve Bank building, Cleveland, is seeking subcontractors for the following work:

44-1010: Cleveland manufacturer requires facilities to finish complete turret shafts, 1⅞ to 2⅝ OD by 36" to 56" long, machined inside and outside. Equipment required: Horizontal boring machine or lathe milling machine and internal and external grinders. Material SAE 1315, not furnished. 25 to 30 of each size monthly. Initial delivery 12-1-41.

45-1010: Midwestern manufacturer wants subcontractor for machining and assembly work on a large unit—consisting of steel castings (largest 700 lbs., 30" diameter x 37" high) large and small forgings and other smaller screw machine parts. Good size plant with lathe equipment, boring mills (horizontal and vertical). Production grinding, gear cutting and automatic screw machines. Steel castings and bar stock furnished. Quantity up to 500 per month.

46-1070: An Eastern manufacturer wants to subcontract the machining of heavy brackets, with operations to bore 2" hole, turning 1" hubs, and face sides, mill edges, drill counterbore, spot face, and straddle milling, requiring equipment of 2" boring mills, engine lathes, No. 4 milling machines, medium and small drill presses. Material consists of steel castings class No. 2 (medium hardness). Delivery requirements 100 sets of 2 items daily. Blueprints on file in this office.

47-1070: Ohio manufacturer requires subcontractors with facilities to machine large road rollers 70" in diameter with 24" face, weighing approximately two tons each. Operations are machining of road face and outside edge, and facing hub with drilling and spot facing of bosses. Manufacturer also requires foundry source to supply material for above, which is cast iron. Quantity wanted is 200 pieces at the rate of 4 pieces per day. Blueprints on file in this office.

48-1017: Eastern manufacturer wants to subcontract the machining of body cupola and turret for tanks. There are numerous operations of turning, boring, planing, milling, drilling and facing. Will require large equipment to machine surfaces 32" to 60" diameter, heavy duty horizontal boring mill, Bullard, planer, No. 4 mill, and drill capacity. The material is cast armor, with close tolerances. The delivery requirements are 100 sets of two items immediately. Blueprints on file in this office.

49-1020: Cleveland manufacturer requires subcontracting source to machine and assemble completely a quantity of 3" and 4" flap valves. Patterns and castings to be furnished by subcontractor. These assemblies consist of pipe castings, flap covers, hand wheel, plates, and miscellaneous tees, elbows, nuts, etc. Quantities are 170 assemblies. Quotations requested immediately. Representative blueprints on file in this office.

50-1022: An Ohio manufacturer wishes to subcontract for complete machining and painting of 4 pin junction boxes for Inglis Bridge. Material is steel castings SAE 1030, weighing 98 pounds. Equipment consists of boring machine, or lathe, for 12" length, 3¼" diameter bore, also No. 4 mills and 4 spindle heavy duty drill presses. Average tolerances are plus or minus .005, some holes to .002. Material furnished and will be available Jan. 1, 1942. Subcontractors are to make jigs and tools. Delivery requirements are 600 per week on total quantity of 4075. Representative blueprints on file in this office.

51-1022: Eastern manufacturer wants subcontractors for machine work on 100 rotors made of cast armor. Outside dimensions are approximately 34" diameter. This part to be machined on outside will require lathe capacity with 36" swing. Other operations will need Keller Profiler, 4" boring mill and planer with at least 50" height. Material is furnished and quantity is 100 pieces at the rate of 2 per day. Tolerances are close. Representative blueprints on file in this office.

52-1023: Eastern manufacturer wishes to subcontract machine work on small gun parts. Requirements are 5000 sets of 89 items. This work will require considerable capacity on the following equipment: Blanchard or Norton surface grinders, 2-20 Kent-Owens milling machine or equivalent, U. S. Hand Mills and Profilers, Avery 1-2-3-4 and 6 spindle drills or equivalent. Material will be furnished, together with tools, jigs, and fixtures. Delivery requirements are a minimum of 300 sets per week. Initial delivery is Dec. 1, 1941. Blueprints on file in this office.

53 Bravo: Eastern manufacturer desires to subcontract the fabrication of steel required for open type lighters and floating caisson gates. Operations consist of cutting, forming, punching, welding, and subassembling. Material when completed to be shipped knocked down to destination for final assembly. Quantity 6 lighters—100' long, 30' wide, 11' 3" molded depth; also one floating caisson gate.

54-1023 Ohio manufacturer wishes to subcontract machine work on large quantity of gun cradles. Machine requirements covering critical operations are planers 42" to 48" wide, 10' to 12' long; horizontal boring mills 3"-3½" and 4" bar size; radial drills 4' to 5' arm. Quantity is 1000 units to be delivered at the rate of 100 per month. Delivery is to start in approximately eight months. Personal contact should be made at any one of our offices located at Cleveland, Cincinnati, Columbus, Dayton, or Youngstown, O.

"If This Keeps Up . . ."

LONG ISLAND CITY, N. Y.

■ A small contractor here who specializes on residential and store alterations and repairs declares that, priorities or no priorities, business of this sort is being strangled. The reason, he says, is price profiteering on the part of middlemen.

"Copper is under a price ceiling," he says, "but that doesn't help us any. This week I had to have 12 feet of ¾-inch copper tubing and I had to pay $28 for it in a plumbing goods shop. Ordinarily I used to pay around 35 cents a foot for this size of copper tubing. If this keeps up you can figure for yourself what is going to happen in the field of building repair and maintenance."

Nonferrous Exports of Canada Set New Mark

■ Canada's exports of nonferrous metals, excluding gold, for the first nine months this year reached the all-time high total of $182,297,000, or $34,671,000 above the nine-month record made last year, and $44,588,000 above the 1939 total. It exceeded the pre-war peak of 1937 by $36,752,000. The value of shipments for September alone was $21,260,000. While this was under the record made in May, $25,747,000, it was higher than the August level of $19,880,000, and $5,640,000 above September, 1940, exports.

High as the current figures are in relation to past performances, large additions to productive capacity now being constructed in Canada, particularly by International Nickel Co. and Aluminum Co. of Canada Ltd., assure much larger exports in coming months. Capacity demand is assured for the duration of the war for these metals as well as for copper, lead, zinc, mercury and other key metals.

■ Dry corn sugar is blown on the inner surface of steel ingot molds, according to a recently patented process. When steel is poured into the molds the coating tends to prevent splashed metal from solidifying on the walls of the mold. Defects are likely to develop in steel if the surface of the mold is not kept smooth. Pitch, tar and other materials have been used for years.

Explains Copper Status To Revere Employes

■ A letter explaining the national situation in copper and brass was sent recently to all employes of Revere Copper & Brass Inc., New York, by C. Donald Dallas, president. Mr. Dallas pointed out the company's present status and its desire to maintain employment despite restrictions on materials.

Revere's copper allocation in October, said Mr. Dallas, was about one-half average consumption per month in the past year. He further stated "we are making every effort to secure every pound of copper and zinc that we can . . . are using up surpluses . . . are developing new types of products . . . and are making every effort to maintain employment." This, in addition to utmost co-operation with the government's defense program.

Scrap Institute Chapters Elect New Officers

■ Officers elected recently by chapters of the Institute of Scrap Iron and Steel Inc. include:

New Jersey: President, Frank Contey, Frank Contey Inc., Jersey City, N. J.; first vice president, Sam Byer, Citron-Byer Co., Trenton, N. J.; second vice president, Harry Wische, Newark Iron & Metal Co. Inc., Newark, N. J.; third vice president, Irving Feldman, P. Feldman & Sons Inc., Elizabeth, N. J.; secretary, Murray Kunin, Schiavone-Bonomo Corp., Jersey City, N. J.; treasurer, Eli Russell, Plainfield Iron & Metal Co., Plainfield, N. J.

Michigan chapter: President, Samuel G. Keywell, Samuel G. Keywell Co. Inc., Detroit; vice president, Gordon D. Skinner, Luria Bros. & Co. Inc., Detroit; secretary, Hyman R. Nathan, Gendelman & Nathan Iron & Metal Co., Detroit; treasurer, Morris Birnbaum, Wyandotte, Mich.

Northern Ohio: President, Sam H. Urdang, A. Shaw Co., Cleveland; first vice president, Sam Nathanson, M. Cohen & Co., Cleveland; second vice president, Jack Levand, Simon-Levand Co., Cleveland; secretary, Joseph B. Horwitz, Cleveland; treasurer, Browne A. Shapero, Max Friedman Co., Cleveland.

Seaboard chapter: President, Hyman H. Block, N. Block & Co., Norfolk, Va.; vice president, Jerome Klaff, H. Klaff & Co. Inc., Baltimore; secretary-treasurer, Nathan Brenner, Joseph Brenner & Son, Baltimore.

Western New York: President, Max Pressler, Summer & Co. Inc., Buffalo; vice president, Jay J. Risman, Morrison & Risman Co. Inc., Buffalo; secretary-treasurer, Leo Chapin, Chapin & Fagin Inc., Buffalo.

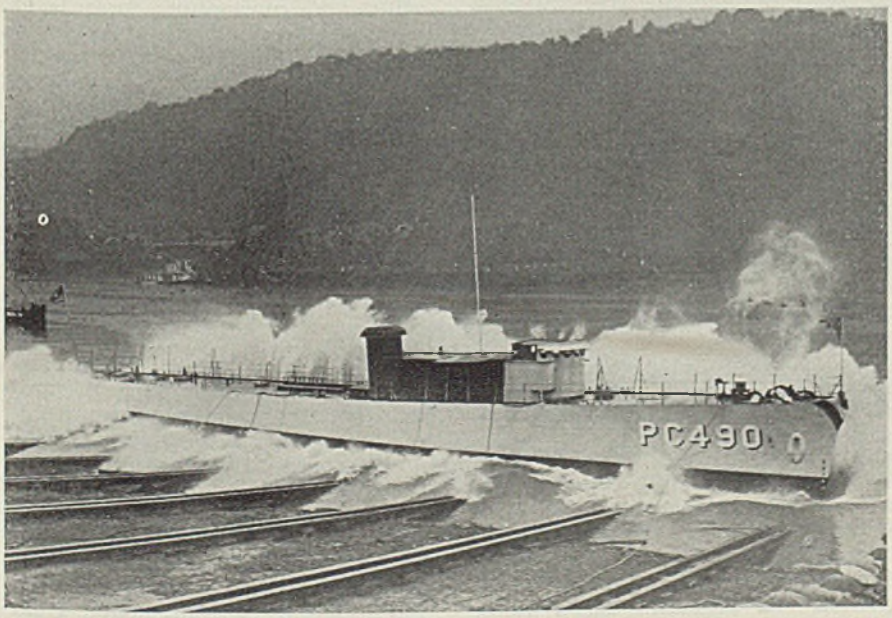
Boston: President, David Feinburg, David Feinburg Co., Medford, Mass.; first vice president, David Borowsky, Fitchburg, Mass.; second vice president, Joseph Cohen, General Scrap Iron Inc., Philipsdale, R. I.; secretary, William G. Mitchell, William G. Mitchell Co., Marblehead, Mass.; treasurer, Ernst Hollander, Ernst Hollander Iron & Metal Corp., Chelsea, Mass.

Northwest: President, Harry H. Isaacs, American Iron & Supply Co., Minneapolis; first vice president, Israel C. Mark, Mark Iron & Metal Co., Minneapolis; second vice president, Max Schwartzman, Anoka, Minn.; secretary-treasurer, Morton Cohen, General Iron & Metal Co., Minneapolis.

Cincinnati: President, George L. Sturm, Middletown Iron & Steel Co., Middletown, O.; vice president, Lee J. Workum, Hickman, Williams & Co. Inc., Cincinnati; secretary-treasurer, Sam Moskowitz, Moskowitz Bros., Cincinnati.

Southern New England: President, Simon J. Katz, Atlantic Steel & Iron Co., Springfield, Mass.; vice president, S. Samuel Kasden, H. Kasden & Sons Inc., New Haven, Conn.; secretary-treasurer, Joseph A. Schiavone, Michael Schiavone & Sons Inc., New Haven.

Sub Chaser Launched at Pittsburgh



■ First of 15 submarine chasers being built by Dravo Corp., Pittsburgh, slides down the ways in the first launching of a sea-going naval vessel at Pittsburgh in 100 years. The vessels are 165 feet long; three more are near completion and eight others are under construction. NEA photo

494 Industrial Trucks Booked in September

■ Domestic industrial truck bookings in September totaled 494 units, with a combined net value, for chassis only, of $1,916,283, according to the Industrial Truck Statistical Association, 208 South LaSalle street, Chicago.

Orders received in the month included 35 nonelevating platform trucks with total value of $69,770; cantilever trucks totaled 375, with $1,432,054 aggregate value; 23 light and heavy duty tractor trucks valued at $54,730; four special trucks with $17,850 combined value; and 57 crane trucks, comprising $341,878.

Details on the September bookings can be secured from the association.

Industrial Radium, X-ray Society Formed

■ American Industrial Radium and X-ray Society Inc. was organized Oct. 17 at a meeting at Massachusetts Institute of Technology, Cambridge, Mass. Aim of the society is to promote scientific education in the field of industrial radiography.

Headquarters are at room 1612, 25 East Washington street, Chicago.

Officers are: President, Carleton G. Lutts, materials engineer, Navy Yard, Boston; vice president, John J. Cavanagh, radiographer, Navy Yard, Boston; treasurer, Joseph A. Catanzano, technician, Thomson Laboratories, General Electric Co., Lynn, Mass.; secretary, Philip D. Johnson, technical adviser, Radium Chemical Co., New York.

New Furnaces Lighted; Electric Steel Capacity Up 100,000 Tons Annually

CHICAGO

■ FIRST heats were tapped from two new electric furnaces at the South Chicago, Ill., Works, Carnegie-Illinois Steel Corp., Oct. 28, in the presence of 50 national defense and company officials and representatives of the press.

The new furnaces represent the first Chicago district expansion project to be completed by Carnegie-Illinois, a subsidiary of the United States Steel Corp., in its program designed to keep pace with defense needs. Construction of the furnaces, which more than double the annual South Works capacity for production of stainless and alloy steels, was started last March. Cost of the expansion is borne by the company.

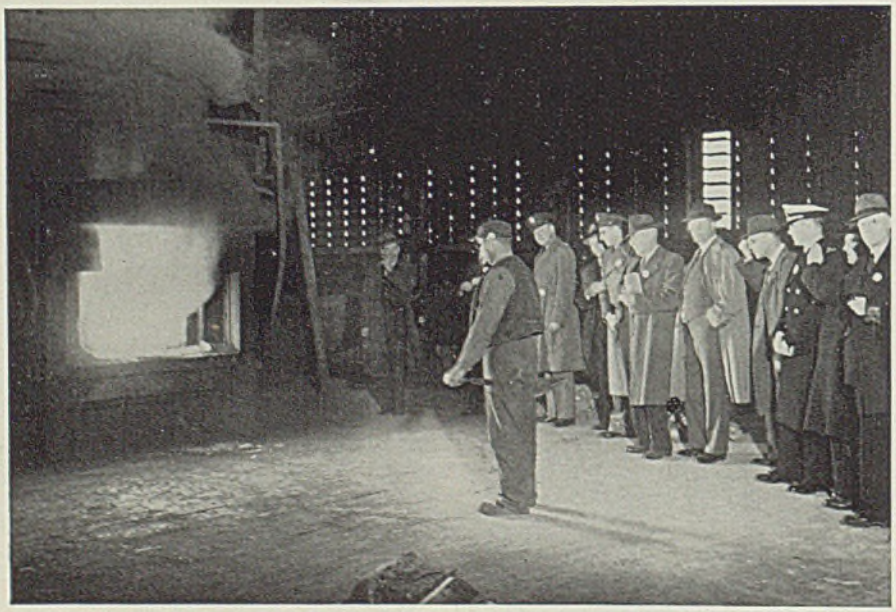
The furnaces which together aggregate nearly 100,000 net tons annual capacity, have nominal rated capacities of 70 and 30 tons per heat, respectively. They represent the most recent developments in design, installation and operation, including facilities for charging raw materials. Furnaces are housed in a new mill-type building with two bays, one 80 x 850 feet and the other 75 x 450 feet. Electric power is supplied from the plant's own generating stations, and delivered to furnace transformers at 22,000 volts. The larger furnace is equipped with a 15,000-KVA transformer and the smaller with a 12,000-KVA transformer.

The larger bay serves the dual purpose of furnace building and stock building. The end in which the furnaces are located is provided with a charging floor at an elevation 20 feet above yard level. The other end of the bay, in which the charging floor has been omitted, houses a series of stock bins divided into 16 compartments which will be used for storage of scrap used in furnace charges. Scrap will be handled from the bins by a 25-ton electric overhead traveling crane and will be placed in charging boxes, carried on buggies, located on the furnace charging floor, from whence it will be transported to the furnaces and charged by means of a 5-ton floor-type charging machine. A second 25-ton crane on this runway will be used to service the furnaces and handle miscellaneous material.

The smaller bay serves as a pit building, in which tapping, pouring and stripping operations are performed. The pit building is served by two 125-ton, four-girder ladle cranes, each having two auxiliary hoists of 50 and 10-ton capacity; along the outside wall are two pouring platforms, one being 275 feet long, at which top poured ingots will be cast, and the other 75 feet long, at which bottom poured ingots will be cast. Also located in the pit building is a 200-ton inverted ingot stripper.

Building of electric furnace plant No. 2 with the two new units brings the total of electric furnaces at South Works to five. Two of the three furnaces in plant No. 1 were installed in 1917. They are of 25-ton capacity per heat and produced alloy steels exclusively until August, 1929, when production of stainless was begun. The third 25-ton unit was installed in 1918. All three have been operating at full capacity for many months.

After inspection of the new electric furnace plant, Carnegie-Illinois entertained its guests at lunch at the South Shore Country Club.



■ One of the two new electric furnaces which began production last week at South Works of the Carnegie-Illinois Steel Corp. The officials present (left to right) are: J. H. Eisaman, assistant superintendent of electric furnaces, South Works; Col. Barrett Rogers, Chicago ordnance district; M. F. Yarotsky, superintendent of steel production, South Works; Lieut. R. N. Voigt, Chicago ordnance district; W. E. Hadley, manager of operations, Chicago district, Carnegie-Illinois Steel Corp.; Walther Mathesius, vice president, United States Steel Corp. of Delaware; B. M. Livezey, general superintendent, South Works; Lieut. C. D. Kuhn, United States Navy; C. F. Frye, group resources engineer, Defense Contract Service Office, Office of Production Management; George Gustafson, assistant superintendent of steel production, South Works

Recommends 504,000-Ton Electric Alloy Steel Plant

Construction of a plant specifically designed for the production of electric alloy steel has been recommended to the Reconstruction Finance Corp. by William S. Knudsen, Director General of OPM.

Proposed plant will be located at South Chicago and will be operated by Republic Steel Corp. It will have a capacity of 504,000 tons of ingots annually, producing 317,000 tons of parts for aircraft and ordnance use.

In making the recommendation, OPM pointed out that ample power is available and that a trained operating and supervisory force is at hand. First units of the plant can be in operation in eight or nine months and entire plant in about 15 months.

First step in the proposed project is the development of a coal mine at Elkhorn, Ky., to produce coking coal for the plant. Shipment of ore and transportation of finished products could be handled by lake vessels, relieving rail facilities in the district, OPM's report said.

■ Office of United States Engineer in Pittsburgh reports that river shipments during September dropped substantially, primarily as a result of the captive mine tie-up, although aggravated by a short strike of boat men.

On the Monongahela total shipments dropped from 3,104,600 tons in August to 2,491,900 tons in September, mainly because of a 586,000-ton decline in coal shipments. Ohio river shipments in September totaled 1,691,100 tons, against 1,771,300 tons in August. Allegheny shipments dropped from 351,500 to 326,300.

Warns Against Building Excess Power Facilities

■ Electric power demands, far in excess of normal usage, will be imposed by the defense program, a survey by the National Association of Manufacturers reveals. While conceding the increased needs, the association warns that unwarranted building of power facilities is likely to create excess capacity which will become burdensome in the post-war period.

Measuring the electric power industry against the demands of the defense program, the association found:

1—That for the country as a whole the power supply plus new construction scheduled for completion before 1944 should prove sufficient to meet probable demands of the defense program.

2—That in the Southeastern states, where there has been a serious drought, and in a few other areas there will be power shortages, but many of these are being corrected by new installations.

3—That the St. Lawrence seaway project does not provide a practical solution to the power problem because it will require men, money and materials more urgently needed elsewhere.

4—That electric power equipment owned and operated by industrial plants may prove unequal to the increased demands of the defense program and that utility companies should make due allowance for this contingency in estimating future power demands.

5—That there is need for a moderate amount of interconnection of transmission lines to close some of the gaps in the high voltage transmission systems.

6—That two factors beyond the control of industry—limited facilities for the manufacturing of heavy electrical equipment and limited facilities for the transportation of fuel—may have an important bearing on the future power supply.

Foundry Equipment Makers Discuss Priorities

■ Priorities claimed major attention at the twenty-third annual meeting of the Foundry Equipment Manufacturers Association Oct. 24 and 25 at The Greenbrier, White Sulphur Springs, W. Va. P. J. Potter, Pangborn Corp., Hagerstown, Md., and association president, emphasized the responsibility of the industry to the defense program and pointed out that equipment for foundries is fundamental to practically all metalworking industries.

Frank G. Steinebach, chief, Foundry Equipment and Supplies Unit, Tools and Equipment Section, OPM, answered many questions relating to methods of operation under the industry's preference rating order.

Dr. E. E. Pratt, OPM regional coordinator, gave a broad outline of the priorities system.

Mr. Potter was re-elected president of the association, and Thomas Kaveny Jr., Herman Pneumatic Machine Co., Pittsburgh, was re-elected vice president.

New directors elected were: W. L. Dean, Mathews Conveyer Co., Ellwood City, Pa.; O. C. Sabin, Steelblast Abrasives Co., Cleveland; and Mr. Potter. Other directors are: E. O. Beardsley, Beardsley & Piper Co., Chicago; R. S. Hammond, Whiting Corp., Harvey, Ill.; H. S. Hersey, C. D. Bartlett & Snow Co., Cleveland; Mr. Kaveny; O. A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind.; and B. C. Trueblood, Arcade Mfg. Co., Freeport, Ill.

Pull on Mired Ore Boat Capsizes Towing Tug

■ An unusual accident in Great Lakes transportation occurred recently when the ore-laden freighter B. F. JONES, Interstate Steamship Co., grounded on a clay bank in the Detroit river near Windmill Point. Great Lakes Towing Co.'s largest tug AMERICA, went to her aid, and in pulling hard on the freighter capsized. It was early morning and six of the tug's crew in their sleeping quarters drowned; seven of the crew at work were rescued. After being lightered of 1000 tons of ore the freighter was finally refloated.

How Defense Has Caused Shifts in Employment

■ Reflecting the pattern of the defense program, employment in the consumer goods industries is declining while that in heavy goods industries is on the upswing, according to an analysis by the National Association of Manufacturers, New York.

"Those lines fortunate enough to have a backlog of defense orders are forging to the front, but those sections devoted to manufacture of civilian products are feeling the pinch of material shortages," it states. "This tendency was already apparent by the end of August in the figures for factory employment. The accompanying chart (see figures below) measures percentage changes in factory employment between July and August this year.

"This shows the beginning of a trend which may become serious."

	Per Cent Decrease
Beet sugar	13.5
Automobiles	11.3
Women's clothing	8.8
Stoves	5.0
Clocks, watches	4.0
Radios, phonographs	3.7
Men's clothing	3.2

	Per Cent Increase
Engines, etc.	6.5
Canning	6.3
Hardware	5.2
Machine tools	4.9
Chemicals	4.0
Agricultural implements	4.0
Electric machinery	3.9

STEEL

Significant or Insignificant?

■ Ever since the first epidemic of sit-down strikes occurred in the Detroit district some years ago, it has been the policy of the government administration to minimize the effect of labor disputes.

Whenever a new wave of strikes occurs, somebody high in authority in Washington rushes into print with a story calculated to assure the public that the disorder is not serious, that only a relatively few persons are involved or that there are actually fewer strikes at the moment than at some previous date.

• • •

These attempts to white-wash serious work stoppages probably were not considered important as long as the nation was at peace. But now that it is in an acute emergency these repeated efforts to "play down" the effect of labor disputes become important.

Therefore, one is justified in asking why on Saturday, Oct. 25, Sidney Hillman's office in OPM was permitted to issue a press release intended to minimize the implications of the strike situation existing at that time.

The OPM release stated that of the 22 defense strikes then in progress only five had any "significant effect" upon the defense program.

Then, as if to discount the destructive effect of these five, the release went on to state that "only" 2500 workers were involved and to imply that this is a small number of employes in relation to the 4,000,000 persons estimated as being employed on defense work.

It should be remembered that this press dispatch was released by OPM at a time when the Department of Labor had certified the labor dispute at the Robins shipyard in Brooklyn and when John L. Lewis was defying the President on his appeal to call off the scheduled strike in captive coal mines.

In short, the Hillman office—confronted with 22 strikes in progress in defense plants and with two more about to break out—chose that particular moment to soft soap the public into thinking the strike situation was "significant" only in small part.

By itself this incident is not important. But taken in conjunction with the previous efforts of President Roosevelt, Mrs. Roosevelt, Miss Perkins, Senator Wagner and others to imply that strikes are seldom "significant," it indicates a shocking inability of the administration to appreciate the seriousness of strikes in relation to defense.

• • •

The "significance" does not lie in the number of strikes in progress or in the number of employes involved. It lies in the extent to which work stoppage cuts into defense production.

Direct breaches of union contracts in United States Steel plants from Sept. 1 to Oct. 15 caused a loss in production of 181,500 tons of ingots—enough to build more than 200 destroyers.

This is "significant" and the sooner the President acknowledges the fact the sooner this nation will get down to real all-out defense.

E. L. Shaner

EDITOR-IN-CHIEF

Nov. 3, 1941

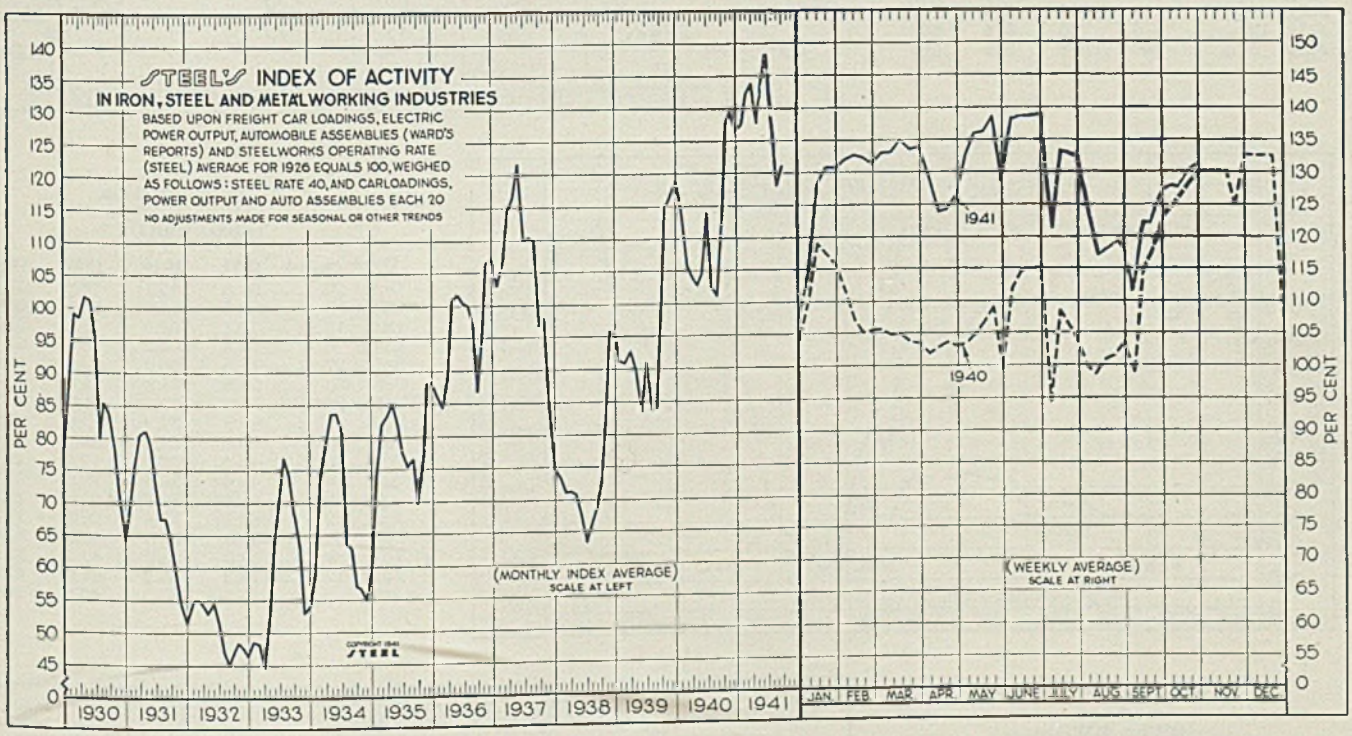
The BUSINESS TREND

Index of Activity Records Slight Gain

■ INDUSTRIAL output for 1941 is expected to show the largest yearly increase on record, and further improvement is indicated through 1942 as new defense plants are brought into operation. Non-defense industries are experiencing additional curtailment in operating schedules, reflecting the growing scarcity of raw materials for civilian lines.

STEEL'S index of activity gained 1.2 points to 131.4 during the week ended Oct. 25. Slight declines in steelmaking operations and revenue freight carloadings were offset by advances in automobile production and in electric power consumption. A year ago the index was at the 129.9 level, while in the same period of 1937 and 1929 the index stood at 95.7 and 104.8 respectively.

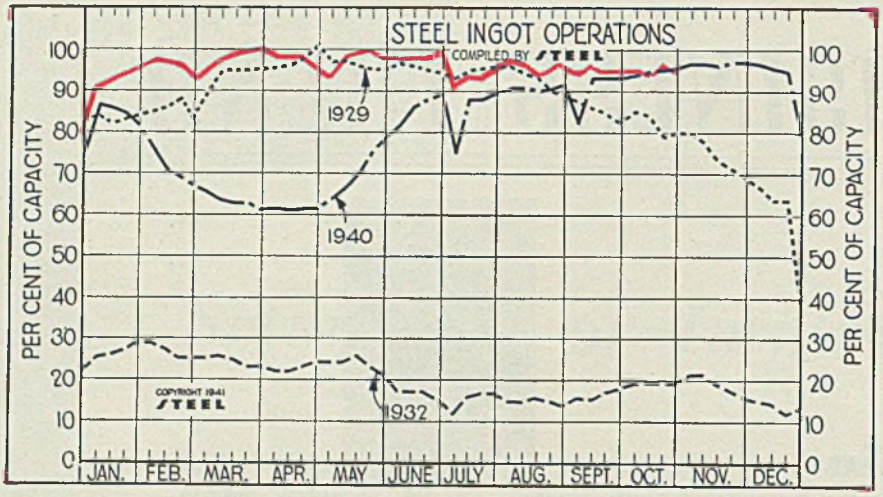
The national steel rate averaged 95.5 per cent during the week ended Oct. 25, a decline of one point. Electric power production advanced to 3,299,120,000 kilowatts, while freight traffic eased less than seasonally to 913,605 cars. Automobile assemblies rose to 91,855 units, the highest level of the 1942 model season. Retail automobile sales are improving slightly but remain substantially below that recorded at this time last year.



STEEL'S index of activity gained 1.2 points to 131.4 in the week ended Oct. 25:

Week Ended	1941	1940
Aug. 9	117.5	98.4
Aug. 16	118.2	100.8
Aug. 23	118.5	101.4
Aug. 30	118.2	103.5
Sept. 6	111.8	98.7
Sept. 13	122.3	114.9
Sept. 20	122.9	124.4
Sept. 27	127.5	122.8
Oct. 4	128.0	124.4
Oct. 11	127.9	126.0
Oct. 18	130.2	128.3
Oct. 25	131.4	129.9

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.5	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3



Steel Ingot Operations

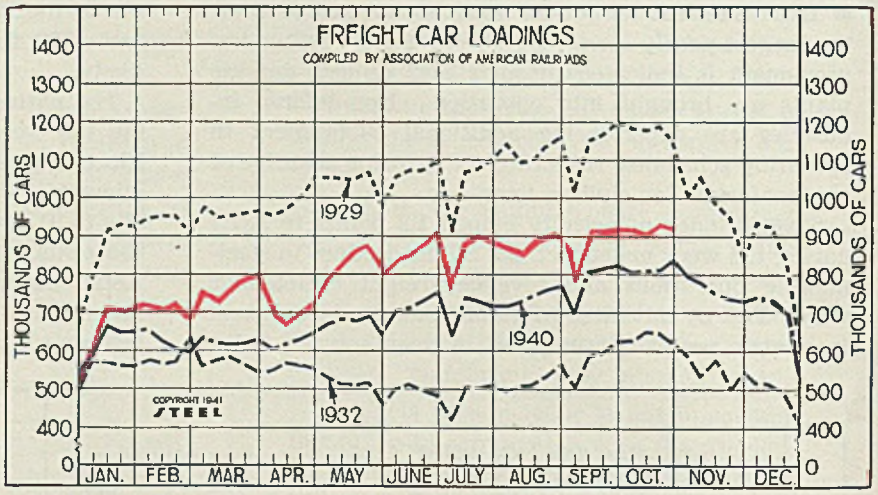
(Per Cent)

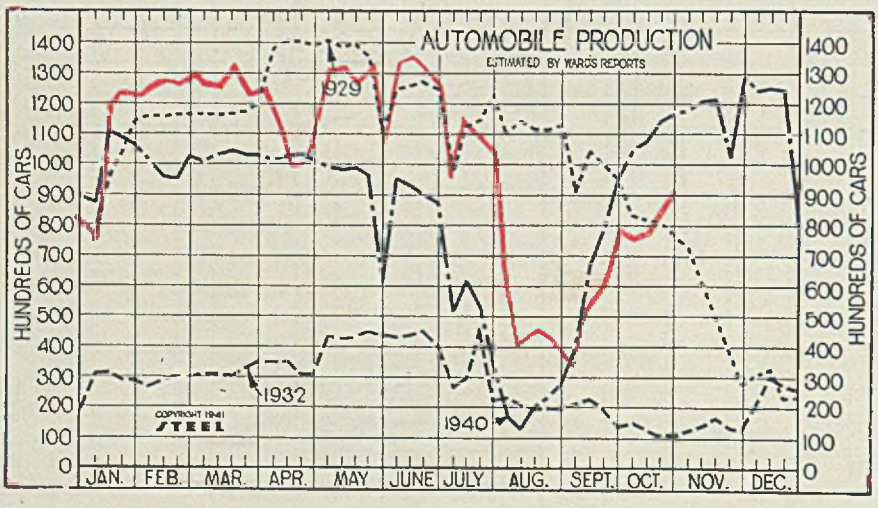
Week ended	1941	1940	1939	1938
Oct. 25....	95.5	95.5	92.0	54.5
Oct. 18....	96.5	95.0	91.0	51.5
Oct. 11....	94.5	94.5	89.5	51.5
Oct. 4....	96.0	93.5	87.5	48.5
Sept. 27....	96.0	93.0	84.0	47.0
Sept. 20....	96.0	93.0	79.5	48.0
Sept. 13....	96.5	93.0	74.0	46.0
Sept. 6....	95.5	82.0	62.0	41.5
Aug. 30....	96.5	91.5	64.0	44.5
Aug. 23....	96.0	90.5	63.5	43.5
Aug. 16....	95.5	90.0	63.5	41.5
Aug. 9....	96.0	90.5	62.0	40.0
Aug. 2....	97.5	90.5	60.0	40.0
July 26....	96.0	89.5	60.0	37.0
July 19....	95.0	88.0	56.5	36.0
July 12....	95.0	88.0	50.5	32.0
July 5....	92.0	75.0	42.0	24.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Oct. 25.....	914	838	834	709
Oct. 18.....	923	814	861	706
Oct. 11.....	904	812	845	727
Oct. 4.....	918	806	835	703
Sept. 27.....	920	822	835	698
Sept. 20.....	908	813	815	676
Sept. 13.....	914	804	806	660
Sept. 6.....	798	695	667	569
Aug. 30.....	912	769	722	648
Aug. 23.....	900	761	689	621
Aug. 16.....	890	743	674	598
Aug. 9.....	879	727	665	590
Aug. 2.....	883	718	661	584
July 26.....	897	718	660	589
July 19.....	899	730	656	581
July 12.....	876	740	674	602
July 5.....	740	636	559	501





Auto Production

(1000 Units)

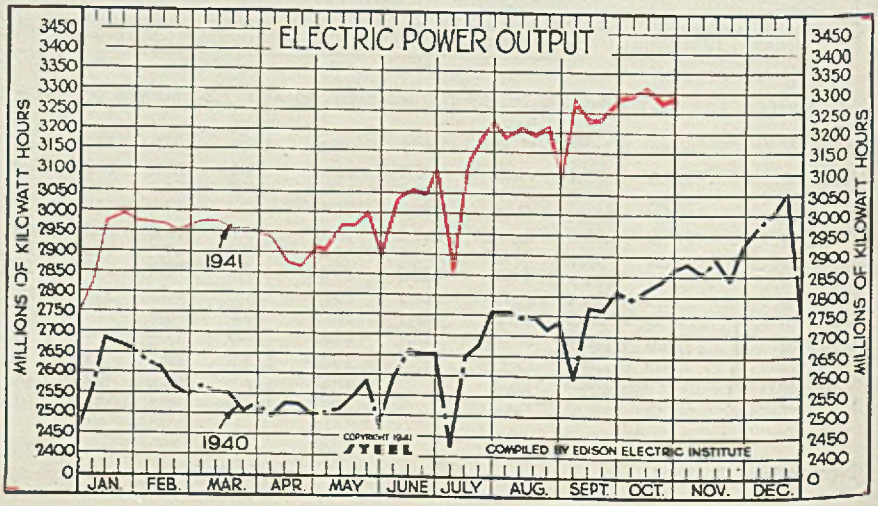
Week ended	1941	1940	1939	1938
Oct. 25....	91.9	117.1	78.2	73.3
Oct. 18....	85.6	114.7	70.1	68.4
Oct. 11....	79.1	108.0	75.9	50 5
Oct. 4....	76.8	105.2	76.1	37.7
Sept. 27....	78.5	96.0	62.8	25.4
Sept. 20....	60.6	78.8	54.0	20.4
Sept. 13....	53.2	66.6	41.2	16.1
Sept. 6....	32.9	39.7	26.9	17.5
Aug. 30....	40.0	27.6	25.2	22.2
Aug. 23....	45.5	23.7	17.5	18.7
Aug. 16....	45.6	20.5	13.0	23.9
Aug. 9....	41.8	12.6	24.9	13.8
Aug. 2....	62.1	17.4	28.3	14.8
July 26....	105.6	34.8	40.6	30.4
July 19....	109.9	53.0	47.4	32.1
July 12....	114.3	65.2	61.6	42.0
July 5....	96.5	52.0	42.8	25.4

Electric Power Output †

(Million KWH)

Week ended	1941	1940	1939	1938
Oct. 25.....	3,299	2,867	2,622	2,284
Oct. 18.....	3,273	2,838	2,576	2,281
Oct. 11.....	3,315	2,817	2,584	2,251
Oct. 4.....	3,290	2,792	2,554	2,229
Sept. 27.....	3,233	2,816	2,559	2,208
Sept. 20.....	3,232	2,769	2,538	2,211
Sept. 13.....	3,281	2,773	2,532	2,279
Sept. 6.....	3,096	2,592	2,376	2,110
Aug. 30.....	3,224	2,736	2,442	2,217
Aug. 23.....	2,193	2,714	2,434	2,202
Aug. 16.....	3,201	2,746	2,454	2,207
Aug. 9.....	3,196	2,743	2,414	2,198
Aug. 2.....	3,226	2,762	2,400	2,194

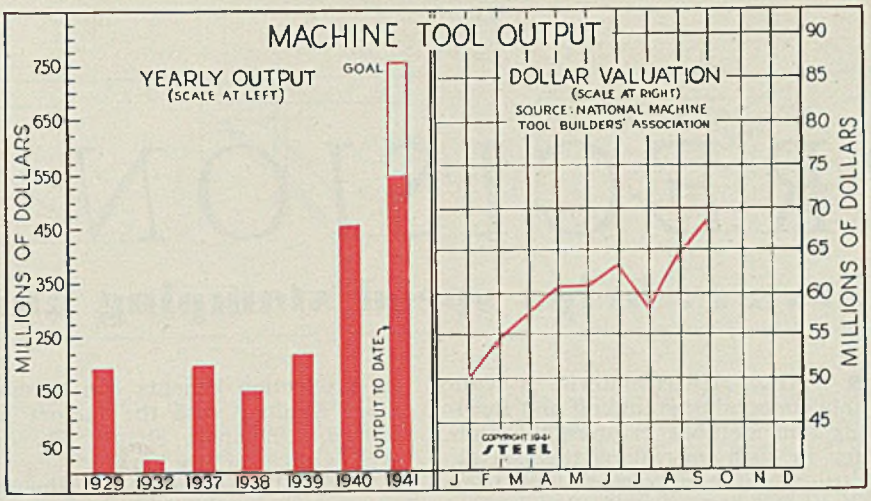
†New series: Includes additional governmental and power generation not previously reported.

