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STEEL

ESTABLISHED 1882

Contents

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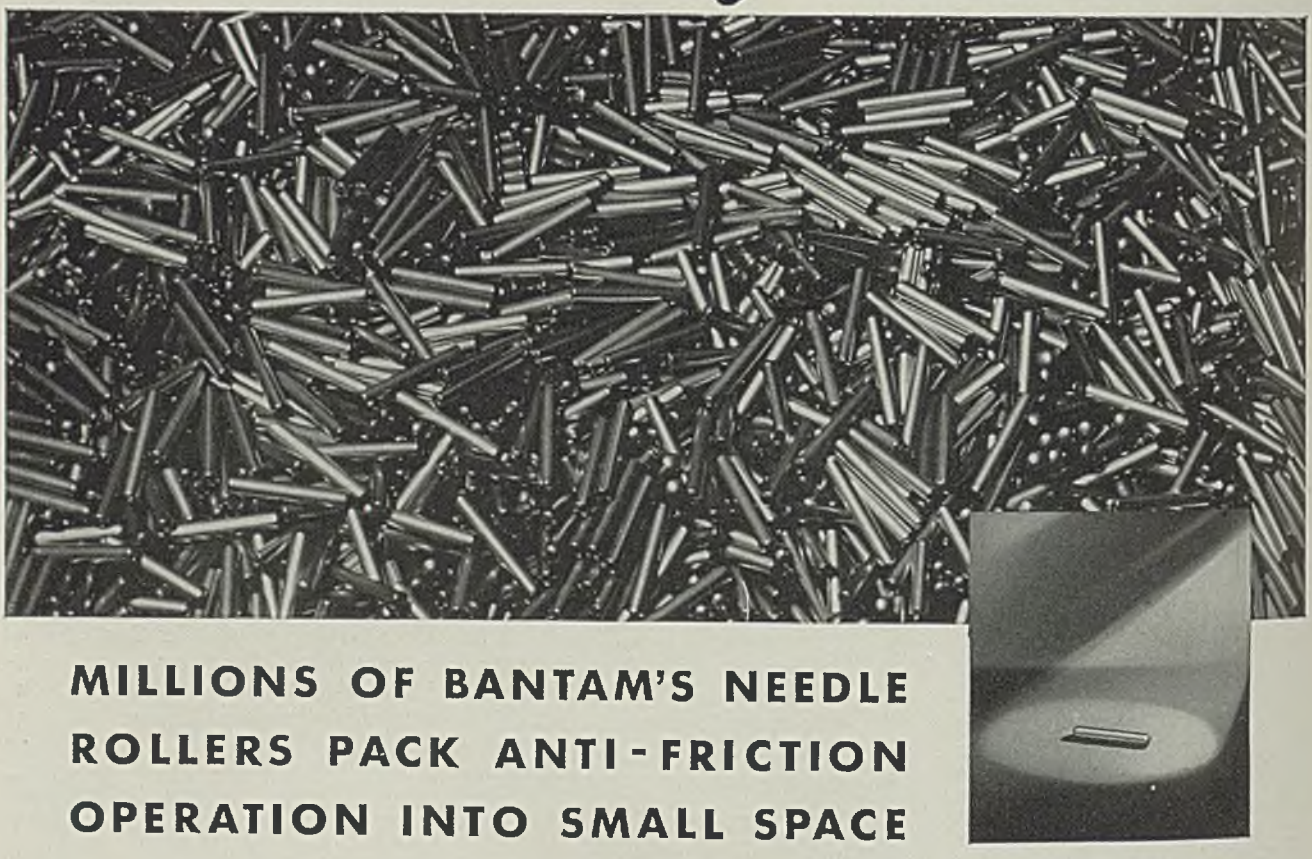
PRODUCTION • PROCESSING • DISTRIBUTION • USE

FRICTION *Fighters*



MILLIONS OF BANTAM'S NEEDLE ROLLERS PACK ANTI-FRICTION OPERATION INTO SMALL SPACE

On universal joints, brake cross shafts, transmission shafts—at a score of strategic points in the modern automobile, designers insure smooth, anti-friction operation by using Bantam's Needle Rollers.

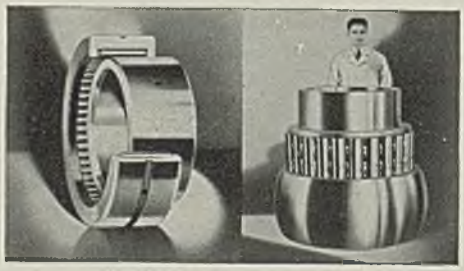
No other type of anti-friction bearing ever devised provides such high capacity in proportion to size and cost. The exceptionally high capacity of Bantam's Needle Rollers is the result of Bantam's engineering skill—a skill developed to the finest point in the production of billions of rollers.

Bantam's Needle Rollers are themselves designed to meet the requirements of good product design. They are lap finished after grinding to provide a better surface. And they are hardened, under the watchful eyes of Bantam's metallurgists, to the precise point that assures their high capacity—yet leaves them ductile enough to bend without breaking.

Wherever capacity, space, and cost are primary considerations, Bantam's Needle Rollers provide an excellent anti-friction bearing. Specify Bantam's Needle Rollers on your next job for dependable anti-friction operation.

BANTAM BEARINGS CORPORATION, SOUTH BEND, INDIANA

(*Lower Left*) **BANTAM'S QUILL BEARING** is a compact, self-retained unit, easy to install. Employing a full complement of Needle Rollers, it has unusually high load capacity in proportion to its size. It is supplied with or without inner race, and is carried in stock in sizes from ½ to 4½" I. D., 1¼ to 7" O. D. Write for Bulletin H-104. For Needle Bearings for lighter service, ask our affiliate, The Torrington Company, Torrington Conn., for Circular 21-H



(*Left*) **CUSTOM-MADE BEARINGS** for the *unusual* application are a major part of Bantam's service to industry. A typical instance of Bantam's engineering is this lift bridge bearing, 47" O. D., 26" I. D., 20" long. Bantam has designed and built some of the largest bearings ever made—and will take on *your* toughest problem, too.

BANTAM'S ENGINEERING COUNSEL is based on wide experience with every major type of anti-friction bearing. Bantam makes them all—recommends the one best adapted to *your* job. For impartial advice on your problem, TURN TO BANTAM.

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING
THIS ISSUE

■ REAFFIRMATION of prices on principal finished steel products through the first quarter of 1941 (p. 111) is reassuring to consumers. Many of them would have had to move up selling prices on their manufactured products in the event of an increase on steel. Hence the continuance of existing steel prices has a stabilizing effect whose full import, perhaps, is not generally understood. . . . Steel buying during December promises to be smaller in volume than has been the case in recent months, both for seasonal and inventory reasons. In the meantime the industry continues to strain to get out steel. Production, because of shutdowns for repairs, dropped ½ point last week (p. 25) to 96½ per cent of ingot capacity.

• • •

Expansion plans in the steel industry begin to be impressive. Last week Bethlehem Steel Co. (p. 21) announced that it would add 850,000 tons to its ingot, 800,000 tons to its coke and 700,000 tons to its pig iron capacity. Recently Tennessee Coal, Iron & Railroad Co. announced a plan to increase its ingot capacity by 400,000 tons. A number of other companies are expanding or rounding out capacity on a sizable scale. . . . Coke is scarce (p. 103) and zinc is even scarcer. Scrap prices continue to move to higher levels. . . . Twelve rules for creating and maintaining smooth and efficient labor-management relations are suggested (p. 39) by the employment relations committee of the National Association of Manufacturers.

Expansion Looms Up

• • •

In labor board elections at Roseville, O., four individuals were elected (p. 43) with full powers as bargaining agents for employes at two potteries, giving union leaders something to think about. . . . The steel construction industry, says V. Gilmore Iden (p. 30), can take care of all defense as well as all private construction work now in sight. . . . The air transport lines have agreed (p. 30) to defer expansion plans that call for new equipment. . . . A new senate bill (p. 32) is aimed at protecting American standards of living against destructive foreign competition. . . . Chrysler Corp. (p. 23) is seeking to locate all possible sources of materials and parts for army tanks.

Elect Individuals

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How to demonstrate a new principle in the design or construction of machinery often poses a difficult problem in sales engineering. Albert H. Dall (p. 50) describes a method developed for demonstrating a new spindle bearing for precision grinding machines. By means of a setup in a glass case the operation of the bearing can be observed and studied. . . . Broach specialists lately have stepped into the front rank of the tool engineering profession (p. 52), says Guy Hubbard in an article on the usefulness of broaching in eliminating bottlenecks. . . . Through use of a die duplicator (p. 56) a saving of approximately 80 per cent in machining time on crankcase and barrel core boxes was obtained.

New Spindle Bearing

• • •

E. J. Mills describes an outstanding materials handling system (p. 60) which results in sharply reducing costs in a plant where many diversified products are made. . . . No. 1 stack at the Aliquippa works of Jones & Laughlin Steel Corp. (p. 66) is to be air conditioned. . . . One steelmaker (p. 66) has found a good substitute for magnesite. . . . Edward R. Williams (p. 68) outlines progress to date in the continuous casting of metals. . . . J. R. Gier (p. 76) discusses controlled atmosphere heat treating. . . . Harold Lawrence (p. 84) writes on the welding and flame cutting of wrought iron. . . . New cutting materials include a new tungsten carbide with high strength (p. 56) and an improved cobalt-chromium-tungsten alloy.

Materials Handling

THE RYERSON UNIQUE 3 point program

1 EVERYTHING IN STEEL

Ryerson carries the largest and most complete steel stocks in America . . . carbon steels, alloys, stainless, etc., in every size, shape and form . . . a ready, reliable source of supply.

2 CERTIFIED QUALITY

Ryerson Certified Uniform High Quality Steels meet exacting, narrow range specifications . . . an important advantage, especially with alloy steels, where chemical content, heat-treating response and other characteristics must be known with certainty to assure best results in less time.

3 IMMEDIATE SHIPMENT

Fast delivery is assured from all ten conveniently located Ryerson plants . . . no order too small for prompt, personal, attention or too large for immediate shipment.

PRODUCTS INCLUDE:

Structurals
Bars
Plates (15 kinds)
Sheets (25 kinds)
Strip Steel
Alloy & Tool Steels
Stainless
Shafting
Mech. Tubing
Boiler Tubes
Welding Rod
Babbitt, Solder
Reinforcing
Nails, Rivets, etc.

RYERSON CERTIFIED STEELS

RYERSON

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

Certified STEELS

New Facilities To Lift Steel Output for Defense Needs

Bethlehem Will Increase Ingot Capacity 850,000 Tons.

Navy Program, Plus Ships for Britain, Spurs Demand.

Rolling Mills, Blast Furnaces, Coke Ovens Also Added.

Stettinius Says Defense Commission Favors Expansions.

■ EXPANSION by the steel industry to meet emergency needs of the national defense program and increased aid to Great Britain began to take form last week in Bethlehem Steel Corp.'s decision to launch an $18,000,000 building program. Bethlehem will increase ingot capacity by 850,000 net tons or about 8 per cent, will add 800,000 tons coke capacity and 700,000 tons pig iron capacity.

For the past several months there has been a mild controversy over whether or not present steel capacity is adequate for normal and emergency needs. One school of thought has held the industry's capacity of about 83,000,000 net tons annually would be reasonably adequate to supply both normal and emergency requirements, plus whatever amount should be needed by Great Britain. They admitted tight spots might develop at certain times and in certain commodities and that a priorities system might be necessary.

The other school, chiefly government officials and economists, insisted considerable expansion would be necessary.

Will Expand as Necessary

Bethlehem's action and that of several smaller producers, coupled with a statement by E. R. Stettinius Jr., raw materials chief of the national defense advisory commission, that the commission would "look with favor upon the installation of desirable emergency facilities in the steel industry," indicates expansion will be made when necessary.

Two retarding factors are the fear of excess capacity when the emergency has passed, and doubt as to methods for financing.

Steel production during the past ten years has averaged only 37,800,000 net tons, or considerably less than half of capacity. Stimulated by the defense program and heavy exports to Great Britain, 1940 production will exceed 65,000,000 tons. Production in recent weeks has averaged 96 to 97 per cent of rated capacity, or at a rate of nearly 80,000,000 tons annually. In the past, periods of such high production have been followed by expansion. (STEEL, Dec. 2, p. 21.)

Current production, however, reflects in large degree the impact of the huge armament program. And the question arises whether, when the emergency has passed, there will be a large capacity owned by the government and possibly competitive with privately owned mills.

If the government finances any expansion above normal "full-employment" needs, the industry believes assurances should be made that this capacity would be demolished, held in reserve for future

On with the Dance—on Stainless!

■ Youngstown, O., dancers now trip "the light fantastic" on a floor that typifies the Ohio Valley steelmaking area, a floor of stainless steel, in the Hotel Ohio. Designed by Sharon Steel Corp., the floor is made up of 12-inch squares of 13-gage 18-8 stainless. A stainless steel lug has been spot-welded to each square and imbedded in a 5-inch concrete base, which first was ground to a perfect smoothness. Edges of the squares were ground to join exactly

emergency, or turned over to private industry when peace comes.

If such proper assurances were given, the expansion conceivably might benefit private industry when the emergency is over by permitting the abandonment of older, more obsolete plants in favor of the newer, more efficient facilities built for emergency needs.

Expansions announced to date, or known to be on the boards, are not large, and are designed to round out facilities to meet the new demands of our war emergency. Bethlehem's program is the most extensive and is necessitated by the company's record backlog of orders, amounting to $1,123,081,930 at the end of the third quarter. Much of this is ship work and armament orders.

Shipbuilding Needs Heavy

Tennessee Coal, Iron & Railroad Co.'s recently announced expansion in the South will add approximately 400,000 net tons to its ingot capacity. Development of the South industrially and increased activity at southern shipyards were large factors in this expansion.

Prospects for unprecedented shipbuilding and likelihood that large numbers of merchant vessels for Great Britain will be built in this country, have stimulated expansion of facilities for making ship steel. If the British are able to place contracts for 360 merchant ships to be built here, as they hope, about 1,500,000 tons of steel will be required, in addition to that used in construction of additional yards and ways. Continued destruction by German submarines to British shipping may necessitate an even larger program.

In addition to Bethlehem and T. C. I. several other producers are planning new open hearths or are rehabilitating furnaces long idle.

Electric steel capacity is undergoing the greatest percentage expansion this year. Approximately 1,000,000 tons have been completed, are under way or on order. These expansions will raise capacity to more than 2,500,000 net tons or about 40 per cent more than was available at the end of last year.

Eight or more companies, led by Republic Steel Corp., Cleveland, are contributing to the increase. Latest company to announce entry into the alloy field is the A. M. Byers Co., Pittsburgh, long a manufacturer of wrought iron. Byers will build an addition to its Ambridge, Pa., plant, to be used as a melt shop for new electric furnace equipment to be installed to produce stainless and other alloys.

Although no new blast furnaces have been built in the past year about a dozen old stacks were replaced, rebuilt or modernized. In almost all cases an increase in capacity resulted. The Bethlehem and T. C. I. programs call for three new stacks.

Three hundred seventy by-product ovens to supply coke to steel plants are under construction. Virtually the entire capacity of the Connellsville district beehive ovens is being brought into production and plans are under way to repair several hundred long abandoned ovens.

Republic Installs Cold Strip Mill

Cold strip capacity of Republic Steel Corp. will be increased by more than 50,000 tons annually with the installation of a cold strip mill at its Warren, O., plant. New mill, which will go into service next spring, will replace 2-high mills which have become obsolete. Mill is a tandem 3-stand, 4-high cold mill with 9½-inch work rolls and 22-inch back-up rolls, and will cold roll strip up to 18 inches in width.

Company also is installing a 2-high temper mill and an improved gang slitter. Hot strip for the new mills will be produced at Warren, where hot strip storage capacity is being increased through the construction of a new 160 x 400-foot storage and shipping building.

Rolling mills also are being rebuilt or modernized. Last week Youngstown Sheet & Tube Co., Youngstown, O., awarded contract for reconstruction and enlargement of its billet mill at Campbell, O., plant to Morgan Engineering Co., Worcester, Mass., at a cost of close to $1,000,000.

American Rolling Mill Co., Middletown, O., will modernize and rebuild its jobbing mill at Ashland, Ky. New mill will be 68 inches wide and will permit a greater diversification of products necessary to national defense.

Total Program Over $100,000,000

Bethlehem's proposed new facilities include six open-hearth furnaces, two batteries of coke ovens, with additions to one of the existing by-product plants, two new blast furnaces and two old blast furnaces which are to be rebuilt and enlarged. These facilities are in addition to two electric steel furnaces having an annual capacity of 120,000 tons and other facilities which were authorized earlier this year. The new facilities will be located at the Bethlehem, Lackawanna, Maryland, and Steelton plants of the company and will supplement existing facilities.

Total cost of all facilities constructed or authorized by Bethlehem in 1940 will exceed $50,000,000. In addition, other facilities costing more than $50,000,000 are being constructed at various plants and shipyards of Bethlehem and will be paid for and owned by the government. E. G. Grace, president, called attention to the big increase recently in Bethlehem's requirements for forged steel products such as armor plate.

■ Will this priorities board ration steel for national defense needs? Commercial airline expansion already has been curbed through an arrangement between the board and the transport lines (see page 30), and the latter have agreed to release a number of engines for military use. Board comprises Defense Commissioners (left to right) E. R. Stettinius Jr., William S. Knudsen, Leon Henderson and Donald M. Nelson, administrator. Acme photo

gun forgings, ship shafting, turbine parts, projectiles and similar armament products as distinguished from commercial products.

"Additional steel provided in this program will in part supply that requirement and it is believed the remainder can be converted into other products with the finishing facilities now available without further important expenditures by the company for processing equipment."

Mr. Grace said December will be the fifth consecutive month in which Bethlehem has operated in excess of 100 per cent of its rated steel capacity and said "in this production there have been substantial tonnages for Great Britain. It would appear that British requirements for steel are likely to increase rather than decrease. The importance of supplying this demand in addition to that of our own defense program is obvious."

Mr. Grace said applications are being made to the secretary of navy and to the national defense advisory commission for certificates of necessities to permit amortization of the cost of the new facilities in accordance with section 124 of the internal revenue code.

Plans and engineering details covering the entire expansion are almost complete. Construction work will proceed promptly as soon as the company's applications have been approved. Part of the new facilities will be completed within six months and the entire program within one year.

MORE INDUSTRIAL EXPANSIONS ANNOUNCED

Timken Roller Bearing Co., Canton, O., has underway a $3,000,000 expansion program at four Ohio plants at Canton, Gambrinus, Columbus and Mt. Vernon. New buildings totaling 184,625 square feet are to be constructed. New equipment includes a 60-ton electric furnace and auxiliary equipment. Machine tools costing $961,825 have been ordered during the past 120 days.

American Rolling Mill Co., Middletown, O., has returned to production its No. 2 blast furnace at Hamilton, O., which has been completely remodeled. Capacity was increased from 350 tons daily to 700 tons.

Substantial expansion at the Harrison, N. J., plant of Crucible Steel Co. of America, New York, is reported under contemplation. Although company officials declined to comment, it was said the electric furnace department will be doubled and that there will be increases in certain other departments.

Outside the steel producing field, a number of expansions were announced last week. These included a $2,500,000 program by Eaton Mfg. Co., Cleveland, for expansion and equipment necessitated by participation in the national defense program. Harshaw Chemical Co., Cleveland, is contemplating a $2,000,000 financing program for refunding and expansion.

Other recent construction awards include $9,000,000 by Cramp Shipbuilding Corp. for plant expansion and shipyard for navy department; $2,000,000 by Giddings & Lewis Machine & Tool Co. for factory buildings at Fond du Lac, Wis.; $15,000,000 by E. I. du Pont de Nemours & Co. for ammonia plant for war department at Morgantown, W. Va.; $500,000 by New York Shipbuilding Corp. for reconstructing shipways at Trenton, N. J.

PLANE BUILDERS SPEND $315,545,052 FOR EXPANSION

Aircraft industry in United States has expended $83,356,580 on plant expansion for national defense and has let contracts for additional facilities, to be completed by next June, totaling $232,188,472.

The industry, according to Aeronautical Chamber of Commerce of America Inc., New York, has already expanded its payrolls from 60,000 shop employes last January to 164,920. Estimated 382,000 shop workers will be directly employed in aircraft buildings when the expansion program reaches its peak, with many additional thousands taken on by subcontractors. Nearly 500,000, it is reported, will be employed in production of fabricated aviation equipment June 1, 1941.

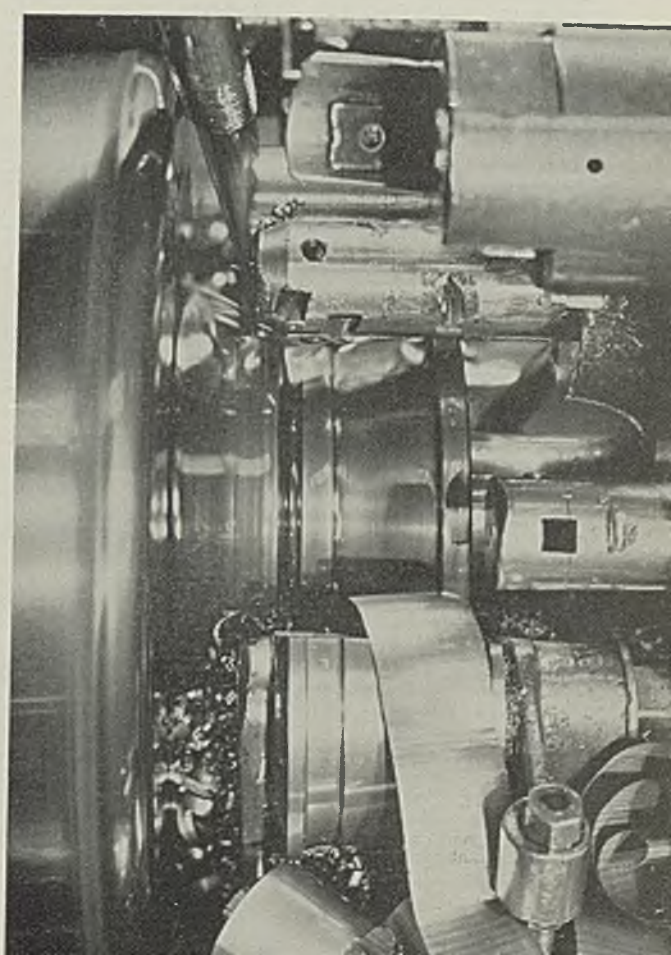
Productive floor space Jan. 1, 1940, totaled 11,983,896 square feet. By year's end, the chamber reports, this area will have been increased to 22,530,988 square feet, with additional 22,635,190 square feet under construction.

Industry's backlog, as of Nov. 1, 1940, was $2,831,665,159, compared with $675,432,475 on Dec. 31, 1939. Deliveries for 1940, it is estimated, will total $625,000,000, against $225,000,000 in 1939.

Chrysler To Start Buying Parts, Materials for Tanks

■ With machinery purchases almost completely allocated, orders for materials and parts to be used in the manufacture of 25-ton tanks in the Chrysler Corp.-U. S. army tank arsenal at Detroit will be placed in the next few weeks, according to E. J. Hunt, tank plant manager.

Among the materials and parts the corporation will require are: Heavy gear, shaft, driveshaft, pinion and hub forgings; various kinds of gages, including those for oil, gas, and electric apparatus; helical springs; electrical panels, including fuse boxes, terminal boxes, and relay boxes; large battery switch box assemblies; and various meters, such as volt meters, ammeters, tachometers, speedometers and others.



■ **Broad ribbons of steel curl away continuously as an automatic screw machine fabricates a tapered roller bearing cone from heavy-wall seamless steel tubing. Photo, Timken Roller Bearing Co., Canton, O.**

October Steel Exports Down 12.3 Per Cent

■ Steel and iron exports, except scrap, totaled 846,584 gross tons, valued at $47,244,586 in October, a decline of 12.3 per cent in quantity and 6.7 per cent in value from September, when exports were 965,444 tons, valued at $50,630,630, according to the metals and minerals division, department of commerce. In October, 1939, exports were 255,081 tons, valued at $16,835,795.

Shipments of such leading items as nonalloy ingots and blooms, plain structural shapes and pig iron, were all smaller in October than in September and exports to such markets as the United Kingdom, Japan and the Union of South Africa were sharply reduced.

The United Kingdom took 461,480 tons in October, against 607,931 tons in September; Canada 122,723 tons against 105,933 tons; Japan 45,599 tons against 54,825 tons; Union of South Africa 17,825 against 34,255 tons and the Argentine 19,508 against 14,179 tons.

For ten months exports, excluding scrap, were 6,336,535 tons, compared with 1,772,068 tons in the comparable period of 1939.

Steel and iron imports in October totaled 3724 gross tons, valued at $196,854, compared with 2542 tons, valued at $160,988 in September and 16,884 tons, valued at $1,147,656, in October, 1939.

Cumulative 1940 receipts are less than one-fifth those of the corresponding period last year. Ten months' imports this year were 5,533 tons, valued at $5,725,432, compared with 257,848 tons, valued at $15,244,958 in ten months, 1939.

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

	1940		1939	
	Exports	Imports	Exports	Imports
Jan.	583,521	8,274	362,672	27,664
Feb.	671,301	6,740	359,690	19,149
Mar.	663,980	5,096	474,360	25,369
April	612,906	6,674	394,008	44,083
May	783,964	7,759	532,641	28,142
June	936,047	5,505	588,856	32,587
July	1,034,938	3,542	513,664	30,851
Aug.	1,402,075	2,105	477,078	28,328
Sept.	1,221,052	2,598	575,613	29,874
Oct.	1,105,510	3,966	591,856	19,189
Nov.	.....	.....	605,555	15,216
Dec.	.....	.....	600,437	14,709
Total	.....	.....	6,076,429	315,161

UNITED STATES IMPORTS FOR CONSUMPTION OF IRON AND STEEL PRODUCTS
Gross Tons

Articles	Oct. 1940	Sept. 1940	Jan. thru Oct. 1940
Pig iron	590	1,830	10,144
Sponge iron	.....	.....	610
Ferromanganese (1)	42	.....	8,572
Spiegeleisen	2,714	25	11,927
Ferrochrome (2)	.....	.....	1
Ferrosilicon (3)	101	137	1,109
Other ferroalloys (4)	.....	.....	215
Steel ingots, blooms, etc.	.....	.....	3
Billets, solid or hollow	.....	.....	437
Concrete reinforc. bars	.....	.....	8
Hollow bar, drill steel	15	1	870
Bars, solid or hollow	1	11	1,799
Iron slabs	.....	.....	.....
Bar iron	.....	.....	194
Wire rods	.....	37	3,986
Boiler and other plate (including skelp)	2	.....	12
Sheets, skelp, saw plate	1	2	116
Die blocks, blanks, etc.	.....	.....	12
Tin plate, taggers' tin and terneplate	15	11	104
Structural shapes	.....	.....	710
Sashes and frames	.....	.....	16
Sheet piling	.....	.....	.....
Rails and track material	138	1	1,583
Cast-iron pipe, fittings	.....	.....	419
Mall. iron pipe fittings	.....	27	29
Welded pipe	.....	.....	31
Other pipe	32	336	2,717
Cotton ties	.....	.....	13
Other hoops and bands	10	2	611
Barbed wire	.....	.....	86
Round iron, steel wire	.....	34	883
Teleg., telephone wire	.....	.....	.....
Flat wire, steel strips	.....	47	2,055
Wire rope and strand	16	4	506
Other wire	.....	.....	1
Nails, tacks, staples	1	1	108
Bolts, nuts, and rivets	.....	1	129
Horse and mule shoes	.....	.....	3
Castings and forgings	46	35	514
Total	3,724	2,542	50,533
Iron and steel scrap	242	56	1,726
GRAND TOTAL	3,966	2,598	52,253

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

ORIGIN OF OCTOBER IMPORTS
Gross Tons

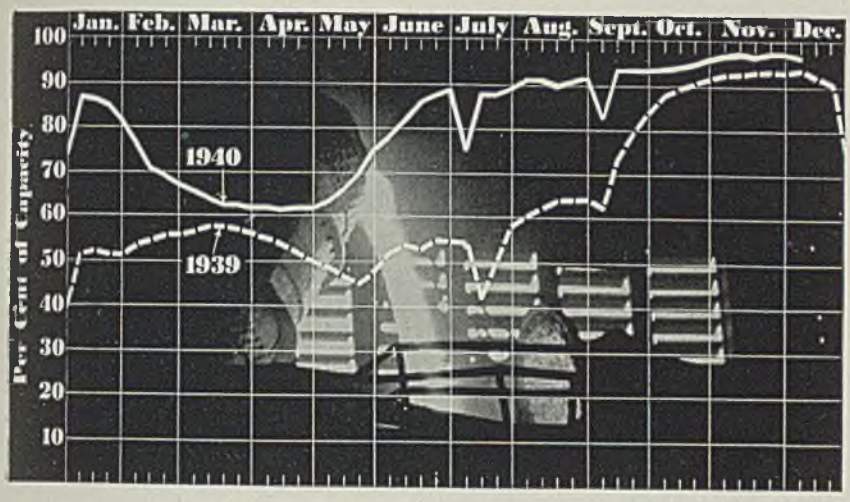
	Iron ore	Pig iron	Manganese ore	Ferromanganese
Canada	62,278	363	.....	.....
Mexico	450	.....	.....	.....
Cuba	23,000	.....	2,836	.....
Chile	160,200	.....	.....	.....
Brazil	19,350	.....	15,371	.....
British India	.....	227	8,563	.....
Philippine Is.	.....	.....	26	.....
Soviet Russia	.....	.....	1,049	.....
South Africa	.....	.....	153	.....
Gold Coast	.....	.....	11,516	.....
Norway	.....	.....	.....	42
Total	265,278	590	39,514	42

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
Canada	1	.....	.....	.....
Sweden	.....	.....	15	.....
Belgium	.....	.....	.....	10
Total	1	.....	15	10

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

Articles	Oct. 1940	Sept. 1940	Jan. thru Oct. 1940
Pig iron	48,426	84,677	456,777
Ferromanganese and spiegeleisen	787	611	12,587
Other ferroalloys	3,250	5,441	20,265
Ingots, blooms, etc.:			
Not containing alloy	208,461	353,448	1,798,532
Alloy, incl. stainless	110,632	38,576	178,578
Steel bars, cold fin.	9,310	2,497	38,096
Bars, iron	689	1,062	12,167
Bars, concrete	6,578	9,781	112,579
Other steel bars:			
Not containing alloy	51,250	58,639	401,460
Stainless steel	86	347	1,021
Alloy, not stainless	13,113	3,585	35,248
Wire rods	31,253	50,891	248,635
Boiler plate	1,137	865	9,291
Other plates, not fab.:			
Not containing alloy	51,933	63,899	438,631
Stainless steel	9	67	407
Alloy, not stainless	332	109	2,160
Skelp, iron or steel	32,009	19,817	116,702
Sheets, galv. iron	273	792	8,027
Sheets, galv. steel	10,548	12,742	132,713
Sheets, "black" steel:			
Not containing alloy	30,913	35,347	385,023
Stainless steel	123	123	1,461
Alloy, not stainless	3,715	302	7,828
Sheets, black iron	652	1,196	23,426
Strip steel, cold-rolled:			
Not containing alloy	4,535	6,574	46,914
Stainless steel	97	36	605
Alloy, not stainless	32	136	451
Strip steel, hot-rolled:			
Not containing alloy	11,787	10,697	115,246
Stainless steel	81	3	183
Alloy, not stainless	39	36	925
Tin plate, taggers' tin	18,453	15,142	348,117
Terne plate (including long ternes)	542	541	5,295
Tanks, except lined	3,987	2,147	25,933
Shapes, not fabricated:	55,187	69,470	330,209
Shapes, fabricated	6,801	5,816	60,539
Plates, fabricated	5,401	402	18,989
Metal lath	123	98	1,161
Frames and sashes	213	299	1,764
Sheet piling	997	1,260	11,225
Rails, 60 lbs.	20,097	25,135	167,928
Rails, under 60 lbs.	6,903	3,717	27,557
Rails, relaying	2,968	159	17,518
Rail fastenings	1,035	586	8,588
Switches, frogs, crsgs.	240	103	2,529
Railroad spikes	432	206	3,872
R.R. bolts, nuts, etc.	442	748	2,766
Boiler tubes, seamless	2,028	3,122	19,251
Boiler tubes, welded	103	51	1,675
Pipe:			
Seamless casing and oil-line	31,587	13,166	126,147
Do., welded	1,881	5,692	29,172
Seamless black	1,538	2,104	25,615
Pipe fittings:			
Mall. iron screwed	423	391	4,267
Cast-iron screwed	103	228	2,166
Pipe and fittings for:			
Cast-iron pressure	5,803	3,033	45,879
Cast-iron soil	595	651	15,422
Pipe, welded:			
Black steel	2,671	3,440	32,883
Black wrought-iron	900	798	7,420
Galv. steel	4,394	4,585	44,181
Galv. wrought-iron	727	495	6,911
All other pipe, fittings	1,067	832	12,698
Wire:			
Plain iron or steel	6,385	10,017	75,749
Galvanized	5,345	8,409	52,642
Barbed	7,014	2,834	35,017
Woven-wire fencing	430	401	3,777
Woven-wire sc'n cloth:			
Insect	64	110	660
Other	211	239	1,938
Wire rope and cable	1,113	1,027	9,510
Wire strand	37	117	1,141
Electric welding rods	587	428	3,492
Card clothing	3	1	14
Other wire	1,802	1,236	14,058
Wire nails	2,201	3,318	43,342
Horseshoe nails	162	75	1,016
Tacks	65	62	690
Other nails, staples	336	337	4,323
Ordinary bolts, machine screws	5,286	5,434	25,861
Castings:			
Gray-iron (incl. semisteel)	540	462	3,974
Malleable-iron	185	224	1,994
Steel, not alloy	268	171	1,745
Alloy, incl. stainless	174	133	1,307
Car wheels, tires, and axles:			
Wheels and tires	1,722	914	11,832
Axles, no wheels	106	81	1,537
Axles, with wheels	323	35	1,237
Horseshoes and calks	5	3	271
Forgings, n.e.s.:			
Not containing alloy	2,398	2,500	22,721
Alloy, incl. stainless	131	163	3,051
Total	846,584	965,444	6,336,535
Scrap, iron and steel	258,482	251,116	2,651,774
Scrap, tin plate	.....	.....	2,841
Tin plate circles, strips, cobbles, etc.	324	162	3,573
Waste-waste tin plate	120	19	5,491
*Terne plate clippings and scrap	.....	4,311	15,080
Total scrap	258,926	255,608	2,678,759
GRAND TOTAL	1,105,510	1,221,052	9,015,294
Iron ore	209,408	201,041	1,258,051

*New class.



PRODUCTION... Down

■ STEELWORKS operations last week receded ½-point to 96½ per cent as necessity for furnace repair caused slight curtailment in five districts. Two areas made small gains and five held their rate unchanged. A year ago the rate was 94 per cent; two years ago it was 61 per cent.

Detroit — Furnace repairs have forced the rate down 7 points to 90 per cent, three furnaces being idle most of last week. Rebound this week is indicated. This was the first time the rate was below 91 per cent since Aug. 17.

St. Louis—For the third successive week production was at 87½ per cent, which is expected to continue until the holidays.

Birmingham, Ala.—Unchanged at 100 per cent, with schedule for this week at the same rate.

Cincinnati — One open hearth taken off for repair caused the rate to drop 4½ points to 87 per cent.

Cleveland—Addition of two furnaces late the previous week raised last week's rate 1½ points to 90½ per cent.

Youngstown, O.—Down 1 point to 92 per cent, Carnegie-Illinois Steel Corp. taking off one open hearth for repair. Outlook for this week is 92 per cent as Carnegie-Illinois adds a furnace and Youngstown Sheet & Tube Co. takes one off.

Central eastern seaboard — With every unit pushed to available capacity the operating rate is up 1 point to 95 per cent.

New England — Production dropped 7 points to 75 per cent last week, but will regain the loss this week.

Pittsburgh—Continues at 97 per cent for the third consecutive week.

Wheeling—Holds steadily at 98½ per cent.

Chicago—Rate continues at 99½ per cent, some interests producing above rated capacity.

Buffalo—Shutdown of one open hearth for repairs caused a drop of 2½ points to 93 per cent, which probably will be regained this week.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Dec. 7	Change	Same week 1939	Same week 1938
Pittsburgh	97	None	94	43
Chicago	99.5	None	94	59.5
Eastern Pa. ...	95	+ 1	88	37
Youngstown ..	92	— 1	93	65
Wheeling	98.5	None	93	62
Cleveland	90.5	+ 1.5	89.5	66.5
Buffalo	93	— 2.5	90	49
Birmingham ..	100	None	94	75
New England..	75	— 7	90	80
Cincinnati	87	— 4.5	80	75
St. Louis	87.5	None	83	51.5
Detroit	90	— 7	96	86
Average	96 5	— 0.5	94	61

Steel Ingot Statistics

Period	Calculated Monthly Production—All Companies—Open Hearth—Net tons	Open Hearth—Per cent of capacity	Bessemer—Net tons	Bessemer—Per cent of capacity	Total—Net tons	Total—Per cent of capacity	Calculated Weekly production, all companies net tons	Number of weeks in month
1940	Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.							
Jan.	5,369,601	86.40	285,714	56.10	5,655,315	84.11	1,276,595	4.43
Feb.	4,203,508	72.37	205,527	43.19	4,409,035	70.16	1,064,984	4.14
March	4,073,196	65.54	191,559	37.62	4,264,755	63.42	962,699	4.43
April	3,798,371	63.11	176,335	35.76	3,974,706	61.04	926,505	4.29
May	4,582,694	73.74	258,709	50.80	4,841,403	72.00	1,092,867	4.43
June	5,228,529	86.88	304,381	61.72	5,532,910	84.97	1,289,723	4.29
July	5,272,708	85.03	322,362	63.44	5,595,070	83.40	1,265,853	4.42
Aug.	5,663,363	91.13	369,674	72.59	6,033,037	89.72	1,361,859	4.43
Sept.	5,530,044	92.10	365,188	74.22	5,895,232	90.75	1,377,391	4.28
Oct.	6,053,845	97.41	408,053	80.13	6,461,898	96.10	1,458,668	4.43
Nov.	5,864,333	97.44	418,491	84.86	6,282,824	96.49	1,464,528	4.29
11 mos.	49,775,859	.....	2,887,502	.....	58,946,185	.....	1,231,638	47.86
1939	Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.							
Jan.	3,413,783	55.35	165,080	27.22	3,578,863	52.83	807,870	4.43
Feb.	3,149,294	56.55	219,621	40.10	3,368,915	55.07	842,229	4.00
March	3,621,177	58.71	217,950	35.93	3,839,127	56.67	866,620	4.43
April	3,122,418	52.27	230,356	39.22	3,352,774	51.11	781,532	4.29
May	3,104,697	50.34	190,467	31.40	3,295,164	48.64	743,829	4.43
June	3,314,012	55.48	209,868	35.73	3,523,880	53.71	821,417	4.29
July	3,308,029	53.75	256,798	42.43	3,564,827	52.74	806,522	4.42
Aug.	3,965,515	64.29	276,479	45.58	4,241,994	62.62	957,561	4.43
Sept.	4,436,792	74.45	332,676	56.77	4,769,468	72.87	1,114,362	4.28
Oct.	5,626,685	91.22	453,492	74.77	6,080,177	89.75	1,372,500	4.43
Nov.	5,694,788	95.34	452,995	77.12	6,147,783	93.71	1,433,050	4.29
11 mos.	42,757,190	.....	3,005,782	.....	45,762,972	.....	958,989	47.72
Dec.	5,468,880	88.87	353,134	58.35	5,822,014	86.13	1,317,198	4.42
Total ...	48,226,070	66.43	3,358,916	47.05	51,584,986	64.70	989,355	52.14

The percentages of capacity for 1939 are calculated on weekly capacities of 1,382,331 net tons open hearth ingots and 136,918 net tons Bessemer ingots, total 1,529,249 net tons; based on annual capacities as of Dec. 31, 1938, as follows: Open hearth ingots, 72,596,153 net tons; Bessemer ingots, 7,138,880 net tons.

The percentages of capacity operated for 1940 are calculated on weekly capacities of 1,402,899 net tons open hearth ingots and 114,956 net tons Bessemer ingots, total 1,517,855 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth ingots, 73,343,547 net tons; Bessemer ingots, 6,009,920 net tons.

November Ingot Rate Up, Output Lower

■ November ingot production amounted to 6,282,824 net tons, equivalent to 96.49 per cent of capacity, according to the American Iron and Steel institute. Because of the shorter month the tonnage is slightly below the record-breaking output of 6,461,898 tons in October, but ranks as the second highest monthly output.

November operating rate compares with 96.10 per cent in October. Weekly average production in November was 1,464,528 tons, against 1,458,668 tons in October. In November, 1939, total production was 6,147,783 tons, at 93.71 per cent of capacity.

Total production in 11 months was 58,946,185 tons, compared with 45,762,972 tons in the corresponding period in 1939.

Mechanical Engineers Hear of Need for Post-Emergency Planning

■ THE MECHANICAL engineering profession has never been in better position to contribute to the needs of the defense program than at present, according to speakers at the sixty-first annual meeting of the American Society of Mechanical Engineers, New York, Dec. 2-6.

One hundred technical papers were presented. Sessions also included symposiums on machine shop practice, metals engineering, mechanical springs, heat transfer, materials handling, fuels and various other subjects. Problems of management also were discussed.

William A. Hanley, a director and head of the engineering division, Eli Lilly & Co., Indianapolis, manufacturers of medicinal products, was elected president, to succeed William H. McBryde, consulting engineer, San Francisco.

Dean Samuel B. Earle, Clemson A. & M. college, Clemson, S. Dak.; Frank H. Prouty, Industrial Appraisal commission, Denver; and Edwin B. Ricketts, mechanical engineer, Consolidated Edison Co. of New York Inc., were elected vice presidents for terms of two years.

Three managers of the society, elected for three-year terms, were Huber O. Croft, head, department of mechanical engineering, University of Iowa, Des Moines, Iowa; Paul B. Eaton, consulting engineer and head of the department of mechanical engineering, Lafayette college, Easton, Pa.; and George E. Hulse, engineer, Safety Car Heating & Lighting Co., New Haven, Conn.

Medals Awarded

Charles F. Kettering, vice president, General Motors Corp., was awarded the A. S. M. E. medal for outstanding inventions and research; Edwin H. Armstrong, professor, electrical engineering, Columbia university, New York, the Holley medal for leadership in the field of radio communications; and William Benjamin Gregory, professor emeritus of experimental engineering and hydraulics, Tulane university, New Orleans, and consulting engineer, the Worcester Reed Warner medal for distinguished work in hydraulic engineering.

Carl A. W. Brandt, chief engineer, the Superheater Co., New York, was awarded the Melville medal for his paper on "The Locomotive Boiler"; George A. Hawkins, associate professor, mechanical engineering, Purdue university, Lafayette, Ind., the Phi Tau Sigma medal for significant achievements in high pressure steam research and engineering education as the "outstanding young mechanical engineer of 1940," and to Frank De Pould, Case School of Applied Science, Cleveland, the Charles T. Main award for his paper, "What Has Been the Effect of Technological Advance on Employment?"

For his paper on "Powder Metallurgy," Edward D. Rowan, Oregon State college, Corvallis, Oreg., was given the Undergraduate Student award, and George W. Shepard Jr., Princeton university, Princeton, N. J., was presented with the Post-graduate award for his paper, "An Automatic Mechanical Control for Synchronizing Prime Movers." The Junior award went to Robert E. Newton, Washington university, St. Louis. Several honorary member ships also were conferred.

William A. Hanley

Awards were presented at the annual dinner in the presence of more than 1000 engineers, executives and guests. The principal speaker was William L. Batt, president, SKF Industries, Philadelphia, a past-president of the society and an associate of the national defense advisory commission, Washington, who discussed the armament program. He suggested the formation of a board to work on plans by which excess capacity created by rearmament could be turned to a peacetime profit. The board, he said, would need "investors and research scientists, trade and fiscal experts, men of practical knowledge and great vision."

Mr. McBryde reviewed progress of the society since its founding in 1880 at Stevens Institute of Technology, Hoboken, N. J. Dr. Harvey N. Davis, president, Stevens Institute was toastmaster.

Mr. Hanley has received many honors in his profession, including the honorary degree of doctor of engineering, Purdue university, where he received the degree of bachelor of science in 1911.

After graduation he entered the employ of Eli Lilly & Co., where in his present capacity as head of the engineering division, he supervises all engineering projects, construction, power and maintenance for the corporation, its branches and subsidiaries, and in addition, operates certain highly mechanized production departments.

Robert M. Gaylord Heads Illinois Manufacturers

■ Robert M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill., was installed as the new president of the Illinois Manufacturers' association at the organization's forty-seventh annual banquet at the Stevens hotel, Chicago, Dec. 3. Mr. Gaylord succeeded W. Homer Hartz, president, Morden Frog & Crossing Works, Chicago, who had served for two terms.

O. M. Burton, president, Burton-Dixie Corp., Chicago, was installed as the new first vice president; H. G. Myers, president, Gardner-Denver Co., Quincy, Ill., as second vice president; and Sterling Morton, Morton Salt Co., Chicago, as treasurer.

Speakers at the banquet were Irving S. Olds, chairman, United States Steel Corp., New York; and Irvin S. Cobb, author and humorist, Hollywood, Calif. Mr. Old's subject was "Defense and Industry," and Mr. Cobb's, "One Thing Brings on Another."

Attendance at the dinner was approximately 2200 and included industrial executives not only from Illinois, but from New York, Pennsylvania, Ohio, Minnesota, Wisconsin, Indiana, Michigan, Iowa and Vermont, as well.

ARGETSINGER RE-ELECTED BY OHIO MANUFACTURERS

J. Cameron Argetsinger, vice president and general counsel, Youngstown Sheet & Tube Co., Youngstown, O., was re-elected president, Ohio Manufacturers' association at the annual meeting of trustees at Columbus, O., last week. Vice presidents chosen included: R. C. Brower, secretary-treasurer, Timken Roller Bearing Co., Canton, O.; John C. Galvin, president, Ohio Steel Foundry Co., Lima, O.; P. O. Geier, chairman, Cincinnati Milling Machine Co.; and H. S. McLeod, president, Delphos Bending Co. W. J. Bennett, secretary, Buckeye Steel Castings Co., Columbus, O., was re-elected association treasurer, and Don K. Martin, executive director.

Air Condition Third Southern Blast Furnace

■ Air conditioning of No. 3 stack of the Woodward Iron Co., Woodward, Ala., will start immediately, contracts having been let to the Carrier Corp., Syracuse, N. Y. The other two stacks were equipped last year, including a centrifugal refrigeration machine of 500 tons capacity. A similar unit will be installed to serve the third furnace.

Lower moisture content provided by the air conditioning equipment has increased the output of the two Woodward stacks by 10 per cent and has reduced coke consumption by about 200 pounds per ton of iron. See STEEL, Nov. 20 and 27, 1939, for description of the installation.

Contracts for air conditioning equipment for the No. 1 stack of the Jones & Laughlin Steel Corp. at Aliquippa, Pa., were let last month to the Carrier Corp., as announced in STEEL, Nov. 11.

Describes Co-operation By Industry, Military

■ Speaking before 200 members of Associated Industries of Cleveland, last Thursday, Maj. H. M. Reedall, district ordnance officer in Cleveland, described the close tie-up between army and navy establishments and industry.

Not until 1922, he said, was there a comprehensive plan for co-operative effort between the military establishment and industry in the event of a national emergency. In the past, the emergency has always arisen before procurement plans have been formulated, with the result that men were called into service before equipment was available for them; guns were ready long before there was ammunition for them; ammunition components became available without powder for loading them.

While extensive planning, including surveys of industry to determine their availability for defense production began actively 18 years ago, it was not until about two years ago that sufficient money became available to start action based on these plans, by placing "educational orders" for defense *materiel* with private industries.

In placing defense contracts the ability of a company is measured by several standards, most important of which are managerial and engineering ability. Then come equipment, plant personnel and plant.

■ Farm implement exports in October were valued at $5,187,000, a decline of 6 per cent from $5,532,667 in October, 1939, according to the machinery division, department of commerce. The October total compares with $4,912,825 in September, which was 15 per cent below September, 1939.

20-Foot Steel Conduits in Dam's Discharge Structure

■ Twenty-foot diameter steel liners for the five power conduits in the Red river dam, near Denison, Tex., have been completed and the encasing concrete is being poured in a checkerboard pattern. Three flood control conduits, on the left, will dump into a stilling basin which will slow down the water velocity from 65 to 16 feet a second before it returns to the river. Power house will be constructed at the far end of the steel-lined conduits. Acme photo

Died:

■ WILBERT J. AUSTIN, who was among the victims in the airliner which crashed at Chicago Dec. 4, was president of The Austin Co., Cleveland, national organization of engineers and builders, since 1924.

Wilbert J. Austin

As active head of an enterprise which designed and erected nearly 6000 industrial buildings in the United States and 23 foreign countries, he was known to business executives throughout the world as an advocate of functionalism in factory building.

Standardization of basic structural designs, pioneering work in the application of electric welding to heavy industrial structures, and development of the controlled conditions principles which are finding widespread application in windowless plants now being erected throughout the country, are characteristic of the contributions made by the organization under Mr. Austin's pioneering leadership.

♦

Thomas B. Kelday, associated with Endicott Forging & Mfg. Co., Endicott, N. Y., over 20 years, and since 1932 president and general manager, in Endicott Nov. 15.

♦

Lewis H. McLouth, 46, director and assistant treasurer, McLouth Steel Corp., Detroit, in that city, Nov. 28. He was the eldest of four McLouth brothers, and had been active with the company in a sales capacity.

♦

In the report of the death of Frank B. Hamerly (STEEL, Dec. 2, p. 31) it was stated that he was vice president of the Chicago Pneumatic Tool Co. This should have read: Independent Pneumatic Tool Co., Chicago.

MEN of INDUSTRY

■ A. H. FERBERT has been elected president, Pittsburgh Steamship Co., Cleveland, United States Steel Corp. subsidiary, succeeding A. F. Harvey, who has retired after 39 years of service with the company.

Mr. Ferbert joined the company in 1904 as a stenographer; was in the order department from 1906 to 1912, at which time he was appointed dispatcher. In 1922 he was made traffic manager and two years later vice president. Mr. Ferbert is a director of Pittsburgh Steamship and Pittsburgh Supply Co.

Mr. Harvey became associated with Pickands, Mather & Co. in 1894, and in 1901 was appointed assistant to vice president and general manager of Pittsburgh Steamship at Duluth, where he remained until 1903 when he was transferred to Cleveland. He served successively as assistant general manager, vice president, and in 1924 assumed the presidency.

A. H. Ferbert

A. F. Harvey

♦

Bennett Lodge has been appointed general superintendent, Buffalo plant, Wickwire Spencer Steel Co., New York. He succeeds George W. Nelson, who with Paul M. Macklin, executive vice president, was drowned while hunting in Maine, Nov. 6.

♦

W. C. Williams Jr., Frederick C. Kroeger and Edward F. Fisher have been elected vice presidents, General Motors Corp., Detroit. Mr. Williams, who has also been appointed a member of the administration committee, is on the staff of C. E. Wilson, acting president, as assistant in charge of the manufacturing section, with offices in Detroit.

Mr. Kroeger is general manager of the Allison division at Indianapolis, having been appointed to that position last August, while Mr. Fisher is general manager, Fisher Body division of General Motors, with headquarters in Detroit.

♦

A. B. Morey has been elected a vice president, Gisholt Machine Co., Madison, Wis. He has served the company 27 years, the past four as treasurer. H. J. Homewood has been named treasurer, succeeding Mr. Morey. A member of the organization 16 years, he has been chief accountant and office manager the past ten. C. K. Swafford, general superintendent, has been elected a director.

♦

Clarence L. Taylor, formerly vice president in charge of engineering, Aetna-Standard Engineering Co., Youngstown, O., has been elected vice president in charge of engineering, Arms-Franklin Corp., Franklin, Pa., designer and builder of steel mill equipment. Delmont Calladine has been appointed manager of operations of Arms-Franklin. He formerly was superintendent, Warren, O., plant of Aetna-Standard, and later superintendent, Taylor-Winfield Corp., Detroit.

♦

Dundas Simpson has been appointed superintendent, masonry department, South works, Carnegie-Illinois Steel Corp., Chicago. He joined the South works as a mason foreman in 1917, and from 1929 to 1931, during construction of the 54-inch mill, the 44-inch slab mill and the No. 4 open-hearth furnace, he served as temporary assistant superintendent of the masonry department. He has been assistant superintendent since July, 1937.

♦

M. P. Hofmann has been appointed manager of research and sales of C. O. Bartlett & Snow Co.'s new

W. C. Williams Jr.

F. C. Kroeger

E. F. Fisher

M. P. Hofmann

H. A. Scallen

Donald A. Robison

colloid mill department, Cleveland. Mr. Hofmann developed several alloys of zirconium during the last World war, which were used by the chemical warfare service in gas masks, and has since spent considerable time in colloidal research. He is said to have been largely responsible for the design and development of the U. S. Colloid Mill in 1926, and for ten years following was in charge of research and sales for that firm. He gained recognition in 1936 as the developer of the Manton-Gaulin two-stage mill, and recently working in the Bartlett & Snow laboratory developed and perfected a new mill, using a three-stage principle.

♦

B. H. Chamberlain, heretofore associated with the Detroit office of Cutler-Hammer Inc., Milwaukee, is now identified with the company's Los Angeles sales staff. Mr. Chamberlain has been associated with Cutler-Hammer since 1935, prior to which he was sales manager of a C-H wholesale electrical supply firm a number of years.

♦

George Belicka Jr., formerly assistant production manager and inspection engineer, Prat-Daniel Corp., Port Chester, N. Y., is now affiliated with Colonial Iron Works Co., Cleveland, as assistant estimating and detail engineer.

♦

Paul Keller has been appointed Cleveland district manager in charge of sales of Aristoloy alloy steels, Copperweld Steel Co., Warren, O. He previously was identified with Mid-States Steel & Wire Co., and Bethlehem Steel Co. in its Baltimore, Bethlehem, Pa., and Cleveland offices. His headquarters are at 415 Swetland building, Cleveland.

♦

H. A. Scallen has been appointed district manager, Hartford, Conn., branch, Jessop Steel Co., Washington, Pa. He has been a representative in the New England territory for Jessop since 1930. H. F. Robertson has been named sales representative for the company, with headquarters at the Hartford branch.

♦

Donald A. Robison has been made a vice president, Caterpillar Tractor Co., Peoria, Ill., with administrative direction of all selling and advertising activities. He has been succeeded as general sales manager by Gail E. Spain, who has been manager of the sales development division since 1938.

B. H. Chamberlain

Paul Keller

♦

S. M. Jenks, heretofore assistant general superintendent, has been appointed general superintendent, Gary, Ind., works, Carnegie-Illinois Steel Corp. He succeeds E. E. Moore, recently elected vice president, industrial relations. Mr. Jenks has been associated with United States Steel Corp. subsidiaries since 1925.

♦

Robert C. Onan, advertising manager, Lindberg Engineering Co., Chicago, has been transferred to the sales department, covering the Chicago territory. Robert L. Aitchison, formerly assistant advertising manager, has been promoted to advertising manager.

♦

Sheldon F. Myers, associated with Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., 25 years, has been appointed sales development manager, Middle Atlantic merchandising division, with headquarters in Philadelphia. He formerly was sales development manager, commercial refrigeration and air conditioning department.

♦

J. E. Bowen has been named general manager, Stran-Steel division, Great Lakes Steel Corp., Detroit. He was first associated with Great Lakes in 1926 when, as a representative of McClintic-Marshall Corp. he was in charge of structural design in the construction of the original Great Lakes plant. Subsequently he became superintendent in charge of erection of steel structures for the Philadelphia & Reading railroad and later was associated with Gibbs & Hill, consulting engineers, New York, He returned to Great Lakes in 1935; two years later was appointed chief engineer, Stran-Steel division, and early this year became assistant manager.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

Fabricated Structural Capacity Is Reported Ample.

Can Handle Current, Expected Defense, Private Orders.

Airlines Agree To Defer Expansion Programs.