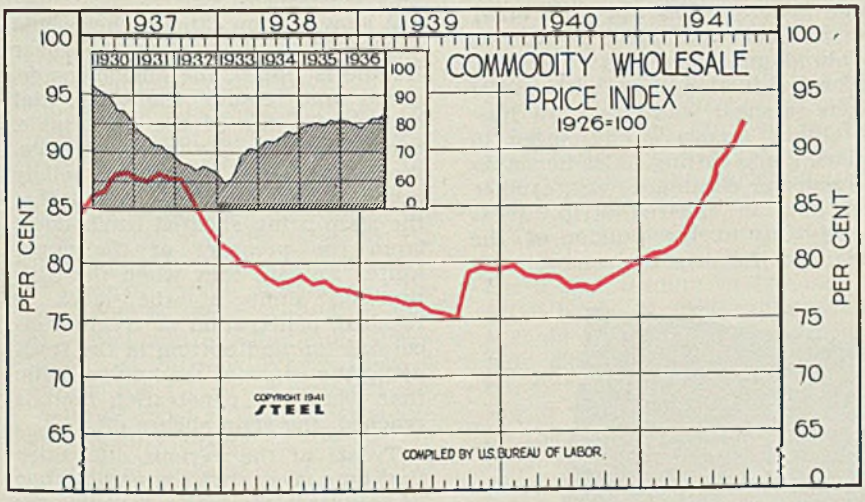


Machine Tool Output

($ Valuation)

	1941
January	$50,000,000
February	54,000,000
March	57,400,000
April	60,300,000
May	60,800,000
June	63,000,000
July	57,900,000
August	64,300,000
September	68,400,000
9 Months	536,100,000
Year	
1929	185,000,000
1932	22,000,000
1937	195,000,000
1938	145,000,000
1939	210,000,000
1940	450,000,000
1941—Goal	750,000,000





All Commodity Wholesale Price Index

U. S. Bureau of Labor

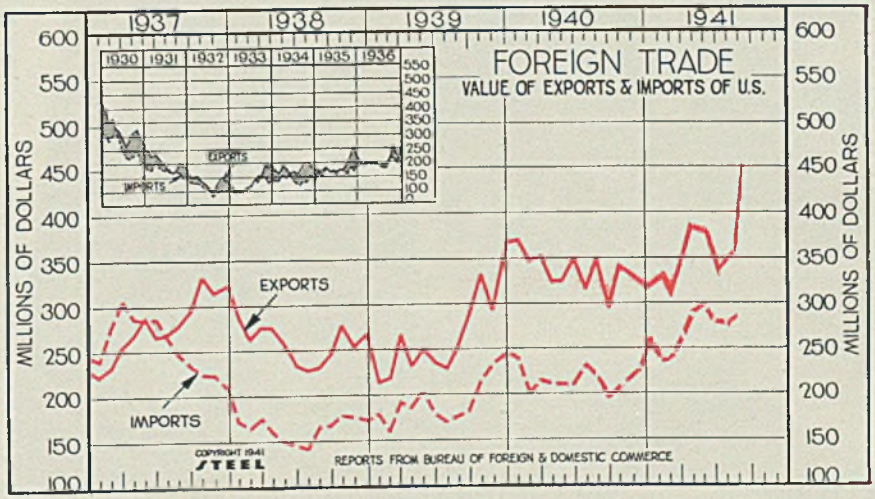
(1926 = 100)

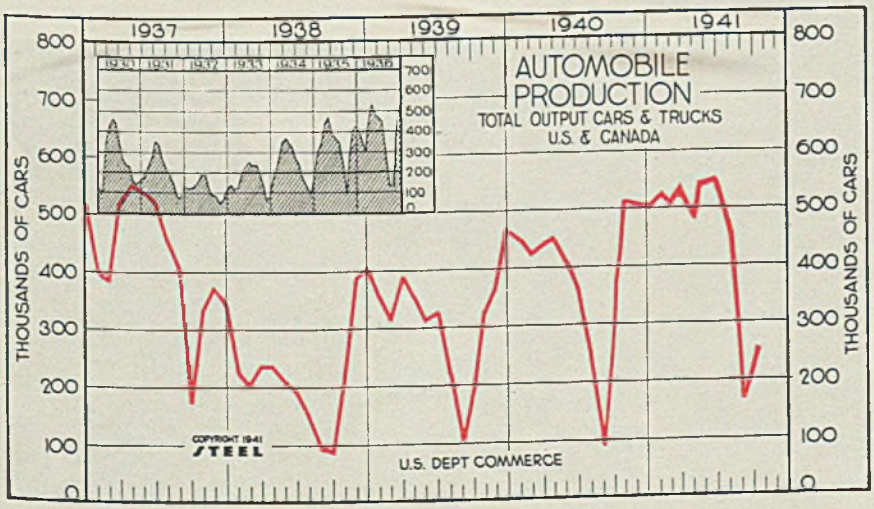
	1941	1940	1939	1938	1937
Jan.	80.8	79.4	76.9	80.9	85.9
Feb.	80.6	78.7	76.9	79.8	86.3
March	81.5	78.4	76.7	79.7	87.8
April	83.2	78.6	76.2	78.7	88.0
May	84.9	78.4	76.2	78.1	87.4
June	87.1	77.5	75.6	78.3	87.2
July	88.8	77.7	75.4	78.8	87.9
Aug.	90.3	77.4	75.0	78.1	87.5
Sept.	91.8	78.0	79.1	78.3	87.4
Oct.	....	78.7	79.4	77.6	85.4
Nov.	....	79.6	79.2	77.5	83.3
Dec.	....	80.0	79.2	77.0	81.7
Ave.	....	78.5	77.1	78.6	86.3

United States Foreign Trade

(Unit: $1,000,000)

	Exports		Imports	
	1941	1940	1941	1940
Jan.	$325.4	$368.6	$228.7	$241.9
Feb.	303.4	347.0	233.7	199.8
Mar.	357.6	352.3	267.8	216.7
April	385.5	324.0	287.6	212.2
May	384.6	325.3	296.9	211.5
June	337.7	350.2	279.5	211.4
July	358.6	317.0	277.8	232.3
Aug.	455.3	349.9	282.5	220.5
Sept.	.....	295.2	.....	194.9
Oct.	.....	343.5	.....	207.1
Nov.	.....	327.7	.....	223.4
Dec.	.....	322.3	.....	253.1
Total	.....	$4,021.6	.....	$2,625.4





Automobile Production

(Unit: 1000 Cars)

	1941	1940	1939	1938	1937
Jan.	524.1	449.3	357.0	227.1	399.2
Feb.	509.3	421.8	317.5	202.6	383.9
March	533.9	440.2	389.5	238.6	519.0
April	489.8	452.4	354.3	238.1	553.4
May	545.3	412.5	313.2	210.2	540.4
June	546.3	362.6	324.2	189.4	521.1
July	468.8	246.2	218.5	150.4	456.9
Aug.	164.8	89.9	103.3	96.9	405.1
Sept.	248.8	284.6	192.7	89.6	175.6
Oct.	.....	514.4	323.0	215.3	338.0
Nov.	.....	511.0	370.2	390.4	376.6
Dec.	.....	506.9	469.0	407.0	346.9
Ave.	.....	391.0	311.0	221.3	418.0

PRECISION SHEAR

. . . . . helps speed stamping and forming operations

WHILE MUCH material is available concerning stamping and forming and methods to promote accuracy in such operations themselves, little attention appears to have been given one of the most important factors influencing press accuracy—and that is shearing, according to Cincinnati Shaper Co., Hopple, Garrard and Elam streets, Cincinnati.

Since most press work is preceded by shearing and since the rapid cutting of accurate lengths greatly increases press productivity, precision in shearing is of utmost value. In order that the practical man seeking accurate shearing and its production benefits can become more familiar with the factors involved, Cincinnati Shaper Co. describes them briefly here.

While mild steel will be considered standard in this discussion, the same general rules apply to other ferrous sheet and plate as well as to aluminum, brass and copper.

The production man with metal sheets to shear wants to know how to obtain accuracy and speed in squaring and cutting. Also he wants to reduce or eliminate twist, camber and bow in sheared strip. It is largely up to the builder of the shear to furnish the answers to these problems as mechanical construction of the shear in a large measure determines the accuracy and speed of the results obtainable.

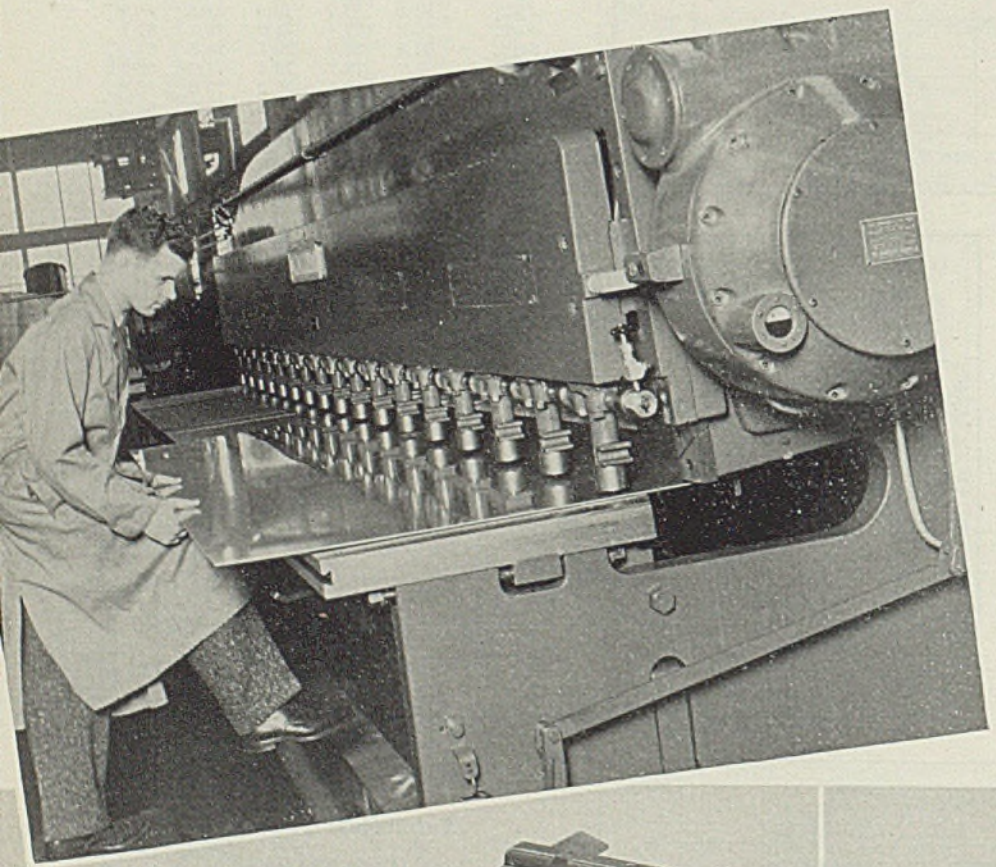
Let's see what happens when a strip is sheared.

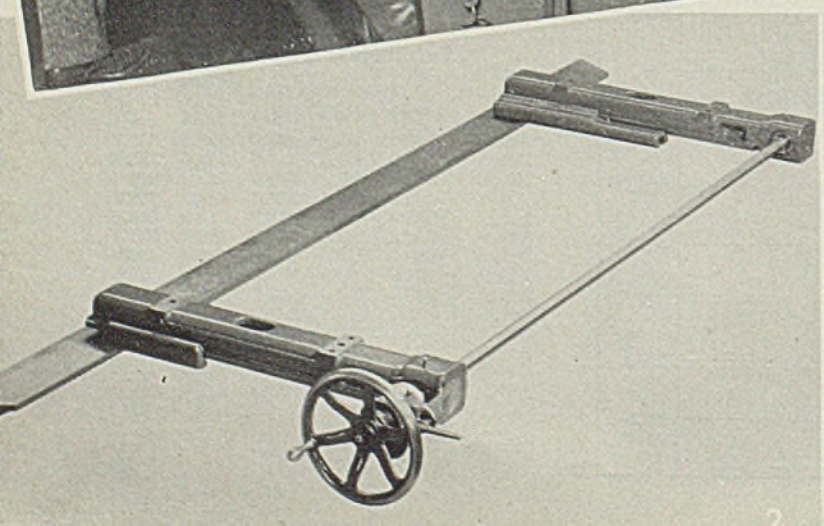
A slow motion camera shot would show: First, that when the shear treadle is tipped, the holddowns descend and clamp the stock flat against the top of the work table. Second, that as the upper knife descends, it holds the stock solidly against the lower knife. Third, that the strip being sheared bends down from the pressure of the upper knife. Fourth, that when the compression limit of the stock is reached, penetration or fracture occurs at top and bottom in the stock along the edges of the knives. Fifth, that when the penetration limit is reached, the strip shears off.

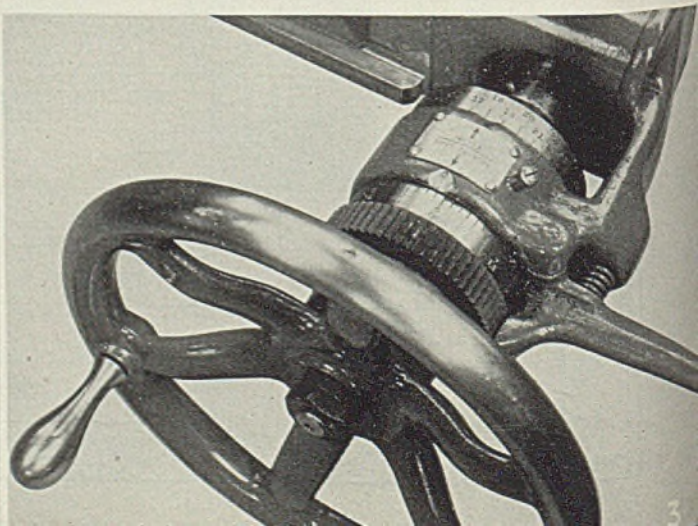
Twist: of the various difficulties that may occur, twist is perhaps one of the most annoying. Twist is the tendency of a sheared strip to turn spirally around itself as shown Fig. 1A. Heavy sheets twist more than light sheets. Soft sheets twist more than hard sheets. Narrow strips twist more than wide strips.

No consistent differences in the degree of twist are evident between shearing across the grain or with the grain. There are two usual causes of twist: Internal stresses in the stock may cause a "natural" twist. Excessive bending of the strip during the cut may cause a "shearing" twist.

There is a direct relation between this bending and the rake or shear angle of the upper knife. A high rake bends the strip more than a low rake. The reason is that a







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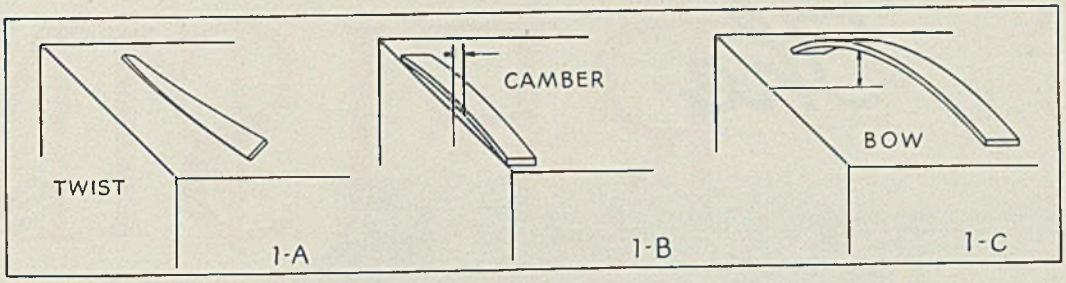


shorter section of the stock is under pressure during the cut. Thus a low rake bends the strip less because a longer section of the stock is under pressure during the cut. Reference to "rake" here refers to the rise per foot of the upper shear knife in relation to the horizontal lower knife.

Improper clearance between the cutting edges of the knives also contributes to excessive bending of the strip. Clearance between knives is the distance between the edge of the upper knife and the edge of the lower knife as they pass each other. The proper degree of rake and the correct knife adjustment can reduce to a minimum or eliminate "shearing" twist entirely. Where there is proper control of shearing twist, "natural" twist is seldom serious in good quality stock.

Camber: Departure of the edges of a strip from a straight line in the plane of the sheet is called camber. It is common to practically all thicknesses of material. Fig. 1B shows camber. Internal stresses in the stock usually are the principal cause. For this reason, the direction and degree of camber are unpredictable.

It is generally recognized that a high rake allows a greater degree of camber than a low rake. While a certain degree of rake may eliminate twist, a still lower degree of rake will be necessary to reduce camber. A commercially flat strip is acceptable if a minor degree of camber is present.

Bow: As shown in Fig. 1C, bow is deformation in a direction perpendicular to the surface of a strip. It is generally associated with camber in wide strip and with twist in narrow strip. It may be present by itself, however. Here again experience shows that low rake of the upper knife gives the best results.

Gaging: The advent of precision gaging has brought to shearing the close fittings and tolerances long associated only with machine tool work. Sheets can be cut to size within a few thousandths of an inch of the gage setting. Cuts can be made so straight that it takes a micrometer to detect the variation in the parallel edges of a strip.

The hand operated, precision, ball bearing back gage shown in Fig. 2 has a dial reading to 1/64-inch (or 1/128-inch). It locks automatically to hold its setting. Compensating nuts eliminate backlash. The back bar is moved by the hand wheel in Fig. 3 which also shows a closeup of the micrometer dial. Note the latch at the right which locks the hand wheel. With the micrometer dial it is easy to set to any dimension that is an even sixty-fourth of an inch since the dial is calibrated in sixty-fourths.

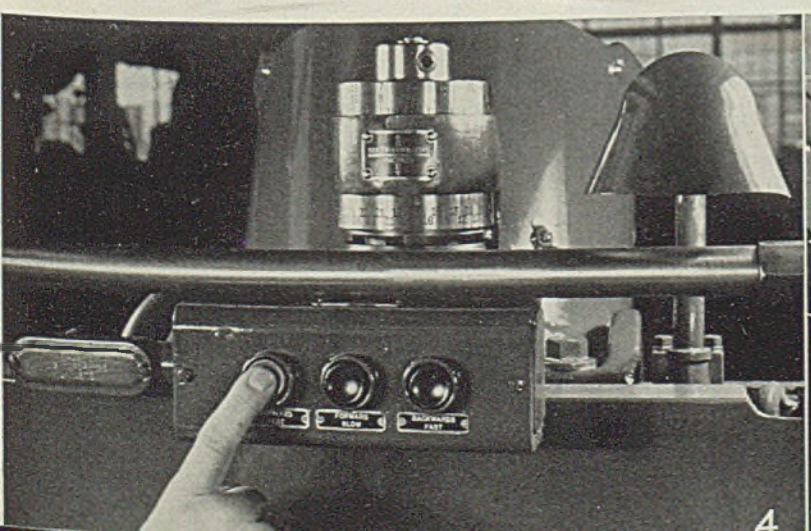
Fig. 4 shows the control station at the operator's position in front of a shear equipped with power-driven gage bars. Note the micrometer dial here also is calibrated in sixty-fourths of an inch.

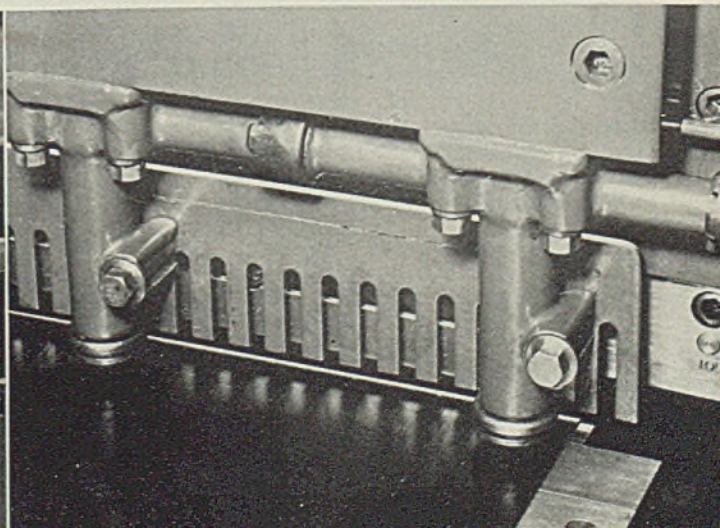
The light beam shearing gage shown in Fig. 5 is an easy means of shearing to a line scratched on the stock as it is only necessary to set this line along a sharp shadow produced by the gage.

Holddowns: All the accuracy promised by precision gaging would be for nothing if holddowns were not provided to prevent slippage of the work during the cut. The most efficient equipment is a series of independent holddown units operated by oil, air or mechanically through individual springs so the pressure exerted by any one of the hold-down units is independent of the others. Such an arrangement will clamp light or heavy sheets without adjustment, so permitting the shearing of shorter sheets of different thicknesses at the same time. Fig. 5 shows a closeup of modern hydraulic holddowns—the type preferred where uniform pressure regardless of variation of thickness of material is desired.

However, there is one final factor that must be present if proper rake and knife adjustments are to be maintained and if the gaging is to hold its precision. Also the effectiveness of holddowns depends on this same vital factor—the strength and rigidity of the housing bed and ram of the machine. For if the housings and frame are not sufficiently rigid to hold the knives in line under the shearing load, precision shearing is impossible. Also upon the rigidness of the frame and driving mechanism depends the speed with which the shear can be operated.

Because outstanding improvements have been developed in shear designs and construction details, some of which have been illustrated here, it is possible for manufacturers of sheet metal products to speed and improve many of their operations by modernizing their shearing departments. Likewise steel warehouses are meeting the demand for greater accuracy in sheared strips, blanks and sheets by installing modern shears and consistently delivering precision cuts.





The REISING sub-

Application of the sub-machine gun in warfare; specifications to be met; stumbling blocks encountered; description of gun; mode of operation; design of bolt; dynamical calculations—bullet is 2.62 inches from muzzle when bolt unlocks; cycle of operations; function of disconnector and automatic connector

This Is Number 36 in a Series on Ordnance and Its Production, Prepared for STEEL *by Professor Macconochie*

■ OUR RECENT references to shoulder arms of the semi-automatic type would hardly be complete without some account of a typical design of shoulder weapon of the fully automatic variety. For this purpose, the Harrington & Richardson sub-machine gun, familiarly known by the name of its inventor, Eugene C. Reising, has been selected. Commonly employed by policemen and prison guards as mobile one-man units with high fire power at moderate range, the sub-machine gun (with U. S. -.30-S. R. M1 experimental ammunition) is being considered for military service.

As a supplement to the lifted cover of machine gun and artillery fire in infantry attacks and as a means of providing increased fire power during the final stages of infantry advance, the Reising gun possesses unquestioned advantages during periods of diminished fire power resulting from casualties, overheated rifles and heavy expenditure of ammunition. Further as a light and effective weapon for street fighting or "jungle fighting" and cavalry armament, it is probably without peer.

Granted these tactical specifications, the weapon selected must be easily carried; should be accurate and completely self-contained. It must, of course, be capable of delivering its full fire power in the hands of one operator and there should be easy selection of full or semi-automatic fire. Finally, the gun must be entirely dependable, any malfunctions caused by defective ammunition must be easily remediable without the use of tools and without extended periods of inaction. No stoppage from overheating in sustained fire can be tolerated. With all these demands, the gun must be simple in construction, easily taken apart, and, as in the case of all military small arms, must possess the virtue of interchangeability.

Perhaps the principal stumbling block to the adoption of the sub-machine gun as a military arm has been the lack of any mass production facilities for the rapid delivery of this arm in anything like the quantities required at this time. Guns possessing the necessary characteristics have been produced in the past, but under the older long and laborious hand manufacturing methods, the present war would be won or lost before pilots, tank crews, infantry squad leaders, etc., could get these weapons in their hands. Recognizing the urgency of our present situation, sub-machine gun makers including the Harrington & Richardson Arms Co., have added "availability" to "performance" and have taken a leaf out of the automobile manufacturers' book dealing with high-speed production line methods.

Since automatic and semi-automatic arms work best with a somewhat "sloppy" fit, there would appear to be little or no argument left for the retention of close hand-fitting operations wherever the machine is capable of doing the job within the widest permissible tolerances. In any event, the coupling of accurate gaging with selective assembly effectively disposes of any criticisms which might be leveled at the "automobile" technique.

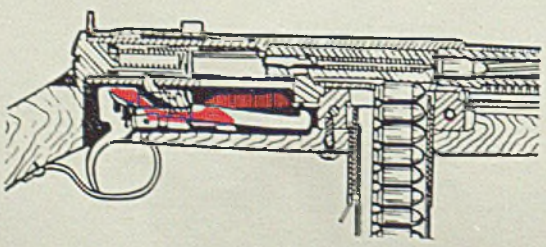
Fig. 1 gives a general view of the Reising sub-machine gun. It is bottom fed by clips holding 20 cartridges and has a cyclic rate of fire of 450 to 500 shots a minute. The bullet used in the present model (which, as indicated, would be changed for military purposes to a smaller caliber) is our old familiar man-stopping .45, weighing 230 grains, as compared with the modern service rifle bullet of 150 grains. The weight of the gun is 6½ pounds as against the 9½ pounds of the regular long-range military rifle. It has an overall length of 35¾ inches; an 11-inch barrel; and a sight radius of 18½ inches. The muzzle velocity of the bullet is low compared with the rifle since this gun is intended to function at a maximum range of around 300 yards. The muzzle velocity is about 920 feet per second, giving the bullet a muzzle energy of 431 foot-pounds. Such a missile will penetrate 6 inches of white pine at 20 yards from the muzzle of the gun.

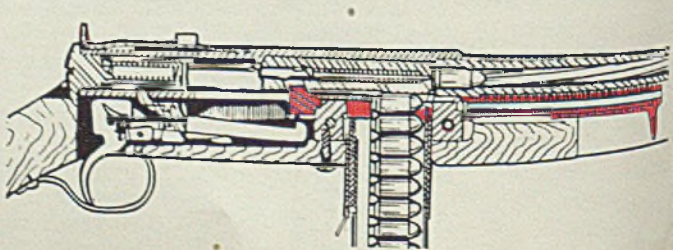
This gun, which operates on what is known as the "delayed" blow-back principle to be explained presently, has a feature which is well enough known to gun manufacturers but which is not so familiar to the layman. The flash-hider, well seen in Fig. 2 (which exhibits the gun in the hands of George Alexander Exley, chief engineer of the Harrington & Richardson Arms Co.) consists of a cylindrical element having its front end half closed by a turned up lip and bearing milled slots in its upper semi-circumference. Guns of the automatic shoulder arms type tend to "climb" in action. This is to be expected if

Fig. 5—Portion of gun diagram. The colored section denotes the disconnector in view at left, below

Fig. 5A—Color shows action bar, rear end engaging the bolt in view at right, below. A Dick Hanley photo

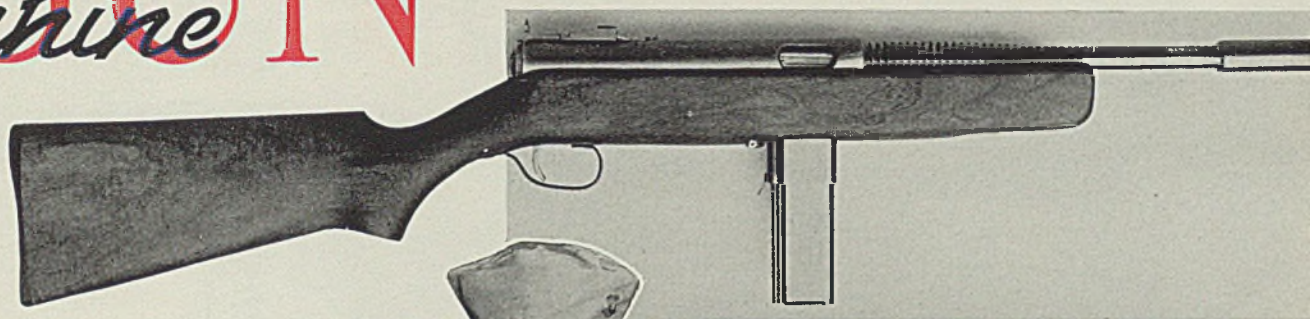
Fig. 6—Colored section in this portion of gun diagram, bottom left, opposite page, shows the automatic connector





GUN machine

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
and
Contributing Editor, STEEL



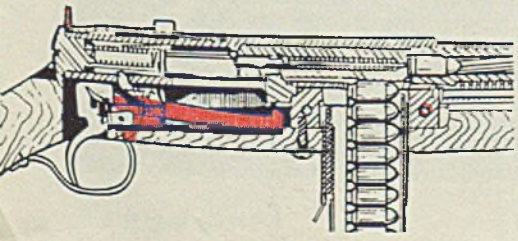
the forces acting upon the gun be considered. In order to offset this tendency, the escaping gases are caused to execute a sharp upward movement. Thus the inertia of the gases during deflection produces a downward force tending to neutralize the moment of the force arising from the acceleration pressure on

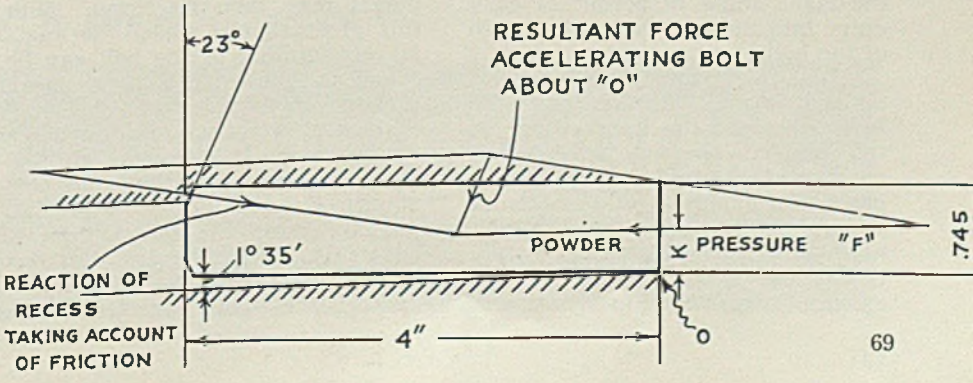
Fig. 1. (Top)—Extended view, fast firing Reising sub-machine gun. Specifications: Bottom fed, clips holding 20 cartridges; oil finish walnut stock, steel butt plate; firing rate, 450 to 500 shots per minute; weight 6.5 pounds; overall length, 35.25 inches; sight radius, 18.5 inches; fires .45-caliber bullets weighing 430 grains; penetrates 6 inches of white pine at 20 yards; bullet energy, 431 foot pounds; muzzle velocity, 920 feet per second

Fig. 9—A Reising in action with empty cartridge cases falling away to the right. Readers with a taste for mathematics may calculate rate of fire for distances between successive cartridge cases in Fig. 9, second from top

Fig. 2—George A. Exley, chief engineer, Harrington & Richardson Arms Co., Worcester, Mass., assembling a Reising in view third from the top. Note the flash hider at end of barrel with slits through which escaping gas is directed upwards to offset the climbing tendency common to all shoulder arms. A Dick Hanley photo

Fig. 4. (Bottom right)—Shows forces acting on bolt at instant of firing. Bolt lies up in receiver recess and is prevented from instantly commencing to move backwards by recess lip. Before bolt can unlock, bolt must rotate around O, giving sufficient time for bullet to traverse length of barrel before breach is opened—called "delayed blow back" action





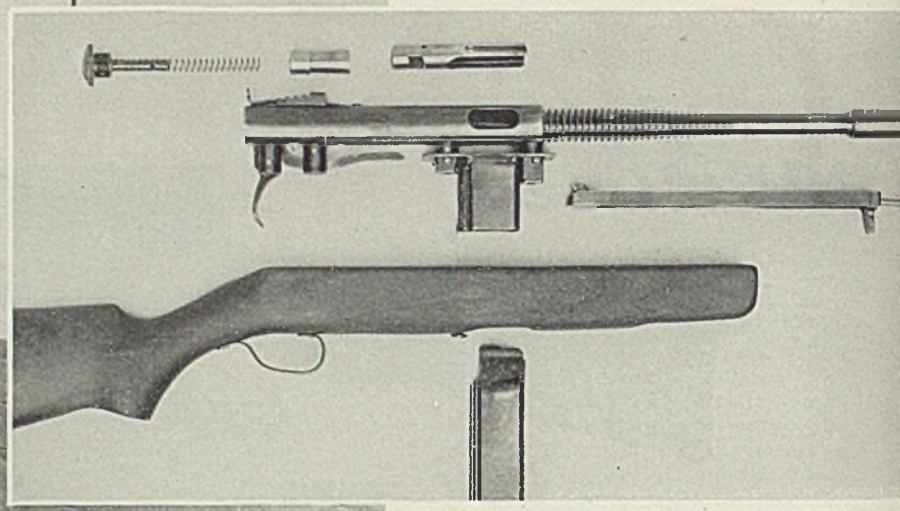


Fig. 7—The inventor, Eugene G. Reising, prepares to assemble his gun blindfolded

Fig. 8—Disassembled Reising gun, showing bumper plug, hammer spring, hammer, bolt, receiver and barrel assembly, action bar, stock and magazine

the bullet about the shoulder of the operator.

In action, the gun is fed from a magazine clip holding 20 standard .45-caliber cartridges of the type adopted by the United States government. The insertion of this clip in the holder involves a straight line movement requiring neither any large application of force nor and particular care. Fig. 3, p. 72 shows cross sectional view of the clip in the lower righthand corner. In filling the clip, the cartridges are pushed in from the top against the pressure of the magazine spring which is capable of close-coil compression when the magazine is full. In this illustration also will be seen the cartridge clip in position and ready to deliver its ammunition, round by round, into the receiver. Some ingenuity is required in the design of these arrangements so that the cartridge is cocked at just the right angle to permit of easy entry into the breech on the return of the bolt.

If the design of the bolt be examined, it may be observed to lie in a recess in the upper cover of the receiver. The end of the bolt is chamfered at an angle of 23 degrees. On explosion of the powder charge in the cartridge, the bolt must first leave this recess before it can move backward. The mechanics of this action may be understood by reference to Fig. 4. Just before the instant of firing, the bolt lies up in the recess at an angle of 1 degree 35 minutes to the axis of the barrel. On the application of pressure to the face of the bolt, the latter must first execute a turning movement about the point O before it can start backward. In order to give some indication of the extent of the delay, the force parallelogram for the bolt has been drawn, the resultant force being neutralized, of course, by the inertia of the bolt which is free to rotate about O.

Knowing the weight of the bolt (5¾ ounces) and the distribution of the steel of which it is made, its moment of inertia about O can be calculated. By making certain assumptions concerning the characteristics of the pressure curve of the exploding powder charge, the mean pressure acting on the bolt during the passage of the bolt through the barrel may then be found. With this information as a basis, the angular acceleration of the bolt can be found as follows. If F is the mean pressure on the face of the bolt and K the distance of the resultant force acting on the bolt from O, we find from our force diagram that this resultant force F′ is about 280 pounds. From the equation F′, K equals $I.a$ in which I is the moment of inertia of the bolt about O and a is the angular acceleration in radians per second squared, we find that a is about 21,400 radians *per second per second.*

Now the barrel of the Reising gun being 11 inches long, we find when we subtract the length of the powder chamber, the bullet actually travels about 10.172 inches. Since the muzzle velocity is 920 feet per second, the average velocity on the usual assumption is around two-thirds of this, or 613 feet per second. Thus the time of flight of the bullet through the barrel is given by

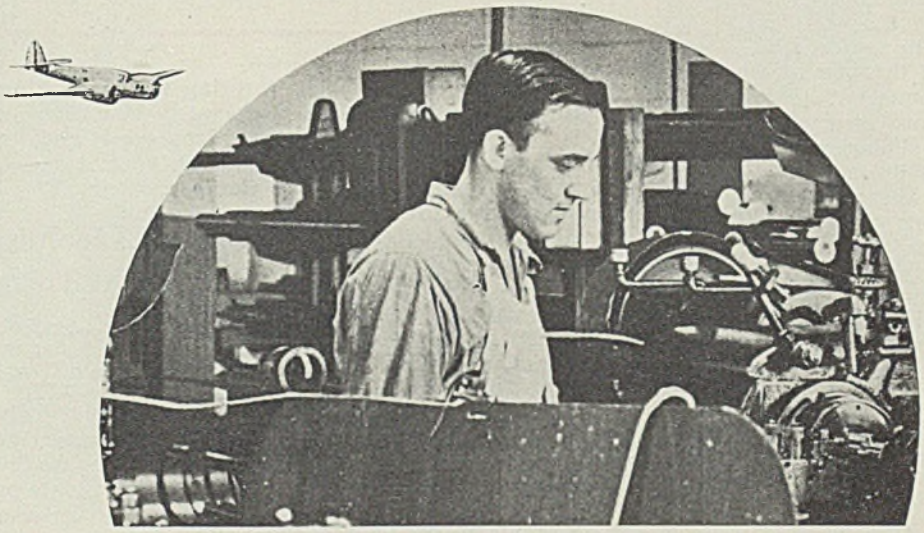
$$\frac{10.172}{12 \times 613}$$ or is 0.00138-second.

Thus the angular travel of the bolt about O during this time is $\frac{1}{2}at^2$ or 0.0204-radian. In clearing the recess, the bolt revolves through 0.11/4 or 0.0275-radian. *Thus the bolt would appear to be still locked when the bullet reaches the muzzle.*

Since the angular velocity of the bolt is $a.t$ or 21,400 x 0.00138 or 29.53 radians per second at the instant the bullet leaves the muzzle, it travels the remaining 0.0275 minus 0.0204-radian in 0.0071/29.53-second. Thus the bullet, traveling at 920 feet per second will be 0.00024 x 920-foot or 2.62 inches *from the muzzle when the bolt unlocks.* Thus the residual pressure of the explosive gases is principally responsible for the "blow-back" action.

Other details of the action of this gun will be more or less readily apparent from Fig. 3. As the bolt leaves the recess in the receiver and commences to move backward, it draws with it the action bar against the pressure of the retracting spring. The hammer is a cylindrical element which slides back and forth behind the bolt. The face

In the Air and in the Shop . . .



men rely upon *this* Stainless

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of the hammer is drilled concentrically to receive the end of the firing pin. Thus the gun cannot be fired until the bolt has lodged in the recess and thus disposed the end of the firing pin eccentrically with respect to the axis of the hammer. At the end of the hammer stroke, it is engaged by the sear which seats in the circumferential notch in the body of the hammer. On the forward stroke of the bolt, a cartridge is pushed into the breech and the trigger pulled through medium of automatic connector.

The Reising gun is provided with a manually operated sliding member called a selector, seen in Fig. 3 at the rear right of the receiver. This selector positions in three notches—"safe", "semi-automatic" and "automatic". Shown in color in Fig. 5 is an element known as the disconnector which functions in semi-automatic fire. This part is hinged in the top of the trigger as shown in Fig. 3 and has a notch which engages the sear. Its forward end rests upon the rear of the action bar (shown colored in Fig. 5A.) After the explosion, the action bar (in color in Fig. 5A) driven to the rear by the moving bolt with which it is engaged, depresses the disengagement of the sear from the notch in the disconnector. The gun is now ready to fire again. Pulling the trigger pushes the notch in the disconnector against the sear, which rotates downward and releases the hammer. The latter now flies forward in the wake of the bolt which has by now closed the breech. The firing pin strikes and the cycle starts all over again with every pull on the trigger.

Shown in color in Fig. 6 is a device known as the automatic connector used in automatic fire. While the gun is set for semi-automatic operation, this element is kept out of action by the selector. By sliding the selector forward to the automatic position, automatic connector rises and engages with a notch cut in the rear end of the action bar, as the bolt is returning to its seat after an explosion (i.e. when the finger of the operator presses upon the trigger only). Automatic connector is pivoted in the tail of the sear on a loosely fitting pin. A forward pull on the connector by the action bar as it returns to its forward position after the explosion, pulls the sear out of the hammer notch, initiating another cycle. This action will continue as long as the operator keeps his finger on the trigger and so permits the rear end of the connector, which rests under spring tension against a pin in the forward extension of the trigger, to drop down and its forward end to cock up and engage with the action bar.

New Handbook Available

Copies of "Modern Gun Production", the third of a series of reprint handbooks on defense production compiled by STEEL, are now available.

"Modern Gun Production" deals with the principles of gun construction, gun carriages and recoil mechanisms, instruments for fire control, and rangefinders. It is attractively bound and fully-illustrated.

Orders should be addressed to Readers Service Department, STEEL, Penton building, Cleveland. Price, $1.00 per copy.

Text of Mechanics for Industrial Training

■ *Mechanics*, by John W. Breneman; cloth, 139 pages, 6 x 9 inches; published by McGraw-Hill Book Co., New York, for $1.50.

Prepared under direction of the division of engineering extension of Pennsylvania State College and written by the associate professor of engineering mechanics of that school, the text is one of a series written to provide a study for persons desiring to further their knowledge of engineering fundamentals. It has been tested in the fields of industrial training and in correspondence instruction before being issued in printed form. It incorporates the study of simple machines, gears, gear trains, pulleys and mechanisms.

The problems are taken from practical examples.

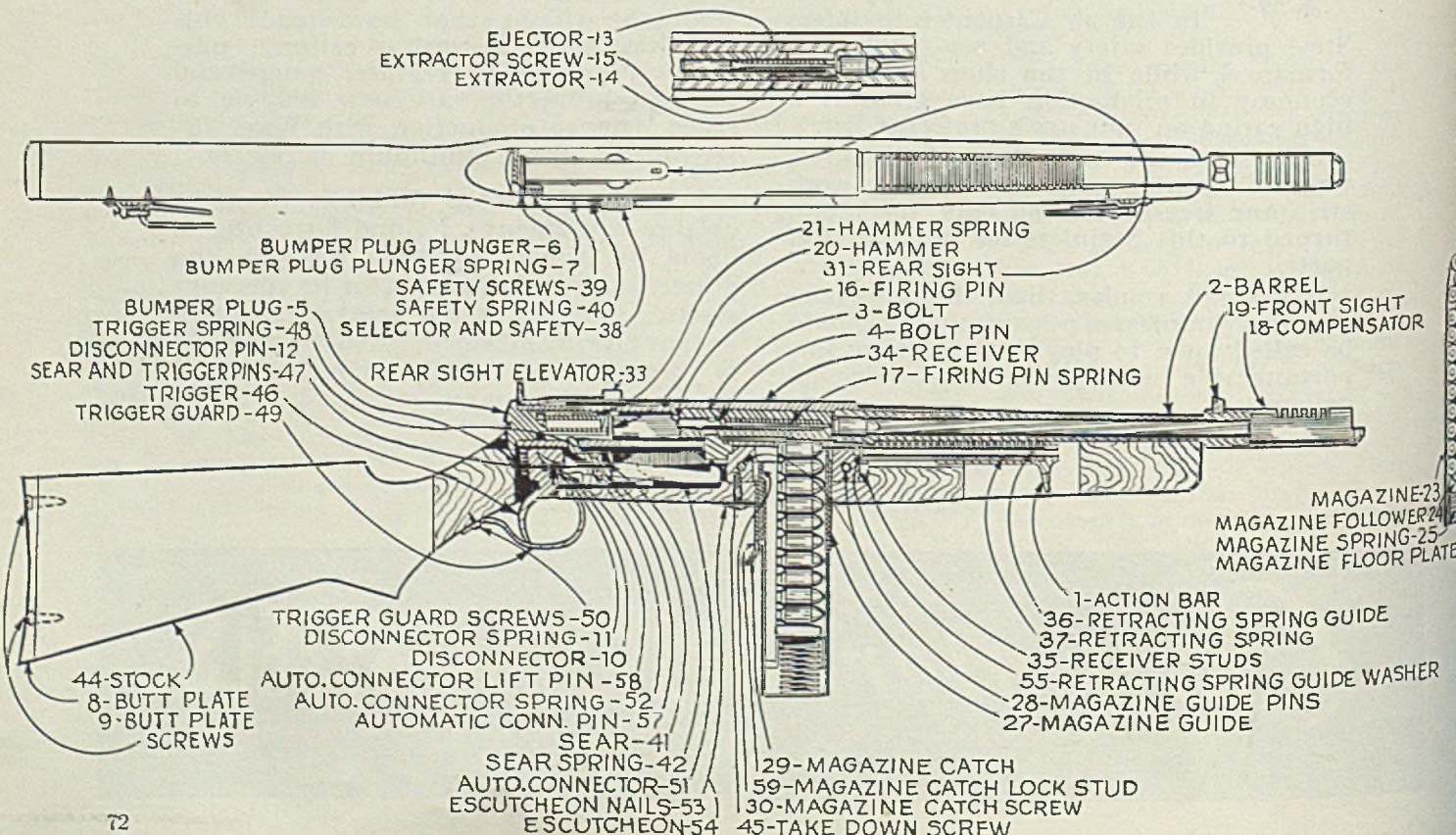

Fig. 3—Diagram of Reising gun showing construction details

NO. 2 OF A SERIE

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NO. 1 HULL PLATES

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RUBBER "KEEPS THEM ROLLING"

"Heavy duty" does not adequately describe the severity of tire service on United States Army mobile units. But fortunately for the effectiveness of the Defense Program, destructive operating conditions do not present new problems to our tire producers. Rubber compounders in America have long since turned out truck tires that will meet just such requirements. The tougher the service, the greater the need for zinc oxide in the rubber compound—to provide heat resisting qualities and reinforcement against wear and tear.

Add to the above the fact that zinc oxide is essential in the activation of accelerators of vulcanization, and you have an idea of the importance of this material in the manufacture and performance of tires for Army use. Rubber is just one of at least a dozen major industries which are depending on zinc in one form or another to produce the myriad products pouring into the Defense Program. At the bottom of this page is a partial list of the *rubber* defense items in which zinc pigments are considered indispensable.

The uses for zinc in defense are the same as those in normal times, but the program calls for such quantities of zinc for certain products that non-defense consumers have not been able to obtain all of the zinc they would like to use. This is part of the price that must be paid for national security.

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How To Increase Output from

COATED ABRASIVES

By 20 Per Cent

It is estimated that at least 20 per cent can be saved on an average by users of coated abrasives by following the few simple rules detailed here. Mr. Gallaher not only discusses common failures of coated abrasives but explains their causes and what can be done to prevent them

■ FROM A careful analysis of the use of coated abrasives by all sorts and kinds of industries large and small, it appears that few plants actually are getting 80 cents in work value from each dollar spent for coated abrasives, no matter what make of abrasive they use. In many cases, nowhere near this return was being obtained.

First, let it be understood that this applies to all glue-bonded coated abrasives. Since all coated abrasives are made to government approved specifications by all manufacturers, at no time is there more than 1 or possibly 2 per cent difference in work value to be found between similar products as produced by any good abrasive manufacturer—a variation to be expected due to the human element.

Usual causes of complaint are about as follows:

1—"The material has been doing excellent work until recently. We now find that we can only sand about half the number of pieces with the same amount of the closely coated abrasive material. What is the answer?"

2—"Abrasive belts are 'filling' very rapidly. Why is this?"

3—"Belts are burning the work."

4—"The coated abrasives we use showed up well during the tests. After being placed in stock and used in production, they were found to work well until recently. Now we get only about 25 per cent of the work formerly handled."

5—"The belt we tested did more work than the belt we had been using, so we put in a stock. Now we find that the stock we bought does not measure up to the sample in work produced."

Although the above refers to use of abrasive belts, the same applies equally well to sheets, disks, sleeves and many other forms of coated abrasives.

These are the five major sources of trouble in the use of coated abrasives and here is the one common cause:

Coated abrasives will give their maximum work value *when they are stored and worked in an atmosphere having a relative humidity of 50 per cent.*

In manufacturing abrasives, complete control of humidification is necessary. Not only are the coating, cutting and packing rooms humidified or dehumidified (as the case may be), but when the goods leave the factory, the water content in the coated abrasive material is exactly right to give 100 per cent work value. Hundreds of work value tests have shown that there is practically no difference between similar materials as made by any first-grade abrasive manufacturer—*when stored and worked under identical conditions.*

Goods are shipped in moisture resisting packages. Note this packing is not moisture proof. Thus coated abrasives should never be stored on a cement floor as all cement floors hold moisture which will be quickly absorbed by the abrasive material.

Rolls should never be stored on end but should be laid on their sides to allow circulating of air evenly all around them.

Coated abrasives should be stored in room with a cool, even temperature and a relative humidity ranging between 35 and 65 per cent.

Analysis of Complaints: In the case of complaint No. 1, the chances are about 10 to 1 that either the abrasives have been stored in a room where the moisture content was excessive—70 or 80 per cent—or that the operating room where the material is used has a high moisture content.

Note here that coated abrasives which will give 100 per cent work value when stored and worked in rooms having a relative humidity near 50 per cent will give only about half their work when operated under 70 per cent relative humidity. Thus since day-to-day change in atmospheric moisture often has a range of 50 per cent, it is easy to see how a variation of 50 per cent in work value can occur from one day to another.

Complaint No. 2: If "filling" occurs, it may be due to too much atmospheric moisture but most likely is caused by insufficient belt speed. Look for excess moisture

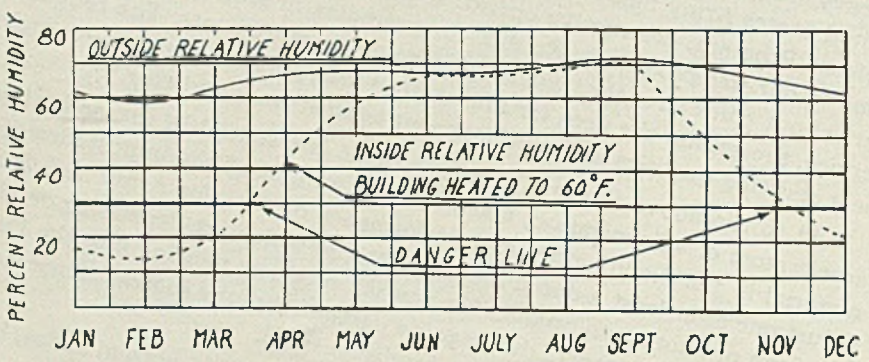
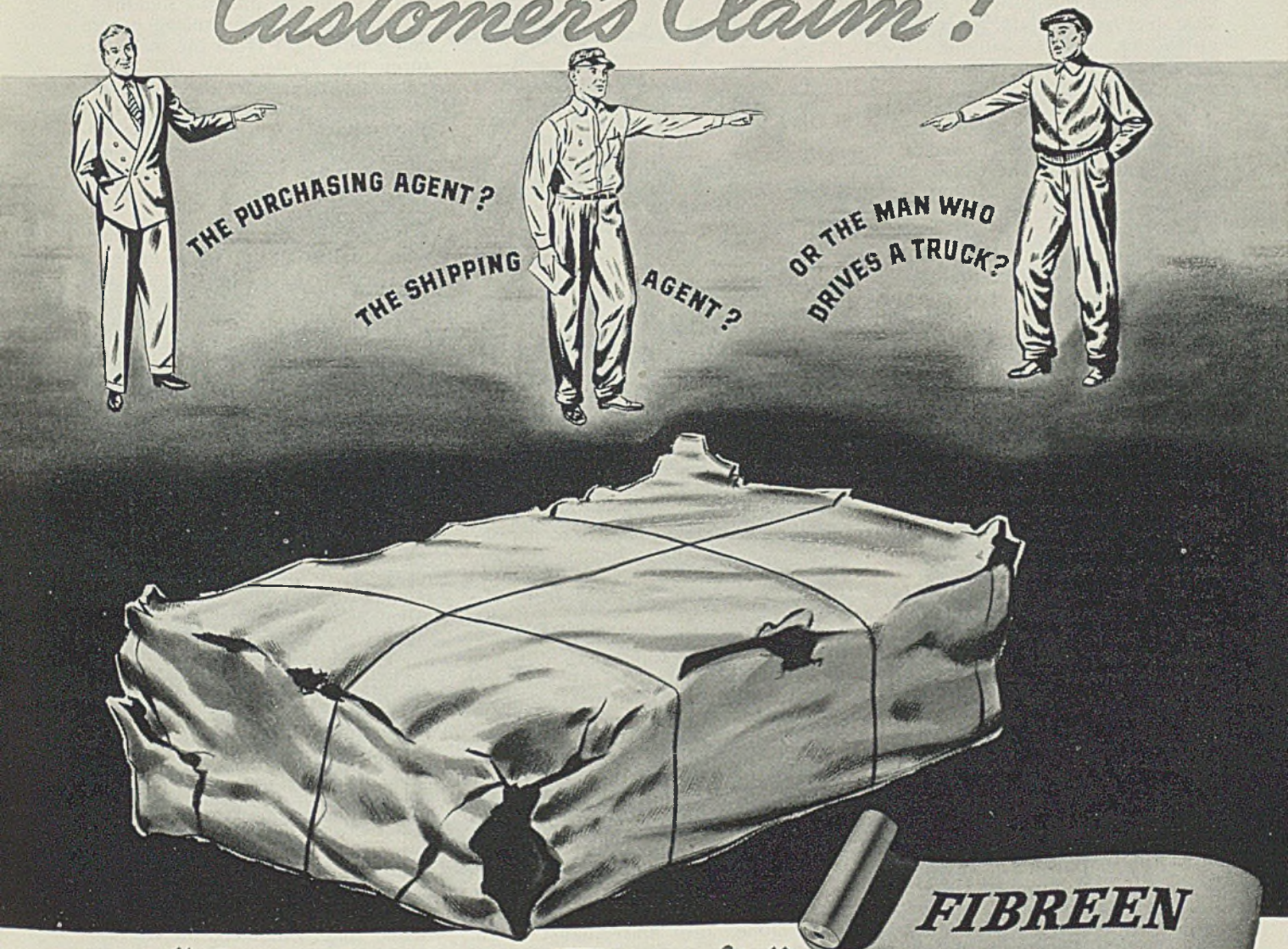


Fig. 1—Showing average outside relative humidity over the year with corresponding inside relative humidity in a building heated to 60 degrees Fahr.

By E. B. GALLAHER
Clover Mfg. Co.
Norwalk, Conn.

WHO TAKES THE BLAME FOR A *Customer's Claim?*



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It's *tough*—stands scuffing, wear and hard knocks. It's *waterproof*—absolutely impervious to moisture, dust or dirt. It's *pliable*, clean, easy to use, and not expensive. Can be used as a self-wrap or as a lining material.

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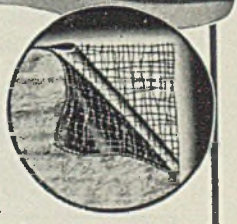
Why not check *your* shipping and packaging methods with The Sisalkraft Co., recognized leader in the field? Suggestions and sufficient FIBREEN for your own trial and experiment will be supplied without obligation. Write, telling us what you ship, and how you now package it.

FIBREEN



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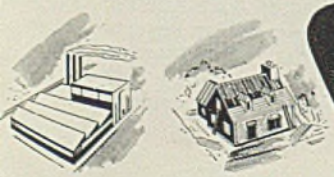

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first. If this is not the remedy, then speed up the belt. Belts sanding metal should run between 1000 and 3000 feet per minute for ordinary operations. Belts sanding wood should run between 3000 and 5000 feet per minute.

Complaint No. 3: Where abrasive is "burning" the work, the cause is usually insufficient belt speed or too much pressure on the work. Burning also occurs in sanding wood where the wood is over rich in resinous matter.

Complaint No. 4 is simple and yet important. Glue-bonded coated abrasives as previously stated give their maximum work value only when they have been stored and are worked in relative humidity of 50 per cent. A humidity of 70 or 80 per cent will cause the abrasive to absorb moisture rapidly with the result that the work value quickly falls from 100 to 50 or even 40 per cent. The material will "come back," however, when slowly dried out to the proper degree of moisture, at which point the work value will be completely restored.

But if the material has been stored where the relative humidity has fallen below 25 per cent, *the glue bond is permanently ruined.*

The critical humidity value is 25 per cent. Abrasive belts hung in a room having 18 per cent relative humidity will in a few hours show a loss in work value of 80 to 90 per cent. and *they can never be brought back by adding moisture.* In cold weather conditions when the relative humidity in heated rooms may fall as low as 5 per cent, it is easy to see how abrasive belts can be quickly ruined. The cheapest thing to do with such an abrasive belt is to throw it away as a total loss because it will not even pay for the labor required to put it in and remove it from the sander.

A relative humidity of 18 per cent is not rare but is common in steam-heated plants which are not air conditioned. It exists to a greater or less extent in practically all steam heated stock rooms where coated abrasives are stored in the winter.

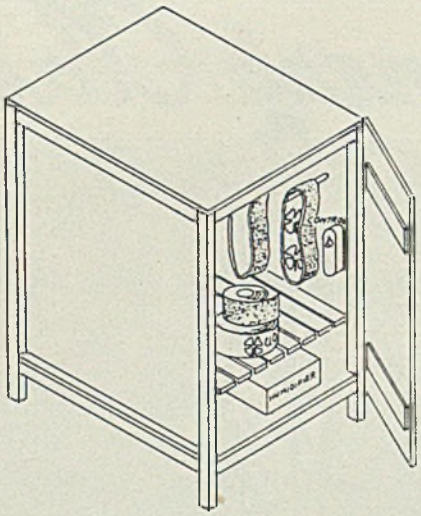


Fig. 3—Cabinet to protect your coated abrasive stock can be made by installing an automatic humidifier such as that used in cigar counters. It consists of a lamp bulb immersed in water controlled by an electric hygrometer which will maintain the humidity at the desired value by controlling evaporation of water

Chart Fig. 1 gives the results of a study of relative humidity found in steam heated buildings each month of the year. It also gives the outside relative humidity over the same period. Note that the inside coincides with the outside only during June, July and August when little or no heat is being radiated inside the plant. The inside humidity was taken in the store room which was maintained at 60 degrees Fahr. If the room had been maintained at a higher temperature, the relative humidity would have been still less during the cold months.

Cases have been known where new stock right from the manufacturer has sanded, say, 100 pieces. Yet a few days later the very same goods cut from the same roll would only sand 10 to 15 pieces. This material will never do better work because it had been stored in a room with a relative humidity below the critical point.

Complaint No. 5: This is a common complaint. A mill using a high-grade coated abrasive will get, say, 100 pieces per belt on an average. Over a period of time this average has become established as the work value without the operators' realizing that on certain days when the humidity is right they get a higher production, while on excessively moist days they get less.

Now it is decided to try some other make of coated abrasive. If the belt arrives on a clear, bright day with proper humidity, the trial belt may easily do 110 pieces, 10 per cent above the average. Being impressed with the gain, a stock order is placed for the new belts which arrive and are placed in stock.

Then one of these new belts is withdrawn from stock and put to work, say, on a moist day, when only 90 pieces or less are produced. Here is what has happened:

The excess humidity has cut the work value. It is not a fault of the new belt. The old belts on which the average performance was established originally probably would be found to act the same way on that particular day and at that particular time. Similarly, the old belts would probably have given the same high output as the trial belt on *that* particular day.

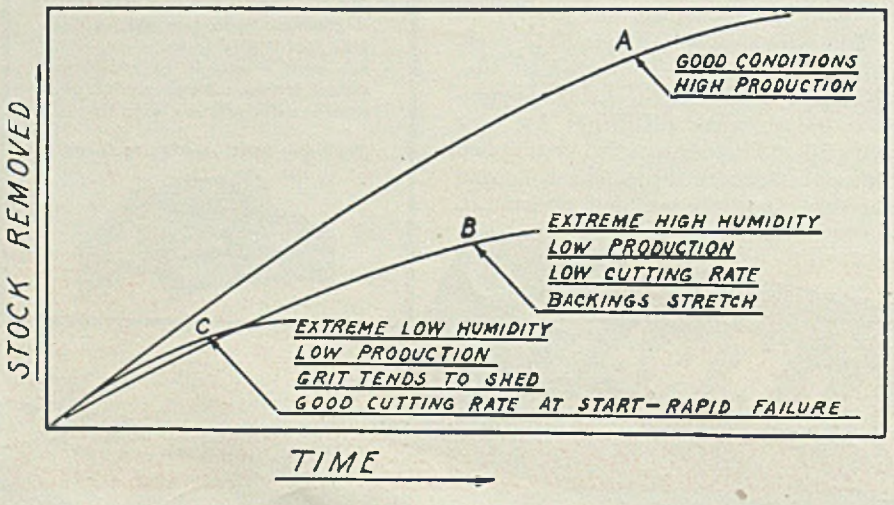
The only way to judge a piece of abrasive material is to use it over a period sufficiently long to include dry and moist days so an average production value can be established —or else keep all coated abrasives under controlled humidification.

Fig. 2 demonstrates results of tests showing the work value of the same piece of coated abrasive under three different conditions of relative humidity. Curve A was developed by a belt having just the right amount of moisture. It is producing 100 per cent work value in a given time. Curve C is again the same material, but first subjected to several hours in a relative humidity of 18 per cent. A work loss of some 80 per cent is noted from the chart.

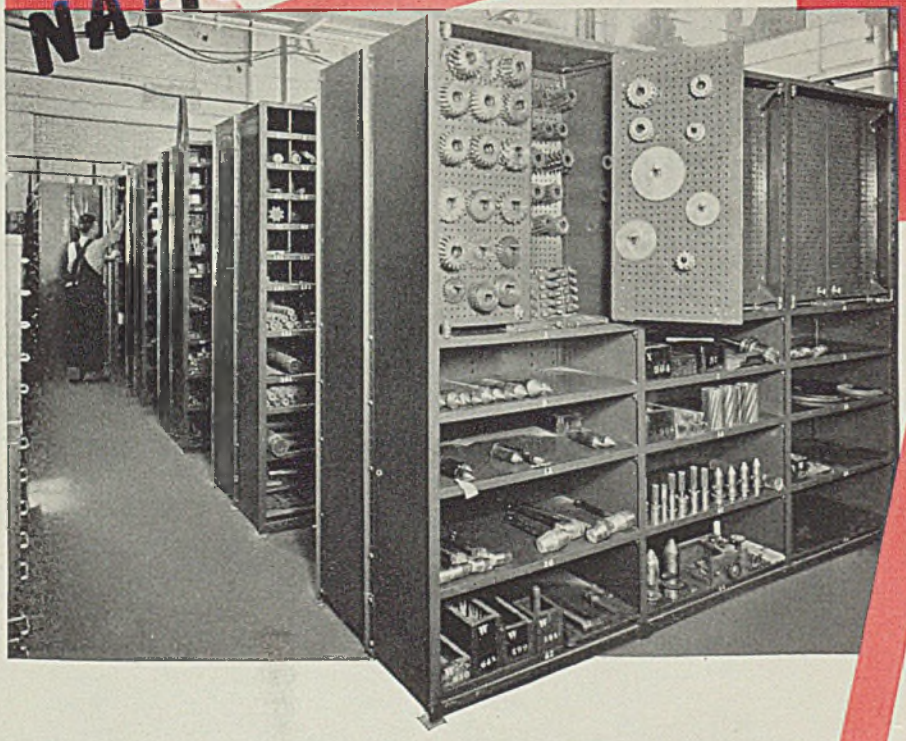
Similarly, curve B is the same material but subjected to a relative humidity of 80 per cent for several hours. Here the loss in work value has been about 55 per cent. This chart is typical of the performance

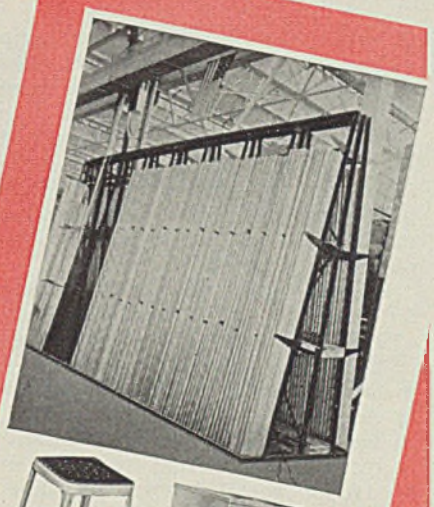
(*Please turn to Page* 109)

Fig. 2—Comparison of production obtained from the same sheet of coated abrasive stock under good conditions, curve A, and also where the material has been exposed to excessively low humidity, curve C, and to extremely high humidity, curve B. Note type of failure induced by each condition



Here's How Lyon Products HELP SPEED UP NATIONAL DEFENSE PRODUCTION





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Assembler's Bench Bin

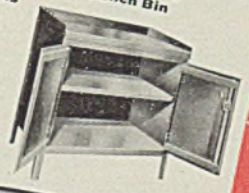

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Fig. 1—Skeleton showing progressive steps of die operations as brass strip is formed into disk used in shell fuze

Progressive Dies Speed Manufacture of FUZE PARTS

. . . . and permit meeting limits as close as plus 0.00005-inch, minus 0.0000-inch, when parts are shaved. Holes are punched satisfactorily although smaller in diameter than thickness of piece

■ MAKING a die which must stamp a large number of holes and slots to close tolerance in a thick piece of metal naturally requires a high degree of precision on the part of the diemaker. This is true of the 10-station progressive die used in producing one of the parts for the mechanical fuze incorporated in various types of shell.

This fuze—described in STEEL, June 9, 1941, P. 58—is a complicated piece of clockwork which fits in the nose of the shell. It must be accurately made so as to detonate the charge at the exact predetermined instant. In fact, its accuracy of manufacture is comparable to that required in producing certain types of timepieces, and several clock and watch makers are included among the seven companies either now engaged in producing these units or shortly to start work on them.

No small task was involved in setting up facilities for producing this fuze in the huge quantities required. Various parts of the mechanism, including the gear train, driving pinion, etc., are assembled compactly within laminations of round brass disks. Stamping was the obvious method for producing these disks in large quantities.

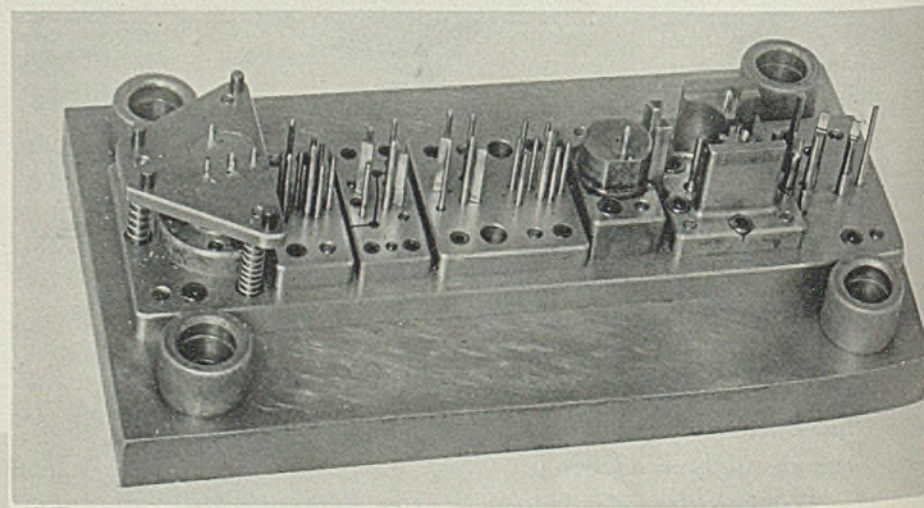
Some of the disks have large openings in them or else involve stamping only a relatively few holes, and these presented no particular problem to the diemaker, but the disk which fits on the top of the fuze is more complicated. This piece, shown in skeleton form in Fig. 1, is made of brass. It has ten holes, varying in diameter, as well as four small slots, two of which are located on the edge of the disk.

Diameter of the smallest hole is only about 70 per cent of the thickness of the metal, despite the fact it is a common if not a rigidly observed rule in stamping practice that the diameter of openings should be no less than the stock thickness.

Diameters of the holes must be held to a tolerance of plus 0.0005-inch, minus 0.0000. Tolerance on the dimensions between holes is plus or minus 0.0005-inch, while the blank must be held flat to 0.003-inch. All holes, as well as slots and outside diameter of the part, are shaved.

Dies used for stamping this piece as well as the other five brass disks required for the fuze were designed and are being furnished by Moore Special Tool Co. Inc., Bridgeport, Conn. With comparatively wide latitude as to the sequence with which the various openings could be pierced at the different die stations, considerable experimenting was done before the present design was adopted. The arrangement finally decided upon is as follows:

The first die station pierces only a single pilot hole in the center of



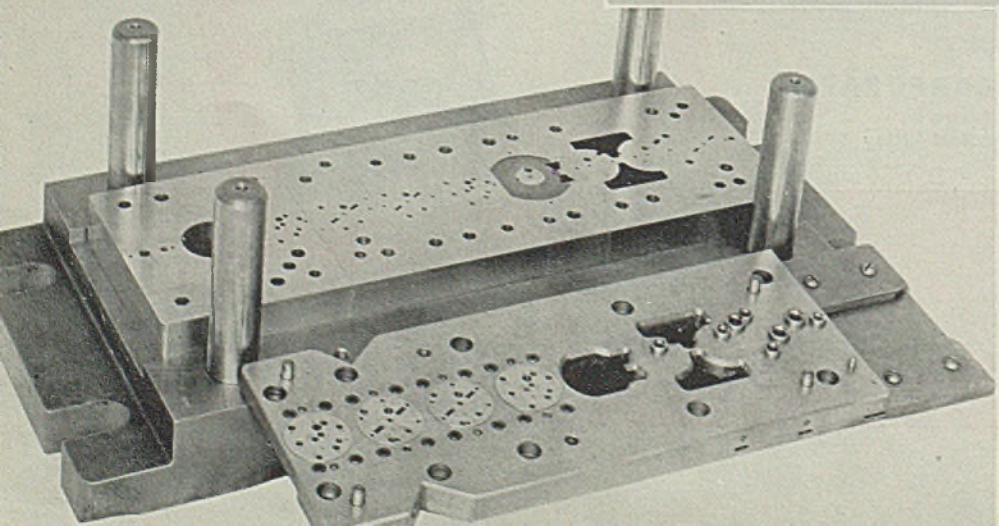


Fig. 2. (Left)—Ten station progressive die and stripper: Four round inserts are fitted in left hand of stripper, held securely in place by screws and dowels

Fig. 3. (Above)—Punches and punch holders: All holes, as well as slots and outside diameter of the part, also are shaved. Diameter of the smallest hole pierced is only about 70 per cent of the stock thickness

the strip. At the second station two elongated slots and two more pilot holes are pierced. These pilot holes are used in subsequent positioning of the stock. At the third station the work is trimmed to semi-circular shape and the side slots are cut. One of these side slots actually is a complete slot at this point, but it becomes a side slot at the fourth station when the remaining half of the circular section is formed.

Next comes a flattening operation, preparatory to the piercing of nine holes at the sixth station. The two interior slots are enlarged and all openings are shaved at the next three positions, with the finished piece cut off and the outside diameter shaved at the last station. In production this progressive die turns out 1250 pieces per hour.

The die blocks are made of oil-hardening high-carbon high-chromium steel. Stripper inserts are oil-hardening clean-boring steel. Piercing and shaving punches, made of carbon tool steel drill rod, are affixed to standard oil-hardening steel punch plates. Figs. 2 and 3 show the die, stripper, punches and punch holder.

A total of 1200 man-hours is required to make the complete die. The work involves grinding approximately 100 holes in the die and in the four hardened stripper inserts. The latter occupy the sixth, seventh, eighth and ninth stations of the stripper and are held in position by four screws and two dowels inserted through a flange on the lower side of the stripper. All holes in the die and inserts must be held to location within about 0.0002-inch to insure the 0.0005-inch tolerance required of the stamped part.

Holes in the die and stripper inserts are drilled on a jig borer, the pieces are hardened and then finished on a precision jig grinder. This latter machine, developed a short time ago by the Moore company, is adapted to all types of die hole grinding but is particularly useful in handling a multiple-station die. Instead of grinding the holes in one section of the die at a time and then assembling these pieces in the die bed, the jig grinder permits all sections to be screwed and doweled into place, put on the machine and ground in one setting. Under this arrangement, the grinder is depended on entirely for location, thereby eliminating time otherwise required for checking and measuring on the bench and surface plate. This setup is illustrated in Fig. 4.

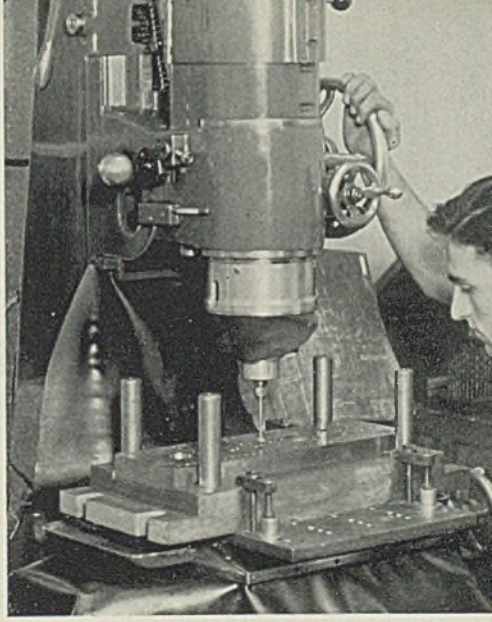


Fig. 4—Die on jig grinder for finishing holes to final dimensions: All holes are ground in one setting, the machine being depended on entirely for hole location. This machine will grind holes accurately to diameter of 1/32-inch up to 4 inches

The machine is able to grind either cylindrical or tapered holes up to 4 inches in diameter in steps of 0.0001-inch, and to a maximum depth of 3⅝ inches. It is possible to grind holes under 1/32-inch in diameter, the minimum diameter limit being entirely dependent on the skill of the operator. For holes under 3/16-inch diamond lapping is employed, wheels used for such work being made by the Moore company by charging diamond dust into steel laps. The spindle unit consists of a large sleeve mounted on two super-precision ball bearings 6½ inches in diameter and preloaded to 450 pounds. Inside this sleeve is mounted a slide way which carries the vertical slide. Slide ways are pivoted at the bottom to allow the slide to

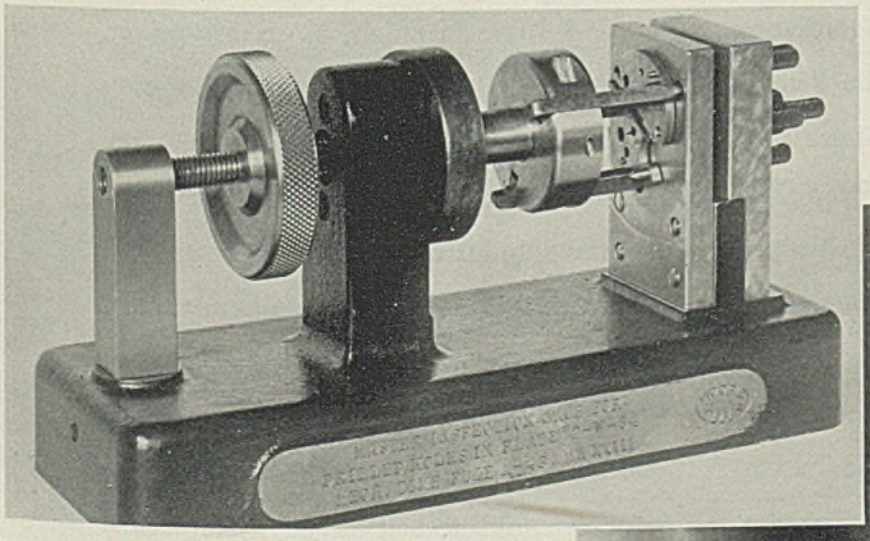


Fig. 5. (right)—Master gage clamped in position for grinding of holes: Tolerance on this work is 0.001-inch

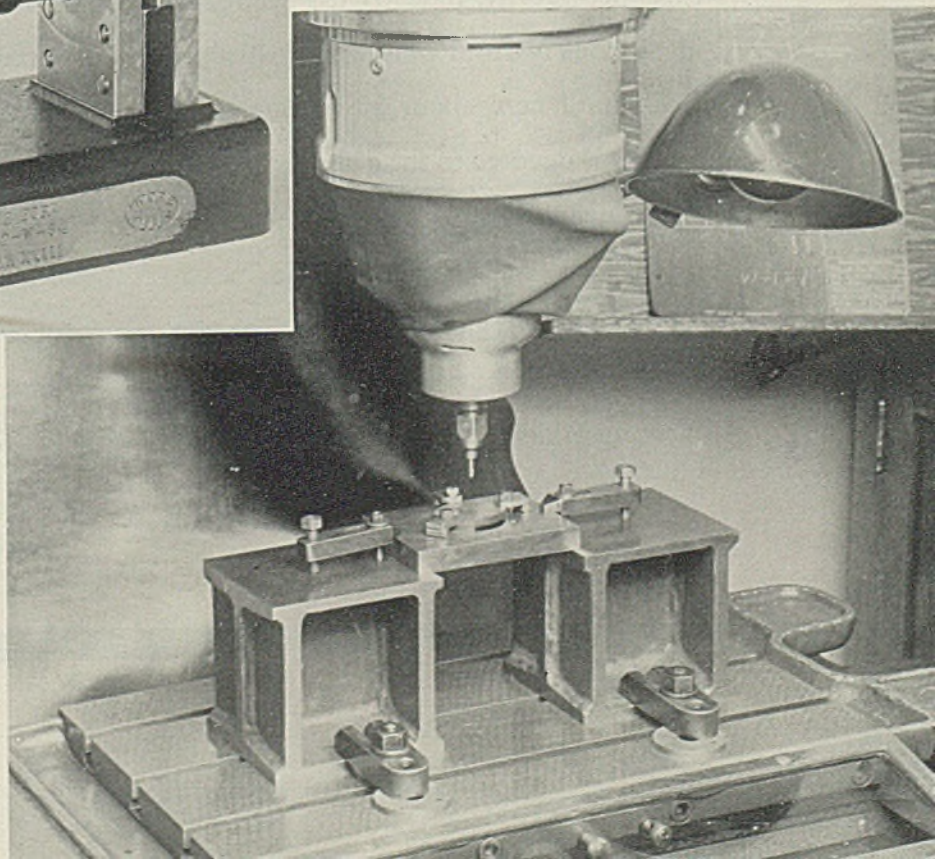


Fig. 6. (Above)—Special gage designed for rapid inspection of finished disk: Rotation of handwheel at left brings piece to position for insertion of gage plugs and withdraws it quickly after hole dimensions and locations are checked

What Is American Industry

MORE THAN TWO YEARS have passed since war broke out in Europe. More than 17 months have elapsed since President Roosevelt first called for the mobilization of American resources for defense. It is 11 months since this nation assumed the role of "arsenal for democracy."

Since the date of these commitments the United States has gone a long way toward preparing for large scale defense activity. It has developed an extensive organization directing for and executing the defense program. The army and navy have been expanded greatly. Industry has been shifting gradually from peacetime to defense work until now about 20 percent of its activity is devoted to the defense program.

But everything we have gone through thus far may be considered preliminary to the real effort which lies ahead. The confusion, delays, shortages, bottlenecks, conflicts, mistakes and petty annoyances which have characterized the shifts from a peacetime to an emergency economy are merely the birth pains of a great undertaking.

The *real* defense effort—the honest-to-goodness, all-out program—will be born sometime in the next few months.

★ ★ ★

What will American industry need most to participate to the utmost of efficiency in this effort?

Is it more materials, more man-power, more machines and equipment, better management, better co-ordination, more realistic leadership? Each of these is important. Industry needs the most and the best of all of these things. But even more, it needs one thing that is seldom mentioned in connection with defense.

It needs light. It needs the light of facts for its guidance. It needs more factual information about the specifications of the job ahead.

Greatest Need Today? . . . .

As the editors of a great industrial publication it is our duty to help provide the light to show the way—the facts to outline the dimensions of the job. Thus far our task has been made difficult by the confusion in planning the defense program, which has been developed by the time-honored method of trial and error. Only now are the dim outlines of objectives beginning to take form.

From now on it will be easier to light the way—easier to interpret Washington's plans in terms of industrial activity—easier to picture the exact share of the big job that will fall upon the shoulders of producers, fabricators, manufacturers, distributors, equipment makers and supply houses.

The developments from day to day which are shaping the specifications of your job are being reported to you each week in STEEL. These reports enable you to find your place in the defense picture as plans for the big drive unfold.

However, it is desirable to get a broad perspective of the defense program—a long-range interpretive view—to augment and supplement the detail of current reports. The 1942 Yearbook Issue of STEEL, to be out January 5, 1942, will provide this perspective. It will furnish a background of understanding against which week-to-week developments will fit and make sense.

The Yearbook issue will constitute "must" reading for those who will carry the brunt of the metalworking industry's contribution to the new-born defense program.

E. L. Shaner

Editor-in-Chief, STEEL

1942 YEARBOOK OF INDUSTRY ISSUE

January 5, 1942

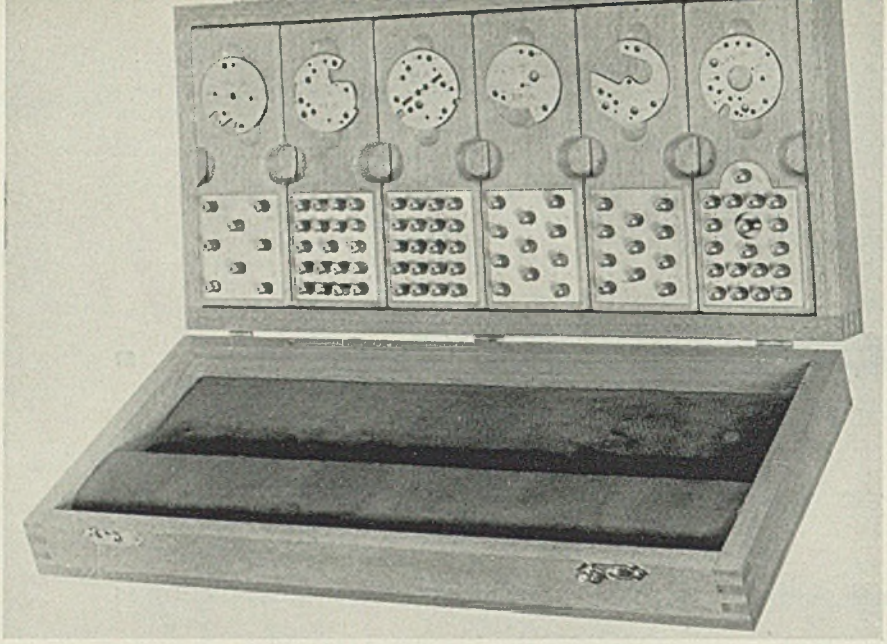


Fig. 7—Master gages used to check accuracy of inspection gages used in production work

swing either way up to 1½ degrees. Available speed of the air-driven grinding tool ranges up to 60,000 revolutions per minute, while the spindle speed may be varied between 50 and 150 revolutions per minute. Table range is 14¼ x 9¼ inches.

To eliminate errors which might be introduced by temperature variations, the Moore company conducts its precision grinding in an air-conditioned room. While this insures that the work is maintained at a constant temperature, care also is taken to prevent accuracy of the grinder from becoming affected through heat generated by operation of the spindle. This is accomplished by holding the spindle temperature uniform by means of an automatically-controlled heating element located in back of the spindle. Thermometer and control to regulate this element are mounted on the side of the spindle and are shown in Fig. 4.

The operator's light, shown in Fig. 5 which illustrates the arrangement for grinding holes in a master gage block, can be turned on for only brief intervals, because of the effect of the lamp's heat on the work dimensions.

A special gage has been designed for testing quickly the dimensional accuracy of the holes and slots in the finished disk. This gage, shown in Fig. 6, is mounted opposite a three-pronged clamp which holds the disk firmly in a vertical position and places it flush with the gage block when the knurled handwheel at the left is revolved. Gage plugs then are pushed forward in the block and must fit various openings of the disk. After checking, the disk is backed away easily from the plugs by a twist of the handwheel, which also causes the prongs to open and permits the disk to fall free. The plugs then are pushed back for gaging the next piece.

This arrangement facilitates inspection, because the snug fit of the plugs makes it difficult to draw the disk away by hand. The gage block is made with a tolerance on hole positions of plus or minus 0.0002-inch.

While this gage reveals the accuracy of the stamped pieces, a regular check also is made that the gage itself retains its original dimensions. This is accomplished by means of master gages, made to a tolerance of 0.0001-inch and shown in Fig. 7. These gages will give the reader a general idea of the shape of the other brass disks which comprise the fuze assembly. The third one from the right is the piece discussed here. Note that six additional small holes are added after the stamping operation. These are drilled on a special machine.

Metal Compound Repairs Damaged Tin Coatings

■ A new protective metal coating compound for making repairs to damaged tin coatings is announced by American Solder & Flux Co., Trenton avenue and Norris street, Philadelphia. Known as Amco metallic coating powder, brand K, it has the appearance of tin and matches perfectly surrounding hot dipped tin coating.

The material is intended for use wherever an original tin coating has been damaged in handling, worn away through use or burned away in a welding operation. Since the melting point of the coating is lower than that of tin, the original coating is not melted or disturbed in any way by the application. The coating on the repaired areas joins with the undamaged surrounding areas of tin, forming a continuous and protective surface.

The development is completely rust resistant and will protect underlying iron or steel to the same extent as hot dipped zinc coating of the same thickness. This is due to the fact that when in contact with iron or steel in a corrosive medium it is electro-positive and therefore affords protection against rust and corrosion. The material is reported to be quite satisfactory for use on those surfaces of food containers which do not come into direct contact with the food itself.

Cartridge Case Stains Removed by Chemical

■ Ugly red cuprous oxide stains and black smut frequently left on the surface of the brass after heat treating operations used in cartridge case manufacture can now be removed by a common and well-known chemical, ferric sulfate, according to J. J. Healy Jr., development director, Merrimac Division, Monsanto Chemical Co., Everett, Mass.

Complete removal of stain, he reports, is achieved by using a pickle solution containing ferric sulfate in addition to the usual acid.

"Sulfuric acid alone will remove the more common black cupric oxide", he said, "but it is not effective against smut or red stain, with the result that these blights have been a frequent cause of trouble in the pickle room.

"To assure complete elimination of stain, ferric sulfate should be used in each pickling operation, starting with the first anneal. If any red cuprous oxide or black smut remains after pickling and is subsequently drawn into the piece, it becomes difficult to remove."

He reports that use of ferric sulfate in pickling cartridge cases not only improves final finish but produces a finish more satisfactory for intermediate draws.

New Publication Serves Metals Executives

■ A new bi-monthly publication for metals executives, Ajax Metelectric Progress, is announced by Ajax Metal Co., Philadelphia.

Described by the president of the company as "an act of communication in fields where practical applications tread so closely on research as to be news rather than theory," the magazine will carry no advertising. It will be edited by Howard Linn Edsall, formerly of the staff of the *Philadelphia Public Ledger*.

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MACHINE:
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MATERIAL:
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CUTTING SPEED:
103 S.F.P.M.

CUTTING LUBRICANT:
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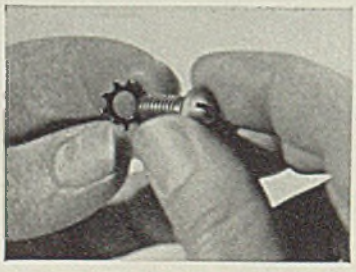

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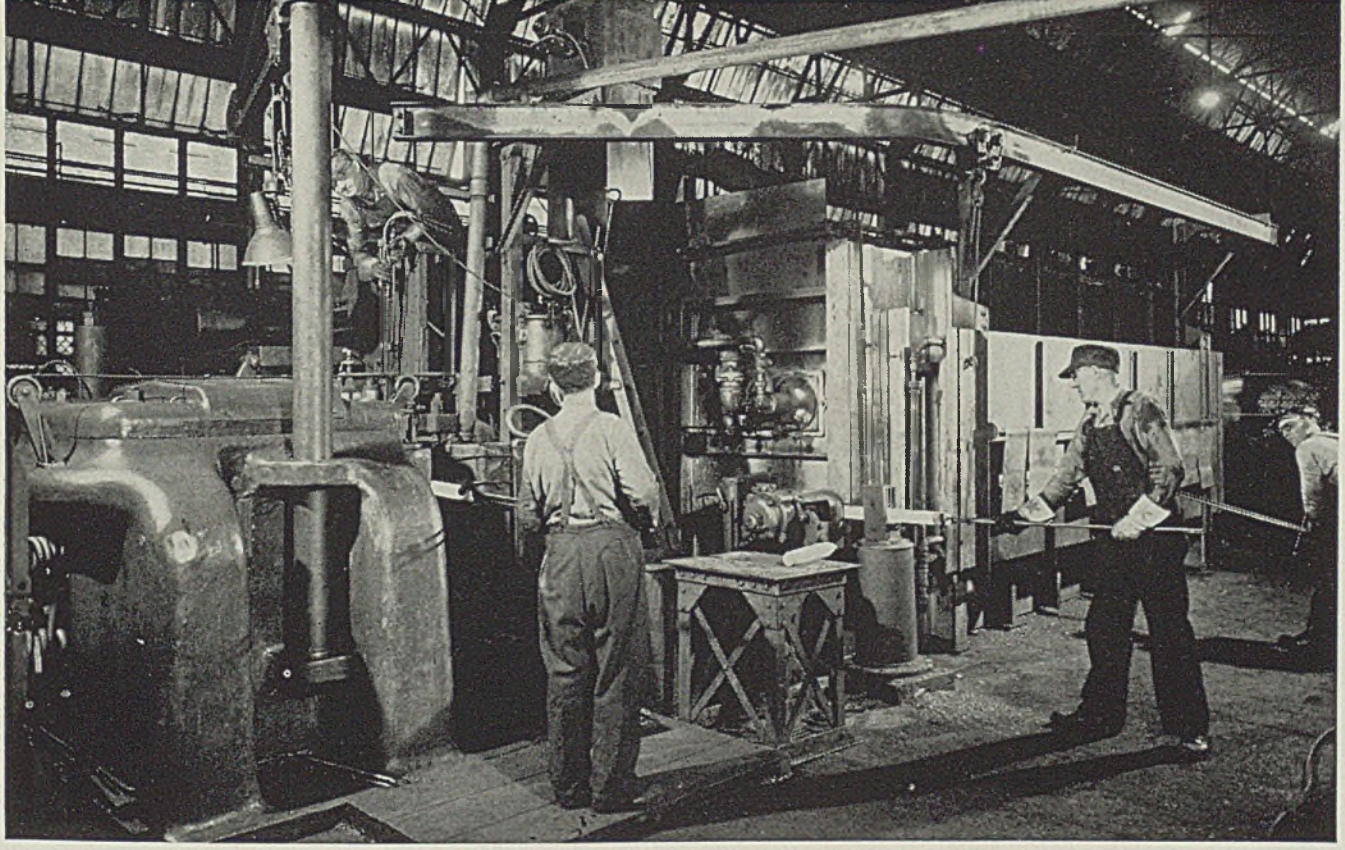


Fig. 1—From right to left, heating solid bars, removing scale, forging in upsetter

75-MILLIMETER SHELL LINE

features

MECHANICAL MATERIALS HANDLING

. . . . . in intricate conveyor system that speeds flow of shell bodies through forging, machining, testing and painting operations; to and through special storage conveyor-elevator setup

■ TO OBTAIN maximum production from equipment and to assure a continuous flow of work through the various operations, International Harvester Co., Milwaukee, employs a carefully worked out system of mechanical handling to supplement the hand operations incident to working several of the machines.