Will Release New Aircraft Engines to Army Air Corps.

WASHINGTON

■ MOST authorities in the construction field predict a comfortable increase in the volume of business during the calendar year 1941, V. Gilmore Iden, secretary, American Institute of Steel Construction, New York, told the construction industry conference held under the auspices of the United States Chamber of Commerce last week.

Mr. Iden said that the fabricated structural steel industry is today experiencing its greatest increase of the past ten years, "and that increase has been largely limited to the past four months. This results, we believe, from the hurry to build new munition plants, factories and stations required for national defense. The existing program of such work may not continue for long in 1941 and the new orders for such work may taper off somewhat with the end of this year.

"We note that in some instances a few of our plants have booked during the past three months about one-half of all the tonnage they booked during the first ten months of 1940 and yet the current bookings do not exceed 48 per cent of bookings of our industry in 1929."

Mr. Iden told the conference that war work has by no means begun to tax the facilities of "our industry." He stated that the industry can well accommodate all the war work now in sight, plus all the private work promised during 1941 without further extending itself. "Inasmuch as this is the case," he said, "we can foresee no great delay in the execution of the orders contracted for."

Mr. Iden told the conference that he could not speak for the rolling mills, "but I am advised that their capacity to roll structural shapes is far from being fully occupied. We have in this country mills capable of producing in excess of 5,000,000 tons of structural shapes a year and our fabricating shops, even with the defense needs in hand, are not calling for more than 2,000,000 tons this year."

Will Accelerate Rearmament

Air transport lines last week became the first industry to be asked and to agree to defer expansion plans which will call for new equipment. The agreement makes possible acceleration of the military aircraft program through temporary priority arrangements.

Policies were formulated by the commercial aircraft priority committee and approved by the priorities board, after a meeting with representatives of the various interests.

Airlines have agreed to furnish to the army air corps certain new engines delivered to them, assuring immediate completion of additional combat aircraft.

"A spirit of co-operation was manifested by all concerned," Donald M. Nelson, priorities administrator, said. "Scheduled airlines, by agreeing to give to the air corps these new engines, have greatly expedited equipment of additional combat aircraft. A program is being developed in co-operation with the airlines and the manufacturers which will permit release to military services during 1941 of approximately $7,500,000 worth of equipment, part of which the airlines had planned to use in expanding their services.

"Temporary preference delivery instructions have been issued to airplane and engine manufacturers. While expediting equipment for military use, these instructions also are designed to assure maintenance of present services and normal replacement of existing equipment.

"Ways and means are being studied by the committee to permit delivery of additional planes to the airlines during 1941 and to permit continuation of current technical development activities."

War department has announced the $25,000,000 recently allotted by President Roosevelt from his emergency fund will be used for initial expenditures in connection with surveys and construction of facilities for army garrisons at the eight base sites recently leased from Great Britain.

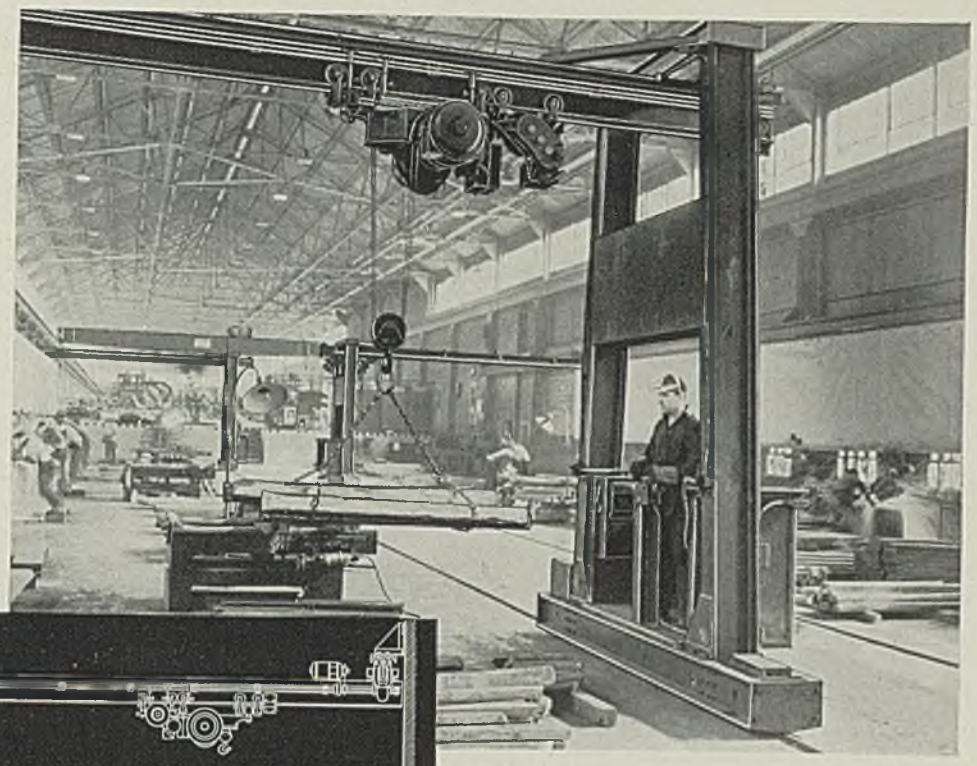
Chief of army engineers will direct the survey and construction activities at all of the army bases. Preliminary work has been started at two of the bases, offices having been established by the corps of engineers some weeks ago at St. John's, Newfoundland, and at St. George's, Bermuda. Field parties will sail at an early date for Trinidad, Jamaica, British Guiana, Antigua, Bahamas, and St. Lucia. A survey boat of the coast & geodetic survey is now at Mayaguana in the Bahamas, and a survey of that island will be completed in the near future.

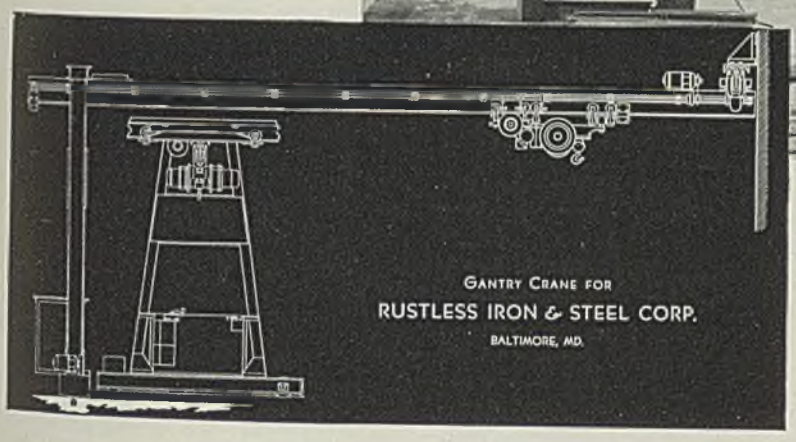
It is contemplated that army defense installations, which have been planned in collaboration with the navy department, will include:

An army base for United States forces to be established near the city of St. John's, Newfoundland. Facilities will also be constructed for an army garrison near Little Placentia harbor. In addition, a staging field will be constructed in the vicinity of St. George's bay in the southwestern part of Newfoundland. Facilities for air units will be provided at an airport to be built near St. John's and at Little Placen-

We are proud of this job at

RUSTLESS





2-ton Gantry Cranes operate at 100 f.p.m. by MonoTractor drive. 30 ft. bridges are equipped with electric hoists propelled at 350 f. p. m. by spur geared Mono-Tractors. Full control from cab.

For the job of handling 2-ton loads of billet to and from grinders in their new mill, Rustless Iron & Steel Corp. chose American MonoRail Gantry Cranes.

These free-moving cranes operate beneath the heavy box crane to allow quick transfer of light billets between operations at a lower handling cost than would be possible otherwise.

Their sturdy construction marks the type of special design created by American MonoRail engineers to meet unusual condition. With the use of standard units such as the American MonoTractors, such equipment can be fabricated at no excessive initial investment.

It is the extreme flexibility of such standard parts that makes it possible for American MonoRail engineers to meet special requirements without extra cost. Their service is available for consultation in any handling problem at no obligation.

A 250 page book used as a technical reference for all data covering Mono-Rail Equipment will be sent on letterhead request.

THE AMERICAN MONORAIL COMPANY

13102 Athens Ave. Cleveland, Ohio

tia harbor. The chief of engineers announces that contracts for the engineering work have been awarded to Fay, Spofford & Thorndyke, Boston, and for the architectural work to Shreve, Lamb & Harmon, New York.

An army landing field will be constructed on Long Bird island, Bermuda. Quarters and facilities for a military garrison of infantry and other ground and harbor defense troops will be constructed on St. David's island. The chief of engineers has awarded contracts for engineering work at Bermuda to Ford, Bacon & Davis, New York, and Metcalf & Eddy, Boston, and for architectural work to Shaw, Naess & Murphy, Chicago.

McGRADY NOW SPECIAL WAR DEPARTMENT ADVISOR

Edward F. McGrady, former assistant secretary of labor, has been appointed special consultant to the secretary of war on labor matters. Mr. McGrady now is vice president in charge of labor relations for the Radio Corp. of America, New York.

Mr. McGrady served with the labor department from 1933 to 1937 and was a member of the conciliation board which attempted to settle the little steel strike in 1937. He also served as assistant administrator of the national recovery administration.

For 40 years associated with the organized labor movement, Mr. McGrady has been a representative of the American Federation of Labor and played a leading role in its organizational and legislative work. He was a special advisor to Secretary of War Newton D. Baker during the first World war.

MEHORNAY NAMED ASSISTANT TO DONALD M. NELSON

Donald M. Nelson, co-ordinator of national defense purchases, has announced appointment of Robert L. Mehornay, Kansas City, Mo., as deputy director of the small business activities office of the national defense advisory commission.

Mr. Mehornay will assist Mr. Nelson in establishing liason between primary contractors who have received national defense contracts and small business men who have facilities to do subcontracting. District officers of the federal reserve board are co-operating in furnishing information on defense procurement requirements to small business, and in helping these potential subcontractors get necessary financial aid with which to assume the responsibilities of such subcontracts.

ROBERT B. WATTS APPOINTED COUNSEL FOR LABOR BOARD

Robert B. Watts has been appointed general counsel of the national labor relations board. Mr. Watts will succeed Charles Fahy who resigned in September to become assistant solicitor general.

Mr. Watts entered the field of labor relations in 1934 when he was appointed special counsel to the first national labor relations board, the agency established to implement the labor section of NIRA. Upon the passage of the present national labor relations act he was appointed associate general counsel charged with the responsibility, under Mr. Fahy, for all litigation of the board, eventually involving the supervision of about 150 attorneys.

In support of the board's position in the 100 injunction cases brought against it during the first two years of its operations, and in subsequent appearances involving the merits of NLRB cases, Mr. Watts has argued before every circuit court of appeals in the United States excepting the tenth circuit. In addition he has appeared in behalf of the NLRB before the Supreme Court in seven cases including the Bethlehem Shipbuilding Co., the Newport News Shipbuilding Co., the Republic Steel Corp. mandamus action from the third circuit court of appeals, the Columbian Stamping & Enameling Co., and Waterman Steamship cases.

EMPLOYMENT INCREASES NOTED DURING OCTOBER

More jobs in private industry were filled by the state employment offices in October than in any other month in history, it is announced by Federal Security Administrator Paul V. McNutt.

Continuing impetus of the national defense program plus further seasonal gains in employment resulted in a record total of 339,000 private placements. Mr. McNutt said that this all-time high topped the previous record of October, 1939, by 10 per cent.

Social security board, of which the employment service is a part, also reported to Mr. McNutt a new record of 366,000 supplementary placements during the month, reflecting the peak demand for agricultural labor in harvesting operations.

In addition, the state employment offices reported a sharp rise in the number of government jobs filled—the result of large-scale placements on defense construction projects. More than 68,000 public placements were made, most of them on jobs at cantonments, airports, and similar projects. By the end of October, the employment service had less than 4,700,000 job seekers registered as actively seeking work, lowest level since November, 1937.

Unemployment insurance operations during October also showed the effect of increasing industrial activity. Both claims for benefits and payments fell to the lowest levels of the year. Benefit payments declined 12 per cent to $32,200,000, a drop of $23,500,000 from the high point in July, 1940. Continued claims decreased six per cent to less than 4,000,000, with a minimum of 757,000 unemployed workers receiving at least one benefit payment during the month and a weekly average of approximately 700,000 recipients. While decreases in benefit claims and payments were reported by practically all the important industrial states, some increases occurred, particularly in states on the Pacific coast.

VANDENBERG PROPOSES "ECONOMIC DEFENSE BOARD"

Bill (S. 4435) has been introduced in the senate by Senator Vandenberg, Michigan, to create an economic defense board. The bill, which has been referred to the senate finance committee, provides for the protection of American price and wage levels and standards of living "against destructive foreign competition."

Senator Vandenberg explained: "It is predicated on the inescapable fact that, regardless of the trends of military war, we face an inevitable international economic war which will be just as ruthless and, in its economic aspects, just as deadly as the military war, regardless of the outcome of the latter. Indeed, we are in it already.

"But we have no adequate national instrumentality through which to cope with this economic war. We have no concentrated responsibility anywhere in the government to plan and execute our essential international protections in this vital economic field.

"Our foreign-trade controls are scattered through the tariff commission, which still theoretically administers the flexible tariff; the state department, which still theoretically administers reciprocal tariffs on an unconditional most-favored-nation basis, which obviously is no longer possible and cannot be in a world at economic war; the export-import bank; the RFC; the White House; the department of commerce—a final total of at least 30 agencies dealing with this unco-ordinated and therefore ineffectual undertaking.

"This bill proposes to bring this total effort into one united undertaking where the whole problem can be met as circumstances may require from time to time. It abolishes the tariff commission and transfers its functions to the new economic defense board. It transfers reciprocal trade agreements from the state department to the new economic board, and thus, incidentally, distinguishes between the foreign commercial and financial activities of the United States, on the one hand and its diplomatic and political activities upon the other."

Notable Machine Tool Expansion Revealed by Builders' Survey

■ PRACTICALLY the entire output of the nation's vastly expanded machine tool industry is destined for the national defense program of the United States and the defense of England, with by far the major share going to United States aircraft builders and other manufacturers of national defense requirements, according to a survey just completed by the National Machine Tool Builders' association.

The survey is based upon information as to plant expansion, employment, and engineering and development work undertaken on behalf of the national defense program, obtained from 115 companies representing approximately 80 per cent of the total machine tool capacity of the country.

Increased output, the survey explains, has been accomplished (1) by plant expansion, (2) by installation of new equipment, (3) by subcontracting work to outside companies, and (4) by training large numbers of new men and thereby operating equipment as continuously as possible.

Employment in the industry, according to the survey, has more than doubled in the last two years, with the bulk of the increase occurring in 1940.

In discussing the industry's employes training program, the survey states, "The result may be summed up in the startling fact that well-nigh half of the nation's machine tool employes today have been trained on the job since September, 1939."

The survey cites many instances of the engineering and development work done by machine tool builders in order to meet the special needs of the makers of national defense equipment and help speed the defense program.

A chart accompanying the survey shows that machine tool production which in the peak of the year 1929 totaled $185,000,000, averaged only $23,500,000 in 1932 and 1933. A slow recovery from the depression brought the volume to $85,000,000 in 1935 and then to $200,000,000 in 1937. The chart indicates that defense production will reach $400,000,000 in 1940, with an anticipated output for 1941 at $600,000,000.

Load Is Not Divided Evenly

As the burden does not fall equally on all plants in the industry, certain types of machines are in great demand—a demand out of all proportion to the normal needs of American industry. The companies that make those types carry a disproportionate share of the load. It is these companies which have had to increase their physical plants as well as their man-hours.

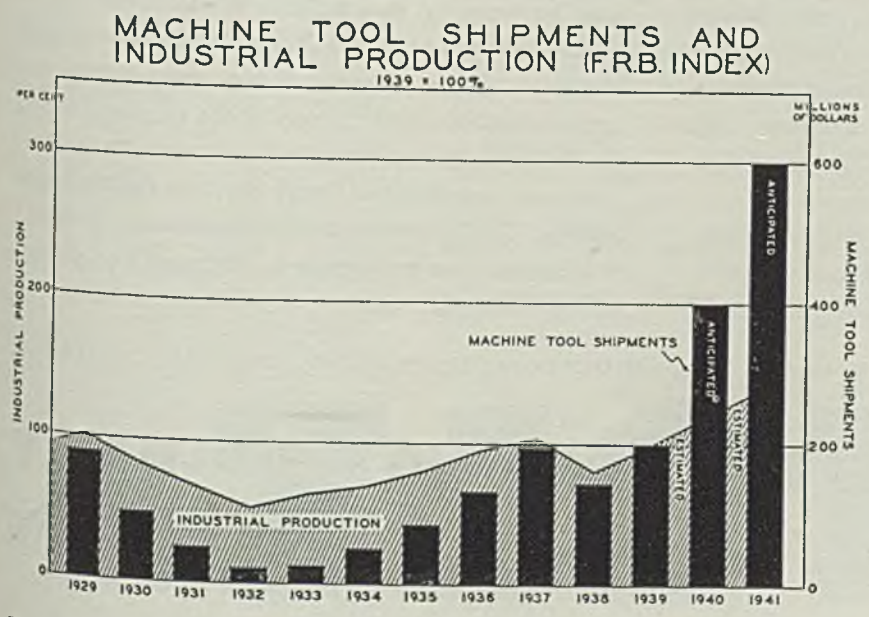
Increased manufacturing space has been gained by converting to it areas formerly used for storage and by renting or purchasing outside buildings formerly used by other industries. Where plant additions have been built, as was the case with 65 of 115 companies reporting, such additions averaged about 30 per cent addition to the previous manufacturing area.

As might be expected, much new equipment also has been added, 106 of the 115 reporting companies having installed more than $20,000,000 worth between August, 1939 and September, 1940. New equipment installed throughout the industry since the beginning of the defense program probably approximates $30,000,000 worth.

Training of workmen has taken several forms. Regular apprenticeship courses have been inadequate to meet the great and sudden demand, so various quicker methods of training to limited skills have been resorted to. One method is to assign a small group of recruits to a skilled operator—first as observers, next as helpers, then as operators under direct observation, and finally as machinists on the simpler work still under close supervision of the skilled tutor. In one instance 1400 learners have been handled in that manner during the past year and of them 900 are now classed as regular operators.

Subcontracting has played an important role in stepping up machine tool output. Of the 115 reporting companies, 86 have "farmed out" work to shops outside the machine tool industry. Of these cases, 80 covered individual parts, 33 subassemblies and 23 complete machine tools.

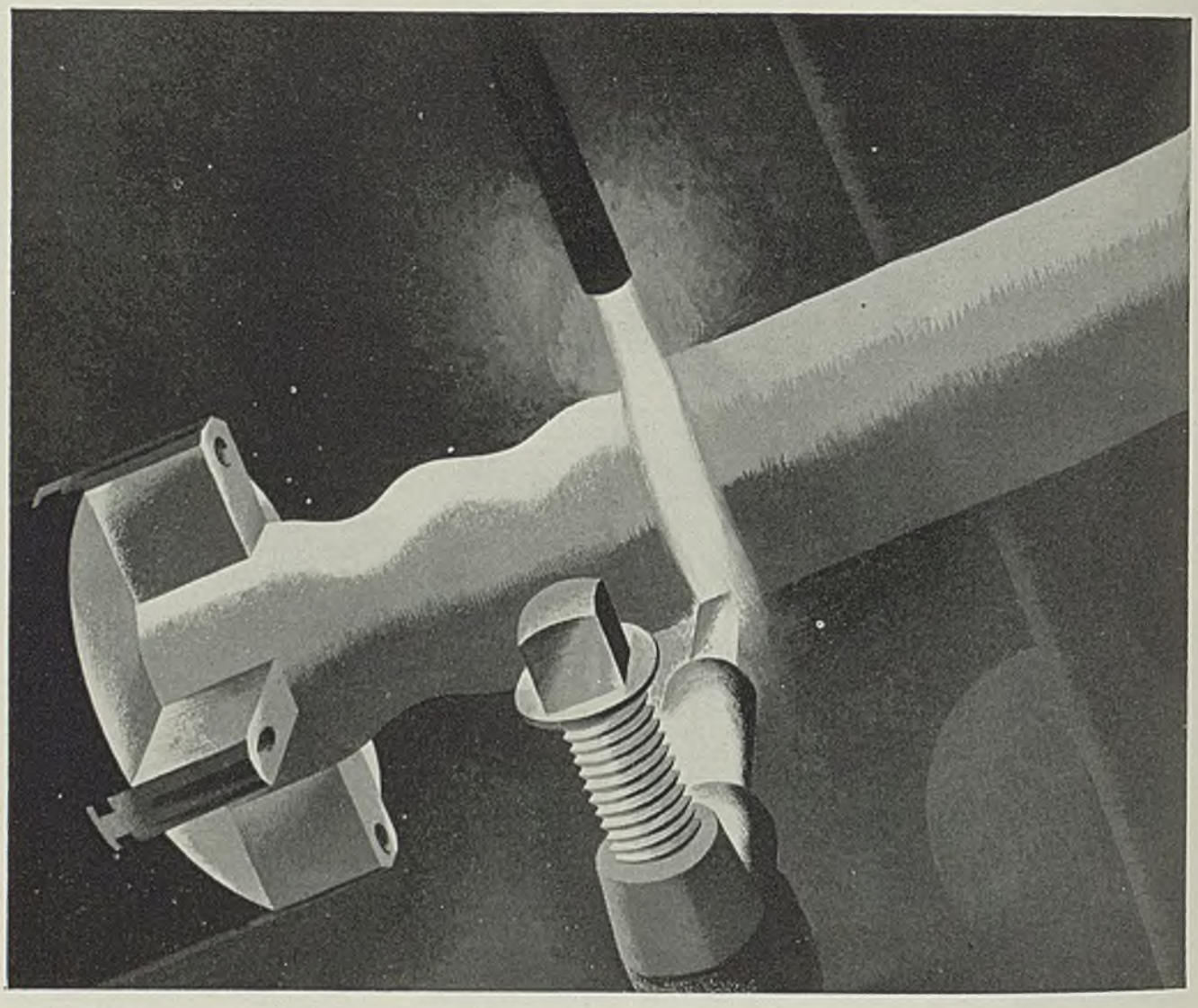
Although the high standards of accuracy required in machine tool work makes it difficult for any but the best equipped outside plants to meet the demand of machine tool builders, this procedure of subcontracting has great possibilities. It will give essential employment to hundreds of plants and thousands of men who might not otherwise be contributing to such a vital phase of the national defense program. At the same time it will avoid the creation of new problems in housing and of plant expansion which as a long pull investment might be questionable.



World Tin Production Shows Small Decline

■ October world production of tin is estimated at 19,900 gross tons, compared with revised figure of 23,300 tons for September. Total production for ten months was 193,500 tons, compared with 136,800 tons in the corresponding period last year, according to the International Tin Research & Development council.

United States deliveries in ten months this year totaled 93,634 tons, an increase of more than 77 per cent compared with deliveries of 52,660 tons in the first ten months of 1939. This year's deliveries include tin acquired for government emergency reserve. World stocks of tin increased 1066 tons during October, to 53,890 tons at the end of the month. Stocks at the end of October, 1939, were 46,561 tons.



DOUBLED SERVICE–HALVED COST

Designers today, employing modern materials, are frequently able to satisfy requirements formerly considered mutually exclusive. A case in point: fishing spear bodies, used in oil well drilling, must be strong and have a high degree of hardness to resist abrasion. The latter quality made them costly to machine—until the manufacturer adopted Nickel-Chrome-Molybdenum (SAE 4340) steel.

This steel is heat treated to a high degree of combined toughness, fatigue strength and hardness (375-400 BHN). But what, in this case, proved especially important, it can be so readily machined at the specified hardness that the tools used last about twice as long as formerly, thus halving the tool cost.

This instance of Nickel-Chrome-Molybdenum meeting the double requirement of high serviceability and low fabrication cost is typical of the results achieved by the employment of modern materials. Rechecking your own specifications may disclose similar opportunities. Our helpful booklet, "Molybdenum in Steel," will be sent free on request to engineers and production executives.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
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MOLY

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Decisions on 1942 Auto Models To Be Made Soon.

Detroit Purchasing Agents Trying To Buy Far Ahead.

Gaging Machine Tests Bearings for Four Dimensions.

Salesmen Object to "Bird Dog" and "House" Deals.

DETROIT

■ OFFICIAL decisions on the extent of changes in 1942 automobile models will be made in the next four or five weeks by most manufacturers. Some determinations already have been made, but little definite information on them has leaked out. A number of parts companies at this moment are working out minor engineering refinements, scheduled for 1942 models.

Major decisions to be made concern body programs. About a year ago, the industry launched one of the heftiest programs on body changes it ever attempted, and the tendency this year normally would be to hold back a little on body changes and concentrate on mechanical innovations.

However, there are whispers of new body programs. Chevrolet, for example, is said to be watching closely the success which the new GM "streamliner" body is meeting among buyers of Buick, Olds, Cadillac and Pontiac, and may decide to incorporate such styling in its 1942 lines.

Certain local foundrymen are convinced there will be a substantial body program and maintain there will be ample capacity to handle it. Specifications for dies in recent years have not been reaching foundries much before Feb. 15 or March 1, so it will be some time before they receive any go-ahead.

Contrariwise, some of the machine tool people are guessing there will be no extensive model changes because of the inability of car builders to get new machine tools and related equipment. Each year, of course, the motor companies earmark millions for machine tools to be used in production of new model parts. If these tools are not obtainable, the alternatives are either to call off the program or to adapt present equipment to new parts. The latter is not so easy to do as it sounds, but certainly is not impossible. As a matter of fact, many of the tools installed in plants within the past two years have been positioned completely above floor level so that they can be rearranged and regrouped quickly and easily for a new program.

Certain it is that most of the details of 1942 plans are now worked out and all that remains is the decision of company executives on how much or how little to approve. Obviously they are keeping close tab of the foreign situation and the likelihood of this country being drawn into actual hostilities.

■ FOURTH purchase authorization or "budget" for 1941 model production of Ford and Mercury, released Nov. 20, covers requirements until March 1. Breaking down authorizations into new commitments and cumulative totals for 1941 models since their start shows that 115,000 units more have been released, bringing cumulative authorizations to 575,000. Of these, 68 per cent are Fords, including about 35,000 of the special or "economy" model. About 60,000 are Mercury and the balance trucks and commercial chassis. These figures cover all parts and material requirements and, in addition to production needs, take into account the usual "float."

Sixth purchase authorization for Lincoln shows no new releases, but cumulative requirements to March 1 total 15,000 units, the bulk of these Lincoln Zephyr sedans and club coupes. Production at the Lincoln plant is running 130 units daily.

No new purchases have been released for the Ford tractor, cumulative buys totaling 47,300 standard gas tractors, 1600 kerosene tractors and 200 industrial units. Tractor implement totals are 43,170 plows of five sizes and types, and 17,500 power takeoff and pulley assemblies.

Conclusion reached from these figures is that Ford production is going to hold at the present level of around 110,000 units monthly at least through February, but that the company is attempting to buy ahead to a greater extent than is the normal practice. This is no different from what practically every purchasing agent today is doing or trying to do.

Survey just concluded by the Purchasing Agents Association of Detroit shows 58 per cent of all buyers questioned are buying three months ahead, 27 per cent buying six months ahead and 3 per cent nine months ahead. Only 9 per cent are buying two months ahead, one per cent one month ahead and 2 per cent on a hand-to-mouth basis.

This is an important change from as recent a date as July of this year, when 13 per cent were buying one month ahead, 18 per cent two months ahead, 47 per cent three months ahead and 18 per cent six months ahead. It is concrete confirmation of the stampede to cover future requirements which has descended upon all industry.

Ford has installed a new gaging device for inspection and sorting of steel ball bearings used in transmissions. The gage is housed in a cabinet 5 feet high, at the top of which is a hopper into which balls

are fed. One at a time, the 15/32-inch diameter balls are passed by a gaging unit where they are held momentarily at a single measuring point. During the pause, the bearing is checked for four dimensions—oversize, undersize, under high limit and over low limit. If the ball is found to be in any of these categories, the gage head operates an electric relay to open one of four small trap doors along a trough leading from it. An oversize ball, for example, will open automatically the door consigning it to the proper receptacle. Balls which are O. K. pass over the four trap doors and down the trough into a receiving hopper. The gage handles 5000 balls an hour, 2000 better than the previous semi-automatic device used.

Speaking of gaging, a Ford engineer points out there are 6300 precision gage applications necessary in the construction of a single car.

■ INDIGNATION meeting of automobile salesmen (connected with one of the "big three" producers' dealer organizations here) was held last week to seek some way of correcting alleged injustices resulting from "bird dog" and "house" deals for cars.

The "bird dog" deal usually works as follows: A foreman or other subofficial in charge of a large group of men in an auto plant is contacted by a local dealer and asked to direct prospects his way, often with some remuneration involved for every prospect who buys. In this way the services, and commission, of the dealer's salesman who would ordinarily close the deal are short circuited and the dealer is in a position to reimburse his "bird dog" and also to give the prospect a little better trade.

The familiar "house" deal is simply one in which the sales manager or a dealer will privately call on a number of his friends—and the word friends covers a lot of territory—advising them that if they will place an order with him he will deduct the salesman's commission.

Obviously, the auto plants frown on such practices, but they are powerless to do much about them and since they are all interested in moving cars in volume and in stepping up sales, they are forced to overlook the imposition on retail salesmen.

However, the UAW-CIO has not relaxed in its efforts to organize these salesmen and purportedly now is sponsoring mass meetings at which suggestions for overcoming the two types of deals mentioned above are advanced. The obvious method is for salesmen to go on strike until the dealers guarantee some salesman will get a commission on every car sold. Mixed in with this probably would be a little intimidation of both dealers and buyers involved in these types of deals.

Some of the motor companies, in regular meetings with salesmen, have been attempting to point out the disadvantages of unionization, but this, of course, is dangerous ground under the lopsided Wagner act, no matter how altruistic the motives involved.

In passing, it might be pointed out that the situation is peculiar to Detroit, although of course bird dogs and house deals are known in other territories but not practiced to the extent they are here. In fact, the "I-can-get-it-for-you-wholesale" attitude is prevalent throughout business circles here. Few persons in business or industry ever give consideration to paying the full retail price for any article, whether it is a new car, a radio or a couple of quarts of anti-freeze solution. There is always someone who knows someone who can get a discount.

The practice is a natural development in a territory where there is such a huge volume of buying and selling being done, but it puts the squeeze on the retailer and often drives him to the wall. Car salesmen cannot be blamed much for becoming indignant over having sales snatched right out from under their noses simply because another dealer can manage to avoid paying a salesman's commission.

Dealers Are Tempted

On the other hand, dealers, faced with narrow profit margins, and attracted by the bait held out for large volume, are only human when they throw out the dragnet for prospects and get orders signed by fancy deals. It is the old story of so many other types of business, "We lose money on individual sales but make it up on volume."

Suppliers contemplating a visit to Detroit to inspect the display of aircraft parts here are advised first to write the Committee for Air Defense, 8505 West Warren avenue, for passes to the exhibit. Large numbers of new parts for the latest types of bombers are being brought in and the clamps are being put on visitors to exclude the curious. This is being done supposedly at the request of the army air corps and the FBI. However, no inconvenience will be experienced by any legitimate supplier showing his credentials in writing before visiting the display.

Complete redesign has been made of the army tanks which Chrysler will start to build next year. Those who are figuring on various parts of the program state two separate models have been worked out, one to be powered by a Dodge diesel engine.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,692	449,492
Feb.	202,597	317,520	422,225
March	238,447	389,495	440,232
April	237,929	354,266	452,433
May	210,174	313,248	412,492
June	189,402	324,253	362,566
July	150,450	218,494	246,171
Aug.	96,946	103,343	89,866
Sept.	89,623	192,678	284,583
Oct.	215,286	324,688	514,374
10 mos.	1,857,806	2,895,059	3,674,434
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

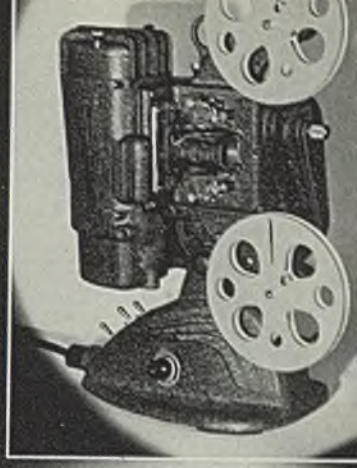
Week ended:	1940	1939†
Nov. 9	120,948	86,200
Nov. 16	121,943	86,700
Nov. 23	102,340	72,520
Nov. 30	128,783	93,638
Dec. 7	125,690	115,488

†Comparable week.

An Umpire That Never Misses the Ball

■ Here's an automatic umpire that calls 'em all right. It's a new automatic gaging machine used at the Ford Motor Co.'s Rouge plant to measure within millionths of an inch the size of balls used for bearings. The operator is shown pouring balls into the hopper, from which they are fed into the measuring unit and then roll over the trap-doors on the automatic sorting chute. For details see accompanying article

DIE CASTING IS NO CURE-ALL, BUT-



● As with other fabricating materials and processes, ZINC Alloy Die Castings are not a cure-all for every production problem. However, numerous problems, common to many metal parts produced today, were solved when this motion picture projector frame* was die cast of ZINC Alloy.

To minimize assembling and machining costs, the projector frame was designed to be produced in one piece. This entailed a complexity of shape which could be obtained only by die casting. Also, as cast from a ZINC Alloy, the part is dimensionally accurate, insuring a snug fit in the projector assembly.

Impact strength is another important requirement, because of the abuse a motion picture projector takes in service. Impact figures, along with other pertinent data, appear on the tag attached to the casting.

The part is finished in wrinkled enamel before final assembly. The smooth as-cast surface of a ZINC Alloy Die Casting promotes ease of finish—whether an organic or electrodeposited coating is required.

If *you* are not thoroughly informed on the physical and economic advantages of ZINC Alloy Die Castings, we suggest that you consult a commercial die caster — or write to The New Jersey Zinc Company, 160 Front Street, New York City.

*Just one of a total of 16 ZINC Alloy Die Castings in the complete projector.

ZINC ALLOY DIE CASTINGS

Research was done, the Alloys were developed, and most Die Castings are made wit

ORSE HEAD SPECIAL (99.99+%) ZINC

Finished Steel Output Above Rated Capacity

■ Finished steel made for sale in October amounted to 4,937,388 net tons, according to the American Iron and Steel institute. This was 490,833 tons greater than in September, partially accounted for by an additional working day.

After deducting 267,378 tons shipped to other members of the industry for conversion into further finished products October production was 4,670,010 tons, which it is estimated, is 102.2 per cent of finishing capacity, on the basis of a yield from ingots of 68.9 per cent.

Output for ten months was 38,899,459 tons, of which 2,047,508 tons were shipped for further conversion, at 82 per cent of capacity.

Sheets represented the largest tonnage in October, 1,087,697 tons. Other leading items: Bars 868,220 tons; plates, 431,817 tons; heavy structurals, 361,813 tons; cold-reduced tin plate, 165,498 tons.

Export shipments in October totaled 783,652 tons, 15.87 per cent of output. This compares with 21.4 per cent in September. Other comparisons are found in the following table, covering the institute's monthly reports, which started in April:

	Output	Exported	Pct.
April	3,005,218	371,532	12.37
May	3,576,860	476,761	13.33
June	3,802,485	601,668	15.8
July	4,173,839	835,385	20.0
Aug.	4,649,065	1,053,110	22.6
Sept.	4,446,555	951,555	21.4
Oct.	4,937,388	783,652	15.87

In ten months this year 6,406,752 tons, or 16.47 per cent of output, was exported, compared with 16.5 per cent in nine months this year and 6 per cent in the entire year, 1939.

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

October - 1940 (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	To Date (10 Months 1940): Total	To Date: Per Cent of capacity	To Date: Shipments: Export	To Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	34	1	xxxxxxx	623,156	xxx	311,232	124,714	4,516,110	xxx	2,170,285	948,540
	Heavy structural shapes	8	2	5,205,300	361,813	82.0	52,427	xxxxxxx	2,443,912	56.3	337,957	xxxxxxx
	Steel piling	4	3	328,000	30,746	110.6	3,365	xxxxxxx	167,950	61.4	17,573	xxxxxxx
	Plates—Sheared and Universal	20	4	6,095,450	431,817	83.6	66,524	1,567	3,314,844	65.3	508,195	17,011
	Skelp	8	5	xxxxxxx	106,349	xxx	36,638	35,533	673,329	xxx	145,516	238,695
	Rails—Standard (over 60 lbs.)	4	6	3,647,600	61,191	19.8	8,758	xxxxxxx	1,281,045	42.1	177,209	xxxxxxx
	Light (60 lbs. and under)	6	7	306,800	15,933	61.3	6,237	xxxxxxx	102,873	40.2	39,218	xxxxxxx
	All other (incl. girder, guard, etc.)	2	8	118,000	2,011	20.1	1,326	xxxxxxx	21,109	21.5	3,729	xxxxxxx
	Splice bar and tie plates	15	9	1,300,200	27,998	25.4	1,364	xxxxxxx	433,276	40.0	8,760	xxxxxxx
	Bars—Merchant	35	10	xxxxxxx	513,802	xxx	88,904	39,252	3,773,490	xxx	617,196	289,091
	Concrete reinforcing—New billet	16	11	xxxxxxx	125,638	xxx	11,762	xxxxxxx	1,072,434	xxx	234,030	xxxxxxx
	Rerolling	18	12	xxxxxxx	15,529	xxx	1,846	xxxxxxx	123,571	xxx	7,976	xxxxxxx
	Cold finished—Carbon	18	13	xxxxxxx	77,968	xxx	3,734	xxxxxxx	560,756	xxx	16,703	xxxxxxx
	Alloy—Hot rolled	16	14	xxxxxxx	115,682	xxx	9,671	10,026	810,396	xxx	70,505	59,446
	Cold finished	15	15	xxxxxxx	10,503	xxx	969	xxxxxxx	78,212	xxx	3,617	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	9,098	xxx	858	xxxxxxx	86,714	xxx	7,970	xxxxxxx
	TOTAL BARS	54	17	12,389,265	868,220	82.7	117,744	49,278	6,505,573	63.0	957,997	348,537
	Tool steel bars (rolled and forged)	15	18	110,220	7,177	76.8	716	xxxxxxx	57,979	63.1	4,980	xxxxxxx
	Pipe and tube—B. W.	13	19	1,851,860	129,978	82.8	7,332	xxxxxxx	888,701	57.6	64,355	xxxxxxx
	L. W.	10	20	1,246,340	36,471	34.5	1,987	xxxxxxx	292,875	28.2	28,005	xxxxxxx
	Electric weld	5	21	735,520	20,683	33.2	2,560	xxxxxxx	234,924	38.3	25,368	xxxxxxx
	Seamless	15	22	3,159,840	169,745	63.4	17,375	xxxxxxx	1,479,606	56.2	177,271	xxxxxxx
	Conduit	6	23	151,145	10,296	80.4	58	xxxxxxx	63,610	50.5	1,508	xxxxxxx
	Mechanical Tubing	13	24	554,825	33,826	71.9	3,020	xxxxxxx	240,226	52.0	19,450	xxxxxxx
	Wire rods	18	25	xxxxxxx	125,589	xxx	24,201	17,952	1,004,809	xxx	306,368	135,201
	Wire—Drawn	37	26	2,255,210	168,082	88.0	13,681	1,299	1,218,672	64.8	143,758	9,630
	Nails and staples	19	27	1,091,690	66,358	71.7	3,264	xxxxxxx	516,396	56.8	51,682	xxxxxxx
	Barbed and twisted	16	28	438,270	19,750	53.2	5,419	xxxxxxx	174,337	47.7	43,353	xxxxxxx
	Woven wire fence	15	29	772,790	15,909	24.3	134	xxxxxxx	192,690	29.9	1,812	xxxxxxx
	Bale ties	11	30	119,050	4,993	49.5	28	xxxxxxx	59,621	60.1	265	xxxxxxx
	All other wire products	5	31	27,030	494	21.6	-	xxxxxxx	4,458	19.8	-	xxxxxxx
	Fence posts	13	32	147,485	4,596	36.8	37	xxxxxxx	45,959	37.4	847	xxxxxxx
	Black plate	12	33	653,295	28,733	51.9	5,150	29	292,541	53.7	38,953	56,011
	Tin plate—Hot rolled	9	34	1,201,960	23,296	22.9	2,080	xxxxxxx	381,942	38.1	74,776	xxxxxxx
	Cold reduced	10	35	2,930,860	165,498	66.6	19,690	xxxxxxx	1,904,392	78.0	299,349	xxxxxxx
	Sheets—Hot rolled	26	36	xxxxxxx	598,601	xxx	44,231	19,185	4,579,294	xxx	441,819	132,078
	Galvanized	16	37	xxxxxxx	164,598	xxx	10,498	xxxxxxx	1,248,409	xxx	134,509	xxxxxxx
	Cold rolled	18	38	xxxxxxx	267,550	xxx	3,566	xxxxxxx	1,914,333	xxx	65,037	xxxxxxx
	All other	15	39	xxxxxxx	56,948	xxx	1,341	xxxxxxx	478,526	xxx	20,130	xxxxxxx
	TOTAL SHEETS	27	40	13,255,610	1,087,697	96.8	59,636	19,185	8,220,562	74.4	661,495	132,078
	Strip—Hot rolled	24	41	3,525,110	164,794	55.2	9,559	17,821	1,213,827	41.3	74,155	141,815
	Cold rolled	35	42	1,313,360	85,631	76.9	1,395	xxxxxxx	618,532	56.5	14,651	xxxxxxx
	Wheels (car, rolled steel)	5	43	424,385	15,549	43.2	3	xxxxxxx	154,472	43.7	2,484	xxxxxxx
	Axles	5	44	472,280	13,447	33.6	82	xxxxxxx	80,174	20.4	1,885	xxxxxxx
	Track spikes	11	45	327,275	8,728	31.5	630	xxxxxxx	89,364	32.8	3,543	xxxxxxx
	All other	3	46	9,100	834	108.2	-	xxxxxxx	8,769	115.6	-	xxxxxxx
	TOTAL STEEL PRODUCTS	134	47	xxxxxxx	4,937,388	xxx	783,652	267,378	38,899,459	xxx	6,406,752	2,047,508
	Estimated total steel finishing capacity based on a yield from ingots of 68.9 %	-	48	53,946,300	xxxxxxx	102.2	xxxxx	xxxxxxx	xxxxxxx	82.0	xxxxxxx	xxxxxxx
	Pig iron, ferro manganese and spiegel	26	49	xxxxxxx	614,240	xxx	60,920	189,597	4,770,719	xxx	483,881	1,301,221
	Ingot moulds	4	50	xxxxxxx	52,420	xxx	1,156	xxxxxxx	389,496	xxx	4,370	xxxxxxx
Iron Products	Bars	10	51	160,600	3,984	29.3	258	73	26,391	19.7	364	1,716
	Pipe and tubes	3	52	109,377	4,999	53.9	152	xxxxxxx	34,886	38.3	850	xxxxxxx
	All other	3	53	71,180	877	14.5	315	-	9,914	16.7	2,176	2,326
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	12	54	276,247	9,860	42.1	725	73	71,191	30.9	3,390	4,042

Total Number of Companies Included - 153

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products: Current month 4,670,010 *N.T.:* 102.2 *% of Finishing Capacity.*
To date 36,851,951 *N.T.,* 82.0 *% of Finishing Capacity.*
The above tonnages represent 68.9 *% of the ingots produced by companies whose products are included above.*

$113,822,280 Award for Cruisers Leads Week's Defense Contracts

■ DEFENSE awards reported last week by the war and navy departments aggregated $235,387,245.06, a substantial increase over the total of contracts reported the preceding week. Navy department's total was more than four times as great as that reported by army.

Principal award reported by the navy was a $113,822,280 contract to Cramp Shipbuilding Co., Philadelphia, for six cruisers, with additional $12,000,000 for expansion of plant facilities. Facilities contracted for include additional shipways, cranes, outfitting piers, machine shops, pipe shops and tools.

War department's quartermaster corps continued heavy purchases of clothing and other articles needed to accommodate expected trainees. Ordnance awards likewise continued strong.

War department announced the following:

Air Corps Awards

Consolidated Aircraft Corp., San Diego, Calif., specification change in the purchase of airplanes, $342,169.82.

Hayes Industries Inc., Jackson, Mich., wheel and brake assemblies, $471,-395.50.

Jack-Heintz Ltd., Cleveland, starter assemblies, $808,785.

Jaeger Watch Co. Inc., New York, clock and tachometer assemblies, $54,748.25.

Mallory, P. R., & Co. Inc., Indianapolis, shackle releases, $329,868.88.

Quartermaster Corps Awards

American Seating Co., Grand Rapids, Mich., 150,000 folding, metal chairs, $247,500.

Barletta, V., Co., Boston, sanitary sewers and water mains and grading to buildings, harbor defenses of Boston, $29,250.

Blackstone Silver Co., Stratford, Conn., 200,000 nickel-silver table forks, $30,-000.

Chapman, A., Construction Co., Sulphur, Okla., gas and oil stations, administration buildings, barracks and warehouse for observation squadron, Ft. Sill, Oklahoma, $56,448.

Chicago Pneumatic Tool Co., Chicago, diesel-electric generating station, Savanna ordnance depot, Illinois, $238,-383.

Federal Motor Truck Co., Detroit, trucks, $42,009.

Ford Motor Co., Detroit, trucks, light five-passenger sedan cars, $2,012,700.

Fruehauf Trailer Co., Detroit, four-wheel semi-trailers, $17,353.

Great Lakes Engineering Works, Detroit, material and repairs to ferryboat MACKINAW CITY, $14,149.60; to ferryboat ST. IGNACE, $13,438.81.

Hackett, Henry H., Rapid City, S. D., temporary housing, Ft. Meade, South Dakota, $127,860.

International Silver Co., Meriden, Conn., 200,000 table knives, $37,200.

Lyon Metal Products Inc., Aurora, Ill., 153,500 metal, box-type trunks, $458,-965.

Merrill, R. D., Construction Co., Helena, Mont., temporary housing, Ft. Douglas, Utah, $151,906.

National Concrete Fireproofing Co., Cleveland, floors and foundations in power building of wind tunnel, Wright field, Ohio, $49,700.

Oehler, Charles, Galveston, Tex., temporary housing, Ft. Crockett, Texas, $145,000.

Oneida Ltd., Oneida, N. Y., nickel silver tableware, $86,600.

Owens-Ames-Kimball Co., Grand Rapids, Mich., temporary housing and hospital, Ft. Custer, Michigan, $1,673,040.

Paulus, Robert, Construction Co., St. Louis, temporary housing, Jefferson barracks, Missouri, $303,532.

Pettyjohn, John P., & Co., Lynchburg, Va.; Dewey G. Weddle & Co., Norfolk, Va.; and Hofheimer Construction Co., Norfolk, Va., replacement center, Ft. Eustis, Virginia, $5,132,245.

Scott-Buttner Electric Co., Oakland, Calif., additions to night lighting system, Moffett field, California, $3625.

Severin, N. P., Co., Chicago, air corps hangars, Howard field, Canal Zone, $1,450,799.

Slaymaker Lock Co., Lancaster, Pa., 11,-750 padlocks for trunk lockers, $1880.

Smythe, Hugh, Co., Wilmington, Del., temporary housing, Saulsbury, Del., $57,570.

Timmons, George W., Columbus, O., temporary buildings, Ft. Hayes, Ohio, $120,936.

Trapp-Carroll Co., Columbus, O., temporary buildings, Ft. Hayes, Ohio, $25,450.

Wallace, R., & Sons Mfg. Co., Wallingford, Conn., nickel silver tableware, $49,800.

Watt & Sinclair, Palm Beach, Fla., storehouse, quartermaster shop, utilities administration building, Orlando air corps base, Orlando, Fla., $28,000.

Watson Automotive Equipment Co., Washington, semi-trailers, $957,440.

Westcott, Frank T., North Attleboro, Mass., filtered water reservoir and appurtenances, Big Bethel filtration plant, Ft. Monroe, Virginia, $21,690.

Whitmeyer, George A., & Sons Co., Ogden, Utah, equipment repair building, Hill field, Utah, $208,990.

Yellow Truck & Coach Mfg. Co., Pontiac, Mich., trucks, tractor-trucks, $40,087.

Ziebarth, Fritz, Long Beach, Calif., gasoline storage and dispensing system, Stockton municipal airport, California, $4998.

Ordnance Department Awards

Allis-Chalmers Mfg. Co., Milwaukee, engine parts, $38,948.55.

American Machine & Metals Inc., East Moline, Ill., hardness tester, centrifugal equipment, $4646.

American Monorail Co., Cleveland, monorail track section, $1068.60.

Associated Spring Corp., Wallace Barnes Co. division, Bristol, Conn., springs, $3900.

Bausch & Lomb Optical Co., Rochester, N. Y., fire control equipment, $8190.

Bendix Aviation Corp., Marine division, Brooklyn, N. Y., artillery materiel, $28,750; Scintilla Magneto division, Sidney, N. Y., engine parts, $5878.43; Eclipse Aviation division, Bendix, N. J., engine parts, $4491.29.

Bethlehem Steel Co., Bethlehem, Pa., artillery ammunition components, $50,-000.

Blake, Edward, Co., Newton Center, Mass., grinders, $1791.

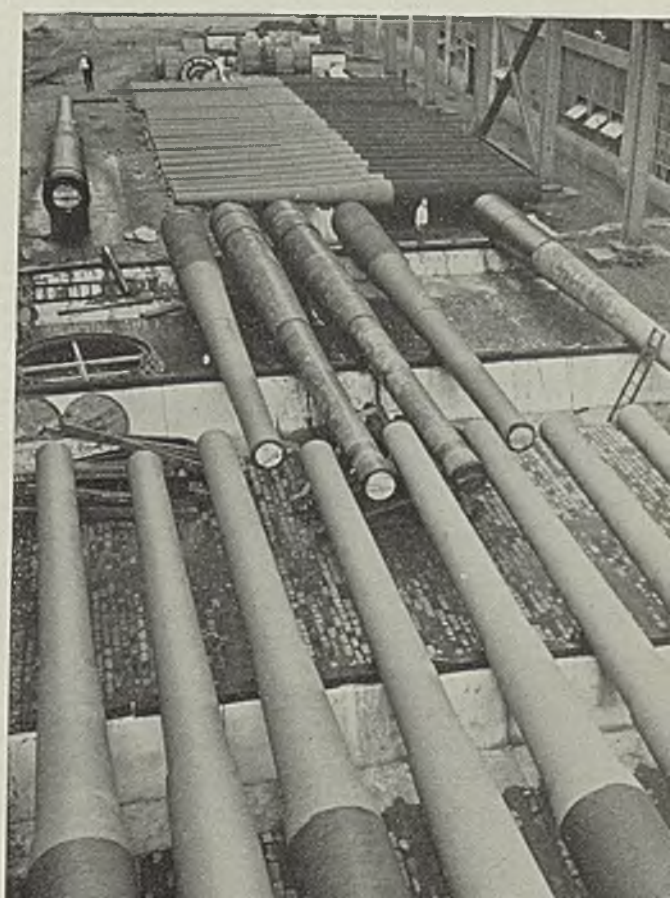
Brown & Sharpe Mfg. Co., Providence, R. I., tools, $2772.40.

Budd, Edward G., Mfg. Co., Philadelphia, machinery, $20,568.96.

Carboloy Co. Inc., Philadelphia, tools for small arms, $1733.80.

Chicago Malleable Castings Co., Chicago, iron castings, $1162.80.

Guns for New Navy



■ Large calibre finished guns await shipment in the Washington navy yard, one of the 11 yards producing guns for the new two-ocean navy. National defense advisory commission photo by Palmer

Clapp, E. D., Mfg. Co., Auburn, N. Y., drop forgings, $1586.
Crucible Steel Co. of America, New York, steel, $4882.25.
Darwin & Milner Inc., Cleveland, cutters, $2500.
Denison Engineering Co., Columbus, O., hydraulic machines, $23,800.
Detroit Broach Co. Inc., Detroit, broach sections, $1413.65.
Duplex Mfg. Corp., Sherman, N. Y., steel chests, $12,185.10.
Du Pont, E. I., de Nemours & Co., Repauno works, Gibbstown, N. J., artillery ammunition components, $330,000.
Firth-Sterling Steel Co., Philadelphia, tools for small arms, $7875.
General Motors Corp., Packard Electric division, Warren, O., ignition cable, $2469.60.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, $41,985.58.
Hanson-Whitney Machine Co., Hartford, Conn., gages, $5545.35.
Haskins, R. G., Co., Chicago, tapping machine, $1038.
Jones & Lamson Machine Co., Springfield, Vt., lathes, $49,200.
Judd, H. L., Co., New York, small arms ammunition components, $10,080.
Koppers Co., Bartlett Hayward division, Baltimore, artillery materiel, $9,956,000.
Lansdowne Steel & Iron Co., Morton, Pa., shell forgings, $539,760.
Mergenthaler Linotype Co., Brooklyn, N. Y., fire control equipment, $578,960.97.
Minneapolis-Honeywell Regulator Co., Minneapolis, artillery materiel $5710.75.
Monarch Machine Tool Co., Sidney, O., lathes, $3410.
Mutual Wheel Co., Moline, Ill., trailers, $4485.
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., gages, $31,762.50.
Noble, K. B., Co., Hartford, Conn., diesel engine generator sets, $6368.25.
Otis Elevator Co., Yonkers, N. Y., artillery materiel, $2,722,679.96.
Philadelphia Hardware & Malleable Iron Works Inc., Philadelphia, small arms ammunition components, $15,180.
Precise Tool & Mfg. Co., Farmington, Mich., gages, $43,196.80.
Sall, George, Metals Co., Philadelphia, aluminum, $12,533.70.
Schauer Machine Co., Cincinnati, polishing and finishing machines, $1158.
Schlosser Mfg. Co., Philadelphia, gages, $1680.
Sheffield Gage Corp., Dayton O., gages, $3600.63.
Smith, H. A., Machinery Co., Syracuse, N. Y., machinery, $3635.20.
Standard Gauge Co. Inc., Poughkeepsie, N. Y., gages, $11,417.67.
Stokes, F. J., Machine Co., Philadelphia, oscillating granulators, $1518.
Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, $2203.69.
Thurston Mfg. Co., Providence, R. I., cutting tools, $1991.20.
Timken-Detroit Axle Co., Wisconsin Axle division, Oshkosh, Wis., herringbone type gears, $1311.25.
Towmotor Co., Cleveland, warehouse tractors, $10,206.93.
Tredegar Co., Tredegar Iron Works, Richmond, Va., artillery ammunition components, $7079.10.
Union Hardware Co., Torrington, Conn., small arms materiel, $5956.96.
Union Twist Drill Co., Athol, Mass., tools, $1314.30.
United States Precision Products, Size Control Co. division, Chicago, gages, $1100.75.
Vandyck-Churchill Co., Philadelphia, machinery, $14,971.
Vinco Corp., Detroit, gages, $3926.
Waltham Watch Co., Waltham, Mass., fire control equipment, $11,717.80.
Wannamaker Chemical Co. Inc., Orangeburg, S. C., artillery ammunition components, $61,000.
Waterhouse Co., Webster, Mass., artillery materiel, $11,118.
West & Dodge Thread Gauge Co., Boston, gages, $2359.65.
W. M. Steel Co., Worcester, Mass., machinery, $9450.
Wright & Gade Equipment Co., Philadelphia, machinery, $2000.

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Navy department announced the following:

Bureau of Supplies and Accounts Awards

Acheson Mfg. Co., Rankin, Pa., cast bronze pipe flanges, $14,802.16.
American Car & Foundry Co., New York, tank lighters, $1,020,262.
American Chain & Cable Co. Inc., Wilkes-Barre, Pa., wire rope, iron or steel seizing strand, $41,700.93.
American Electrical Heater Co., Detroit, electric glue pots, soldering irons, $11,002.99.
American Tool Works Co., Cincinnati, radial drills, engine lathes, $62,062.
Babcock & Wilcox Tube Co., Beaver Falls, Pa., boiler and superheater tubes, $96,307.31.
Baldt Anchor, Chain & Forge Corp., Chester, Pa., steel anchors, anchor chain, $92,657.76.
Bendix Aviation Corp., Marine division, Brooklyn, N. Y., salinity indicator panels, $15,937.70; Bendix Products division, South Bend, Ind., wheel and brake assemblies, $260,100.
Berkeley Steel Construction Co. Inc., Berkeley, Calif., steel mooring buoys, $45,360.
Bertsch & Co. Inc., Cambridge City, Ind., plate straightening rolls, plate bending rolls, $48,471.
Borg-Warner Corp., Marvel-Schebler Carburetor division, Flint, Mich., hydraulic track controls, $226,237.70.
Brown & Sharpe Mfg. Co., Providence, R. I., calipers, dividers, gages and squares, $39,772.45.
Buffalo Forge Co., Buffalo, bending roll, $5026.
Burke Electric Co., Erie, Pa., motor generators, $5575.35.
Carlton Machine Tool Co., Cincinnati, heavy duty drills, $21,334.
Carnegie-Illinois Steel Corp., Pittsburgh, nickel steel, $44,905.78.
Caswell, Strauss & Co. Inc., New York, pig tin, $101,908.80.
Chase Brass & Copper Co. Inc., Waterbury, Conn., rolled naval brass, $12,554.02.
Commercial Enclosed Fuse Co. of N. J., Hoboken, N. J., electric fuses, $24,981.65.
Commercial Engineering Co., Washington, diesel fuel oil purifiers, $6716.05.
Condenser Service & Engineering Co. Inc., Hoboken, N. J., steel mooring buoys, $6954.
Consolidated Machine Tool Corp., Rochester, N. Y., vertical boring mills, $215,600.
Dreis, Edward J., Co., Ltd., San Francisco, press forming brake, $5070.

Purchases Under Walsh-Healey Act

(In Week Ended Nov. 23)

Iron and Steel Products	Commodity	Amount
American Cast Iron Pipe Co., Birmingham, Ala.	Iron pipe	$37,178.19
American Fork & Hoe Co., Cleveland	Axes	38,303.27
Ames Baldwin Wyoming Co., Parkersburg, W. Va.	Shovels	89,720.82
Anchor Post Fence Co., New York	Fence	10,221.76
Belknap Hardware & Mfg. Co. Inc., Louisville, Ky.	Range boilers	15,400.00
Bethlehem Steel Co., Bethlehem, Pa.	Bar steel	89,540.00
Bethlehem Steel Export Corp., New York	Penstocks	22,918.00
Bourlier Sheet Metal Works, Louisville, Ky.	Stovepipe hoods	30,350.00
Budd Wheel Co., Detroit	Projectiles	86,774.80
Cahn, A. L., & Sons Inc., New York	Graters	28,696.00
Case Crane & Kilbourne Jacobs Co., Columbus, O.	Food carts	29,800.65
Chicago Bridge & Iron Co., Chicago	Steel tanks	95,750.00
Chicago Hardware Foundry Co., North Chicago, Ill.	Griddles	41,920.00
Chicago Pneumatic Tool Co., Detroit	Riveters	18,355.20
Columbia Steel Co., San Francisco	Piling	11,571.42
Cramp Brass & Iron Foundries Co., Philadelphia	Propeller wheels	*15,063.00
Crown Iron Works Co., Minneapolis	Piers	21,390.00
Duro Metal Products Co., Chicago	Motor maintenance equipment	37,989.29
General Drop Forge Co. Inc., Buffalo	Forgings	10,801.00
Hart Mfg. Co., Louisville, Ky.	Stoves	17,545.00
Herring-Hall-Marvin Safe Co., Hamilton, O.	Safes	28,286.25
Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.	Stoves	62,390.00
Lakeside Bridge & Steel Co., Milwaukee	Gate hoists	41,027.00
Lalance & Grosjean Mfg. Co., Woodhaven, Long Island, N. Y.	Plumbing fixtures	14,446.08
Lansdowne Steel & Iron Co., Morton, Pa.	Forgings	539,760.00
Lukens Steel Co., Coatesville, Pa.	Fabricated plates	*223,629.85
Maclane Hardware Co., New York	Scoops, shovels	14,743.84
Midvale Co., Philadelphia	Forgings	670,000.00
Noland Co. Inc., Washington	Mattocks	38,830.79
Owatonna Tool Co., Owatonna, Minn.	Motor maintenance equipment	24,747.00
Pittsburgh Forgings Co., Coraopolis, Pa.	Forgings	12,135.50
Pittsburgh Screw & Bolt Corp., Pittsburgh	Rivets	43,680.00
Remington Arms Co. Inc., Bridgeport, Conn.	Shotguns	165,253.01
Republic Steel Corp., Cleveland	Steel bars	21,651.16
Ryerson, Joseph T., & Son Inc., Chicago	Steel, reinforcing bars	155,166.00
Southern Welding & Machine Co., Charlottesville, Va.	Stuffing tubes	17,860.00
Storms Drop Forging Co., Springfield, Mass.	Forgings	21,389.40
Timken Roller Bearing Co., Canton, O.	Steel	18,280.00
Townsend Co., New Brighton, Pa.	Rivets	31,785.00
Truscon Steel Co., Youngstown, O.	Platforms	14,400.00
United States Pipe & Foundry Co., Philadelphia	Water pipe	76,260.00
Variety Aircraft Corp., Dayton, O.	Tool assemblies	14,477.91
Youngstown Sheet & Tube Co., Youngstown, O.	Roofing	*135,280.50

*Estimated.

Edna Brass Mfg. Co., Cincinnati, pipe, bronze flanges, $7270.01.

Elliott Co., Ridgway, Pa., main parts for generators, $37,156.49.

Federal Machine & Welder Co., Warren, O., electric seam welding machine, $6590.

Gardner-Denver Co., Quincy, Ill., air compressors, $31,956.86.

General American Transportation Corp., Chicago, railroad box cars, $5816.

General Motors Corp., Cleveland Diesel Engine division, Cleveland, main engine spares for submarines, $24,681.

Hanna Furnace Corp., S. Weinstein Supply Co., agent, New York, malleable pig iron, $6558.43.

Hayes, C. I., Inc., Providence, R. I., electric furnaces, $6482.

Hooven, Owens, Rentschler Co., Hamilton, O., main engine spares, piston and rod assemblies, $50,304.65.

Hyde Windlass Co., Bath, Me., electric hydraulic type steering gears, $103,080.

Ingersoll-Rand Co., New York, air compressors, $96,846.

Laganke Electric Co., Cleveland, welding panels, $7776.

Latham, E. B., & Co., New York, cartridge-type fuses, $10,132.50.

Lodge & Shipley Machine Tool Co., Cincinnati, engine lathes, $27,738.

MacWhyte Co., Kenosha, Wis., steel cable, $81,810.

Milwaukee Electric Tool Corp., Milwaukee, electric drills, $53,011.20.

National Broach & Machine Co., Detroit, automatic hydraulic profiling machine, $20,320.

National Lead Co., Baltimore, anti-friction ingot metal, $21,510.

Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn., radial drill machines, die sinking machines, $59,384.

North American Smelting Co., Philadelphia, anti-friction ingot metal, $13,796.60.

Pacific Wire Rope Co., Los Angeles, wire rope, $36,883.80.

Pittsburgh Screw & Bolt Corp., West Hartford, Conn., alloy steel tap rivets, $261,280.20.

Pittsburgh Steel Co., Pittsburgh, iron or steel wire, $7687.16.

Reed-Prentice Corp., Worcester, Mass., engine lathes, $47,548.

Revere Copper & Brass Inc., Baltimore, copper-nickel alloy plates, admiralty metal condenser tubes, $65,052.71.

Roebling's, John A., Sons Co., Trenton, N. J., copper, iron or steel wire, $13,333.84.

Sellers, Wm., & Co. Inc., Philadelphia, horizontal boring, drilling, and milling machines, $3,299,169.

Stone Heating & Ventilating Co., Washington, electric ventilating fans, $56,416.

United Engineering & Foundry Co., Pittsburgh, forging press, $1,972,182.

Union Wire Rope Corp., Kansas City, Mo., wire, steel rope, $49,393.47.

Upson-Walton Co., Cleveland, steel cable, wire rope, $53,163.

Warner & Swasey Co., Cleveland, turret lathes, $18,467.50.

White Mop Wringer Co., Fultonville, N. Y., dust pans, $7098.01.

Wire Rope Corp. of America, New Haven, Conn., towing hawsers, wire rope, $99,324.60.

Wire Rope Mfg. & Equipment Co., Seattle, wire rope, $20,629.80.

Bureau of Yards and Docks Awards

Aqua Systems Inc., New York, gasoline and oil systems at naval air station, Jacksonville, Fla., $201,539.

Kaltenbach, R. W., Corp., Bedford, O., cranes for navy yard at Pearl Harbor, T. H., $236,500.

Kuljian, H. A., & Co., Philadelphia, boiler and accessories at navy yard, Washington, $162,901.

Mackie Co., Miami, Fla., housing facilities at naval air station, Miami, on a cost plus fixed fee basis, $555,000.

Pacific Construction Co. Ltd., Honolulu, T. H., extension to garage and bakery buildings at marine reservation, navy yard, Pearl Harbor, Hawaii, $29,405.

Parker, K. E., Co., San Francisco, transit shed, garage, firehouse and public works shop, and locomotive and crane shed, naval supply depot, Oakland, Calif., $394,298.

Parrott's, William, Sons, extension and repair of main wharf at naval ammunition depot at Iona Island, N. Y., $91,500.

Philadelphia Gas Works Co., Philadelphia, construction of cold rooms at marine barracks galley, Philadelphia navy yard, $3518.

Purchases Under Walsh-Healey Act (Cont.)

Nonferrous Metals and Alloys	Commodity	Amount
Addressograph-Multigraph Corp., Cleveland	Identification tags	$84,200.00
Aluminum Cooking Utensil Co., New Kensington, Pa.	Utensils	20,990.70
American Brass Co., Waterbury, Conn.	Brass, brass strip	*143,234.58
C-O-Two Fire Equipment Co., Newark, N. J.	Fire extinguishers	39,208.50
Chase Brass & Copper Co. Inc., Waterbury, Conn.	Condenser tubes	50,986.43
Hoosier Lamp & Stamping Corp., Evansville, Ind.	Utensils	13,655.16
Illinois Pure Aluminum Co., Lemont, Ill.	Pitchers	22,375.00
International Nickel Co. Inc., New York	Nickel-copper alloy, nickel	81,820.00
International Silver Co., New York	Tableware	248,909.36
Metal Goods Corp., St. Louis	Copper tubing	16,937.82
New Haven Copper Co., Seymour, Conn.	Copper	15,984.12
Revere Copper & Brass Inc., Baltimore	Brass	12,198.00
Machinery and Other Equipment		
American Blower Corp., Detroit	Draft fans	$59,633.00
American Bosch Corp., Springfield, Mass.	Engine parts	68,493.95
American Brake Shoe & Foundry Co., New York	Dredging pumps	23,659.35
American Cutter & Engineering Co., Detroit	Punches	10,865.60
Axelson Mfg. Co., Los Angeles	Lathes	294,283.50
Bodine Corp., Bridgeport, Conn.	Tapping machines	19,515.00
Buda Co., Harvey, Ill.	Engine parts	99,351.06
Carlton Machine Tool Co., Cincinnati	Drills	111,378.45
Chicago Pneumatic Tool Co., New York	Grinders	29,663.30
Cincinnati Shaper Co., Cincinnati	Shear machine	14,938.00
Cleveland Tractor Co., Cleveland	Tractors	185,747.04
Ellis Drier Co., Chicago	Washing equipment	10,104.00
Ex-Cell-O Corp., Detroit	Engine parts, pumps	184,051.50
Gleason Works, Rochester, N. Y.	Generators	30,340.15
H. & B. American Machine Co., Pawtucket, R. I.	Spinning frames	12,186.40
Hannifin Mfg. Co., Chicago	Recoil mechanisms	442,641.00
Hardinge Brothers Inc., Elmira, N. Y.	Lathes	10,291.40
Ingersoll-Rand Co., New York	Drills, breakers, hammers	13,064.24
International Harvester Co., Chicago, Ill.	Cranes, tractors	1,005,764.56
Lloyd & Arms Inc., Philadelphia	Drilling machines, presses	52,703.55
Novo Engine Co., Lansing, Mich.	Pumps, hoists	16,229.38
Pacific Marine Supply Co., Seattle	Pumps	24,148.05
Pangborn Corp., Hagerstown, Md.	Blast machines	24,166.00
Prentiss, Henry, & Co. Inc., New York	Drilling, boring machines	30,363.00
Rasmussen Machine Co. Inc., Racine, Wis.	Hack saws	11,868.00
Sealed Power Corp., Muskegon, Mich.	Cylinder sleeves	12,086.00
Sidney Machine Tool Co., Sidney, O.	Lathes	27,486.00
Star Drilling Machine Co., Akron, O.	Drills	159,607.91
Tidewater Supply Co. Inc., Norfolk, Va.	Hobber machine	12,477.00
Universal Crusher Co., Cedar Rapids, Iowa	Crusher equipment	14,768.00
Whitin Machine Works, Whitinsville, Mass.	Dry twisters	10,772.58
Williams White & Co., Moline, Ill.	Rotary shears	13,500.00

Zinc, "Badly Needed in U. S.," Shipped to Japan

■ Policy of supplying America's potential enemies abroad with raw materials needed at home for both American and British defense was criticized last week by C. Donald Dallas, president, Revere Copper & Brass Inc., New York. There is available to brass fabricators less than one-half the amount of zinc needed to meet present requirements, said Mr. Dallas.

"This country," he pointed out, "shipped 3775 tons of zinc to Japan in October, bringing the total to 12,042 tons for the first 10 months of 1940, every pound of which was so badly needed at that time by our brass manufacturers that fabricating plants all over the country are being forced to curtail production schedules when they should be increasing. The result is that deliveries which are desperately needed by Britain are being seriously delayed."

Mr. Dallas declared that to secure an adequate supply of zinc for defense purposes two possibilities were available. Either some new supply of the refined metal must be found, "which would seem to require a minimum of at least six months" or else zinc substitutes must be employed for nondefense purposes.

November Pig Iron Operating Rate Up 2.2 Points to 96.4 Per Cent

■ FURTHER acceleration in pig iron operating rate in November, to 96.4 per cent of capacity, resulted in record daily average production of 146,589 net tons for the month. Aggregate production of coke pig iron in United States last month was 4,397,656 tons, according to reports from operators of the nation's 231 potential blast furnaces. Two hundred two stacks were reported in blast Nov. 30, six more than were active Oct. 31, bringing the industry to virtual capacity operations.

Average daily output was 3437 tons or 2.4 per cent greater than October's 143,152 tons. It was 5.5 per cent greater than 138,883 tons in November, last year, and almost double 74,929 tons, daily average for the month in 1937. In November, 1936, average was 110,131 tons; for the period in 1929 it totaled 118,811 tons.

Total output of pig iron in November, despite substantial increase in daily average, was 40,069 tons or 0.9 per cent less than in October, because last month was one day shorter. It was, however, second only to October which set an all-time record with 4,437,725 tons. Aggregate production in November, 1939, was 4,166,512 tons.

Aggregate production in first 11 months this year was 42,351,812 tons. This was 36.2 per cent more than 31,090,324 tons, output in the period last year. It was more than double 18,678,178 tons produced in first 11 months of 1938, and exceeded by more than 7.4 per cent production of 39,430,344 tons in the period in 1937.

Average daily production in the 11 months was 126,423 tons. This compared with daily averages of 93,085 tons, 55,923 tons, and 118,055 tons, produced in the respective periods in 1939, 1938 and 1937.

Operating rate in November increased for the seventh consecutive month, was 2.2 points higher than October's 94.2 per cent of capacity, compared with rates of 91.5 per cent in September and 89.9 per cent in August. Rate of operations in April, low for 1940, was 68.9 per cent. In November last year, rate was 90.3 per cent.

Stacks active at the end of the month totaled 202, highest since October, 1929, when 203 were blowing and production totaled 4,018,724 tons. In October, 196 were reported in blast; 192 in September; 190 in August; 187 in July; and 152 in March, lowest this year. In November, last year, 191 were active, and 114 for the month in 1937. Stacks in blast in November, 1929, totaled 176.

Six furnaces were reported blown in during November, and none were blown out or banked. Two stacks put in blast were merchant; the other four of the steelworks or nonmerchant classification. Stacks put in blast in November:

In Alabama: North Birmingham No. 3, Sloss-Sheffield Steel & Iron Co. In Ohio: Mingo No. 2, Carnegie-Illinois Steel Corp.; and Hamilton No. 2, Hamilton Coke & Iron Co. In Pennsylvania: Edgar Thomson G, Carnegie-Illinois Steel Corp.; and Bethlehem D, Bethlehem Steel Co. In Virginia: Reusens furnace of E. J. Lavino & Co.

Wisconsin Steel Works reported blowing out, Dec. 1, its South Chicago No. 2 furnace, in Illinois, for rebuilding.

Though pig iron production in recent months has been at record levels, and total for the year probably will exceed 46,750,000 tons, it is doubtful a new record will be achieved. In 1929, total output was 47,342,605 tons, all-time high.

Twenty-nine of the 44 companies possessing coke pig iron producing facilities reported all their stacks were in blast Nov. 30. Carnegie-Illinois had blowing 51 of 64 furnaces; Youngstown Sheet & Tube, 10 of 12; National Steel, 8 of 9; American Steel & Wire, 4 of 5; and National Tube, 8 of 9.

MONTHLY IRON PRODUCTION

Net Tons

	1940	1939	1938
Jan.	4,024,556	2,436,474	1,618,245
Feb.	3,304,368	2,307,405	1,463,093
March	3,270,575	2,680,446	1,646,636
April	3,139,043	2,301,965	1,534,569
May	3,497,157	1,923,625	1,412,249
June	3,813,092	2,373,753	1,188,037
July	4,060,513	2,638,760	1,358,645
Aug.	4,234,576	2,979,774	1,674,976
Sept.	4,172,551	3,218,940	1,885,069
Oct.	4,437,725	4,062,670	2,315,599
Nov.	4,397,656	4,166,512	2,561,060
Tot. 11 mo.	42,351,812	31,090,324	18,678,178
Dec.	.....	4,219,718	2,478,244
Total	.....	35,310,042	21,156.422

AVERAGE DAILY PRODUCTION

Net Tons

	1940	1939	1938	1937
Jan.	129,825	78,596	52,201	116,327
Feb.	113,943	82,407	52,254	120,800
March	105,502	86,465	53,117	125,385
April	104.635	76,732	51,819	126,956
May	112,811	62,052	45,556	128,083
June	127,103	79,125	39,601	116,304
July	130,984	85,121	43,827	126,501
Aug.	136,599	96,122	54,031	130,677
Sept.	139,085	107,298	62,835	127,604
Oct.	143,152	131,053	74,697	104,450
Nov.	146,589	138,883	85,369	74,929
Dec.	.....	136,119	79,943	54,319
Ave.	126,423	96,740	57,962	112,642

NOVEMBER IRON PRODUCTION

Net Tons

	No. in blast last day of Nov.	No. in blast last day of Oct.	—Total Tonnages— Merchant	—Total Tonnages— Non-merchant
Alabama	18	17	121,068*	185,332
Illinois	16	16	93,412	313,671
Indiana	18	18	.....	512,884
New York	13	13	94,869	197,484
Ohio	45	43	174,088	819,983*
Penna.	67	65	133,896*	1,226,023*
Colorado	3	3		
Michigan	5	5		
Minnesota	2	2	14,326*	193,953
Tennessee	1	1		
Utah	1	1		
Kentucky	2	2		
Maryland	6	6		
Mass.	1	1	16,805*	299,862
Virginia	1	0		
West Va.	3	3		
Total	202	196	648,464*	3,749,192*

*Includes ferromanganese and spiegeleisen.

RATE OF FURNACE OPERATION

(Relation of Production to Capacity)

	1940[1]	1939[2]	1938[3]	1937[4]
Jan.	85.4	51.0	33.6	76.6
Feb.	75.0	53.5	33.6	79.5
March	69.5	56.1	34.2	82.5
April	68.9	49.8	33.4	83.7
May	74.2	40.2	29.4	84.3
June	83.6	51.4	25.5	78.6
July	86.1	55.0	28.2	82.9
Aug.	89.9	62.4	34.8	86.7
Sept.	91.5	69.7	40.5	83.7
Oct.	94.2	85.2	48.0	68.4
Nov.	96.4	90.3	55.0	49.3
Dec.	....	88.5	51.4	33.6

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

Canadian Steel, Iron Output Up in October

■ Production of steel ingots in Canada in October totaled 185,091 gross tons, a substantial increase over September. Pig iron output, 109,385 tons, was the largest in history except 112,528 tons in August, 1929. Ferroalloy production also gained. Ten months' output in all three materials was larger than in the corresponding portion of 1939. Comparisons follow:

Pick up 6-point

	Steel ingots	Pig iron	Ferro-alloys
Oct., 1940	185,091	109,385	15,016
Sept., 1940	164,515	105,020	13,147
Oct., 1939	149,890	85,758	6,357
10 mos., 1940	1,649,639	948,841	105,361
10 mos., 1939	1,087,583	573,740	57,455

Improvements in Electric Power Equipment Featured at Show

■ IMPROVED efficiency in production of electric power was manifest in various exhibits of 300 companies participating in the fourteenth National Exposition of Power and Mechanical Engineering, last week in Grand Central Palace, New York. Attendance exceeded 40,000.

Displays covered the entire field of materials and apparatus used in generating and distributing power. Metallurgical advances which have contributed to progress in power development were emphasized in displays by metals companies. These included Revere Copper & Brass Inc., International Nickel Co. Inc., Bridgeport Brass Co., Chase Brass & Copper Co., Eagle-Picher Sales Co., Phelps Dodge Copper Products Corp., Scovill Mfg. Co., Republic Steel Corp. and United States Steel Corp.

Ampco Metals Inc. featured aluminum bronze electrode, designed for welding to steel, cast iron, Ampco metal and many other commercial alloys, employing the oxyacetylene, carbon arc or metallic arc process.

Simplified refractory wall and arch construction was demonstrated by George P. Reintjes Co., Kansas City, Mo. In this construction wall sections are supported on box girder castings after the manner of the steel-framed skyscraper. The company also showed a new type of wall support consisting of a frame of small rods welded together in basket shape.

Among displays of flexible seamless hose and tubing were samples in 8 and 10-inch inside diameters, products of Packless Metal Products Corp., Long Island City, N. Y.

Allis-Chalmers Mfg. Co. demonstrated its Weld-O-Tron, a low-current electronic welder. This unit employs current as low as 5 amperes and electrodes of 1/32 and 3/64-inch in welding sheets as thin as 32 gage. A portable six-tube mercury arc rectifier converts alternating current into direct current for welding purposes.

A fully-automatic electric forging heater was operated by American Car & Foundry Co. Equipped with an electric eye, this heater automatically ejects the bar at a predetermined temperature and gives a constant heat to each succeeding piece.

Whitney Metal Tool Co., Rockford, Ill., displayed a steel bending brake. This has hardened jaws and as an aid in the working of stainless steel the nose of the upper jaw and the gib plates on the apron are highly polished.

New applications of photo-electric controls were demonstrated by Photoswitch Inc., Cambridge, Mass. One of these was a method for continuously indicating in the boiler room the density of smoke passing through the flue and signalling when this exceeds a predetermined value. Counting equipment, including a high speed unit capable of indicating up to 30 units per second, said to be the fastest electrical counting system available for industrial purposes; a remote meter-reading transmission system, using no wires; and a liquid level control system, adapted to the control of powders as well as non-conducting liquids, were among the devices shown.

A comprehensive group of gas-fired equipment used in the metal-working industry was included in the American Gas association's exhibit.

International Expositions Inc., which conducted the show, stated a survey indicated the utilities now have budgeted for installation nearly $600,000,000 worth of new equipment. This accompanies the expansion in electric power production to an all-time high this year, as a result of mounting industrial activity.

■ Scene at fourteenth National Exposition of Power and Mechanical Engineering in Grand Central Palace, New York, last week

Individuals Win in Labor Board Elections

■ Novel wrinkle in labor relations developed at Roseville, O., recently when four individuals became sole bargaining agents for workers at two pottery plants by defeating an American Federation of Labor union in national labor relations board elections.

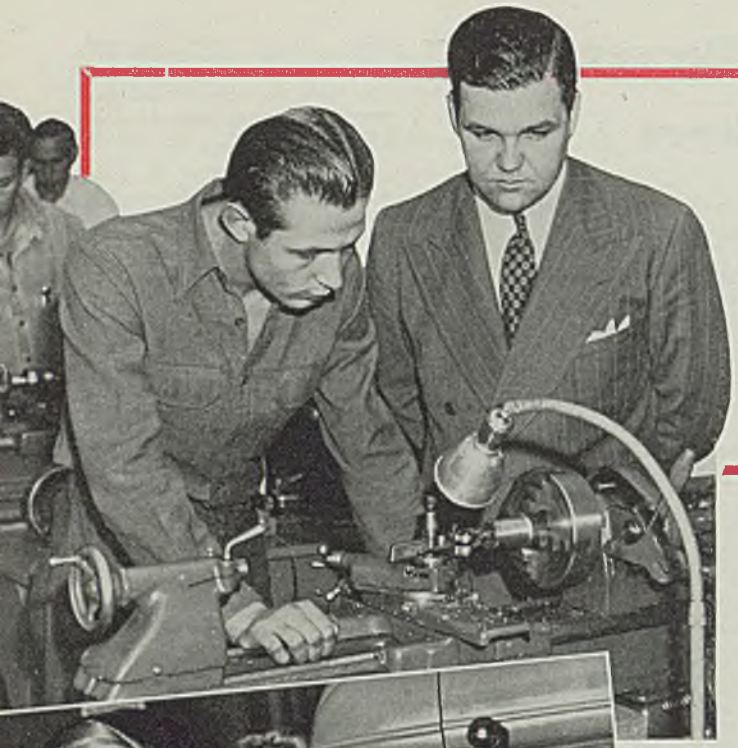
The two pottery companies, the Nelson-McCoy Co. and the Robinson-Ransbottom Co., in recent years have been negotiating separate contracts with the AFL Pottery Workers union and with nonunion employes. The AFL recently demanded a closed shop, which was refused on the ground the union had no majority of employes.

The AFL called a strike which was quickly settled through the efforts of Ralph A. Lind, labor relations advisor to the companies and formerly chief of the labor board office in Cleveland. During the discussions preceding the settlement, Mr. Lind pointed out that workers could elect individuals as sole collective bargaining agents, as well as independent, AFL or CIO unions.

This idea appealed to two individuals in each plant who circulated petitions to make themselves the employes' representatives. After obtaining a large number of signatures, the four filed their petitions with the company and asked the labor board to hold an election on the grounds they represented a majority of employes.

At the election, the four individuals beat the AFL union handily, and were certified as sole collective bargaining agents. Later they started negotiations for a contract with the companies.

AFL unionists protested to the labor board its members are being discriminated against by both companies.



Youth Takes Place

In Front Lines of

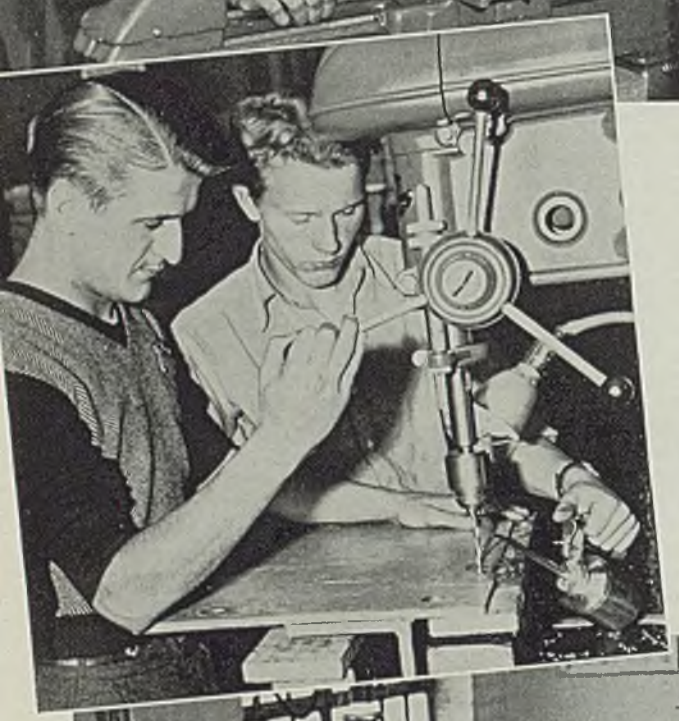
Industrial Defense

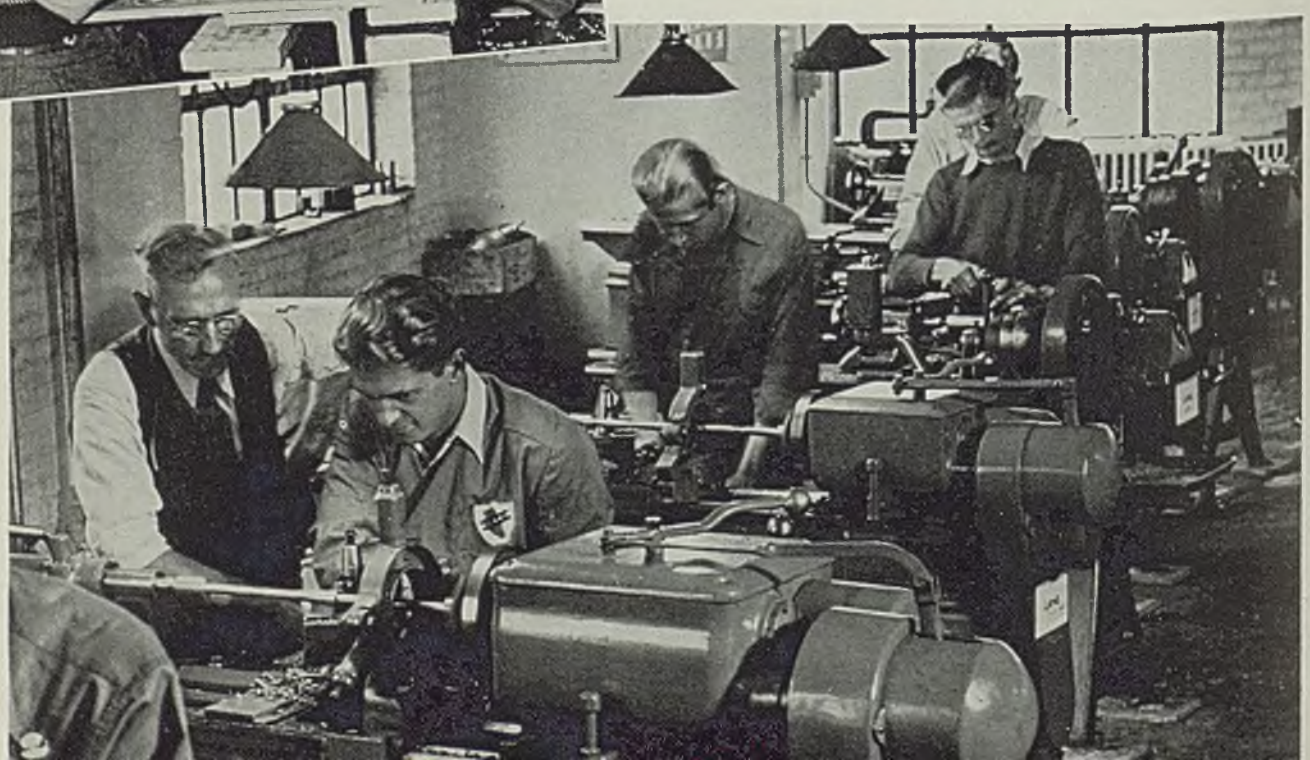
NATIONAL youth administration has doubled its program to prepare youth for employment in industry and to aid in the defense program. Typical of the programs is that in Illinois, where more than 7000 young men and women are gaining job experience in 33 centers.

Actual production experience under factory conditions is aim of NYA, which is striving to help both factors in the employment picture—those who want jobs and those who have jobs to offer.

Through mechanical aptitude tests, the plan endeavors to give basic machine shop experience to youths who have the education and other necessary qualifications. In all cases, experience is offered step-by-step. Only as the youth masters one task is he given another.

Experience includes phases of machine work from repairing turret lathes to threading nuts. In addition to machine shop, training is offered in sheet metal work, welding, foundry, forge, radio, woodworking, drafting and designing. Accompanying photos were taken in the NYA center at 153 West Huron street, Chicago, and illustrate youths working at machines under instructor's guidance.





Industry Outlines 12-Point Labor Program To Expedite Defense

■ TWELVE specific suggestions for creating and maintaining smooth and efficient labor-management relations during the defense program were made public last week by the National Association of Manufacturers. They are contained in a report by the association's employment relations committee and approved by the resolutions committee, to be submitted to the Congress of American Industry in New York this week.

If put into practice, the committee's report asserts, the recommendations would "speed up defense production" and "obtain the most value for taxpayers who foot the bill for defense costs." The committee, composed of 109 industrial executives from 28 states, representing both large and small companies and many types of industries, declared:

"The national defense program is not an end in itself; it is necessary to us because it is designed to supply a means of protecting and preserving the American way of life.

"The success of national defense program depends primarily on the production of goods; this means the employment of millions of workers.

"What employment problems are created—what principles should be applied in their solution? We submit the following suggestions:

1. The government should not play favorites as between employers and employes, or between different unions.

2. There should be no arbitrary interference by either government or unions with the right of employers to employ, retain and promote the most competent workers available. If employers cannot do this then they cannot produce national defense materials as efficiently as the public need requires.

3. Employers should continue to use every effort to employ workers in the occupations for which they are best fitted.

4. Employers should continue and expand the practice of paying, wherever feasible, workers according to their individual or group accomplishment, thus giving the most return to workers who produce the most for national defense.

5. Such increased earnings as are necessary and desirable during the armament period in individual cases should be made in the form of temporary wage bonuses rather than increases in the basic wage rates; providing, however, that the basic wage rates are not less than equal to the general wage level for similar work in the community, with due regard for the following factors:

The wage for each job being determined in relation to all other jobs in the plant, with due regard for skill, responsibility, experience, physical demands and hazards which the job requires.

6. Employers should endeavor to augment the supply of skilled labor in occupations where shortages now exist or are threatened, giving as diversified training and work-experience as is practical.

7. In the interests of safeguarding national defense production, employers should carefully review the citizenship status, the job requirements and the physical and mental qualifications of their watchmen and guards.

8. In the interest of preventing espionage and sabotage, employers in national defense industries should provide adequate checking or identification of those admitted to company premises as employes or in any other capacity.

9. Labor unions should abandon or suspend rules and practices which prevent maximum production by individual workers.

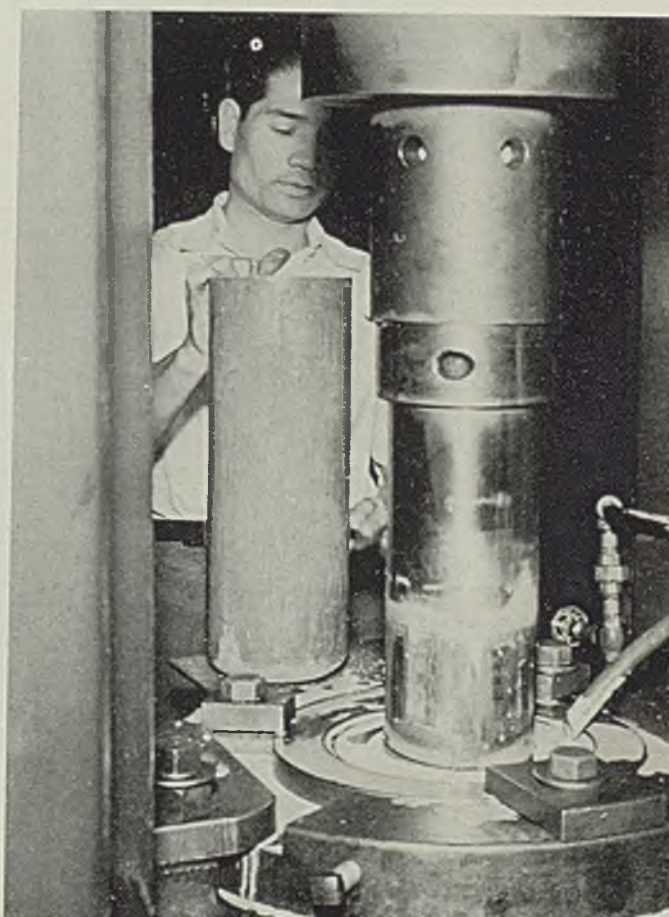
10. Jurisdictional disputes between rival unions in national defense industries should not be permitted to obstruct defense production; they do not involve any real differences between employers and employes, and the employer, since not a party to the dispute, is helpless to end it.

11. When disputes between employers and employes arise in national defense industries attempts should be made to mediate them in a manner satisfactory to both employers and employes before either a strike or lockout occurs.

12. In the World war the committee on labor of the Council of National Defense declared April 2, 1917, as its first national labor policy that the *status quo* in bargaining relationships between employers and employes should be maintained during the war. We are not now at war, but the national defense program is of major national importance, and we believe that again in the interests of national defense the *status quo* in bargaining relationships should be maintained so long as the preparedness program is a major national policy."

Foote-Burt Co., 13000 St. Clair avenue, Cleveland, manufacturer of machine tools, has bought the capital stock of the Hammond Mfg. Co., 3089 East Eightieth street, Cleveland, manufacturer of sensitive radial drills and surface grinders. Name of the latter company will be changed after Jan. 1. Manufacture of its lines will be continued.

Drawing 5-Inch Shell



■ Five-inch antiaircraft guns will defend Uncle Sam's latest warcraft. Here a workman in the Washington navy yard is drawing a brass shell for these large guns. This is an intermediate step in the conversion of heavy flat blanks into finished shells. National defense advisory commission photo by Palmer

Toledo Has Its Own Shock Absorber

■ WHILE the expansion of industrial plant and equipment now is being pushed vigorously, the officials responsible for it are trying hard not to forget the lessons of the past. Leaders in the federal government and in private industry are painfully conscious of the difficulties that will come when capacity has to be adjusted downward to peacetime requirements.

Inasmuch as the government in recent years has entered into the economic life of the nation to a degree unheard of in 1918 and in 1929, it is logical to believe that it should bear a greater share of the burden of post-emergency readjustment in the early forties than it did in the early twenties and again in the early thirties. Today a large portion of the public is disposed to let Uncle Sam do all of the worrying about the future.

This is a dangerous philosphy. Unless we do something to change this trend, we will wind up as a totalitarian state.

One way to change it is to encourage private enterprise to do its utmost to ease the shocks that come from sharp fluctuations in industrial activity. A case history will serve to show what can be done in this direction.

In 1929, more than 30 per cent of the industrial employes in Toledo, O., were working for one company—an automobile manufacturer. Due largely to this unbalanced situation, Toledo suffered more acutely from the depression than many other cities.

Their plight caused Toledo's citizens to act promptly to fortify their city against future contingencies. They took steps to insure industrial peace, installed clean city government and worked hard to restore the city's good name.

But the manufacturers of Toledo did one other thing that is important and significant. They started to reduce Toledo's dependency upon one employer and upon one branch of industry.

Electric Auto-Lite and Doehler Die Casting developed products not dependent upon the automobile industry. Toledo Scale's then recently developed plastic material led to the formation of a new company, whose products go into diversified markets. De Vilbiss company's spray gun was adapted to an important function in the food industries. Surface Combustion, once dependent upon the market for industrial furnaces, now also makes air conditioning equipment for industrial and commercial use. Owens-Illinois Glass developed fiber glass and glass block, which opened up markets in new fields. Libbey-Owens-Ford Glass brought out new products which diversified its markets, etc., etc.

As a result, the highest percentage of Toledo's industrially employed persons dependent upon a single branch of industry now is only 14 per cent. This diversity, achieved in a few years, will ease the shock for Toledo when post-defense recession knocks at its door.

Industrial executives will do well to study the Toledo technic in diversification. It will convince them that industry can cure many of its ills through its own efforts.

E. L. Shaner

The BUSINESS TREND

Activity Index Reaches New High Level

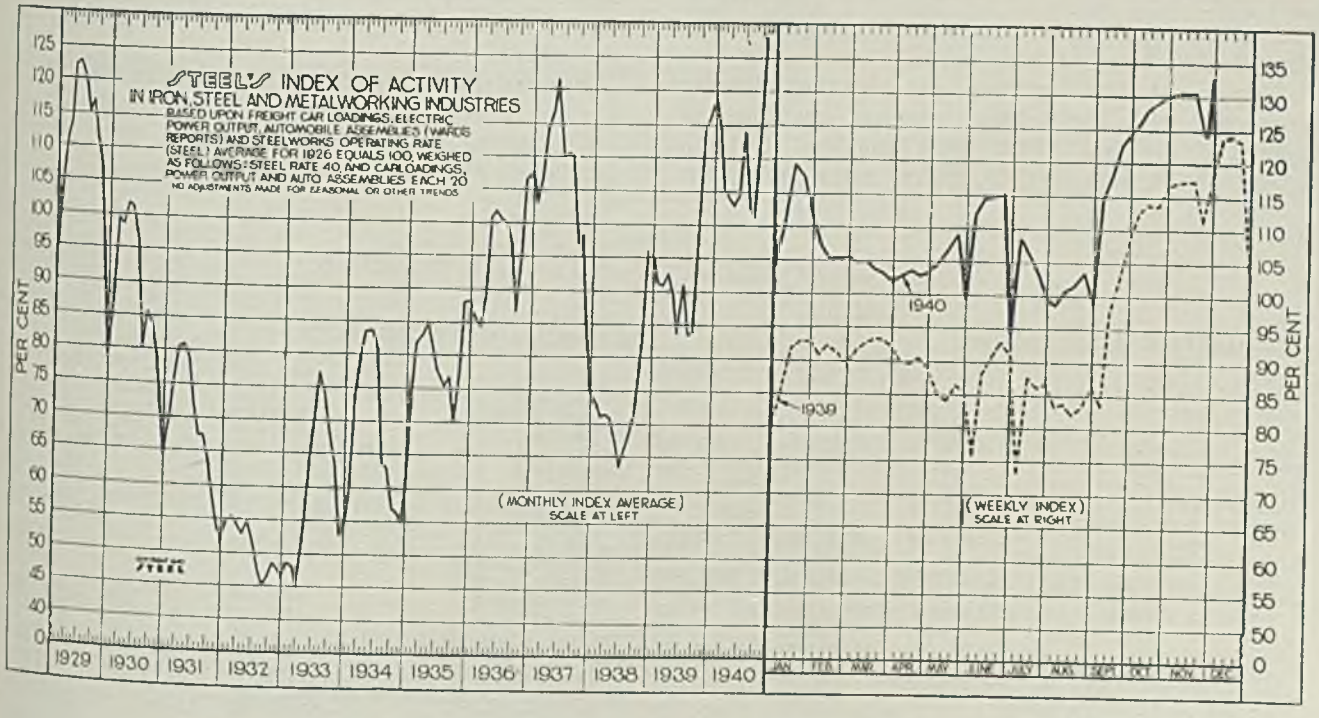
■ INDUSTRIAL output in the capital goods industries is well sustained at practical capacity. In some instances further gains in production have occurred, although operations in most lines have leveled off as a result of the current limitation of operating facilities.

The sharp rebound of most industrial indicators following the temporary holiday week dip is particularly encouraging. Electric power consumption and automobile output attained new peak levels in the seaonal upward movement.

During the week ended Nov. 30, STEEL'S index of activity climbed to a new high of 132.6, a gain of 7.9 points over 124.7 recorded during Thanksgiving day week. In the corresponding period of 1939 and 1938 the index advanced 6.5 and 4.5 points respectively.

Steelmaking operations held steady at 97 per cent of capacity in the week ended Nov. 30. Last year at this time the national steel rate was at 94 per cent.

Electric power consumption advanced to a new



STEEL'S index of activity gained 7.9 points to 132.6 in the week ended Nov. 30.

Week Ended	1940	1939	Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Sept. 14	114.9	97.5	Jan.	114 7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Sept. 21	117.7	103.0	Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
Sept. 28	122.8	107.9	March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
Oct. 5	124.4	112.5	April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
Oct. 12	126.0	113.9	May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
Oct. 19	128.3	113.6	June	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
Oct. 26	129.9	116.2	July	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Nov. 2	130.2	117.1	Aug.	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Nov. 9	130.3	117.2	Sept.	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Nov. 16	130.3	117.3	Oct.	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov. 23	124.7	111.4	Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Nov. 30	132.6	117.9	Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

all-time peak during the week ended Nov. 30, totaling 2,795,634,000 kilowatts, compared with 2,695,431,000 in the previous week and 2,538,777,000 in the comparable 1939 period.

Contrary to previous expectations, automobile output continued to surge upward during the week ended Nov. 30, reaching a new high for any week since May, 1937. December production schedules are being stepped up considerably as a result of continued stronger than expected dealer and consumer demand. Indications are that output this month will approximate 450,000 units, which will bring fourth quarter assemblies to around 1,465,000, or more than 25 per cent above the previous peak for the period set last year.

Building construction continues to expand, reflecting stimulus of the defense needs.

Volume of new business, notably that directly connected with the defense program, continues to exceed production. With order backlogs in these industries at new all-time peaks, indications point to capacity operations well into next year. In a few instances, such as certain types of machine tools, delivery cannot be obtained until early 1942.

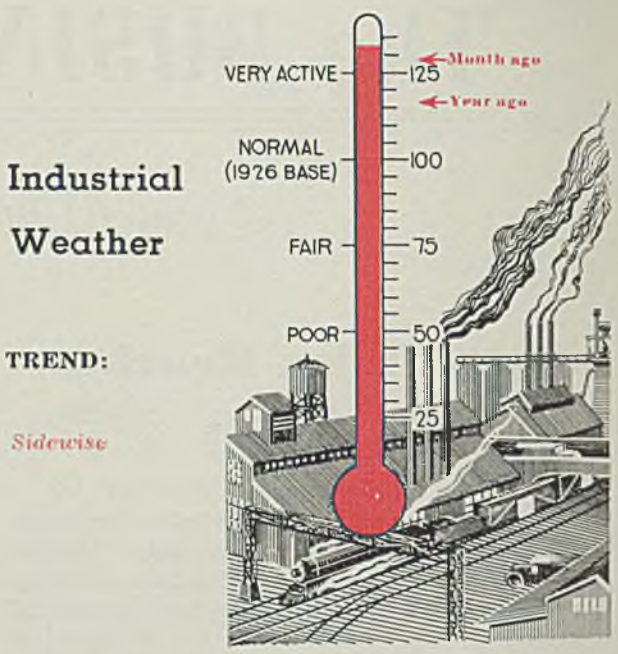
Inventory position of most companies, while considerably augmented in recent months, is not considered out of line in view of the substantial upturn in consumption and prospects of further improvement.

Heavier shipments of war materials to Great Britain are reflected in the United States export figures for October. In that month exports were 16 per cent above the September volume.

Where Business Stands

Monthly Averages, 1939 = 100

	Oct., 1940	Sept., 1940	Oct., 1939
Steel Ingot Output	148.4	140.1	139.6
Pig Iron	147.9	143.8	135.5
Building Construction	129.5	117.5	88.5
Automobile Production	165.4	91.5	104.4
Freight Movement	124.1	119.7	128.8
Wholesale Prices	102.1	101.2	103.0



The Barometer of Business

Industrial Indicators

	Oct., 1940	Sept., 1940	Oct., 1939
Pig iron output (daily average, tons)	143,093	139,085	131,053
Iron and steel scrap consumption (tons)	4,233,000	3,876,000	3,809,000
Gear Sales Index	216	183	141
Foundry equipment new order index	264.0	161.2	166.1
Finished steel shipments (Net tons)	1,572,408	1,392,838	1,345,855
Ingot output (average weekly; net tons)	1,458,668	1,377,391	1,372,500
Dodge bldg. awards in 37 states ($ Valuation)	$383,069,000	$347,651,000	$261,796,000
Automobile output	514,374	284,583	324,688
Coal output, tons	38,300,000	38,413,000	46,394,000
Business failures; number	1,111	976	1,234
Business failures; liabilities	$12,715,000	$11,397,000	$17,464,000
Nat'l Ind. Conf. board (25 industries, factory):			
Av. wkly. hrs. per worker†	39.0	38.5	38.2
Av. weekly earnings†	$28.99	$28.58	$27.58
Cement production, bbls.	13,984,000	13,123,000	12,538,000
Cotton consumption, bales	770,702	639,252	686,451
Car loadings (weekly av.)	812,850	783,833	843,736

†September, August and September respectively.

Foreign Trade

	Oct., 1940	Sept., 1940	Oct., 1939
Exports	$343,485,000	$295,245,000	$331,978,000
Imports	$207,141,000	$194,928,000	$215,289,000
Gold exports†	$13,000	$10,000	$15,000
Gold imports	$325,981,000	$334,113,000	$69,740,000

†September, August and September respectively.

Financial Indicators

	Oct., 1940	Sept., 1940	Oct., 1939
25 Industrial Stocks	$173.26	$171.50	$194.82
25 Rail stocks	$21.34	$21.05	$25.84
40 Bonds	$74.20	$73.90	$73.40
Bank clear'gs (000 omitted)	†$21,083,000	$21,046,000	$24,015,000
Commercial paper rate, (New York, per cent)	½–⅝	½–⅝	⅝–¾
*Com'l. loans (000 omitted)	$8,909,000	$8,689,000	$8,521,000
Federal Reserve ratio (per cent)	90.1	89.6	85.5
Capital flotations: (000 omitted)			
New Capital	$257,003	$110,687	$338,340
Refunding	$453,017	$114,752	$404,370
Federal Gross debt (millions of dollars)	$44,137	$44,073	$41,040
Railroad earnings	$86,988,444	$66,014,798	$101,716,356
Stock sales, New York stock exchange	14,489,085	11,940,000	$23,732,664
Bond sales, par value ($1,000,000)	151.0	126.4	170.3

†September, August and September respectively.
*Leading member banks Federal Reserve System.

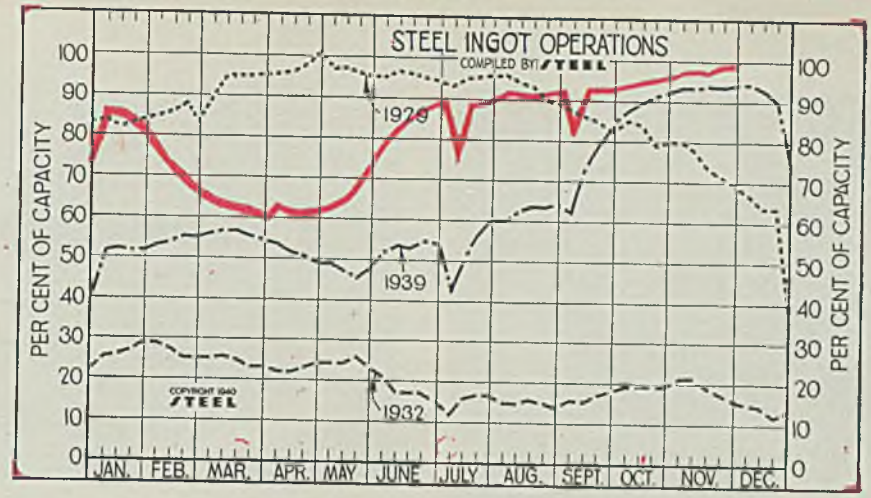
Commodity Prices

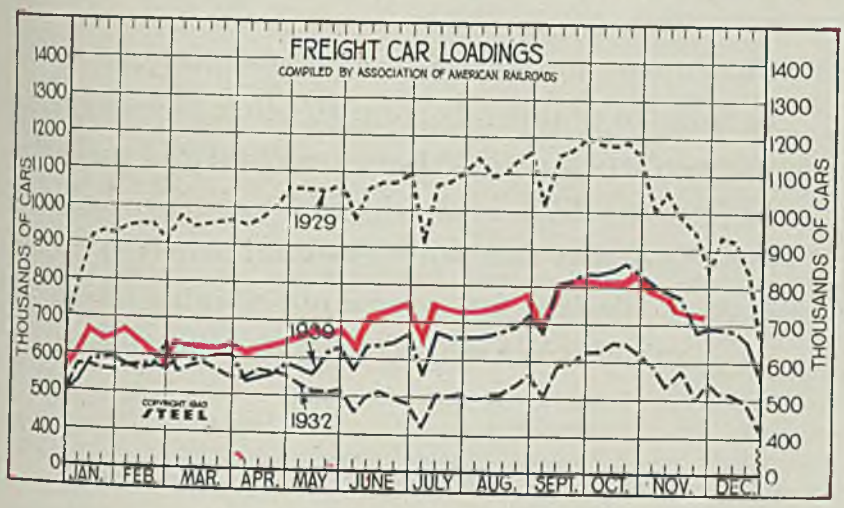
	Oct., 1940	Sept., 1940	Oct., 1939
STEEL'S composite average of 25 iron & steel prices	$38.07	$37.93	$37.62
U. S. Bureau of Labor index	78.7	78.0	79.4
Babson monthly prices: Wheat (bushel)	$0.85	$0.888	$0.895
Corn (bushel)	$0.683	$0.625	$0.62

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
Aug. 17....	90.0	63.5	41.5	81.0
Aug. 24....	90.5	63.5	43.5	83.0
Aug. 31....	91.5	64.0	44.5	83.0
Sept. 7....	82.0	62.0	41.5	72.0
Sept. 14....	93.0	74.0	46.0	80.0
Sept. 21....	93.0	79.5	48.0	76.0
Sept. 28....	93.0	84.0	47.0	74.0
Oct. 5....	93.5	87.5	48.5	66.0
Oct. 12....	94.5	89.5	51.5	63.0
Oct. 19....	95.0	91.0	51.5	53.0
Oct. 26....	95.5	92.0	54.5	51.0
Nov. 2....	96.5	93.0	57.5	47.0
Nov. 9....	96.5	93.0	61.5	39.0
Nov. 16....	96.0	93.5	63.0	35.0
Nov. 23....	97.0	93.5	62.0	31.5
Nov. 30....	97.0	94.0	61.0	30.5





Freight Car Loadings

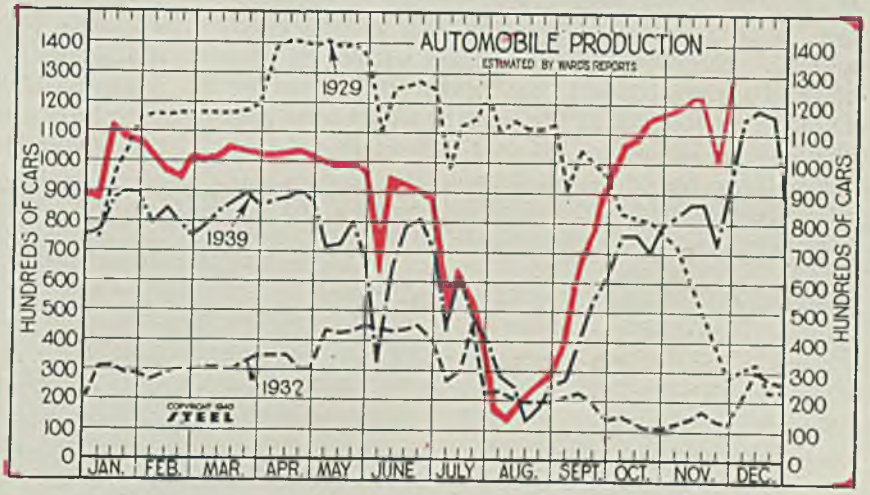
(1000 Cars)

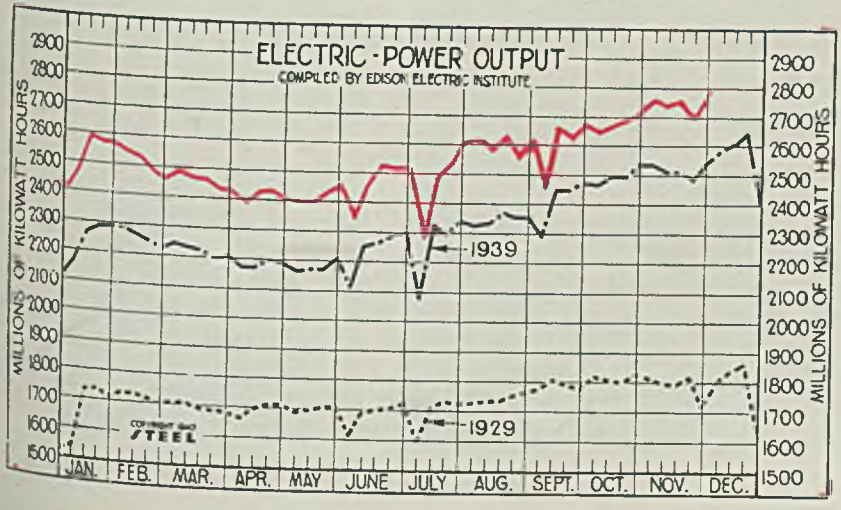
Week ended	1940	1939	1938	1937
Aug. 24.....	761	688	621	787
Aug. 31.....	769	722	648	805
Sept. 7.....	695	667	569	711
Sept. 14.....	804	806	660	827
Sept. 21.....	813	815	676	840
Sept. 28.....	822	835	698	847
Oct. 5.....	806	835	703	815
Oct. 12.....	812	845	727	810
Oct. 19.....	814	861	706	773
Oct. 26.....	838	834	709	772
Nov. 2.....	795	806	673	732
Nov. 9.....	778	786	637	690
Nov. 16.....	745	771	657	647
Nov. 23.....	733	677	562	559
Nov. 30.....	728	689	649	623

Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Aug. 24....	23.7	17.5	18.7	83.3
Aug. 31....	27.6	25.2	22.2	64.2
Sept. 7....	39.7	26.9	17.5	59.0
Sept. 14....	66.6	41.2	16.1	30.1
Sept. 21....	78.8	53.9	20.4	28.0
Sept. 28....	95.9	62.8	25.4	45.8
Oct. 5....	105.2	76.1	37.7	72.0
Oct. 12....	108.0	75.9	50.5	89.7
Oct. 19....	114.7	70.1	68.4	91.9
Oct. 26....	117.1	78.2	73.3	90.2
Nov. 2....	118.1	82.7	80.0	89.8
Nov. 9....	120.9	86.2	86.3	85.3
Nov. 16....	121.9	86.7	96.7	85.8
Nov. 23....	102.3	72.5	84.9	59.0
Nov. 30....	128.8	93.6	97.8	86.2





Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Aug. 24...	2,571	2,354	2,134	2,295
Aug. 31...	2,601	2,357	2,149	2,321
Sept. 7...	2,463	2,290	2,048	2,154
Sept. 14...	2,639	2,444	2,215	2,281
Sept. 21...	2,629	2,449	2,154	2,266
Sept. 28...	2,670	2,470	2,139	2,275
Oct. 5...	2,641	2,465	2,154	2,280
Oct. 12...	2,665	2,495	2,183	2,276
Oct. 19...	2,687	2,494	2,214	2,282
Oct. 26...	2,711	2,539	2,226	2,255
Nov. 2...	2,734	2,537	2,207	2,202
Nov. 9...	2,720	2,514	2,209	2,176
Nov. 16...	2,752	2,514	2,270	2,224
Nov. 23...	2,695	2,482	2,184	2,065
Nov. 30...	2,796	2,539	2,285	2,153

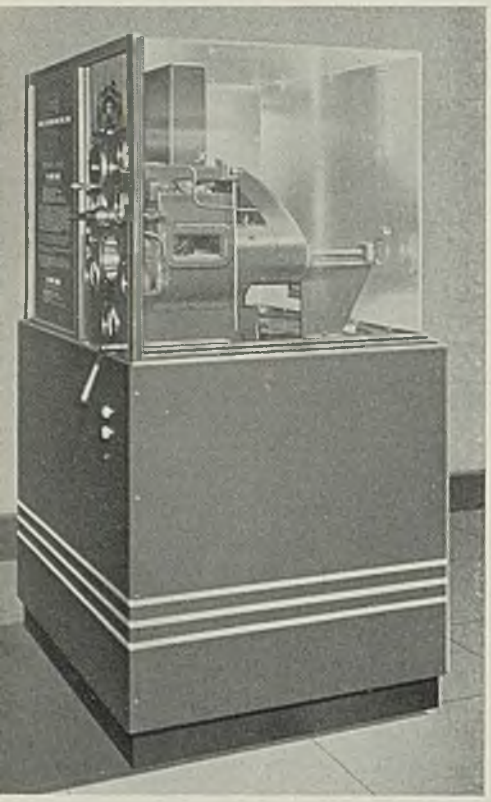


Fig. 1—Model especially designed and built to demonstrate the new Filmatic bearing and its action

Demonstration Model

. . . . Graphically Reveals New Bearing Principle

To demonstrate a new principle effectively, it should be isolated completely from all other factors affecting performance if it is to be evaluated properly. Unique machine is developed to show radial preloading action and other essential points of a new bearing design for precision grinding-machine spindles but also suitable for other uses

By ALBERT H. DALL

Research Department
Cincinnati Milling Machine Co.
Cincinnati Grinders Inc.
Cincinnati

■ HOW TO demonstrate a new principle or construction, or both, poses a difficult problem in sales engineering. The device is often hidden within the machine. Its essential parts are nearly always out of sight. Then, too, all of the parts of an intricate machine are so closely co-ordinated and integrated that the performance of the machine as a whole is not necessarily convincing proof of the value of a new principle which is incorporated in it.