A typical example of how mechanical handling facilities are used to aid hand operation is shown in Fig. 1 where the forging operation is begun. Steel rods are heated in the slot-type furnace shown at the right in Fig. 1, work being inserted and removed through slots in the side of the furnace. The slots are covered by sheets hung on a rod in front of the opening to prevent drafts and to keep the heating at as high an efficiency as possible. The sheets are slid sidewise or overlapped to permit access to the work in any portion of the furnace.

An overhead monorail is provided which affords a support for the operator's tongs at the proper working height while he removes work from the furnace slot opening and inserts the heated bar in the special cleaning setup which the operator in the center, Fig. 1, is shown working. The heated bar is fed to the motor-driven wire brush or grinding wheel through a spring-positioned device as shown.

The cleaned and heated bar then is placed on the nearby stand where the operator working the upsetting machine can reach it or else the tongs and bar suspended from the monorail are passed on to the upsetter. In these operations, the overhead monorail relieves the workmen of the need for supporting the weight of the bar and tongs.

The heated and cleaned bar is passed consecutively between five different sets of dies in the upsetting machine to complete the rough forging. The operator at the upper left hand in Fig. 1 operates a device which places the rough forging on a conveyor that carries it to the next operation, which is shot blasting.

In the shot blast machine, both interior and exterior of the rough forged shell are cleaned thoroughly, after which the unit is ready for its first inspection. Here outside dimensions are checked and the shell placed on a conveyor which car-

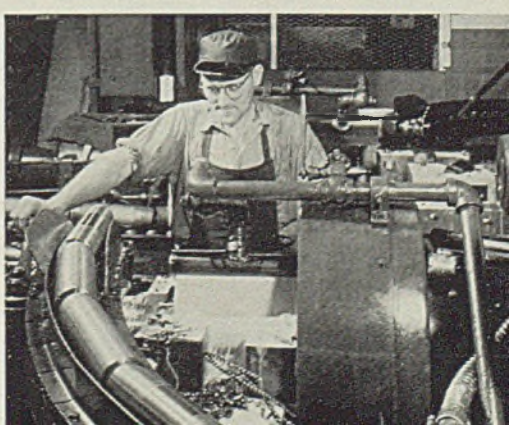
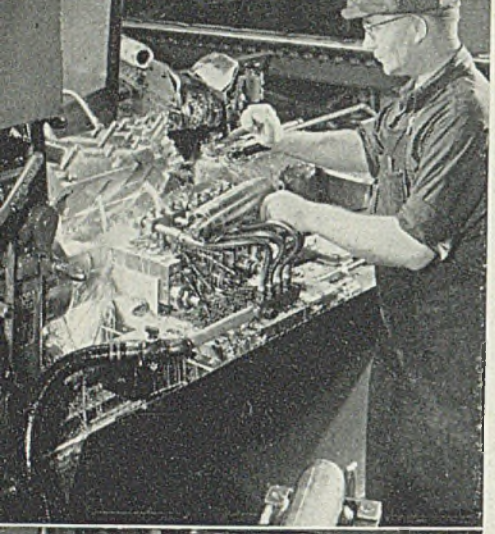
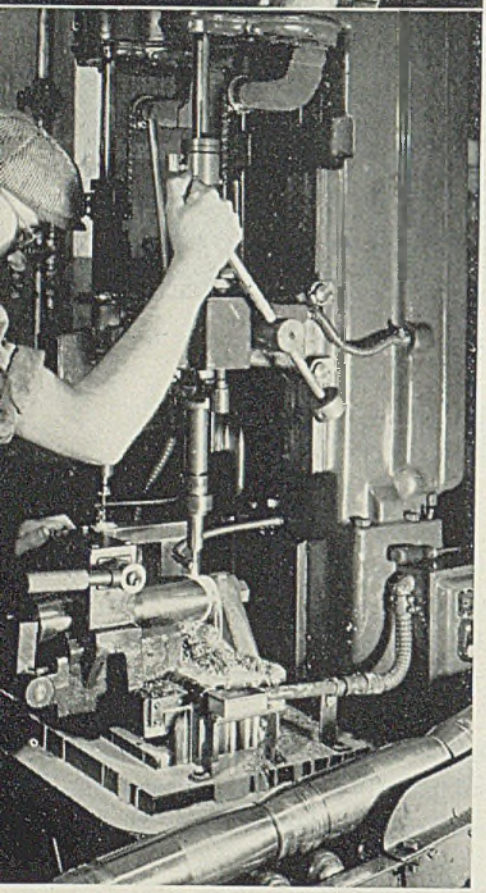


Fig. 2—First rough turning to machine exterior. Note roller conveyors





ries it to the shell machining department.

First operation in the machining department is centering. A rough forging is placed on an expanding mandrel and a center bored in at the closed end, providing a point from which all succeeding operations on the shell are dependent.

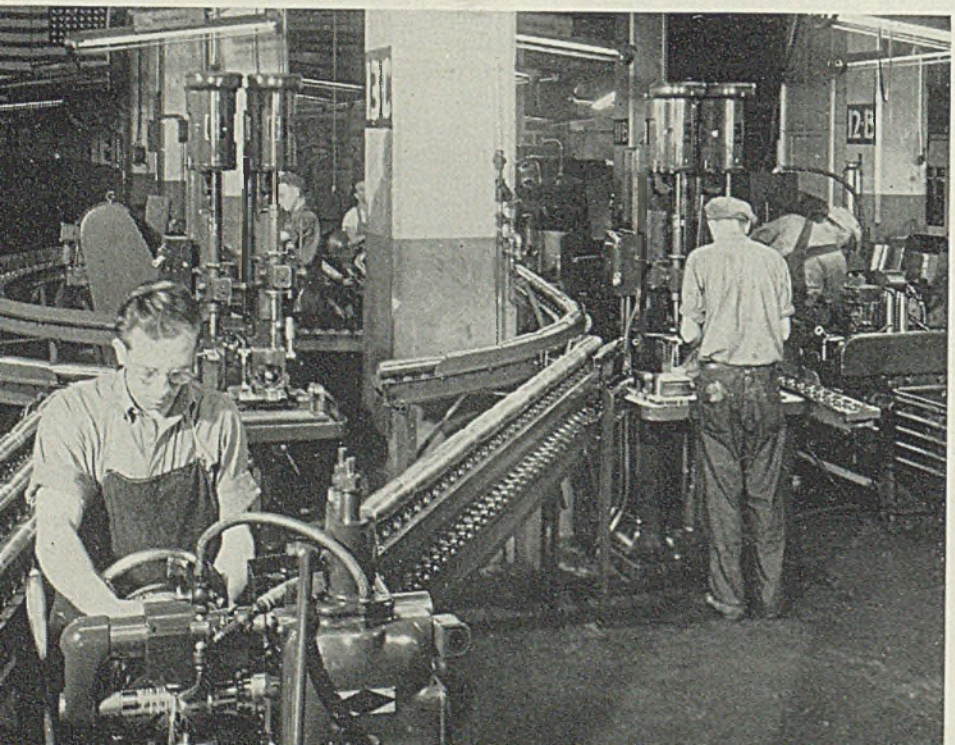
In Fig. 2 is shown the station in which the shell receives the first rough turning to machine the exterior. Here a Gisholt Simplimatic automatic lathe rough finishes the outside and base of the shell in a single operation. Note the roller conveyors for feeding work to and speeding it away from the point of operation.

Gravity roller conveyors are employed throughout the plant in such a manner that the operator from one machine feeds the work to the high point of the roller conveyor carrying the work to the next station. Wherever possible the conveyors are set so the work arrives approximately at work level, thus facilitating the handling operations. Too, since the machines are placed in fairly close relation to each other in proper sequence, none of the conveyors need be very long so it is unnecessary to provide much drop to get the proper flow on the gravity conveyors. Thus the operator needs to lift the work only a short distance to place it on the upper end of the conveyor feeding the next station in the line. Note in Fig. 2 the upper end of one of these feed conveyors to the right of the operator.

Fig. 3. (Top)—Tolerances of 0.0035 are required on the outside finishing operations here

Fig. 4. (Center)—Drilling and tapping hole to lock fuze plug into shell nose, with sliding fixture

Fig. 5. (Below)—A portion of the complicated conveyor layout in machining department. Note the special 3-line conveyor at left, 2-line vertical unit at right



After rough machining, the shell is placed in a vertical position, open end up, in a crank press while the open end is closed in slightly, "nosing" the shell. Fig. 3 shows a Fay automatic lathe which gives the shell the final turning to establish the outside diameter. Finished tolerances of 0.0035-inch are required on this operation. Note here too the gravity roller conveyors carrying the work to and away from the station. The end of the conveyor delivering the work to this machine can be seen at the extreme lower center, while the conveyor feeding the next operation is seen at the upper center of the illustration just beyond the operator's hand. It will be noticed that the shell is delivered practically at work level, yet the operator needs to lift the shell only a few inches to put it on the conveyor feeding the next machine.

Shell Next Grooved

At the next station the base of the shell is faced to the proper length and is grooved. In the same operation, the band groove is turned and crimped.

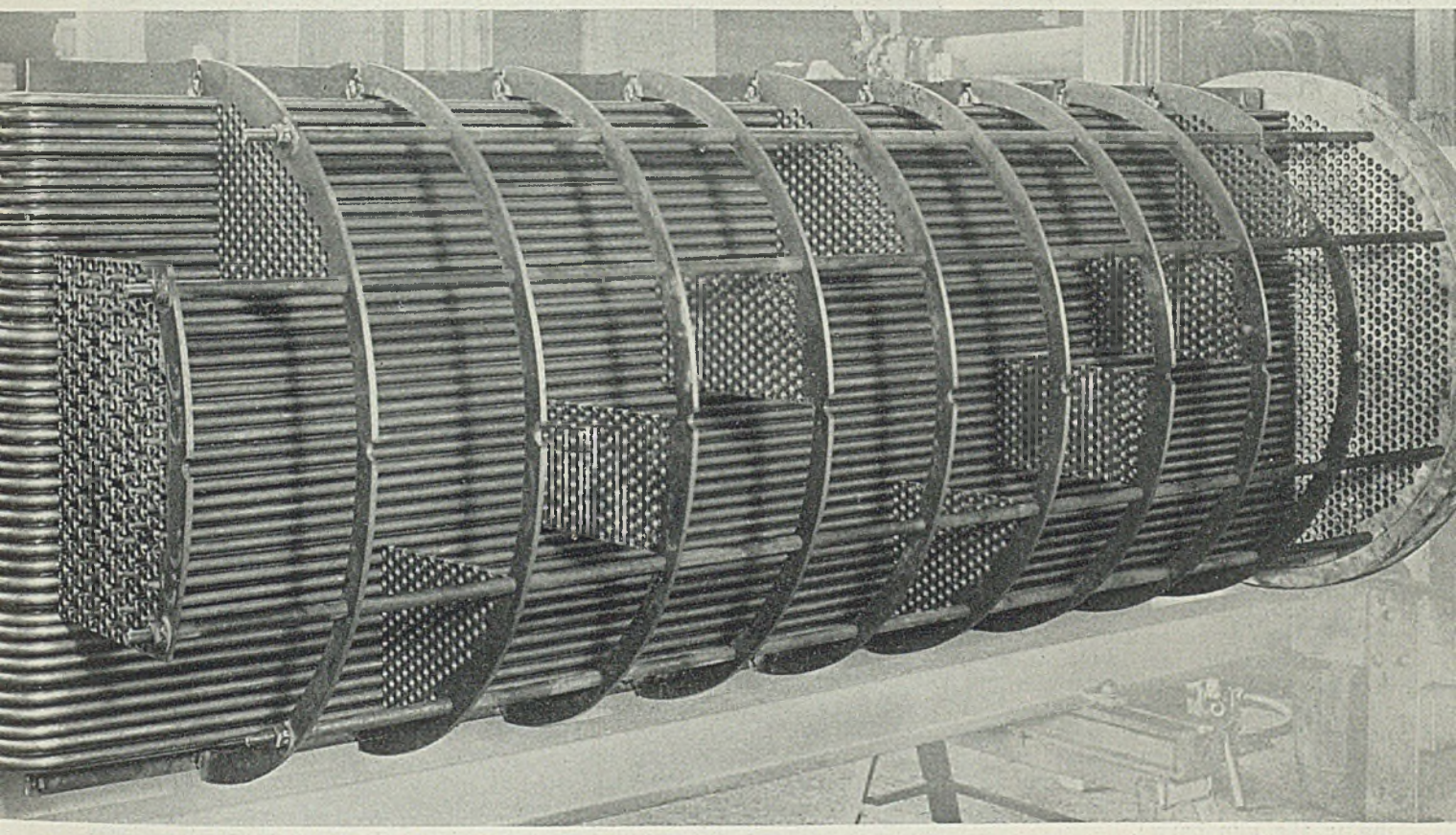
Fig. 4 shows a setup for drilling and tapping the holes used to lock the fuze plugs in the nose of the shell. The work is clamped in a special sliding fixture which first is run under the drill and then shifted under the tapping head—the operation shown in Fig. 4. Note the section of roller conveyor within easy reach of the operator.

Fig. 5 shows some of the various conveyor setups utilized in the shell machining department to facilitate rapid movement of the shell bodies from station to station. The operator in the foreground is running a Sundstrand machine which puts four notches in the end of the shell. Just to the left of this operator is seen a 3-line conveyor.

Such conveyor units are utilized to provide a "float" or stock of work between stations. Note in the center foreground, Fig. 5, a double vertical roller gravity conveyor having two levels on which to store or transport work. The reason, of course, for storing work between stations is that some operations can be performed slightly faster than others, thus making it desirable to have a stock to carry the surplus. Also certain machines operate at two to six times the output of others handling different portions of the work, so often one machine can take care of the output of two or more other machines handling the previous operation. See the operation analysis further along in this article.

It's not the first cost

—it's the Upcreep!



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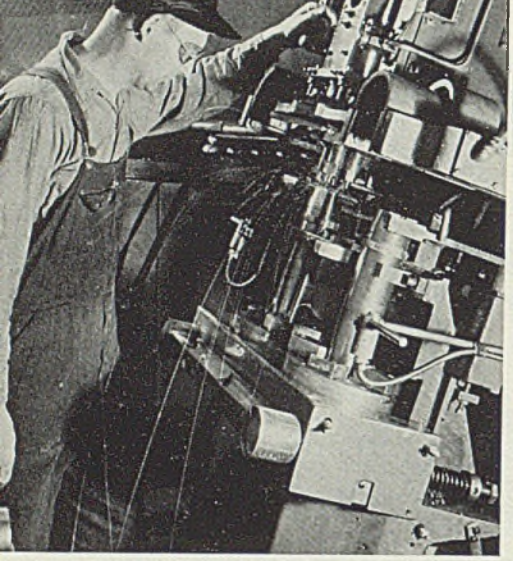


Fig. 6—Cover plates are welded to shell base. Two-station fixture slides to speed work

Note also the guards on those portions of the roller conveyors rounding curves. These, of course, prevent the pressure from shell back up the conveyor line from pushing unit on the curve off the conveyor.

Fig. 6 shows operation of welding a cover plate to the base of the shell. Here a series of overlapping spot welds is employed as an added measure to be certain the base is sealed so that explosion of the propelling charge will not be conducted to the explosive charge of the shell by any crack or fissure in the base of the shell. Of course there is only a very small chance that any such crack or fissure might possibly occur, yet even this small risk is ruled out by the sheet steel seal welded in place, thus preventing any possibility of the shell's exploding in the gun barrel.

Note here, too, the double roller conveyors delivering work to the station at approximately work level with the conveyor carrying the work away from the station at a somewhat higher level just back of the operator. The particular welding machine shown here has a special sliding fixture with two positions. This permits one station to be loaded and unloaded while the machine is welding a shell at the other position, assuring maximum output from the machine. The fixture slides to the right and to the left as each of the two stations alternately becomes the working station.

Before machining is completed, the copper alloy shell band must be pressed into place and finish machined. Then, of course, there are innumerable inspection operations as well as other machining operation not shown. The completely machined shell, for instance, is tested in the ingenious Electrolimit automatic gage which checks the outside dimensions of the shell at seven different points simultaneously. Small electric lights on the gage inform the operator if any dimension is beyond the limits and indicates whether it is too large or too small.

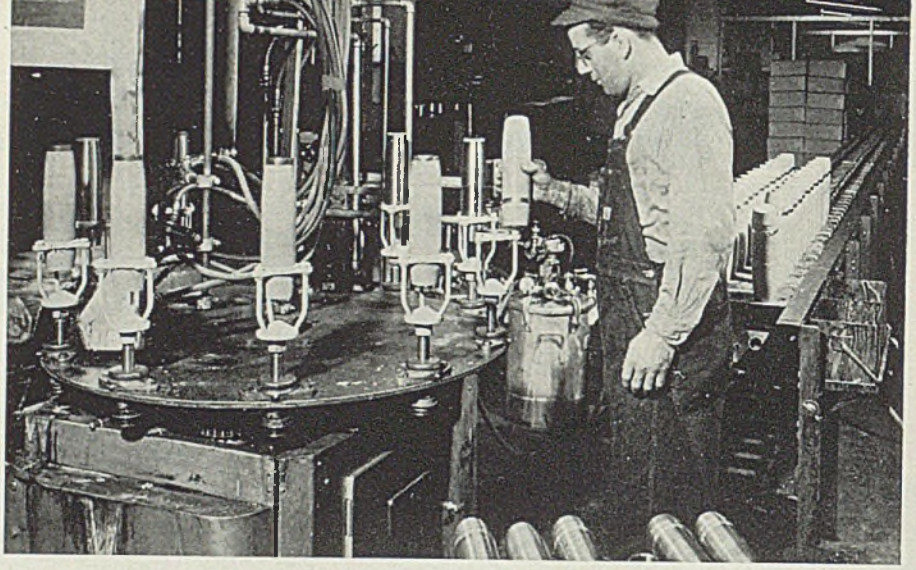


Fig. 7—High speed setup for painting shell interiors and exteriors. Quick drying finish allows placement of shell on drying line at right. Clamp covers shell band during painting

Then before painting, the drilled and tapped hole used to lock the fuze in place in the nose is filled with a set screw. Also certain other portions of the shell may be covered or masked off. As shown in Fig. 7, the exterior of the shell is painted in an automatic machine which sprays paint on the outside of the shell bodies as they revolve on a turntable. At the same time, the shell interior receives a spray of lacquer. The narrow clamps which hold the shell in place cover the copper band, thus preventing paint from being deposited on that portion of the shell. In Fig. 7 the operator is removing a painted shell and will immediately replace it with an unpainted unit. The painted shell bodies are placed over short sections of vertical tubing welded to flat plates of the conveyor shown at the right in Fig. 7.

As they pass down this conveyor, the shell again receives a number of inspections. Fig. 8 shows the other end of this conveyor and a number of inspectors working on the line. On a table immediately adjoining the end of this conveyor, the finished shell bodies are packed in cartons, six to a carton. Each shell is placed in a separate compartment within the carton to avoid jostling in shipping.

Fig. 8 also shows a portion of an interesting combination conveyor and storage unit for finished shell. It consists of five roller conveyors at different levels. An automatic elevator carries the shell cartons to

(*Please turn to Page* 107)

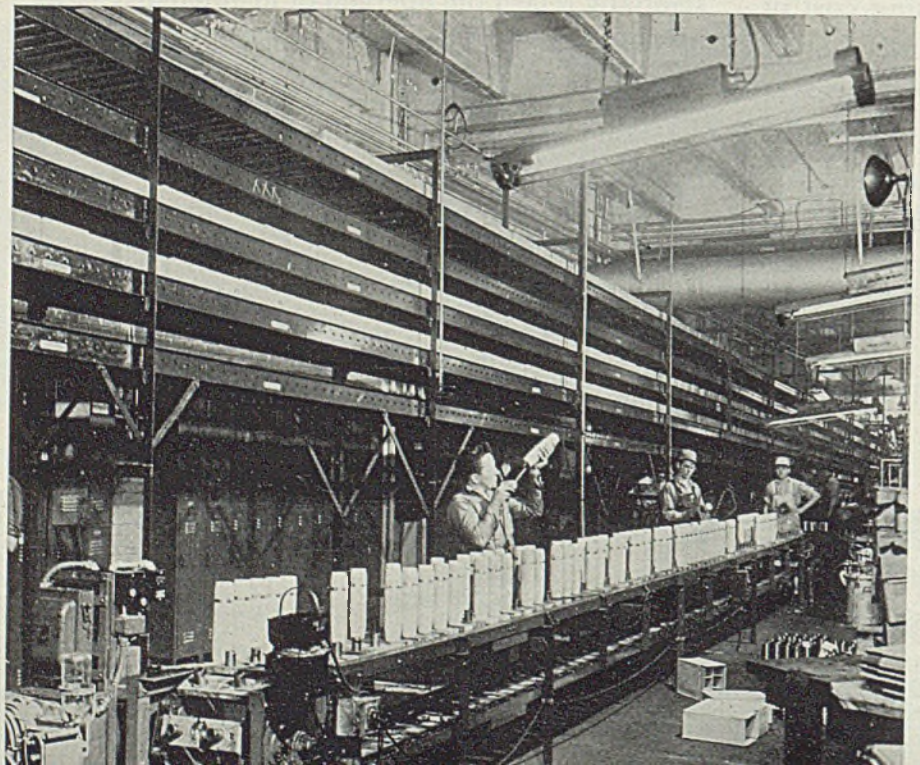
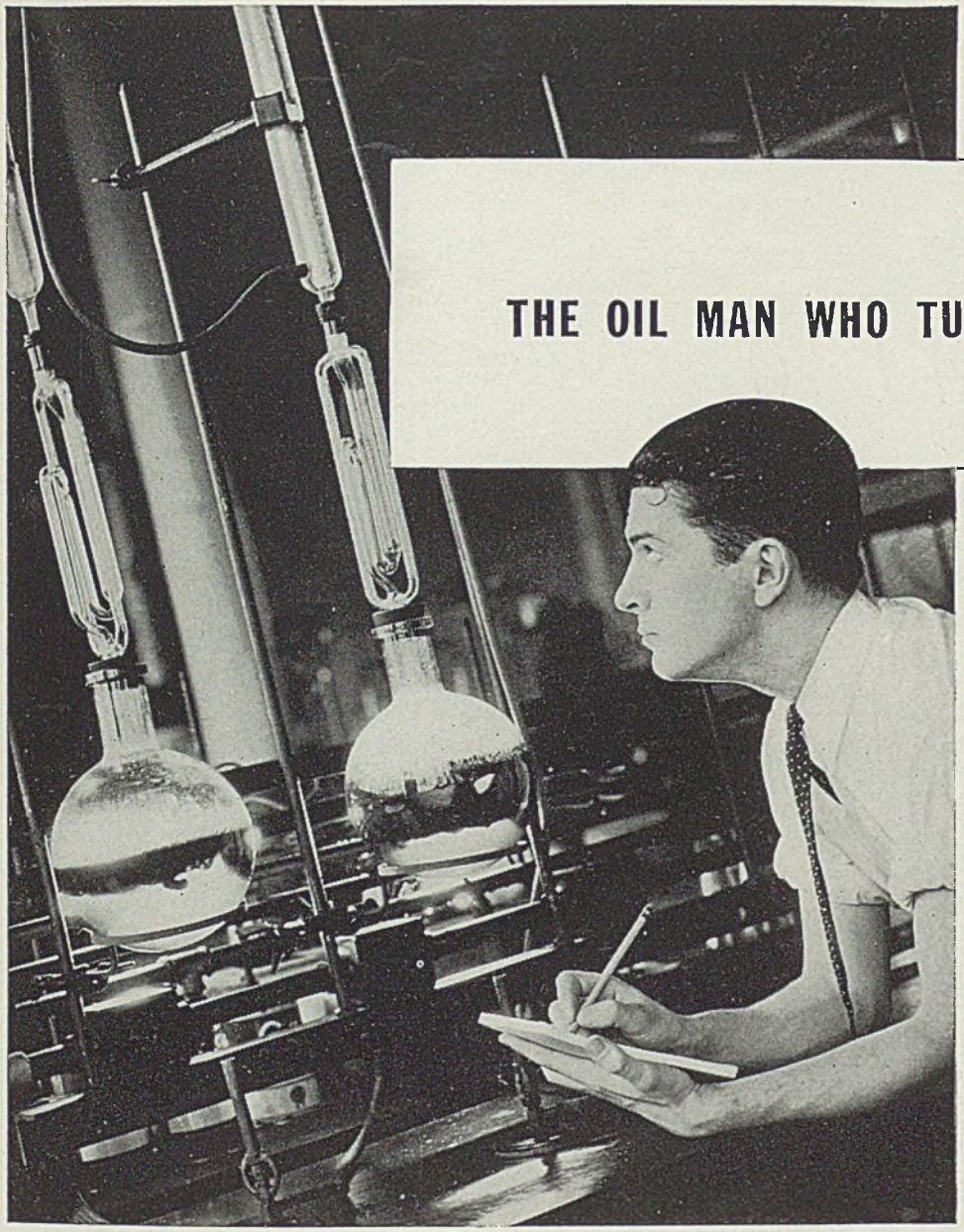


Fig. 8—As shell pass down drying line, inspectors check carefully. Upper background shows portion of unique storage elevator-conveyor system which holds cartons of completed shell on five different levels



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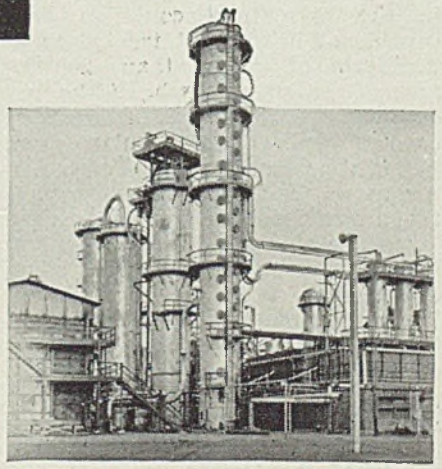

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ARC WELDING

the aircraft alloy

SAE X-4130

By HAROLD LAWRENCE
Metallurgist and
Welding Engineer

. . . . Requires a definite welding technique. Here metallurgy, type of welds, recommended procedures with operator and equipment requirements, and a means of preventing crater formation are presented

■ ALTHOUGH many airplane parts are light-weight nonferrous metals, many of the backbone or structural elements of the machine are made of steel. The landing gear and engine mounts and other parts subjected to either impact or vibrational stresses are likewise made of steel.

In the early days low-carbon steel with a minimum tensile strength of 55,000 pounds per square inch proved entirely satisfactory. But the strength-weight ratio left much to be desired. A consideration of alloy steels results in adoption of a chromium-molybdenum alloy possessing a minimum tensile strength of 90,000 pounds per square inch in the normalized condition and capable of being heat treated to a strength of more than 200,000 pounds per square inch. Although other alloys are used in airplane construction, this particular steel (known as SAE X-4130) accounts for more than 90 per cent of all the aircraft tubing used today.

Metallurgy: SAE X-4130 differs from the straight automotive steel of the same type in that it has a lower manganese content, which is beneficial in certain fabricating operations. Its normal chemical composition is given in Table I. Carbon may run as low as 0.25 per cent provided that the physical requirements of the United States Army and Navy specifications are met.

TABLE I—Chemical Composition of SAE X 4130 Steel, Per Cent

Carbon	0.27 to 0.33
Manganese	0.40 to 0.60
Phosphorus	0.040 max.
Sulphur	0.045 max.
Chromium	0.80 to 1.10
Molybdenum	0.15 to 0.25

Furthermore, every effort is made to keep both the phosphorus and sulphur as low as possible for greater ease of welding.

To pronounce SAE X-4130 steel a good welding steel is to be almost guilty of heresy. In the first place, the steel is definitely air hardening—an extremely important factor in attaining the desired physical properties as a result of normalizing.

Secondly, the steel is used in the heat treated condition and is alloyed to bring about high strength in this state. The very alloys that contribute so much to the excellent heat treating response of the steel are the same ones that might prove dangerous in welding.

Lastly, the material is hot short at a white heat and cannot withstand any stress in this condition. That all of these factors have been met and successfully eliminated as hazards in welding is a definite tribute to the pioneering spirit of the metallurgists and welding engineers asociated with both the aircraft and the welding industries.

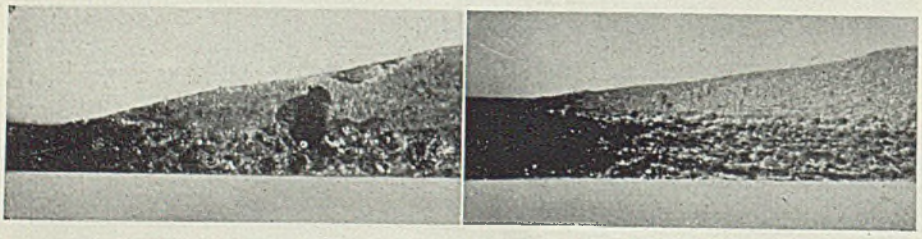


Fig. 5—Cross sections through SAE X-4130 steel arc welded bead ends made with and without the crater eliminator: Note the large void in view at left made without eliminator

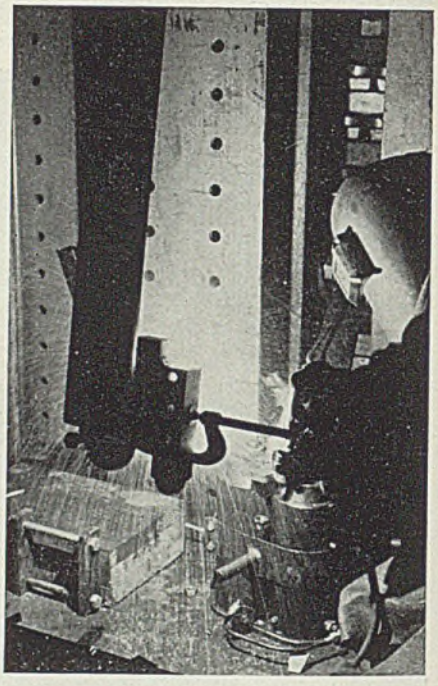
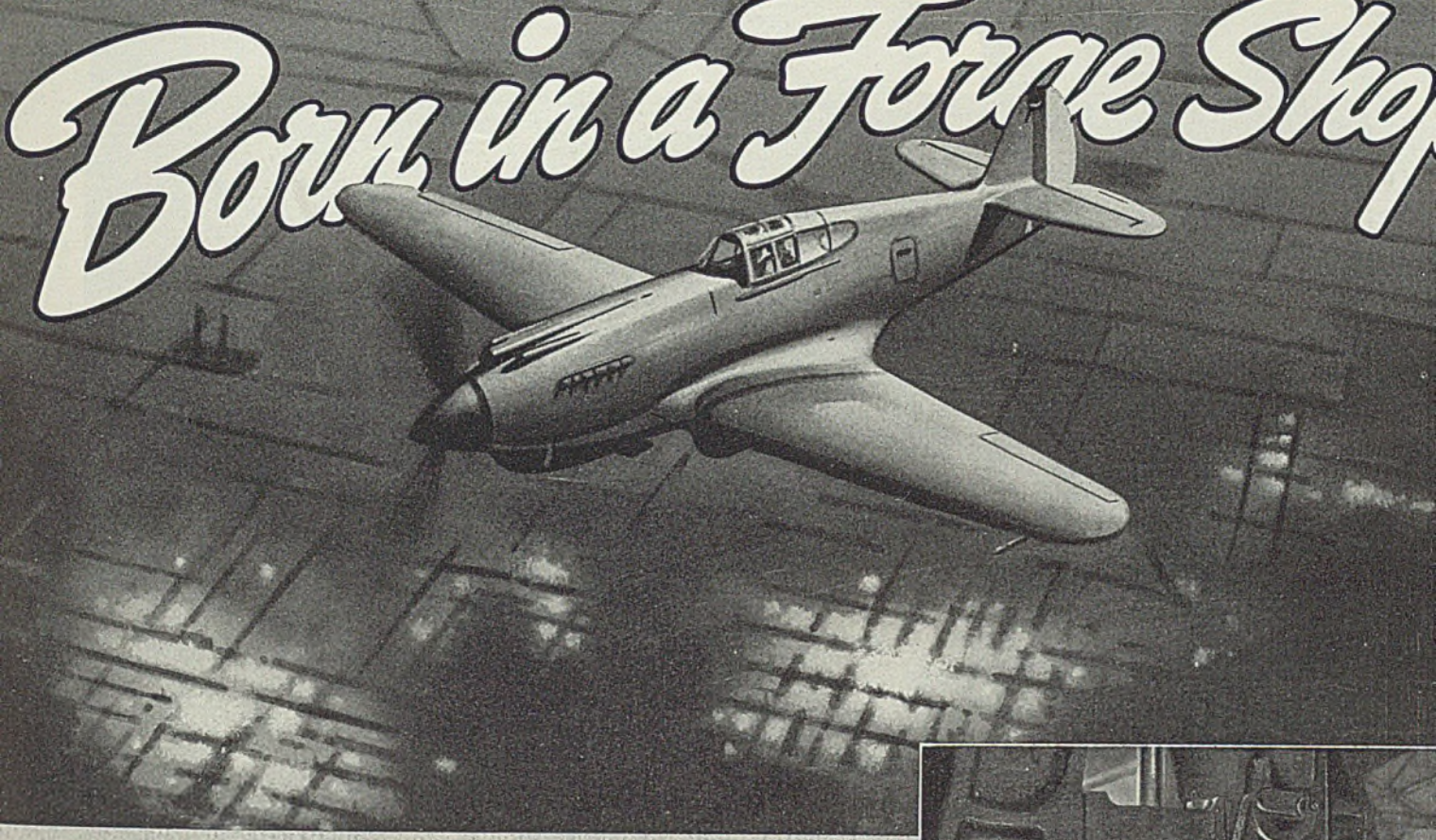


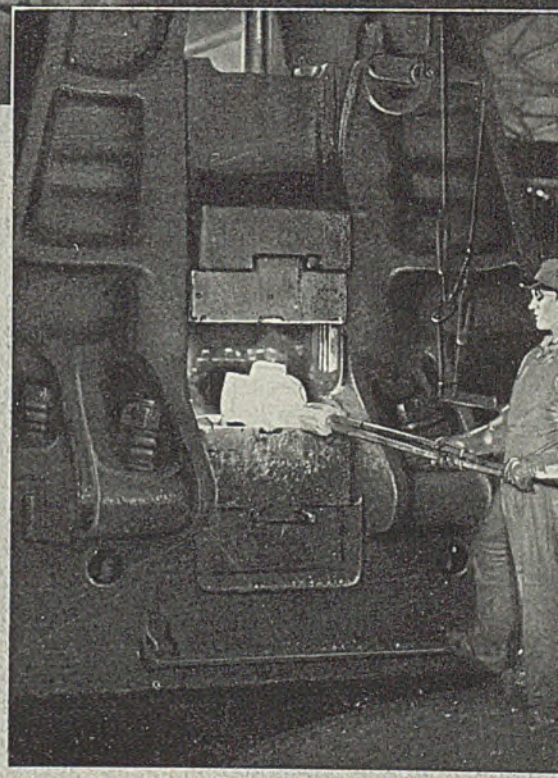
Fig. 3—Arc welding is being used more and more at plant of North American Aviation Inc., Inglewood, Calif., as this huge factory steps up production for national defense

All materials that go into an airplane obviously must be of the highest quality. Therefore, every steel mill practice from melting to final inspection is carried out with the utmost care. Almost all SAE X-4130 is produced in the electric furnace and but a limited tonnage in the open hearth. In either, melting practices are controlled precisely to bring about just the right degree of deoxidation, for the deoxidation controls the finished grain size, which must be No. 5 or finer on the McQuaid-Ehn scale.

In addition to tubing, SAE X-4130 is furnished as bars and sheets. Bars are generally purchased in the heat-treated state where they develop a tensile strength of 125,000

Born in a Forge Shop





PURSUIT plane, combat plane, bomber, or peaceful airliner, all have their auspicious beginnings in the fire and thud of the powerful drop hammer. From the massive propeller hub, crankshaft and crankcase forgings to the tiny clevis forgings, wherever utmost strength and dependability with minimum weight are vital, there you will find the drop forging . . . more than likely produced on a Chambersburg hammer . . .

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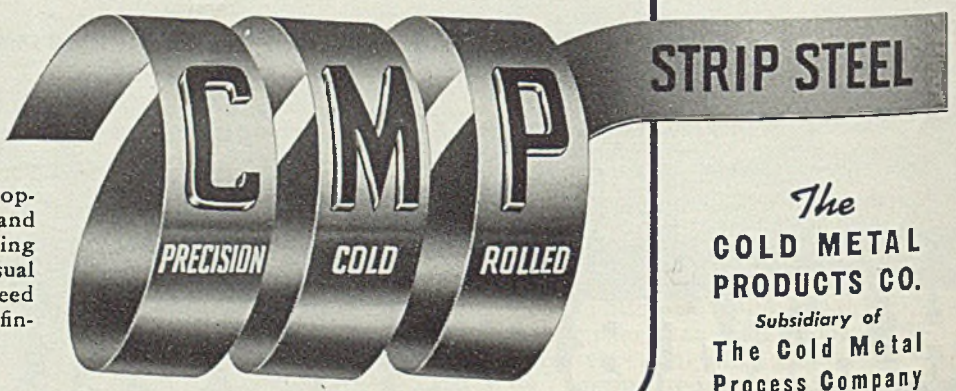

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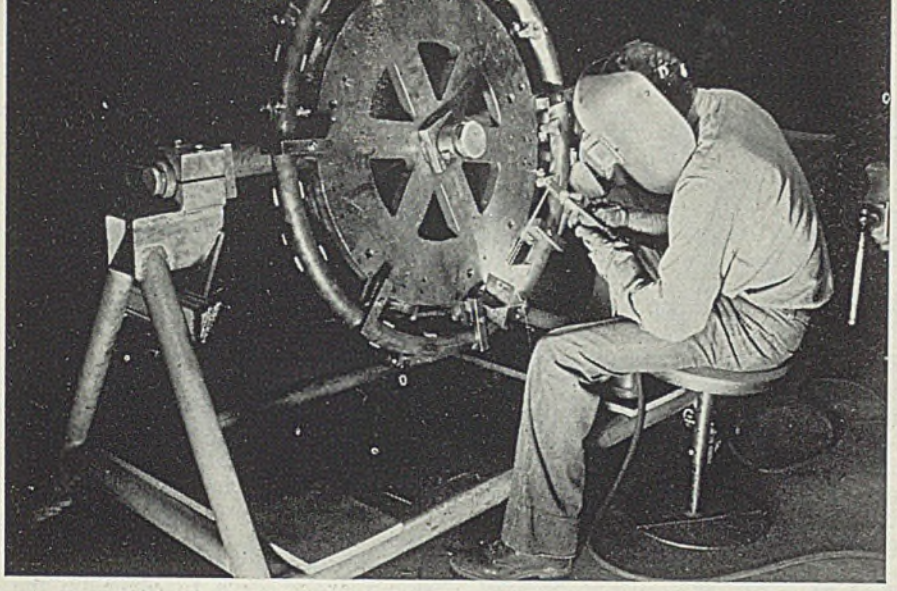


Fig. 2—Arc welding engine mount forgings at Douglas. Note how welding fixture is pivoted on two axes so welder can move work to most convenient position. Photo from **Aircraft Tubing Data.** Summerill Tubing Co., Bridgeport, Pa.

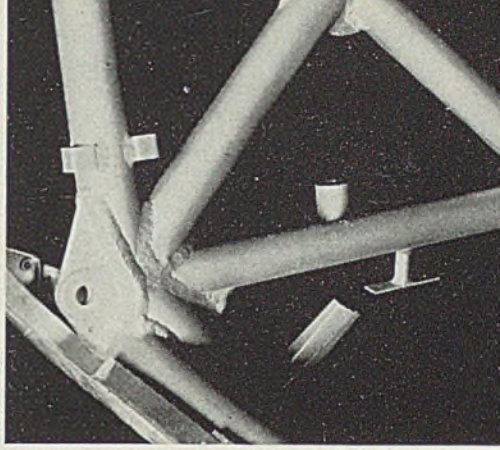


Fig. 4—Typical example of joint designs and excellent welding at Vought-Sikorsky. **Aircraft Tubing Data,** by Summerill Tubing Co., Bridgeport, Pa.

pounds per square inch minimum along with an elongation in 2 inches of 18.0 per cent minimum. Sheets are delivered in the normalized condition where they show a minimum strength of 90,000 pounds per square inch with the elongation exceeding 20.0 per cent in 2 inches for sheets thicker than 3/16-inch. Tubing is sold in both the normalized and heat-treated forms in accordance with the physical properties detailed in Table II. The figures given in Table II conform to the requirements of the Air Corps Specification .57-180-2D. Most tubing is supplied in the normalized state with the heat treatment, where desired, being accomplished after welding.

Welding of SAE X-4130 steel is being done by processes that include arc, oxyacetylene, butt flash, atomic hydrogen and spot welding. There has been a recent increase in arc welding due primarily to new equipment and techniques. Oxyacetylene welding has been for many years the standby in aircraft welding work. Butt flash welding is coming to the fore as the aircraft industry expands to where mass production justifies its use. Atomic hydrogen welding has been employed for its well recognized ability to deposit sound metal while retaining the advantage of a separate heat source which is common to oxyacetylene welding as well. The use of spot welding is limited by the inherent properties of the process and the air hardening tendencies of the alloy.

Each large industry that relies upon welding for fabrication of metals has certain joints that are peculiar to it. In this regard the aircraft industry is no exception. Primarily the differences, other than the fact that extremely thin metals are encountered, lie in the combination of thin walled tubing with gussets of much heavier gage.