When the principle is new and a radical innovation, it is especially desirable to demonstrate it entirely apart from the machine in which it will be incorporated. In this way the observer cannot harbor the suspicion that the improved performance may not be wholly or largely due to the new device. Furthermore, to be entirely convincing it is often advisable to show results by means of various measuring instruments such as gages, which to attach may require drilling holes and otherwise damaging the machine.

A demonstration model has none of these drawbacks. The device to be demonstrated can be divorced from all other parts of the machine. Needed instruments can be attached permanently. Enough of the model can be made of glass to permit the observer to see just what is going on.

Such a model, Fig. 1, has been built to demonstrate the new Filmatic bearing for precision grinding-machine spindles. Before describing the model let us see what theories, principles and constructions it is intended to demonstrate.

The aim of our research department was to develop a spindle bearing which would have the following characteristics: It must maintain a continuous, uninterrupted fluid film to support the spindle. The spindle must have a constant axis of rotation without fluttering or wavering. The change in spindle position with change in grinding load must be as small as possible. The bearing must be able to carry loads in all directions. Friction losses must be virtually independent of applied load. It must be foolproof and able to carry high overloads without failing.

It has been known for some time that when two surfaces move relatively to each other in such a way as to form a wedge shaped space between them, a film of fluid in the wedge shaped space develops high pressure normal to the bearing surfaces. This effect, which results in a degree of instability in ordinary bearings, was utilized to give stability and the other desirable characteristics listed above to the Filmatic bearing.

As shown in Fig. 2 five self-adjusting shoes produce independent converging oil films each of which develops a high radial pressure. Together, these forces maintain the spindle in a central position.

The model, Fig. 1, consists of a glass case in which is mounted a standard medium-size grinding-wheel head, the spindle nose of which is cut off. The spindle and the bearing shoes can be seen clearly through a glass window, as in Fig. 2.

Five high-pressure gages are arranged symmetrically around the bearing window on the front of the

model as shown in Fig. 3. Each is connected to the bearing area of the shoe nearest it by means of tubes and interdrilled connections.

The low pressure gage at the upper right of the panel shows the oil pressure in the chamber which surrounds the front and rear segmental bearings and the thrust bearing. The meter at the upper left shows the power input to the spindle driving motor.

Just above the bearing window is a microscope for observing any fluttering or wavering of the spindle. Through the microscope, an illuminated hairline on a spring-actuated pin, which is mounted on the spindle, can be observed with respect to graduations on the eyepiece.

The dial at the top of the panel indicates the load which is applied to the spindle. The load is applied or released by the lever at the bottom of the panel, while the magnitude of the load can be varied by rotating the hand wheel below the dial. Movement of the hand wheel changes the position of a weight behind the panel in such a way as to vary the pressure on a pair of rollers which ride on the spindle.

The knob at the left of the bearing window operates a valve which can be used to bypass the oil in the bearing chamber to illustrate the operation of the pressure switch which safeguards the bearing from failure of the oil supply.

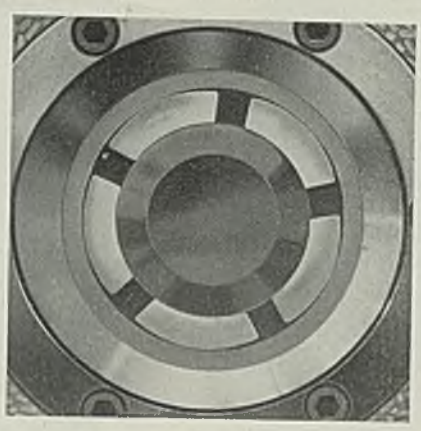


Fig. 2—Closeup of bearing showing the five self-adjusting shoes

In operation, the oil pump is started by push-button control. As the bearing chamber fills, the displaced air escapes through a high resistance vent. When passing air, the vent resistance is not sufficient to build up an appreciable pressure in the chamber. But when the chamber is filled, oil begins to flow through the vent which offers enough resistance to the flow of oil to build up pressure in the chamber.

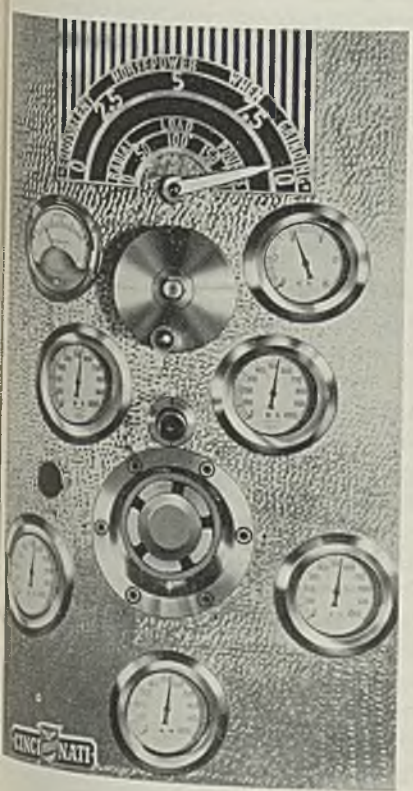
As this pressure approaches 6 pounds per square inch, a relief valve operates to limit the pressure. In the meantime a pressure switch is closed at 3½ pounds per square inch completing a relay circuit which starts the main motor driving the spindle. The pressure-operated relay prevents the spindle from running whenever the pressure in the chamber is too low to provide an adequate supply of oil to the bearings. One purpose of the model is to demonstrate this feature.

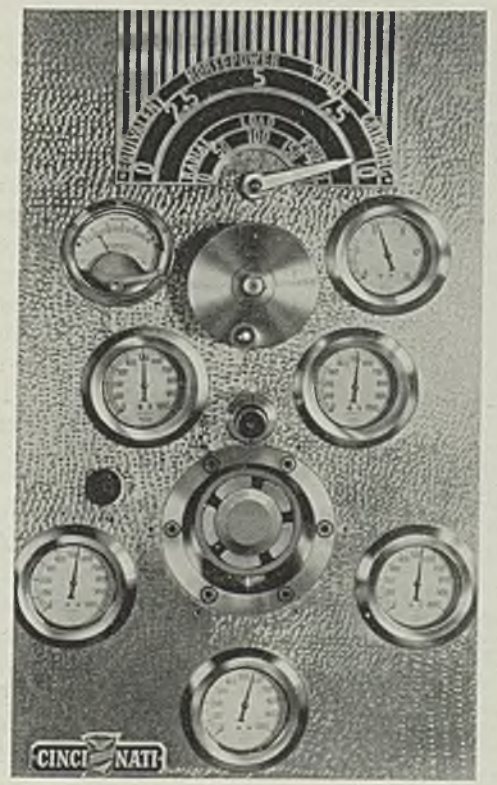
The instant the spindle starts, hydrodynamic oil films build up between the bearing shoes and the spindle. The static pressures generated in these films are transmitted to their respective pressure gages.

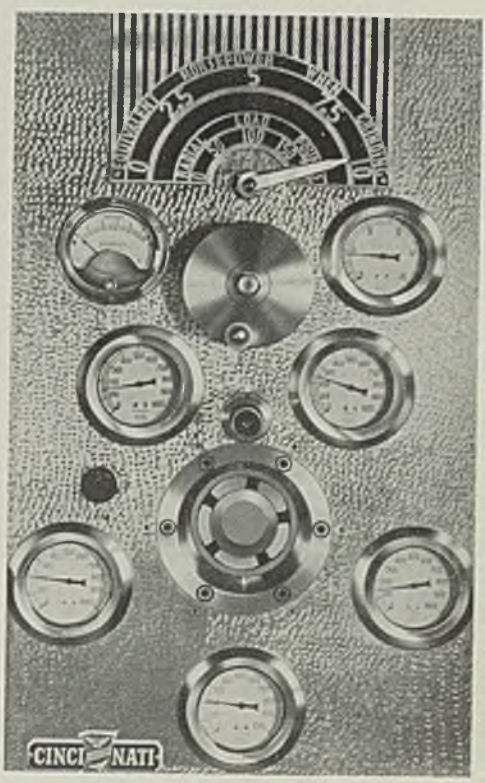
Fig. 3 shows the film pressures of all five shoes at slightly over 500 pounds per square inch when the spindle is running idle. This proves the preloaded condition of the bearing.

Fig. 4 shows the changed pressures on the bearings when the spindle is subjected to 200 pounds vertical, downward load. The (*Please turn to Page* 74)

Fig. 3. (Left)—Gages show film pressure of all five shoes at slightly over 500 pounds per square inch when spindle is running idle. Fig. 4 shows the changed pressures when spindle is subjected to 200-pound downward load. Fig. 5. (Right)—Shows wattmeter at zero with pressures dropping —low oil pressure has caused pressure switch to cut off main drive motor







When early American gunsmiths devised the hardened steel "filing jig" for use in shaping duplicate parts for firearms, they laid foundations for surface broaching as an interchangeable manufacturing method. Although the first broaching machines were limited to cutting internal keyways, they have developed into machine tools of major importance in surface machining intricate parts ranging all the way from watch wheels to cylinder blocks. Broach specialists lately have stepped into the front rank of the tool engineering profession. Their methods hold solutions for many tough problems in national defense production

Broaching To Beat Bottlenecks

By GUY HUBBARD
Machine Tool Editor

■ BROACHING is one of the oldest machining methods and one of the newest production processes. That statement seems paradoxical, but it is true nevertheless —as will become more and more strikingly apparent as the national defense program emerges from the order-placing phase and really hits its stride in mass production.

As was true also of milling, to which it is closely related and with which it lately has become competitive in certain fields, broaching originally came into being as what might be called "mechanized filing." Its ancestry is perhaps more obvious than is that of milling, due to the shape of the cutting tools.

Broaching first became widely accepted as a mechanical method for cutting keyways in bores of pulleys, gears, etc., replacing the tedious hand process of chipping and filing which was one of those tasks which made the life of an apprentice uninspiring. As an outgrowth of this, broaching was further developed as a machining method for finishing holes to shapes other than plain round. For example, round drilled holes can be serrated, "hexed" or squared. This kind of broaching is of great importance today—not only in squaring holes in sliding transmission gears, but also in cutting the multiple keyways which have come into extensive use in automotive and aircraft construction. Accurate internal gears also are now being cut by the broaching process.

Internal work such as the foregoing, which especially in the smaller diameter range is slow and difficult—if not impossible—to machine in any other way, was the field to which broaching was limited for almost 100 years. During that time tremendous improvements were made in broaching machines, in broaches and in holding fixtures. Without such a background of machine tool design and tool engineering, the comparatively new technique generally called "surface broaching" could not possibly have developed so far and so fast as it has within the past 20 years.

Surface broaching might be described as milling by means of a longitudinal cutter instead of the conventional circular cutter. With the exception possibly of certain simple jobs which might be performed by means of stock broaches, surface broaching ordinarily requires special and rather expensive tools and fixtures.

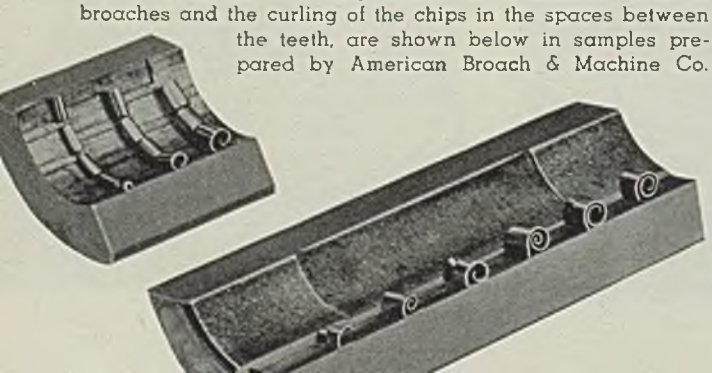


Fig. 1—Progressive cutting action of successive teeth in broaches and the curling of the chips in the spaces between the teeth, are shown below in samples prepared by American Broach & Machine Co.

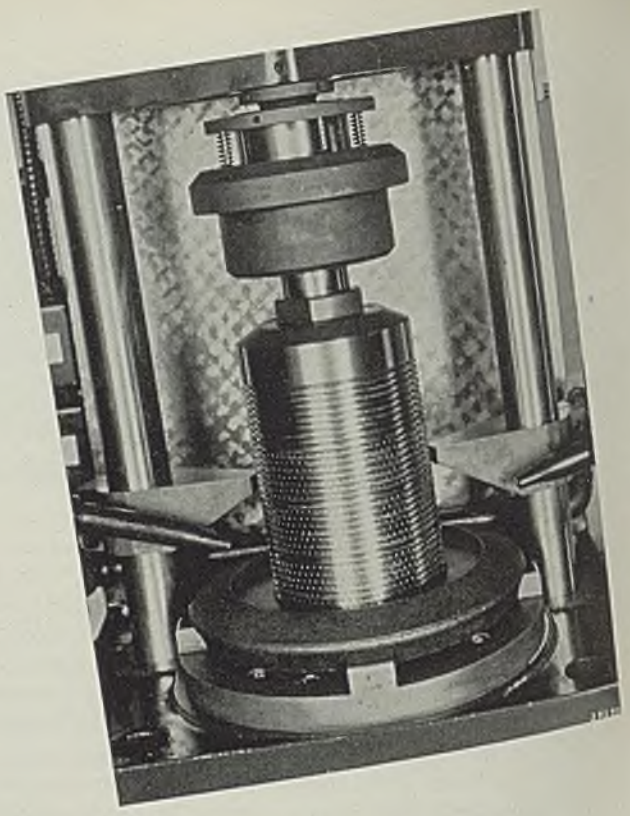


Fig. 2—Broaching of holes by no means is confined to those of interrupted contour or irregular shape as is demonstrated by photograph, above, of semifinish machining of the round hole in a large tractor ring gear—a method engineered in co-operation with Colonial Broach Co.

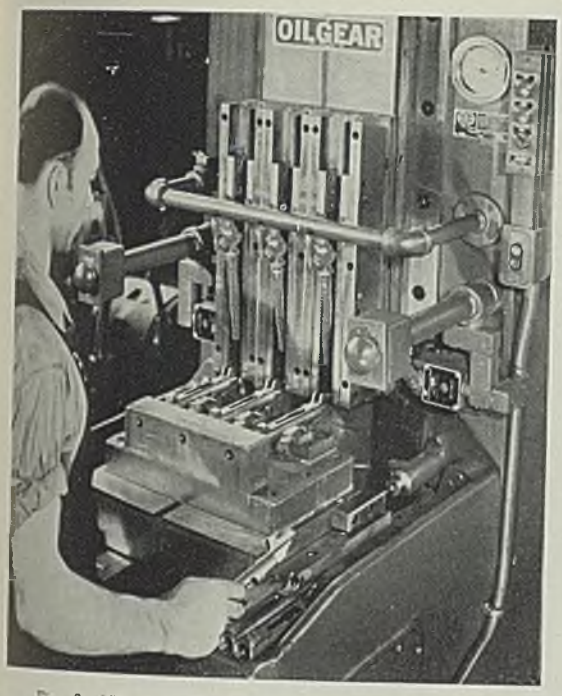


Fig. 3. (Above)—Typical of broaching in connection with mass production of small arms is this Oilgear method by which both sides of three forged carbon-steel rifle receivers are finish machined at every stroke of the ram

Fig. 4. (Right)—Surface broaching as practiced on small automotive parts is typified by machining of cast iron rocker shaft supports in Cincinnati duplex Hydro-Broach. Each side of the swinging fixture holds one piece—one being loaded as six surfaces on the other are being broached

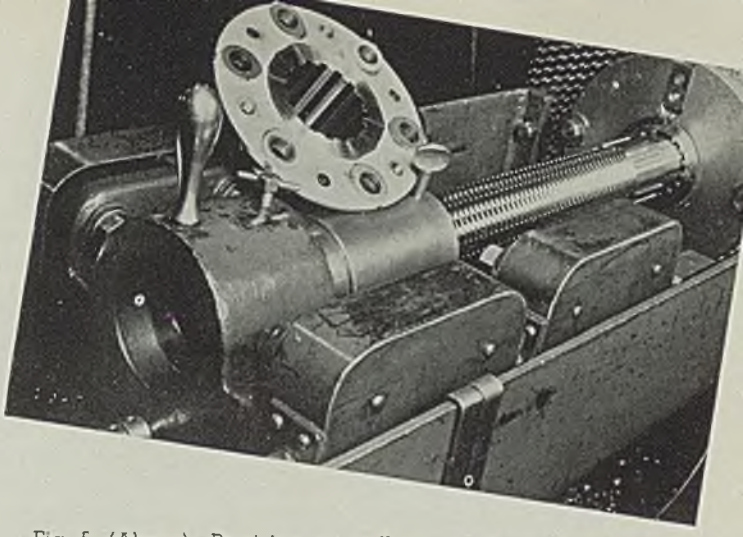
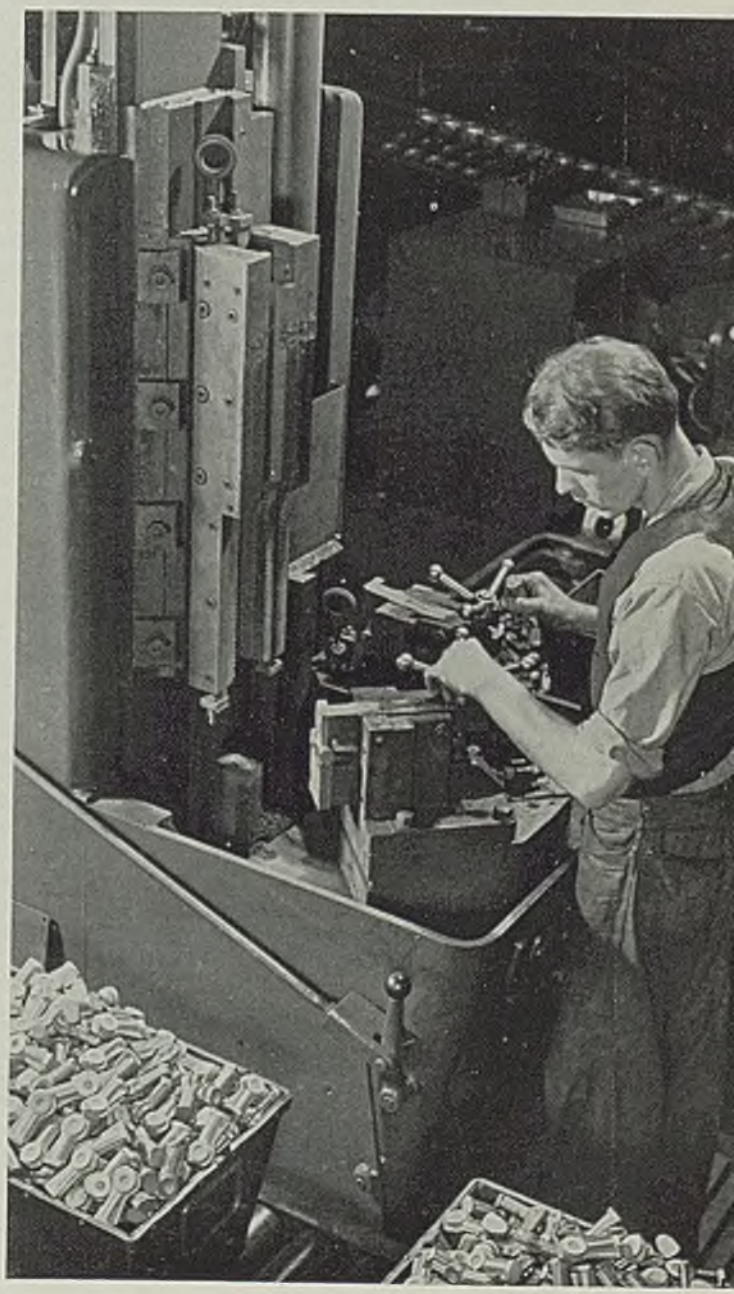


Fig. 5. (Above)—Precision, as well as speed, can be maintained in production broaching, if it is built into tools and fixtures. Tolerances of 0.0002-inch are held on important dimensions in multiple-splined reduction gear hub for Pratt & Whitney aircraft engines. This setup is in a Lapointe horizontal-type machine



and machines designed primarily for surface broaching. On that account it is distinctly a mass production process. Although standard machines for surface broaching are relatively simple and very reasonable in price, the cost of special broaches and fixtures is bound to be rather high and must therefore be spread over large runs of work.

The range of sizes of work which can be handled effectively by surface broaching is very wide. One of its earliest applications was as a means for cutting the gripping teeth in the jaws of pliers and pipe wrenches. One of its latest applications is for finishing the surfaces of automotive crankcases at one pass of these large castings through big machines "designed into" the production line. The smaller work can be set up on standard broaching machines in almost every case, but the large jobs usually require machines—as well as broaches—of special design.

The basic principle of broaching is that cutting action is divided among a number of teeth, this progressive action being attained by having the teeth of increasing height from the "roughing" to the "finishing" end. This cutting action is demonstrated clearly by Fig. 1. These samples, prepared by National Broach & Machine Co., were made by stopping the cuts when partially completed and removing the work without disturbing the chips. The lower sample shows a keyway in process. The upper shows the progressive broaching out of a circular surface.

In addition to demonstrating progressive chip formation, these samples also show that while the teeth are

in the work there is no place for the chips to go except between the teeth. This makes it necessary, especially on long work, to leave ample chip room between the teeth and also to design the teeth so that they will curl the chips properly. In the smaller of the two samples it will be noted that by breaking up the circular teeth and staggering the individual teeth thus formed, the cut is divided not only between the successive rings of teeth but also is alternated in individual "bites" between the separate teeth in alternate rings.

Obviously one of the fundamental principles in broach design is to divide up the cut in such a manner that no one tooth or small group of teeth will be overloaded. Otherwise the effect on the tool will be much the same as that on a milling cutter which has its feed jumped up suddenly at one point in its progress through the work.

In mentioning the new types of machines developed within recent years primarily for surface broaching, it perhaps should have been mentioned that many of them also can be tooled up for effective operation on internal work. Another thing which should have been mentioned is that broaching is now recognized as an effective method for finishing round as well as irregularly shaped holes.

Broaching Instead of Boring

An interesting example of the use of broaching to replace boring or reaming as a method for machining round holes is presented by Fig. 2. This shows semifinish broaching of the round bore in a steel ring gear used in tractors. This job is being done in a hydraulically operated Colonial openside utility press of 10-ton rating. One of the remarkable things about this piece of work is that the circumference of this broach is nearly 2 feet. It is about 15 inches long and is built up of a number of individual rings of which the lower ones are provided with chip breakers.

This big broach is guided at both top and bottom during its downward cutting stroke, which is at the rate of 30 feet per minute. At the bottom of the stroke, the broach is released at the top, permitting quick removal of the work from the fixture. An automatic broach handler below the table then raises the broach into a puller before the ram returns to the top. The return stroke is made at 60 feet per minute to minimize idle time.

As mentioned at the beginning of this article, broaching is destined to play a tremendously important role in the defense program—a more important role than many familiar only with 1914-1918 munitions manufacturing yet realize. It has been developed for so many operations to which it was not at that time applied, that it should be looked upon as one of the major factors in speeding arms production—cannon as well as small arms.

A typical application of surface broaching to modern small arms production is shown by Fig. 3, which is one of several operations involved in the finishing of the receiver of a rifle. At this setup, which is in an Oilgear 12 by 30-inch single-slide vertical broaching machine, the forged steel receivers in groups of three are finish broached on both sides—0.120-inch of metal being removed on each side.

The broaches are of angular slab type with individual cutters for each surface. They are used in conjunction with a simple faceplate-type fixture with pins for locating the threaded end of each receiver; and with spring-loaded shaped plates to receive the parts. No clamping is necessary with this setup.

Work Cycle Is Semiautomatic

The operator locates the three work pieces in this fixture, then depresses the dual safety control buttons. Thereupon the shuttle table moves into broaching position and the tool slide is pulled down at speed of 30 feet per minute—thus machining the surfaces. At the end of the cutting stroke the shuttle table backs up to unloading position, then, as the tool slide returns at 80 feet per minute to its starting position and stops, the operator unloads the three broached parts and loads three more for broaching. This semiautomatic cycle is typical of many on gun work and similar small parts. Some idea of the production possibilities of a setup of this kind is given by the fact that the foregoing operation is performed on these receivers at the rate of 600 pieces per hour.

Fig. 4 shows another method of handling small parts for surface broaching. The machine in this case is a Cincinnati duplex Hydro-Broach, and the parts being operated on are cast-iron rocker-shaft supports. Six surfaces are machined at one pass—about 1/16-inch of stock being removed.

The fixture can be described as of swinging turret type, each side holding one piece. On this machine the rams rise and fall alternately, hence the operator has an opportunity to unload and reload at one position of the fixture while a part is being broached at the other position. To a large degree this eliminates the so-called "idle time" and makes it possible, in what production men refer to as a "52-minute hour," to machine 612 of these rocker shaft supports, once the operator becomes dexterous.

Possibilities of modern horizontal broaching machines are fully as great as are those of vertical machines. This is indicated by Fig. 5, which depicts a Lapointe machine set up to cut multiple internal splines in reduction gear hubs for Pratt & Whitney aircraft engines. This is a high-precision job, in which limits of 0.0002-inch are involved, in line with a great deal of work for aircraft engines. This means that extreme care had to be exercised in the manufacture of the broach and the fixtures used with it. Once established in the setup, however, this accuracy rapidly and unfailingly is reproduced in the work.

Avoid Amateur Engineering

Broach engineering is an art in itself. Even in the cases of simple broaches for cutting single keyways, for squaring holes, etc., it is better to get expert broach service from companies in the business than it is to attempt to have these tools made in the toolroom. Few companies these days attempt to make their own milling cutters. Variables to be considered in designing broaches are much more numerous, and much more serious if misjudged.

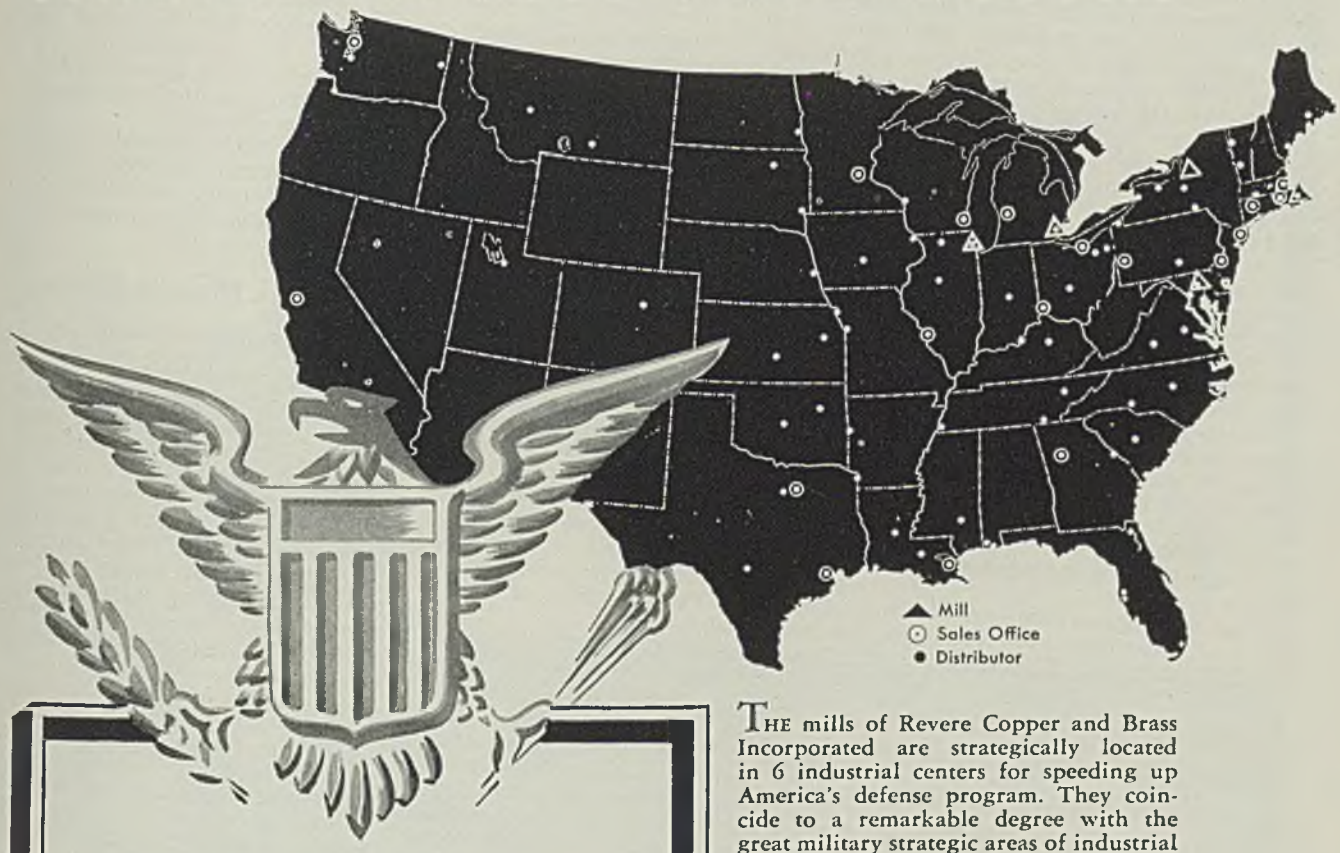
Almost every job presents its own special problems. With broaches costing up to several thousand dollars each for some of the larger sizes, they represent a poor field for amateur experimentation either in design or in application. A simple error in judgment, such as allowance of insufficient room for chips or insufficient support for work or broach during the cut, may defeat the whole purpose of the setup and very likely will wreck the tools during trial cuts.

Here, in line with recommendations of Illinois Tool Works, are important points on which a broach engineer must be informed before he can undertake to design or even to recommend a broaching setup:

(1) Length of cut and amount of material to be removed.
(2) Analysis and type of material to be operated on, as for instance whether rolled stock, forgings or castings.
(3) Hardness of the material.
(4) Quantities involved in the production runs.
(5) Whether broaching is to be done before or after heat treating.
(6) Tolerances required on the broached surfaces.
(7) Type and full specifications of the broaching machine on which it is proposed to do the work.
(8) Description of adapters and holding fixtures in case these already have been designed or built.
(9) Lubricant or coolant to be used.

While broaches can be designed from drawings of the part, it is more satisfactory to furnish samples

STRATEGIC POSTS FOR INDUSTRY



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In many plants and industries, Revere Technical Advisory Service men are working shoulder to shoulder with executives and engineers in solving defense problems by selecting a suitable type and form of copper or one of the many copper base alloys.

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This Technical Advisory Service comprises a thoroughly equipped Research Laboratory, manned by engineers and metallurgists for (1) developing new and better Revere materials to meet active or anticipated needs of industry; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; and (3) continuously observing developments of science and engineering with a view to their utilization in the improvement of Revere production methods and equipment.

In addition a corps of technical men are available to (1) help industrial executives make use of data developed by the Revere research laboratory staff; (2) perceive the material problems existent in industrial plants contacted; (3) assemble data enabling Revere research laboratory men to study these problems; and (4) make practical tests of the materials recommended in the plants concerned.

This Revere Technical Advisory Service set-up has been very successful in reducing costs, improving products and increasing the output for many industrial concerns.

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of the part along with the foregoing information. As in many other tool engineering undertakings, broach engineers constantly have to "think around the part" when working out their fixtures and cutting tools, and the practical value of having the part itself to cogitate upon during the inventive process is very great.

If the broach engineer can get into the picture while a production product is in the design stage, he often can offer suggestions for slight changes in design of details which are to be broached, which will make the broaching process much easier and much more economical without affecting the part at all from the standpoint of its structural value. Unfortunately, product draftsmen and designers in general are not as well posted on broaching as they are on most of the other machining processes, so their unaided judgment cannot be so much depended upon. Even if they know something about it, they hardly can be familiar with all the variables, and so consultation with a broach engineer remains highly desirable.

Progress in broaching—especially surface broaching—has been so rapid that only those who have been devoting most of their time to it for the past few years have been able to keep up with all of its many phases. In the meantime, they have been so busy solving new problems from day to day that so far they have had no time to compile complete data for publication. Hence there are not yet to be found such comprehensive treatises on this art as can be found on other types of machining. Under the pressure and inspiration of the defense program, tempo of development in this art already has increased to such an extent that a complete treatise probably will not be compiled until the existing worldwide emergency comes to an end.

In the meantime, about all that can be done is to explore the possibilities of broaching on every long-run job involving internal and external surface machining, especially on small and medium-size parts with surfaces of peculiar shape and those which must be mortised to shape. It isn't a cure-all, but where it is practical it may work wonders in eliminating "bottlenecks"—if properly applied.

Duplicator Reduces Machining Time

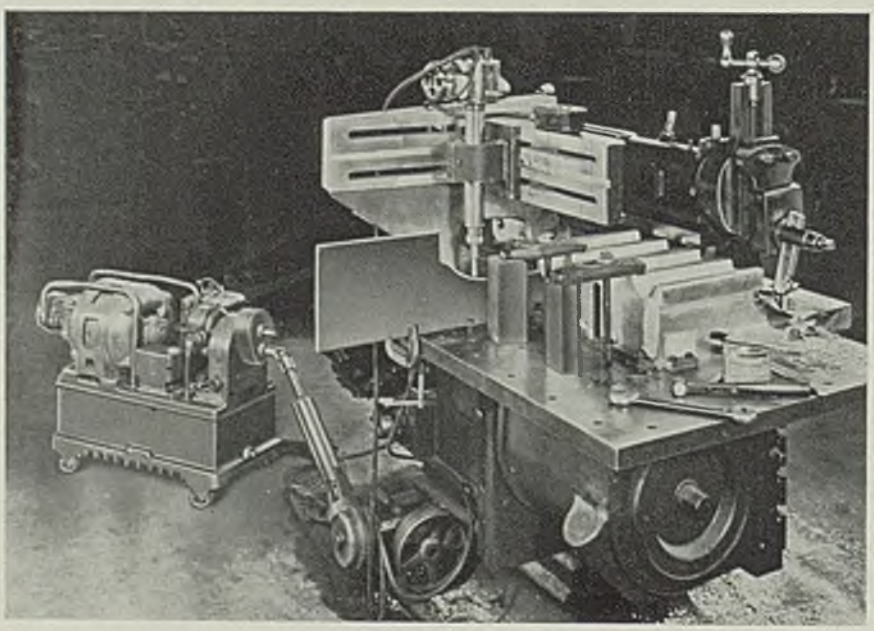
■ Saving of approximately 80 per cent in machining time is realized at Peerless Pattern Works, 9455 Grinnell avenue, Detroit, by automatic form cutting with a shaper through the use of a form duplicating control. The idea was developed to solve the problem of machining the sides of a quantity of magnesium crank case and barrel core boxes to provide for the application of steel wear plates.

Normally such a job would be milled, and with the frequent checking which would be required, the floor-to-floor time would be roughly three hours per piece. Now, however, a simple die duplicator produced by Detroit Universal Duplicator Co., 253 St. Aubin street, Detroit, is hooked up to a shaper, a template of the form provided, and machining time is reduced to about 30 minutes. Accuracy within 0.002-inch is said to be maintained.

The duplicator is connected with the table elevating mechanism and, as shown in the illustration, the steel template conforming to the shape of the core box is mounted on the table of the machine. A tracing finger, supported by a tracer head mounted on a bracket on the shaper, follows the contour of the template. This finger controls the vertical feed, while transverse feed is governed automatically by the setting of the shaper.

The work itself is clamped in duplicate—in other words, "ganged up"—on the table parallel to the template so that several pieces are machined at one time.

Form cutting of magnesium crankcase and barrel core boxes with duplicator-controlled shaper



McKenna Metals Markets New Tungsten Carbide

■ McKenna Metals Co., Latrobe, Pa., announces a straight tungsten carbide grade of Kennametal which is approximately 15 per cent stronger than any other tungsten carbide of the same hardness. Known as K4, it has a hardness of 92.0 rockwell A and a strength of 223,000 pounds per square inch (transverse rupture test). It, however, has the same thermal conductivity as other tungsten carbide tool materials.

The product is particularly applicable to the machining of hard, crumbly materials such as cast iron, "transite" pump, Bakelite, porcelain, hard rubber, glass, casein—as well as silicon aluminum, hard bronze and other nonferrous materials.

The increased strength of K4 is particularly desirable when taking rough cuts or interrupted cuts on hard metals.

Rubber Base Coating Unaffected by Acids

■ Paratex, a new chlorinated rubber base coating developed by Truscon Laboratories, Caniff avenue and G. T. R. R., Detroit, is claimed to provide a lasting finish on floors of concrete or wood. It contains no linseed oil but is developed entirely out of chlorinated rubber base liquid. It flows easily, and as it does not react chemically in the presence of alkali and moisture, it is especially suitable for concrete basement floors.

When drying conditions are good, it will dry hard enough to walk on in a few hours. In 24 hours it will be oil, grease and gasoline proof, as well as resistant to acid and most chemicals in 48 hours. Because it is unaffected by sunlight it may be used outdoors as well as indoors.

The product is made in six standard colors—tile red, stone gray, brown, concrete gray, green and blue.

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BETWEEN HEATS WITH Shorty

Say Fellers:

Bumped in to Jerry Hudson the other day and there flashed across my memory a story that 's as interestin' as any you've ever heard 'round a steel plant. I'll tellya 'bout 'im but of course I'll not use 'is right name 'cause he doesn't like to see it in print.

Jerry's dad used to work on our railroad. His run was on the hot metal train. One day there was a wreck and his dad was laid away up on yon knoll among the pine trees. The burden of supporting the widowed mother and a sister fell on the shoulders of Jerry when he was only a lad about 18 years old.

'N so one day he came down to the gate lookin' for a job. Our employment manager took 'im in 'is office and sez: "What kind of a job are y' after, Jerry?" Lookin' 'im right straight in the eye, Jerry sez: "Any kind of a job you've got. 'N I can start any time y' say."

Few days later the superintendent of the blast furnaces, Bill Corey—the boys all called 'im the Big Boss—was goin' down the yard 'n he spies Jerry pilin' pig iron. Walkin' up to 'im, he sez: "Who told y' to handle that stuff?" 'N after Jerry had finished tellin' 'im the circumstances the Big Boss sez, "don't tire yourself, kid," 'n then he walked away.

Becomes Skip Operator

Next mornin' found Jerry down in the stockhouse learnin' to operate the skip that takes the ore to the top of the furnace. Not only to the top of "the furnace" but to the top of "a particular furnace" for that furnace had been makin' high sulphur iron off 'n on for many a day until there was somethin' like 20,000 tons piled in the yard. What 's more she was still makin' off casts rather frequently 'n no one could discover why.

The Big Boss spent a lotta time lookin' through peep sights at the coke dancin' 'round inside the furnace. He stopped many times during the day at the box near the cinder notch to examine samples of slag. He'd study the chargin' sheet in the stockhouse to see if the boys were fillin' the furnace all right. But every once in awhile the ol' stack would throw a cast of iron so high in sulphur that the fellers at the open hearth would refuse to take it. So she had to be sent through the pig machine and piled in the yard.

'N jus' as sure as she'd throw an off-cast of iron, y' could jus' as sure count on seein' the Big Boss browsin' 'round. But the funny part of it was, he'd always hit toward the stockhouse n' start studyin' the chargin' sheet.

This particular day he climbs up in the skip shanty. Jerry was on turn.

"Jerry," he sez, "pull up on the bench here. I wanta ask y' somethin'. How much coke are y' chargin'?"

Gives Him the Answer

"Jus' what the score board calls for," he sez.

"Look me in the eye, kid. The books over at the office show there 's so much coke being dumped in the bins but the chargin' sheets don't tally. How's come? Somewhere between the bins and the top of the furnace we're losin' coke. Y' know where she's goin'?"

After a while the Big Boss tripped Jerry in the course of their conversation. N' then the lad had to confess what he had been obliged to do since he began pullin' levers that sent the skips to the top of the stack. Seems as though Charlie Gable, the blower in charge of the furnace on one turn, and Mike Boyle, the blower on the other turn, were at odds with one another. 'Bout a couple of hours after Charlie would come on turn, he'd go down in the stockhouse, get the attention of the skip operator, hold up five fingers and yell, "Give 'er a skip of scrap. Mum 's the word—understand?" The skip man gave 'er five loads right in a row and only marked up one on the chargin' sheet under the threat of losin' 's job. 'Fore Charlie left that night for home, he'd yell to the skip man, "Give 'er an extra skip of coke" 'n then he'd hold up five fingers. So five skips of coke went to the top of the furnace but only one was entered on the record sheet.

Twelve hours later when the scrap would hit the hearth, Charlie's buddy would get a rotten cast of high sulphur iron that was relegated to the ever-growing stockpile. But when Ol' Charlie would come on duty next morning the furnace would be straightened out with plenty of coke at the tuyeres. Finally Mike got next to his buddy's tactics and he started to reciprocate. 'N it all ended in the Big Boss firin' the two blowers, Charlie and Mike, 'n then the high sulphur casts of iron ceased.

Passes Out Advice

Never forget what the Big Boss told the two blowers when he let 'em out that day. He sez: "Boys, don't forget that everyone of us helps to make the environment for everybody else. You and I are makin' life cold for other people, or else we're makin' it warm. We're makin' things easy for them, or difficult—friendly or unfriendly. Lots of times, fellows, we cause ourselves and others much sorrow by our mismanaged situations. One mistake may permanently discredit the integrity of years. One leak may sink a ship. Both of you failed to redeem the opportunity that was yours and it has cost you the loss of much good."

The Big Boss sent for Jerry, the lad runnin' the skip in the stockhouse, to come over to the front office. Don't know what he said to 'im, but I do know this. Few days later Jerry was on his way to college 'n all bills were sent to the Boss until Jerry finished his schooling there. Then he returned to the furnaces. He worked 'imself up to general turn foreman 'n then one day he left the company to become assistant superintendent of a group of blast furnaces in Ohio. Durin' the next few years he worked 'is way higher up in the ranks 'n then took up steelmakin'. 'N that 's what he 's doin' today.

Yes, he paid back every cent the Big Boss loaned 'im while he was goin' through college. 'N for his folks at home—well he saw to it that 'is mother never wanted for a thing; 'n he saw to it that his sister had a good musical education.

Well so long, fellers. I'll be seein' ya.

"Shorty" Long

"...and the Greatest of these is MEN"

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Here Are the Reasons Why Mr. Mills Says . . . . . .

"You, Too, Can Cut Costs By Efficient Handling"

Here the man responsible for cutting handling costs at General Electric's Pittsfield works explains the principles whose successful application has enabled him to show outstanding results that earned for him a 1939 Coffin award, the highest honor conferred upon its employes by General Electric Co. Because so many diversified products are made, the advanced practices developed at this plant can be applied equally well in a great many other plants

By E. J. MILLS
Supervisor, Plant Transportation
Pittsfield Works
General Electric Co.

■ UNTIL comparatively a few years ago, the handling of materials through any plant was quite generally regarded as a series of disconnected trucking moves between different departments or buildings. These individual handling operations might have been efficient in themselves, but no consideration was given to the effect various handling methods might have on the departments receiving the material. This is an important factor for the manner in which materials are delivered has a great influence on the costs of unloading, placing in stock, inventorying, processing, assembling and final loading for shipment.

In the average plant, materials handling systems have not been improved as rapidly as manufacturing methods. Thus there is a tremendous field for cost reduction by bettering materials handling, and a splendid opportunity for making good handling an important part of processing operations.

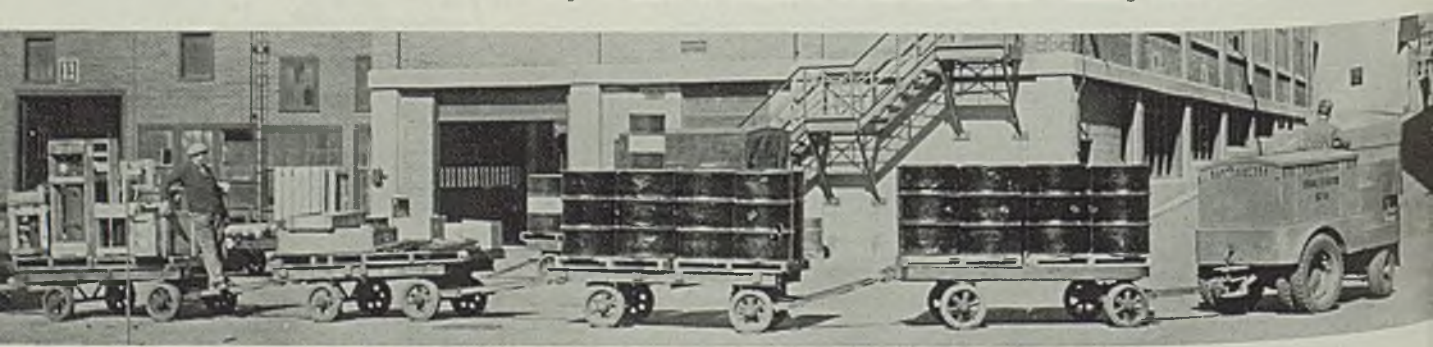
The materials handling department of any plant should attempt to organize handling operations into a continuous flow from inbound raw materials to outbound shipments to customers. Unless this broad view of handling is taken, the cost of moving materials a few feet within a department may be many times greater than cost of the long-haul delivery to the department in the first place.

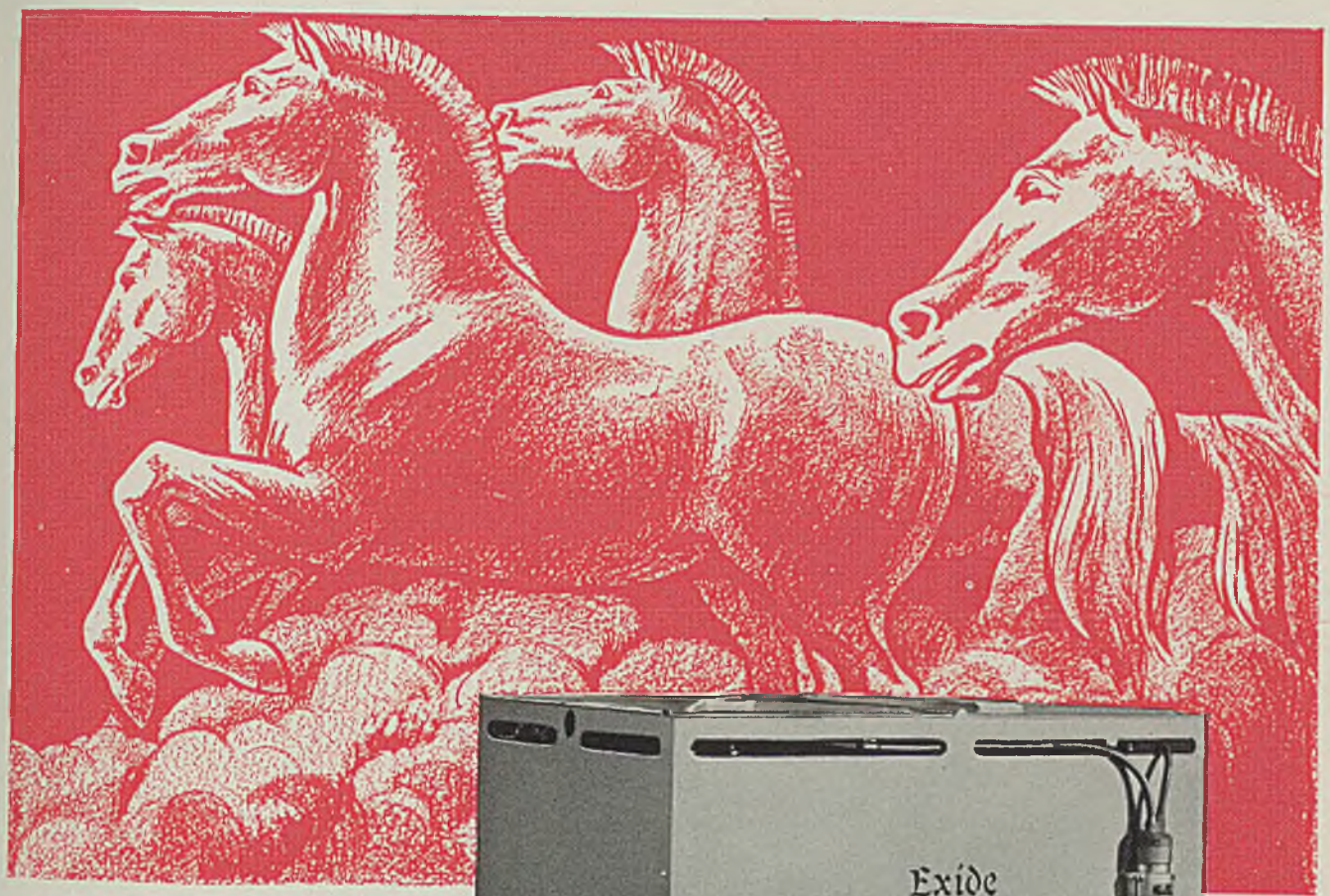
Spotlighting materials handling methods opens up a new field to labor. The old-time trucker, classed as a handy man in the sweeper bracket, has been replaced by highly skilled operators of mobile equipment who find that they have increased opportunities to make themselves important factors in the production setup.

Centralized Control: It is our firm conviction that the handling of materials in any plant must be entrusted to a specialized materials handling group or individual who shall have complete control over all handling operations and equipment. Only by centralized control is it possible to achieve complete utilization of men and equipment, to minimize maintenance charges and to effect cost reductions by introducing new methods and modern equipment.

Under a decentralized handling system run by manufacturing departments, handling costs tend to

Fig. 1—Train of industrial tractor-trailer units handling loads on pallets





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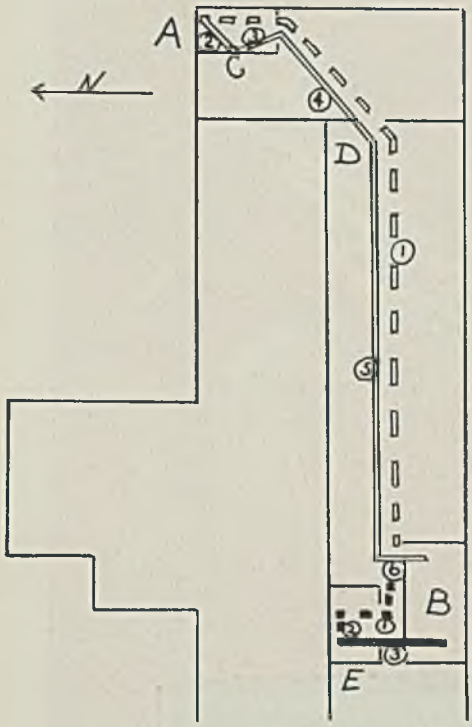


Fig. 2—This is chart of present and proposed flow to show better handling possible. The solid lines show travel loaded and dotted lines show travel empty

—Present Flow—

Stop No.	Movement (Double Line)	Feet
1	2 men with empty wheelbarrow from furnaces (B) to stockroom at (A)	360
2	Load pigs on scales at (C)	15
3	Load pigs from scales to wheelbarrow	5
4	Push wheelbarrow to monorail at (D) and transfer load	100
5	Push monorail rack to furnaces at (B)	220
6	Transfer pigs from monorail rack to wheelbarrow and dump on floor or in bins	20
	Total travel	720

—Proposed Flow—

Stop No.	Movement (Single Line)	Feet
1	Fork truck operator enters proposed stockroom (E) and picks up pallet load of pigs	20
2	Fork truck places pallet load on scales to be weighed	10
3	Fork truck delivers pallet load direct to furnaces (B)	20
	Total travel	50

get out of hand due to insufficient or inefficient supervision. Too, since the charges are usually submerged in a pool of general expense, the rising trend is likely to go unnoticed and unchecked. With a decentralized system of this kind, handling charges are scattered through many department budgets. This makes it difficult to ascertain total handling charges quickly. With a centrally controlled materials handling department operating on a variable budget on direct labor, handling costs for any month are instantly available and can be estimated easily for future periods.

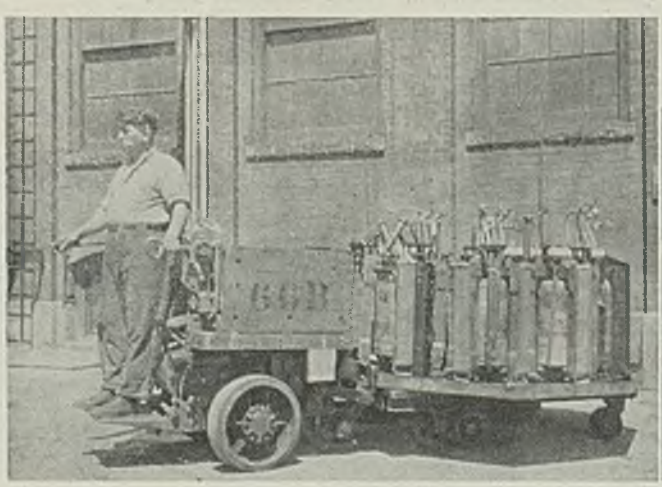
With a decentralized system, handling methods become static from lack of specialized training among its supervisors or the limited time they are able to devote to study of new methods.

Very often profits estimated for a line of products are lost in excessive and unorganized handling, whereas a centrally controlled and well organized materials handling department, the unnecessary and excess handling costs can readily be shown up and eliminated. In the Pittsfield works, we use flow analysis charts, such as the one shown in Fig. 2, to discover backtracking in handling or excessive handling by skilled men who should devote all their time to their machines. When the flow of materials is thus charted, poor routing, double handling, excessive hauling distances and other defects in the handling system are brought to light and eliminated, once discovered. The important thing is to find them before they run up excessive handling costs.

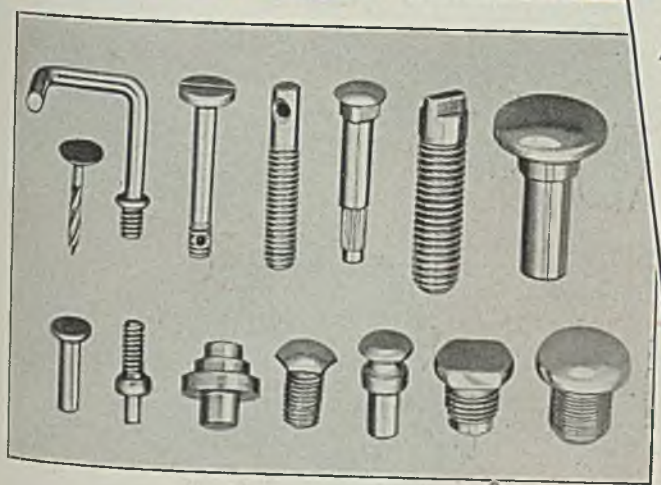
Co-ordination: Only under a centralized handling system is it possible to co-ordinate all handling equipment to attain maximum efficiency. In the Pittsfield works, all mobile equipment is operated on definite time schedules, controlled by a central dispatcher. These schedules necessarily are governed by the production requirements of the manufacturing departments. Divided responsibility over materials handling usually means confusion and delay when loads are transferred between sections. As a result of these delays, production schedules are disrupted and the clutter of undelivered materials is not only unsightly from a good housekeeping standpoint but costs go up, too. With divided responsibility, there is such duplication of effort that usually it is seldom possible to obtain more than 70 per cent utilization of equipment.

Factory Planning: In many older plants which date back to the

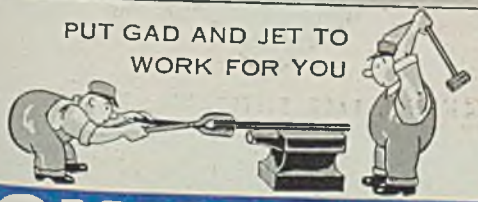
Fig. 3. (Left)—Here a 6000-pound capacity truck is enabled to handle easily an 8000-pound load by the use of a live skid taking part of the weight. Fig. 4. (Right)—Loading finished lightning arresters on a semi-trailer by means of a fork truck



The CONFERENCE IS OVER...



PUT GAD AND JET TO WORK FOR YOU



But IS THE GADGET PROBLEM SOLVED?

We don't like to be snoopy, but we'd like to point out that high-price men consume a lot of valuable time when they discuss things that should be turned over to experts. In the matter of gadgets, now: doesn't it seem unreasonable to let anybody but a gadget expert solve a gadget problem? The TOWNSEND CO. operates the largest and most efficient department in the world devoted exclusively to the design and manufacture of gadgets. Write for our catalog, it pictures hundreds of types of gadgets. This may help you select the one YOU wish.

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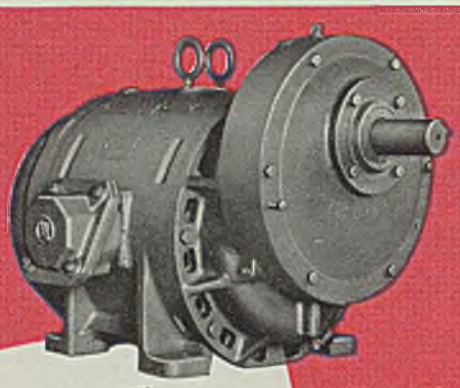
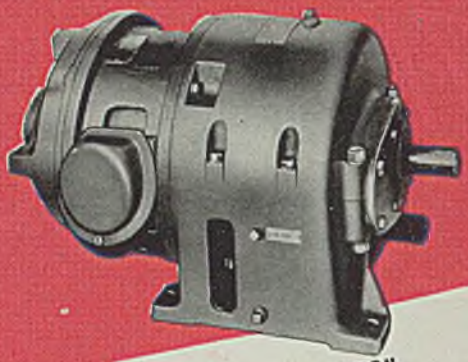




SINGLE REDUCTION

Westinghouse Type S, single reduction, explosion-proof gearmotor. (Standard ratios 1:1 to 5:1). This type available for all types of enclosures.

DOUBLE REDUCTION

Westinghouse Type D, double reduction gearmotor. (Standard ratios 5.6:1 to 10.0:1). Compact design is the result of building reduction gears and motor as one complete unit.

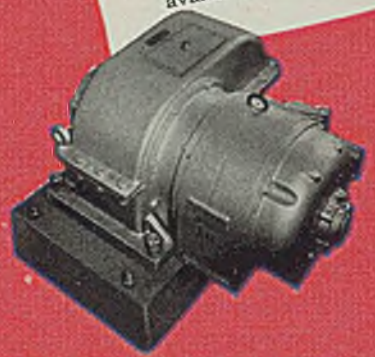
THERE'S A *Westinghouse Gearmotor* FOR EVERY TYPE OF SLOW-SPEED DRIVE

TRIPLE REDUCTION

Westinghouse Type T, triple reduction gearmotor. (Standard ratios 40:1 to 200:1). The wound rotor motor illustrated here, is adjustable in speed and starts easily under load.

SPECIAL ENCLOSURE

Westinghouse Type FD, double reduction gearmotor. (Standard ratios 10:1 to 40:1). This splash-proof enclosure and other special enclosure and available throughout the line.



WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, EAST PITTSBURGH, PA. 7-317-B

Westinghouse

GEARED DRIVES

Fig. 5—Special 2000-pound light-weight fork truck designed for use at the Pittsfield works

hand truck and horse-drawn vehicle, especially many in New England, New York and all along our eastern seaboard, materials handling departments should be equipped to work with the factory planning section to bring about the co-ordination of conveyors, elevators, industrial trucks and all other movements of work in process and stock—also to simplify and speed up production without the necessity of rebuilding a greater part of the buildings in the plant.

With a decentralized materials handling system, there is no one responsible person to confer with factory layout men when moves or layout changes are contemplated. Under a centralized control system as at Pittsfield, all factory layouts must be approved by the materials handling supervisor. This system assures the practicability of the layout from a handling viewpoint and makes it possible for the materials handling department to assign equipment, first, to facilitate the actual move itself and, second, to have the department functioning smoothly the moment the move is completed.

Limitations of Equipment: In many recent articles the fork truck has received much publicity due to the spectacular savings it makes possible. However, lift trucks, tractors, trailers, semi-trailers and trucks still continue to function efficiently on their respective jobs.

Fig. 3 shows an example of lift truck operation—a 3-ton lift truck co-ordinated with special treating tanks and an assembly conveyor. As load and rack come out of the treating tanks, they weigh 8000 pounds, are 7 feet in diameter. The rack is placed on a live skid platform with one pair of rigid wheels and one pair of casters. The end with the caster wheels is 1 inch higher from the floor than the end with the rigid wheels. When being hauled by the lift truck this difference allows one-third of the load in transit to be carried on the caster wheels of the live skid with the lift truck platform itself called upon to carry only two-thirds of the load. This system permits greater pay loads to be moved without overburdening the equipment—in this instance, 8000-pound loads being handled easily with a 6000-pound low-lift truck.

It has been our experience with lift trucks and fork trucks that their efficiency decreases as the length of haul increases. Therefore, we restrict their use to loading and unloading of material, delivery into and out of stockrooms, and servicing conveyors or factory floors. When the haul is more than 150 feet, we advocate the use of the trailer system.

Industrial truck and trailer units, shown in Fig. 1, are recommended for medium long hauls (over 150 feet) and small loads that must be delivered directly into buildings, involving elevators or restricted aisles. Pallets and fork trucks allow quick loading and unloading to release the trailers for additional trips. The Pittsfield works has 300 trailers, but many more would be required if the turnover rate did not allow each trailer to be reloaded several times a day.

Semi-trailers, Fig. 4, are effective for longer hauls and bulkier loads. These are unloaded by fork trucks or cranes and are effective when the material can be unloaded with a short run within the building.

Fork Truck Operations: The use of fork trucks to obtain increased storage capacity is widely understood by this time and does not need detailed comment. It will suffice to say that fork truck stacking has increased the storage capacity of our stockrooms an average of 35 per cent. The possibilities of increasing storage capacity with fork truck methods are limited only by ceiling heights and floor load limits.

One phase of fork truck operations that deserves special emphasis is the necessity for integrated planning to insure continuity of operations. Fork truck installations should involve complete cycles from raw material to the shipping department whenever possible. Handling of our material for cutouts is an example. Our first fork truck was used to unload cutout porcelains received in box cars on pallets.

Our second fork truck was detailed to the shipping department to handle finished cutouts and other material into storage and into cars for shipment. The fork truck handling of cutout porcelains and other cutout parts through manufacturing was stymied for a time by the low load limit of the elevator and the manufacturing floor. Fork truck operation in this area seemed out of the question until the materials handling department of the

(*Please turn to Page* 101)

Sun Oil Issues Booklet On Cutting, Grinding

■ A new 60-page booklet, "Cutting and Grinding Facts," released recently by Sun Oil Co., 1608 Walnut street, Philadelphia, illustrates more than 46 of the most modern machine tools offered by master tool builders and gives actual performance data concerning these machines when running at rated capacity.

It includes machining data on the latest lathes, milling machines, hobbers, drillers and grinders, also essential information to aid the operator or production executive in achieving efficiency. It includes such important information as: Operation, machine used, materials being machined, spindle speed, depth of cut, feed and cutting lubricant used.

In addition, every page carries a brief statement that applies to metalworking—facts that will help every metal worker produce more and expend less effort.

Several pages also are devoted to other metal working operations such as: Pipe threading, cold rolling, quenching and tempering and metal cleaning. This booklet is available gratis to those requesting it on their business stationery.

Northern Stack To Be Equipped With Air Conditioning Unit

■ AIR CONDITIONING equipment capable of removing from 7 to 40 tons of water per day from the air blown into one of the world's largest blast furnaces, in order to more closely control the quality of the iron produced, is to be installed on the No. 1 stack at the Aliquippa works of the Jones & Lauglin Steel Corp., Pittsburgh, as pointed out in STEEL, Nov. 11, page 28.

With modern air conditioning equipment it is possible to secure a constant supply of humidified air for the blast furnace and thus control the silicon content and iron temperature within narrow limits. These two major factors have a direct bearing on steel quality. With such iron, both bessemer and open-hearth steel production can be increased. Additional advantages are a possible reduction in the coke and limestone consumption and an increase in the output of iron

Equipment will be used to maintain a constant low-moisture content in the air blast, eliminating the necessity of trying to out-guess the weather 24 hours in advance of charging the furnace. Due to the fluctuating moisture content of the atmosphere, operators must constantly change the proportions of raw materials charged into the furnace, which approximate 2000 tons of iron ore, 950 tons of coke, 500 tons of limestone, and 4000 tons of air per day to produce 1000 tons of molten pig iron.

Ordinarily, wide fluctuations in humidity cause irregular blast furnace operation, which results in less iron production. On hot, humid days, more coke must be charged per ton of iron to offset the excess moisture in the air, which is blown into the furnace at the rate of 80,000 cubic feet per minute. This air carries with it into the furnace 7 tons of water per day for every grain of moisture content per cubic foot, which has the effect on extreme days of pouring 30 or 40 tons of water into the furnace.

The air conditioning equipment, which will be furnished by the Carrier Corp., Syracuse, N. Y., and installed by the Dravo Corp., Pittsburgh, conditions the air by drawing it through two chilled water sprays, then passing it through eliminator plates where excess moisture is removed.

The idea of conditioning the air blast to a furnace was first recorded about 1880 when attempts were made to regulate the moisture content of the blast by passing the air through calcium chloride, sulphuric acid and other chemicals. In 1890, James Gayley, a blast furnace operator at Pittsburgh, began his experiments using refrigeration to reduce the moisture. This led to the basic concept that the removal of water vapor from the blast would afford definite economies in coke and increase the output of the furnace. Gayley was granted certain basic patents, but they have long since expired.

During the first quarter of the century some nine installations were made. The equipment was cumbersome and required a huge capital investment, but the results proved that iron quality could be improved with a saving of coke and limestone by removing vapor from the blast. The equipment, however, was not dependable and it was difficult to operate, due in part to the formation of tons of ice on the air cooling coils. All of these plants were finally dismantled.

The first modern installation was made by the Woodward Iron Co., Woodward, Ala., in 1939. It uses equipment to condense the moisture by cooling with direct sprays of chilled water. These sprays are cooled by a centrifugal refrigeration machine. A similar installation is being made by Jones & Laughlin Steel Corp. The American Rolling Mill Co., Ashland, Ky., has installed a chemical system of removing the moisture from the blast.

Naturally, the furnace operators in the South have a greater concern with air blast moisture content because the average humidity is higher for a greater number of days of the year than in the North.

Open-Hearth Operators Discuss Shop Problems

■ Sessions at the Fall meeting of the Pittsburgh district section of the Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers held in the afternoon and evening at the Bureau of Mines Auditorium, Pittsburgh, Nov. 29 were well attended not only by local metallurgists and open-hearth superintendents but by many from nearby districts.

Under the chairmanship of R. C. Good, Electro Metallurgical Co., Pittsburgh, chairman of the Pittsburgh section, and W. J. Reagan, assistant open-hearth superintendent, Edgewater Steel Co., Pittsburgh, about 50 questions on open-hearth construction and operation and basic open-hearth steel metallurgy were submitted to various operators in attendance.

Good Substitute for Magnesite

In discussing the maintenance of sloping backwalls one operator brought out that he has only changed one skewback at his plant since 1926. Mention also was made of a 25-ton open hearth in Ohio built with a sloping backwall that has been in operation for 12 years.

Stayset, a refractory obtained by extracting lime from ordinary dolomite, was acclaimed by a steelmaker as a suitable substitute for magnesite. He emphasized that when properly installed in the hearth it seldom if ever will come up. The material recently has been developed for hot patching bottoms. He recommended the following procedure. Clean out the hole, fill with Stayset and set; apply a dressing of dead burned dolomite and set, and then proceed with the charging. The first test of this material was made at a plant in the Pittsburgh district about eight months ago.

In discussing methods employed for inspecting purchased scrap and the basis for rejection it was pointed out that many plants follow the practice of removing the top layer of the car and observing the exposed stock. In alloy steel plants where alloy contamination is not bothersome the opinion was advanced that some laxity in the rejection of scrap shipments can be shown, but at plants where steel of welding quality is being made, care is taken to see that incoming scrap shipments are free from alloy contamination. It develops that some plants are having difficulty in working up scrap containing galvanized material inasmuch as the latter plays havoc with the checkers. Consequently any No. 1 pressed bundles containing galvanized stock are immediately rejected.

THE *Precision* REQUIRED FOR MODERN INDUSTRY

SOUTH BEND LATHES

South Bend Lathes are designed and built to provide the extreme precision required in modern industry. They are giving tool room accuracy on close-tolerance production work in hundreds of manufacturing plants throughout the United States. The smooth, vibration-free belt drive to the spindle permits finish turning or boring with such precision that subsequent grinding, honing or lapping operations can often be eliminated.

South Bend Lathes are made in 9", 10", 13", 14½" and 16" swing, in 3' to 12' bed lengths, in Motor Drive and Countershaft Drive.

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Continuous Casting of Metals

Experimental work on plain carbon, alloy and stainless steels at pilot plant demonstrates the importance of rapid heat removal from ingot to effect freezing of ingot skin

By EDWARD R. WILLIAMS
Manager
Williams Engineering Co.
Latrobe, Pa.

Continuous casting of steel ingots will probably require a longer period of development before large scale commercial usage can be accomplished. However, the probable benefits of this method of casting are so great that the details cannot be overlooked by the steel industry. Preliminary work discloses that surface imperfections and pipe are eliminated, better economies because of by-passing the roughing and slabbing mills are obtained and that the grain structure is greatly improved

■ FOR MANY YEARS, ingots have been cast by pouring molten metal into individual stationary molds. During these years, practically no fundamental improvements in this method of casting have been made. Such minor improvements as have been obtained in ingot quality and cost have been produced by changes in mold and ingot design, hot topping, mold washes, and control of pouring conditions. However, the same basic method of pouring molten metal into a stationary metallic mold, letting it solidify, and stripping the ingot, is standard practice in most plants today, and most of the problems produced by this method of ingot casting remain unsolved. Large percentages of the ingot are cropped—ingot surfaces require conditioning—interior structure is not homogeneous and often unsound and ingots generally are hot worked much more than grain refinement demands.

For 75 years, men have attempted to improve the pouring of steel and other metals by continuously casting the metal into ingot and strip form. These attempts can be divided into two principal methods.

1. Forming the ingot against mold walls that are moving at the same speed as the ingot so that there is no relative movement between ingot and mold wall.
2. Moving the ingot along a stationary mold wall.

In 1865, Lord Henry Bessemer in England attempted to pour molten metal between two rotating rolls spaced to form a mold chamber. His attempt was the basic idea of the first method but was never perfected.

The basic idea of casting an ingot, which moved in relation to the mold wall, seems to have been discovered in Germany about 1889. In the United States, Trotz also worked on this second method at about the same time but without apparent success.

Most of the failures in continuous casting in the past can probably be attributed to one fundamental reason—failure to solve the problem of heat removal and dissipation. In processes where the heat from the molten metal was transferred to mold walls (usually rolls) which moved at the same speed as the ingot, it has been necessary to dissipate this heat by extracting it either from the outside of the wall or passing it through the wall and removing it from the other side. In the first instance, the mold or roll wall was heavy and the material of which it was made could not stand these drastic thermal changes. In the second instance, when the wall was made of a thin, heat-conductive material it would not stand the pressure necessary to accomplish the forming of the ingot and subsequent reduction. In processes where the ingot moved in relation to the mold wall, it was found necessary to remove the heat from the ingot with sufficient rapidity to form a skin that would shrink away from frictional resistance while being strong enough to prevent rupture as it slid along the mold wall. Both processes require effective means of heat removal for high-speed operation.

In reviewing the art of continuous casting, it is apparent that failure to solve this fundamental problem of heat removal and dissipation drove many inventors to experiment with other remedies. We find, for example, the inside surface of

From a paper presented at the Fall meeting of the Pittsburgh section of the Open Hearth committee, American Institute of Mining and Metallurgical Engineers, Bureau of Mines auditorium, Pittsburgh, Nov. 29.

THE DEFENSE PROGRAM REGARDING MACHINE TOOLS

The situation as it exists finds—there are not enough new machine tools to supply the ever increasing demands of those who have received national defense orders and the metal working industries in general. It is imperative that they receive immediate assistance.

Private industry can do its part to lighten the demand for new machine tools. How?—By releasing all idle and surplus machinery.

We and other used machinery dealers will buy up such equipment, and in turn sell to you such machines that we have available and which you are unable to get reasonable delivery on from the machine tool manufacturer.

UTILIZE WHAT IS AVAILABLE,
DON'T DEMAND
NEW MACHINE TOOLS ONLY!

We will do our part in co-operation with you.

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molds tapered and highly polished to overcome friction—jolting arrangements to shake the ingot loose from the mold wall, and reciprocating arrangements which keep the mold wall moving with the ingot for a time and then quickly returning to original position in an attempt to overcome sliding friction.

One group of inventors have confined their work to the casting of thin strip while others have experimented with the casting of ingots or billets. Those processes which show possibilities of success can be briefly described as follows:

In the casting of strip, practically no work of any importance has been done from the time of Bessemer until Hazelett Metals, Inc., New York, began some years ago to perfect the Bessemer idea. Hazelett achieved considerable success in pure metals, like lead and copper, but in alloy metals segregation difficulties were encountered. Also, it was impossible to obtain satisfactory life on the rolls because of rapid fire-cracking. Recently, Hazelett has been working on a variation of his original method which he claims has not only solved the problem of segregation but has also increased output. It is understood that this latest process is limited to the production of thin gage strip because no attempt is made to roll the metal until it has completely solidified.

Develops Method for Nonferrous

A process that is part way between a stationary mold wall and one that moves with the ingot has been developed by Junghans of Germany and a number of machines are in commercial operation on aluminum and brass both in the United States and foreign countries. No attempt has been made to produce steel ingots. The particular characteristic of the Junghans machine is the automatic movement of the mold with the ingot for a short distance and then snapping back quickly to its original position. This is done to present a constantly changing section of mold wall to the molten metal and to minimize skin ruptures in the ingot by overcoming sliding friction. The speed of ingot in commercial operation is less than 1 foot per minute but material of satisfactory quality has been produced for several years.

While most inventors have relied on a metallic mold wall, usually of high conductivity, others have tried the use of a refractory wall, such as graphite. A commercial unit has been operating on copper for several years on this principle in the United States for casting nonferrous ingots smaller than 3 inches diameter at speeds less than 1 foot per minute. Byron E. Eldred, New York, has worked for over 15 years on a process of this same general principle casting nonferrous ingots of small diameter and at slow speeds through a graphite die. His efforts have been directed chiefly toward improvement of internal ingot structure by controlling accurately the speed and direction of heat removal.

For over 10 years, the author has been experimenting at Latrobe, Pa., in the continuous castings of nonferrous and steel ingots. This work in the past few years has been entirely on steel and had included plain carbon, alloy, and stainless steels of a large variety of analyses and in sections of 6-inch rounds, 4-inch squares, and 4 x 8½-inch slabs. Ingots have been cast at speeds up to 12 feet per minute. Experimental work on steel has shown the necessity of rapid heat removal from the ingot to obtain the formation of an ingot skin which will shrink away from frictional resistance of the mold wall while having sufficient strength to prevent rupture as it slides along the wall. This has been accomplished by providing a thin mold wall of high-conductivity material through which heat can rapidly pass from the ingot and then scrubbing this heat rapidly off the outside of the mold wall by forcing water through a narrow passage along the surface of the wall at high velocity.

By dissipating the heat rapidly from the outer surface of the mold wall, a high temperature gradient is created within the mold wall, which produces fast heat removal from the ingot itself. The ingot skin therefore freezes instantaneously and shrinks away from frictional resistance while moving along the mold wall. Only a relatively small amount of water has been found necessary to cast ingots at high speed and the temperature rise of the water is less than 50 degrees Fahr. in pouring steel ingots.

Additional experimental work (the original of which was done several years ago at Battelle Memorial institute, Columbus, O.) further increased the speed of ingot casting and it is thought that speeds as high as 20 feet or more per minute may be obtained. This has been accomplished by the introduction of certain materials between the mold wall and molten metal which help to lubricate and thus reduce frictional resistance while also increasing thermal contact and heat removal.

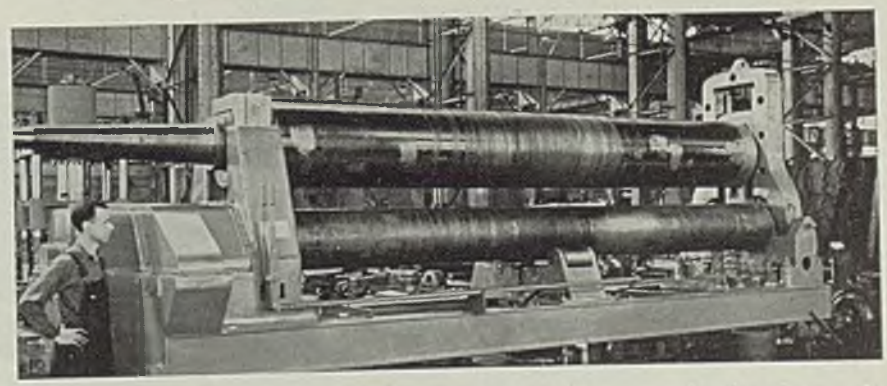
A description of the continuous methods as carried on at Latrobe, Pa. as well as views of the experimental setup including the electric furnace, mold cavity, rolls, sprays and typical sections of ingots were presented in the April 8, 1940 issue of STEEL, page 48.

The pilot plant laboratory has demonstrated that steel ingots of good quality can be cast at commercial speed and plans are now being made for the installation of commercial units in several steel plants.

Continuous casting of metals offers many advantages over individual ingot casting in stationary molds, chief of which are as follows:

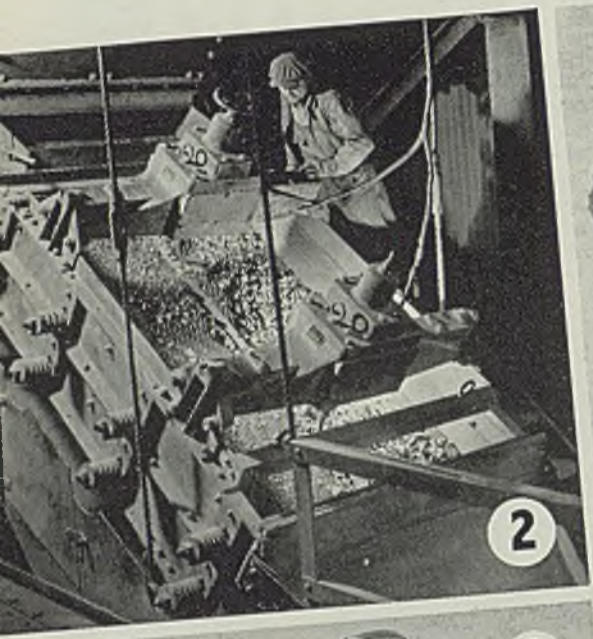
1. Ingot yield can be greatly in-

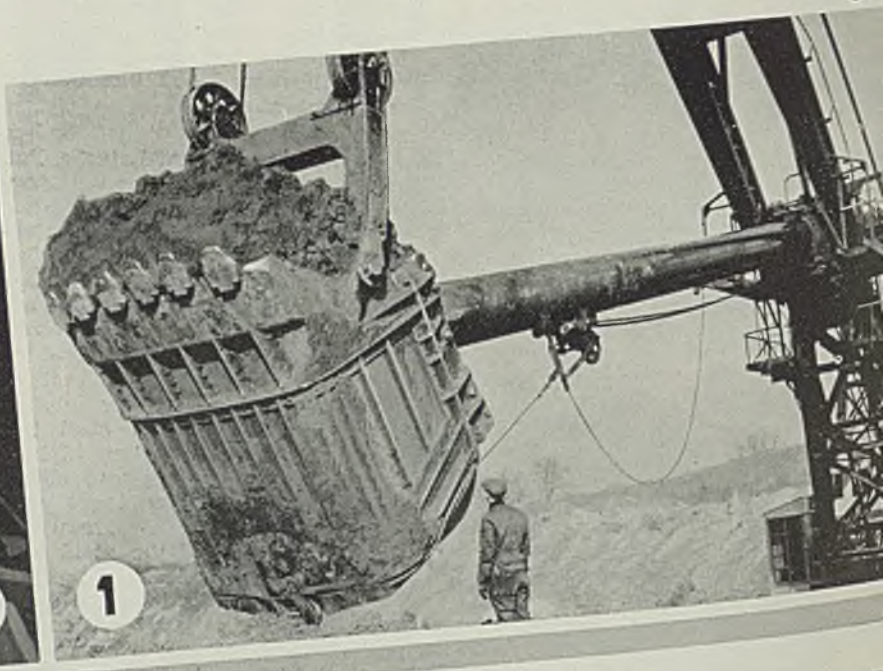
Welding Simplifies Bending Roll Construction

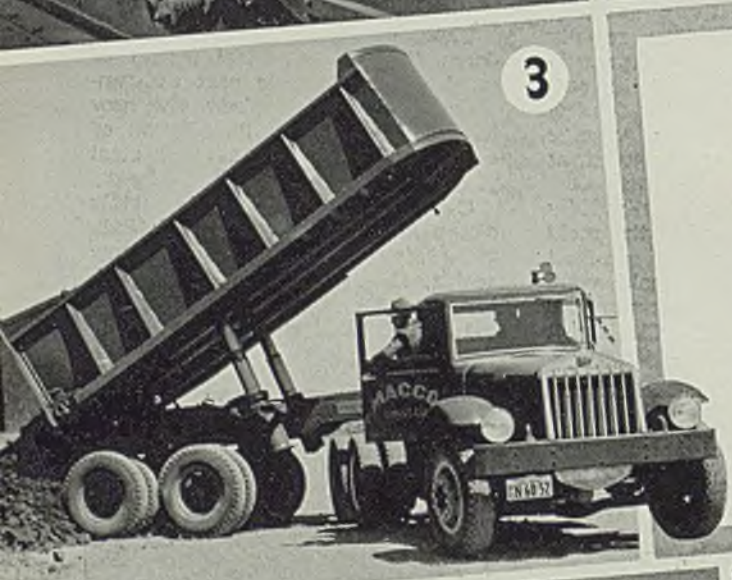


■ Simplification of design through the use of welded construction is apparent in this new 16-foot horizontal bending roll built by Baldwin Southwark division, Baldwin Locomotive Works, Eddystone, Pa. In order to provide greater rigidity and better load distribution at the several joints between the drive box, bed rails and inner housing, these parts were welded as an integral unit. The drive gears are arranged to minimize the twisting moments. Conical shapes can be rolled by raising one end of the top roll. Lever-operated clutches permit either end of this roll to be raised or lowered independently. Cylinders and shapes which must be removed from the machine in a direction parallel to the axis of the rolls are readily handled because of the drop-end housing

Before you build or buy







1. MAN-TEN HELPS INCREASE SHOVEL CAPACITY 66⅔%. By replacing old-style 18 yd. dipper with this 30 cu. yd. MAN-TEN dipper, shovel's front end now weighs than before; machine handles 12 cu. yd. extra payload at every scoop, does 10 days' wor 6 days, reduces excavation cost 40%, with no change in power equipment.

2. VIBRATOR BARS LAST TWICE AS LONG. This screen vibrates 1800 times per mi time. Even when made of open-hearth .80 to .90 carbon spring steel, 4 to 6 weeks was the of service. Made of U·S·S MAN-TEN, these bars now stay on the job from 3 to 4 m

3. 12 OF THESE 16 YD. SEMI-TRAILER DUMP TRUCKS set new records for material ing in building San Francisco's new Municipal Airport. Made 14 round trips ap mately 8½ miles from quarry to project per 6-hour shift. COR-TEN used in the body struction to insure strength and stamina still saves 750 lbs. or 12.6% weight.

4. U·S·S MAN-TEN USED IN THE CONE DRUM of this Rex Moto-Mixer, give vital part of the equipment the ability to last under the highly abrasive action concrete batch. In cement mixers, in steam shovels, trucks and tractors and in ma handling equipment of all kinds, U·S·S MAN-TEN and U·S·S COR-TEN have made it p to reduce weight up to 30%—without the loss of a single advantage previously enjoye

5. COR-TEN BUILDS WORLD'S LARGEST LOGGING TRUCK UNIT. Of COR-TEN tion throughout, designed to carry a payload of 110,000 lbs., these units will carry 15 of logs per trip at average speeds of 25 miles per hour with full load—a total of about ft. of Ponderosa pine per day on a haul of 15 miles. This truck is hauling 23,610 ft., b to be largest load of logs ever carried by a truck and trailer.

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equipment that must

pay its way . . .

Get the facts and service records of these high-efficiency steels

ASK the railroads. Ask the operators of busy trucks and trailers. Talk to the men who build our dams and highways. Go into the mines. Listen to lumbermen down South and out West. You'll soon find out why so much hard-working mechanized equipment is being built with U·S·S Cor-Ten and U·S·S Man-Ten.

These U·S·S High Tensile Steels ask no favors when the pressure is on. They have made good in the toughest kinds of service. They have lifted the drag of dead weight off thousands of production schedules and cost sheets. They have definitely reduced upkeep and maintenance by the added protection they assure against the destructive attacks of abrasion and rust.

Equipment built of U·S·S Cor-Ten and U·S·S Man-Ten pays for itself — often with a handsome bonus to boot — because it is able to do more work. Because it lasts longer, costs less to operate, is cheaper to keep up, won't break down or rust out prematurely. And that's the kind of equipment this country needs right now.

Easy to fabricate, low in cost, these tough, hard-wearing, high strength steels have been successfully applied to make stationary and mobile equipment of all kinds more efficient than ever before. Find out what possibilities they offer in your product. Let our metallurgical specialists go over your blue prints. They will be glad to tell you if the use of these special-purpose steels is economically justified.

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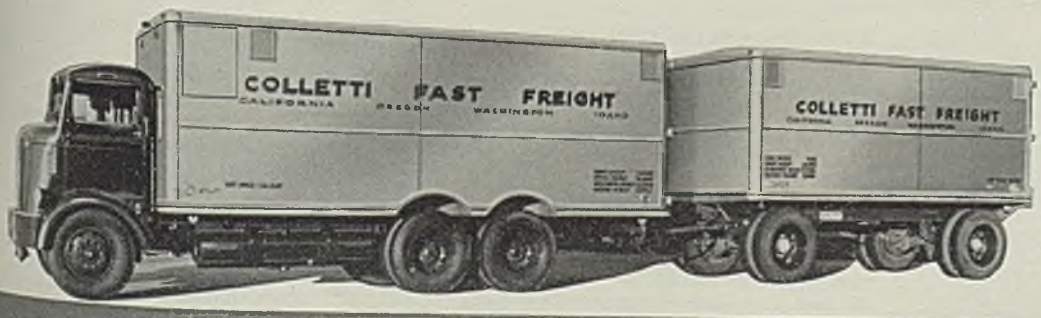
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*
United States Steel Export Company, New York
Scully Steel Products Company, Chicago, *Warehouse Distributors*

USS COR-TEN HIGH TENSILE STEEL

ON YOUR EQUIPMENT THIS SEAL MEANS that the steel used has a yield point approximately 1½ times that of mild steel, has 50% greater tensile strength. Experience has shown that Cor-Ten has approximately 35% added resistance to abrasion . . . the fatigue resistance—its ability to stand vibration stresses—is 80% greater than ordinary steel. Tests and service have shown that the steel has resistance to atmospheric corrosion 4 to 6 times that of ordinary steel—2 to 3 times that of copper steel, surety for its complete safety, long life and low maintenance cost when used in lighter sections to reduce weight.

USS MAN-TEN HIGH TENSILE STEEL

ON YOUR EQUIPMENT THIS SEAL MEANS... that the steel has 50% greater tensile strength and a yield point approximately 1½ times that of ordinary steel. Experience has demonstrated that Man-Ten has resistance to abrasion approximately 33% greater than ordinary steel, and that it is much superior in resistance to fatigue; in resistance to atmospheric corrosion it equals copper steel.



COR-TEN CONSTRUCTION KEEPS THE ROLLING. Used in this latest type truck and trailer with refrigerated bodies U·S·S Cor-Ten construction not only keeps weight to a minimum but more important still, assures strength and stamina to stand heavy-duty hauling between Los Angeles and the Pacific Northwest.

UNITED STATES STEEL

creased particularly with killed steel as the yield from continuously cast ingots is nearly 100 per cent.

2. Rolling cost will be reduced since it is possible to cast billets and slabs of small section and long length which do not have to be broken down in large roughing mills. It may even be possible to cast ingots having sections that are partially formed for final products, such as I-beams and rails.

3. Since the metal falls only a short distance, splashing is decreased and much improvement is found in ingot surface. Ingots are really bottom cast from the top. This should reduce or eliminate chipping and conditioning costs.

4. Improved internal ingot structure has been obtained largely because an ingot of small cross section can be cast. The smaller the section the quicker the solidification and the less segregation can occur.

5. When the water-cooled mold is properly designed, practically no wearing of mold wall occurs and since the casting operation can be made almost automatic, pouring cost including mold cost is reduced considerably.

6. Improvement of quality steel products has been obtained largely by control of operating practice. Continuous casting is a step in this direction. After many years of inadequate control in present methods of casting individual ingots, steel producers should welcome this new found tool of quality control.

Continuous casting of nonferrous metals has already shown successful commercial results although it has so far been limited to certain definite applications. Increased usage and perfection of processes is rapidly taking place, and we will undoubtedly see the large scale use of continuous casting in the nonferrous industry within a few years.

Demonstration Model

(*Concluded from Page* 51)

pressures on the lower shoes increase slightly, while those on the load side decrease slightly. This demonstrates the slight variations in film pressures which result from imposing high external loads. This 200-pound load is equivalent to the normal force imposed by a 10-horsepower grinding cut, as indicated on the dial.

The power change from idle running, Fig. 3, to running under load, Fig. 4, is negligible—which fulfills the requirement of small change in friction force with large change in external normal load.

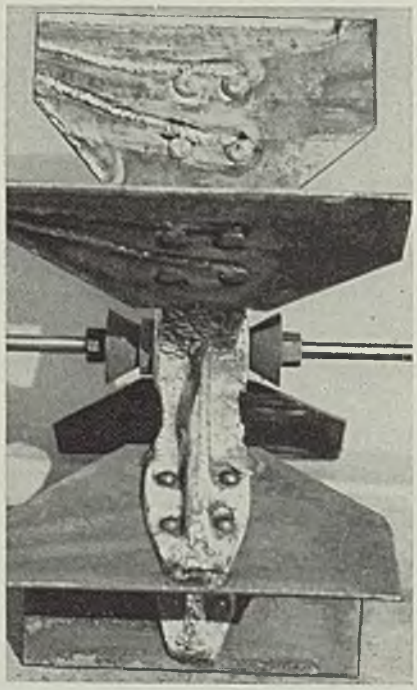
Observations through the microscope show no discernible movement of the hairline which indicates spindle flutter, either during continuous operation or when the load is applied or released. Since the distance between adjacent graduations corresponds to a spindle movement of 0.001-inch, the actual movement must be less than 0.0001-inch. As a matter of fact, oscillograms which plainly show displacements of 60 micro inches for cap type bearings, show no perceptible displacements for the Filmatic. This absence of flutter and wavering is evidenced in practice by the quick spark-out when a heavy plunge cut is made on machines equipped with this bearing and also by smooth action of the truing diamond.

Fig. 5 demonstrates the safety feature of the pressure switch device. When the by-pass valve is opened sufficiently to cause pressure in the bearing chamber to drop below 3 pounds per square inch, the pressure switch opens and the main drive motor stops. Fig. 5 shows the wattmeter at zero, and the pressures between the shoes and the spindle dropping. The operation of the bypass valve simulates possible failures in oil lines, oil supply, pump or pump motor.

In short, this model serves all the purposes of a convincing demonstration device. It reproduces all possible conditions of operation and breakdown. It supplies visual demonstration of the device's functioning as well as scientific measurements of the results achieved.

Hard-Facing of Blower Blades Reduces Abrasion

■ In the manufacture of special fine clays and talc, the dry material is transposed through the plant by blowing it from one operation to another, usually by means of centrifugal blowers. In one plant, where plain steel blades were used in the blowers, the blades used wore through completely due to the abrasion of the fine particles of suspended clay on their "entrance" sides. Now, however, the blades are kept operating economically, with increased service life, by protecting them with hard-facing.



The accompanying illustration shows a blower blade which has been hard-faced with Haynes Stellite alloy rod. As can be seen, the entrance corner of each blade is protected by four narrow alloy deposits. The unusual spacing and location of the alloy have been worked out after two years of careful study of blade wear by a welding shop specializing in hard-facing. The method has been found to be more economical than hard-facing the entire blade surface.

The abrasion, however, eventually wears holes in the steel between the hard-facing deposits—but only after much longer service. It is estimated that the hard-faced blades last approximately 3 times as long as plain steel blades.

Four narrow alloy deposits protect these centrifugal blower blades. Photo courtesy The Linde Air Products Co., 30 East Forty-second street, New York

Metal-Cutting Alloy Gives Longer Service

■ An improved grade of cobalt-chromium-tungsten metal-cutting alloy which when tipped on tools gives longer life between grinds is announced by Haynes Stellite Co., unit of Union Carbide & Carbon Corp., Kokomo, Ind. Known as Haynes Stellite Star J-Metal, it is recommended for all machining operations now being performed with the original J-Metal tipped tools. The tools tipped with this new metal can be operated under the same conditions as the original grade and are ground with the same wheels, at the same wheel speeds and feeds.

The new alloy is now available in all of its manufacturer's standard tool bit sizes, both squares and flats, and in many standard and special blade designs and sizes—also in the form of standard welded tip tools and in many special tool designs for grooving, cutting off, counterboring, spot facing, form cutting, core drilling, etc.

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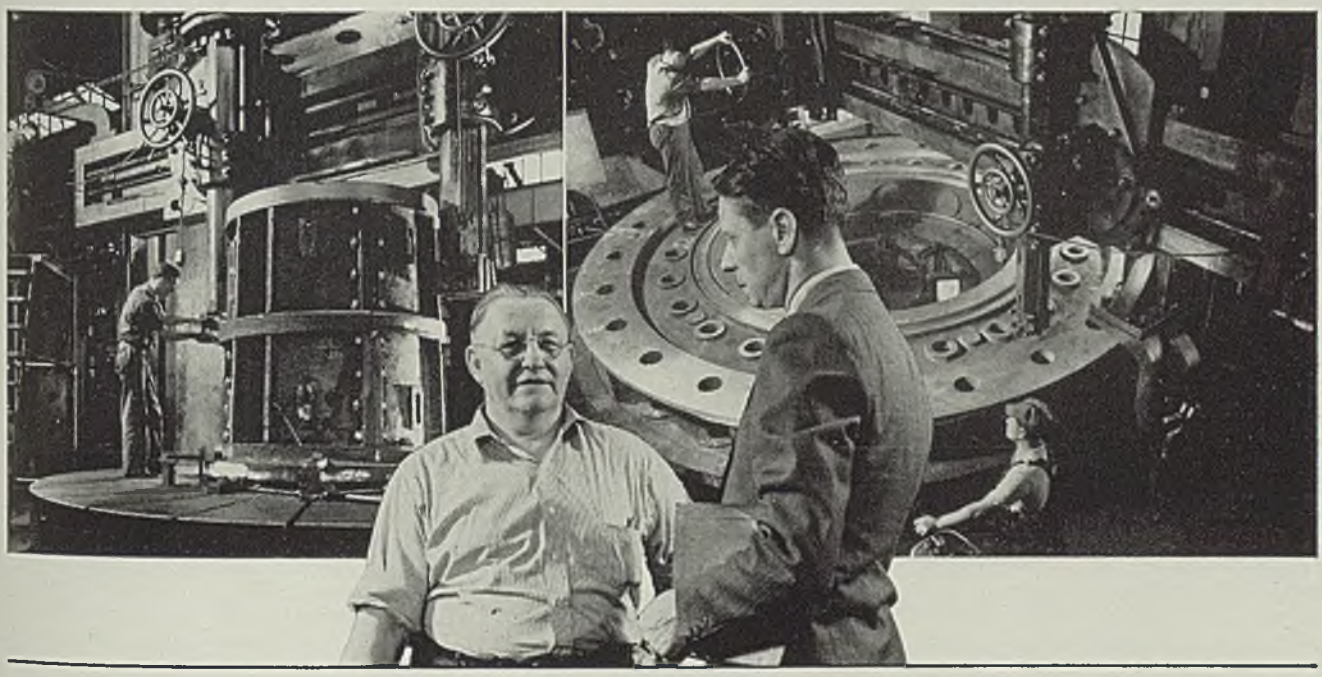

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For Controlled Atmosphere Heat Treating, Mr. Gier says:

"Save the surface . . . . . and you save all"

A new furnace atmosphere is important because it can be adjusted to exactly balance the various carbon contents of different steels. This development is supplemented by a novel new gage which measures the carburizing power of the atmosphere and so offers a means for quickly and accurately determining when the composition of the atmosphere has been adjusted so no change in carbon can occur

By J. R. GIER
Research Engineer
Westinghouse Research Laboratories
East Pittsburgh, Pa.

■ SURFACE condition of metals is especially important to the performance of a part because it is the surface that must resist wear and deformation. Maximum stresses usually occur at the surface, where the metal is generally weakest, and develop cracks that can easily progress inward through the subsurface metal. In highly stressed parts, the best protection against failure is a sound surface free from scale, decarburization, pits or other forms of injury incurred during heat treatment.

To attain the necessary good surface on parts subject to severe duty, it has been common practice to machine them roughly to size before hardening so the inevitable heat-treating damage could be removed in finishing to final size. These finishing operations are costly, as hardened steel is more difficult to machine than soft steel. Also, a decarburized surface impairs finish grinding by clogging the wheel. This tends to cause localized burning of the surface, which in turn may cause cracks to form at these points.

Thus the old practice of allowing the surface of the work to be injured during heat treatment has become intolerable in modern plants where highest standards of quality and efficiency are sought. Various means have been used to minimize surface damage during heating. In addition to protective gas atmospheres, these include heating in molten salts, lead baths and coating the work with protective paints. Of these various methods of protection, controlled furnace atmospheres appear the most generally applicable as they require no preparation of the work before heating nor any cleaning afterward.

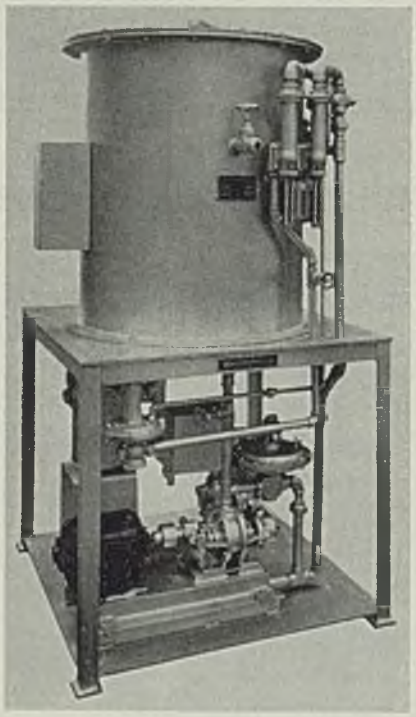

Fig. 1—A complete Endogas generator unit. The mixing pump below delivers the feed mixture of air and fuel to the electrically heated reaction chamber above where an electrically heated catalyst further reacts with the mixtue to produce the atmosphere desired

Controlled furnace atmospheres consist of specially prepared gases admitted to the heating chamber to displace the normal furnace atmosphere and envelope the work in a protective manner. Gases commonly used for this purpose are generally derived from the partial combustion of hydrocarbon fuel. Although quite effective in preventing scaling, they are difficult to control in their effect on the carbon in steels. Either they tend to increase the surface carbon which may go to a high value limited only by the saturation point, or else they tend to decarburize the surface completely. Intermediate adjustment is difficult and has been the aim of a number of protective atmosphere investigations and developments.

One such new protective atmosphere that can be adjusted to balance the various carbon contents of different steels is prepared in a single-step process, consisting of the thorough reaction of a mixture of hydrocarbon fuel and air in an electrically heated catalyst. This atmosphere is called Endogas. A novel device also has been developed to measure its carburizing power. With this device, known as a hot-wire carbon gage, the composition of Endogas atmospheres can be quickly and accurately adjusted to any steel so no change in carbon will occur.

Controlled atmospheres, of course, require gas-tight furnace construction to confine the gas and to exclude infiltering air that would be chemically objectionable. Controlled atmospheres are easily adapted to electric furnaces as they do not ordinarily require muffles to keep the gas separate from the heat source. Electric heating does not generate gas, the heating elements can be exposed to the furnace atmosphere.

Scaling and loss of surface carbon

This development was presented before the American Society for Metals at the 1940 Metal Congress and Exposition, Cleveland.

Lewis develops...

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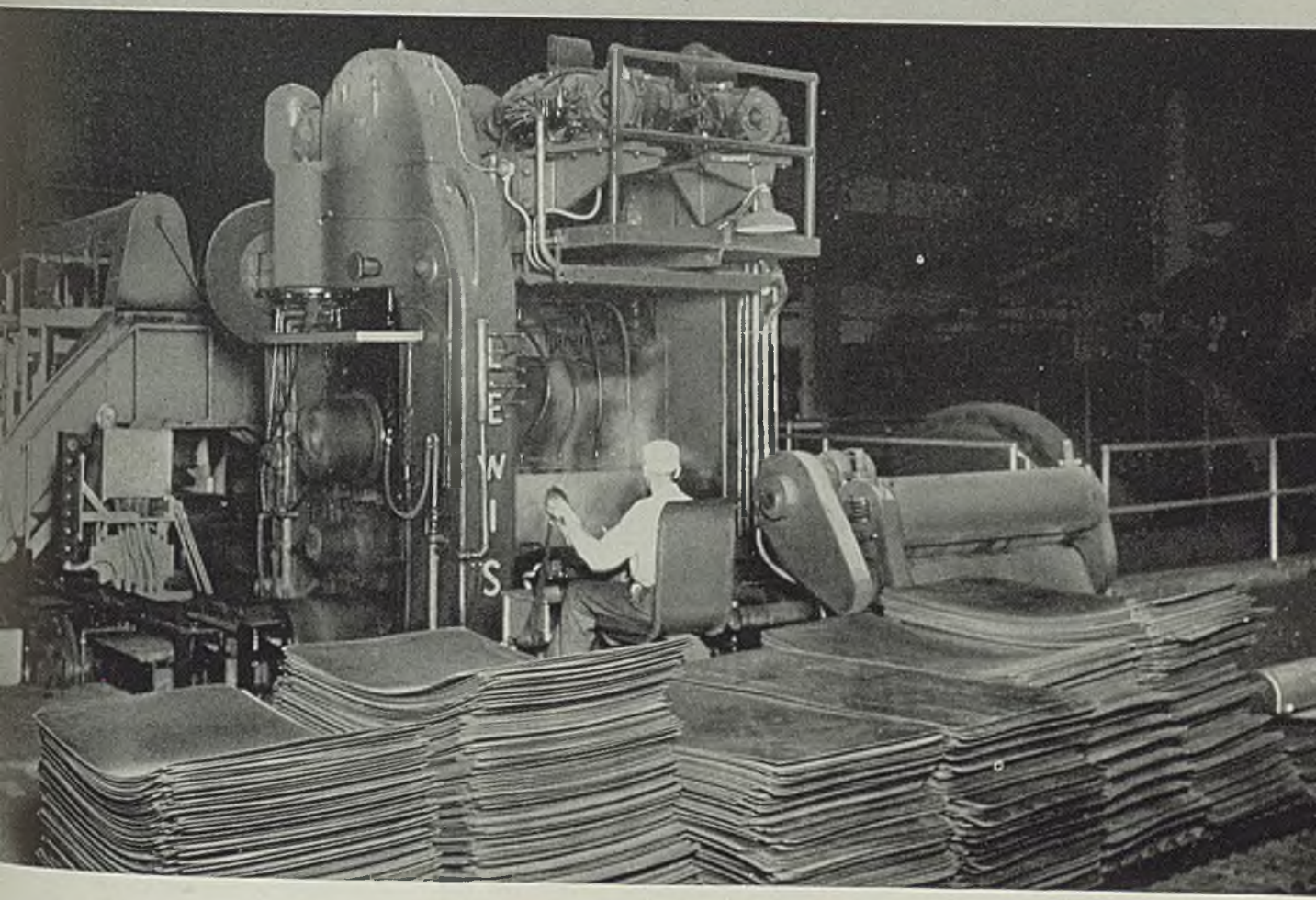

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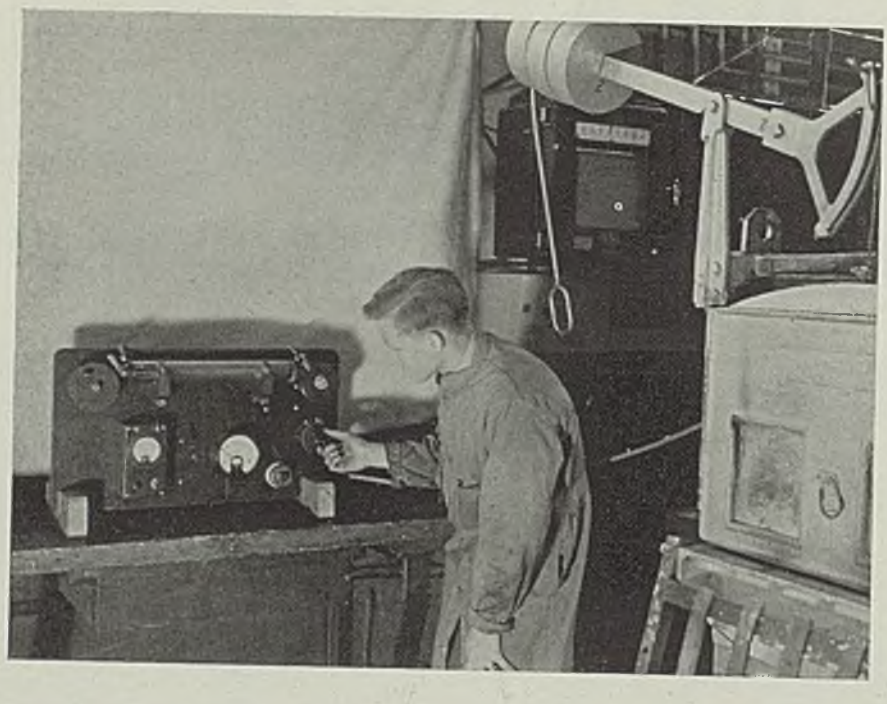

Fig. 2—New hot-wire gage being used to measure the carbon pressure of an Endogas atmosphere in the adjoining electric box furnace

occur when steel is heated because it then becomes chemically active toward its gaseous surroundings. For this reason it should be emphasized that the success of a protective atmosphere, especially one used for hardening steels, depends upon close control of its chemical composition while in the furnace in contact with the work.

To attain this control, contamination of the atmosphere must be avoided; the furnace must be so designed that the work can be put in and taken out without letting air into the heating zone. This can be accomplished in conveyor-type furnaces, but not in ordinary box furnaces. Box furnaces require a gas supply sufficient to purge out the furnace after the door has been opened to put in work; purging should be complete before the work attains a reacting temperature. This is easily accomplished when heavy parts are being heated, as their slower heating allows more time for purging than do light parts; moreover, they generally require hand quenching, which is more easily done from a box furnace than from a conveyor furnace. For these reasons, heavy parts are best hardened from box furnaces and light parts from continuous furnaces.