In addition to the butt and T-welds that are common to piping as well as airplane construction, there are the scarf, fish mouth, T with gussets, lattice, and lattice with plate joints. Each type has an allowable unit stress as indicated in Fig. 1. One important modification should be noted: Where joints are heat treated after welding, the allowable stress may be as high as 80 per cent of that of the base metal in the heat-treated state. The data in Fig. 1 are for joints that have been welded after the material has been heat treated.

Arc Welding: An understandable reason for the reticence of welding engineers with regard to arc welding for SAE X-4130 steel is found in the metallurgy of heat treatment. The formation of brittle, heat affected zones is a function of cooling rates. With the arc process, cooling rates are much higher than with the oxyacetylene process. Therefore the gas process provides a factor of safety through slower rates of cooling. But experimental figures have shown that both processes are remarkably able to deposit weld metal without introducing an unwanted zone of hard, brittle steel. In fact, the faster cooling rate of the arc process does not bring about the slight annealing effect observed where a greater heat imput is found over a wider area.

Before getting too far into the subject of aircraft welding by the arc process it must be remembered that special equipment and technique are the order of the day. Arc welding aircraft steels successfully in sections as thin as 0.016-inch requires special tools and well developed skills.

Naturally, arc welding light sections calls for low current values and small electrodes. In extreme cases, the current may fall to a value as low as 3 amperes. Here

Type of Weld	Allowable Unit Stress Base Metal P.S.I.	Type of Weld	Allowable Unit Stress Base Metal P.S.I.
Butt	80,000	Tee with Gussets	75,000
Scarf	90,000		
Fish Mouth	90,000	Lattice	60,000
Tee	55,000	Lattice with Plate	75,000

P - shows direction of stress

Fig. 1—Allowable stresses in welded members made from SAE X-4130 tubes, courtesy J. B. Johnson, Welding of Aircraft Structures, **American Welding Society Journal,** September, 1936

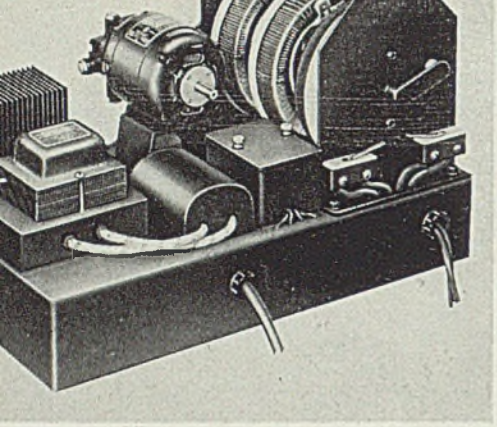


Fig. 6—Strocco crater eliminator can be applied to almost any direct current welding generator to cut field excitation at a predetermined rate by means of a motor-driven rheostat. This in turn slowly snuffs out the arc, allowing gas to be evolved from the weld before metal becomes too viscous. Made by Karl Strobel Corp., 4700 Santa Fe avenue, Los Angeles

the arc is apt to be most unstable. However, the development of special welding machines designed for direct-current welding at low amperages with a sufficiently high open circuit voltage meets the special conditions of aircraft work.

Arc stability always has been an important consideration. But in highly stressed aircraft constructions, fabricated from thin gages, arc stability becomes a factor of the greatest consequence. Should the arc go out or should the electrode stick, unsound metal will result. Therefore, the welding generator must possess ample arc stability to permit the ready deposition of welds of uniformly high quality.

Equally as important as the ability to maintain an arc once established is the capacity for speedy, almost instantaneous voltage recovery needed to insure correct striking of the arc at the will of the operator.

Amount of Spatter: One factor often overlooked when selecting a welding generator for aircraft work is the amount of spatter. Two factors influence amount of spatter—the welding generator and the welding electrode. It is surprising how much variation in spatter will be observed with the same electrode when the power supply is provided by different generators. A good generator feeding current to a proper electrode results in a fine shower of spatter that may be cleaned away easily with hand tools such as the wire brush. Slag removal, too, is facilitated by the right arc characteristics.

Arc welding of aircraft structures is almost completely restricted to direct-current processes, although alternating current equipment probably will find a place in this industry as electrodes now being used lend themselves to alternating-current welding in most cases.

Three classes of electrodes falling into two distinct groups predominate. Most work is done with mild steel electrodes of either the general-purpose direct-current or general-purpose alternating-current types. Where heat treatment to a high strength level is to follow welding, some welding engineers favor a heat-treatable alloy-steel electrode. However, since dilution of the mild steel electrodes runs quite high, their deposits respond well to heat treatment.

The most popular sizes are rods 3/32 and 1/8-inch, 1/16-inch and smaller electrodes. The two small sizes, however, account for only a small percentage of the total arc welding being performed, the smaller diameters being troublesome as regards slag removal.

The several qualities determining a good aircraft electrode include uniformity and concentricity of coating, low spatter level, high arc stability (alternating-current electrodes used on direct-current welding are quite good in this regard), ability to be strengthened by heat treatment (in those instances where heat treating is done after welding), easily controlled degree of penetration and a readily removable slag.

Eliminating Arc Craters: Voids in any welding deposit are undesirable, particularly in aircraft work. And thanks to the outstanding piece of research accomplished by F. Robert Kostoch of North American Aviation Inc., in conjunction with C. J. Gallant of the same company, a method for eliminating arc craters has been established. In addition to the structural welds themselves, each of many thousands of tack welds in a large airplane structure has a crater. And every crater provides a possible location for an unsound weld.

Arc welders are familiar with crater unsoundness and means for its elimination. In heavy weldments, the cure is simple. But in aircraft work, remedies such as slowly withdrawing the arc, backing up over the previously deposited metal and hesitating before breaking the arc in a sideways motion merely serve to cover up the surface and do not cure deep seated gas pockets. But what is worse, these supposed remedies hide the defects from view.

Now suppose that instead of abruptly extinguishing the arc and thereby trapping gas before it can escape, an electrical resistance is introduced into the field excitation at a predetermined rate so as to s-l-o-w-l-y snuff out the arc. This allows the gases to be evolved from the weld before the viscosity of the molten pool can detain them. The crater eliminator, Fig. 6, provides a convenient and precise means for doing just this and so assures the soundness of every portion of the weld, including the point where the crater usually would be found.

A subsequent article will detail other methods of welding SAE X-4130 aircraft steel, jig and fixture design, heat treatments, etc. It is scheduled to appear in STEEL, Nov. 17, 1941.

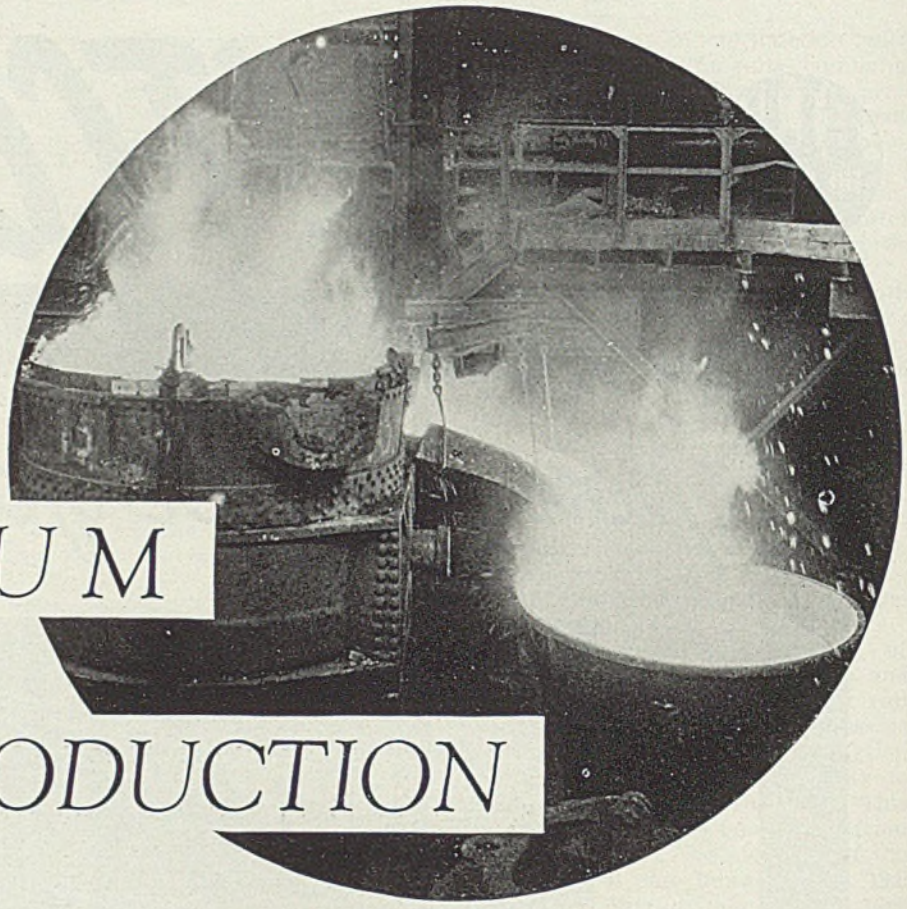
Now Offers Grease Pencils in Ten Colors

■ Purple and green Phano grease pencils for marking highly polished metal for future identification, instructions to workers or inspectors or for layout work are now being offered by Joseph Dixon Crucible Co., Jersey City, N. J. The addition of these two colors now makes it possible for a manufacturer to have a choice of 10 colors.

TABLE II—Physical Properties of SAE X 4130 Aircraft Tubing

Condition	Wall Thickness in.	Tensile Str. p.s.i. min.	Yield Pt. p.s.i. min.	Extension under load in./in.	Elong. Full Tube	2"% min. Strip
Normalized	Up to and inc. 0.035	95,000	75,000	0.0045	10	5
	Over 0.035 to 0.186 inc.	95,000	75,000	0.0045	12	7
	Over 0.186	90,000	70,000	0.0043	15	10
Heat Treated						
HT-125	Up to 0.06 inc.	125,000	95,000	0.0052	12	7
HT-125	Over 0.06	125,000	95,000	0.0052	18	11
HT-150	Up to 0.06 inc.	150,000	112,000	0.0057	10	6
HT-150	Over 0.06	150,000	112,000	0.0057	15	9
HT-180	Up to 0.06 inc.	180,000	135,000	0.0065	8	5
HT-180	Over 0.06	180,000	135,000	0.0065	12	7
HT-200	Up to 0.06 inc.	200,000	150,000	0.0070	7	4
HT-200	Over 0.06	200,000	150,000	0.0070	11	6

Modern Contributions of TITANIUM to STEEL PRODUCTION



Tapping a heat of basic open-hearth steel into a 150-ton ladle. Overflow slag is handled in thimble-type ladle shown at the right

■ TITANIUM is one of the elements that form stable oxides, or which may be said to have a high affinity for oxygen, and for that reason it serves as a useful deoxidizer for steel and other engineering alloys. Other elements commonly used for the same purpose are silicon and aluminum, their oxides being likewise much more stable, or more strongly united, than is iron oxide. Titanium ranks between silicon and aluminum in deoxidizing power, being considerably more effective than silicon, and is generally classed with aluminum as a "strong" deoxidizer.

Steel is deoxidized before casting chiefly to prevent the evolution of carbon monoxide gas, the product of the reaction between iron oxide and the carbon in the steel, so that the castings or ingots will be sound and free from blowholes after they have solidified. Other advantages, however, have also been found to follow from the treatment of steel with an adequate quantity of a strong deoxidizer. One of these is less segregation, or greater uniformity of composition throughout the ingot. Some slight segregation of impurities in certain parts of an ingot as compared with other parts is probably unavoidable, because most impurities in steel tend naturally to be concentrated in the part that freezes last. But when the steel is poorly deoxidized, so that gas bubbles are rising while the ingot is partly frozen, there is a much greater tendency for more of the impure liquid to be concentrated in streaks and pockets in the upper part of the ingot, and the segregation of impurities is greater. Strong deoxidation prevents this action, and therefore decreases segregation.

Another effect of strong deoxidation, more recently discovered, is that treatment of steel with a strong deoxidizer tends to produce a finer grain size, and improved yield strength, ductility, and impact resistance, but lower hardenability assuming heat treatment at usual temperatures. The exact connection between deoxidation and fine grain size is not so readily explained as are the other effects of deoxidation previously noted, but the finer grain is generally thought to be due to the interference of some compound of the deoxidizing agent with the normal growth of the steel grains at high temperatures. The effective compound may likely be oxide (alumina or titania) distributed through the steel in particles so small that they cannot be distinguished with the microscope. Since all the commonly used strong deoxidizers, such as aluminum and titanium, form stable nitrides as well as oxides, however, it may be that nitride particles rather than oxides are responsible for preventing or delaying grain growth in strongly deoxidized steel.

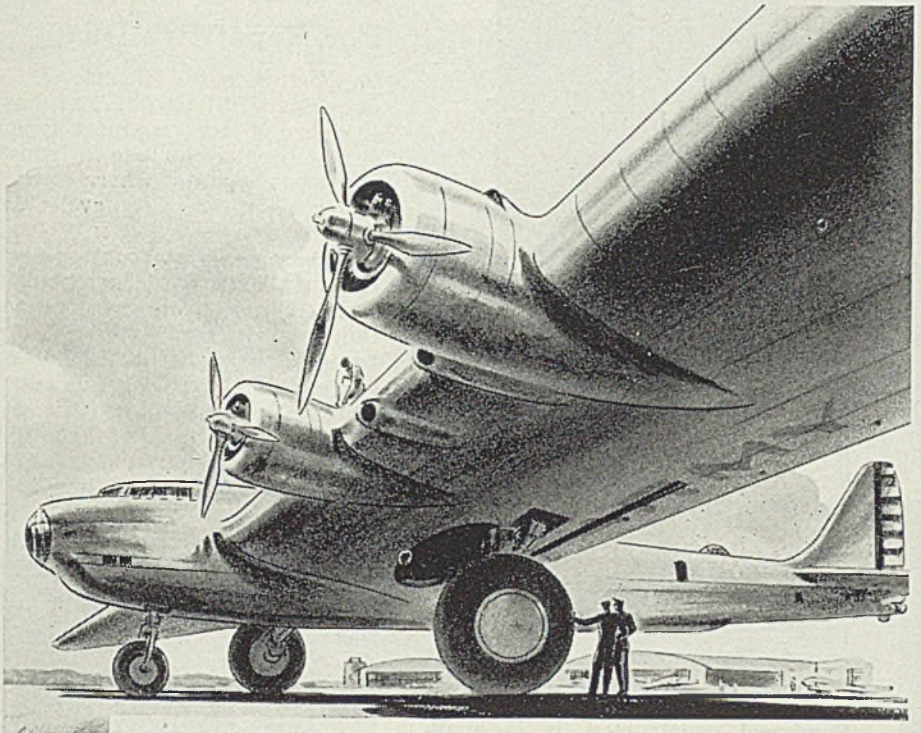
Aluminum is the element most used for producing fine-grained steel, but recently titanium is being substituted to an increasing degree. This is due not only to the scarcity of aluminum, but also to certain definite advantages of titanium as a deoxidizer. Aluminum-treated steel is likely to suffer from dirtiness that is conspicuous even without microscopic examination, as the alumina produced is not easily eliminated from the molten steel and often collects in groups or "galaxies" of fine inclusions that develop into serious streaks and seams in the finished product. Titanium when used in moderate amounts does not have this effect, and when used with aluminum it serves to reduce the dirtiness for which aluminum is responsible. The improvement in quality, and in yield of high-grade product, often more than justifies the slightly higher cost of the titanium.

Thus a large and increasing tonnage of strongly deoxidized steel is now being made with titanium replacing a part, or all, of the aluminum that previously was relied on for this kind of steel. The form of titanium employed for this purpose is of course not the virtually pure metal, as is the case with aluminum,

(*Please turn to Page* 110)

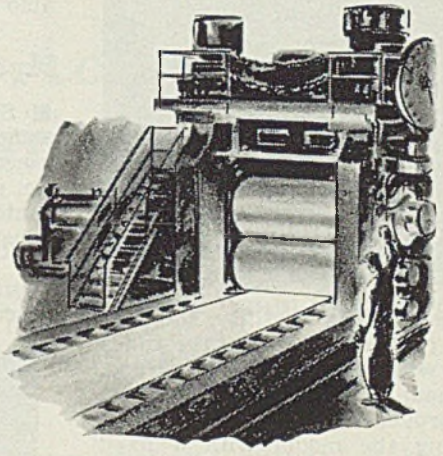
Prepared for STEEL by the technical staff of the Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

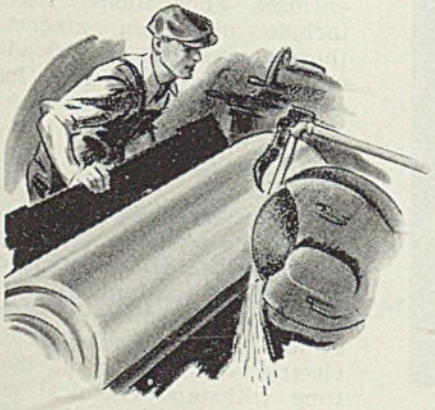
What does it take to smooth a Warbird's Feathers ?



A wingspread of 212 feet ...every inch preened sleek as satin! The perfect smoothness of the metal sheathing on American warbirds like the B-19, world's mightiest bomber, isn't there for looks. It's essential to top performance. How do they get the flawless sheets of metal used to make airplanes? They're rolled out by the ton by giant steel rolls. And keeping the surfaces of these rolls ground to almost perfect accuracy and finish is another of the vital contributions of Carborundum-made wheels to America's defense.

Thousands of other products for defense and for normal needs are made by the rolling process. Plate glass for your car, steel rails, plastics, tin plate and paper are only a few. And since their surfaces can be only as perfect as the faces of the rolls that roll them, finish is highly important. Today, surface quality of rolls can be maintained to within a millionth of an inch by the use of Carborundum-made grinding wheels.





The same skill and experience that have helped develop modern roll grinding techniques are at your disposal, too. Whatever your use of grinding wheels or coated abrasives, Carborundum engineers can help you. Send for your copy of "Theory and Practice of Roll Grinding"-Form No. A-786. Write The Carborundum Company, Niagara Falls, New York.

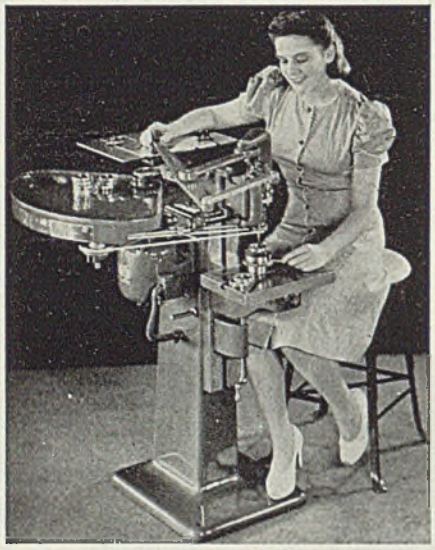
CARBORUNDUM
REG. U.S. PAT. OFF. BRAND
ABRASIVE PRODUCTS
50 YEARS OF SERVICE TO ALL INDUSTRY

Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company.

Industrial Equipment

Munitions Engraver

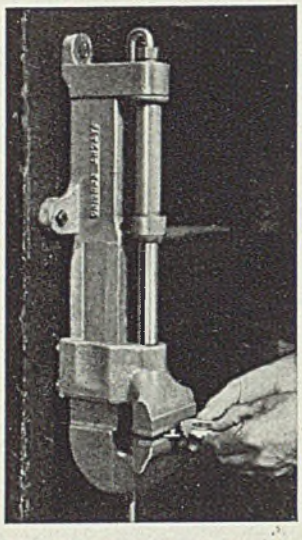
■ George Gorton Machine Co., Racine, Wis., has developed a model M-E munitions engraver stripped down especially for defense work. It is used to engrave or profile such parts as gun range scales, indicator plates, gun barrels, airplane propeller pump housings, rangefinder bands, gun sight dials, gun elevation scales and air temp dials. By eliminating many controls and adjustments necessary to give standard



machines their versatility, the unit can be produced nearly three times as fast without sacrificing accuracy. Simplification has been achieved by an improved spindle drive and by providing the model with a fixed pantograph reduction ratio. Stock tools and accessories used with standard engraving machines are used equally well in the munitions engraver.

Hydraulic Vise

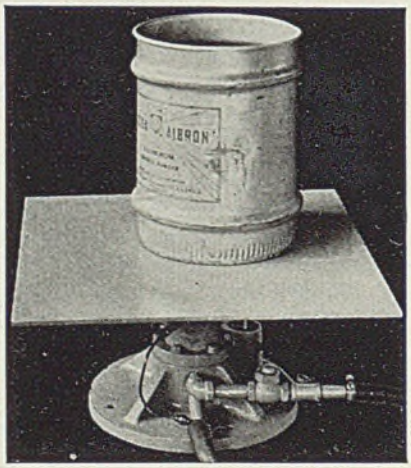
■ Studebaker Machine Co., Nine South Clinton street, Chicago, has placed on the market a new hydraulic vise capable of developing pressures up to 5 tons between its jaws. It is designed to speed up small press and cutting operations, as well as ordinary vise work. The vise is operated entirely by foot control, permitting use of both hands. Pressure to close jaws is controlled by a foot pedal pump arrangement in a pedestal mounted on the floor. The latter is connected with the vise proper by a steel tube which carries the hydraulic fluid to a ram behind the back jaw and thus



moves it forward. Thus three pedals are involved in the operation of the unit—one moves the vise jaw to contact against the work, a second applies pressure up to 5 tons and a third releases the jaw. The vise is capable of handling press work, punching, bending, cutting, straightening, testing and stamping. It mounts horizontally on any bench as well as vertically on wall or post. Semisteel constructed, it is available in two sizes.

Hydraulic Jolter

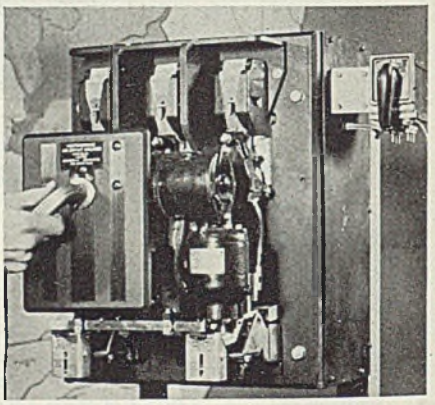
■ Syntron Co., 370 Lexington avenue, Homer City, Pa., announces a new line of water-powered hydraulic packers or jolters for packing materials in barrels or drums. It consists of a deck plate on which the barrel, drum, carton or other container to be filled and packed is placed, and a hydraulically operated



cylinder which lifts the table and drops it with a sharp jolt approximately once per second. The speed of the jolts per minute as well as the overall lift are controlled by a hand valve in the water line from which the unit obtains its power. Operation of the unit only requires about 50 pounds of water pressure per square inch. A small electric motor-driven pump with a closed circuit can be used to operate the equipment.

Air Circuit Breaker For Repetitive Duty

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has introduced a new, compact type DK circuit breaker for use in industrial or power plants where operation under repetitive duty cycles is required. It is available in 15,000 and 25,000-ampere interrupting capacities in all standard current ratings from 15 to 600 amperes for operation on 1, 2, 3 or 4-pole 600-volt alternating current or 250-volt direct current circuits. The breaker is equipped with a rotary type, removable operating handle for controlling the breaker manually. In addition, electric operation can be provided

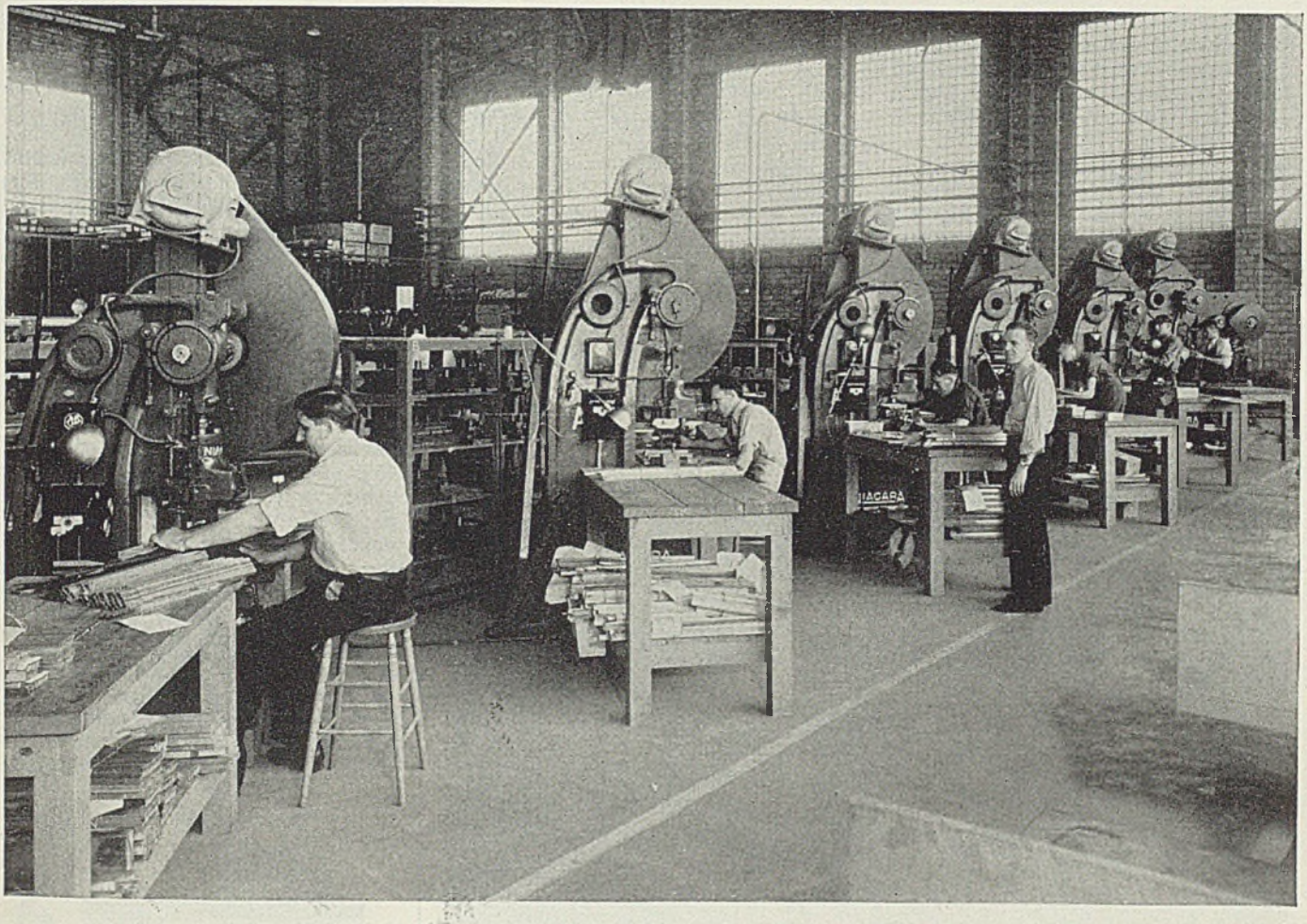


by a motor mechanism and a shunt trip. Main contacts are of silver alloy and employ a self-wiping action. "De-Ion" arc quenchers minimize burning on the main and the arcing contacts. The unit is being offered in four different forms—an open type and three forms for enclosed applications. Accessories include oil-suction magnetic, or thermal-magnetic overload trip units which are adjustable for minimum tripping.

Explosive Preventive

■ Goodyear Tire & Rubber Co., Akron, O., reports a new explosive preventive in the form of conductive rubber flooring for use in munitions plants where surfaces must be an excellent conductor of static electricity and must at the same time withstand chemical actions.

Black in color, the rubber flooring is made in four thicknesses with smooth, plate finish that may be cleaned with steam or clear lukewarm water. It is especially suitable for munitions plants because



NIAGARA PRESSES *in Action–*
on AMERICA'S PRODUCTION LINES

The above photograph shows a typical line-up of Niagara Series "A" Inclinable Open-Back Presses in one of America's foremost airplane plants.

More strokes per hour are the result of Niagara advanced engineering features including instant acting sleeve clutch with built-in single stroke mechanism, strong rigid frames, and slides operating in multiple "V" gibs for long die life.

Write for Bulletin 58.

PRESSES, SHEARS AND MACHINES *for* **PLATE AND SHEET METAL WORK**

NIAGARA MACHINE & TOOL WORKS, BUFFALO, N. Y.

BRANCHES: LEADER BLDG., CLEVELAND . . . GENERAL MOTORS BLDG., DETROIT . . . 50 CHURCH ST., NEW YORK

it maintains a smooth, even surface, free from cracks, ridges or depressions and resists indentation from truck and heavy foot traffic as well as from stools or tables.

Aircraft Welding Torch

■ National Cylinder Gas Co., 207 West Wacker drive, Chicago, has placed on the market a new Rego aircraft welding torch for making fast sound welds. It features exceptional balance for precision work, and is very light in weight—weighing only seven ounces. Convenient front-end valve wheels on the unit also provide one-hand flame adjustment of the new torch.

In addition, long bend and short bend swaged tips of pure copper, with brass protectors prevent damage to tip threads. These are available in sizes 76, 72, 68, 62, 59, 55, 53 and 51 (drill size of orifice). Flame characteristics of the torch may be varied from short to long pointed.

Flexible Coupling

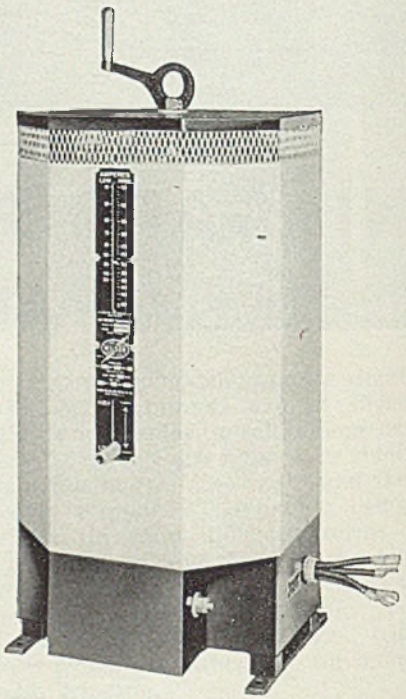
■ Harris Products Co., 5435 Commonwealth avenue, Detroit, has placed on the market a new type D flexible coupling which can serve as a connecting medium for oil lubricating lines as well as a coupling capable of transmitting torque. It also can be used for any size shafting between ¼ and 5/16-inch inclusive.

Like the rest of the Torflex line, the new unit employs two metal caps, and two rubber bushings. But the spacer, which is required to keep the rubber bushings separated so they will tighten onto the shafting when the metal caps are screwed together, consists of a nipple and two fiber washers instead of the double end all-metal type.

The couplings can be pre-assembled, or can be put together "piecemeal" on the two shafts. Torque capacities range up to approximately 45-pound inches at recommended usages and will compensate for high parallel and angular misalignment depending on the size of the shafting.

Transformer Welders

■ Wilson Welder & Metals Co. Inc., 60 East Forty-second street, New York, has developed a new line of alternating current transformer welders in 300, 500, 750 and 1000

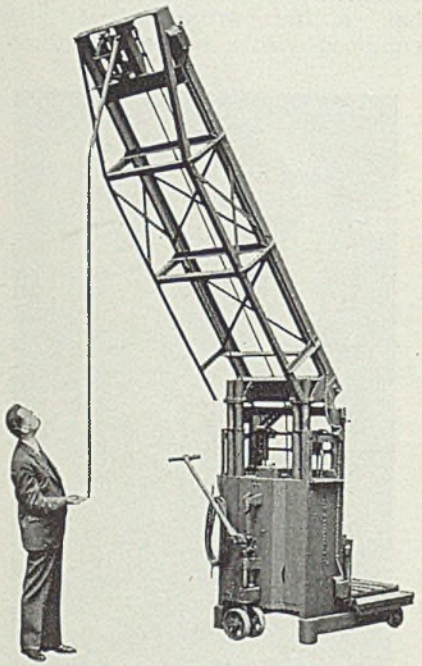


ampere capacities. Known as model TW, these are completely self-contained units for use in shipyards, railroads and steel mills. They have a wide range of current output, and continuous stepless current regulation is provided by means of a hand crank on top of the machine. This model is said to operate "cooler" because of the divided construction of the coils. All coil covering is spun glass fiber, heat-resistant, class BB insulation. On 60 cycle units, all sizes are fan-cooled except the 300 ampere size. On 25 cycle units, all sizes are fan-cooled. The

60 cycle units have high and low range switches, while the 25 cycle units have only one range.

Spring Balance

■ Lewis-Shepard Co., 245 Walnut street, Watertown, Mass., has introduced a special spring balance device for easing the raising and lowering of the hinged section of portable elevators where fairly frequent hinging operations are necessary. Powerful compression springs within the cylinders balance the weight of the upper frame, enabling one man to raise and lower the frame quickly. This spring balance will balance hinged sections 8 feet, some-



times longer, in length. The illustration shows one man balancing the hinged upper section of a stacker on the tips of the fingers of one hand.

Inkless Recorder

■ General Electric Co., Schenectady, N. Y., announces a new low-chart speed recorder which telescopes 30-day load and voltage surveys, formerly requiring 60-foot strip charts, into a chart only 30 inches long. It has a chart speed of only 1-inch per day and allows the operating record for an entire month to be checked at a glance.

Speed of recorder is made possible by the inkless recording mechanism which makes an impression by pressing the chart against a typewriter ribbon. The inkless feature obviates freezing and evaporating difficulties. Setting up the new recorder for operation is simple. Date and time may be marked at the beginning of the record, and date and time of any other point can be found quickly by counting each 1-inch time line as a day. The unit is obtainable as an ammeter or a voltmeter.

Truing Attachments

■ Brown & Sharpe Mfg. Co., Providence, R. I., announce three new radius wheel truing attachments for use on its No. 5 plain grinding machines, Nos. 10 and 12 and Nos. 20, 22 and 23 plain grinding machines. These provide a means of forming wheels for grinding to shoulders where a fillet is required, and permit shaping either the right-hand or left-hand corner of the grinding wheel to any convex radius from zero to ½-inch.

The base of each attachment is secured to the table of the machine by a clamp, which is operated by a knob at the outer end of the attachment for the No. 5 machine and by a lever on the other sizes. The hand-operated diamond tool holder is supported and guided by a fixed segment-shaped piece; and the segment, in turn, is mounted on a slide which is adjustable transversely in the attachment base and is clamped in position by a screw. This transverse adjustment permits shaping the grinding wheel without changing its position.

Figures stamped on the finished

back face of the diamond tool holder show the radial distance from this surface to the center of the segment-shaped guide when the tool holder is in operating position. Consequently, by using a micrometer or suitable gage, the diamond tool is readily adjusted to give the radius desired. Each attachment includes a diamond tool blank.

Power and Control Units For Resistance Welding

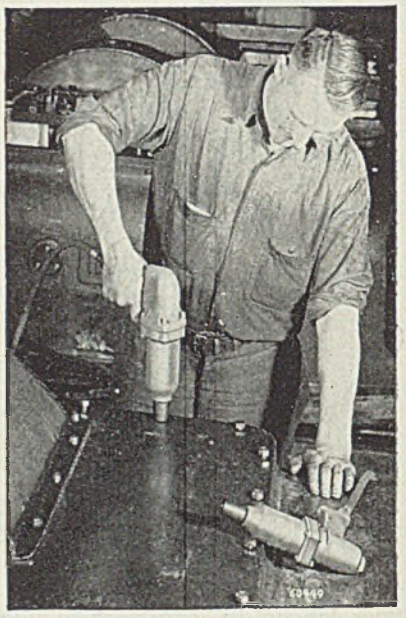
■ Weltronic Corp., 2832 East Grand boulevard, Detroit, announces complete power and control units for resistance welding—including, in one compact cabinet, contactors and firing relays, sequence timer, protecting fuses, limit switches, motor starter, low voltage transformer and relay.

The cabinets not only eliminate the necessity for the usual multiplicity of separate control units but also eliminate all external inter-unit wiring requirements. The control units are assembled in the steel back panel cabinets to meet the user's requirements. They are offered for any type of welding equipment, and are available with a wide variety of contactors, ranging up to 600-ampere capacity, with synchronous and nonsynchronous types.

In addition, similar units, without ignitron contactors and firing relays, are being offered for controlling the operation of a wide variety of automatic machines.

Impact Wrench

■ Ingersoll-Rand Co., Phillipsburg, N. J., has developed a new size 508 air-operated impact wrench which can be used in close places due to its short over-all length and small nose diameter. It is designed with the patented Pott impact wrench principle which localizes steel to steel impact without transmitting shock to other parts of the tool. Easily operated with one hand, the tool has a form-fitting pistol grip equipped with a trigger-type throttle. By a single turn of a lever, the rotation can be reversed. Average working speed of the unit at 90 pounds pressure is 850 revolutions per minute.



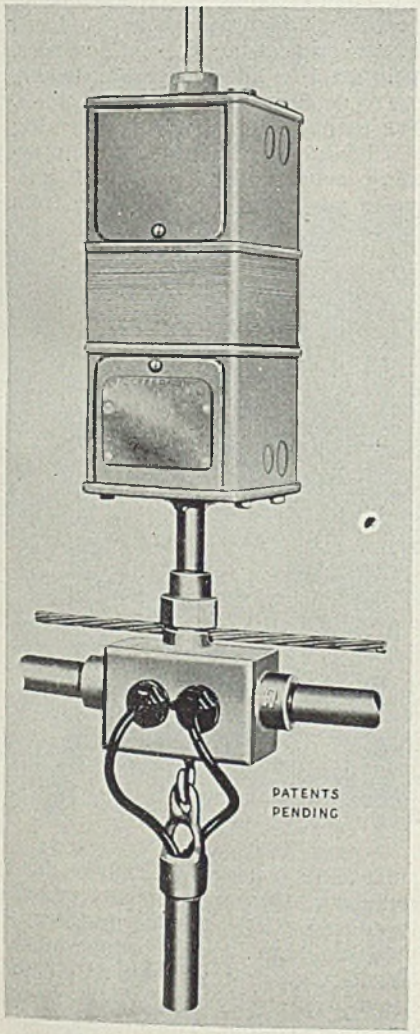
Quick-Acting Clamps

■ Products Engineering Co., 416 South Robinson boulevard, Los Angeles, has introduced a new line of quick-acting clamps adaptable to practically all manufacturing, tooling and fabrication requirements. The clamps in the line are designed for application on jigs and fixtures in a large variety of ways. They are constructed of combinations of hot-rolled and cold rolled steel, and rivets and rollers are heat treated for strength and long wear.

Fixture Hanger Pylet

■ Pyle-National Co., 1334 North Kostner avenue, Chicago, announces a U series fixture hanger Pylet especially designed for installation of combination mercury vapor and incandescent lamp fixtures used in

industrial plant lighting. It provides a permanent mounting for the transformer required for the mercury vapor lamp above the messenger or span wire. The weight of the transformer is carried by the support rod attached to the ceiling structure of the building. The union hub of the Pylet is slotted to receive the messenger wire and a steel barrier is provided within the hub through which the messenger wire can slide without danger of abrasion. Space is provided for two pairs of No. 10 wire. The union nut will not loosen when installed, as pressure on the messenger wire has a locking effect. The Pylet body will take a single or 2-



gang receptacle. A hook also is provided at the bottom of the Pylet body to fit the double outlet fixture loop for two portable cords. Both hook and fixture loop are designed so that the fixture pendent must be raised to an angle of approximately 45 degrees before the fixture can be detached from the hook.

Carbon Filament Lamps

North American Electric Lamp Co., 1025a Tyler street, St. Louis, has introduced Nalco inside-silvered carbon filament lamps for infra-red ray processes in drying, baking, heating and dehydrating. They are designed so the polished silver in the base end of the lamps acts as a reflector to project the infra-red rays toward the surface being worked on. They are being offered in 250-watt types for 110 to 120 volts.

Hydraulic Pump

Detroit Universal Duplicator Co., 253 St. Aubin, Detroit, announces a new Dudco infinitely variable delivery, hydraulic pump of dual vane design which employs a means of balancing the vanes so that overheating is eliminated. Designed for continuous operation at high pressures, it is recommended for use where the possibility of line surges require a "break-proof" pump.

The pump handles 1250 pounds per square inch pressures, and can be used where periodic pressures go as high as 2000 pounds per square inch. Each of the dual vanes employed in the pump is bevelled around its entire edge so that oil from the oil hole in the rotor can flow around all the edges of the vanes. Thus "back" pressure can be placed on the vanes from the

stator side. The bevelling also serves to hold the vanes "contrally" with respect to the housing.

Patch Vulcanizer

■ B. F. Goodrich Co., Akron, O., has placed on the market a new type RO patch vulcanizer for maintenance of conveyor belting in the field. Designed for repairing covers of conveyor belting, it is round in shape, measuring 10 inches in diameter and of the single heated platen type. It clamps, in use, against a steel plate 12 inches in diameter held against the opposite sides of the belt.

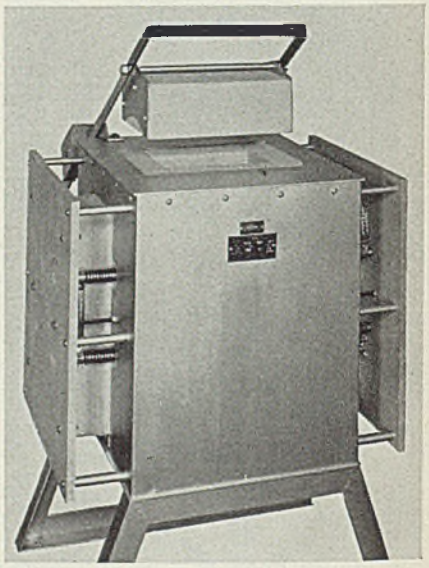
Inspector's Stamps

■ New Method Steel Stamps Inc., 149 Jos Campau, Detroit, announces new type of inspectors' stamps facilitating identifications of parts—especially in industries working three shifts. The stamps are numbered from 1 to 99, the numbers in each group used by each shift being enclosed in identifying shaped borders. Thus, one shift has the numbers enclosed in a square, another in a triangle, another in a circle, another still—if needed— in an oval.

This makes it possible to assign identical numbers with different borders to inspectors or operators doing identical work. The stamps are available in sizes ranging from 5/32 to 5/16-inch sized border—the standard sizes including also 3/16 and ¼-inch.

Heat-Treating Furnace

■ Sentry Co., Foxboro, Mass., has placed on the market a smaller size pit type controlled atmosphere furnace for heating high speed steel. Similar to the larger unit introduced earlier this year, the unit handles shorter tools or tools that require the hardening of a short end only. These are handled in a vertical position to eliminate any tendency to warp or to change shape when being heated. The atmosphere produced is the correct neutral atmosphere, whether the alloy be molybdenum, cobalt or tungsten high speed steels. The furnace has a maximum rating of 16 kilowatts with a normal operating consumption of 4 to 8 kilowatts per hour. Heating time from



cold to 2350 degrees Fahr. is about one hour. Heating elements properly spaced along side the muffle provide uniform muffle temperature. Shielded electrical terminals eliminate any necessity for a water-cooled terminal system. The electrical design permits direct connection to either 110 or 220-volt supply without the use of a transformer.

Electronic Robot

■ Through a typographical error, the electronic robot introduced by Max Mosher, 130 West Forty-second street, New York, described last week in this department, was said to be built in capacities up to 25 horsepower on the grinder motor. The sentence referring to the capacity should have read: "The panels are built in capacities up to 250 horsepower etc."

Advertisement NOVEMBER, 1941

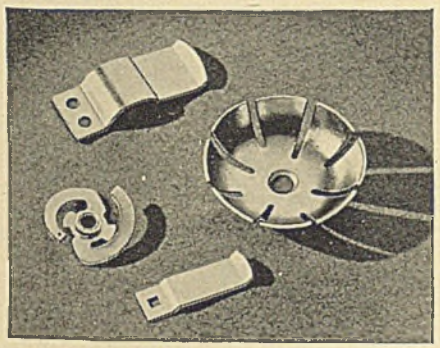
COPPER ALLOY BULLETIN

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

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

Durable Spring Parts Made from Bridgeport New Phosphor Bronze

Lasting resilience is an outstanding feature of spring parts fabricated from Bridgeport New Phosphor Bronze, which is produced and tested under the rigid metallurgical control necessary to assure an alloy of uniformly high quality. Large bar methods of casting, annealing in the most modern type furnaces, and rolling on 4-high tandem mills are factors that contribute to the exceptional properties of Bridgeport New Phosphor Bronze.



These spring parts are typical of the many precision-made, resilient shapes that can be fabricated from Bridgeport New Phosphor Bronze.

Memos on Brass—No. 24

The alloy containing 70% copper and 30% zinc is characterized by an unusual combination of strength and ductility. It is especially suitable for use where severe deep drawing, forming, bending, or expanding operations are involved. One of its most extensive applications is in the manufacture of cartridge cases, and the alloy is frequently designated as "Cartridge Brass."

Copper Now Used In Sodium Reflectors

Chromium-plated copper is being used for reflectors on sodium luminaires on a trial basis, it is reported, and has been found to have excellent weathering properties and other characteristics required of outdoor lighting fixtures. Chromium-plating over nickel-plating on copper is said to rank among the best available materials for this purpose.

Duronze III Offers Exceptional Advantages in Many Applications

Strength, Hardness, and Corrosion Resistance are Chief Factors Contributing to its Success in Severe Service

In this age of highly specialized engineering requirements, unusual physical properties in metals and alloys are becoming more and more important. Although brass, bronze, and copper hold a leading place in industry because of their exceptional properties—such as excellent corrosion resistance, great strength, toughness, and ease of workability—it is sometimes necessary to look for materials with still higher physical properties. For such cases, Duronze* III offers unusual advantages.

Duronze III is a patented silicon aluminum bronze alloy containing approximately 91% copper, 7% aluminum, and 2% silicon. In other words, it is an aluminum bronze modified by the addition of silicon, an alloying element that has a tendency to increase corrosion resistance, strength, and hardness. The alloy is silver yellow in color. It is approximately 9% lighter in weight than brass, and about 10% lighter than the silicon-copper alloys which are called silicon bronzes by the trade.

High Tensile Strength

Duronze III has an unusual combination of properties desirable for modern engineering requirements. Where brass in the annealed condition, for example, has a tensile strength of about 45,000 lbs. per sq. in., Duronze III averages from 85,000 to 90,000 lbs. per sq. in.—a value about 100% greater. Ordinary "silicon bronzes" average from 50,000 to 60,000 lbs. per sq. in. in the annealed and hot forged conditions. When silicon bronze and brass are hard drawn to increase their tensile strength to about 85,000 lbs. per sq. in., their elongations drop to about 20% and 12% respectively, compared with 35% for annealed Duronze III of equivalent tensile strength. Hot forged Duronze III averages about 90,000 lbs. per sq. in. tensile strength, as compared with about 50,000 lbs. per sq. in. for hot forged brass rod.

Although Duronze III does not contain lead, it is free machining because the chips are fine and break up into small pieces. While it is not as free machining as highly leaded brass, it is much easier to cut down than non-leaded bronzes. In addition, the alloy is very hard, compared with ordinary non-ferrous alloys, and has a lower friction value than brass or copper. These properties are especially valuable when Duronze III is used in items that are in contact with sliding parts made from ferrous materials.

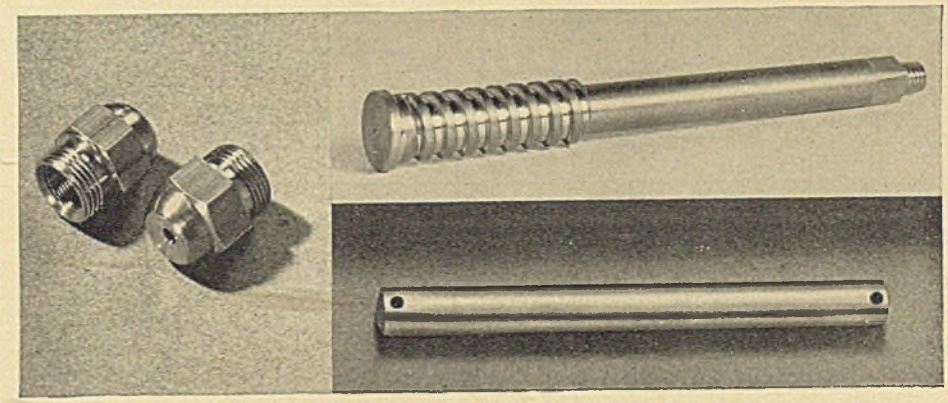
Production of Duronze III

Since it is essentially a hot working alloy, Duronze III is made by the hot extrusion process, and is supplied in rod form in conventional shapes, such as round, hexagon, square, and rectangular. It is not supplied in the form of sheet or tubing.

As Duronze III hardens rapidly when cold worked, it is not practical to make it in sizes much smaller than those which come from the extrusion machine. The finished rods, however, are cold drawn to size.

Since Duronze III has the corrosion resistance of aluminum bronze fortified with

(Continued on page 2, column 2)



Oil burner nozzles, valve stems, and pivot pins for circuit breaker bridge arms are among the many strong, corrosion-resisting parts that can be fabricated from Duronze III.

ALLOYS OF COPPER

This is the twenty-eighth of a series of articles on the properties and uses of the copper alloys, and continues the subject of the copper-tin alloys.

PROPERTIES OF THE COPPER-TIN ALLOYS

As an introduction to the subject of the copper-tin alloys last month, curves were shown indicating the general effect of tin on certain of the properties of copper. While the range of tin contents is not great, a number of alloys are regularly made commercially, which are listed in the table at the bottom of the adjoining column.

Effect of Phosphorus

It will be noted that all these alloys contain small amounts of phosphorus. As pointed out last month, copper and tin alone do not alloy readily, and small amounts of phosphorus are almost always added. This statement needs some clarification. When tin is added to a bath of molten copper, the copper oxide which is likely to be present is reduced by the tin to form tin oxide and copper. Tin oxide is almost insoluble and is not sufficiently different in specific gravity to permit it to be slagged off. It can, however, be reduced by phosphorus to form phosphorus pentoxide, which will float to the surface and can be removed by skimming. If the tin oxide is not thus removed, it will solidify in the casting at an early stage in the form of a film or network, thus producing a weak and brittle casting, unsuitable for fabrication. Other elements than phosphorus, such as silicon, can be used when certain specific properties are desired.

Amount of Phosphorus Added

While, theoretically, the amount of phosphorus added need be no more than required to reduce the oxides present, it is not possible to calculate this quantity with any great degree of certainty. Hence the addition of phosphorus is increased to permit an appreciable residual quantity of phosphorus. Moreover, it has been found that phosphorus is helpful in increasing the hardness of phosphor bronze. While the usual alloy contains only about 0.10% phosphorus, some producers add greater quantities as a means of increasing the hardness and tensile strength of the material. This increased hardness, however, is likely to produce a less ductile material, and the advantages of increased hardness are somewhat offset by the decrease in the ductility of the alloy.

Uses of Duronze III

(*Continued from page 1, column 3*)

silicon, it is considered one of the most highly corrosion-resisting of the non-ferrous alloys.

Duronze III finds one of its most important applications in the manufacture of solderless connectors, where a strong material is needed to hold securely the wire, cable, or hollow cable, which is fastened by clamping action instead of by soldered points. The high corrosion resistance of Duronze III is an added advantage in parts of this type, which are exposed to the action of the elements.

Other uses of Duronze III

Recently Duronze III has been finding many uses in machine gun construction. A number of parts are made either from rod or from hot forging. Here the alloy's high strength and low coefficient of friction are of special importance. Other applications are in the manufacture of sleeves for compression fittings for oil and gas lines in airplane construction. These fittings support the tubing and reduce breakage from flexing resulting from vibration.

Hot forgings for valve stems, universal joints, and parts for acetylene torches are frequently made from Duronze III. In general, its applications include those cases where brass and ordinary bronzes are not strong or tough enough to meet the requirements of the service.

Because of its low coefficient of friction, Duronze III is used for the manufacture of thrust screws which mesh with steel. Here wear is reduced on both the steel and the Duronze III. Another application is in the manufacture of Duronze III threaded bushings in gate valves made from stainless steel. Friction between Duronze III and stainless steel is lower than between stainless steel parts, especially when the valve is operated at high temperature.

NEW DEVELOPMENTS

An immersion tin finish can be applied to brass or copper surfaces in 10 seconds, it is reported, in many instances replacing slow boiling methods of tin plating. Work can be handled in baskets or on wire. Finish is said to be inexpensive, and to have high resistance to tarnishing. **(No. 260)**

A new solderless lug of the set screw type is made of seamless electrolytic copper with a heavy brass shell that is said to reduce heating. Current-carrying capacity is evenly distributed from wire to lug. 8 sizes are available for a range from No. 14 wire to 2,000,000 cm cable. **(No. 261)**

Hard soldering of cold worked copper and copper alloys can be effected by a patented process that prevents loss of hardness and eliminates need for re-working, it is said. Process is reported to involve accurate control of electrical energy, a solder with a low flow temperature, and means for chilling the work immediately after the joining operation. **(No. 262)**

A clear liquid can be applied to glass surfaces to protect them from welding spatter. It forms a transparent film, and is described by the maker as especially suitable for use on welders' goggles, one application being sufficient to protect the glass from pitting for approximately 25 hours' service. **(No. 263)**

A measuring machine is reported to provide a simple and accurate means for checking gages, tools and parts. It consists of a master bar, dividing screw, and means for controlling measuring pressure, all mounted on a rigid bed. The machine reads directly to 0.00001 inch. Means are provided for indicating when the correct measuring pressure has been reached. **(No. 264)**

A portable welder is designed for use on 110 volts AC, and is adaptable for use in welding, brazing, or soldering of brass, copper, and other metals, it is said. The maker suggests its use in butt, lap, and fillet welding, repairing fractures, filling pits in castings, and building up shafts, gears, and other parts. **(No. 265)**

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.

TYPICAL PHOSPHOR BRONZES (NOMINAL ANALYSES)

Alloy	*% Copper*	*% Tin*	*% Phosphorus*	*% Lead*	*A. S. T. M. Designation*
Phosphor Bronze.....	98.2	1.8	.05	—	—
4% Phosphor Bronze....	95.75	4.0	.25	—	A
5% Phosphor Bronze....	94.9	5.0	.10	—	A
8% Phosphor Bronze....	91.9	8.0	.10	—	C
10% Phosphor Bronze...	89.9	10.0	.10	—	D
Leaded Phosphor Bronze.	92.9	4.0	.10	3.0	B

Handling Shell

(*Concluded from Page 88*)

the proper conveyor level and places them on the conveyor. They may be moved immediately to the shipping dock or remain in storage on the conveyor until such time as sufficient stock has been accumulated for a certain shipment.

Such storage conveyors are also built into the roller conveyors carrying shell from station to station in the machining department, as was previously mentioned in connection with Fig. 5. The reason for such an intricate arrangement of conveyors as is indicated in Fig. 5 is simply because certain operations can be completed at a much faster rate than others.

For example, rates of production for a typical 75-millimeter line show that whereas the band groove for the shell can be knurled in 6 seconds and the shell weighed in 5 seconds, other individual operations take as many as 70 seconds. It thus becomes evident that one or two weighing stations and band groove knurling stations can accommodate the output of several stations doing the slower and more complicated machining operations.

Stamping the base, for example, requires only 10 seconds; (these are approximate figures only) pressing on the shell band requires only 16 seconds; tape and paint inside, 12 seconds, paint outside, 14 seconds. Contrast these short operations with the longer ones. For example, it usually takes 60 seconds to assemble the closing plug, 70 seconds to cut the band groove and remove center boss, 70 seconds for the pressure test, 49 seconds to thread the nose and 20 seconds to wash the shell. Obviously if a plant is to be set up on basis of continuous operation, it is desirable either to combine these various operations into groups equivalent to the longest single operation or else furnish a number of machines to handle the slow operations at a total rate equivalent to the faster operation.

In any event, the conveyor layout necessarily becomes somewhat complicated. This is especially so where it is desirable to handle certain of the machining operations on an intermittent basis, since then it becomes necessary to provide a storage or a "float" at those stations. In any high-production layout such as this, however, mechanical handling equipment plays a most essential part.

Story of Development Of American Industries

■ *Development of American Industries*, revised edition, by John G. Glover and William B. Cornell; cloth, 1005 pages, 6 x 9 inches; published by Prentice-Hall Inc., 70 Fifth avenue, New York, for $5.50 to the trade and $4.50 for schools.

First edition of this work was published in 1932 and since then social, economic and business changes have made a revision necessary. Statistics have been brought up to date, changes in the status of industries have been explained, the effects of legislative enactments have been stressed, changes in methods of production have been discussed and new products described.

Growth of American industries has been due largely to American inventive genius in developing processes and methods for converting natural resources into usable commodities. Our standards of living have been raised far above those of other nations. To appreciate the significance of our advanced civilization it is necessary to understand its industrial background.

Authoritative and adequate treatment of the development of each of 39 major industries would not be within the mental or physical capabilities of one or two persons. Cooperation of the industries themselves was therefore solicited. As a result each chapter of the book is the joint product of some of the

best minds in that particular industry.

The volume has been developed primarily as a text for colleges of arts and sciences and schools of commerce and business administration, as well as schools of engineering. It is in reality a history of industrial economy in the United States.

The chapter on the iron and steel industry was prepared by American Rolling Mill Co., Charles R. Hook, president, and Hugh W. Wright, assistant to director of personal relations. It sketches the beginning of iron in prehistoric times and its gradual development until it began its rapid advance in the nineteenth century, which has accelerated up to the present. From ore to pig iron, to the ingot and then to the varied finished products the progress of steel and iron is sketched rapidly by men thoroughly conversant with its details.

The copper industry is presented by the Copper and Brass Research Association, the lead industry by the Lead Industries Association, zinc by the American Zinc Institute Inc., the electrical industry by Westinghouse Electric & Mfg. Co.

The chapter on the machine tool industry is by the National Machine Tool Builders' Association, John E. Lovely, president; Tell Berna, general manager. The automobile industry is presented by Chrysler Corp., T. J. Ross, public relations counsel.

Numerous charts and illustrations supplement the text and a comprehensive index assists in finding desired material.

ASA Approves Standards On Electroplating

■ Another standard in the industrial hygiene field became available recently for use by industry through approval by the American Standards Association of the practice for safety in electroplating operations. It outlines requirements for the protection of workers in operations which may injure the health of operators through contact with gases, mists or liquids.

The standard applies to electroplating and deplating operations and to the anodizing of metals, and describes standard exhaust systems and methods for personal protection of the operator. Other requirements and uniform practices for the conduct of the work in order to reduce possible hazards to health are also given.

Electroplating systems are classified according to the degree of hazard associated with them. Chromium plating and arsenic plating, for instance, are placed under the severe hazard classification. Cyanide solutions for plating copper, brass, bronze, zinc and cadmium, tin plating from alkaline baths, anodizing aluminum and deplating operations that evolve gases are placed under the moderate hazard classification. Three sections of the standard contain basic recommendations covering specifications for exhaust systems, personal protection, inspection and maintenance.

Issues Monthly News Digest for Executives

■ To keep industrial executives abreast with current technical news, Graham Transmissions Inc., 2711 North Thirteenth street, Milwaukee, is issuing monthly a publication known as the *Graham Dial*. It contains brief abstracts of outstanding articles in the technical press "boiled down" to just the essential facts, with the source given in full so that the reader may readily refer to the complete article.

Engineers and industrial executives may receive the publication without charge—copies may be obtained by writing directly to the company.

Coated Abrasives

(*Concluded from Page 76*)

of all glue-bonded coated abrasives under varying conditions of relative humidity. In it lies the answer to variations in performance.

Humidity Affects Flexibility: The relative humidity of the store room and the shop also has a marked effect on the degree of flexibility—especially thin finishing papers and the finer grits in cloths.

Where coated abrasives are stored in a cabinet or room having controlled humidity of 50 per cent, full flexibility and work value will be obtained from the abrasives. *But if abrasives are kept in an ordinary store room, the papers and cloths become stiffer and stiffer; loss of flexibility—as well as work value—resulting.*

All glue-bonded coated abrasives do this. It is not a question of the quality of the glue used nor the method of manufacture.

It is suggested that during dry weather and in buildings where the relative humidity is low, "special flexed" material be substituted for "regular flexed" abrasive. The former material has been flexed two ways at right angles, which produces an extremely flexible material as against the regular flexed type which has been flexed only one way in manufacture.

Already some larger users of coated abrasives have appreciated the possible savings to be obtained by the use of controlled humidification and have installed humidified rooms where their rolls, belts, disks and sheets are stored until ready for use.

Several companies to date have stated their savings run as high as 25 per cent. These savings are obtained not alone by getting increased work value from the abrasive material itself but also by reducing the time lost in changing belts since the properly humidified abrasive works longer and does not have to be changed so often.

Control Your Own: Now it is not difficult or expensive to make a small cabinet to control the humidity of its contents. Fig. 3 shows the necessary features of such a cabinet. It can be made by anyone in a few hours in a size to suit his own requirements.

The humidifying unit is the same as that used in cigar counters. It consists of a lamp bulb immersed in water and controlled by an electric hygrometer which may be set at the desired per cent of moisture. This control then automatically turns the lamp on and off to evaporate water as needed.

A storage space for sheets and disks can be provided on the cabinet floor and belts can be hung on wood pegs. Such a cabinet can be placed near the machines or work benches and will pay for itself many times over in the first year's operation.

Note such an arrangement will not dehumidify—remove excessive moisture. It will only add moisture—humidify. This answers the requirements, however, because excessive moisture can be subsequently removed to restore the abrasive to 100 per cent work value. On the other hand, if humidity falls below 25 per cent, the stock can never be reconditioned. Thus the humidifier guards against permanent loss of work value.

Revises Specifications On Welded Bridges

■ The third edition of a booklet entitled "Specifications for Welded Highway and Railway Bridges," dealing with the design, construction and repair of the structures, is announced by the American Welding Society, 33 West Thirty-ninth street, New York.

Material in this 108-page publication has been revised or rewritten in accordance with current theory and practice. Copies of the publication may be obtained for $1 from society headquarters.

Titanium in Steel

(*Continued from Page* 96)

fine grain size is not an absolute requirement. An average value is about 6 or 7 pounds of ferro-carbon-titanium to replace 1 pound of aluminum. In some instances, however, where aluminum is entirely eliminated, it is reported that as much as 12 pounds of ferro-carbon-titanium are used instead of 1 pound of aluminum for clean steel of the finest grain size. Where titanium is used merely as a cleaning agent in steel otherwise deoxidized either with silicon or with aluminum, the usual practice is to add from 3 to 5 pounds of ferro-carbon-titanium per net ton of steel.

Part of the ferro-carbon-titanium should be the last addition to the ladle. Occasionally, when aluminum is used with it for close control of grain size, some of the titanium may be added before some of the aluminum. This practice may give more efficient and reliable utilization of the aluminum, but probably at the cost of the maximum cleanness. Titanium should certainly always be added after the manganese and silicon, unless it should be desired merely to save manganese without regard to cost or steel quality. Adding ferro-carbon-titanium in the mold, as is often done with aluminum, is generally not helpful, as that alloy does not dissolve or react quickly enough to be suitable for mold additions. When mold additions of titanium are necessary, a low-carbon ferrotitanium should be used.

In rimming steel, which of course is not deoxidized like killed steel, there is nevertheless a need for some degree of deoxidation in order to control the rimming action and consequently the quality of the ingot. In making rimmed steel it must be sufficiently oxidized to produce a brisk evolution of gas in the mold before the steel cools to the pasty stage. If under-oxidized, so that the steel rises in the mold, the quality is poor, and nothing can be done about it after the steel is in the ladle. If over-oxidized, however, so that too much gas is given off, and the ingots sink deeply after pouring, this condition can be corrected by adding a little aluminum in the molds. The tendency therefore is for the steelmaker to insure that his rimmed steel heats are not under-oxidized, and to rely on aluminum to correct any over-oxidation. A small addition of ferro-carbon-titanium in the ladle has been found desirable to save some of the aluminum otherwise required for rimming steel, and it also has the peculiarity of improving the rimming action, or helping the evolution of the gas before the steel ingot becomes pasty. A large percentage of all the titanium used in metallurgy is added in the form of ferro-carbon-titanium to rimming steel.

Titanium Often Preferred

In high-grade alloy steels titanium deoxidation is often preferred to the use of aluminum in order to insure the absence of alumina streaks. Also as a degasifier to promote soundness, titanium often is definitely superior, possibly on account of its greater efficiency in removing nitrogen. In such high-alloy steels, which are generally made in comparatively small heats, low-carbon ferrotitanium alloys, containing 20 to 40 per cent titanium, 3 to 20 per cent silicon and 3 to 8 per cent aluminum, are favored, in spite of higher cost, because of their more rapid solution and higher rate of reaction as compared with the cheaper high-carbon alloys. Steels in which increasing amounts of titanium are used in this way include those made for light armor plate, heat-resisting furnace parts, articles to resist acid-corrosion, etc.

The use of titanium as an alloying element in stainless and 5 per cent chromium steels is also increas-

ing, although no new developments have occurred recently in these fields. In the 18-8 stainless steels, a titanium content equal to at least four times the carbon prevents the formation of chromium carbide at the grain boundaries which results in susceptibility to intercrystalline embrittlement. In the 5 per cent chromium steels, which are widely used for superheater and oil-refining tubes, titanium present in the same relation to carbon prevents air-hardening, so that air-cooling is permissible after hotwork or heat treatment, and annealing furnaces are not tied up so long with a given batch of steel. Considerable progress has been made in recent years in the production of these higher titanium steels with better recovery of titanium in melting, and better yield of high-grade product than was at first experienced. Low-carbon ferrotitanium, usually with low silicon and 6 to 8 per cent aluminum, is of course required for their production.

Baruch's Own Story of Mobilization for War

■ *American Industry in the War*, by Bernard M. Baruch; cloth, 498 pages, 6 x 9 inches; published by Prentice-Hall Inc., 70 Fifth avenue, New York, for $5.

This volume includes a reprint of the report of the war industries board of the first world war, of which Mr. Baruch was chairman, his own program for total mobilization of the nation as presented to the war policies commission in 1931 and current material on priorities and price fixing. An introduction by Gen. Hugh S. Johnson calls attention to the wide experience of Mr. Baruch during the former war and his intensive study of the subject since that time.

To those interested in current mobilization of the nation for defense this volume is rich in material, written by the man who evolved the pattern of organization and method for war-regulation of industry which has since been adopted by both British and Germans as far as it is adapted to their systems.

Numerous appendices contain various actions by the government and its boards during the first world war, priorities circulars and similar material.

Wall Chart Gives Decimal Equivalents

■ A giant wall chart which provides engineers and draftsmen with ready decimal equivalents is being offered by the Frederick Post Co., 3650 North Avondale avenue, Chicago. Measuring 26 x 39 inches, it gives the equivalents in type 1¼ inches high—making the chart readable 50 feet away.

Printed in two colors, the chart gives all decimal equivalents from 1/64 to 63/64. It is being offered only to those requesting it on business stationery.

Handbook on Sleeve Bearings for Engineers

■ A handbook which discusses the effect of design, alloys and manufacturing methods upon sleeve bearing efficiency and defines the field of application for each basic type of sleeve bearing is being offered by Federal-Mogul Corp., Shoemaker and Lillibridge streets, Detroit. Entitled "Handbook of Sleeve Bearings," it contains information which engineers, designers and draftsmen will welcome as a constant guide to bearing design and selection.

Written by Albert B. Willi, chief engineer, the book contains much engineering data supplemented by photos and drawings. As a reference, it embodies a section which includes innumerable sizes and types of bearings and bushings for which major manufacturing tools are available. The handbook is available only to those who are directly concerned with sleeve bearing installations.

Steel Output Faces Severe Handicaps

Captive mine truce removes greatest threat.
Scrap shortage continues strong deterrent.
Pig iron allocation covering most needs

MARKET IN TABLOID ★

Demand
Civilian inquiry less active.

Prices
Unchanged at ceiling levels.

Production
Held at 95½ per cent.

■ DESPITE severe handicaps the steel industry continues to keep production at a high rate, some units operating well above capacity.

Truce in the captive coal mine strike, reached Thursday, eliminates at least temporarily this threat to continued steel production by mills dependent on these mines for fuel. Before the truce preparations had been made by several important producers to curtail production sharply to conserve coke supplies for most needed purposes. Return of strikers at Great Lakes Steel Corp. plants at Detroit caused resumption there but a strike at Homestead works of Carnegie-Illinois Steel Corp. practically balanced the Detroit gain.

Scrap shortage continues to hamper steel mills, open hearths taken off the previous week still being idle and further curtailment for this cause is being made at several points, though steelmakers are using every effort to obtain scrap to continue production as long as possible.

Doubt is expressed of the success of steel expansion programs under present plans, the blanket priority of A-1-k being far too low to give needed deliveries on numerous steel products, notably plates. Difficulties also appear in procurement of special equipment for blast furnaces and steel mills, manufacturers being booked far ahead on other defense business.

Additional pressure on non-defense production is being exerted by OPM, the past week bringing orders to washer and ironer manufacturers to reduce production by 17.3 per cent for final five months, based on production during 12 months ending June 30. Manufacturers of ice boxes are ordered to cut steel use 35 per cent during the period Sept. 1 to Dec. 31. Producers of structural shapes are asked to curtail the variety of sizes of angles by 50 per cent and in beams, channels and shapes by a slightly smaller per cent. The request will be effective Feb. 1, 1942. Shapes used in ship, freight car and building construction are not affected.

Pig iron allocations for November have been issued and meet general approval, producers and consumers finding the situation much improved over that prevailing before it was established. Practically all needs for defense are being met and some tonnage seems likely to be available for melters without preference. An additional furnace will be blown in at Buffalo this month and a second is under construction there. All furnace production is being shipped and none accumulated. A cargo of 8200 tons of iron salvaged from a wrecked ship in Delaware river has been allocated to a cast iron pipe producer.

Allocation of scrap is not expected before mid-month, after all reports have been received, inventories determined and points of greatest need revealed. Occasional orders have been issued for movement of materials to melters in greatest need and at least one case has developed where a consumer with fairly large reserve has been ordered to accept no more until permission is given. Some additional capacity has been closed down because of shortage but most users have managed to obtain sufficient to maintain a good rate. In general steelmakers are running on current shipments and dipping into stock where the former do not suffice. Reserves are the exception.

Automobile production last week totaled 92,879 units, a gain of 1024 over 91,855 cars the preceding week. This compares with 118,092 produced in the corresponding week last year.

Production held at 95½ per cent in face of marked changes in two important districts, losses balancing gains. Detroit gained 59 points to 91 per cent, Wheeling advanced 1 point to 95 and Chicago went up 1½ points to a new all-time high of 103½ per cent. Pittsburgh lost 9 points to 90 per cent, eastern Pennsylvania declined 1 point to 92 and Buffalo was 2½ points lower, at 81 per cent. Rates were unchanged in other districts: Cleveland, 97; Birmingham 95; New England, 90; Cincinnati, 91½; St. Louis, 83; Youngstown, 98.

Better to represent the situation and to reflect prevailing differentials between raw materials and the product in both semifinished and finished form STEEL this week starts publication of four price composites instead of the three carried for many years. They cover finished steel, semifinished steel, steelmaking scrap and steelmaking pig iron. Figures have been compiled retroactively so that the usual comparisons can be made. In the new presentation finished steel is at $56.73, semifinished steel at $36.00, steelmaking pig iron at $23.05 and steelmaking scrap at $19.17.

COMPOSITE MARKET AVERAGES

	Nov. 1	Oct. 25	Oct. 18	One Month Ago Oct., 1941	Three Months Ago Aug., 1941	One Year Ago Nov., 1940	Five Years Ago Nov., 1936
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$53.36
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	34.40
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.05	18.63
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	20.80	16.50

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Nov. 1, 1941	Oct. 1941	Aug. 1941	Nov. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
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	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to 9/32-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Nov. 1, 1941	Oct. 1941	Aug. 1941	Nov. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$21.50
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	20.25
Rails for rolling, Chicago	22.25	22.25	22.25	24.55
No. 1 Cast, Chicago	20.00	18.75	18.75	18.25

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$4.75
Connellsville, foundry, ovens	7.25	7.25	7.25	5.75
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.

Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.

Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.

Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c

Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box $5.00
Granite City $5.10

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.05c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 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, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy		Alloy	
S.A.E.	Diff.	S.A.E.	Diff.
2000.....	0.35	3100.....	0.70
2100.....	0.75	3200.....	1.35
2300.....	1.70	3300.....	3.80
2500.....	2.55	3400.....	3.20

4100 .15-25 Mo. 0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni. 1.20
5100 80-1.10 Cr. 0.45
5100 Spr. flats 0.15
6100 Bars 1.20
6100 Spr. flats 0.85
Carb., Van. 0.85
9200 Spr. flats 0.15
9200 Spr. rounds, squares 0.40
T 1300, Mn, mean 1.51-2.00 0.10
Do., carbon under 0.20 max. 0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

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, Bham. $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 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅝ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller ....68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅜-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.00 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

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

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 Blk.	Steel Galv.
In.		
½	63½	51
¾	66½	55
1—3	68½	57½
Iron		
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

	Steel	
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

Iron

2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

Steel

1 to 3, butt weld..... 68½
2, lap weld 63
2½ to 3, lap weld 66
3½ to C, lap weld 65
7 and 8, lap weld 64
Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.) $2.00
Do., over ⅝ to 11/32-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	{24.00– 24.50	24.00– 24.50	23.50– 24.50	24.50– 25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	{24.00– 24.50	24.00– 24.50	23.50– 24.50	24.50– 25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty paid, sbd. $120.00
Carlots, del. Pitts. 125.33
Carlots, f.o.b. Southern furn. 145.00
For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot. 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90

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 13.00c
Do., ton lots 13.75c
Do., less-ton lots 14.00c
less than 200 lb. lots. 14.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	19.50c	20.25c	20.75c
1% carb.	20.50c	21.25c	21.75c
0.10% carb.	22.50c	23.25c	23.75c
0.20% carb.	21.50c	22.25c	22.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., and Langeloth, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% lb., con. ti., 0.10 C. max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton. $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00
15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 8.25c
Do., ton lots 8.75c
Do., less-ton lots 9.00c
Do., less 200 lbs. 9.25c
Spot ¼c lb. higher

Tungsten Metal Powder, 98-99 per cent, per lb., depending upon quantity $2.60-2.65

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c
88% chrome, cont. tons. 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00

35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.10
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	6.00	....	4.42	....	....
Memphis	4.15	4.35	4.35	4.20	4.20	5.96	4.35	....	6.00	....	4.56	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	7.15	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.45	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 10 bun. in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis ,Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle, 1 to 99 pounds in Los Angeles; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.40	1	16	9
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	Cincinnati Ashland, Ky. Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Birmingham	Alabama City, Atlanta	*Pacific Coast	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00(d)	$14.50	$16.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00(d)	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00(d)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	.....	12.25	12.25	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00	15.00	10.00	12.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00	16.00	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50	16.50	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50	12.50	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75	12.75	10.25	12.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00	16.00	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00	.....	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50	.....	17.00	.....
Stove plate	19.00	.....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00	.....	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	23.50	22.50	22.85	23.00	22.00	.....	19.50	.....
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	19.50	.....
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	17.50	.....
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00	.....	19.00	.....
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Punchings and plate scrap††	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00	.....	16.50	.....
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00	.....	15.50	.....
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50	.....	14.00	.....
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00	.....	12.50	.....
GRADES ORIGINATING FROM RAILROADS															Kansas City		
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	.....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00	17.00	15.50	.....
Scrap rails	22.00	22.00	20.75	20.25	.....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00	18.00	16.50	.....
††Rerolling quality rails	23.50	23.50	22.25	21.75	.....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50	19.50	18.00	.....
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	.....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00	20.00	18.50	.....
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	.....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25	20.25	18.75	.....
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	.....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50	20.50	19.00	.....

*Johnstown, Pa., and Warren, O., are not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are bases only for railroad grades. Pacific Coast bases are Los Angeles, San Francisco, Seattle, Portland. †Base price at Portsmouth; Middletown 25 cents less and Ashland, Ky; ††The term 'rails for rerolling' includes any rails which are sold to be used for rerolling, irrespective of whether or not such rails are usable for re-laying. **⅜-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅝-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Atlanta only.

OTHER BASE PRICES: **Machine shop turnings** $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale, Bridgeport and Worcester; **Heavy breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; **Machinery cast cupola size** $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges. Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** is material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 and a consumer may obtain permission from OPACS to absorb transportation charges necessary to obtain 500 tons or more.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

LOGEMANN Presses for Sheet Scrap

THE NATION NEEDS YOUR SHEET SCRAP!

In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

Sheet mills particularly recognize the value of the years of experience and the performance records which back up LOGEMANN designs and workmanship.

The line includes scrap presses *designed for mill service,* presses *designed for automobile plant conditions,* presses *designed for general plant applications.*

Write for details.

The scrap press illustrated operates in one of the largest industrial plants. Compresses scrap from three directions to produce high-density mill size bundles. Built in various capacities.

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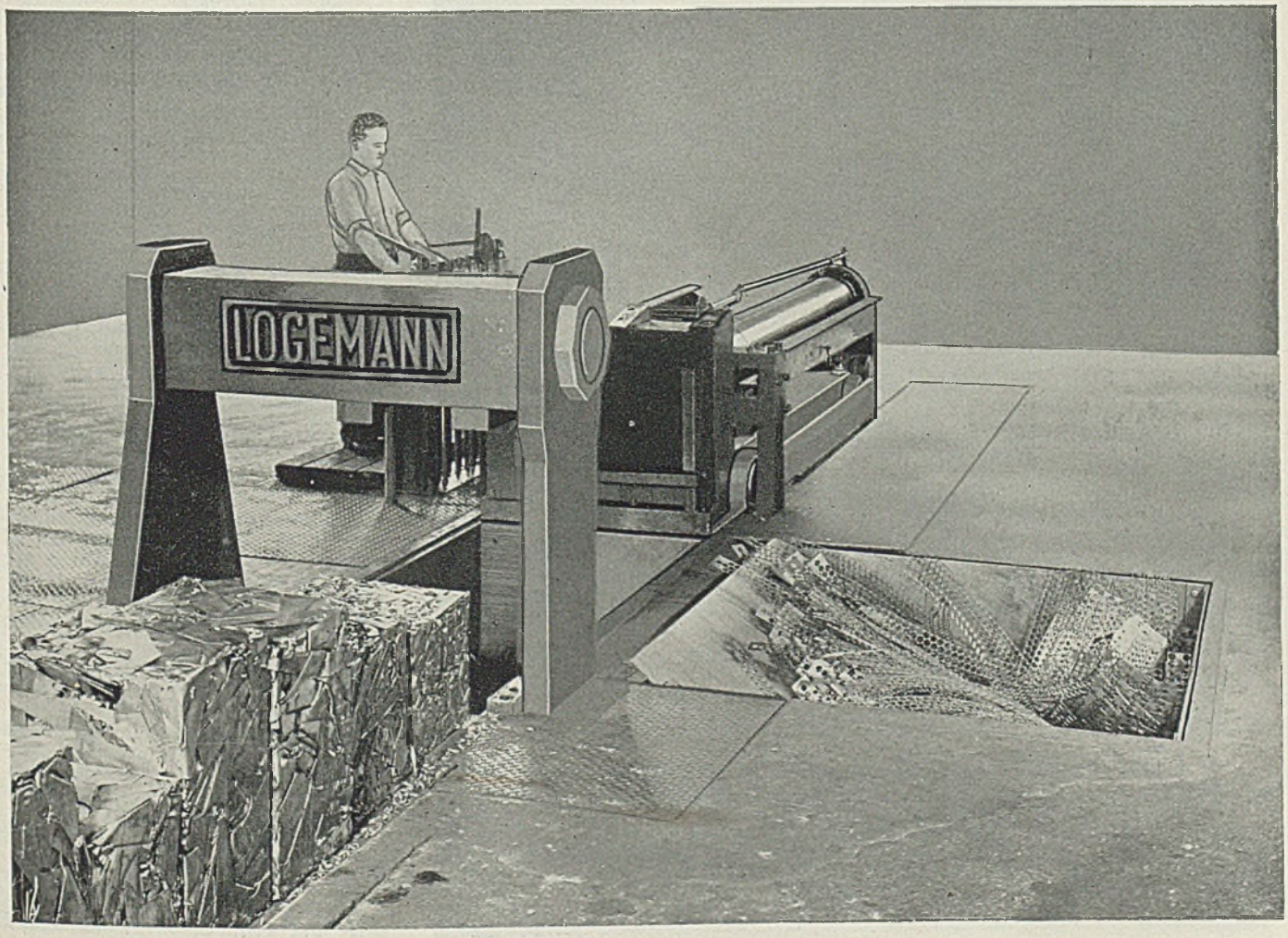

Sheets, Strip

Sheet & Strip Prices, Page 114

Sheet inquiries indicate a steady drift toward defense work, higher priorities accompanying current inquiries. Producers of sheets and strip, with production schedules constantly subject to revision to accommodate new priority tonnage, are making little progress in getting down to lower ratings. The proportion of high priority orders is increasing. Before one A-1-a order is shipped another is ready for processing and the lower half of the order book gets little attention. Strip producers generally are sold for six months and while some unrated tonnage is included shipment is uncertain.

Rolling schedules show preponderance of heavy gages but demand for light sheets is increasing as sheet mills are switched to plate production. Recent government orders cutting production rates of washer, ironer and ice box manufacturers is expected to have some effect on sheet demand.

Plates

Plate Prices, Page 114

Slight easing in demand for steel plates is noted, due to less pressure from shipyards, but the situation continues tight. Deliveries in the Middle West are somewhat improved on some sizes, material up to ⅝-inch being available in five to six weeks on A-1-a priority. Material heavier than this can not be booked currently for delivery before first quarter.

Platemakers filed tentative schedules with Washington two weeks ago and are awaiting broad allocations for November, informing them how much they will be called on to supply to various industries, shipyards, army, railroad car builders and others. An eastern plate mill has received cancellation of its lease-lend tonnage.

A shipyard on the Delaware river has closed on 2500 tons of plates to a district mill and is negotiating for an additional 3000 tons and 600 tons of shapes, with other makers. McCloskey & Co., Philadelphia, has placed 2100 tons with Bethlehem Steel Co. for gasoline tanks for Porto Rico. The Reading Co. has let fabrication of steel parts for 1000 fifty-five-ton hopper cars to Parish Pressed Steel Co., Reading, Pa., and Bethlehem Steel Co.

PLATE CONTRACTS PLACED

167 tons, 16-inch, welded pipe, Arcadia, Calif., to Southern Pipe & Casing Co., Azusa, Calif.

PLATE CONTRACTS PENDING

630 tons, three 56,000-barrel tanks, water and power department, Los Angeles, for harbor steam plant at Wilmington, Calif.; bids Nov. 4.

Unstated tonnage, all-welded steel barge 130 x 33 x 7.50 feet, United States engineer, Pittsburgh, Bethlehem Steel Co., Bethlehem, Pa., $36,900 only bidder, pro. 83.

Unstated tonnage, elevated steel water tank, general quartermaster depot, Columbus, O., to Pittsburgh-Des Moines Steel Co., Pittsburgh, $27,236.

Unstated tonnage, 18,000-ton steel floating dry dock, Morgan City, La., to Chicago Bridge & Iron Co., Chicago, $2,234,700; bureau of yards & docks.

Bars

Bar Prices, Page 115

Pressure for further bookings of steel bars has eased somewhat and it is questioned whether October bookings will show much increase over September. Leveling off may be attributed to a great degree to more rigid application of priorities and allocations and to a less extent because of restrictions on some lines of commercial production by direct government decree. Many buyers have long since placed substantial orders against which shipments are highly indefinite and assume there is no point to placing further orders until deliveries have been started.

New England manufacturers of rifles and small arms have been given supplemental orders for several million units, requiring several thousand tons of alloy steel bars for barrels. This places bar consumption in that area at the highest peak ever attained.

Bar requirements are tied in with defense work, including shipbuilding, bolts and nuts and other highly rated needs. Outside of defense little bar tonnage is available and

warehouses are getting fewer bars under fourth quarter quota than had been expected.

That stampers are actively seeking contracts is indicated by 69 bids recently submitted for a cartridge clip order. Three New England shops now have orders for 90,000,000 clips, taking close to 4000 tons of cold-rolled strip and a further contract for 30,000,000, requiring 1300 tons of steel, is about to be placed at Washington.

Watervliet arsenal has estimates on 20-mm. machine gun links, requiring about 4000 tons. No fixed steel analysis is specified, each bidder being required to meet rigid specifications involving approximately .60 to .70 carbon.

Pipe

Pipe Prices, Page 115

Pipe demand continues heavy with distributors called on for large tonnages in the aggregate, in the face of depleted stocks. Merchant steel pipe supply is sufficient to meet defense and industrial demand where the latter has priority rating.

A General Electric project at Everett, Mass., is taking a substantial pipe tonnage, as are aircraft ferry terminals at Houlton and Presque Isle, Me. Large prospective tonnages of boiler tubes for naval and Great Lakes vessels overhang the market. There is a tendency to purchase aircraft tubing in large lots under OPM supervision.

Cast pipe buying is on the increase, a large number of small contracts being covered recently.

CAST PIPE PLACED

1305 tons, including 375 tons, air base, South Weymouth, Mass.; 175 tons, housing project, Hartford, Conn.; 245 tons, South Portland, Me., shipbuilding yards; 410 tons, Lewiston, Me., various sizes; all to Warren Pipe Co., Everett, Mass.

472 tons, 4 to 12-inch, Santa Monica, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

315 tons, cement-lined, bell and spigot, Panama, sch. 5566, to Florence Pipe & Machine Co., Florence, N. J.; bids Oct. 3.

240 tons, 10 and 12-inch, Fresno, Calif., to United States Pipe & Foundry Co., Burlington, N. J. 4, 6 and 8-in. pipe bids rejected.

200 tons, various sizes, Tyndall Field, Panama City, Fla., to United States Pipe & Foundry Co., Birmingham.

CAST PIPE PENDING

1012 tons, 8 to 20-inch cast iron, steel or cement asbestos pipe, Fort Ord, Calif.; California Corrugated Culvert Co., Berkeley, Calif., low on welded pipe.

1000 tons, 2 to 8-inch, cast iron, steel, cement asbestos, concrete or wood pipe, District No. 1, Wahkiakum county, Wash., 87,000 feet; bids Nov. 11.

550 tons, 6 to 12-inch, Fresno, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

381 tons, 4 to 8-inch, Fresno, Calif.; new bids Oct. 30.

200 tons, Gatewood housing project, Seattle; J. C. Boespflug Co., Seattle, low for general contract.

155 tons, 6-inch, cement lined, Panama, sch. 5645; bids Nov. 3, also 12,740 feet small diameter welded steel pipe and 19,000 feet galvanized steel pipe.

100 tons, Fort Lewis, Wash., project; bids in.

Unstated, 45th ave. S. W. improvement, Seattle; bids soon; $37,500 project.

Unstated, Beacon Hill housing project, Seattle; general bids in.