For bright annealing of low-carbon steel sheet and wire and nonferrous metals, where loss of carbon is not a consideration, the essential chemical requirement of the protective atmosphere is that it be nonoxidizing. Suitable atmospheres for this purpose are prepared by partially combusting hydrocarbon fuels to give a mixture of nitrogen, hydrogen, carbon monoxide, carbon dioxide and water vapor. Of these components, the hydrogen and carbon monoxide are the reducing agents which tend to prevent metal from oxidizing and scaling, while the carbon dioxide and water vapor have a contrary effect tending to cause oxidation. The net effect of the gas in contact with the metal is either oxidizing or reducing, depending upon the proportions of these two types of opposing constituents and the temperature.

Control: In practice, these proportions can be controlled over a considerable range to suit the various needs of different metals by regulating the ratio of air to gas in the feed to the gas-generating unit; further control can be had by drying the gas. The composition on the gas is not critical when the metal does not contain carbon that must be maintained intact. The only requirement is that the gas be reducing and an excess of reducing power above the bare need is all to the good.

On the other hand, when both oxidation and change in carbon are to be prevented, as in hardening steels, a real problem arises. Here it becomes necessary to produce and control a gas mixture of precise composition that is in chemical equilibrium with the carbon in the steel. This means that the gas must have a carburizing power just strong enough and no stronger than that needed to balance the natural decarburizing tendency of the steel.

Since the carburizing tendency, designated as "carbon pressure," of the gas is a very sensitive function of the CO-CO_2 ratio, this ratio must be maintained at a definite and proper value if a gain or loss of carbon is to be prevented. In other words, the gas must have a composition that is in chemical equilibrium with the carbon in the steel being protected. Fortunately, the reducing power of such gases is adequate to prevent oxidation of most steels.

The difficulty of attaining such a balanced gas condition becomes apparent when it is considered that for a 1 per cent carbon steel at 1600 degrees Fahr. an atmosphere having 20 per cent carbon monoxide must contain only a few hundredths of a per cent of carbon dioxide; a definite amount, but too small to be measured by ordinary means.

Gas mixtures as produced by partial combustion in conventional generators contain upwards of 5 per cent carbon dioxide and similar amounts of water vapor, the remainder being hydrogen, carbon monoxide and nitrogen. In attempts to prepare mixtures suitable for protecting steels against decarburization, it has usually been necessary to process the gas further by removing the water vapor and the carbon dioxide, which if left in would be actively decarburizing. Thus, a considerable amount of equipment is used to make a gas that still is difficult to control with the precision necessary to insure the desired equilibrium with the steel. Although the improved surface condition of the steel justified the effort and cost of protection by this method, an urgent need was recognized for a less complicated means of making an atmosphere suitable for protecting steels during hardening.

A study of the chemistry of the problem showed that it was theoretically possible to produce the desired gas in a single step by reacting air and hydrocarbon fuel in proper proportions. A special generator, shown in Fig. 1, was built having an electrically heated catalyst which was capable of producing the required gas directly and without need for further treatment.

Because of the endothermic (heat absorbing) character of the gas reacting process, the product was called "Endogas." A typical composition of Endogas as prepared from Pittsburgh natural gas fuel is 40 per cent hydrogen, 20 per cent carbon monoxide and the balance nitrogen except for traces of carbon dioxide and water. This gas can be adjusted readily to balance the carbon in any steel simply by regulating the ratio of air to fuel in the feed mixture to the

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Rail haulage for intra plant movements can be very costly; industry appreciates this, and is constantly on the alert to adopt more reliable, practical and economical methods. Our files bulge with case studies of plants that have adopted WHITCOMB LOCOMOTIVES; the savings and availability listed in these studies are impressive. You will want to check your haulage to see if it can be made more economical. Do this, and then call one of our engineers. He will go into this subject with you without obligation.

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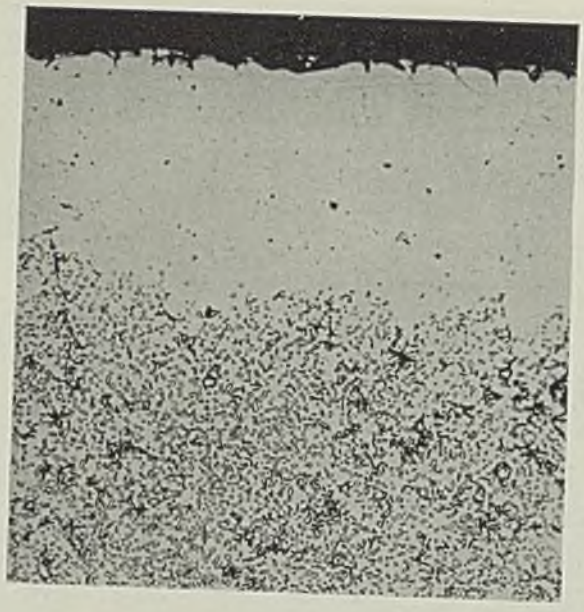
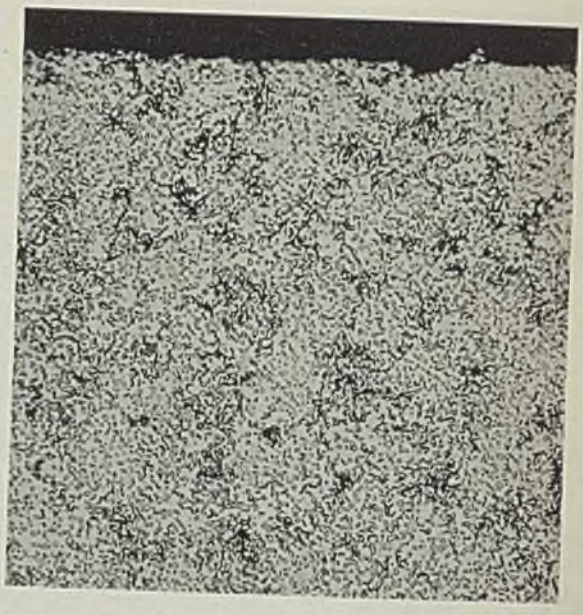




Figs. 3 and 4 are micrographs of surface sections of SAE 52100 steel after heating in ordinary atmosphere and in Endogas respectively. Note the decarburized white zone of Fig. 3 which means a "soft" skin. Fig. 4 shows no loss of carbon

generator. Endogas costs approximately 30 cents per thousand cubic feet, based upon a natural gas at 50 cents per thousand. Any utility fuel gas may be used for this purpose.

Carbon Gage: After Endogas was developed and found to be capable of ready adjustment to chemical equilibrium with the carbon in steels, there still remained the problem of determining in advance when this adjustment had been attained. In other words, an indicating device was needed to measure the carburizing power or carbon pressure of the gas mixture.

Currently available gas analyzing devices being responsive only to thermal conductivity, heat combustion or other properties unrelated to carbon pressure, it was necessary to devise a special instrument for the purpose which is shown in Fig. 2.

In this gage, a thin steel wire is electrically heated to incandescence in a glass tube through which a small flow of the test gas is passed. Carbon is absorbed by the wire from the gas until a chemical equilibrium is attained between the carbon in the wire and the carbon in the gas. This action is rapid and is complete in less than 10 minutes. The amount of carbon in the wire is then a function of the carbon pressure of the gas, and will not change with continued heating. Shutting off the heating current in the wire allows it to cool quickly and "freeze" the carbon in the wire and cause it to harden in the same way that quenching any steel will harden it.

After the above treatment under standardized conditions, the electrical resistance of the wire is used as a measure of its carbon content, and, therefore, as a comparative measure of the carbon pressure of the gas. Calibration curves are prepared expressing the relation between the gage-wire resistance and the equilibrium carbon content of steels heated in the same gas.

Thus, it is possible for the first time to preadjust a complex gas mixture in a positive manner to balance the carbon in any steel so no gain or loss will occur during heat treatment. Endogas lends itself to this critical balancing better than other types of gases for two reasons. First, the active components of Endogas are in approximate chemical balance between themselves when the gas is formed in the generator, due to the extremely thorough reactions obtained there by high temperature catalysis. Second, this balance is not disturbed by the removal of any of the components, the gas being delivered directly from the generator to the furnace without change in composition.

The effectiveness of the gas in protecting steel is illustrated in Figs. 3 and 4, which show photomicrographs of surface sections of SAE 52100 ball bearing steel after heating in ordinary reducing gas atmospheres and in Endogas, respectively.

The white zone of Fig. 3 represents a decarburized surface layer that is soft, weak and in a state of tension likely to cause cracking. Such a surface should be ground off from parts subject to severe stress or wear. The structure in Fig. 4 shows a uniform distribution of carbon clear out to the surface, a desirable condition.

Industrial heat-treating furnaces equipped with this new protective atmosphere are giving good results in production heat treating of gasoline engine parts and other items.

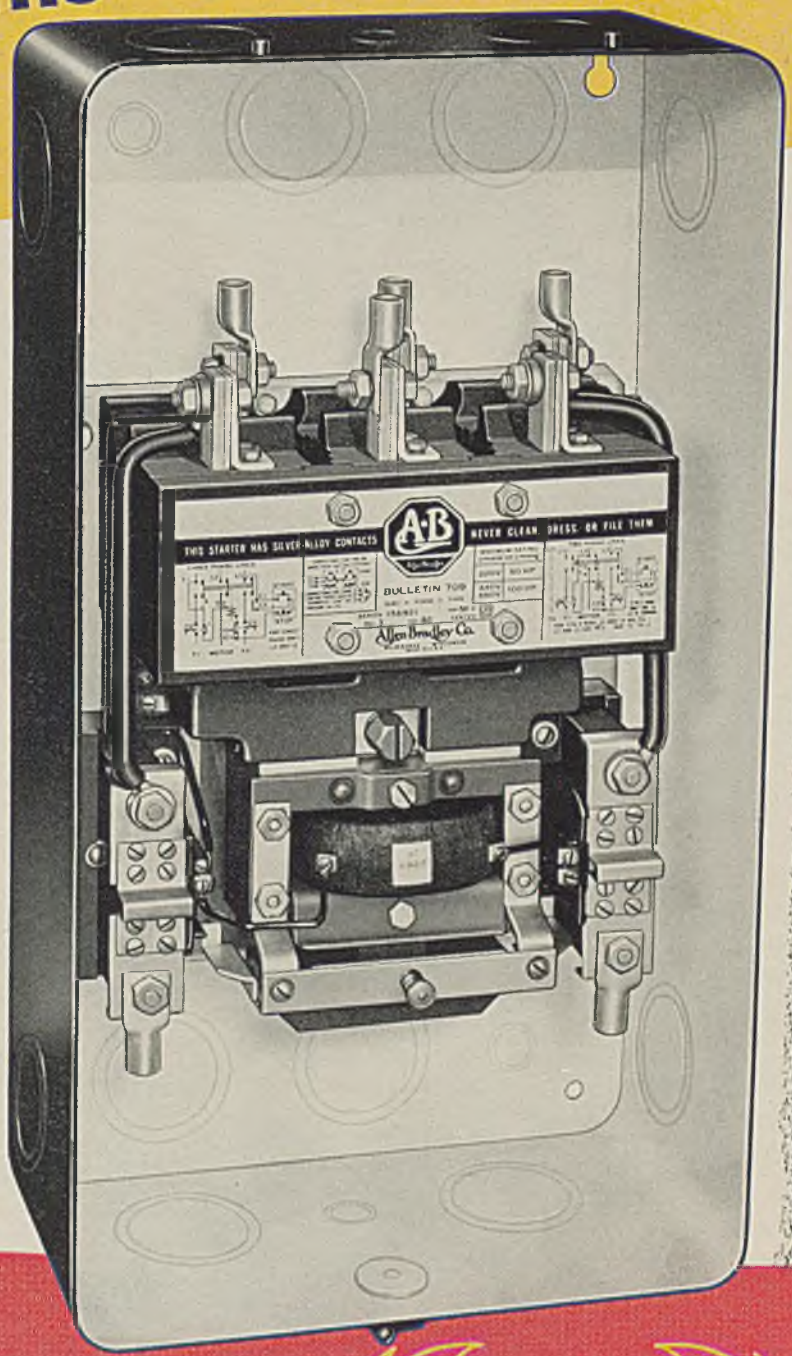
Test for Thin Sheets of Stainless Developed

■ A new testing method for thin sheets of stainless steel is announced by national bureau of standards, department of commerce, Washington. The development of this test was part of a research project undertaken for the national advisory committee for aeronautics, supported by funds from eight different manufacturers.

According to Dr. Lyman J. Briggs, director of the bureau, knowledge on how this material will behave under high compressive stress should increase its use in the manufacture of airplanes and may help to speed up airplane production.

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

ADVANTAGES OF A-B SOLENOID CONSTRUCTION force Development of this SIZE 4 Starter



Bulletin 709, Size 4

Maximum Rating
50 Hp, 220 Volts
100 Hp, 440-550 Volts

In all classes of service, the Allen-Bradley solenoid construction has proved its superiority beyond all question of doubt. This has created a demand for a solenoid starter of higher ratings. To satisfy this demand, Allen-Bradley has developed the *SIZE 4* solenoid structure used in the Bulletin 709 across-the-line starter, shown at the left. This switch has all the design simplicity, the double break, silver alloy contacts, the ruggedness, and the many other features that have established the reputation of the smaller Allen-Bradley solenoid starters.

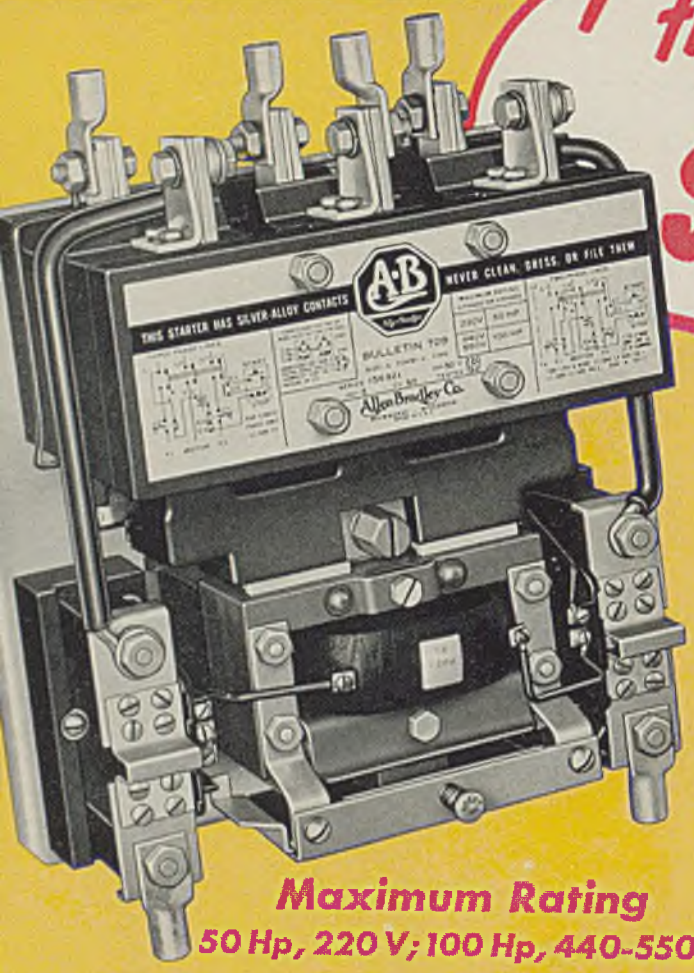
A-B

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

QUALITY

SEVEN-YEAR SUCCESS OF A-B SOLENOID LINE

creates demand for the NEW SIZE 4



Maximum Rating
50 Hp, 220 V; 100 Hp, 440-550 V

These fundamental advantages of the Allen-Bradley solenoid construction are now available for much larger motors.

- **NO CONTACT MAINTENANCE**
The double break, patented cadmium silver contacts never require ordinary cleaning or filing—a distinct advantage over copper-to-copper contacts.

- **GREATER SWITCHING CAPACITY**
The Allen-Bradley solenoid starter will easily and without much commotion interrupt currents of at least ten times its maximum horsepower rating.

- **SIMPLE, RUGGED CONSTRUCTION**
No other starter has so few moving parts. No pivots! No pins! No hinges! No complicated switch mechanisms!

- **LONGER LIFE**—With contact filing unnecessary and with only one moving part in the solenoid switch structure, the life of the starter is greatly increased.

- **UNIT CONSTRUCTION**—The switch is mounted on a metal base plate and is self-insulated. Hence, it can be quickly and easily mounted to metal surfaces without extra insulation.

- **ENCLOSED ARC HOOD**—The arc hood encloses the starter contacts and confines all arcing, allowing closer grouping of starters or contactors.

- **WHITE INTERIORS**—The patented white interior reflects light and illuminates the starter in dark corners. There is generous space for wiring.

The Growth of the Allen-Bradley Solenoid Line

SIZE 1—In 1933, Allen-Bradley announced the remarkably new and different solenoid starter.

SIZES 2 and 3—Encouraged by its success, the solenoid was extended to larger sizes.

SIZE 0—Last year this smaller solenoid starter was inserted in the line.

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Barber-Colman Issues Loose Leaf Data Book

■ Barber-Colman Co., Rockford, Ill., recently initiated a new service to those concerned with production of gears by the hobbing process.

Basis of this service is a loose-leaf book entitled "Hobbing Data." In its initial form, this book contains basic information on hobbing machines, hob and cutter sharpening machines, hobs, milling cutters and reamers; together with 14 data sheets giving detailed case histories of actual field performance in hobbing.

These sheets, which are illustrated, give details of setup and performance under a wide variety of production conditions, including tractor plants, washing machine factories and clock shops. Monthly releases of additional sheets will be made for inclusion in the loose-leaf binders, thereby building up and maintaining a complete and up-to-date handbook on hobbing for every registered holder of the book.

This service is available on request to the Barber-Colman Co. and its representatives, to properly identified superintendents, foremen, production engineers, master mechanics and others engaged in specification and use of hobbing equipment.

Automatic Bronze Welding

■ BETWEEN 240 and 250 lawnmower handle shafts are being welded in an 8-hour shift in the plant of a lawnmower manufacturing company that recently installed a single bronze-welding setup equipped with a vapor flux dispenser. These handle shafts, or tongues, are made of a hollow square of 20-gage steel and bronze welded along their center seam, 39 inches in length.

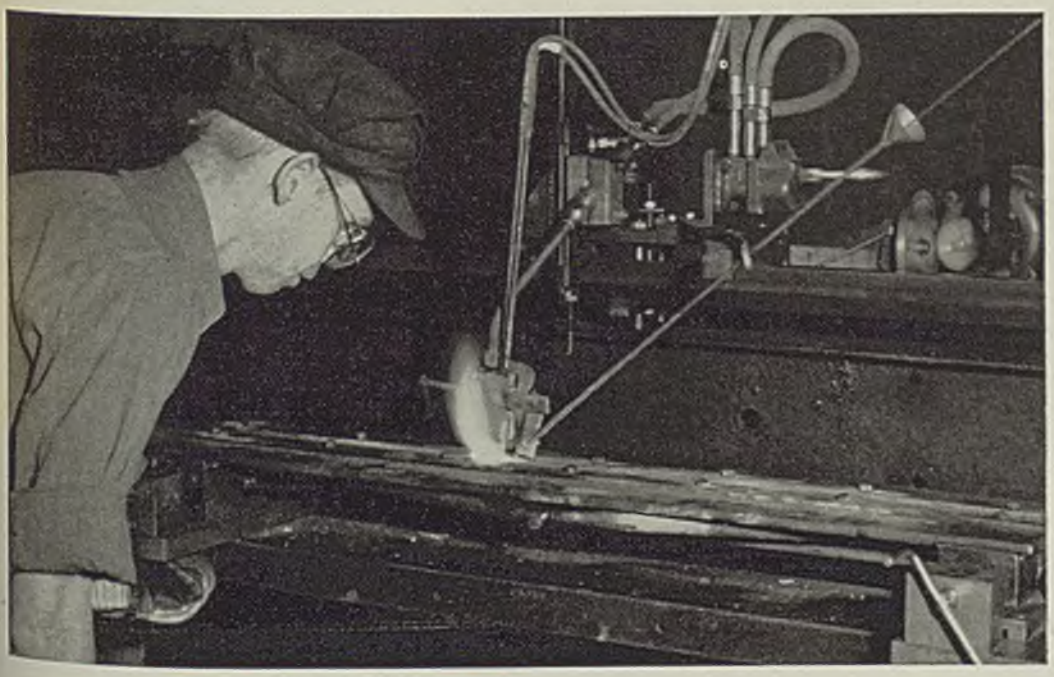
Major advantages of this new welding method are: A distinct speeding of production, 70 shafts being the maximum number of shafts that could be welded in the same time by previous methods; a decided improvement in the as-welded appearance of the work; elimination of finish grinding because the bronze weld is so smooth and regular; and savings in production costs that total 25 per cent.

The equipment used is simple in operation. It consists of a welding blowpipe with a 7-flame welding head (four flames in operation) mounted on a carriage that is propelled at the desired speed along a track by an electric motor. The bronze welding rod, 1/16-inch in diameter, is fed by gravity to the weld area. The lawnmower handle shaft to be welded is clamped in a jig, formed by a long vise that runs its full length. See Fig. 1. The jaws of this jig are of angle iron which approach the welding seam closely to carry off the heat.

Of great importance to the welding operation is the use of the vapor fluxing principle for bronze welding on a production basis. Vapor flux permits continuous welding without pausing from time to time to apply powdered flux to either welding rod or weld area. This greatly increases the economy and speed inherent in the bronze welding process. The liquid flux is held in a special dispenser of the bubble type which provides a means for bubbling acetylene through the liquid flux. Thus the flux, in vapor form, is picked up by the acetylene and carried through the hose and blowpipe to the point of welding. The dispenser is connected between the acetylene cylinder regulator and the blowpipe so all of the acetylene used passes through it. The weld area thereby is automatically supplied with the flux required to provide the chemically clean surface necessary to insure a strong bond between the steel and bronze weld metal.

Using vapor flux in this manner saves much time and material since application of flux is controlled automatically with the acetylene flow. No more than the required amount can be passed and all of it is deposited at the point where needed. As a result, waste from excessive use of flux is impossible. Avoiding excess flux also affords important improvements in welding time and finished appearance.

Lawnmower handles, shown at extreme right, are bronze welded automatically in this special fixture shown below. An electric motor advances the torch at required speed. Rod feeds to joint by gravity. Photos courtesy The Linde Air Products Co., 30 East Forty-second street, New York



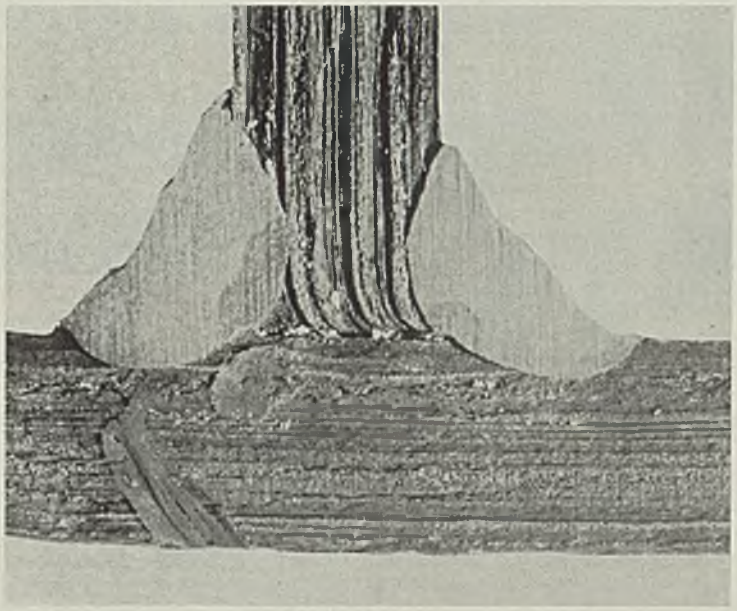


Fig. 1—Excellent fillet welds like this are made readily in wrought iron

Welding and Flame Cutting Wrought Iron . . . . . .

Correctly welding wrought iron requires maintenance of a pool of liquid metal to allow slag constituent of the iron to float out of the deposit. Melting slag must be differentiated from melting metal if proper fusion is to be obtained

By HAROLD LAWRENCE

■ WROUGHT iron, like most ferrous metals, is readily welded and flame cut provided certain precautions are observed. To understand these factors, some discussion of the nature of wrought iron is warranted.

Primarily, wrought iron is used for its better resistance to corrosion resulting from its peculiar structure —largely an iron silicate or slag varying from 1 to 3½ per cent of the metal present. This slag is distributed by the rolling operation into a series of threads. As many as 250,000 such slag stringers may be found in a cross-sectional square inch. It is these slag stringers that impart to wrought iron its fine resistance to corrosion since any corrosion soon meets the slag inclusions that set up barriers to the further spread of corrosive attack.

Since there are so many slag stringers present throughout the metal, corrosion attack is impeded at every turn.

In welding, however, these slag stringers present two distinct problems. First, the slag must be floated out of the weld metal. Second, the greasy appearance presented by the lower melting point of the silicates must not be confused with the slick appearance of the steel at the fusion temperature in oxyacetylene welding.

In addition to forge welding which may be accomplished readily, fusion welding may be done with the metallic arc, the oxyactylene torch and the carbon arc. All three may be accomplished either manually or automatically.

Disregarding for a moment the slag constituent in wrought iron, consider the fact that this material is essentially a very low carbon steel. Therefore, it is nonhardening and quite ductile. These factors eliminate the usual problems of a hardened heat affected zone and excessive internal stresses. Not all the locked up stresses are dissipated in heavy sections, though, and for this reason stress relieving of welds in thick plate remains good practice. Usual stress relieving temperatures may be lowered to 700 or 800 degrees Fahr. and will bring about the same results as 1100 or 1250 degrees Fahr. for steel.

In metallic arc welding wrought iron, a lower heat or wattage is required to go hand in hand with a slower speed of travel. The idea is to maintain a quiescent pool of liquid weld metal, thereby allowing time for the slag to float out of the deposit. As this slag melts at 2100 to 2200 degrees Fahr., compared with 2730 degrees Fahr. of the metal and is lighter than the metal, the fluid pool will discharge the slag if given enough time.

Electrode choice is of extreme importance. Although sample welds may be made with all three of the general classes of electrodes, preference should be given the two high-quality types — all-position and downhand. The better fluxing characteristics of these electrodes prove beneficial in removing slag constituents.

For example the weld made in Fig. 3 violated two of the established

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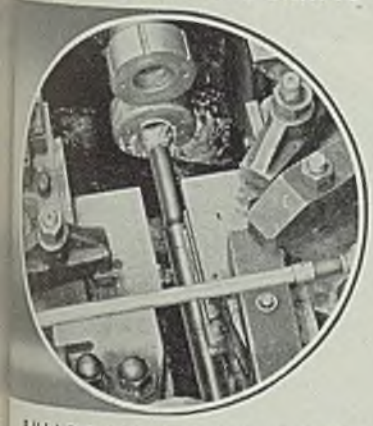
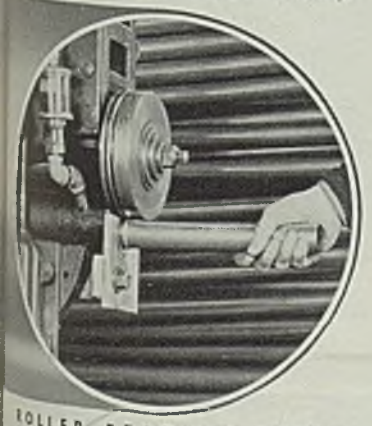
ELECTRIC RESISTANCE WELDED TUBING

SWAGING PROPELLER SHAFTS



BULLDOZING TUBE ENDS



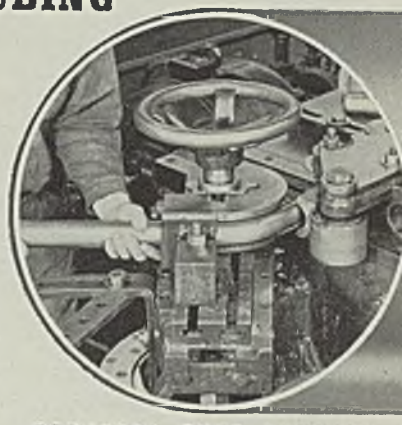
ROLLER BEADING TUBES

● Because of its shape, tubing may be fabricated with less effort than many other sections. And because it is consistently uniform in diameter, wall thickness, concentricity and ductility, Republic ELECTRUNITE Tubing assures unvarying ease of fabrication and perfectly-formed tubular parts.

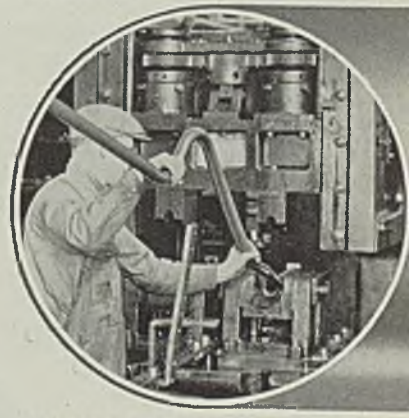
This modern electric resistance welded tubing is cold-formed from *flat-rolled* steel into a butted tube and then electric resistance welded. No heat is applied except at point of weld. Hence, Republic ELECTRUNITE Tubing may be cold-fabricated readily and accurately.

It can be bent, flanged, expanded, swaged, upset, beaded, grooved, rolled, fluted, flattened, coiled and tapered. It can be joined by welding, brazing, threading, bolting, riveting or with sweated-type or threadless compression fittings. Sheets may be attached easily and economically by various methods.

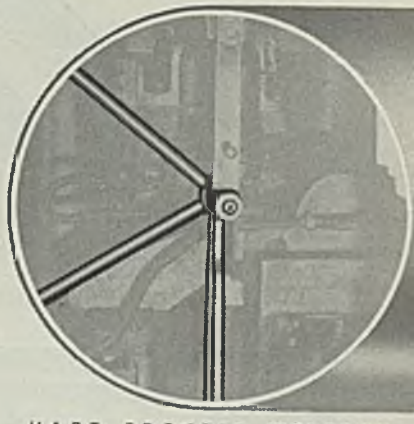
If you're a regular tubing user, give Republic ELECTRUNITE a trial and learn for yourself what its advantages can mean to your product and profits. If you've never used tubing, let our engineers show you how it can be applied to your product, and how best to fabricate it. Write—Steel and Tubes Division, Republic Steel Corporation, Cleveland, Ohio—*world's largest manufacturer of steel and ferrous alloy electric resistance welded tubing.*



PEDESTAL TYPE BENDING



PRESS TYPE BENDING



HART PROCESS WELDING

When you select...

HIGH SPEED SHAFTING

check the Workmanship!

DEPENDABILITY under maximum service conditions, that is the watchword in modern machine design!

The airplane, diving at 500 miles per hour . . . the motor truck, speeded up to double the ton-miles per day . . . mechanized equipment hurdling every obstacle . . . and the machine tools of industry, geared to peak production records . . . all these demand steel shafting that will not fail under the most violent stresses.

That is why the designer-engineer must be sure of the material he works with. B&L Cold Finished Shafting is produced to the highest standards that manufacturers demand. Developed from uniform quality bars of close-checked analysis, B&L Shafting is brought to superb accuracy and surface finish by carefully controlled production methods.

For revolving or reciprocating shafts, linkages or fixed bars, you can assure maximum service life and smooth running qualities by specifying

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- TURNED AND GROUND
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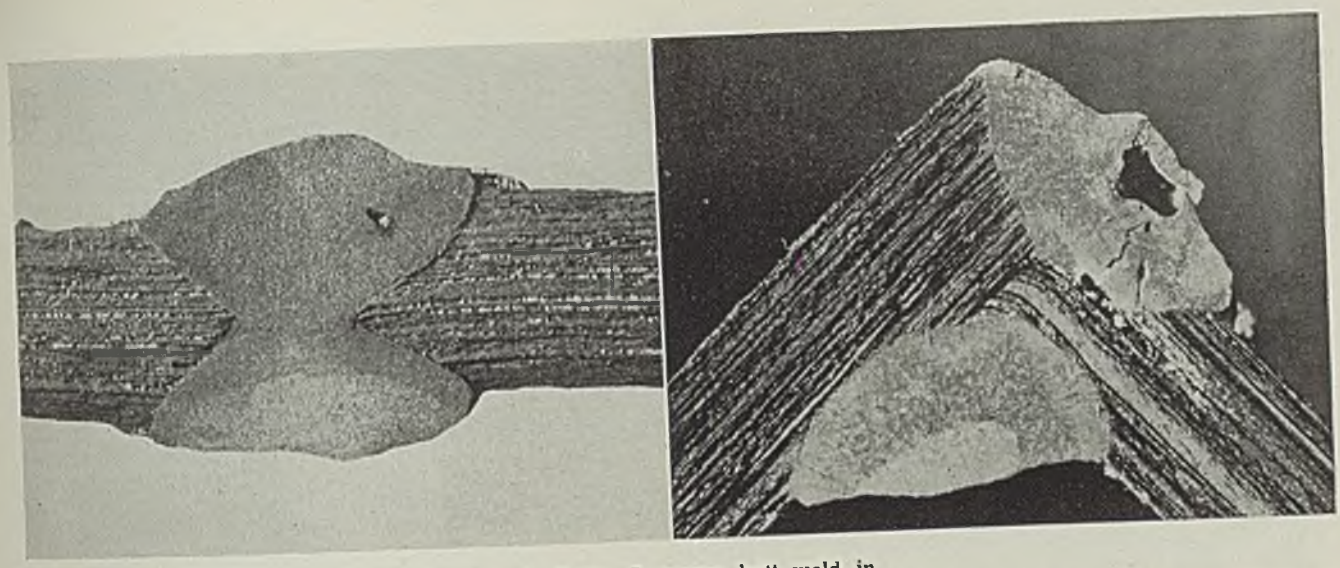


Fig. 2. (Left)—A proper butt weld in 5/16-inch wrought iron plate. Fig. 3. (Right)—This faulty weld resulted from improper welding technique

rules for the successful welding of wrought iron. Here high travel speed and the quick solidifying tendency of the general purpose electrode combined to produce an unsound weld. Also this edge weld is an unsatisfactory design. Good practice calls for use of adequate bearing surface for fillet welds to counteract the weakening influence of the nonmetallics in wrought iron welds.

Where butt and fillet welds are made in wrought iron of less than ⅜-inch thickness, the lower heat capacity of the material must be taken into consideration. Butt welds are best made with all-position electrodes while fillet welds may either be deposited with this type electrode or with mineral coated downhand rod. Most electrode manufacturers produce two electrodes in this class. One is for strictly positioned welds, the other for horizontal fillet welds. This latter electrode frequently has a lower melting point and other desirable attributes so is recommended for horizontal fillets in material ¼-inch thick or heavier.

Wrought iron of more than ⅜-inch thickness works well with electrodes used for mild steel of the same thickness except general purpose electrodes for stringer bead fillet welds. The all-position and downhand types will generally be found best.

Although this apparently condemns the general purpose electrode, there are applications in the lighter gages where this electrode will produce welds of acceptable quality at low cost. Wherever any difficulty is encountered in welding wrought iron with quick-solidifying poor-fitup electrodes, they should be changed.

Such a change may be desirable because of welding technique employed rather than to the apparent failure of the electrode. Many shops find welding applications to be a function of the type and skill of the welding operators as well as of the familiarity of welders with all three electrode classes.

As pictured in Figs. 1 and 2, quality welds in light plate are quite possible. The butt weld was made in 5/16-inch plate without any edge preparation. A gap of ⅛-inch and three passes with an all-position electrode turned the trick. The slight porosity in the weld proved the fault of the operator, rather than of the base metal as a mild steel weld made under the same conditions would have disclosed the same porosity.

Procedure Readily Picked Up

The fillet welds were made with a downhand electrode of the horizontal fillet weld class. A good rate of speed was possible with a pool long enough to guarantee ready elimination of all slag. The insulating properties of the heavy slag formed allows ample time for the complete cleansing and deoxidizing of the deposit.

As previously mentioned, the oxy-acetylene process demands a little experience to obtain good fusion. The first apparent flowing of the metal actually is the melting of the slag constituent. At a higher temperature the steel melts and welding may proceed. As soon as the operator learns to distinguish between that preliminary false alarm and actual fusion, welding may progress in exactly the same manner as in welding mild steel by the flame process.

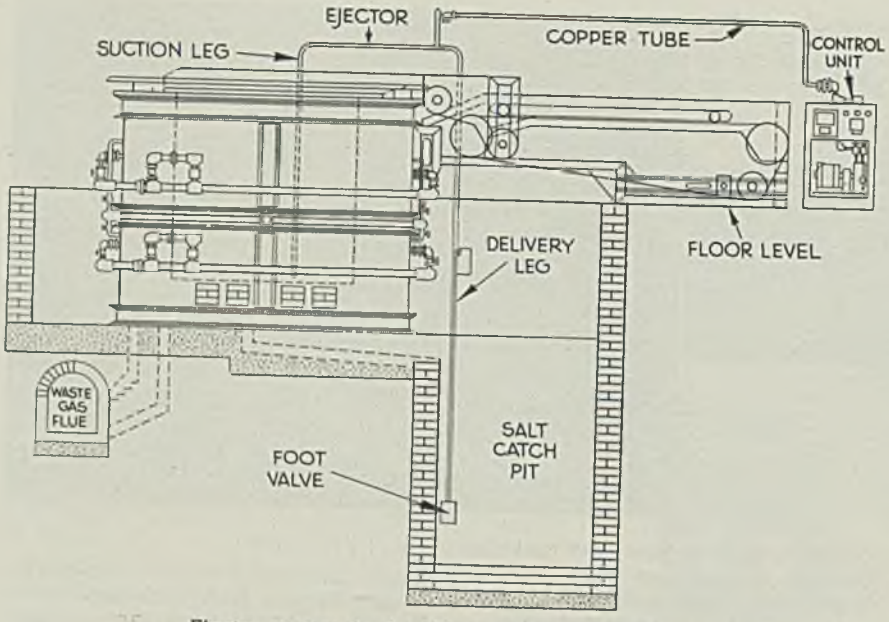
Mix no more of the base metal and filler metal than necessary to obtain good fusion. Too much rubbing or mixing may form unwanted oxides. Ample fusion without melting excessive base metal is the goal. At first the operator is sure to melt more base metal than is required to assure fusion; later with experience he will avoid this excessive melting.

Not much manual carbon arc welding of wrought iron is being done. Almost all such welding is done automatically employing fluxing ingredients. Reported speeds for ⅜-inch plate in both wrought iron and mild steel are identical—40 feet per hour of completed weld.

Flame cutting wrought iron is different than cutting steel because the presence of the iron silicate stringers profoundly affects the cutting operation. Most everyone that works with flame cutting is familiar with the effect of a plate lamination on the cut. A bad lamination will cause the operator to lose his cut altogether. When a bad lamination is replaced by a multiplicity of minute slag inclusions, the effect is somewhat the same.

Slow speeds with considerable preheat will bring about the ready severing of wrought iron. The best combination is a 6-hole preheat tip rather than the usual 4-hole. In addition, a tip one size larger than commonly used to cut steel is recommended.

Because of the refractoriness of the inclusions, oxygen combustion efficiency is lowered somewhat. Reaction may be slowed, also. Lowering the oxygen pressures will furnish enough oxygen to burn and erode without excessive stream pressure and will give sufficient speed for economical cutting. The larger oxygen hole, since a larger size tip is used, will still provide much more oxygen even with the lower pressures. No one need fear the welding of wrought iron. The simple precautions that have been outlined are more for the sake of success from the very start. The material is weldable from the standpoint of chemistry, while the presence of many streaks of iron silicate is harmless when the procedure is correctly handled.



Ejector system for handling molten salt baths

Ejector Provides Effective Means For Removing Molten Salt Baths

■ SOLUTION TREATMENT is a vital and well-established process in the manufacture and manipulation of light alloys. The exigencies of modern specifications for both material and treatment require a high degree of skill in salt bath design and execution, and the ever-increasing demand on production capacity necessitates the highest possible efficiency, flexibility and economy on the part of the plant installed.

Salt baths of all sizes and capacities are widely used throughout the aircraft and allied industries for the heat treatment of light alloys in the form of rolled sheet and large presswork; airframes, extruded sections, strips and bars; fabricated frames, sheets and pressings; tubes and rods; components, stampings and rivets. Frequent clearance and changes of salt are unanimously approved by users of salt bath furnaces, as the most effective method for maintaining the ideal chemical balance; freedom from contamination and corrosion of work; and—of equal importance—obtaining the longest possible life from the pot or container. Present methods of discharge, that is, ladling out and cutting out of molten and frozen salt, involve considerable risk, expense, and loss of valuable production time. This lack of rapid and effective means of salt transfer has seriously impeded regular cleaning out, and, under stress, such operations are often deferred until bath failure is apparent.

A patented mechanical device for facilitating the discharge of molten salt has recently been introduced by the Incandescent Heat Co., Ltd., Cornell road, Smethwick, Birmingham, England. This automatic salt ejector reduces the discharge effort to electric push-button action, and the time factor from days to minutes. Tests recently carried out show that a salt bath of 15 tons capacity is completely emptied in about 20 minutes. Consequently, weekly or monthly inspection cycles may be adopted with the ease and simplicity of the average plant maintenance task.

Structure and Fixing

The ejector, which is, in effect, an inverted U-tube, has the suction leg fully immersed in the molten salt, with the delivery leg arranged to discharge the salt into the catch pit, or other convenient storage receptacles. The whole unit is portable, and may be readily assembled and dismantled. It may be suspended from above, or, if working space permits, be made a permanent fixture, and fastened to the bath casing. The control unit is located as near as possible to the ejector, and both units are coupled together by the copper connecting tube. The complete assembly is ready for operation immediately after plugging in the control unit to the electric mains. It is suitable for a.c. or d.c. supply at customary voltages. The outflow of salt is under complete control, and may be intermittent or continuous, the rate of discharge being adjustable to suit the facilities available. The ejector will operate satisfactorily on baths of all capacities and is manufactured in several standard sizes.

At present, the salt is cut out from the catch pit after freezing, and for this purpose it is recommended that the pit be divided up in such a manner as to enable the contents to be lifted out in blocks of a few hundred pounds each. A special injector, which will operate in conjunction with immersion heaters and allow the salt to be returned to the salt bath in molten form, is being developed.

From a paper presented in Sheet metal Industries, September, 1940.

Publishes Sagging Test For Iron, Steel Sheets

■ Due to the increasing use of lighter gage iron and steel, and to the manufacture of articles of more complicated design, the Products Standards section, Porcelain Enamel institute, 612 North Michigan avenue, Chicago, announces a tentative standard sagging test for iron and steel sheets during enameling.

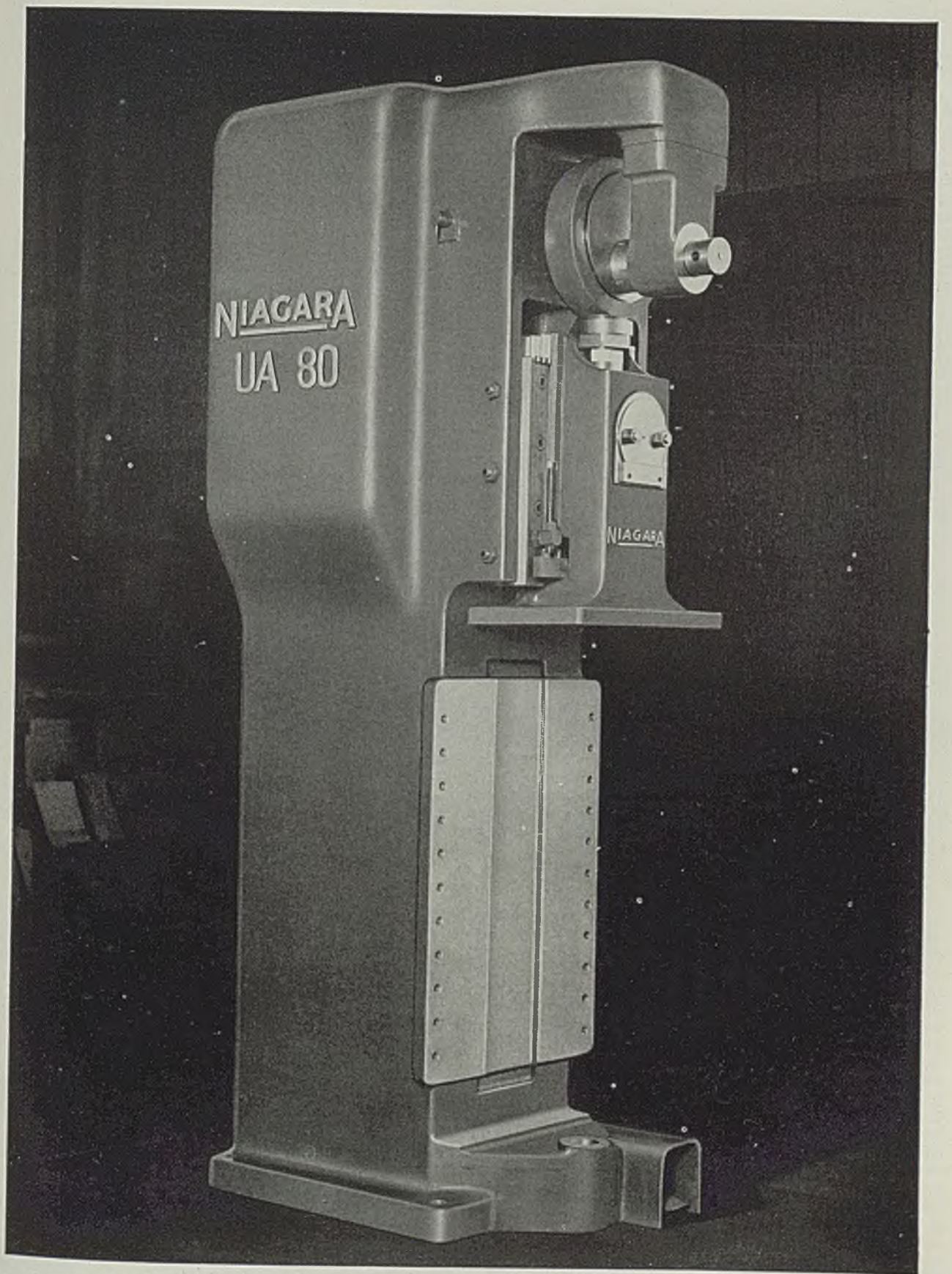
Embodied in a booklet called "Test for Sagging of Iron and Steel Sheets for Porcelain Enameling," the test was prepared by a special committee after studying the various test methods in use and conducting extensive experimental work in various co-operating laboratories.

Although this test is not as simple as the committee hoped it might be, the precautions noted are necessary if successful results are to be obtained. The committee is anxious to have men in the industry use and criticize this test severely in order that revisions may be made and incroporated in a permanent test. Copies of this booklet are available for 20 cents.

New Abrasive Features High Cutting Action

■ Vanite, a new fused aluminum oxide polishing abrasive produced in the electric furnace is announced by Hanson-Van Winkle-Munning Co., Matawan, N. J. A product of bauxite, it features a "blocky" type grain of great sharpness and high cutting action. The grain size is controlled by screening and separation into oversize, nominal and undersize.

Because of the products high capillarity or "degree of wetness" it is highly adherent to glue. When stored, the kegs of Vanite must be covered and kept in a dry place.



An interesting example of functional design resulting in operating economies as well as streamlined appearance is shown in this photograph of one of the Niagara Streamlined Presses.

Frame design provides strength and rigidity as well as a completely enclosed housing for shafts, gearing, flywheel, motor, 14-point sleeve clutch. All gears are supported between anti-friction bearings and operate in oil. Write for Bulletin 60-U. Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. Branches: Cleveland, Detroit, New York.

—*Advt.*

Activities of Steel Users, Makers

■ H. E. BEYSTER, associated with General Motors Corp., Detroit, as building designer, for nearly 20 years, and former Detroit commissioner of public works, has purchased the interests of C. A. Handeyside and John Earnshaw of the C. A. Handeyside Construction Co. Name of the company has been changed to H. E. Beyster Corp. and offices have been moved to larger

H. E. Beyster

quarters in the General Motors building. Construction by the firm will be discontinued and the organization will specialize as architects and engineers in designing and supervising construction, primarily in industrial fields. Mr. Beyster is president and general manager.

Richard H. Krueger will be chief engineer of the new company. He has been in charge of design in several of the largest architectural organizations in this country. Fred O. Schroeder, at one time head of the architectural division at the University of Michigan, will be chief draftsman. Ronald C. Linton will be in charge of structural engineering. He designed and supervised construction of large plants for Detroit Edison Co., Michigan Alkali Co. and Whitehead & Kales.

Raymond C. Perkins, John Kasurin and U. U. Woodhouse are prominent architectural designers with the organization; Leslie G. Larkin will be in charge of specifications; Carl S. Barry in charge of estimating; Julius C. Peter will be in charge of sales promotion and Jules G. Hoffman will be assistant general manager.

♦

Harry E. Coal Co., West Pittston, Pa., has awarded contract to Koppers-Rheolaveur Co., Pittsburgh, a Koppers Co. subsidiary, for three 12-foot and one 10-foot Koppers Menzies cone separators to be installed in a new anthracite coal cleaning plant now being built at Swoyersville, Pa. Delivery will be made early in 1941.

♦

Amsler-Morton Co., Pittsburgh, has moved its offices from 701 Fulton building to 1320 Fulton building.

♦

Crescent Tool & Die Co., Chicago, has completed a $20,000 addition, to be used for offices and storage.

♦

Sterling Electric Motors Inc., Los Angeles, has established an office at 11 West Forty-second street, New York. Allen A. Adams is eastern manager.

♦

Whiting Corp., Harvey, Ill., has appointed Shirley, Olcott & Nichols, 202 Mills building, Washington, as sales representatives to look after government work.

♦

Bastian-Blessing Co., Chicago, has taken over the distribution of the Forster torch line manufactured by Ransome Co., covering all states east of the Rocky Mountains.

♦

Babcock & Wilcox Tube Co., Beaver Falls, Pa., announces that sale and distribution of its seamless steel tubular products in Argentina, Brazil, Paraguay and Uruguay are handled by Babcock & Wilcox Ltd., London, Eng., through its offices in these countries.

♦

Innis, Speiden & Co., New York, manufacturer and distributor of heavy chemicals, has been appointed Ohio distributor of Drymet, Crystamet and Dryorth, powdered silicate products of Cowles Detergent Co., Cleveland. Don Cushman is Cleveland manager of Innis, Speiden & Co.

♦

Ampco Metal Inc., Milwaukee, has completed erection of a two-story office building, 45 x 100 feet. Previously the office was located in one end of a production building, but demands of the production department for increased space made the new structure necessary. Ground has been broken also for two additions to the foundry.

♦

American Gear Co., Chicago, maker of standard and special industrial gears, soon will occupy a new $110,000 plant at 6665 West Sixty-fifth street. This plant, of one-story construction and containing 30,000 square feet, is being built by Clearing Industrial District Inc. It is being leased from the latter for a 15-year period with option to purchase. One department of the new plant will be devoted exclusively to manufacture of special gears used in airplanes, tractors and diesel engines.

Barge Building Active in Pittsburgh District

■ A fleet of 30 barges is being built by Jones & Laughlin Steel Corp., Pittsburgh, for its own use. Dravo Corp. has scheduled for delivery Dec. 15 four covered cargo barges with rolling hatches for River Terminals Corp., New Orleans. These units are 10 x 35 x 165 feet. Dec. 1 delivery was made on the first five of ten standard coal barges for Weirton Steel Co., with the remaining five scheduled for Jan. 1. Shipment has just been made on an order for ten car floats for Pennsylvania railroad service in New York harbor. These were fabricated in Pittsburgh and assembled at the company's Wilmington, Del., ways.

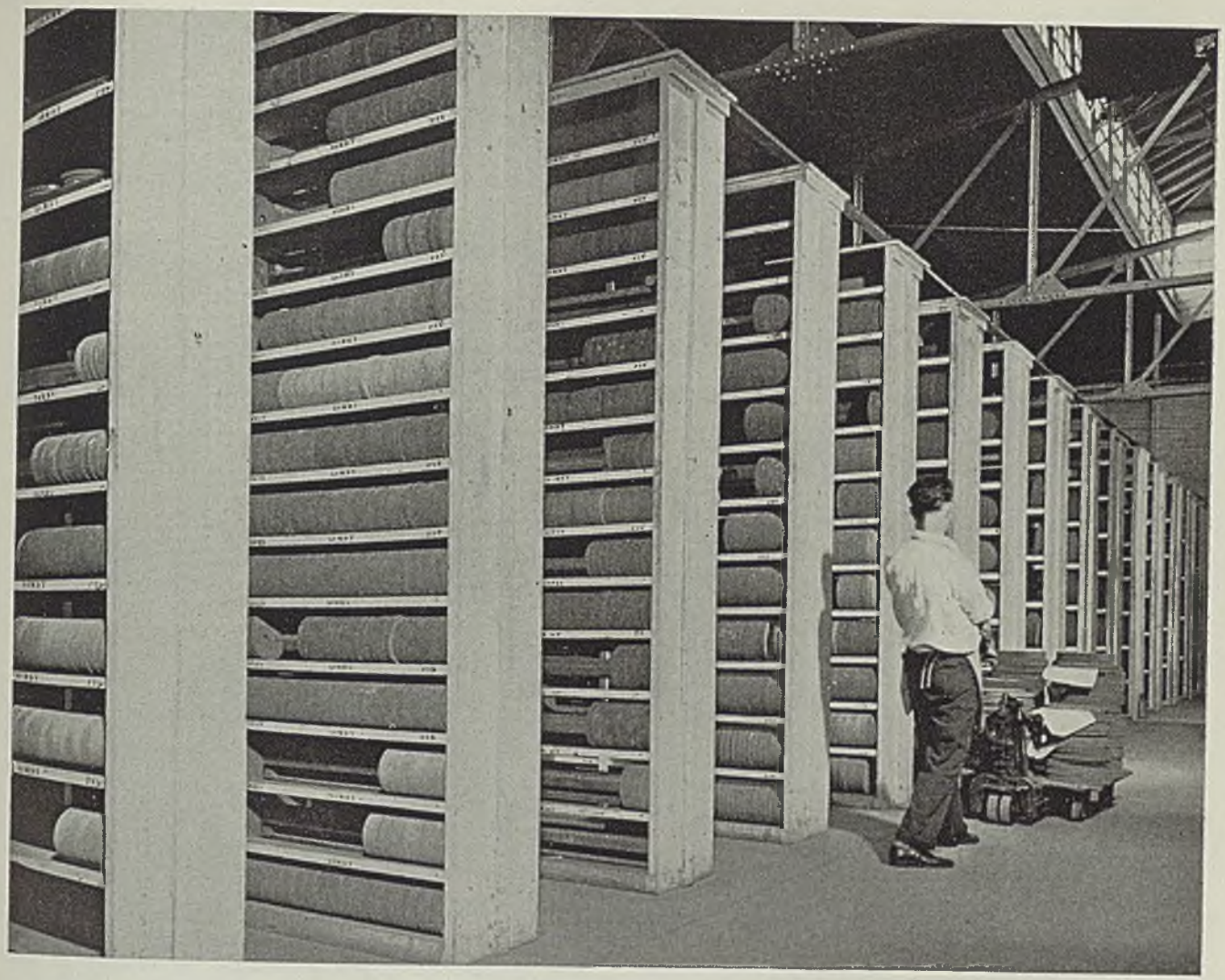
October River Shipments Establish Record

■ River shipments in the Pittsburgh district during October set new tonnage records on the Ohio and Monongahela rivers. On the Ohio, 1,603,000 net tons moved, surpassing the record of 1,559,700 net tons set in May. On the Monongahela total shipments amounted to 2,935,400 net tons, with the previous high 2,688,811 set in March, 1937. Most of the gain over preceding months was in coal and coke. Steel shipments dropped slightly, although scrap gained. Coke movement showed the highest relative gain, between 40 and 50 per cent higher than September.

Steel Laboratory Works Without Accident

■ Completing 11 consecutive years without a lost-time accident, the chemical laboratory of Carnegie-Illinois Steel Corp.'s Gary, Ind., steelworks, has established a new safety record. The period covers more than 2,000,000 man-hours.