Unstated, Lakewood and American Lake improvements, near Tacoma, Wash.; bids soon to defense public works division, Seattle; $403,000 project, involving 185,000 ft. 4 to 12-inch pipe, 44 tons fittings, 219 hydrants, three elevated steel tanks, etc.; Parker & Hill, Seattle, engineers.

Wire

Wire Prices, Page 115

Wire demand exceeds production, which is somewhat restricted because of wire rod shortage. Heavy demand for other semifinished steel has held rod supply below requirements. Defense needs are being filled for most part. Some producers find bookings are about equal to shipments, but considerable business is offered which is not being accepted. Demand is slightly better than in September but not as heavy as in midsummer.

Production schedules are influenced by defense tonnage and subject to change continually. Material requiring long processing, such as spring wire, rifle springs and other coils slows up deliveries of other products. Nails continue scarce. Rope mills, which are operating at capacity, are generally well covered as to wire requirements.

Rails, Cars

Track Material Prices, Page 115

Domestic car buying is featured by the placing of two lots of 1000 cars each in railroad shops. The Reading Co. will build 1000 fifty-ton hoppers, with component parts to be fabricated by the Parish Pressed Steel Co., Reading, Pa., and Bethlehem Steel Co., Bethlehem, Pa., while the Great Northern will build 1000 box cars.

Estimates as to number of freight cars now being considered for purchase under the lease-lend program for shipment mostly to the Near East now range around 12,000. At one time recently as many as 20,000 were being considered. Car builders assert they have received no definite inquiries yet. Approximately 200 locomotives are also being considered.

LOCOMOTIVES PLACED

Army engineers, 35-ton diesel-electric locomotive, to Vulcan Iron Works, Wilkes-Barre, Pa.

Army, 45-ton and 80-ton diesel-electric, for Alabama ordnance plant, to General Electric Co., Schenectady, N. Y.

Atlantic Coast Line, two 1000-horsepower diesel-electric switch engines, to Baldwin Locomotive Works, Eddystone, Pa.

Chesapeake & Ohio, ten 2-6-6-6 Mallet steam locomotives, to Lima Locomotive Works, Lima, O., at $2,750,000.

Chicago & North Western, 44-ton diesel-electric, to Whitcomb Locomotive Works, Rochelle, Ill.

Chicago Short Line, one 1000-horsepower diesel-electric switch engine, to Baldwin Locomotive Works, Eddystone, Pa.

Navy, 30-ton diesel-electric for Cherry Point, N. C., to Fate-Root-Heath Co., Plymouth, O.

Navy, fireless steam locomotive for Charleston, S. C., to H. K. Porter Co., Pittsburgh.

Pere Marquette, four 1000-horsepower, one 600-horsepower diesel locomotives, to Electro-Motive Corp., LaGrange, Ill., at $373,750.

CAR ORDERS PLACED

Central of New Jersey, 50 seventy-ton covered hoppers, to American Car & Foundry Co., New York.

Great Northern, 1000 fifty-ton box cars; to own shops.

Reading, 1000 fifty-five-ton hoppers; to own shops; parts to be fabricated by Parish Pressed Steel Co., Reading, Pa., and Bethlehem Steel Co.; in addition to 1500 now going through shops.

Wabash Car & Equipment Co., 25 seventy-ton covered hopper cars, to American Car & Foundry Co., New York.

Ceiling on Relaying Rails Is Considered

OPA executives and sellers of relaying rails conferred in Washington last week on a price ceiling for relaying rails. It was reported OPA officials tentatively proposed a maximum of $28 per gross ton on rails of 35 pounds or heavier from Class I roads, f.o.b. at point of nearest destination.

Government officials also proposed that jobbers or wholesalers may resell the rails at $30 per ton f.o.b. shipping point, and that street railway, interurban and short line roads' maximum be $30 per ton at certain basing points minus freight from shipping point to basing point.

A minimum price of $22 also was proposed.

Structural Shapes

Structural Shape Prices, Page 115

Fabricating shops are well occupied but backlogs are not as heavy as over the past several months and fabricators show interest in further bookings for future work.

OPM has requested structural steel producers to simplify the number of sizes they roll. A reduction of 50 per cent is asked in angles with a cut only slightly less in beams, channels and other shapes. The request becomes effective Feb. 1, 1942, allowing time for adjustment by producers and consumers.

SHAPE AWARDS COMPARED

	Tons
Week ended Nov. 1	12,510
Week ended Oct. 25	44,230
Week ended Oct. 18	10,231
This week, 1940	37,890
Weekly average, 1941	28,713
Weekly average, 1940	21,326
Weekly average, Oct., 1941	22,530
Total to date, 1940	1,248,756
Total to date, 1941	1,263,367

Includes awards of 100 tons or more.

The purpose is to avoid necessity for rolling small lots of small, unusual shapes for which there is light demand. Commoner sizes will not be affected, including sections regularly used in ship, freight car and building construction.

Shipments of fabricated structural steel in September, 199,200 net tons, compared with 182,353 tons in August and a monthly average of 183,878 tons. It was second highest this year, American Institute of Steel Construction reports. New business closed totaled 153,168 tons, compared with 152,945 tons in August, and a monthly average of 201,887 tons. Backlog Oct. 1, scheduled for delivery during the succeeding four months, was reduced to 678,540 tons.

SHAPE CONTRACTS PLACED

2850 tons, general assembly shops, for Defense Plant Corp., Louisville, Ky., to American Bridge Co., Pittsburgh.

2500 tons, building, American Propeller Co., Toledo, O., to Joseph T. Ryerson & Son Inc., Chicago; Austin Co., Detroit, contractor.

2000 tons, new blast furnace, Bethlehem Steel Co., Lackawanna, N. Y., to be fabricated by company.

1100 tons, TNT plant, Volunteer Ordnance Works, Chattanooga, Tenn., to Duffin Iron Co., Chicago; Stone & Webster Engineering Corp., Boston, contractor.

500 tons, warehouse and factory building, City of New Orleans, to Jones & Laughlin Steel Corp., Pittsburgh.

417 tons, Clark Fork river bridge and over tracks Northern Pacific Co., Mineral county, Mont., to unnamed interest through contractor Roy L. Blair, Spokane, Wash. at $173,578.

400 tons, hangar, Los Alamitos, Calif., to Union Iron & Steel Co., Los Angeles.

382 tons, bridges, Grenada, Miss., for Illinois Central railroad, to American Bridge Co., Pittsburgh.

346 tons, bridges, Leavitt street, Chicago, for Grand Trunk Western railroad, to American Bridge Co., Pittsburgh.

340 tons, two piers, Portland, Me., to American Bridge Co., Pittsburgh.

325 tons, United States engineer, Aberdeen Proving Ground, Md., to Belmont Iron Works, Philadelphia.

255 tons, state highway bridge RC-41-43, Southfield, N. Y., to American Bridge Co., Pittsburgh.

220 tons, alterations, railroad bridge, Harpersville, N. Y., to American Bridge Co., Pittsburgh; placed direct by Delaware & Hudson railroad.

200 tons, addition to pig-casting department, Hanna Furnace Corp., Buffalo, to Lackawanna Steel Construction Co., Buffalo.

175 tons, turbine supports, Boston Edison Co., Everett, Mass., to American Bridge Co., Pittsburgh.

145 tons, pumping station, Rockaway Beach, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh; National Excavators & Structures Corp., New York, contractor.

140 tons, boiler supports, Wood River, Ill., for Shell Oil Corp., to American Bridge Co., Pittsburgh.

115 tons, Pennsylvania railroad bridge repairs, Trenton, N. J., to American Bridge Co., Pittsburgh.

100 tons, plant addition, Farrel-Birmingham Co. Inc., Buffalo, Howard Stimm, contractor, to R. S. McMannus Steel Construction Co. Inc., Buffalo.

SHAPE CONTRACTS PENDING

2730 tons, extension of pump and blower and sludge disposal building, Westsouthwest sewage treatment works, division Q, Stickney, Ill., for Sanitary District of Chicago; bids Nov. 6; inquiry for same tonnage of unfabricated material in August brought no bids.

2200 tons, lift bridge, Central Railroad of New Jersey, over Hackensack river, Kearny, N. J.; bids Nov. 28.

1800 tons, laboratory and test building, navy yard, Brooklyn, N. Y.; bids Nov. 6; Thompson-Starrett Co., New York, contractor.

1500 tons, aircraft motor testing building, Chevrolet division, General Motors Corp., Tonawanda, N. Y.; Darin & Armstrong, Detroit, contractor.

1020 tons, ship fitters shop, navy yard, Mare Island, Calif.

1000 tons, two shipfitters buildings, navy yard, Mare Island, Calif.; Moore Drydock Co., Oakland, Calif., low.

626 tons steel sheet piling, U. S. Engineer, New Orleans, inv. 149; bids in.

500 tons, battery storage building, Philadelphia navy yard.

430 tons, manufacturing building, Vickers Inc., Waterbury, Conn.

320 tons, two air corps hangars, 184-foot demountable, Basic Flying school, Waco, Tex.; bids Nov. 6, United States engineer, Galveston, inv. 144.

300 tons, two buildings, General Electric Co., Lynn, Mass.

290 tons, overhead bridge FAP-467-B-(2), Soelch, Wis., for state.

280 tons, turbine room extension, Dallas Power & Light Co., Dallas, Tex.

275 tons, building, American Metal Products Co., Detroit.

250 to 300 tons, power house No. 5, Pa-

cific Gas & Electric Co., San Francisco, for Pit river; bids Oct. 30.

245 tons, building, Union Wire Die Corp., Stamford, Conn.

230 tons, bridges over spillway, Ducktown and Farner, Tenn., for Tennessee Valley Authority.

186 tons, state bridge FAP-398-B-(1), Sparta, Wis.

172 tons, bridge over North Shore channel, Sec. 162-1313.31-MFT, Lincolnwood, Ill., for Cook county, Illinois; American Bridge Co., Pittsburgh, low; bids Oct. 21.

170 tons, casting shop extension, Bridgeport Brass Co., Bridgeport, Conn.

150 tons, subway under Belt line railway, Sec. 134-0303.2-MFT, Chicago, for Cook county, Illinois; Bethlehem Steel Co., Bethlehem, Pa., low; bids Oct. 21.

145 tons, factory building, Emery Industries, St. Bernard, Cincinnati, O.

130 tons, reconstruction bridge 352-B, Albany, N. Y., for New York Central railroad.

100 tons, shapes and bars, state bridge, route 39, east of Bordentown, N. J.; bids Nov. 14. E. Donald Sterner, state highway commissioner, Trenton; project has A-7 rating.

Ferroalloys

Ferroalloy Prices, Page 116

Selling price of Chinese wolframite held by the Metals Reserve Co. and distributed to consumers has been reduced 50 cents per short ton unit. This follows an advance of 50 cents a few weeks ago, and is being taken to ease the market on tungsten products which had reflected the advance in the ore.

As a result of this latest action, ferrotungsten has been reduced to $1.90 per pound contained tungsten, in carloads, and tungsten metal powder, 98-99 per cent, to around $2.60 to $2.65 per pound, depending upon quantity.

Reinforcing Bars

Reinforcing Bar Prices, Page 115

Reinforcing steel demand is declining, inquiries becoming scarcer and few awards being made. Suppliers usually will not consider projects with priorities below the A group. Priorities of B-1 or lower, which include most public buildings and schools, have little chance of receiving material for some time. If plane and tank production is to be doubled a renewed wave of plant construction is probable.

REINFORCING STEEL AWARDS

2000 tons, power house foundation, Philadelphia Electric Co., to Bethlehem Steel Co., Bethlehem, Pa.

800 tons, lighter-than-air base, Elizabeth City, N. J., to Jones & Laughlin Steel Corp., Pittsburgh; J. A. Jones Construction Co., Charlotte, N. C., contractor.

600 tons, Pennsylvania railroad shed, United States government, Washington, to American Steel Engineering Co.; McCloskey & Co., contractor.

400 tons, Pennhurst hospital, near Philadelphia, to Taylor-Davis Inc., Philadelphia.

200 tons, United States engineer, St. Louis, to Republic Steel Corp., Cleveland, pro. 91.

200 tons, addition, White Cap Co., Chicago, to Ceco Steel Products Corp., Chicago; Campbell-Lowrie-Lautermilch Corp., Chicago, contractor.

200 tons, bridge, Pawtucket, R. I., to Bethlehem Steel Co., Bethlehem, Pa.; M. A. Gamimino, contractor.

200 tons, highway project B-03087, Section 1, Armstrong county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.; N. R. Corbisello, contractor.

200 tons, factory, Hagerstown, Md., Fairchild Aviation Corp., to Bethlehem Steel Co., Bethlehem, Pa.; Price Construction Co., contractor.

200 tons, Scott Field, Rantoul, Ill., for U. S. Engineer, St. Louis, inv. 1103-42-91, to Laclede Steel Co., St. Louis.

155 tons, addition, naval prison, Portsmouth, N. H., to Truscon Steel Co., Youngstown, O.

150 tons, factory, American Bosch Corp., at Springfield, Mass., to Joseph T. Ryerson & Son Inc., Chicago; Brown & Mathews, contractor.

150 tons, Virginia Public Service Co., Alexandria, Va., to Truscon Steel Co., Youngstown, O.; Doyle & Russell, contractor.

139 tons, Clark Fork River bridge and over Northern Pacific Co. tracks, Mineral county, Mont., to unnamed interests, through contractor Roy L. Blair, Spokane, Wash., at $173,578.

120 tons, highway project R-223, Section 3, Cambria county, Pennsylvania, to Truscon Steel Co., Youngstown, O.; Laub & Collins, contractor.

116 tons, highway project R-219, section 7, Centre county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.; H. J. Williams, contractor.

100 tons or more, additional facilities, Ft. Hauchuca, Arizona, to Allison Steel Mfg. Co., Phoenix, Ariz.; Del E. Webb Construction Co., Phoenix, contractor.

100 tons, community high school, Oaklawn, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

100 tons, sewage treatment plant, Great

CONCRETE BARS COMPARED

	Tons
Week ended Nov. 1	6,230
Week ended Oct. 25	14,522
Week ended Oct. 18	11,103
This week, 1940	10,936
Weekly average, 1941	14,460
Weekly average, 1940	8,814
Weekly average, Oct., 1941	9,894
Total to date, 1940	426,546
Total to date, 1941	635,245

Includes awards of 100 tons or more.

Lakes Naval Training Station, Great Lakes, Ill., to Concrete Steel Co., Chicago; bids Oct. 21.

100 tons, construction and paving, Camp Forest, Tennessee, to Virginia Steel Co., Richmond, Va.; T. M. Strider Co., Nashville, Tenn., contractor.

REINFORCING STEEL PENDING

5000 tons, ammonia nitrate plant, Baxter Springs, Kans.; McGraw Construction Co., contractor.

5000 tons, estimated, steel sheet piling and bars, concrete graving dock, Boston, specification 10717; Bureau of Yards and Docks, Navy department, Washington.

3008 tons, Bureau of Reclamation, invitation A-33,457-A, Coram, Calif.; bids Nov. 4.

4200 tons, Odair, Wash., invitation D-38133-A, for Bureau of Reclamation, Denver; bids Oct. 28.

1600 tons, tank plant, Fisher Body Co., at Grand Blanc, Mich.

1000 tons, army base requirements, Newfoundland; Newfoundland Base, contractor.

1000 tons, Bureau of Reclamation, Invitation A-33,422-A-1, Keswick, Calif.; Colorado Builders Supply Co. Denver, Colo., submitted only bid.

900 tons, gun plant, Pontiac Motor Co., Pontiac, Mich.

730 tons, expansion, Granite City Steel Co., Granite City, Ill.; Stupp Bros., contractor.

717 tons, Bureau of Reclamation, Invitation 22,522-A-1, Mountain Home, Idaho; new bids Oct. 30; no bids received Oct. 17.

600 tons, Penway viaduct, Kansas City, Mo.; bids Nov. 18.

600 tons, supercharger plant, General Electric Co., Ft. Wayne, Ind.; Stone & Webster, contractor.

568 tons, two pumping stations, Plymouth, Pa.; bids to United States engineer, Baltimore.

400 tons, hotel for women, Washington; J. W. Harris Associates, contractor.

350 tons, invitation 2292, Bonneville power administration, Oreg.; no bids received.

300 tons, switching building, Boston Edison Co., Boston.

300 tons, power station, Atlantic Utility Service Co., Alexandria, Va.

280 tons, Dixie ordnance plant, Sterlington, La.; M. W. Kellogg Co., New York, contractor.

225 tons, service building, Springfield, Mass., armory.

200 tons, Panama, schedule 5645; bids Nov. 3.

100 tons, defense plant building, U. S. Rubber Co., Naugatuck, Conn.; A-1-c priority.

Pig Iron

Pig Iron Prices, Page 116

November allocations of pig iron have been received by producers and differ little from October allotments, some adjustments being made in accordance with inventories on hand. On the whole, this method of distribution has proven highly successful, although some melters without defense work have suffered from lack of iron. Cases of shutdown or severe curtailment have been few. Little iron is being accumulated at furnaces, shipment being made promptly as fast as the iron is cast.

A number of consumers have not made application for iron since the allocation plan went into effect, apparently realizing they would be given no iron because of sufficient stocks for their needs. Sellers are endeavoring to have these melters file the PD-70 form, in accordance with regulations, which require statement of inventory whether further supply is asked or not.

Some producers find their allocations will cover all rated tonnage and leave some small lots to help customers who have not obtained an appreciable quantity of defense work.

United States Pipe & Foundry Co., Burlington, N. J., has been allocated 8200 tons salvaged from a ship beached in the Delaware river while en route to England early this year. The iron is low phos made by Bethlehem Steel Co. and bessemer made by Alan Wood Steel Co. Ceiling prices are said to have applied. This iron will require special mixing to meet the pipe company's requirements and how far it will affect November needs is not clear.

Bethlehem Steel Co. plans to blow in its sixth blast furnace at Buffalo, now nearing completion, about the middle of November. A seventh stack is under construction.

Scrap

Scrap Prices, Page 118

Allocation of scrap is not expected to be put into effect until after Nov. 15, when Washington has reports of

inventories in hand and can determine where greatest need exists. In a few instances some scrap has been diverted to cover critical shortage and avoid curtailment.

Meanwhile dealers continue to prepare and ship all scrap received, supplying their regular customers as in the past. They are awaiting instructions as to what changes are to be made in their usual routine. Washington is preparing schedules of normal needs of melters and also of inventories held by them and by suppliers. In the latter work the surveys of the Bureau of Mines are proving of value.

While overgrading and prices above ceiling are charged occasionally OPA is successful in several instances in forcing dealers to refund the overcharges and is proceeding in other cases.

Low phos scrap is extremely scarce and acid furnace operators, especially in the East, are unable to obtain as much as they require. A factor in this situation is that many steel producers who formerly sold their low phos scrap, its price being about $3 per ton above heavy melting steel, now are retaining it. In so doing they increase their scrap supply, though at cost of the higher price they could obtain. Various expedients are being tried in the effort to obtain larger supply but the situation is growing worse.

In the Chicago district weekly shipments have declined, with reserves generally low. A number of carloads have been ordered shipped into the Youngstown district and one steel plant, which has been forehanded in accumulating a reserve, has been ordered to take in no more until given permission.

Railroad offerings are small, almost the only list being by the Baltimore & Ohio, about 6500 tons, slightly larger than usual. Youngstown Sheet & Tube Co. has bought 200 tons of rails removed from Youngstown streets, bidding the ceiling price.

Despite an eight-day respite at Detroit when operations were strikebound, scrap supplies again are becoming critical at Great Lakes Steel Corp. plant with intake of materials estimated to be only 75 per cent of consumption and inventories virtually exhausted. It is believed that if incoming shipments do not improve curtailment of operations will be necessary this week.

Pacific Coast

San Francisco — Most producing mills on the Pacific Coast are running three shifts when enough ingots can be obtained. The most active market was that for structural shapes and 4507 tons were placed, bringing the aggregate for the year so far to 552,259 tons as compared with 325,321 tons for the corresponding period in 1940.

The scrap situation has become acute and stocks are badly depleted. The OPM office has granted open hearth producers some leeway as regards obtaining scrap from remote districts, such as Nevada, but

the annual production in that state is estimated to be but slightly over 5000 tons. This material may be purchased at $13 a gross ton at the point of production, provided the delivered price at mill does not exceed $19.50 a gross ton. Many districts in the northern part of California produce many times the amount available from Nevada but the freight haul is as much if not greater than from Nevada points. It is expected that further concessions, as regards remote scrap, will be granted producers on the Pacific Coast soon.

Seattle — Federal and municipal units are in the market for important electric machinery. Denver has called bids Nov. 19 for three 150,000-horsepower hydraulic turbines and three actuator-type governor units for Coulee dam power house. Spec. 1013; also for three 15 x 29.65 ft. penstock coaster gates for the same project, Spec. 1010. Bids are called Nov. 25 for three penstock coast gate hydraulic hoists, Spec. 1012. A. M. Angove, secretary of Tacoma Board of Contracts, will receive bids Nov. 24 for one 55,000-horsepower hydraulic turbine and 40,000-kw generator for LaGrande station. and two 34,500-horsepower hydraulic turbines and two 25.000-kw generators for Alder station.

Inquiry for reinforcing bars is insistent but rolling mills are not quoting. Only additional business being accepted is coming from federal agencies, navy and army engineer projects purchasing from day to day.

Cast iron pipe market has developed no important tonnages but housing projects, cantonments and airports are buying under priorities. Two housing expansions in Seattle involve about 300 tons, yet unplaced. Some projects are going to transite because cast iron pipe is not immediately available.

Cast iron scrap is increasingly hard to get and foundries are bending every effort to meet requirements. Rolling mills are not yet suffering from reduced receipts of steel scrap but are unable to obtain as much as desired.

Canada

Toronto, Ont. — Steadily expanding demand for iron and steel with more rigid enforcement of priority ratings are features of the Canadian markets. Primary producers state that practically all new business must have the approval of the steel controller, but despite this fact orders are pouring in for all materials. Backlogs are at an all-time peak, and while orders are being accepted on some materials delivery dates are far in the future. One consumer of merchant bars stated he was unable to place an order for delivery within four to six months.

Heavy orders are appearing for ship plates, with Canadian production fully absorbed and large tonnage reported going to United States mills. For ship construction alone, it is stated, some 10,000

Nonferrous Metal Prices

Oct.	Copper, Electro, del. Conn.	Copper, Lake, del. Midwest	Copper, Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-8	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	7.25	15.00	14.00	35.00
9-31	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50-13.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.00-10.25
Cleveland	10.50-10.75
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.37½-9.75

Light Copper

New York	8.00
Cleveland	8.00-8.50
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00-6.25
Chicago	6.00-6.25
St. Louis	6.25

Lead

New York	5.25-5.50
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	5.00-5.25
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

tons of plate orders are pending. Rolling stock builders complain of shortage of plates.

Structural steel awards were about 10,000 tons last week, mainly for war plant construction. Additional large tonnages are pending for other plant enlargements for which contracts are to be let soon.

Foundry and malleable pig iron output is larger, but still far below merchant melters' demands. Merchant sales are upward of 5000 tons per week and recently have included some basic iron in addition to foundry and malleable. Malleable is the most active. Steel Co. of Canada Ltd., Hamilton, Ont., is again in the market and has made some sales since its new furnace blew in during September.

Demand for iron and steel scrap is increasing more rapidly than the supply, and special efforts are being made by foundries and steel interests to obtain larger deliveries. Fixing of new prices on iron grades has not stimulated offerings, and foundries not engaged in war work are in a precarious position.

Nonferrous Metals

New York—Control of metals by the government was tightened as of Nov. 1 on which date and thereafter foundries must have on A-10 rating in order to buy copper scrap and copper alloy scrap; lead producers must set aside 15 per cent of their month's production for the OPM pool; zinc producers must set aside in November an amount equal to 31 per cent of their August production for the OPM pool. On Nov. 1 also, the lower price schedule on scrap and secondary aluminum goes into effect.

Copper—Brass mills have agreed to hold their present prices unchanged on brass sheet, tube and rod. Copper and brass wire and cable prices may be officially established at a lower level.

Lead—Producers will ship approximately 37,000 tons during November in the usual manner.

Zinc—Trade awaits OPA permission to advance zinc product prices.

Tin—Offerings remained light as Far Eastern prices remained above the equivalent of 52.00c, New York, the OPA maximum.

Semifinished Steel

Semifinished Prices, Page 115

While first quarter specifications have not been issued, some experts believe that England's semifinished requirements under lease-lend will be somewhat lighter than the current rate, which is somewhere between 250,000 and 300,000 tons per month. Meanwhile, little finished steel is going to England although approximately 150,000 tons are moving monthly to her colonies under the lease-lend program. Whether there will be any particular variation in these shipments next quarter remains a question.

Tin Plate

Tin Plate Prices, Page 114

Tin plate producers have backlogs sufficient for capacity operation through the winter, a season usually slack. In addition to the usual miscellaneous business there is heavy demand for general line cans, such as containers for army oil and gasoline and an unusual demand for cans for 1942 food packing. Export business is also heavy, from all parts of the world.

Price determination for next year is expected to be a formality, present prices probably being extended. Determination of needs will be difficult but probably they will exceed those for this year.

Integrated mills have no difficulty in obtaining material for rolling plate for tinning but some non-integrated producers have met interruptions because of inadequate supply.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 115

Bolt and nut manufacturers are operating at 90 to 100 per cent capacity, with backlogs for the remainder of the year and in some cases beyond. While priority tonnage makes up most of their backlogs some nondefense orders can be taken, though without definite delivery promise. Plain material is difficult to obtain but increasing defense business now being booked is providing relief, compared with a few weeks ago. An eastern producer now has more than 70 per cent of capacity on defense work, with fully half carrying A-1-b priority or higher.

Two large Navy inquiries are pending, one for chrome-nickel anchor bolts, on which bids were opened Oct. 31, which may involve expenditure running to six figures. The other is for carbon steel bolts, bids early in November.

Steel in Europe

Foreign Steel Prices, Page 117

London—(*By Cable*)—Steelworks in Great Britain are operating at capacity on ingot production and plate mills are producing every ton possible. Refined pig iron output is expanding to replace hematite shortage. Demand for alloy steels is increasing. Some steel tonnages have been released for export. Tin plate producers are disposing of their entire output in domestic markets and export of primes is negligible.

Equipment

Boston—Orders for machine tools placed with New England shops within the last two weeks have built up backlogs to the highest point in the history of the industry. Including four or five outstanding contracts for boring, grinding and lathe equipment, additional orders are in excess of $5,000,000, substantial part being placed by the Ordnance Department with shops in the Worcester, Provi-

dence and Hartford districts. Duplicate purchases for expanding production of the Pratt & Whitney aircraft engine make up part of the heavier volume with much supplemental business to be placed for assembly lines in new plant expansion. Equipment for engine builders at Lycoming and Pottstown, Pa., and propeller shops in the middle west is involved. Two contracts to the Heald Machine Co., Worcester, Mass., for boring and grinding machines are well in excess of $1,000,000.

Seattle—Dealers report inability to meet demand, as new units cannot be obtained. Stocks of used machinery are practically exhausted. Serious shortages of tractors and other essential equipment is threatening shutdowns in the lumber industry. Deliveries of new machinery are slow and uncertain and up to now the industry has been able to continue because parts supplies were available. Lumber and logging has an A-10 priority. Normally the industry requires 15 to 20 new tractors a month but not more than six new units have been delivered in the last four months, it is reported. Even outmoded steam donkey engines cannot be obtained.

Hold Little Hope for Profit System After War

■ Virtually no hope for a broad system of free enterprise after the war is held by nine-tenths of the management group, a quarterly poll by the magazine *Fortune* reveals.

More than 75 per cent of those polled also believe the administration is using the national emergency whenever possible to push still further the more radical social and economic aims of the New Deal.

Manufacturers, who account for nearly half the panel in the magazine's poll, reported: They are being progressively strapped by priorities; they are having to lay off more employes; inventories are declining; there are signs of unnecessary hoarding by the Army and Navy.

On the question of free enterprise, 7.2 per cent believe such a system will be restored after the war; 52.4 per cent believe there will be established a system in which government will take over many of the public services formerly under private management but still leave many opportunities for private enterprise; 36.7 per cent believe there will be a semisocialized society in which there will be little room for the profit system; 3.7 per cent believe there will be a complete economic dictatorship along the Fascist or Communist lines.

Brass Sheet, Rod, Tube Makers Steady Prices

■ Leading manufacturers of brass sheets, rods and tubes have agreed not to raise prices despite a 1-cent increase in price of primary zinc, OPA officials said last week.

"In acceding to an OPA request not to pass on the increased cost of zinc at this time brass mills have co-operated in our efforts to prevent any inflationary trend developing in prices of brass sheets, tubes and rods," Administrator Henderson said.

"The larger problem of keeping finished product prices in line should not be considerably modified." Unchanged prices for brass sheets, tubes and rods removes any ground for increased prices in brass mill scrap, now under ceiling, Mr. Henderson continued, adding that some fabricators have been hoarding scrap in anticipation of higher prices.

"Since no higher prices may be expected for brass mill scrap and toll agreements have been eliminated by the recent priority order, every reason exists for fabricators to return scrap promptly to brass mills."

OPA is studying cost factors of brass products, he stated. On

present information it appears mills are well able to continue to absorb increase in zinc prices without advancing brass rod, sheet, tube price.

Four More Scrap Dealers To Refund Overcharges

Three Chicago and one Cleveland sellers of iron and steel scrap have signed stipulations providing for refund to buyers of all amounts collected since Sept. 2 in excess of the ceiling prices set by OPA.

This increases to six the number of cases in which complete restitution of sums charged above the established maximums has been arranged through direct action by OPA. Proceedings against certain other dealers and brokers are underway.

Fire-Fighting Apparatus Makers Given A-2 Rating

Manufacturers of essential fire-fighting apparatus have been assigned a preference rating of A-2 in acquiring necessary materials by the Priorities Division of OPM. Order is effective immediately.

Chlorinated Rubber Placed Under Priority Control

All stocks and sales of chlorinated rubber were today placed under rigid priority control in General Preference Order M-46, issued by the Division of Priorities.

Producers of chlorinated rubber are directed to make deliveries only as ordered by the Director of Priorities, and the term "producer," defined in the order, includes all who have the rubber processed for them under toll agreement, or who have purchased, or purchase, it for re-sale, in addition to those engaged in its primary production.

Chlorinated rubber is produced by the Hercules Powder Co. and the Firestone Tire & Rubber Co., and is usually ordered by the trade names of Parlon, and Raolin.

Railroads Asked to Cut Steel Rates to West Coast

Railroads have been asked by several government agencies, including OPA, to reduce freight rates on iron and steel articles on all-rail routes to the Pacific Coast.

Rates proposed would be revised downward to $1.15 per 100 pounds from the Atlantic Seaboard to 75 cents per 100 pounds from Colorado shipping points. These rates would apply to minimum carload weights of 80,000 pounds. They compare with present rates ranging from $1.43 per 100 pounds from Atlantic seaboard points to 85 cents per 100 pounds from Colorado on minimum carloads weights of 40,000 and 60,000 pounds, depending on product.

The proposed all-rail rates would be as follows from key producing points to north and south Pacific Coast destinations:

From	Present Rate	Proposed Rate
Baltimore	$1.43	$1.15
Pittsburgh	1.27	1.10
Detroit	1.19	1.05
Chicago	1.10	1.00
St. Louis	1.05	.95
Kansas City	.99	.90
Pueblo, Colo.	.85	.75

Steelworks Expansion Faces Many Obstacles

■ The projected steelworks expansion program, even that part already authorized, is not going to materialize as things now stand, some steelmakers hold. That is because the program has been given a general blanket A-1-k priority rating, which is utterly worthless on some most needed products, such as plates.

It is understood that attempts are being made at Washington to break down the program, giving varying priorities ratings to various portions. In the industry it is believed such a setup could be arrived at only after a complicated process and that it would be faulty at best.

Even with A-1-a priorities the program would meet serious delays since manufacturers of special equipment for blast furnaces, steelworks and rolling mills and in connection with ore and coal handling and by-product coke ovens are booked far ahead and could not make delivery within any reasonable period.

Were proposed new blast furnaces covered by top priorities they could be completed in a comparatively short time. There seems to be no indication that top priorities will be granted. As things now stand it will take at least two to three years to complete the portion already authorized. Should pressure for materials and equipment become greater it would take even longer.

Steel Industry Granted A-3 Rating for Repair

(*Concluded from Page* 30)

cation therefrom, black plate, tin and terne plate, sheets, strip, tool steel bars, including high speed, steel wheels and axles for railroad use only, railroad locomotive tires, armor plate ordnance forgings, steel castings, rough as cast, skelp, rolling mill rolls, ingot molds, coke for use in production of pig iron and ferroalloys.

Granite City To Build 300,000-Ton Plant

Granite City Steel Co., Granite City, Ill., has been authorized by Defense Plant Corp. to build and equip a plant at Granite City for the production of steel ingot and plates. Plant will have a capacity of 300,000 tons of ingots and 190,000 tons of plates annually. Cost will be $6,300,000.

Title to the plant will remain with Defense Plant Corp. and Granite City Steel will operate it under a lease agreement.

Urge Steel Substitute In Oil Containers

WASHINGTON

■ To save steel and other metals for defense program, Office of Petroleum Co-ordinator for National Defense has recommended that the oil industry discontinue use of metal containers. Containers made of wood, glass, paper and other materials were suggested as practical substitutes. Complete figures on the normal metal container requirements of the oil industry, in tons, are not available, but drum manufacturers reported that in 1940 they sold 310,950 tons of steel containers to the industry.

■ Donner-Hanna Coke Corp., Buffalo, has awarded a contract to Otto Construction Corp., New York, for a complete new unit for producing ammonium sulphate. Construction is to begin immediately.

Construction and Enterprise

Ohio

AKRON, O.—C. M. Wilkinson Co., 619 East Tallmadge street, manufacturer of chutes, conveyors, etc., will build 40 x 80-foot addition. Office will be removed from 1422 Central Tower to new plant. Cost about $30,000.

ATHENS, O.—New York Coal Co., P. C. Morris, general manager, will build a powerhouse and tipple at mine No. 25, replacing fire damage, costing about $50,000.

CLEVELAND—Yoder Co., 5500 Walworth avenue, will build addition with

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 123 and Reinforcing Bars Pending on page 125 in this issue.

21,000 square feet floor space for execution of $7,200,000 contract for anti-tank guns and 105-mm. shells.

CLEVELAND—Barth Stamping & Machine Works, 3815 West Thirty-fourth street, John J. Barth, manager, is considering erection of office and machine shop addition to cost about $16,000.

KENT, O.—Twin Coach Co., 850 South Main street, will build two factory buildings on Stow street for manufacture of trailer fire pumper. Additions will cost $175,000. Contract to H. K. Ferguson Co., Hanna building, Cleveland.

MANSFIELD, O.—R. B. Ridenour, 74 North Diamond street, is considering erection of three-story factory, containing 14,500 square feet of floor space.

NEWTON FALLS, O.—City, W. Elmo Bailey, mayor, is considering expansion of municipal power plant, including additional diesel power generator and auxiliaries. Carl J. Simon & Associates, Evans-Central building, Van Wert, O., are engineers.

NORTH BALTIMORE, O.—Village, Fred Halboth, mayor, A. M. Lloyd, clerk, has complete plans for a municipal light and power system, including building 38 x 211 feet, diesel engine equipment, switchboard and distribution system. C. J. Simon & Associates, Evans-Central building, Van Wert, O., are engineers.

SOUTH AMHERST, O.—Village, Albert Schneider, mayor, plans complete distribution system, including water treatment plant, 100-foot tower, with 100,000-gallon steel tank. Carl J. Simon and Associates, Evans-Central building, Van Wert, O., consulting engineers.

Pennsylvania

ERIE, PA.—Swanson Tool & Machine Co., 810 East Eighth street, will build a one-story 51 x 108-foot plant addition costing $40,000.

PITTSBURGH—Kerotest Mfg. Co., E. G. Mueller, president, 2525 Penn avenue, will take bids soon through S. L. Roush, architect, 1210 Chamber of Commerce building, for a three-story 100 x 100-foot plant addition costing $100,000.

WILLIAMSPORT, PA.—Lowry Electric Co. Inc., 643 Elmira street, will build a one-story warehouse and distribution building, to cost about $40,000.

New Jersey

BAYONNE, N. J.—Western Electric Co., Kearny, N. J., has leased former Margon plant, Avenue A and West Thirty-first street, for use as a branch plant. Includes 95,000 square feet of floor space.

BLOOMFIELD, N. J.—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has let contract to Salmond Scrimshaw Construction Co., 58 Elm street, Arlington, N. J., for five manufacturing buildings, to cost about $55,000.

RIDGEFIELD, N. J.—Amsco Wire Products Inc., 606 Grand avenue, has let contract for design and construction of a one-story wire plant addition to Bonanno Construction Co., Inc., 8533 Tonelle avenue, North Bergen, N. J.

SAYREVILLE, N. J.—National Lead Co., Chevalier avenue, South Amboy, N. J., will build a dock and unloading equipment on Raritan river, to cost $290,000, including equipment.

New York

BRENTWOOD, L. I., N. Y.—Production Engineers Inc., manufacturer of tools and precision parts, Middle Valley, Queens, N. Y., has leased building on Suffolk avenue, near Washington avenue, to handle subcontracts for aviation plants at Farmingdale, L. I. August Wolfe is president.

FALCONER, N. Y.—Jamestown Malleable Iron Co., Tiffany avenue, Jamestown, N. Y., will build a foundry addition, contract to Warren Construction Co., 335 State street, Jamestown, costing about $40,000.

LONG ISLAND CITY, N. Y.—Liquidometer Corp. 36-16 Skillman avenue, has plans by C. M. Lobegager, 54-19 Roosevelt avenue, Woodside, L. I., for a two-story plant at 41-95 Thirty-sixth street, costing $50,000.

LONG ISLAND CITY, L. I., N. Y.—Thomson Equipment Corp., manufacturer of aircraft parts and accessories, Jamaica, L. I., has leased a one-story industrial building at Thirty-second avenue and Twenty-second street, into which it will move its manufacturing activities on defense materials.

NEW YORK—Kincaid Co. Inc., has been incorporated with 100 shares no par value to deal in metals and metal products. Bangset & Kaufmann, 10 East Fortieth street, New York, are representatives.

Michigan

DETROIT—Odel Tool & Die Co., 8820 Grinnell street, has plans by F. Emrich Jr., 1126 Detroit Savings Bank building, for a one-story tool and die shop addition to cost about $50,000.

JACKSON, MICH.—Calvan Machine Products Inc., 801 South Water street, has been incorporated with $20,000 capital to manufacture automotive and airplane parts, by Dan E. Kitson, R.F.D. No. 4, Jackson.

Illinois

GRANITE CITY, ILL.—Commonwealth Steel Co., division of General Steel Castings Co., Eddystone, Pa., G. F. Driemeyer, works manager, Granite City, plans construction of $14,000,000 defense plant there to manufacture cast armor for tanks.

ROCKFORD, ILL.—George D. Roper Corp., manufacturer of rotary pumps, stoves, etc., will build $600,000 addition to plant for manufacture of 75-mm. armor-piercing components.

Wisconsin

MILWAUKEE—Eclipse Moulded Products Co., North Thirty-second street, will build $7000 factory addition. Oscar Knabs is architect.

California

OAKLAND, CALIF.—G. R. Borrman Steel Co., 25 Eighth street, will expand its plant at cost of about $45,000.

OAKLAND, CALIF. — Romak Iron Works, 915 Eighteenth street, will build plant addition to cost $40,000.

SAN FRANCISCO—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will build a two-story plant, irregular site, to cost $400,000. A. F. Roller, Crocker-First National Bank building, is architect.

SAN FRANCISCO—Pacific Gas & Electric Co., 245 Market street, plans generating facilities at Midway steam plant at Buttonwillow, Calif., to cost about $6,850,000.

Washington

ORTING, WASH.—City has a $37,547 WPA allocation for construction of municipal water system.

SEATTLE — United States Plywood Corp., 4000 Fifteenth avenue, West, plans construction of 90-foot steel tower supporting 24-foot steel water tank.

SEATTLE — Gear Pulling Equipment Co. has been incorporated with $20,000 capital by Thomas Masuda, 1711 Smith tower.

SEATTLE—Defense Plant Corp. has allotted $700,000 to Pacific Car & Foundry Co., White building, Seattle, for construction of an addition to the Renton plant which now produces castings up to eight tons, but in the larger plant will have capacity up to 15 tons for use in local shipyards.

Canada

CLARKSON, ONT.—British-American Oil Co. Ltd., Royal Bank building, Toronto, Ont., will ask bids soon on two additional buildings in connection with its new $3,000,000 oil refinery here. C. B. Dolphin is architect.

CHIPPAWA, ONT.—Norton Co., manufacturer of abrasives, will award contracts soon for a plant addition 70 x 100 feet, to cost about $100,000, with equipment.

GUELPH, ONT.—Callander Foundry & Mfg. Co., Crimea street, will build foundry addition, 90 x 118 feet, to cost about $30,000, including equipment. William Parker, 26 Glasgow street, general contractor.

HAMILTON, ONT.—Canadian Westinghouse Co. Ltd., 288 Sanford avenue North, builders of electrical equipment, will build a three-story 100 x 600-foot addition to its eastern plant here, to cost about $250,000. Hutton & Souter, Pigott building, are taking bids.

HAMILTON, ONT.—Dominion Foundries & Steel Ltd., Depew street, will build

addition to armor plate department costing about $250,000, general contract to Canadian Engineering & Contracting Co. Ltd., 25 Hughson street South, Prack & Prack, Pigott building, are architects.

HAMILTON, ONT.—National Steel Car Corp. Ltd., Kenilworth avenue, will build plant addition of 50,000 square feet, bids having been called, to cost about $250,000. Hutton & Souter, Pigott building, are architects.

HAMILTON, ONT.—Aerovox Canada Ltd., 43 Catharine street South, manufacturer of electric condensers, etc., will build addition costing $150,000, with equipment, general contract to Pigott Construction Co., Pigott building.

LONDON, ONT.—J. I. Case Co., 88 York street, will build addition 92 x 186 feet, costing about $100,000. L. G. Bridgman, 311 Royal Bank Chambers, is architect.

LONG BRANCH, ONT. — Small Arms Ltd., Lake Shore road, will build plant addition to cost $300,000 exclusive of equipment. General contract awarded to Foundation Co. of Ontario Ltd., 1158 Bay street, and steel contract to John T. Hepburn Ltd., 18 Van Horne street, Toronto, Ont.

PETERBOROUGH, ONT. — Canadian General Electric Co. Ltd., King street West, Toronto, Ont., has awarded general contract to A. W. Robertson Ltd., 57 Bloor street West, Toronto, for erection of plant addition on Park street, here, to to cost $500,000.

PORT HOPE, ONT.—Mathews Conveyer Co. Ltd., 102 Water street, is taking bids for erection of two-story, 40 x 60-foot plant addition to cost about $30,000. Herbert Horner, 19 Bloor street West, Toronto, architect.

PRESTON, ONT.—Clare Brothers, 216 King street, William Knobs, manager, is having plans prepared for plant addition, and will require machinery, converters, etc. Cost about $40,000, with equipment.

SAULT STE. MARIE, ONT.—Algoma Central Railway Co., Bruce and Bay streets, will build new car shops and erect other buildings on Hudson street, to cost about $80,000.

SMITH FALLS, ONT.—Frost & Wood Co. Ltd., Chambers street, maker of agricultural implements, has given general contract to F. E. Scott, 8 Oak street, for construction of two-story plant, 80 x 110 feet, to cost $25,000.