Among the tasks performed were sampling of all blast furnace tappings, continuous work in control laboratories on the open-hearth floors, over 7,000,000 quantitative analyses entailing the use of concentrated mineral acids, sampling thousands of carloads of raw materials and every cargo of iron ore and limestone received in lake vessels.



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Increased production in the metal-working industries is demanding quicker deliveries on grinding wheels. In most instances, you can eliminate bottle-neck delays in your grinding department *by specifying factory stock items.*

Abrasive Company carries many thousands of all sizes, shapes and grain and grade combinations of grinding wheels and other bonded abrasive products in Philadelphia factory stock at all times for immediate shipment. If you know what this stock is you can select stock items for your needs. Write today for our new FACTORY STOCK LIST, issued November, 1940, showing both Philadelphia Factory and Chicago Branch Stocks.

In addition, local stocks are carried by leading mill supply distributors in all industrial centers. There is one near you.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

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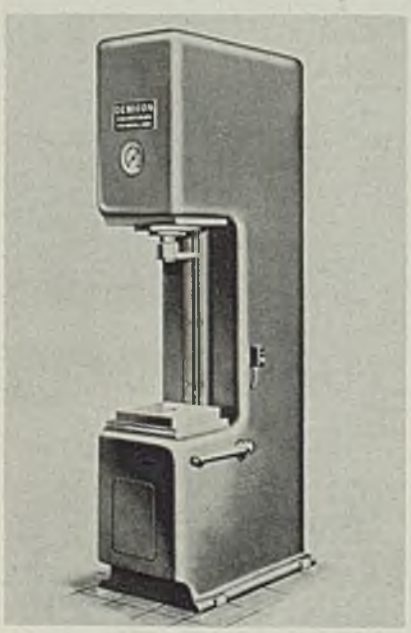
Hydraulic Press

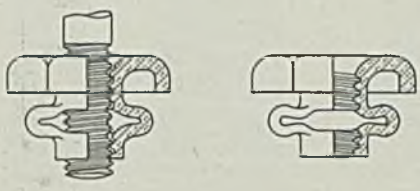
■ Denison Engineering Co., Columbus, O., has introduced a type DLAC2 hydraulic press for assembling, straightening and general production pressing. It can be furnished in 5, 15, 25 or 50-ton capacities equipped with either manual or electric control. Its frame is of steel construction. Cylinder assembly consists of finished steel



cylinder with nickel alloy iron cylinder head and mounting flange. Upper head is welded into place. Lower head is provided with a bronze guide and self-sealing gland packing. The ram is fitted with a guide head that operates in a ram guide in the throat of the press. The control valve, either of the subplate or panel mounting type, may be removed for maintenance or replacement. It is operated mechanically on the manual press and by solenoids on the electric press. Direct control of either the manually or electrically operated press is derived through a shipper rod which is supported in four bearings and which is protected by being mounted behind the ram guide in the throat of the press. "Up" and "down" stroke is adjusted by the adjustable "stroke-stops" on the shipper rod. A tonnage adjustment in the rear of the press permits adjustment of tonnage from the maximum rating to approximately 10 per cent of the maximum.

Self-Locking Nut

■ Scovill Mfg. Co., Waterbury, Conn., has introduced a new vibration-resisting Boots self-locking nut of the wing style which, when applied, the spring member of the nut expands to locking position,



providing a constant tension. In addition it presents all the advantages of the solid type, but is 10 to 50 per cent lighter. It is of one-piece construction and is fabricated from steel and cadmium-plated. The illustration at the left shows a hexagon wing-style nut when not in use. At right, the nut is in use on a screw or bolt, and the spring member is expanded to its locking position, the threads in the nut member pushing up and the threads in the locking member down. Sizes at present run from No. 6 through ¼ inches.

Transmission Units

■ Fafnir Bearing Co., New Britain, Conn., announces a new series of ball bearing pillow blocks and other transmission units incorporating Mechani-Seal bearings. These units feature two advantages. They offer ease of applcation made possible by the wide inner ring design, with self-locking collar, and the Mechani-Seal bearing imposes no friction or drag. Two steel plate shields form the innermost mem-

bers. They are tightly fitted to the bearing outer ring. An outer corrosion-proofed steel-plate shield, pressed on the inner ring, clears these inner plates by definite but close tolerances and acts as an efficient slinger. The new transmission units, interchangeable with the separately sealed units which preceded them, are available in types LAK (pillow block), LCJ (flange cartridge) and LC (cylindrical cartridge).

High-Speed Lathe

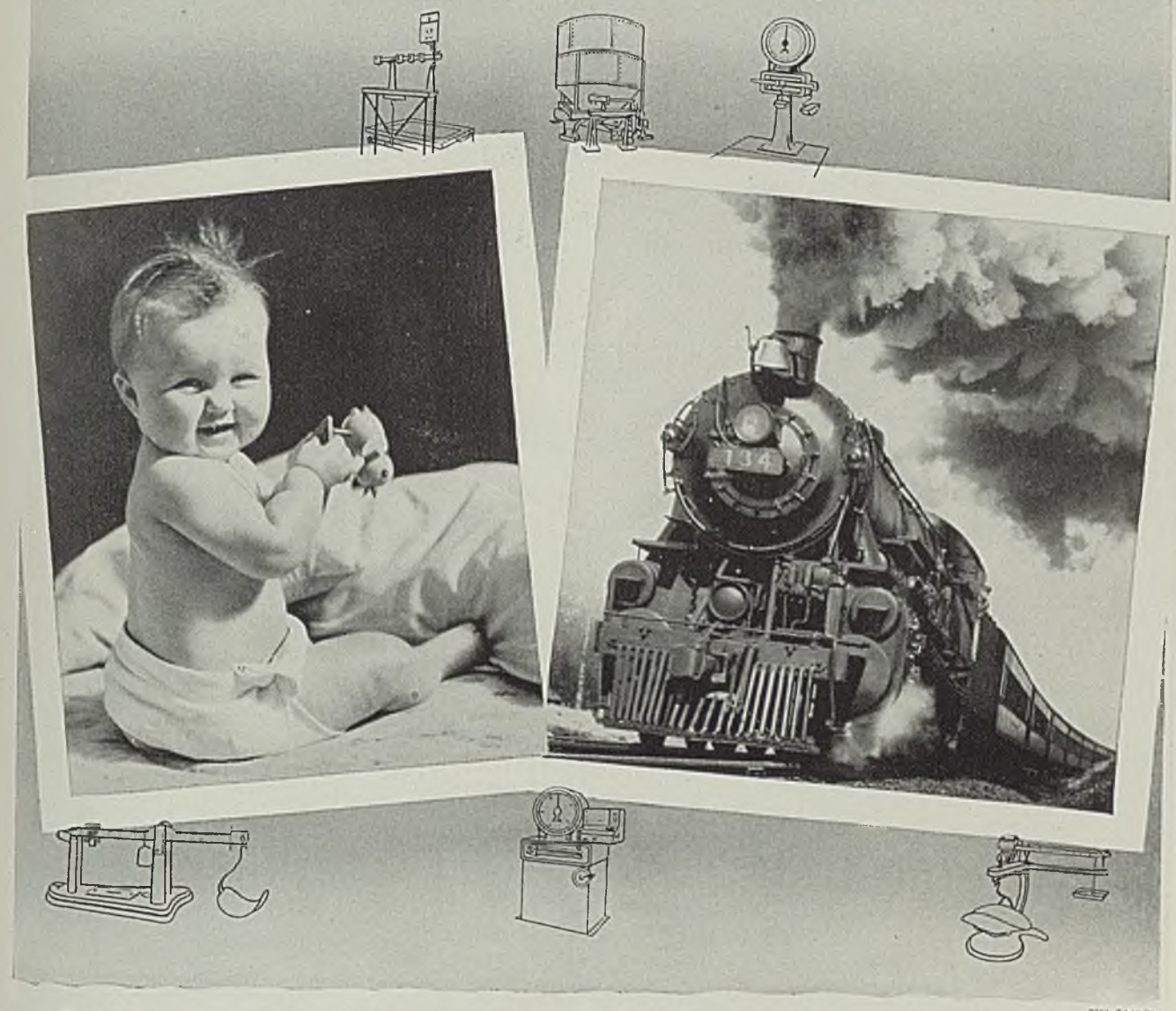
■ W. C. Lipe Inc., Syracuse, N. Y., has improved its high production Carbo-Lathe enabling it to be more rigid and to withstand heavy, precise cuts in tough materials at high speed without chatter or tool breakage. Its box-like base encloses the motor and drive mechanism, and all controls are out of sight. The motor cabinet is larger to accommodate amply a motor rating as high as 10 horsepower alternating current and also to provide additional space for air circulation. A larger coolant tank and a large size

chip pan is housed in the base. Recessed toe room is sufficient to prevent interference even when the operator stands on a platform. The size of the lathe permits 12-inch swing and 18 inches between centers. Power is transmitted through worm drive, and reduction of friction is obtained by mounting the spindle on two Timken bearings and by using ball bearings on the clutch pulley, clutch shaft, worm shaft, feed worm-gear shaft, clutch-feed shaft, hand-feed shaft, rack pinions and feed shaft in the bed. Headstock and bed are cast in one piece. The tailstock is of 2-piece construction. Tailstock quill is 3 inches in diameter. Its center can be operated by a handwheel or lever.

Quenching Machine

■ Hannifin Mfg. Co., 621 South Kolmar avenue, Chicago, announces a new centrifugal quenching machine for quenching circular parts such as gears, sprockets, disks, flat cams, rings, bearing races and similar work. It applies a large volume of quenching fluid at uni-

From BABIES *to* LOCOMOTIVES!



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From the prescription counter of the corner drugstore to the steel mill handling hot slabs of metal . . . from the nursery to the roundhouse —there is hardly a type or size of weighing job for which Fairbanks Scales aren't built. Each scale can be depended upon for the *sustained* accuracy that has made Fairbanks the greatest name in weighing throughout the world.

The facilities of the organization that has made this name great are available to you on call. Fairbanks, Morse & Co., Dept. 96, 600 South Michigan Avenue, Chicago, Illinois. Branches and service stations throughout the United States and Canada.

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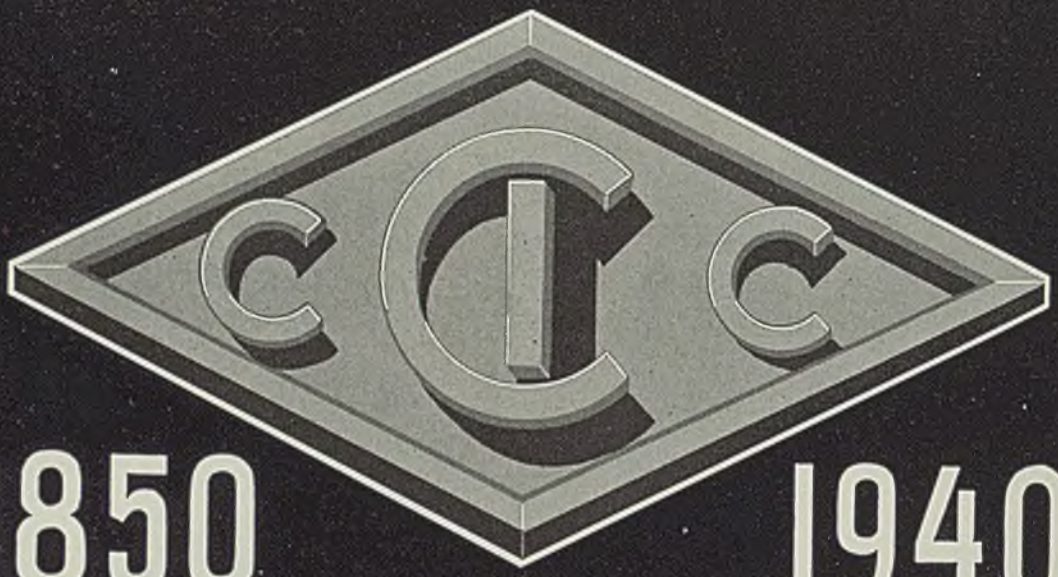
Scales



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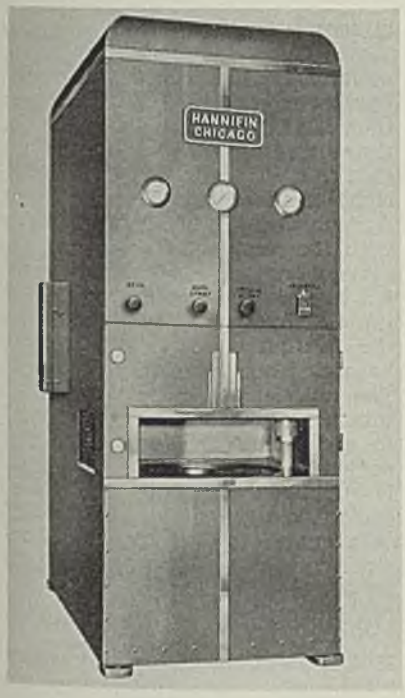
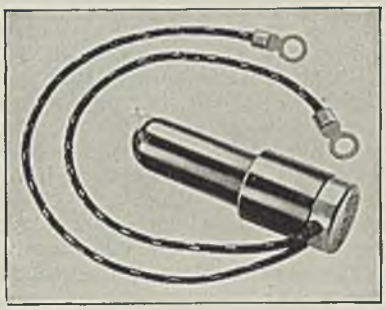
form controlled temperature and reduces distortion by applying coolant to the entire circumference simultaneously with progressive quenching toward the center of the piece. The holding fixtures of the machine are operated automatically, and in closing provide a mechanical straightening affect or alignment of the hot part. It is surrounded by a circular quenching chamber which opens in two parts with the fixture, and when closed provides a circular vessel for the quenching fluid. When closed the entire assembly of quenching chamber, holding fixture and hot part, is rotated by a motor drive. The quenching fluid in controlled volume is introduced at the outer



edge of the revolving container. The rotation, and the control of volume, produce a revolving "dougnut" of quenching oil around the circumference of the chamber. As volume is increased the hole in the doughnut is reduced, and the quenching action takes place from circumference of the part in toward the center. The operating cycle is automatically controlled, with uniform timing, and may be adjusted to furnish the desired timing for handling parts of various types. The complete cycle of automatic operation is fast, ranging from 40 to 60 seconds.

Mercury Switches

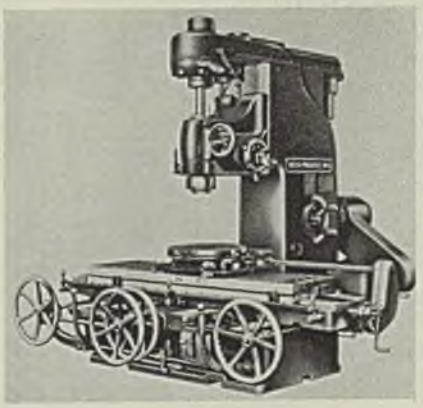
■ Durakool Inc., Elkhart, Ind., announces A-5M and A-10Z unbreakable mercury switches for larger electrical capacities featuring smaller overall mechanical dimensions. Both have new internal construction characteristics. The A-5M has successfully withstood 750,000 operations on a 500-watt alternating current lamp load at an operating



speed of 5 times per minute 24 hours a day. It also has taken 50,000 operations on a 1000-watt direct current lamp load at a rate of 25 times per minute. The performance of the A-10Z is equally impressive. The A-5M has a very small required angular tilt for operation and maintains this angle to even under heavy overload. It is especially adapted to snap acting mechanisms, as well as tilt action. It can be used in many applications which formerly required a 10 ampere switch. Similarly, the A-10Z can be used in applications where formerly a 20 ampere switch was required. Its dimensions are the same as the A-10 switch made by this company.

Vertical Milling and Die Sinking Machine

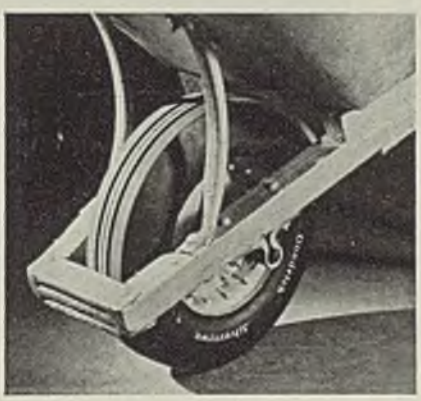
■ Reed-Prentice Corp., Worcester, Mass., announces a No. 6 vertical milling and die sinking machine for handling large dies and for general milling work. It features a positive gear drive to the spindle, the top box being totally enclosed and dustproof. Main drive pulley is provided with clutch and brake for start and stop,



controlled by two levers at the front of the machine table. An entire antifriction drive is secured for main driving pulley to spindle with bevel gear shafts and spindle mounted on Timken taper roller bearings. Of heavy box section, the base forms a rigid support for the column and saddle, the later extending the full length of the table, forming a rigid support for it. The table has five T-slots serving as oil channels and oil pockets at either end. The T-slots extend through the outer edge of the oil pockets, increasing the working surface of the table. Maximum operating efficiency is secured through power rapid traverse to table in either direction at 95 inches per minute. Control handle is located convenient to operator's normal working position, and when released disengages and engages feed automatically. The spindle is provided with a 12-inch graduated scale and micrometer stop for accurately feeding to depth. The machine has 12 spindle speeds, eight feeds being provided for each spindle change.

Wheelbarrow Tire

■ B. F. Goodrich Co., Akron, O., announces a Cushion tire for wheelbarrows and other industrial vehicles. Like a pneumatic tire it combines lightness and high cushioning qualities, yet it has the sturdy construction and load-carrying capacity of a 4-ply pneumatic tire. Because of the cushion rubber the



tire requires no servicing such as inflation or repairs. For wheelbarrows the tire is available in the 16 x 4.00 and 16 x 2.00 sizes with carrying capacities of 645 and 240 pounds respectively. The larger unit is designed to fit the lug base wheels of the same size single-tube pneumatic tire, while a special wheel has been designed for the 16 x 2.00 size.

Stamping Machine

■ H. O. Bates, Elizabeth, N. J., has introduced a new AcromarkeR numbering and lettering machine to number and letter innumerable parts, pieces and name plates. Attractively designed, it is constructed to permit all parts to work in unison, insuring ease of operation and marking accuracy.

The die wheel carries a full alpha-

bet and a full set of figures also a dash, diagonal line, comma and period. The holding fixture receives a name plate up to 8 x 4¾ inches and permits stamping within an area of 5 inches left to right by 3¼ inches top to bottom by 0.000 to ⅝-inch thick.

The die wheel rotates on a double row of roller bearings. With each stroke of the hand-operating lever the table can be advanced for each full space or any portion of a full space at a single stroke. This is of particular advantage where varied spacing or the spacing of a narrow letter such as "I" is necessary. The screw pressure principle permits stamping of steel, stainless steel and alloy steels. Several sizes of these machines are available. Special sizes can be made to order.

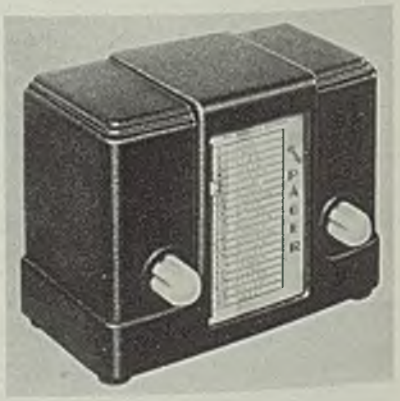
Flame Detector

■ Brown Instrument Co., division of Minneapolis-Honeywell Regulator Co., Philadelphia, announces a Protectoglo, photo-electrode system which provides protection against failure of oil, powdered coal, and luminous gas flames. It detects the presence of a flame by means of the light emitted when a burner is in normal operation. The heart of the system is a light-sensitive device. Its response to flames of different luminosity may be changed on the job by means of a sensitivity

adjustment. To prevent transient flame disturbances from causing unnecessary shut downs, the system has been designed to provide a time lag in the relay operation. The time lag is provided by the discharge of a small capacitor at the right of the sensitivity adjustment. A door switch connected in series with the relay coil, de-energizes the relay whenever the door is opened. All high impedance components of the circuit are supported on isolantite insulation. This includes both base and socket of the photo cell. The unit is supplied with a swivel mounting which can be screwed to a length of 1¼-inch pipe supported from the floor. The system is supplied for 115 volts, 25 to 60 cycles inclusive. It also is furnished as a cut-off model, for manual restarting.

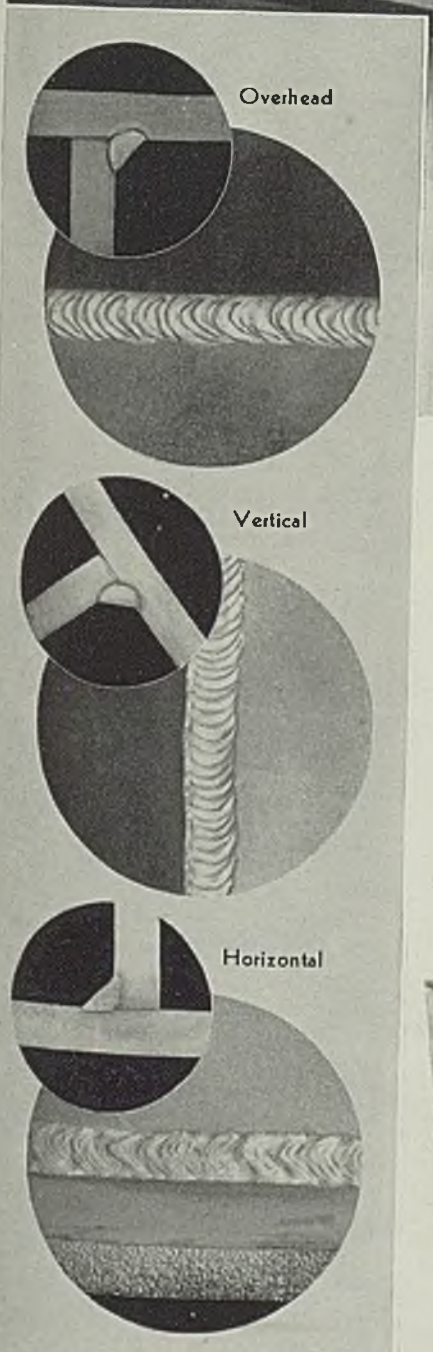
Code Sending Machine

■ Autocall Co., 125 Thomas avenue, Shelby, O., announces a new and inexpensive code-sending station which transmits codes to locate from one to twenty individuals. It is only necessary to assign numbers to persons wanted most frequently. The Pager is then dialed, transmitting an audible code, simultaneously to all departments on the premises. The code is sounded by selected



G-E ELECTRODES CUT REJECTS-- TO HELP YOU KEEP PRODUCTION SCHEDULES!

A fully-approved *shielded-arc* electrode, Type W-22, makes welding in the vertical and overhead positions an easy matter, and assures peak production and increased profits on work that is not easy to "position."



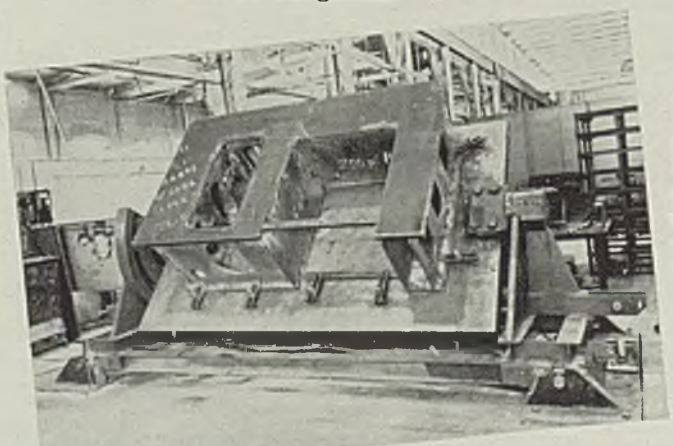
The kind of welds your operators can get with G-E electrodes. These were made with Type W-22. Note the pleasing appearance and flat contour, which avoids stress concentration and wasted electrodes.

WHETHER your work calls for welding mild steel or high-tensile steel, G-E electrodes give you profitable production on vertical, overhead, flat, or horizontal welding. Repair work on cast iron, manganese steel, worn surfaces, and the like present no difficulty. You can rely on G-E electrodes for speed, quality, and money-saving results.

G-E electrodes are fully approved by every major board of authority for their respective applications.

Special, localized service in your territory by your G-E arc welding distributor affords you immediate engineering help on any welding problem you may have. Why not get in touch with him today, or write direct to General Electric, Schenectady, N. Y.

Demonstrations on your work will be gladly arranged at your convenience, and with no obligation.



Typical example of how G-E electrodes save time and money. When the position of the joint permits using Type W-24, welding speeds are two to four times as fast as can be obtained on vertical or overhead joints.

GENERAL ELECTRIC

672-18

signals which may consist of musical chimes, mellow-toned bells or sharp and insistent gongs. The Pager is available in capacities from 10 to 90 codes.

Circuit Breaker

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has introduced a new type CA compressed-air circuit breaker for indoor service on 15,000-volt circuits. Designed for interrupting capacities as high as 2,500,000 kilovolt amperes it interrupts arcs on the "cross blast" principle that is, the arc is drawn between contacts which open in a line perpendicular to insulating splitter plates. The compressed-air stream is blown at right angles to the arc and elongates it between these plates. A muffler at the end of the arc chute serves to eliminate residual flame and to reduce noise. It has a large cross section, so that the gas velocity is low, and cooling is facilitated. The circuit breakers are equipped with air storage tanks. The pressure in these tanks is 150 pounds per square inch, and drops about 20 pounds per square inch for each close-open operation. Safety features of the air supply system include cut-off valves that prevent automatically a discharge of air from the system to a faulty breaker, or from breaker tanks to

a leaky system and alarm valves which warn of leakage in either breakers or supply systems.

Drawing Press

■ Toledo Machine & Tool division E. W. Bliss Co., 1420 Hastings street, Toledo, O., has placed on the market a new No. 2-E-10-86 straight sided double action toggle drawing press. It is of 4-piece steel tie-rod construction with properly shrunk in tie-rods. All gearing, eccentrics, etc. are enclosed in the crown of the press. The covers are removable and protect bearings and working mechanisms. A cascade filtered oil system is employed in this machine. The lower motion of the press illustrated is independently driven and electrically synchronized. Other features include triple gearing, V-belt motor drive, hydraulic friction clutch with disk

brake, electric push button control, hydraulic operated brake for stopping the flywheel after the power has been turned off and a slide counterbed area 62 inches front to back.

<< HELPFUL LITERATURE >>

1. Metal Cleaning

Cowles Detergent Co.—4-page illustrated monthly publication, "Metal Cleaning Tips," is available regularly to those interested in metal cleaning problems of all types. Cleaning preparatory to plating, finishing, lacquering and other operations are covered. Helpful hints are given on industrial cleaning for all types of metallic products.

2. Screw Machines

Cone Automatic Machine Co.—4-page illustrated bulletin, "6 Ways to Step Up Production," describes 4, 5, 6, and 8-spindle "Conomatic" machines for production of precision parts. Specifications and features are covered briefly.

3. Forgings and Castings

Forging and Casting Corp. — 64-page spiral-bound illustrated catalog on "FCC" products and services gives details of forgings, composite die sections, Nitri-cast iron, tool steel cast to shape, metal resistance grids, special alloy steels, air hardening welding rod, rough machining and heat treating.

4. Sheet Lifter

Cullen-Friestedt Co.—6-page illustrated bulletin No. SL-18 is descriptive of various designs and capacities of sheet lifters for loading, unloading, storing, transporting, and general handling of sheet steel by manufacturers, warehouses, and mills.

5. Springs

Lee Spring Co.—4-page illustrated bulletin, "Lee-Spring Builder," includes "ScienTech" spring specification form for listing physical specifications, operating conditions, and spring metals to be used.

6. Compressor Units

Cooper-Bessemer Corp.—16-page illustrated bulletin No. 332 presents complete description and specifications on type G-MV angle compressor units of 2-cycle, gas engine driven design. These units are built in 4, 6, 8, and 10-cylinder sizes, rated at 400, 600, 800 and 1000 horsepower.

7. Heat Exchanger Tubes

American Brass Co. — 60-page illustrated engineering data book No. B-2 covers latest data on condenser and heat exchanger tubes and plates. Discussions include corrosion factors, tube and plate alloys, methods of manufacture, applications, installation data, specifications and properties. Temperature conversion table, steam tables, and Mollier diagram are included.

8. Industrial Lubrication

Gulf Refining Co.—8-page illustrated bulletin No. 60 is entitled, "Building Aircraft Engines with Modern Machinery." Important steps in manufacture of Pratt & Whitney engines are shown pictorially. Features of "Gulf" periodic consultation service on industrial lubrication are related.

9. Materials Handling

Elwell-Parker Electric Co.—12-page illustrated bulletin, "Seven Steps in Handling Industrial Loads," describes important points in materials handling system in industrial plants where waste may occur. Charts show routing for most economical transportation of raw and finished products through factories and warehouses.

10. Precision Lathe

Hardinge Brothers, Inc.—4-page illustrated bulletin No. TR contains description and gives features of new high speed precision lathe for producing parts to exacting limits. List of regular equipment and general specifications are included.

11. Atmospheric Pot Furnace

A. F. Holden Co.—4-page illustrated bulletin on "Holden" atmospheric pot furnace for heat treating baths gives features, applications and specifications of these gas fired units which require no blower or air supply.

12. Gear Materials

International Nickel Co.—16-page illustrated bulletin, "Modern Trends in Nickel Steel & Cast Iron Gear Materials," is a reprint of paper presented by Mr. C. M. Schwitter at the semi-annual meeting of the American Gear Manufacturers Association. Tables and charts amplify text.

13. Single Beam Cranes

Shepard Niles Crane & Hoist Corp.—24-page illustrated bulletin No. 130 describes and outlines features of "Shepard Niles" single beam cranes. Designs include over-running, inner-running, and under-running units. Complete specifications and installation views are included.

14. Insulating Materials

Eagle-Picher Lead Co.—40-page illustrated catalog, "Eagle Insulation," presents features, uses and specifications of various commercial insulating materials. These include wool, blankets, pipe, plastic, and other insulating compounds. Engineering and selection data are included for application guidance.

15. Mobile Crane

General Excavator Co.—12-page illustrated bulletin No. 4018 presents complete details and specifications on "No. 307 Supercrane," 15-ton capacity unit mounted on heavy duty pneumatic tired wheels. Unit may be operated as crane, clamshell, dragline, pullshovel, and pile driver. Chapter headings include lifting capacity, mobility, maneuverability, stability, and accessories.

16. Blast Cleaning

Hydro-Blast Corp.—16-page illustrated booklet, "Let's Take a Look at Hydro-Blast," describes features of this combination sand and water blast cleaning equipment which is claimed to create no dust while removing cores or when cleaning castings.

17. Steel Plate

W. J. Holliday & Co.—20-page illustrated bulletin No. 40 deals with "Speed Case" free machining, open hearth steel plate. Physical characteristics and properties, including machinability, ductility, heat treating, and carburizing, are but few of subjects covered. Welding procedures are given.

18. Unit Coolers

Fedders Manufacturing Co.—8-page illustrated catalog No. AC-300 gives specifications, dimensions and performance data of unit coolers for comfort cooling. In addition to complete engineering data on these units, thermostatic expansion valves and superheat thermometers are described.

19. Motor Spindle Drill

Buffalo Forge Co.—8-page illustrated bulletin No. 3285 is descriptive of "Buffalo" motor spindle drill, which is available in two and three horsepower models and incorporates drum type pole changing switch for starting, stopping and changing motor speeds.

20. Hobbing Machine

Barber-Colman Co.—4-page illustrated bulletin No. F1408 contains description, features, dimensions and specifications on No. 3 precision hobbing machine for tool room and general hobbing work. Guaranteed accuracy is not more than 0.0006 inch between nonadjacent teeth on 4-inch pitch circle.

21. Pyrometers and Controls

Leeds & Northrup Co.—8-page illustrated bulletin No. ENT-0600C is devoted to latest news of "L&N" measuring instruments, telemeters, automatic controls, and heat treating furnaces. Equipment design, application, features and available literature are covered.

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(Continued)

22. Turret Lathes

Jones & Lamson Machine Co.—28-page illustrated spiral-bound bulletin, "Turret Lathe Earning Power," presents and answers 12 fundamental questions which are claimed to form basis for comparison of turret lathe values relative to earning power of machine. Features of machines are illustrated and described.

23. Steel Shop Boxes

Lyon Metal Products, Inc.—Illustrated catalog on steel shop boxes gives resume of use of boxes. It covers types and sizes of stacking units, specialized shop containers, nesting boxes, shelf boxes, and accessory equipment. Line drawings illustrate construction features of each type of unit.

24. Bearings

Link-Belt Co.—12-page illustrated bulletin No. 1846 gives features of "Friction Fighter" series of ball and roller bearings. These units are available in various capacities in pillow block, flanged, take-up, hanger, duplex, cartridge, and dust sealed designs.

25. Circuit Breaker

I-T-E Circuit Breaker Co.—12-page illustrated catalog No. 1401 describes new 600-ampere, type KB circuit breaker in manually or electrically operated types. Operating features, full specifications, and enclosures for these units are covered.

26. Crushers and Grinders

American Pulverizer Co.—8-page illustrated bulletin, "Crushing," describes laboratory machinery for reduction of practically all types of crushable materials. Specifications are given for rolling ring and swing hammer crushers, grinders, and shredders.

27. Metal Working & Finishing

Magnus Chemical Co.—46-page illustrated bulletin, "Metal Working and Finishing Performance Data," includes series of performance reports from metal working plants outlining improvements and economies effected by use of proper cleaning materials.

28. Filing Stainless Steel

Nicholson File Co.—Data sheet No. 3 discusses use of files on stainless steel. Problem created by abrasive action of metal on file teeth is analyzed. Why special files should be selected is explained and correct method of using them is suggested.

29. Phosphor Bronze

Phosphor Bronze Smelting Co.—8-page illustrated bulletin, "Technical Data on Elephant Brand Phosphor Bronze," lists composition of four standard alloys. Physical properties and specifications are given on finished and unfinished rods, round and flat spring wire, welding wire, and wire rope of phosphor bronze.

30. Motor Controls

Cutler-Hammer, Inc. — 36-page illustrated bulletin No. CS-151 presents complete details and specifications on "Unitrol," a new unit type of standardized motor control construction which permits needed types of control devices to be organized readily into complete, enclosed, sectionalized motor control center.

31. Munitions Threading

Landis Machine Co. — 12-page illustrated bulletin, "Precision in Munitions Threading," describes shell tapping machines, die heads and collapsible taps, threading machines and special equipment for threading operations in munitions manufacture.

32. Coal

Koppers Coal Co.—2-page bulletin No. D-4063 is entitled "Koppers Coal for Industrial Fuel." Properties are given for Pocahontas, Beckley, Fire Creek, Sewell, Powellton, Wharton, No. 2 Gas, Eagle, Elkorn, Federal, Indian Creek and Sonman coals.

33. Speed Reducers

W. A. Jones Foundry & Machine Co.—40-page illustrated bulletin No. 68 presents description, torque chart, horsepower ratings, specifications and other data on worm gear speed reducers. Specifications of flexible couplings are included also.

34. Hob Checking Equipment

Michigan Tool Co.—4-page illustrated bulletin No. 464 is descriptive of "Sine-Line" hob checking equipment for checking lead, contour, and sharpening of hobs. Equipment enables user of hobs to detect errors in tools, and to correct them to produce gears of identical characteristics.

35. Tool Room Chart

McKenna Metals Co.—Illustrated tool room chart No. 6 is imprinted with 8-inch rule and protractor for measuring tool dimensions and angles. Design of chip breaker on style No. 11 Kennametal tool for turning bar stocks and forgings is shown. Also illustrated is design of facing tool for turret lathes.

36. Roller Chains & Sprockets

Whitney Chain & Manufacturing Co.—20-page illustrated stock list No. V-150 gives complete specifications on roller chains and sprockets which are available from stock. Condensed information is included for aiding selection of drives. List prices and dimensional data are given for entire line.

37. Gang Slitting Machines

Waterbury Farrel Foundry & Machine Co.—20-page illustrated catalog No. 898-S is descriptive of standard and special designs of gang slitting machines for slitting and trimming sheet metal. Winders, coilers, scrap cutters, and other cutter equipment are illustrated.

38. Stainless Clad Steel

Jessop Steel Co.—24-page illustrated catalog on "Jessop Silver-Ply" stainless clad steel lists advantages of this product and shows typical equipment produced from it. Instructions for fabrication, physical properties, and specifications are given.

39. Steel Products

Republic Steel Co.—20-page illustrated bulletin No. Adv. 199 is a complete list of products, arranged alphabetically, made by Republic Steel Corp. and subsidiaries. These include Berger Mfg. Div., Niles Steel Products Div., Union Drawn Steel Div., Steel & Tubes, Inc., and Truscon Steel Co.

40. Profiling Machine

National Broach & Machine Co.—4-page illustrated bulletin, "Red Wing Automatic Precision Profiling," shows type of work performed and major feature of this automatic profiling machine. Details and specifications of unit are included.

41. Laboratory Furnaces

Norton Co.—24-page illustrated bulletin, "Construction of Electric Furnaces for the Laboratory," covers standard types of laboratory furnaces and their uses. Bulletin is written as aid in design and construction of small furnaces for high temperatures. In addition to showing how to make furnaces, data is given for engineering calculations.

42. Presses, Punches & Shears

Niagara Machine & Tool Works—68-page illustrated booklet No. 106-A is descriptive of presses, punches, squaring shears, rotary shears and machines for shearing, blanking, drawing, and forming of plate and sheet metal.

43. Heating & Heat Treatment

Surface Combustion Corp.—28-page illustrated bulletin No. MS-40 carries the title, "Heat and Metals." Equipment described for heating and heat treatment of metals includes heating, forging, normalizing, annealing, carburizing, hardening, drawing, and patenting furnaces.

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You Too, Can Cut Costs

(*Continued from Page* 65)

Pittsfield works decided that a lightweight fork truck would answer the problem. After repeated protestations that such a truck would be impractical, equipment manufacturers were finally convinced that a truck weighing but 2000 pounds could be built and Fig. 5 shows the midget electric fork truck designed and built primarily for our use—the first electric fork truck weighing less than 2000 pounds to be built but now obtainable from several sources. They are comparatively inexpensive, operate in a 5-foot aisle and have a fork lift of 120 inches.

By forcing the design of these lightweight trucks, we were able to complete our cycle by bringing fork trucks to the manufacturing floor without exorbitant charges for rebuilding elevators and strengthening floors.

Porcelains are now tiered to ceiling level—6 to 12 cartons to a pallet. Before the lightweight fork truck was available, pallet loads of these porcelains had to be transferred by hand to skid platforms for delivery on the elevator, transferred by hand again from the platforms to conveyors which constituted a rolling stockroom, and then pushed along the conveyors by hand to the first manufacturing operation. With the new fork trucks, the unit load remains unbroken on the pallet from inbound freight car to stockpile, and then to the first operation.

With work on pallets, whole stacks can be shifted quickly when the assembly conveyor is changed to products requiring different sized porcelains. During manufacturing operations, the cutouts remain on conveyors. But when completed, they are loaded on pallets and delivered by fork truck to the warehouse for shipping.

(*Concluded Next Week*)

Adds New Tough Steel To List of Tool Steels

■ A medium carbon manganese-molybdenum steel of unusual toughness known as 773 Tool Steel has been added to its list according to Jessop Steel Co., Washington, Pa. Its toughness was demonstrated by tests on a chisel made from this steel, conducted in an outside plant.

The superintendent of this plant drove the chisel, corner first, into an anvil—using it for cutting unannealed steel—and finally supported it at both ends and repeatedly hammered the unsupported midsection. In no case was he able to break the chisel, nor did it show any signs of deformation.

New Metal Withstands Harder Services

■ Ampco Metal Inc., 3830 West Burnham street, Milwaukee announces a new metal which has good bearing characteristics. Known as Ampco Metal 20-13, it is a modification of this company's grade 20 after the application of a special heat treatment. It also possesses physical properties desirable for adverse conditions.

The metal can be used as a bearing material on hardened steel shafts and its non-seizing tendencies have made it satisfactory even where lubrication is doubtful. As a bushing, it stands up well and has performed where other metals failed. It is resistant to both corrosion and wear, making it suitable for pump parts for handling liquids where abrasive particles are present.

Grade 20-13 has a tensile strength of 96-102,000 pounds per square inch and a yield strength of 40-50,000 pounds per square inch. Its elongation in 2 inches is 8 to 12 per cent, and its brinell hardness is 192-207.

WHERE will it turn up next?

Lifting windows

Long, open helicals of bethanized spring wire are now being used instead of weighted sash cord to facilitate the raising and lowering of windows.

Lashing lead cables

Because of its heavier protective coating, bethanized wire is being used by a large telephone company to lash lead carrier cables to the messenger strand.

Taking the baby for a ride

Being both attractive in appearance and unusually corrosion-resistant, bethanized wire has been widely adopted for use as spokes in baby carriage wheels.

THE applications of bethanized wire are limited only by the imagination and eye to profit of its many users. Every day this electrolytically zinc-coated wire turns up in new applications, takes over new and tougher jobs, gives an amazing account of itself.

Bethanized wire can handle unusual jobs because it is zinc-coated by a special electrolytic process. The zinc coating is 99.9+ per cent pure, uniform both along and around the wire, and as ductile as gold leaf. Bethanized wire can be coiled, twisted, bent or drawn through dies without impairing the coating. Equally important, any desired weight of zinc within practical limits can be applied by the bethanizing process.

Why not investigate and test this special zinc-coated wire yourself? It is ideally suited for use in woven wire fabric, conveyor belting, pump chain, pail handles, automotive parts, twisted brush handles and scores of other products.

BETHANIZED WIRE

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Expanding Capacity, Same Prices, Reassure Industry

Tendency towards speculative purchasing is curbed. Routine coverage experiences flurry. Coke and zinc shortages more pronounced.

MARKET IN TABLOID ★

Demand
More moderate.

Prices
First quarter unchanged.

Production
Down ½-point at 96½.

■ ANNOUNCEMENT of reaffirmation of prices for first quarter is tending to lessen demand of a speculative nature, while increasing routine sales. The former wanes because consumers are assured on prices, while in the case of the latter the price naming is merely a signal to place orders for February and March, since January is already taken care of.

Increase in sales volume is less uniform as to products, makers and districts, than it has been, with more instances of tapering. December business promises to be the least for several months, not only because of the season but announcements of plans to expand capacities which should ease the tightness eventually.

It is expected that Bethlehem's contemplated expansion will be followed by other steel makers. There is question as to how smoothly capacity can be increased, as other raw material facilities must be increased proportionately, possibly to the extent of building more ore vessels and particularly of increasing coke capacity, which now is the worst bottleneck.

Steel ingot production in November was 6,282,824 net tons, second highest on record, but a 30-day month. Steel Institute estimates an average pace of 96.49 per cent. Calculated weekly production was 1,464,528 tons as against 1,458,668 tons in October.

Steel ingot production sagged a half point to 96½ per cent last week, solely because of need of furnace repairs. Pig iron production attained a record production in November, increasing 2.4 per cent in daily rate, averaging 96.4 per cent capacity.

Steel inventories in the hands of both producers and consumers on Dec. 31 will be the smallest in years, at least based on heavy consumption.

Included in the list of price reaffirmations by Carnegie-Illinois, though not mentioned in the formal announcement, have been galvanized sheets, enameling sheets and long ternes. Wire and its products are understood to remain the same, but with no formal announcement. Most descriptions of bolts and nuts have been reaffirmed.

Among products yet to be defined in price are pig iron, tin plate and light steel rails, in all cases reaffirmation being expected. Some readjustments in extras may come later. Merchant pipe makers have eliminated a special discount. In several cases price advances would have seemed justified by higher costs of materials.

Many believe that for second quarter some price rises might materialize as a result of advancing cost of raw materials. Some also question whether wages will continue at the existing level. Meanwhile, incidentally, some steelmakers complain of less labor efficiency.

Even scarcer than coke is slab zinc which has brought about the greatest shortage of an essential raw material in years. Handicapping the large galvanizers has been the loaning of zinc to their customers and friends. With the price 7¼ cents per pound, East St. Louis, consumers have bid 8 or even 9 cents and been unable to buy. Some smaller galvanizers are reported to have curtailed or shut down plants. Many had considered a price advance in galvanized steel products warranted.

Orders for freight cars in November comprised 8234 units against 12,195 in October and 2650 in November, last year. Orders for eleven months have been 59,731 which exceeds those for twelve months in preceding three years.

November pig iron production was 4,397,656 net tons, or 146,589 tons daily, against 4,437,725 tons or 143,152 tons daily, the aggregate less since November was a shorter month. A net gain of six stacks brought the operating number to 202 on Nov. 30.

Automobile production is due to decline 3093 units for the week ended Dec. 7 to 125,690 which compares with 115,488 a year ago.

Ingot operating rates advanced in two districts, fell in five and were unchanged in five last week. Cleveland improved 1½ points to 90½ and eastern Pennsylvania 1 point to 95 per cent. Declines were: Detroit 7 points to 90, Cincinnati 4½ points to 87, Youngstown 1 point to 92, New England 7 points to 75 and Buffalo 2½ points to 93. Unchanged were St. Louis at 87½, Birmingham at 100, Pittsburgh at 97, Wheeling at 98½ and Chicago at 99½ per cent.

A gain of 50 cents per ton on scrap at Pittsburgh caused an advance of 16 cents in STEEL's steelworks scrap composite to $21.29; it also brought up 5 cents the iron and steel composite to $38.18. Finished steel remained at $56.60.

COMPOSITE MARKET AVERAGES

	Dec. 7	Nov. 30	Nov. 23	One Month Ago Nov., 1940	Three Months Ago Sept., 1940	One Year Ago Dec., 1939	Five Years Ago Dec., 1935
Iron and Steel....	$38.18	$38.13	$38.07	$38.08	$37.93	$37.42	$33.31
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.50	53.70
Steelworks Scrap..	21.29	21.13	20.71	20.72	20.05	17.88	13.17

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Dec. 7, 1940	Nov. 1940	Sept. 1940	Dec. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.15	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.225
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	1.98

Pig Iron

	Dec. 7, 1940	Nov. 1940	Sept. 1940	Dec. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$24.34
Basic, Valley	22.50	22.50	22.50	22.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	24.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	24.21
No. 2 foundry, Chicago	23.00	23.00	23.00	23.00
Southern No. 2, Birmingham	19.38	19.38	19.38	19.38
Southern No. 2 del. Cincinnati	23.06	23.06	23.06	23.06
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	25.215
Malleable, Valley	23.00	23.00	23.00	23.00
Malleable, Chicago	23.00	23.00	23.00	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melt. steel, Pitts.	$22.75	$21.50	$20.15	$18.50
Heavy melt. steel, No. 2, E. Pa.	19.75	19.75	19.70	17.60
Heavy melting steel, Chicago	20.50	20.25	19.30	16.65
Rails for rolling, Chicago	25.00	24.55	21.40	19.85
Railroad steel specialties, Chicago	23.75	23.25	21.65	19.60

Coke

Connellsville, furnace, ovens	$5.50	$4.75	$4.75	$4.75
Connellsville, foundry, ovens	6.00	5.75	5.75	5.75
Chicago, by-product fdry., del.	11.75	11.75	11.25	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50

Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold strip	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(*Base, 20 tons or over*)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(*Base, 5 tons or over*)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.50c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55

(Per Pound)

Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg $3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c

Detroit, delivered 2.80c

Alloy	S.A.E.	Diff.	S.A.E.	Alloy Diff.
	2000	0.35	3100	0.70
	2100	0.75	3200	1.35
	2300	1.70	3300	3.80
	2500	2.55	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.20
5100 0.80-1.10 Cr.	0.45
5100 Cr spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c

Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve.,	Pitts.
0.26—0.50		2.80c
0.51—0.75		4.30c
0.76—1.00		6.15c
Over 1.00		8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham.	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%. full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68 off
Do., ⅞ and ⅝ x 6-in. and shorter	66 off
Do., ¾ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5-10 off; with nuts attached 72.5 off; bulk 82 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	66	70
⅝-1-inch	63	65
1⅛-1½-inch	61	62
1⅝ and larger	60	

Hexagon Cap Screws

Upset 1-in., smaller 70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	.65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off	

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, etc., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, 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
3¼" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
3" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Pet Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅝-inch incl. (per 100 lbs.)	$2.00
Do., over ⅝ to ⅞-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.75- 5.00
Connellsville, fdry.	5.25- 6.00
Connell. prem. fdry.	6.00- 6.50
New River fdry.	6.50- 7.00
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.85-12.30
Chicago, outside del.	11.00
Chicago, delivered	11.75
Terre Haute, del.	11.25
Milwaukee, ovens	11.75
New England, del.	12.50
St Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del.	11.55
Buffalo, del.	11.75
Detroit, del.	11.50
Philadelphia, del.	11.63

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.)	13.75c
Do. (1000 lbs. or over)	12.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$29.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	22.00	.....	.....	.....
*Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher. *One producer quotes $2 higher on bessemer, $1.50 higher on other grades.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	‡Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	26.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., Ill., net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 36.00
Do., 26-28% 49.50

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 3 per cent carbon 113.00
2½% carbon 118.00
2% carbon, 123.00; 1%, 133.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. i., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c
less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. tl., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, tl., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% tl., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., 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	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.55	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.25	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.40	3.22	3.75	8.40	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.45	....	3.65	8.40	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.64	3.20	3.80	8.70	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	....	5.00	....	4.42	....	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.75	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.50	5.95	5.95	3.85	3.85	5.50	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.65	3.75	5.75	3.70	6.50	5.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.55	9.80
San Francisco	3.50	4.00	6.00	3.50	3.50	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	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	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Oreg.; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Official Rates of Exchange

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, gross tons: Quoted in dollars at current value	Continental Channel or North Sea ports, gross tons: **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	.....	$33.23	3 15 0
Basic bessemer	.....	.....	.....
Hematite, Phos. .03-.05	.....	.....	.....
Billets	.....	$31.95	3 15 0
Wire rods, No. 5 gage	.....	60.71	7 2 6
Standard rails	.....	$48.99	5 15 0
Merchant bars	2.97c 16 10 0	2.77c	7 6 0
Structural shapes	2.79c 15 10 0	2.83c	7 9 0
Plates, +¼ in. or 5 mm	3.04c 16 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 m m	4.01c 22 5 0	2.98c	7 17 0
Sheets, gal., 24 ga., corr.	4.61c 25 12 6	3.94c	10 7 6
Bands and strips	.....	2.70c	7 5 0
Plain wire, base	.....	3.15c	8 6 3
Galvanized wire, base	.....	3.75c	9 17 6
Wire nails, base	.....	3.56c	9 7 6
Tin plate, box 108 lbs.	$6.33 1 11 4	....	.....

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French ‡‡Francs		Belgian ‡‡Francs		Reich ‡‡Mark
Fdy. pig iron, Si. 2.5.	$24.24	6 0 0(a)	$17.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	22.83	5 13 0(a)	.....	...	29.79	900	27.94	(b) 69.50
Furnace coke	6.77	1 13 5	4.91	225	10.92	320	7.64	19
Billets	42.42	10 10 0	26.62	1,221	42.20	1,275	38.79	96
Standard rails	2.30c	12 15 6	1.69c	1,692	2.06c	1,375	2.38c	132
Merchant bars	2.78c	15 8 6††	1.53c	1,530	2.06c	1,375	1.98c	110
Structural shapes	2.46c	13 13 0††	1.49c	1,487	2.06c	1,375	1.93c	107
Plates, +¼-in. or 5 mm	2.55c	14 3 0††	1.95c	1,951	2.42c	1,610	2.29c	127
Sheets, black	3.49c	19 17 6§	2.30c	2,295‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4.07c	22 12 6	3.59c	3,589	4.80c	3,200	6.66c	370
Plain wire	3.83c	21 5 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.91c	16 3 6††	1.71c	1,713	2.48c	1,650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed ††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. ‡‡No quotations.