TORONTO, ONT.—C. H. Taylor, 193 King street East, makers of high-pressure meters, etc., is taking bids through James Thompson, architect, 26 Queen street East, for plant addition to cost $15,000.

TORONTO, ONT.—Amalgamated Electric Co. Ltd., 386 Pape avenue, will build addition costing $100,000, exclusive of equipment.

TORONTO, ONT. — Neptune Meters Ltd., 345 Sorauren avenue, will build a new plant with 25,000 square feet floor space, to cost $125,000, for manufacture of war materials.

TORONTO, ONT.—John Inglis Co. Ltd., 20 Strachan avenue, will build new heat treating and boiler plants to cost $100,000, and has given general contract to A. W. Robertson Ltd., 57 Bloor street West.

TORONTO, ONT.—Massey-Harris Co. Ltd., 915 King street West, has given general contract to Walter Davidson & Co., 188 Duke street, for plant alterations to cost $35,000.

WELLAND, ONT.—Electro Metallurgical Co. of Canada Ltd. has given contract to Gardner Construction Co. Ltd., 7 Riverbank street, for a plant addition costing $100,000.

WINDSOR, ONT.—Dominion Forge & Stamping Co., 2480 Seminole street, plans erection of plant addition to cost $25,000, excluding equipment. General contract awarded to Allan Construction Co., 44 Wyandotte avenue.

LEVIS, QUE.—George T. Davie & Sons, 27 Davie street, has started work on large addition to shipyards to cost $200,000, work to include three shipways, erection of new shops and office building.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, will build addition to its Dominion works at Ville St. Pierre, costing $50,000, general contract to Corinthian Construction Co. Ltd., 5726 Sherbrooke street West.

MONTREAL, QUE.—Jacques Cartier Machine Shop will build addition costing $10,000 on Chambly road, general contract to Joseph Chagnon, 2528 Chambly street. H. Guerette, 1880 Papineau avenue, is president.

MONTREAL, QUE.—Sicard Ltd., 2055 Bennett street, manufacturer of snow plows, will build addition costing $60,000, with equipment.

SHERBROOKE, QUE.—Canadian Ingersoll-Rand Co. Ltd., Commissioner street, will build a one-story addition 75 x 100 feet, costing $150,000, with equipment. H. G. James, 36 Portland avenue, is architect.

WHERE-TO-BUY

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ABRASIVES (Blast Cleaning)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVES (Wheels)
Bay State Abrasive Products Co., Westboro, Mass.

ACCUMULATORS
Elmes, Chas. F., Engineering Wks., 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Schioemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

ACETYLENE
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

ACID-PROOF LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.
Quigley Co., 56 W. 45th St., New York City.

ACIDS (Pickling)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

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. S, Pennsalt Cleaner Div., Philadelphia, Pa.

ALLOYS (Hard Surfacing)
Stoody Co., Whittier, Calif.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANNEALING BOXES—See BOXES (Annealing)

ANNEALING COVERS
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

ANODES (All Types)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BALANCING MACHINES
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.

BALING PRESSES
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

BALL TRANSFERS
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

BALLS (Brass or Bronze)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Strom Steel Ball Co., 1842 S. 54th Ave., Cicero, Ill.

BALLS (Special Alloy Metals)
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

BALLS (Steel)
***Also Stainless**
*Strom Steel Ball Co., 1842 S. 54th Ave., Cicero, Ill.

BAND FILES (Metal)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

BAND SAWS (Metal Cutting)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BAR BENDERS
Kardong Bros. Inc., 346 Buchanan St., Minneapolis, Minn.

BARGE MOVERS
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Maryland Dry Dock Co., Baltimore, Md.

BARRELS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

BARRELS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

BARS (Alloy)
Ampco Metal, Inc., Dept. S-113, 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., 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.

BARS (Brass, Bronze or Copper)
American Brass Co., The, Waterbury, Conn.
Copperweld Steel Co., Warren, O.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BARS (Concrete Reinforcing)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BATHS (Heat Treating-High Speed)
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.

BATTERIES (Storage)
Edison Storage Battery Div. of Edison, Thomas A., Inc., West Orange, N. J.
Electric Storage Battery Co., The, 19th St. and Allegheny Ave., Philadelphia, Pa.

BATTERY CHARGING APPARATUS
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BEAMS, CHANNELS, ANGLES, ETC.
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BEARINGS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Torrington Co., The, Torrington, Conn.

BEARINGS (Babbitt)
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

BEARINGS (Brass, Bronze)
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Moraine Products Division, General Motors Corporation, Dayton, Ohio.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BEARINGS (Journal)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Needle)
Torrington Co., The, Torrington, Conn.

BEARINGS (Non-Metallic)
Moraine Products Division, General Motors Corporation, Dayton, Ohio.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.

BEARINGS (Oilless)
Moraine Products Division, General Motors Corporation, Dayton, Ohio.
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

BEARINGS (Quill)
Bantam Bearings Corp., South Bend, Ind.

BEARINGS (Radial)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St., and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The Canton, O.

BEARINGS (Roll Neck)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn. Harrison, N. J.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Bower Roller Bearing Co., 3040 Hart St., Detroit, Mich.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller Tapered)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

BEARINGS (Rolling Mill)
American Roller Bearing Co., 416 Melwood St., Pittsburgh, Pa.
Bantam Bearings Corp., South Bend, Ind.
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.
Morgan Construction Co., Worcester, Mass.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Thrust)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Link-Belt Co., 519 No. Holmes Ave., Indianapolis, Ind.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BELTING (Chain and Link)
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.

BELTING (Metal, Conveyor, High and Low Temperature)
Cyclone Fence Co., Waukegan, Ill.

BENCH PLATES
Challenge Machinery Co., Grand Haven, Mich.

BENCHES
Challenge Machinery Co., Grand Haven, Mich.
Lyon Metal Products, Inc., 7211 Madison Ave., Aurora, Ill.

BENDING AND STRAIGHTENING MACHINES
Alliance Machine Co., The, Alliance, O.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Cleveland Crane & Engineering Co., Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, 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.
Kardong Bros., Inc., 346 Buchanan St., Minneapolis, Minn.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Co., Tar & Chemical Div., 901 Koppers Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BILLETS (Alloys and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

BILLETS AND BLOOMS (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

BINS (Storage)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Lyon Metal Products, Inc., 7211 Madison Ave., Aurora, Ill.

BLAST CLEANING EQUIPMENT (Sand)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.

BLAST FURNACE CLEANING (Gas)
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Peabody Engineering Corp., 580 Fifth Ave., New York City.

BLAST FURNACE HOT BLAST STOVES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bk. Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACE STOCK HOUSES
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Reading Chain & Block Co., Dept. 311, Reading, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
General Electric Co., Schenectady, N. Y.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWPIPES (Oxy-Acetylene)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., The, Tiffin, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

BOLTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

BOLTS (Carriage and Machine)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
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 (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

BOLTS (Special)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS (Stove)
Central Screw Co., 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BOLTS (Stove, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

WHERE-TO-BUY

BOLTS (Stove, Recessed Head)—Con.
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 9378-B, Scranton, Pa.

BORING MACHINES (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

BOXES (Annealing)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
National-Erie Corp., Erie, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES (Open Hearth Charging)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

BRAKE LININGS
Johns-Manville Corp., 22 E. 40th St., New York City.

BRAKES (Electric)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, ETC.

BRICK (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)—See CRANES (Bridge)

BRIDGES, BUILDINGS, VIADUCTS, STACKS, ETC.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Blaw-Knox Co., Blawnox, Pa.
Columbia Steel Co., San Francisco, Calif.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.

BROACHING CUTTERS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BROACHING MACHINES
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, Hartford, Conn.

BRUSHES (Industrial)
Fuller Brush Co., The, Hartford, Conn.

BRUSHES (Steelgript)
Fuller Brush Co., The, 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.
Osgood Co., The, Marion, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUCKETS (Single Hook, Automatic Dump, Automatic Single Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, BUILDINGS, ETC.

BULLDOZERS
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.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bloom Engineering Co., 916 Behan St., Pittsburgh, Pa.
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.

BURNERS (Fuel, Oil, Gas, Combination)—Con.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

BUSHINGS (Jig)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City N. Y.

BY-PRODUCT PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

CAISSONS (Pneumatic)
Dravo Corp., (Contracting Div.), Neville Island, Pittsburgh, Pa.

CALCIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)

CAPSTANS (Electric, Gasoline, Diesel)
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CAR DUMPERS
Alliance Machine Co., The, Alliance, Ohio.
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.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

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.
Easton Car & Construction Co., Easton, Pa.
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.
Easton Car & Construction Co., Easton, 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)
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Iron)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Alloy Steel)
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro Alloys Co., The, Elyria, O.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O.-Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
Sumet Corporation, 1553 Fillmore Ave., Buffalo, N. Y.

CASTINGS (Corrosion Resisting)
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.

CASTINGS (Die)—See DIE CASTINGS

CASTINGS (Electric Steel)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
National-Erie Corp., Erie, Pa.
Reading Steel Casting Div. of American Chain & Cable Co. Inc., Reading, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Brown & Brown, Inc., 456 So. Main St., Lima, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Oil Well Supply Co., Dallas, Texas.
Shenango-Penn Mold Co., Dover, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)
Electro Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Div. of Blaw-Knox Co., Blawnox, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Malleable)
American Chain & Cable Co. Inc., Bridgeport, Conn.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)
(*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehm, Pa.
Birdsboro Stel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Ferracute Machine Co., Bridgeton, N. J.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Oil Well Supply Co., Dallas, Texas.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
Standard Steel Works Div. of Baldwin Locomotive Works, The Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Div. of Blaw-Knox Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Wear Resisting)
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.

CEMENT (Acid Proof)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CEMENT (High Temperature)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Eagle-Picher Lead Co., The, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.
Norton Company, Worcester, Mass.
Quigley Company, 56 W. 45th St., New York City.

CEMENT (High Temperature Hydraulic)
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.

CENTRAL STATION EQUIPMENT
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

CHAIN (Conveyor and Elevator)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Draw Bench)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Malleable)
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Power Transmission)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Sling)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHAIN (Sprocket)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Steel-Finished Roller)
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Welded or Weldless)
American Chain & Cable Co. Inc., Bridgeport, Conn.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Allince, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

CHARGING MACHINES AND MANIPULATORS (Autofloor Type)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

CHECKER BRICK
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.

CHECKS (Metal)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

CHEMICALS (Industrial)
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

CHISELS (Chipping)
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

CHROMIUM METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.

CHROMIUM PLATING PROCESS
United Chromium, Inc., 51 E. 42nd St., New York City.

CHUCK OPERATING CYLINDERS
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

CHUCKING MACHINES (Multiple Spindle)
National Acme Co., The, 170 E. 131st St., Cleveland, O.

CHUCKS (Automatic Closing)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CLAMPS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

CLEANERS (Steam)
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.

CLEANING SPECIALTIES
American Chemical Paint Co., Dept. 310, Ambler, Pa.
MacDermid, Inc., Waterbury, Conn.
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

CLUTCHES (Friction)
Jones, W. A. Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.

CLUTCHES (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

COAL OR COKE
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHERE-TO-BUY

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, Ohio.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

COKE OVENS (By-Product)
Koppers Co., Engineering and Construction Div., 100 Koppers Bldg., Pittsburgh, Pa.

COLUMBIUM
Electro Metallurgical Co., 30 E. 42nd St., New York City.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMBUSTION CONTROLS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

COMPARATORS (Optical)
Jones & Lamson Machine Co., Springfield, Vt.

COMPENSATORS (Automatic)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

COMPRESSORS (Air)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Klenlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.

CONCRETE (Heat Resistant)
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.

CONCRETE REINFORCING BARS —See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-Jet)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

CONNECTING RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYOR BELTS (Wire)
Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

CONVEYORS (Apron)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Chain)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Elevating)
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.

CONVEYORS (Roller—Power and Gravity)
Mathews Conveyer Co., 142 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9378-B, Scranton, Pa.

COTTER PINS
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Alliance Machine Co., The, Alliance, Ohio.
Dravo Corp. (Engineering Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Alliance Machine Co., The, Alliance, Ohio.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.

CRANES (Electric)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Alliance Machine Co., The, Alliance, Ohio.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
Alliance Machine Co., The, Alliance, Ohio.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Osgood Co., The, Marion, O.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div., of The Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUT-OFF MACHINES (Abrasive)
Challenge Machinery Co., Grand Haven, Mich.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CUTTING-OFF MACHINES (Rotary)
Metch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Taylor-Wilson Mfg. Co., 15 Thomson Ave., McKees Rocks, Pa.

CYLINDERS (Air or Hydraulic)
Airgrip Chuck Div., Anker-Holth Mfg. Co., Port Huron, Mich.
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Hydraulic)
American Hollow Boring Co., 1054 W. 20th St., Buffalo, N. Y.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City.

DESCALING PROCESSES
The Bullard Co., Bridgeport, Conn.

DESIGNERS (Industrial)
Designers for Industry, Inc. Terminal Tower, Cleveland, O.

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co. 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DIES (Steel, Embossing)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Refractories, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.
Peabody Engineering Corp., 580 Fifth Ave., New York City.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAW BENCHES
Vaughn Machinery Co., Cuyahoga Falls, O.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLING MACHINES (Vertical)
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Link-Belt Co., 220 S. Belmont Ave. Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pangborn Corp., Hagerstown, Md.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELECTRODES (Hard Surfacing Welding)
Stoody Co., Whittier, Calif.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Loftus Engineering Corp., 747 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINEERS (Lubricating Equipment)
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

ENGINES (Diesel)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., Dept. K75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. K75, 600 So. Michigan Ave., Chicago, Ill.

ENGINES (Kerosene)
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Osgood Co., The, Marion, O.

FANS (Crane Cab)
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FANS (Exhaust Ventilating)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Sturtevant, B. F., Co.,

FANS (Portable)
Perkins, B. F., & Son, Inc., Holyoke, Mass.

FANS (Wall)
Perkins, B. F. & Son, Inc., Holyoke, Mass.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Co., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., The, Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Southern Ferro Alloys Co., 2108 Chestnut St., Chattanooga, Tenn.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America,

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.,

FILES AND RASPS
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE EXTINGUISHERS
C-O-Two Fire Equipment Co., 10 Empire St., Newark, N. J.
Kidde & Co., Inc., Walter 1132 West St., Bloomfield, N. J.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.

FLOORING (Monolithic)
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.
Scully Steel Products Co.,
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Div. of The Baldwin Locomotive Works, Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Upton Electric Salt Bath Furnace Div. Commerce Pattern Fdry. & Mach. Co., 7452 Melville Ave., at Green, Detroit, Mich.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.

FURNACES (Gas or Oil)—Con.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wilson, Lee, Sales Corp., 1368 Blount St., Cleveland, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
A. F. Holden Co., The, 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Ohio Crankshaft Co., The, 6600 Clement Ave., Cleveland, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Upton Electric Salt Bath Furnace Div. Commerce Pattern Fdry. & Mach. Co., 7452 Melville Ave., at Green, Detroit, Mich.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Wilson, Lee, Sales Corp., 1370 Blount St., Cleveland, O.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2300 Chester Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Automatic Control & Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GAGES (Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
General Electric Co., Schenectady, N. Y.
Sheffield Corp., The, Gage Div., Dayton, O.

GAGES (Pressure & Vacuum Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Products Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Galvanizers Incorporated, Portland, Ore.
Fanner Mfg. Co., The, Cleveland, O.
Finn, John, Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hill, James, Mfg. Co., Providence, R. I.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International-Stacey Corp., Columbus, O.
Isaacson Iron Works, Seattle, Wash.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING COMPOUNDS
American Solder & Flux Co., 2153 E. Norris St., Philadelphia, Pa.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GALVANIZING PRODUCTS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., First National Bank Bldg., Pittsburgh, Pa.
Peabody Engineering Corp., 580 Fifth Ave., New York City.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Fairbanks, Morse & Co., Dept. K75, 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.
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Plating)
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Bravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

GREASE FITTINGS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE GUNS
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDER CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

GRINDERS (Circular Saw)
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

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 (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING COMPOUNDS
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.

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.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
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.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Segmental)
Norton Company, Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Norton Co., Worcester, Mass.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

GRINDING WHEELS
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Co., The, Jackson, Mich.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUARDS (Belt, Machine & Window)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-113, 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.
Broslus, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

WHERE-TO-BUY

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BUSHINGS
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

HAMMERS (Drop)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Power)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

HAMMERS (Steam)
Alliance Machine Co., The, Alliance, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
National Machinery Co., Tiffin, O.

HEATERS (Air)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

HEATERS (Electric Space)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

HEATERS (Unit)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Grinnell Co., Inc., Providence, R. I.

HELMETS (Blast Cleaning)
Pangborn Corp., Hagerstown, Md.

HITCHINGS (Mine Car)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

HOISTS (Chain)
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 311, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

HOISTS (Electric)—Con.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Monorail)
American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Div. of Curtis Mfg. Co., 1996 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.

HONING MACHINES
Micromatic Hone Co., 1345 E. Milwaukee Ave., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

HOOPS AND BANDS
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOOPS (Welded Wire)
Keystone Steel & Wire Co., Peoria, Ill.

HOSE (Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Blast Furnace Stock Line)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

INDICATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

INDUSTRIAL DESIGNERS
Designers for Industry, Inc., Terminal Tower, Cleveland, O.

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Superior Mold & Iron Co., Penn, Pa.
Valley Mould & Iron Corp., Hubbard, O.

INHIBITORS
American Chemical Paint Co., Dept. 310, Ambler, Pa.

INSTRUMENTS (Electric-Indicating and Recording)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Brush Development Co., 3311 Perkins Ave., Cleveland, O.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
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.
Quigley Co., 56 W. 45th St., New York City.

INSULATING CONCRETE
Atlas Lumnite Cement Co., Dept. S-18, Chrysler Bldg., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St. New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Building)
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, Etc.)
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Quigley Co., 56 W. 45th St., New York City.

IRON (Bar)
Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The Youngstown, O.

JIG BORERS
Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.
Cleereman Machine Tool Co., Green Bay, Wis.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

LABORATORY WARE
Bay State Abrasive Products Co., Westboro, Mass.
Norton Company, Worcester, Mass.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.

LAPPING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LATHE CENTERS
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Axelson Manufacturing Co., 6160 So. Boyle Ave., Los Angeles, Cal.
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-2, Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 894 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Automatic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Chucking)
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 894 E. Madison St., South Bend, Ind.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD (Tellurium)
National Lead Co., 111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.

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.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div., Fate-Root-Heath Co., Plymouth, O.
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Fireless)
Porter, H. K., Co. Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LOCOMOTIVES (Steam)
Porter, H. K., Co., Inc., 49th & Harrison Sts., Pittsburgh, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Switching and Transfer)
Cooper-Bessemer Corp., The, Mt. Vernon, O.

LUBRICANTS (Graphite)
Acheson Colloids Corp., Port Huron, Mich.

LUBRICANTS (Industrial)
Acheson Colloids Corp., Port Huron, Mich.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.
Lincoln Engineering Co., 5700 Natural Bridge Ave., St. Louis, Mo.

MACHINE WORK
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Special)
Alliance Machine Co., The, Alliance, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hanniffin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The, New Haven, Conn.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

MACHINERY (Used & Rebuilt)
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 No. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago, Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2670 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 Co., 30 E. 42nd St., New York City.

MANGANESE ORE
Cuban-American Manganese Corp., 122 E. 42nd St., New York, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MANIPULATORS (Forging)
Alliance Machine Co., The, Alliance, Ohio.

MARKING DEVICES
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh, Pa

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

METAL FINISHES
American Nickeloid Co., 1310 N. Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Hard Surfacing)
Stoody Co., Whittier, Calif.

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

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 E. 283rd St., Wickliffe, O.
Reading Chain & Block Corp., Dept. 311, Reading, Pa.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTOR-ROLLERS
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

MOTORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. K75, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS (*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NUTS (*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave., at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Non-Ferrous and Stainless)
Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2367 Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

OILS (Cutting)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., Dept. 1, 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., Dept. 112, 5600 Roosevelt Rd., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City

PACKING (Asbestos or Rubber)
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. S. 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 (Marking)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERN EQUIPMENT (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6011 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

PICKLING EQUIPMENT
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
International Nickel Co., The, 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. S. Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wieman & Ward Co., The, Oliver Bldg., Pittsburgh, Pa.

PIG IRON (Charcoal)
Tennessee Products Corp., Nashville, Tenn.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Ball)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.

PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3015 W. 47th St., Chicago, Ill.
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div., Republic Steel Corp., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

PLANT DISMANTLERS
Hetz Construction Co., Warren, O.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATE LIFTING GRIPS
Downs Crane & Hoist Co., 3989 S. Normandie Ave., Los Angeles, Cal.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube and Bar)
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

POTENTIOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3828 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Bending)
Cleveland Crane & Engineering Co., Steelweld Machinery Div., The, 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The, Steelweld Machinery Div., 1125 E. 283rd St., Wickliffe, O.
Watson-Stillman Co., Roselle, N. J.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Denison Engineering Co., The, 113 W. Chestnut St., Columbus, 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.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

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.
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Suply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. K75, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., The, 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Roper, The Geo. D., Corp., Rockford, Ill.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PUMPS (Reciprocating)
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co.,
Fairbanks, Morse & Co., Dept. K75, Providence, R. I. 600 S. Michigan Ave., Chicago, Ill.
Roper, The Geo. D., Corp., Rockford, Ill.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.

PUMPS (Vertical Turbine)
Layne & Bowler, Inc., Memphis, Tenn.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

WHERE-TO-BUY

PUNCHING AND SHEARING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Albert, L., & Son, Whitehead Rd., Trenton, N. J.
Crawbuck, John D., Co., Empire Bldg., Pittsburgh, Pa.
Galbreath Machinery Co., Empire Bldg., Pittsburgh, Pa.
General Blower Co., 404 N. Peoria St., Chicago, Ill.
Iron & Steel Products, Inc., Hegewisch Sta., Chicago Ill.
Lang Machinery Co., 28th & A.V.R.R., Pittsburgh, Pa.
Motor Repair & Mfg. Co., 1558 Hamilton Ave., Cleveland, O.
Philadelphia Transformer Co., 2829 Cedar St., Philadelphia, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

RECORDERS (Combustion)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

RECORDERS (Pressure, Speed, Temperature, Time)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REDUCERS (Speed)—See SPEED REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

REFRACTORIES (Dolomite)
Basic Refractories, 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.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

REFRACTORIES (For High Frequency Furnaces)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORIES (Silicon Carbide)
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co. Dept. S-18, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

RINGS (Steel)
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
King Fifth Wheel Co., 2915 No. Second St., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
*Midvale Co., The, Nicetown, Philadelphia, Pa.

RIVET SETS
Pittsburgh Saw & Tool Co., 7[illegible] Sycamore St., Etna P. O., Pittsburgh, Pa.

RIVETERS (Hydraulic—Portable and Stationary)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETERS (Pneumatic)
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

RIVETING MACHINERY
Buffalo Forge Co., 446 Broadway, Buffalo, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Conn.

RIVETING MACHINERY—Con.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

RIVETS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RIVETS (Non-Ferrous and Stainless)
Harper, H. M., Co., The 2646 Fletcher St., Chicago, Ill.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Drill)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The Alliance, Ohio
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

ROLLING MILLS (Consulting, Contracting Engineers)
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLING MILL TABLES
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

ROLLS (Bending and Straightening)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Sand and Chilled)
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O. Springfield, O.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co. Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. and Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ohio Steel Fdry. Co., Lima, O.-Springfield, O.
Pittsburgh Steel Foundry Corp., Glassport, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Tinning Machine)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

ROOFING AND SIDING
Johns-Manville Corp., 22 E. 40th St., New York City.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
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)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

RUST PREVENTIVES
Alrose Chemical Co., 80 Clifford St., Providence, R. I.
American Lanolin Corp., Railroad St., Lawrence, Mass.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Smith Oil & Refining Co., Rockford, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING COMPOUNDS
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.

RUST PROOFING PROCESS
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Parker Rust Proof Co., 2158 E. Milwaukee Ave., Detroit, Mich.
Udylite Corp., The, 1651 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

SALT TABLETS
Fairway Laboratories, Div. The G. S. Suppiger Co., 1530 Hadley St., St. Louis, Mo.
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND-BLASTING NOZZLES (Borium)
Stoody Co., 1134 W. Slauson Ave., Whittier, Calif.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWING MACHINES (Hot and Cold)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

SAWS (Band—Metal Cutting)
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Disston, Henry & Sons, Inc., Tacony, Philadelphia, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.

SAWS (Inserted Tooth, Cold)
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Disston, Henry, & Sons, Inc., Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SAWS (Segmental)
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Motch & Merryweather Machinery Co., Penton Bldg., Cleveland, O.
Pittsburgh Saw & Tool Co., 78-80 Sycamore St., Etna P. O., Pittsburgh, Pa.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.) 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. K75. 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.

SCALES (Dial & Recording)
Fairbanks, Morse & Co., Dept. K75, 600 S. Michigan Ave., Chicago, Ill.

SCALES (Laboratory)
Fairbanks, Morse & Co., Dept. K75. 600 S. Michigan Ave., Chicago, Ill.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. K75. 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

SCHOOLS
International Correspondence Schools, Box 9378-B, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Inc., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Continental Screw Corp., New Bedford, Mass.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Cap, Set, Safety-Set)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2930 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

WHERE-TO-BUY

SCREWS (Conveyor)
Lee Spring Co. Inc.,
30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp.,
194-200 Varick St.,
New York City.

SCREWS (Hardened Self-Tapping)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O
Parker-Kalon Corp.,
194-200 Varick St.,
New York City.

SCREWS (Machine)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co.,
Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
International Screw Co.,
Detroit, Mich.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
New England Screw Co.,
Keene, N. H.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pawtucket Screw Co.,
Pawtucket, R. I.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Non-Ferrous and Stainless)
Harper, H. M., Co., The
2646 Fletcher St., Chicago, Ill.

SCREWS (Self Locking)
Shakeproof Inc.,
2525 N. Keeler Ave.,
Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co.,
Providence, R. I.
Central Screw Co., Chicago, Ill.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shakeproof Lock Washer Co.,
Chicago, Ill.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Parker-Kalon Corp.,
194-200 Varick St., New York City
Shakeproof Inc.,
2525 N. Keeler Ave.,
Chicago, Ill.

SCREWS (Thumb)
Central Screw Company,
3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co.,
Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co.,
2440 E. 75th St., Cleveland, O.
Parker, Charles, Co., The,
Meriden, Conn.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Southington Hdwe. Mfg. Co.,
Pawtucket, R. I.
Whitney Screw Co., Nashua, N. H.

SEAMLESS STEEL TUBING—
See **TUBES**

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
LaSalle Steel Co., 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.
Scully Steel Products Co.,
1316 Wabansia Ave., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works,
Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co.,
4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co.,
1461 So. 66th St.,
Milwaukee, Wis.
Roebling's, John A., Sons Co.,
Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg.,
Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co.,
3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Disston, Henry, & Sons, Inc.,
926 Tacony, Philadelphia, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.
Wapakoneta Machine Co., The,
Wapakoneta, O.

SHEARS
Buffalo Forge Co.,
446 Broadway, Buffalo, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave.,
Cleveland, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Halliden Machine Co., The,
Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co.,
Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The,
Alliance, O.
Niagara Machine & Tool Works,
637-697 Northland Ave.,
Buffalo, N. Y.
Thomas Machine Mfg. Co.,
Etna Branch P. O.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

SHEARS, ROTARY (Slitting, Beveling, Circling, Flanging)
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET BARS
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.

SHEET BARS—Con.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Yoder Co., The, W. 55th St. & Walworth Ave., Cleveland, O.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.
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.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-113, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
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.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
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, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc. Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Lead Coated)
Superior Sheet Steel Div., Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 2351 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.

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, 3021 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., 2243-2244 Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHELLS (Seamless Drawn)
Crosby Co., The, 183 Pratt St., Buffalo, N. Y.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SILICO-MANGANESE
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SLITTERS
Ohio Knife Co., Dreman Ave. & B. & O. R.R., Cincinnati, O.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Pennsylvania Salt Mfg. Co., Dept. S, Pennsalt Cleaner Div., Philadelphia, Pa.

SPACING TABLES
Thomas Machine Mfg. Co., Etna Branch P. O., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.

SPIEGELEISEN
Electro Metallurgical Co., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPINDLES (Lathe)
American Hollow Boring Co., 1054 W. 20th St., Erie, Pa.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
*Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
*Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Coil & Elliptic)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Compression)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Oil Tempered—Flat)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Torsion)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINGS (Valve)
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.

SPRINKLERS (Automatic)
Grinnell Co., Inc., Providence, R. I.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Crosby Co., The, 183 Pratt St, Buffalo, N. Y.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Lyon Metal Products, Inc., 7211 Madison Ave., Aurora, Ill.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAMPS (Steel)
Cunningham, M. E., Co., 172 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
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.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., 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.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Granite City Steel Co., Granite City, Ill.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Electric)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Copperweld Steel Co., Warren, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rustless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.

STEEL (Screw Stock)—Con.
LaSalle Steel Co., 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.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Spring)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., 97 Main St., Bristol, Conn.
Cold Metal Products Co., The, Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O.
Rockefeller Bldg., Cleveland, O.

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)

*Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 3021 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cold Metal Products Co., The, 2131 Wilson Ave., Youngstown, O.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Levinson Steel Co., 33 Pride St., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Scully Steel Products Co., 1316 Wabansia Ave., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Frasse, Peter A., & Co., Inc. 17 Grand St., New York City
Ingersoll Steel & Disc Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Ill.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean, Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

STONES (Honing)
Bay State Abrasive Products Co., Westboro, Mass.

STOOLS
Superior Mold & Iron Co., Penn., Pa.

STOPPERS (Cinder Notch)
Bailey, Wm. M. Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

STOPPERS (Rubber)
Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

STORAGE EQUIPMENT
Lyon Metal Products, Inc., 7211 Madison Ave., Aurora, Ill.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.

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. S. Pennsalt Cleaner Div., Philadelphia, Pa.

SWITCHES (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2670 E. 79th St., Cleveland, O.
General Electric Co., Dept. 166-S-G, Nela Park, Cleveland, O.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Cellcote Co., 750 Rockefeller Bldg., Cleveland, O.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Storage, Pressure, Riveted, Welded)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
General American Transportation Corp., 135 So. LaSalle St., Chicago, Ill.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

TANKS (Wood or Steel, Rubber or Lead Lined)
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron, O.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.

TANTALUM-TUNGSTEN CARBIDE
Vascoloy-Ramet Corp., No. Chicago, Ill.

TAPS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

TERMINALS (Locking)
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.
Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

TESTING MACHINERY (Materials)
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

THERMOMETERS
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Brown Instrument Div. of Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stanton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, 2057 E. 61st St., Cleveland, O.

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)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Disston, Henry, & Sons, Inc., 926 Tacony, Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

WHERE-TO-BUY

TOOL BITS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Gisholt Machine Co., 1217 E. Washington Ave., Madison, Wis.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tantalum Carbide)
Vascoloy-Ramet Corp., N. Chicago, Ill.

TOOLS (Tipped, Carbide)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
Air Reduction, 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.) Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 E. 283rd St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRANSMISSIONS—VARIABLE SPEED
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

TRAPS (Compressed Air)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (High Pressure Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TRAPS (Steam)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

TREADS (Safety)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Ford Chain Block Div., American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Reading Chain & Block Co., Dept. 311, Reading, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCK CRANES
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Silent Hoist Winch & Crane Co., 849 63rd St., Brooklyn, N. Y.

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.
Easton Car & Construction Co., Easton, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Gasoline Diesel)
Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, N. Y.

TRUCKS AND TRACTORS (Gasoline Industrial)
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.

TRUCKS (Dump-Industrial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

TRUCKS (Industrial)
Ohio Galvanizing & Mfg. Co., Penn St., Niles, O.

TRUCKS (Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Clark Tructractor Div., Clark Equipment Co., 127 Springfield Pl., Battle Creek, Mich.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Taylor-Wilson Mfg. Co., 15 Thompson Ave., McKees Rocks, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUBES (Boiler)—Con.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
Ohio Seamless Tube Co., Shelby, O.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUBING (Alloy Steel) (*Also Stainless)
*Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

TUBING (Copper, Brass, Aluminum)
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

TUBING (Monel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.

TUBING (Seamless Flexible Metal)
American Metal Hose Branch of The American Brass Co., Waterbury, Conn.

TUBING (Seamless Steel)
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Columbia Steel Co., San Francisco, Calif.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBING (Square, Rectangular)
Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUBING (Welded Steel)
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Frasse, Peter A., & Co. Inc., 17 Grand St., New York City
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBULAR PRODUCTS
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel and Tubes Division, Republic Steel Corp., 226 E. 131st St., Cleveland, O.

TUMBLING BARRELS (Coke Testing)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

TUNGSTEN CARBIDE
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TUNGSTEN CARBIDE (Tools and Dies)
Firth-Sterling Steel Co., McKeesport, Pa.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Co., 30 E. 42nd St., New York City.
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.

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Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

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Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.
Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Homestead Valve Mfg. Co., P. O. Box 22, Coraopolis, Pa.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

VALVES (Electrically Operated)
Bristol Co., The, 112 Bristol Rd., Waterbury, Conn.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

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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.

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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.
Homestead Valve Mfg. Co., P. O. Box 20, Coraopolis, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

VALVES (Iron & Steel)
Galland-Henning Mfg. Co., 2747 So. 31st St., Milwaukee, Wis.

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Vanadium Corp. of America, 420 Lexington Ave., New York City.

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WALKWAYS—See FLOORING—(Steel)

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Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

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Garrett, George K., Co., 1421 Chestnut St., Philadelphia, Pa.
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Thompson-Bremer & Co., 1638 W. Hubbard St., Chicago, Ill.

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Harper, H. M., Co., The, 2646 Fletcher St., Chicago, Ill.

WASHERS (Spring)
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Raymond Mfg. Co., Div. Associated Spring Corp., 280 So. Centre St., Corry, Pa.
Shakeproof Inc., 2525 N. Keeler Ave., Chicago, Ill.
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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST81, Troy, O.
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Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich.

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Federal Machine & Welder Co., Dana St., Warren, O.

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Lincoln Electric Co., The, Cleveland, O.
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Hobart Bros., Box ST81, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson Welder & Metals Co., 60 E. 42nd St., New York City.

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Linde Air Products Co., The, 30 E. 42nd St., New York City.

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Lincoln Electric Co., The, Cleveland, O.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

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Bridgeport Brass Co., Bridgeport, Conn.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Hobart Bros., Box ST81, Troy, O.
Lincoln Electric Co., The, Cleveland, O.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
Maurath, Inc., 7311 Union Ave., Cleveland, O.
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Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
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Washburn Wire Co., Phillipsdale, R. I.
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Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
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Midvale Co., The, Nicetown, Philadelphia, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

WHEELS (Track)
National-Erie Corp., Erie, Pa.

WHEELS (Trolley)
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Silent Hoist Winch & Crane Co. 849 63rd St., Brooklyn, N. Y.

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Columbia Steel Co., San Francisco, Calif.
Firth-Sterling Steel Co., McKeesport, Pa.
*Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
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Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Barb)
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE (Cold Drawn)
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (High Carbon)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Washburn Wire Co., 118th St. and Harlem River, New York City.

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Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

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Columbia Steel Co., Los Angeles, Calif.
Continental Steel Corp., Kokomo, Ind.
Page Steel & Wire Div., of American Chain & Cable Co., Inc., Monessen, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
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.
Keystone Steel & Wire Co., Peoria, Ill.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. & Harlem River, New York City.

WIRE (Stainless)
Allegheny Ludlum Steel Corp., Dept. T-125, Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE (Stapling)
Keystone Steel & Wire Co., Peoria, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Rustless Iron & Steel Corp., 3400 E. Chase St., Baltimore, Md

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WIRE AND CABLE (Electric)
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General Electric Co., Sec. CDW-1907, Appliance & Merchandise Dept., Bridgeport, Conn.
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WIRE CLOTH
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Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.
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 DIES
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Firth-Sterling Steel Co., McKeesport, Pa.
Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
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Roebling's, John A., Sons Co., Trenton, N. J.
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Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
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Hubbard, M. D., Spring Co., 444 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
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Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
*Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Washburn Wire Co., 118th St. and Harlem River, New York City.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WIRE ROPE AND FITTINGS (*Also Stainless)
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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.
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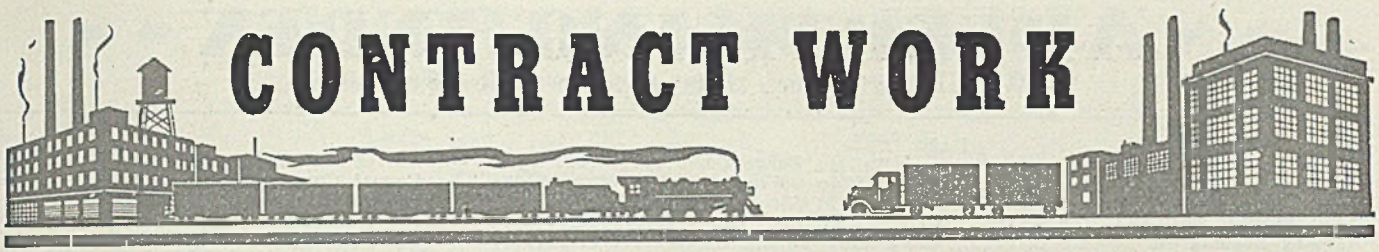

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Help Wanted

MANUFACTURERS REPRESENTATIVE. To represent well-known line of rust preventive coatings. Exclusive territories open for Cleveland, New York and Pittsburgh. Write full details of past experience and type of accounts you are now contacting. Reply Box 585, STEEL, Penton Bldg., Cleveland.

METALLURGICAL ENGINEER — GRADUate in metallurgy or metallurgical engineering with advanced degree or sufficient experience to qualify for research work in large middle west manufacturing concern. State Age, education, and experience. Address Box 579, STEEL, Penton Bldg., Cleveland.

METALLOGRAPHIST — GRADUATE IN metallurgy with experience in metallographic work and X-ray examination of materials for research laboratory of large middle west concern. State age, education, and experience. Address Box 580, STEEL. Penton Bldg., Cleveland.

WANTED — LAYOUT AND DETAIL draftsmen for steel and concrete mill building construction, ore handling equipment, Northern New York state. Must be U. S. citizens. State color, age, experience, references and salary desired. Box B, Port Henry, New York.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind—

Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry.

When you have an opportunity to offer, use the Help Wanted columns of STEEL.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words, 6.50, each additional word .13; all capitals, leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05; all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge.

Displayed classified rates on request.

Address your copy and instructions to STEEL, Penton Bldg., Cleveland.

Accounts Wanted

DETROIT — MANUFACTURERS' AGENT with twenty years' successful experience in selling to the automobile industry is—due to reduced automobile production—now in position to aggressively represent manufacturers who are properly equipped to handle sub-contracts from the automobile industry on National Defense work. If you are prepared to handle such sub-contracts efficiently at annual volume of $250,000.00 and upwards, our sales efforts backed by our favorable reputation in the industry will bring results. Address Box 586, STEEL, Penton Bldg., Cleveland.

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 nigh 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.

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

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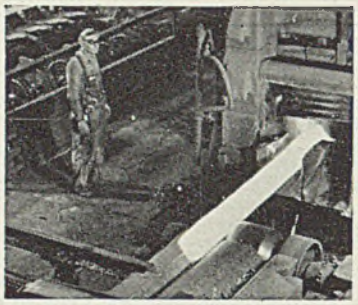
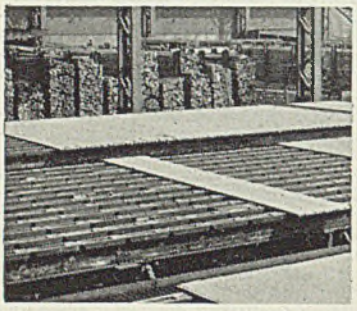
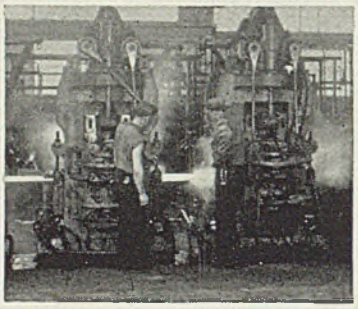
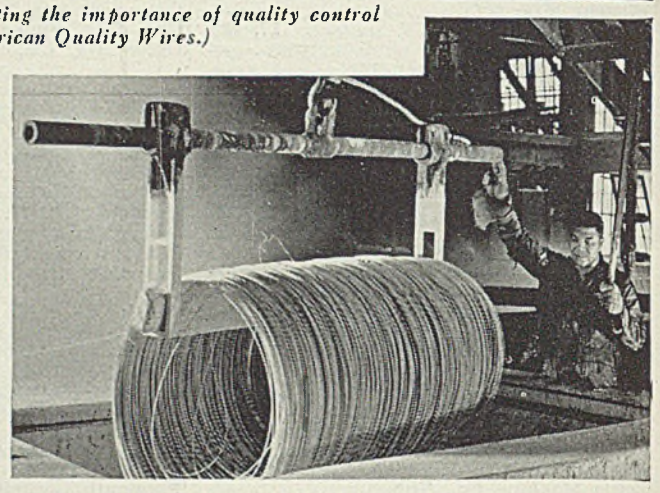
IT TAKES "*knowing how*" TO MAKE GOOD WIRE

(One of a series of advertisements illustrating the importance of quality control in the manufacture of American Quality Wires.)



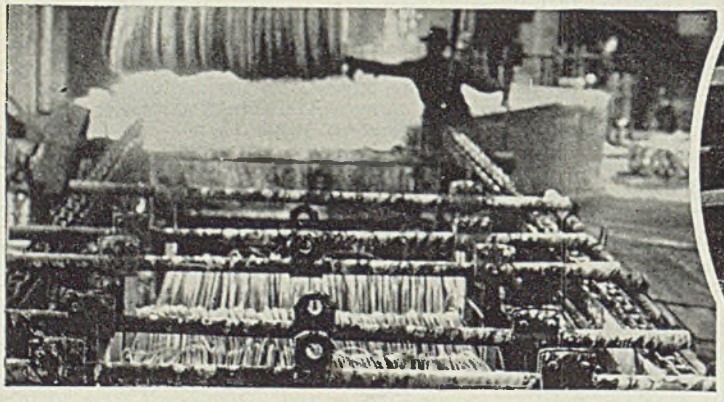






1 **BEGINNING WITH THE CAREFUL SELECTION** of ores and other basic materials, the quality of American Wire is rigidly controlled in every processing and manufacturing step. "Knowing How" combines the knowledge of specially trained technical men, and the skill of experienced workers with the most modern equipment available.

3 **TO PROTECT** and prepare the surface for subsequent drawing, the cleaned steel rods are coated with a solution of the best quality lime. Specially designed, modern bakers bake the lime on the rods, giving them the soft, silky coating which aids in the drafting of the wire. Exact temperatures in the bakers and careful control throughout this process are highly important.



2 **ONE OF THE MANY IMPORTANT STEPS** in wire manufacture is the cleaning of the hot rolled rods. At this stage, the dark oxide or natural protective coating of the rods must be carefully removed without injuring the metallic surface underneath. Careful control is exercised to guard against overcleaning. "Knowing How" is your protection.

4 **TO ENABLE WIRE** to be drawn from the rods to the very finest size, a softening treatment is necessary at one or more of the intermediate sizes. This softening operation is known as "process heat treating." Thermostatic temperature regulation and control are necessary to secure the uniform softness required. American Quality Wire is heat treated under the guidance of experienced technical men, in the most modern equipment in the industry.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

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

AMERICAN *Quality* WIRES FOR MANUFACTURING PURPOSES

UNITED STATES STEEL