IRON AND STEEL SCRAP PRICES

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

HEAVY MELTING STEEL

Birmingham, No. 1.	19.00
Bos. dock No. 1 exp.	17.00
New Eng. del. No. 1	17.00-17.50
Buffalo, No. 1	21.50-22.00
Buffalo, No. 2	19.50-20.00
Chicago, No. 1	20.25-20.75
Chicago, auto, no alloy	19.25-19.75
Cincinnati, dealers.	18.00-18.50
Cleveland, No. 1	21.00-21.50
Cleveland, No. 2	20.00-20.50
Detroit, No. 1	†16.50-17.00
Detroit, No. 2	†15.50-16.00
Eastern Pa., No. 1	20.50-21.00
Eastern Pa., No. 2	19.50-20.00
Federal, Ill., No. 2	16.75-17.25
Granite City, R. R. No. 1	17.50-18.00
Granite City, No. 2	16.75-17.25
Los Ang., No. 1 net	12.50-13.00
Los Ang., No. 2 net	11.50-13.00
N. Y. dock No. 1 exp.	†17.00
Pitts., No. 1 (R. R.)	23.00-23.50
Pittsburgh, No. 1	22.50-23.00
Pittsburgh, No. 2	20.00-20.50
St. Louis, No. 1	17.75-18.00
St. Louis, No. 2	17.00-17.50
San Fran., No. 1 net	13.00-13.50
San Fran., No. 2 net	12.00-12.50
Seattle, No. 1	15.00
Toronto, dirs., No. 1	11.00-11.25
Valleys, No. 1	21.00-21.50

COMPRESSED SHEETS

Buffalo	19.50-20.00
Chicago, factory	19.75-20.25
Chicago, dealers	18.25-18.75
Cincinnati, dealers.	17.00-17.50
Cleveland	20.50-21.00
Detroit	†18.25-18.75
E. Pa., new mat.	21.00
E. Pa., old mat.	17.50-18.00
Los Angeles, net	9.25- 9.75
Pittsburgh	22.50-23.00
St. Louis	15.00-15.50
San Francisco, net	9.50-10.00
Valleys	19.50-20.00

BUNDLED SHEETS

Buffalo, No. 1	19.50-20.00
Buffalo, No. 2	18.00-18.50
Cleveland	15.00-15.50
Pittsburgh	21.00-21.50
St. Louis	13.50-14.00
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	15.50-16.00
Cincinnati, dealers.	13.00-13.50
Detroit	†14.50-15.00
St. Louis	13.00-13.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	17.00
Buffalo, No. 1	19.50-20.00
Chicago, No. 1	19.25-19.75
Cincin., No. 1 deal.	14.00-14.50
Cincin., No. 2 deal.	8.00- 8.50
Cleveland, No. 2	14.50-15.00
Detroit, No. 1 new	†17.50-18.00
Valleys, new, No. 1	19.50-20.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	8.50
Buffalo	14.00-14.50
Chicago	15.00-15.50
Cincinnati, dealers.	10.00-10.50
Cleveland, no alloy.	13.50-14.00
Detroit	†10.25-10.75
Eastern Pa.	14.50-15.00
Los Angeles	4.00- 5.00
New York	†10.00-10.50
Pittsburgh	16.00-16.50
St. Louis	11.00-11.50
San Francisco	5.00
Toronto, dealers	7.25- 7.50
Valleys	14.00-14.50

SHOVELING TURNINGS

Buffalo	15.00-15.50
Cleveland	14.00-14.50
Chicago	14.75-15.25
Chicago, spel, anal.	15.50-16.00
Detroit	†12.25-12.75
Pitts., alloy-free	17.00-17.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†8.50- 9.00
Buffalo	14.00-14.50
Cincinnati, dealers.	9.25- 9.75
Cleveland	14.50-15.00
Eastern Pa.	13.00-13.50
Detroit	†11.50-12.00
New York	†9.00- 9.50
Pittsburgh	15.00-15.50
Toronto, dealers	7.00- 7.25

AXLE TURNINGS

Buffalo	17.00-17.50
Boston district	†12.00-12.50
Chicago, elec. fur.	20.25-20.75
East. Pa. elec. fur.	19.50-20.00
St. Louis	13.50-14.00
Toronto	7.25- 7.50

CAST IRON BORINGS

Birmingham	8.50
Boston dist. chem.	†9.75-10.00
Buffalo	14.00-14.50
Chicago	14.00-14.50
Cincinnati, dealers	9.25- 9.75
Cleveland	14.50-15.00
Detroit	†11.75-12.25
E. Pa., chemical	15.00-15.50
New York	†10.50-11.00
St. Louis	10.50-11.00
Toronto, dealers	7.25- 7.50

RAILROAD SPECIALTIES

Chicago	23.50-24.00

ANGLE BARS—STEEL

Chicago	23.50-24.00
St. Louis	22.00-22.50

SPRINGS

Buffalo	25.50-26.00
Chicago, coil	24.50-25.00
Chicago, leaf	23.50-24.00
Eastern Pa.	25.00-26.00
Pittsburgh	27.50-28.00
St. Louis	23.00-23.50

STEEL, RAILS, SHORT

Birmingham	21.00
Buffalo	25.50-26.00
Chicago (3 ft.)	24.00-24.50
Chicago (2 ft.)	24.50-25.00
Cincinnati, dealers.	25.25-25.75
Detroit	†23.00-23.50
Pitts., 2 ft. and less	27.00-27.50
St. L. 2 ft. & less	23.75-24.00

STEEL RAILS, SCRAP

Birmingham	19.00
Boston district	†16.50-17.50
Buffalo	22.50-23.00
Chicago	20.25-20.75
Cleveland	25.00-25.50
Pittsburgh	24.00-24.50
St. Louis	21.00-21.50
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	14.50-15.00
Cincinnati, dealers.	13.50-14.00

RAILROAD GRATE BARS

Buffalo	14.50-15.00
Chicago, net	14.00-14.50
Cincinnati, dealers.	13.00-13.50
Eastern Pa.	18.50
New York	†13.00-13.50
St. Louis	14.50-15.00

RAILROAD WROUGHT

Birmingham	17.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	20.00-20.50
St. Louis, No. 1	14.50-15.00
St. Louis, No. 2	16.75-17.25

FORGE FLASHINGS

Boston district	†13.00-13.25
Buffalo	19.50-20.00
Cleveland	19.00-19.50
Detroit	†16.75-17.25
Pittsburgh	21.00-21.50

FORGE SCRAP

Boston district	†12.75-13.00
Chicago, heavy	24.50-25.00

LOW PHOSPHORUS

Cleveland, crops	23.50-24.00
Eastern Pa., crops	25.00-25.50
Pitts., billet, bloom, slab crops	28.00-28.50

LOW PHOS. PUNCHINGS

Buffalo	25.00-25.50
Chicago	23.50-24.00
Cleveland	22.50-23.00
Eastern Pa.	25.00-25.50
Pittsburgh	27.00-27.50
Seattle	15.00
Detroit	†20.00-20.50

RAILS FOR ROLLING

5 feet and over

Birmingham	20.00
Boston	†18.50-19.00
Chicago	24.75-25.25
New York	†19.00-19.50
Eastern Pa.	25.00-26.00
St. Louis	24.25-24.75

STEEL CAR AXLES

Birmingham	19.00
Boston district	†19.75-20.00
Chicago, net	25.50-26.00
Eastern Pa.	25.00-25.50
St. Louis	24.75-25.25

LOCOMOTIVE TIRES

Chicago (cut)	24.00-24.50
St. Louis, No. 1	21.00-21.50

SHAFTING

Boston district	†19.75-20.00
New York	†20.00-20.50
Eastern Pa.	25.00-25.50
St. Louis, 1¼-3¾"	20.00-20.50

CAR WHEELS

Birmingham, iron	20.00
Boston dist., iron	†16.00-16.50
Buffalo, steel	25.50-26.00
Chicago, iron	21.50-22.00
Chicago, rolled steel	24.00-24.50
Cincin., iron deal.	20.50-21.00
Eastern Pa., iron	22.50-23.00
Eastern Pa., steel	25.50-26.00
Pittsburgh, iron	22.50-23.00
Pittsburgh, steel	27.50-28.00
St. Louis, iron	20.75-21.25
St. Louis, steel	22.75-23.25

NO. 1 CAST SCRAP

Birmingham	18.50
Boston, No. 1 mach.	†17.25-17.50
N. Eng., del. No. 2	17.50-18.00
N. Eng. del. textile.	21.50-22.00
Buffalo, cupola	19.00-19.50
Buffalo, mach.	20.00-20.50
Chicago, agri. net	16.50-17.00
Chicago, auto net	18.00-18.50
Chicago, railr'd net	17.75-18.25
Chicago, mach. net.	18.50-19.00
Cincin., mach. deal.	21.75-22.25
Cleveland, mach.	23.00-23.50
Detroit, cupola, net	†16.75-17.25
Eastern Pa., cupola	23.00-23.50
E. Pa., No. 2	20.00
E. Pa., yard fdry.	20.00
Los Angeles	16.50-17.00
Pittsburgh, cupola.	22.00-22.50
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	19.75-20.25
St. L., No. 1 mach.	20.75-21.25
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†15.75-16.00
New England, del.	17.00-17.50
Buffalo, break	18.00-18.50
Cleveland, break, net	16.50-17.00
Detroit, auto net	†17.00-17.50
Detroit, break.	†14.75-15.25
Eastern Pa.	21.50-22.00
Los Ang., auto, net.	13.00-14.00
New York break	†16.00-16.50

STOVE PLATE

Birmingham	12.00-13.00
Boston district	†13.50-14.00
Buffalo	17.00-17.50
Chicago, net	13.25-13.75
Cincinnati, dealers.	13.50-14.00
Detroit, net	†11.50-12.00
Eastern Pa.	18.50
New York fdry.	†14.25-14.50
St. Louis	15.00-15.50
Toronto dealers, net	12.00

MALLEABLE

New England, del.	22.00-23.00
Buffalo	23.50-24.00
Chicago, R. R.	24.00-24.50
Cincin. agri., deal.	18.25-18.75
Cleveland, rail	25.00-25.50
Eastern Pa., R. R.	22.50-23.00
Los Angeles	12.50
Pittsburgh, rail	26.00-26.50
St. Louis, R. R.	21.75-22.25

Ores

Lake Superior Iron Ore

Gross ton, 51½ %

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos	nom.
Spanish, No. African basic, 50 to 60%	nom.
Chinese wolframite, net ton, duty pd.	$23.50-24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, c.i.f.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	.....
So. African, 50-52%	54.00-55.00
Indian, 49-50%	54.00
Brazilian, 46%	50.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 96, 97

Pittsburgh—Sheet mills are suffering from lack of semifinished material, and the pinch has not become as marked in flat-rolled products as in other finished material. Galvanized sheet production rate is up 1 point to 83 per cent of capacity. Bookings in either hot or cold-rolled sheets are not being guaranteed delivery until February.

Cleveland—When Carnegie-Illinois reaffirmed sheet prices for first quarter no mention was made in formal announcement of galvanized sheets, enameling sheets and long ternes, but these have been reaffirmed also. Price announcements have caused a new wave of buying, particularly for February and March needs, January being covered. Deliveries still slip, ranging from five to six weeks for silicon steel to eight weeks for stainless and others.

Chicago—No noticeable change in demand for sheets and strip can be discerned. It is not believed consumers purchased ahead in the fear of higher prices, but have covered only on reasonable requirements for two or three months.

Boston — Reaffirming for narrow cold-rolled strip prices for next quarter, including practically all specialties, has not yet been reflected in material easing in pressure for deliveries. Buying is unabated and well in excess of production and shipments. Forward orders continue in good volume and some tonnage has been booked for shipment at open prices beyond next quarter.

New York—While sheet specifications here are a shade easier, so much work is pending that the situation may change at any time. Due to increasing order accumulation, sellers are quoting somewhat more extended deliveries, around eight to nine weeks on hot and cold-rolled sheets and seven to eight weeks on galvanized sheets.

Priorities on narrow cold-rolled strip are becoming more common, with demand heavy. Preference as to shipment is given for defense needs. Deliveries are more extended, 10 to 12 weeks being the best most producers can do even under the most favorable circumstances while considerable tonnage is on books for shipment well beyond that period. February delivery is common on even the most standard low carbon.

Philadelphia — Sheet consumers and distributors continue efforts to enlarge stocks and cover forward needs. This is increasing second quarter orders. Mills are heavily sold into February although occasional small lots are worked in for January shipment.

Buffalo—Orders continue to ac-

cumulate. Delivery extensions are shorter than in other items, but a slight lengthening was noted recently. Only priority orders can still get recognition before the end of the current year. Production is about 85 per cent of capacity.

Cincinnati—Sheet orders have recently been taken in such volume that January rolling schedules are nearly filled, and considerable tonnage is for February delivery. Demand for household equipment, including stoves and refrigerators, is heavy. Automotive interests are filing specifications for more extended needs than normally. Meanwhile lengthening deliveries cause some anxiety lest conditions, not yet serious, become more complicated.

St. Louis—More deliveries and in many instances larger order backlogs feature the sheet and strip situation. Some consumers who ordinarily show a disposition to slow down at this time of year show little seasonal contraction. Specifications on strip in November were measurably greater than in October.

Birmingham, Ala. — Continued heavy booking in sheets is evident. Demand, as usual, is approximately even between manufacturers' and roofing sheets, even though it probably is not quite as heavy in either specification as for the past two or three weeks. Only a moderate amount of strip is being produced.

Toronto, Ont.—Sheet buying is gaining in volume under pressure of new contracts for war materials and producers are steadily advancing delivery dates, now well into second quarter, and are falling farther behind on deliveries. Sheet production is being maintained at the limit of capacity.

Youngstown, O.—Considerable satisfaction seems to have developed through the sheet and strip trade over reaffirmation of price for first quarter. Order books for both strip and sheets are growing heavier, with delivery dates falling behind steadily.

Plates

Plate Prices, Page 96

Pittsburgh—Practically the entire plate output is now required for defense, although on many defense orders deliveries are not scheduled until after the first of the year. Ordinary production demands, therefore, are being satisfied at the moment as rapidly as possible. However, unless the buyer already has placed his tonnage, he stands no chance of getting delivery much before the middle of second quarter.

Cleveland—Tension on deliveries, particularly in wide plates, has not slackened. In view of the expansion of steel capacity more ore vessels may be constructed, all requiring plates.

Chicago—Demand for steel plates is strong, with fabricators of heavy equipment and machinery well booked for most of first quarter. Mill deliveries are considerably extended and backlogs heavy.

Boston — Reaffirming of plate prices for first quarter has not materially affected new orders and specifications, which are brisk. Deliveries continue the major problem and are lengthening on most wider plates, alloys and semi-fabricated material. Depending on rolling schedules, some tonnage is worked in for shipment ahead of the general average, but such instances are becoming less evident. However, except on the part of the larger consumers, shipyards, jobbers included, forward buying in this district probably involves relatively less tonnage than in other areas.

New York—The delivery situation in plates continues tight. Except for universal plates little is being offered under eight to nine weeks and in some cases where wide plates are involved, deliveries run several weeks beyond that. Specifications continue heavy and diversified.

Philadelphia — Plate orders are

sufficiently heavy to prevent improvement in deliveries, which, on some larger sizes, extend to 12 weeks. Some large users able to anticipate needs in standard sizes, are buying for second quarter, but this is an exception. While delivery delays are beginning to interfere with operations of some consumers, mills believe this situation will be relieved in the next 90 days and see no permanent shortage.

Birmingham, Ala.—Buying continues heavy, with deliveries still somewhat behind. Some anxiety is expressed in certain quarters over deliveries for car building at Bessemer. A considerable backlog is to be carried over into next year.

Toronto, Ont.—Further stimulus to plate demand will be given with the placing of new orders for naval ships and other vessels. Department of munitions and supply, Ottawa, placed an order for six minesweepers to cost $7,750,000 with a Vancouver, B. C., builder for which steel will be ordered without delay. War tank construction on a larger scale is under consideration.

San Francisco — Awards aggregated 1878 tons, bringing the total to date to 192,061 tons, compared with 90,676 tons for the corresponding period in 1939. While it is not definitely known it is presumed by those in close touch with the situation that the United States maritime commission will decide to award two P-4-P type passenger vessels to the Seattle-Tacoma Shipbuilding Corp.

Plate Contracts Placed

1899 tons, fabricated high-strength, low alloy steel plates with eye-bolts, bolts and cap screws, Panama, schedule 4484, bids Nov. 15, to Lukens Steel Co., Coatesville, Pa., $223,629.85.

750 tons, slip No. 1, Los Angeles Shipbuilding Co., Los Angeles, to Lacy Mfg. Co., Los Angeles.

480 tons, 16-inch welded steel pipe, March Field, Riverside, Calif., to California Corrugated Culvert Co., Los Angeles.

375 tons, structural plate steel, Panama, schedule 4447, to Inland Steel Co., Chicago, $24,674.92, and U. S. Steel Export Co., New York, $13,647.30, bids Nov. 4, Washington.

300 tons, welded steel pipe, gas department, Long Beach, Calif., to Southern Pipe & Casing Co., Alhambra, Calif.

205 tons, fueling system and storage, naval air base, Jacksonville, Fla., to Buffalo Tank Co., Buffalo, Aqua Systems Inc., New York, contractor.

150 tons, 30-inch welded steel water pipe, Spokane, Wash., to Steel Tank & Pipe Co., Portland, Oreg.

100 tons, 200,000-gal. tank and tower, Muroc Lake, Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

100 tons, or more, two 500,000-gallon riveted steel tanks, elevated, Panama, schedule 4404, to Chicago Bridge & Iron Co., Chicago, $71,600.

Unstated tonnage, non-self-propelled crane vessels, navy department, to Dravo Corp., Pittsburgh, $3,582,000.

Unstated tonnage, 20,000-barrel capacity all-welded cylindrical steel tank, Panama, schedule 4463, to Pittsburgh-Des Moines Steel Corp., Pittsburgh.

Unstated tonnage, one 110-foot barge, coast guard, for use on western rivers, to Canulette Shipbuilding Co., Slidell, La., $22,560; bids Nov. 26, United States engineer, New Orleans.

Plate Contracts Pending

705 tons, fabricated high-strength low-alloy steel plates with eyebolts, nosing plate, bolts and cap screws, Panama, schedule 4567; bids Dec. 9.

225 tons, navy, schedule 4234, delivery east and west yards; also 3500 tons sheet steel, schedule 4234.

Unstated tonnage, eight dump scows or barges, 1000-cubic yard capacity, composite welded and riveted construction, Panama, schedule 4579; bids Dec. 6.

Unstated tonnage, 200,000-gallon elevated steel water tank, Duncan field, Tex.; bids in to constructing quartermaster, Fort Sam Houston, Tex.

Unstated tonnage, 200,000-gallon elevated steel water tank, Middletown Air Depot, Pa.; bids Dec. 14, constructing quartermaster.

First Quarter Steel Prices are Unchanged

Carnegie-Illinois Steel Corp., Pittsburgh and Chicago, announced Dec. 4 it had reaffirmed its base prices on hot-rolled carbon steel, semifinished material, bars, structural shapes, plates, steel sheet piling, hot and

cold-rolled sheets, hot-rolled strip and standard rails, as well as all hot-rolled alloy steel items, for shipment to and including March 31, 1941, for delivery and consumption in the United States.

Prices will apply only on such shipments as are made up to and including March 31, 1941, and any shipments after that date will be billed at prices then in effect.

Other producers followed this announcement and prices for first quarter at present levels have been made general.

American Steel & Wire Co. followed this by announcement of reaffirmed prices on cold-rolled strip and commodity strip, subject to the same restrictions as to time of delivery.

Bars

Bar Prices, Page 96

Pittsburgh — Deliveries continue to extend on carbon steel bars, although the lag in alloy bars is considerably greater. It is now virtually impossible to place alloy bar orders for delivery earlier than second quarter, and in some cases longer.

Cleveland—No letdown in demand, with volume still increasing, is the rule. Deliveries on larger sizes usually run eight to twelve weeks, with four to six weeks on more ordinary descriptions.

Chicago—Well maintained orders and inquiries, with a wide diversification of consumers, characterizes the steel bar situation. Mills are unable to work down backlogs, as orders flow in steadily and deliveries are lengthening

Boston — Bar specifications are heavy and there has been little recession in buying, especially in alloys. Meanwhile pressure for deliveries continues. Producers are booked through February on some finishes, and, unless destined for aircraft assembly, machine tools and other urgent defense contracts, heat-treated quality stock is indefinite as to shipment. Largest inquiry for nickel-steel bars for chain-making, Charlestown (Boston) navy yard closes Dec. 13 with delivery wanted through and beyond first quarter, 2500 tons following bids on 186 tons the previous day.

New York—Bar sellers generally are extending current prices for next quarter delivery, in line with general trade expectations. This applies to cold-drawn bar makers as well as producers of hot carbon and alloy bars. Deliveries, and not prices, assume even greater importance and shipping dates become more extended.

On hot carbon bars little can now be done under eight weeks and on cold drawn bars little under nine to 10 weeks, except where cold drawers can work from material already in stock. In these cases deliveries of four and five weeks can still be done, but such instances are the exception rather than the rule.

Philadelphia — Merchant bar demand is still influenced by consumer fears of inadequate supplies. First quarter orders are increasing with specifications entered on a large part. Steadily expanding portion of shipments are scheduled for armament production. Approaching inventory period is without material effect as the tendency is to enlarge supplies where possible.

Birmingham, Ala.—Mills are comfortably booked on bars. Merchant bars are in good demand, although it is probable a major part of the tonnage is for concrete reinforcing. Output is 80 per cent or better.

Buffalo — Backlogs for first quarter delivery are growing rapidly as demand continues to exceed shipments. Deliveries generally run well into February. Considerable tonnage is shell steel for export to Canada and Great Britain.

Toronto, Ont.—Demand for merchant bars is increasing and deliveries are further delayed. While building trades call heavily on producers

for supplies, there is increasing demand from bolt and nut makers. The automotive industry is taking larger supplies and orders for mechanical transport are heavier.

Youngstown, O.—Steel bar demand continues brisk. While bar mills are operating at capacity deliveries are being deferred.

Pipe

Pipe Prices, Page 97

Pittsburgh — Continued construction activity holds demand for merchant pipe higher than production and stocks are declining at most points. Pressure tubing demand is growing, although there has been no change in oil country business.

Cleveland—Extra 5 per cent discounts on merchant pipe to some jobbers have been rescinded, leaving only the 5 per cent regular discount on official price lists.

Boston — Demand for both merchant steel and cast pipe is stronger than usual for this season. Construction requirements maintain buying of the former with only scattered declines in resales on which prices are firmer, but still mixed. Mill deliveries against replacement orders as a rule are far nearer normal than on other steel products, although most such shipments are from stock. Tubing demand is well diversified and fairly active.

Birmingham, Ala.—Pipe plants continue on a schedule somewhat above that of late October and early November. The six-day week is not unusual. West Coast demand and government requirements account for a large part of the tonnage.

Youngstown, O.—Wrought pipe demand for standard merchant pipe is easily the best in several years, largely due to continued building construction. Pipe requirements for military cantonment and camp construction are heavy.

San Francisco—The largest cast iron pipe award in over a month was placed with American Cast Iron Pipe Co., 884 tons of 6 and 8-inch pipe for the east bay municipal utility district, Oakland, Calif.

Cast Pipe Placed

1225 tons, assorted sizes for Twelfth avenue S. W., Myrtle street, and Sixteenth avenue N. E., Seattle, and Bremerton, Wash., sewer extension, to H. G. Purcell, Seattle, for United States Pipe & Foundry Co., Burlington, N. J.

884 tons, 6 and 8-inch, east bay municipal utility district, Oakland, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

800 tons, 4 to 12-inch, housing project, Hartford, Conn., to United States Pipe & Foundry Co., Burlington, N. J., through contractor.

635 tons, 6 and 8-inch, class 150, additional tonnage, extensions, Fort Devens, Ayer, Mass., to Warren Pipe Co., Everett, Mass.

265 tons, 10 and 12-in., treasury department, invitation A-10821, Los Angeles, to United States Pipe & Foundry Co., Burlington, N. J.

135 tons, two street improvement jobs, Seattle, Wash., to United States Pipe & Foundry Co., Burlington, N. J.

Wire

Wire Prices, Page 97

Pittsburgh—Principal difficulty in wire markets is supply of wire rods. British buying of wire rods has been heavy, principally in alloy steels, and local alloy steel users are unable to get satisfactory deliveries on the grades popular in Britain. Wire drawing mills here are running at less than capacity because of inability to obtain enough rods to meet demands. Merchant wire buying is fairly good. Releases on manufacturers' wire tonnage continue heavy, about on a par with the last two months.

Chicago—Demand for wire and wire products is good and shows no signs of lessening. Mills are working near capacity and find shortage of semifinished a handicap.

Boston — Wire orders continue ahead of shipments with production at capacity in most departments.

Rod mills are under pressure and supplies of special analysis are short with producers having difficulty in accumulating surplus beyond needs of their own finishing departments.

New York — Producers of galvanized wire products are becoming more concerned as to zinc supplies, processors in some instances being unable to cover for immediate needs all zinc wanted, although few, if any instances are noted where production has actually been curtailed. Supplies of wire rods are also becoming tighter on more finishes, those entering into specialties notably. There is but slight decline in incoming orders for wire goods.

Birmingham, Ala. — Bookings are highly satisfactory in all wire specifications. Because of extended mild weather, nails and fencing are active, with considerable backlog.

Rails, Cars

Track Material Prices, Page 97

Domestic freight car awards in November totaled 8234 units, making the total for 11 months 59,731, which exceeds the total for all of the past three years. Inquiries now pending are heavy and it is possible the year's total might exceed the 64,523 units placed in 1936, which was the highest since 1929. Comparisons are as follows:

	1940	1939	1938	1937
Jan.	360	3	25	17,806
Feb.	1,147	2,259	109	4,972
March ...	3,104	800	680	8,155
April	2,077	3,095	15	9,772
May	2,010	2,051	6,014	4,732
June	7,475	1,324	1,178	548
July	5,846	110	0	1,030
Aug.	7,525	2,814	182	1,475
Sept.	9,735	23,000	1,750	1,216
Oct.	12,195	19,634	2,537	1,355
Nov.	8,234	2,650	1,232	275
11 mos....	59,731	57,740	13,722	51,336
Dec.	.....	35	2,581	275
Total ..	.....	57,775	16,303	51,611

Rail Orders Placed

New York, New Haven & Hartford, 15,000 tons previously noted, divided equally between Carnegie-Illinois Steel Corp., Pittsburgh, and the Bethlehem Steel Corp., Bethlehem.

Car Orders Placed

Berwind-White Coal Mining Co., Philadelphia, 50 fifty-ton all-steel hopper cars, to own shops.

Colorado & Wyoming, 15 seventy-ton gondolas, to Pullman-Standard Car Mfg. Co., Chicago.

Cudahy Car Lines, 50 forty-ton refrigerator cars, to own shops.

New York Central, 200 seventy-ton flat cars, to Despatch Shops Inc., East Rochester, N. Y., New York Central subsidiary.

Norfolk Southern, 50 hopper cars, to Virginia Bridge Co., Roanoke, Va.; in addition to the 250 box cars and 50 gondolas reported recently as having been placed with the Magor Car Corp., Passaic, N. J., and the American Car & Foundry Co., New York.

Norfolk & Western, 30 seventy-ton covered hopper cars, to own shops in Roanoke, Va .

Wabash Car & Equipment Co., five 70-ton covered hopper cars to American Car & Foundry Co., New York.

Car Orders Pending

Pittsburgh & Lake Erie, subsidiary of New York Central, 1000 fifty-ton box cars bids asked.

Union Pacific, 100 to 300 fifty-ton lightweight automobile cars; contemplated for construction in its own shops.

Locomotives Placed

New York, New Haven & Hartford, one 380-horsepower diesel-electric switch engine, to General Electric Co., Schenectady, N. Y.

Tin Plate

Tin Plate Prices, Page 96

Orders increase in number but not in aggregate tonnage. Pittsburgh notes a 3-point output rise to 48 per cent. Inventories of consumers are obviously shrinking. First quarter prices are expected to be unchanged. Exporters are watching to see if Britain becomes more liberal in allowing shipments from the United States to Portugal, present control being in effect an embargo.

Shapes

Structural Shape Prices, Page 96

Pittsburgh—Slackening in inquiries continues as initial construction on the defense program is well covered. Deliveries on shapes are still far behind, with no inroads apparent against heavy backlogs.

Cleveland—Placing of 1000 tons by Republic Steel Corp. for a raw steel extension at Canton, O., is of double interest, being, besides a routine contract, an indication of expanding ingot capacity here. Bids will be opened this month for buildings for the airplane motor testing plant at Cleveland airport, requiring a substantial tonnage.

Chicago—Considerable more activity was observed last week in orders and inquiries for structural steel. Considerable tonnage was booked by fabricators, about equally divided between defense program projects and industrial plant expansions.

Boston—In addition to a torpedo and assembly plant, naval station, Newport, R. I., Bethlehem Steel Co., Bethlehem, Pa., will fabricate structural steel for the company's shipbuilding subsidiary warehouse, Fore river (Quincy), Mass. The same mill will also furnish bars required. For the largest industrial project to come out in New England in recent years, 7000 tons, mill buildings, American Steel & Wire Co., South Works, Worcester, Mass., American Bridge Co., Pittsburgh, will fabricate.

Philadelphia — Structural inquiries are somewhat slower but mills have heavy tonnages and no appreciable delivery improvement is evident. Small building work is still active.

Seattle — Plants operating to capacity, fabricators are figuring future business carefully as the question of delivery is an important factor. Ordinarily shipments are received here from the East Coast in 30 days but under present conditions materials cannot be obtained in less than six or eight weeks.

Toronto, Ont.—Despite the fact that fabricators are working to capacity and are flooded with orders, new business continues to pour in. War construction projects are specially featured. The addition to the Atlas Steel plant at Welland, Ont., will require about 4000 tons of steel. Private construction announced during the past week or ten days call for about 15,000 tons of steel, and approximately 20,000 tons are pending in connection with industrial plant expansion and war projects.

Shape Awards Compared

	Tons
Week ended Dec. 7	14,966
Week ended Nov. 30	33,970
Week ended Nov. 23	11,377
This week, 1939	9,721
Weekly average, year, 1940	27,887
Weekly average, 1939	22,411
Weekly average, Nov.	28,153
Total to date, 1939	1,101,535
Total to date, 1940	1,366,442

Includes awards of 100 tons or more.

Shape Contracts Placed

5300 tons, T.N.T. plant, war department, Wilmington, Ill., Stone & Webster Engineering Corp., Joliet, Ill., contractor, to Duffin Iron Works, Chicago; bids Oct. 25.

1500 tons new plant, Danly Machine Specialties Inc., Chicago, Kaiser Ducett Co., Chicago, contractor, to Wendnagel & Co., Chicago.

1150 tons, Jefferson Island Salt Co., Jefferson Island, La., to Ingalls Iron Works Co., Birmingham, Ala.

1050 tons, building No. 140, Aluminum Co. of America, Massena, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

1000 tons, 170-foot extension to open-hearth department at Canton, O., Republic Steel Corp., to Fort Pitt Bridge Works, Pittsburgh.

730 tons, state bridges PSC-4775, Duane, N. Y., to American Bridge Co., Pittsburgh.

600 tons, plant addition, Union Carbide Co., Niagara Falls, N. Y., to Lackawanna Steel Construction Co. Inc.,

Behind the Scenes with STEEL

Put It In Writing

■ In the warehouse of a large Midwest distributor of steel, hangs a bulletin board, above which is a sign reading: "Don't Say It—Write It!" Here, everything must be written on A. V. O. forms (meaning "avoid verbal orders"). Humorous touch to this campaign was lent last week by one of the writing-conscious receiving clerks, who rushed in pell-mell, scribbled out an A. V. O. which he tacked to the board and scurried away. The men gathered around the board to find this notice: *Sam, Jr., just arrived via Stork Limited, and meets all specs. Net weight 10½ lbs., delivered in good condition.*

New Process

■ We sneaked out a little early one afternoon this last week and took little Ann over to have her first look at Santa; and we thought her eyes would pop right out on his lap. It was a lot of fun and of course, as usual, the little woman got a bit provoked when we hung around the toy trains until the clerk started to get nasty. They've got some dandy ones this year but we bet General Motors or U. S. Steel would gladly pay millions for the secret to those new *die-cast steel* locomotives Lionel is pushing so hard.

Santa's Black List

■ And speaking of Christmas, we just had a nice *form* letter from one of the country's big companies politely explaining that they are writing all of their "connections" and requesting that the practice of sending gifts to any of their employes be discontinued. Maybe they've been bad boys and Santa's helpers found out about it, huh?

Saboteurs

■ But the really bad boys who do their jobs on the q. t. and are hard to catch are the modern *saboteurs*. The etymologists tell us this word comes, appropriately enough, from the French. It is derived from the word "wooden shoe" (*sabot*), and symbolizes the old pastime of hurling wooden shoes into the machinery when "requests" were not complied with. The Yankee equivalent, of course, is "throwing a monkey wrench into the works."

Bridge Sequel

■ The collapse of the Tacoma "Narrows" bridge wasn't sabotage but it apparently put ideas into the heads of newspaper artists. A recent photo in a southern paper shows a cantilever bridge. But evidently the picture editor thought the steel framework might collapse, so he sent the pic back to the art department . . . where an extra concrete pier was added to "help support the steel structure."

All Around Man

■ Tracing through the classified section we noticed this want ad for what must be the indispensable, all-around man: "Wanted, lathe hand, experienced and able to operate all types of metal turning machinery. Must speak English, non-Aryan. Prefer man with past exp. in shipping dept. and fdry. Must have background in metallurgy." We felt like adding—"Men with only two hands needn't apply."

No Fueling

■ Synthetic hay, according to the gasoline experts, is what the new superfuels for motorized units really are. Like we always said, it's a wise tank that knows its own fodder. And if you can stand that one bright and early on a Monday morning, (when most copies of STEEL are feverishly taken from their attractive mailing envelopes) you're a man, and the Army needs you!

SHRDLU.

Buffalo.

500 tons, boiler house addition, Procter & Gamble Co., Houston, Tex., to Austin Bros., Dallas, Tex.

450 tons, warehouse, Cleveland, Sears, Roebuck & Co., to Bethlehem Steel Co., Bethlehem, Pa.

310 tons, shop building 14, General Electric Co., Pittsfield, Mass., to Lehigh Structural Steel Co., Allentown, Pa.

285 tons, machine shop, Chambersburg Engineering Co., Chambersburg, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

268 tons, two bridges, Pennsylvania route 234, Clearfield county, Pa., Midwest Construction & Asphalt Co., Chicago, contractor to Phoenix Bridge Co., Phoenixville, Pa.

250 tons, steel piling, Northwest Engineering Co., Green Bay, Wis., to Inland Steel Co., Chicago.

200 tons, factory addition, A. D. Ellis & Sons, Monson, Mass., to Haarmann Steel Co., Holyoke, Mass.; Adams & Ruxton Construction Co., Springfield, Mass., contractor.

175 tons, Roselawn pumping station, City of Chicago, to Zieber Steel Co., Chicago.

160 tons, building, Wall Rope Co., Beverly, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

158 tons, sheet piling, three bridges, King county, Washington, for state, to Bethlehem Steel Co., Seattle, Wash.

150 tons, Woolworth store, Pasadena, Calif., to Consolidated Steel Corp., Los Angeles.

134 tons, machine shop, Revere Copper & Brass Inc., Chicago, Dahl-Stedman Co., Chicago, contractor, to Joseph T. Ryerson & Son Inc., Chicago.

111 tons, building for John Deere Plow Co., Houston, Tex., to Texas Gulf Construction Co., Houston, Tex. Understood latter will furnish own steel.

110 tons, building No. 111, Frankford arsenal, Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa.

105 tons, building, Coca Cola Co., Troy, N. Y., to West Side Structural Co., Troy, N. Y.

100 tons, highway bridge work in Lee and Clay counties, Texas, to North Texas Iron & Steel Co., Fort Worth, Tex.; also bridge railing and steel piling.

100 tons or more, addition, DeLaval Steam Turbine Co., Trenton, N. J., shapes to Keystone Structural Steel Co., Trenton, N. J.; bars to Bethlehem Steel Co., Bethlehem, Pa.; J. W. Ferguson Co., Paterson, N. J., contractor.

100 tons, shapes and bars, addition, Mossberg Pressed Steel Co., Attleboro, Mass., to J. H. Tower Iron Works, Providence, R. I., and G. Fred Swanson Inc., Providence; Rowley Construction Co., Pawtucket, R. I., contractor.

Unstated tonnage, addition, Remington Arms Co., Bridgeport, Conn., to Topper & Griggs, Hartford, Conn.; Harry Marling, Jr., Bridgeport, contractor; Chapin & Bangs Co., Bridgeport, awarded reinforcing steel.

Unstated tonnage, addition, Rome Cable Corp., Rome, N. Y., to Smith & Caffrey Co., Syracuse, N. Y., bars to Bethlehem Steel Co., Bethlehem, Pa.; B. McCarey, Rome engineer in charge.

Unstated tonnage, shop building, Botwinik Bros., Hamden, Conn., to Truscon Steel Co., Youngstown, O., bars to Fox Steel Co., New Haven; M. Teitelman, New Haven, contractor.

Shape Contracts Pending

9210 tons, 896 transmission towers and accessories, for Bonneville project;

American Bridge Co., Pittsburgh, low.

4300 tons, shell loading plant, war department, Elwood, Ill., Sanderson & Porter, Joliet, Ill., engineers, bids Dec. 6.

2800 tons, state bridge 5900 over main channel, Winona, Minn.

2700 tons, airplane repair shop, Hill field, Ogden, Utah.

900 tons, state bridge, contract 2071, Newberry, Ind.

800 tons, submarine railway cradle, New London, Conn., for government.

800 tons, North Channel bridge, Mississippi river crossing, Bluff Siding, Wis., for state.

681 tons, grade crossing elimination, Pennsylvania-Reading Seashore Lines, Haddon avenue and Keys-Milford road, Berlin, N. J.; bids Dec. 20, E. Donald Sterner, state highway commissioner, Trenton.

680 tons, railroad grade crossing, Berlin, N. J.; bids Dec. 20; also 110 tons reinforcing bars.

600 tons, viaduct, McKeesport, Pa.; bids to state highway department, Harrisburg, Pa., Dec. 13.

500 tons, magazine buildings, Ravenna, O., for government.

500 tons, storehouse, specification 10240, navy yard, Bremerton, Wash.; bids Dec. 26.

400 tons, buildings, for R. R. Donnelley & Sons, Crawfordsville, Ind.

400 tons, plate girder bridge, Dauphin county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 13.

350 tons, state bridge, contract 2072, Newberry, Ind.

300 tons, trash racks, specification 1453-D, Parker dam project, Earp, Calif.; Southwest Welding Mfg. Co., Azusa, Calif., low.

275 tons, magazine buildings, Ravenna, O., for government.

250 tons, state bridge, contract 2074, Banner City, Ind.

225 tons, state bridge, contract 2075, Speed, Ind.

210 tons, Apple river highway bridge, Savanna, Ill., for government.

200 tons, state highway bridge, Mountainside, N. J.

200 tons, stock building, for Lomb Glass Co., Mt. Vernon, O.

200 tons, Washington state Grande Ronde bridge, Asotin county; bids at Olympia, Dec. 17.

183 tons, transportation building, Puget Sound navy yard; Isaacson Iron Works, Seattle, low.

175 tons, penthouses and conveyor bridge, for Consolidated Edison Co., New York.

170 tons, bays for steel storage building Puget Sound navy yard; bids Dec. 5.

170 tons, two buildings, naval reserve training station, Glenview, Ill., bids Dec. 9.

150 tons, piling, sea wall, aviation depot, Philadelphia.

130 tons, machine and shop building, for Electric Machinery Mfg. Co., Minneapolis.

110 tons, state bridge, route FA-5, section 22-X1-VF-1, Lincoln, Ill.

110 tons, overpass bridge, Adams county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 13.

100 tons, public school, West Seneca, N. Y.

100 tons, joists, nurses' home and school, Mercy hospital, Canton, O.; bids postponed to Dec. 5.

Unstated tonnage, two buildings, airplane motor testing institute at municipal airport, Cleveland; plans not completed, with one building of concrete possible; bids Dec. 23 and Dec. 30.

Unstated, 3-span grade separation, Spokane, Wash. by Great Northern railroad.

Unstated tonnage, one mitering lock gate, Panama, schedule 4405, Bethlehem Steel Co., Bethlehem, Pa., low, $439,800; bids Nov. 20, Washington.

Reinforcing

Reinforcing Bar Prices, Page 97

Pittsburgh—In spite of the fact that seasonal declines should be evident at this time of year, tonnage of concrete bar jobs continues heavy, and inquiries are fairly active. Deliveries are beginning to fall behind.

Chicago—Somewhat increased activity in orders and inquiries for reinforcing steel, is evident. Considerable of this is traceable to government defense projects, although there is still a good volume of relatively small private work.

Philadelphia — Reinforcing bar inquiries are numerous with small lots predominating. Several large tonnages for defense are pending. Prices are fairly steady on most business.

Boston—With most larger pending reinforcing steel tonnages

placed, current buying is mainly in small lots, the number of orders increasing. Rail steel prices are not holding generally to the recently revised quotation as compared with billet steel stock.

Seattle — Small tonnages from public and private sources are assuming considerable volume, mills now having 60-day backlogs. Merchant bars are moving in steady volume for general consumption and to replenish jobbers' stocks. Prices are firm.

San Francisco—The reinforcing bar market was the most active one of the week and 2572 tons were placed, bringing the aggregate for the year to 162,545 tons, compared with 158,325 tons for the corresponding period in 1939.

Reinforcing Steel Awards

2500 tons, TNT plant, war department, Wilmington, Ill., Stone & Webster Engineering Corp., Chicago, contractor, to Carnelgie-Illinois Steel Corp., Chicago. Part of estimated 5000 tons required.

1100 tons, Jamaica Plain and Roxbury housing, Boston, to Northern Steel Co., through John Bowen & Co., contractor.

928 tons, International boundary commission, El Paso, Tex., 578 tons to Truscon Steel Co., Youngstown, O., and 350 tons to Sheffield Steel Corp., Kansas City, Mo.; bids Nov. 7.

563 tons, Panama Canal, scheduled 4524, to Joseph T. Ryerson & Son Inc., Chicago.

500 tons, housing project, Pawtucket, R. I., to Truscon Steel Co., Youngstown, O., through Chain Construction Corp., contractor.

500 tons, Lindbergh boulevard, bridge, St. Louis, to Laclede Steel Co., St. Louis through Massman Construction Co., contractor.

400 tons, United States army cantonment, Fort Riley, Kans., to Sheffield Steel Co., Kansas City, Mo.

375 tons, bridge over Mississippi river, Chester, Ill., to Laclede Steel Co., St. Louis, through Massman Construction Co., contractor.

275 tons, Bancroft Hall addition, Annapolis, Md., to Bethlehem Steel Co., Bethlehem, Pa., through Irwin & Leighton, contractors.

200 tons, treasury department, specification A-10867, Los Angeles, to Columbia Steel Co., San Francisco.

165 tons, Gully brook conduit, section 1, Hartford, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through W. W. Wyman Inc., contractor.

150 tons, warehouse building 801, Sears, Roebuck & Co., St. Louis, Fruin-Colnan Contracting Co., St. Louis, contractor, to Sheffield Steel Corp., St. Louis, bids Sept. 25.

140 tons, housing project, Rock Island, Ill., to Bethlehem Steel Co., Bethlehem, Pa.

130 tons, Wright Aero Corp., foundry building, Lockland, O., to Truscon Steel Co., Youngstown, O.

100 tons, school, Fresno, Calif., to Kyle & Co., Fresno.

100 tons, administration building, torpedo station, Newport, R. I., to Concrete Steel Co., Boston; O. D. Purington & Co., Providence, R. I., contractor.

100 tons, highway project, Hartford-Winsted, Conn., to Truscon Steel Co., Youngstown, O.; Alexander Jarvis Co., Manchester, Conn., contractor.

100 tons, Beverly-West Calumet sewer, Chicago, invitation 53607, public letting, state procurement office, treasury department, Chicago, to W. J. Holliday & Co., Hammond, Ind.; bids Nov. 29.

100 tons, housing and ammunition facilities, Indian Head, Md., to Hudson Supply & Equipment Co., through Harwood-Nebel, contractors.

100 tons or more, state viaduct Union county, Oregon, to unstated Portland house; Colonial Construction Co., Spokane, general contractor.

Concrete Bars Compared

	Tons
Week ended Dec. 7	9,286
Week ended Nov. 30	18,077
Week ended Nov. 23	13,792
This week, 1939	3,376
Weekly average, year 1940	9,854
Weekly average, 1939	9,197
Weekly average, Nov.	11,748
Total to date, 1939	463,203
Total to date, 1940	482,825

Includes awards of 100 tons or more.

Reinforcing Steel Pending

8000 tons, shell loading plant, war department, Union Center, Ind., Bates & Rogers Construction Corp., Laporte, Ind.. contractor, bids Dec. 3.

8000 tons bars and 330 tons wire mesh, shell loading plant, war department, Burlington, Iowa, A. Guthrie & Co., St. Paul, and A1 Johnson Construction Co., Minneapolis, joint contractors.

2500 tons, Curtiss-Wright Aero Corp. expansion, Robertson, Mo.; bids Dec. 3.

750 tons, housing project, Cambridge Mass.

500 tons, factory, Glidden Co., Chicago.

425 tons, four state bridges King county and approaches Asotin county, Washington; bids at Olympia, Dec. 17.

375 tons, substructure Canal street bridge, Chicago.

370 tons, steel sheet piling, United States engineer, inv. 91, Milwaukee.

368 tons, four bridges, King county, Washington, for state; bids Dec. 17.

338 tons, Panama, schedule 4566, bids Nov. 22, Republic Steel Corp., Cleveland, low.

323 tons, project No. 200, Lake county, Ohio, Hollinger-Davidson, Akron, O., low; bids Dec. 3.

300 tons, Adair street overpass, Louisville, Ky.

230 tons, Harrison homes housing, Philadelphia.

230 tons, R-187, sections 6C and 6D, Allegheny-Westmoreland counties, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 13.

220 tons, bridges, Livingston and Westchester counties, New York; bids Dec. 18, Albany.

200 tons, Hercules Powder Co., Radford, Va.; Mason & Hangar, contractors.

195 tons, viaduct, McKeesport, Pa.; bids to state highway department, Harrisburg, Pa., Dec. 13.

150 tons, bridge 2071, Newberry, Ind.; bids Dec. 3.

130 tons, bridge 2069, Reelsville, Ind.; bids Dec. 30.

130 tons, bridge 2067, Greenwood, Ind.; bids Dec. 3.

130 tons, including 20 tons mesh, grade crossing elimination, Pennsylvania-Reading Seashore Lines, Berlin, N. J.; bids Dec. 20, E. Donald Sterner, state highway commissioner, Trenton.

100 tons, sewage plant, Hannibal, Mo.

100 tons, overpass bridge, Lehigh county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 13.

Unstated, foundations for storehouse and other improvements, Puget Sound navy yard; bids Dec. 26.

Pig Iron

Pig Iron Prices, Page 98

Pittsburgh — Local buyers are awaiting action on first-quarter pig iron prices. It is known that sentiment in the district is divided, with some sellers pointing to increased costs of coke and scrap and demanding a proportionate rise in the price of iron, while others are believed to be content with holding the price at current levels.

Cleveland—Sales are slow, as consumers are largely covered through February. Naming of prices and opening of books for first quarter are expected soon. Some producers will now sell sparingly to regular customers, subject to individual negotiation. The coke shortage worries pig iron producers and foundrymen, with substitute analysis often used. December shipments are expected to be the same, or perhaps less, than November.

Chicago—Pig iron sales and shipments continue at a capacity. Sellers have not yet opened books for first quarter although this is expected momentarily. The foundry coke situation still remains tight, in view of heavy requirements and the fact that by-product ovens are operating at capacity.

New York—Early action by pig iron sellers in opening books for first quarter is now predicted. Prices generally are expected to be reaffirmed. November was the most active month in point of specifications this year and some believe that notwithstanding year-end holiday influences, December releases will be almost as heavy.

Cincinnati—Pig iron shipments are holding to the high levels of November, the best month this year. Reports disagree on tonnage remaining on books. Some producers may start contracting heavily when books are opened.

Philadelphia — Pig iron shipments are being pushed to capacity, with December movement expected to approach November, despite the fact some consumers are seeking to defer receipts until the end of the month. Large users are expanding stocks in anticipation of winter needs but a number of small foundries are operating with scant inventories. Sellers are taking no formal price action for first quarter and it is thought likely the market may be merely continued at the present level, without announcement.

St. Louis—Sellers of pig iron indicate that shipments during November were the heaviest this year, and largest for the month in more than a decade.

In spite of the expected letdown, specifications point to a larger total for December than November. Books are expected to be well cleared of 1940 orders by Jan. 1.

Toronto, Ont.—Pig iron demand is heavier and supply for the merchant trade is on the decline. Steelmaking requires steadily increasing supplies of pig iron. Producers are holding sales to 100 to 200 tons on spot delivery account and while contracts have been closed to the year end, deliveries are only for current needs of melters.

Scrap

Scrap Prices, Page 100

Pittsburgh—No. 1 heavy melting steel showed an increase of 50 cents again this week at a $23 top, based on buying by at least two melters here. All open-hearth grades, including No. 1 and No. 2 steel, compressed and hand bundled sheets, reflect increased prices, and sales of machine shop turnings resulted in a 50-cent increase in that grade. Several railroad list closings showed prices up $1 from last month on heavy melting steel, although none of this material has come into the Pittsburgh district yet.

Cleveland—Dealers are slow to make contracts as supplies are un-

certain, though shipments are going forward steadily. Prices are strong and some grades have been advanced 50 cents per ton.

Chicago — Iron and steel scrap prices are strong in absence of much trading. No significant price changes have been made since a general rise last week. Dealers find collections small and have little to offer, due both to cold weather and shortage of material. Latest mill transaction was $20.75 for No. 1 heavy melting steel.

Boston—Shipments by barge to mid-Atlantic points are maintained and include No. 2 cast and stove plate in addition to heavy melting steel grades. This movement by water is also supplemented by a slightly more active export demand, more boats appearing for loading, although individual cargoes tend to be smaller. Three vessels recently left Boston and Portland with close to 8000 tons.

Philadelphia — Scrap deliveries are influenced only slightly by a strike of yard workers and truckers in Philadelphia city limits. Yards outside the city are not affected. The market retains a strong tone, particularly in cast grades, which tend upward. Quoted prices remain unchanged. Heavier loading for export may develop, largely dependent on vessel availability.

Detroit—Local scrap market finally has succumbed to bullishness in other districts. Quotations on No. 1 busheling, heavy melting steel, forge flashings, low-phosphorus plate, compressed bundles, loose sheet clippings and machine shop turnings are advanced 50 cents a ton; short shoveling turnings 25 cents a ton; other items are unchanged.

Cincinnati—Iron and steel scrap prices are 50 cents higher, a reflection of the strong market in which increases were necessary to obtain wanted material. Especially active are all grades of foundry scrap; blast furnace outlets are limited and this class of material appears adequate. Mill requirements, without attempt to supplement inventory, call for steady, large tonnages.

St. Louis — Prices of iron and steel scrap continue to rise. No. 2 heavy melting for St. Louis delivery was marked up 50 cents to $17 to $17.50 per ton, a new apex on the present upsurge, and $1 higher than three weeks ago. Virtually all other grades advanced 25 cents to $1 per ton. Among items with higher quotations are car wheels, railroad malleable, rails for rolling, cast borings, grate bars, stove plate.

Birmingham, Ala.—Scrap shows continued high activity, with advances announced this week in heavy melting steel of $1, accompanied by comparable advances in other major items. A large tonnage of all grades is moving.

Seattle — Foundry operations are more active and plants are purchasing a larger tonnage of cast scrap. Rolling mills are the chief buyers of steel scrap, the going price having dropped from $15 to $14 per gross ton. Exporters still have stocks on hand which they are offering locally. Country receipts are less with the approach of winter.

Youngstown, O. — Shipments of iron and steel scrap continue satisfactory, but there are signs that supplies are tightening somewhat. This leads to further strengthening, which has not been translated into higher quotations, awaiting receipt of information on recent railroad list closings.

Toronto, Ont.—Firmer prices are in the making in the iron and steel scrap markets. Local dealers expect to move up buying prices on cast scrap 50 cents per ton, although they were not changed last week. The strength in cast is credited to increasing demands from consumers and falling off in supplies. While customers are being supplied at $20 per net ton, new accounts are being charged an additional 50 cents.

San Francisco—No change is noted in the scrap market and west coast open-hearth producers continue to buy in heavy lots. No. 1 heavy melting scrap in the San Francisco metropolitan area holds at $13 to $13.50 a net ton, f.o.b. cars. Weaker prices prevail in the Los Angeles metropolitan district.

Iron Ore

Iron Ore Prices, Page 100

Cleveland — Iron ore shipments from upper lake ports in November totaled 5,412,798 gross tons, compared with 5,472,605 tons in November 1939. This is one of the few months of 1940 in which comparisons with last year have been unfavorable.

In October, 1940, shipments were 10,061,127 gross tons, the largest for that month since records had been kept by the Lake Superior Iron Ore association, Cleveland. The November decrease from a year ago was 59,807 tons, or 1.1 per cent.

Cumulative tonnage for the year to Dec. 1 was 63,709,152 gross tons compared with 45,066,175 tons, an increase of 18,642,977 tons, or 41.37 per cent.

Comparisons by ports for November are as follows:

	Gross Tons Nov. 1940	Nov. 1939
Escanaba	386,524	344,132
Marquette	569,496	702,335
Ashland	573,146	565,352
Superior	1,236,880	1,561,931
Duluth	1,658,499	1,335,942
Two Harbors	925,526	930,370
Total U. S. Ports	5,350,071	5,440,062
Michipicoten	62,727	32,543
Total	5,412,798	5,472,605

Comparisons by ports for the season to Dec. 1 are as follows:

	Gross Tons To Dec. 1, 1940	To Dec. 1, 1939
Escanaba	3,423,334	2,531,260
Marquette	5,486,289	4,458,894
Ashland	5,968,214	5,341,939
Superior	21,502,083	14,925,013
Duluth	16,267,848	9,081,476
Two Harbors	10,705,000	8,663,503
Total U. S. Ports	63,352,768	45,002,085
Michipicoten	356,384	64,090
Total	63,709,152	45,066,175
Increase from 1939	18,642,977	

Warehouse

Warehouse Prices, Page 99

Cleveland—With some distributors sales have declined somewhat, attributed to the season and severe weather. Best demand is for bars and structurals, the latter reflecting extensive defense building projects. Prices are being reaffirmed in line with mill prices.

Chicago—Sales of warehouse products are being sustained and inquiries also are heavy. More and more business is coming from national defense. Greatest strength is in alloy and higher carbon grades.

Philadelphia — Warehouse sales are slightly heavier than a month ago, contrary to the usual seasonal trend. Continuation of present prices is indicated.

Buffalo — Distributors report difficulty in certain products as more breaks are appearing in stock sizes. Demand continues to hold at the top.

Detroit — Warehouse sales continue strong. November sales generally were the highest of any month in the year, and indications point to this rate holding in December.

Cincinnati—Warehouse activity is unabated, with possibility that the usual holiday tapering will be avoided. Individual orders are heavier on business coming to jobbers by mill delays.

St. Louis—Business of steel warehouses, which has moved steadily upward since last spring, recorded its best month in November. Carlot shipments are more frequent.

Steel in Europe

Foreign Steel Prices, Page 99

London—(*By Cable*)—The hematate pig iron situation in Great Britain is improved by increased domestic output and larger imports. Scrap now is plentiful, helping the foundry iron position. North African iron ore is arriving well and coke supply is ample. Steel output is completely booked into early next year. The billet position is satisfactory. A South American buyer has placed large orders for tin plate for use in oil containers.

Ferroalloys

Ferroalloy Prices, Page 98

New York—Ferroalloy shipments continue at a high rate, with prices generally holding at the levels reaffirmed early in November. Ferromanganese is quotable at $120, duty paid, Atlantic and Gulf ports, and domestic spiegeleisen, among other major items, at $36, Palmerton, Pa., for 19 to 21 per cent material, and $49.50 for 26 to 28 per cent.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 97

Cleveland — First quarter prices on bolts, nuts and rivets have been reaffirmed, though no announcement has been made on stove bolts and machine screws. November sales were somewhat less than in October, but a good backlog of orders enables makers to continue at 80 per cent operations. Further tapering of demand is expected this month.

Industry Asks Curb on Nonmilitary Spending

■ Drastic curtailment of all nonmilitary governmental expenditures is keynote of recommendations in a report to be presented to the forty-fifth annual congress of American industry, at New York, this week. Prepared by the National Association of Manufacturers' committee on government finance, the report reiterates the association's position favoring wise and careful use of public funds to insure maximum defensive strength.

United States congress is called upon to establish a "competent, impartial commission to review and to make recommendations" on four broad financial fronts: Relations of expenditures to appropriations; means of financing governmental expenditures, both defense and nondefense; changes needed in the tax laws; and possible economies in nondefense expenditures.

Reports on Steel's Capital Requirements

■ National resources committee, a government agency, has published a pamphlet entitled, *Capital Requirements, a Study in Methods as Applied to the Iron and Steel Industry.*

The study attempts to estimate the amount of expansion that would be necessary should the United States attain several levels of consumer income. It concludes that to satisfy an 83 billion dollar economy, little expansion and no outside financing would be necessary. To satisfy an economy with 89 or 94 billion dollar national incomes would require outside financing to the extent of 250 and 750 million dollars, respectively.

Copies of the study are available from the superintendent of documents, Washington, at 20 cents each.

Semifinished Steel

Semifinished Prices, Page 97

Pittsburgh—British buying continues the principal consideration in semifinished steel. Tonnage moving to Britain during the first quarter will be substantially more than that during the current quarter, if present plans are carried out. The tonnage being sent to Britain alone is equal to, or greater than the normal amount of semifinished produced for the market. This means that integrated producers have been forced to rob their own finishing mills of material, which accounts for lower production rates on finishing mills in this district than on ingot production.

Nonferrous Metal Prices

	Copper										
Nov.	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Future	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
30	12.00	12.00	11.87½	50.20	50.10	5.65	5.50	7.25	17.00	14.00	35.00
Dec.											
2	12.00	12.00	11.87½	50.20	50.05	5.50	5.35	7.25	17.00	14.00	35.00
3	12.00	12.00	11.75	50.20	50.05	5.50	5.35	7.25	17.00	14.00	35.00
4	12.00	12.00	11.75	50.20	50.05	5.50	5.35	7.25	17.00	14.00	35.00
5	12.00	12.00	11.75	50.20	50.05	5.50	5.35	7.25	17.00	14.00	35.00
6	12.00	12.00	11.75	50.20	50.05	5.50	5.35	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.23
Copper, hot rolled	20.62
Lead, cut to jobbers	8.75
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	21.98
Seamless copper	21.12

Rods

High yellow brass	14.76
Copper, hot rolled	17.12

Anodes

Copper, untrimmed	17.87

Wire

Yellow brass (high)	19.48

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	8.00-8.25
Cleveland	8.62½-9.12½
Chicago	8.25-8.50
St. Louis	8.37½

Heavy Copper and Wire

New York, No. 1	9.62½-9.87½
Cleveland, No. 1	9.37½-9.87½
Chicago, No. 1	9.50-9.75
St. Louis	9.37½-9.50

Composition Brass Turnings

New York	7.62½-7.87½

Light Copper

New York	7.62½-7.87½
Cleveland	7.37½-7.87½
Chicago	7.50-7.75
St. Louis	7.37½-7.50

Light Brass

Cleveland	4.12½-4.37½
Chicago	5.50-5.75
St. Louis	4.87½

Lead

New York	4.60-4.70
Cleveland	4.00-4.25
Chicago	4.25-4.50
St. Louis	4.00-4.25

Zinc

New York	5.25-5.50
Cleveland	3.50-3.75
St. Louis	3.50-3.75

Aluminum

Mis., cast, Cleveland	9.25-9.50
Borings, Cleveland	6.50
Clips, soft, Cleveland	14.25
Misc. cast, St. Louis	7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	13.25
Standard No. 12 aluminum	15.00-15.50

Nonferrous Metals

New York—Activity in most nonferrous metal markets is restricted only by the amount of metal available for sale or shipment. Consumers are taking all that is offered because they need it and expect to need even larger tonnages in the near future. A 15-point drop in lead was the only price change last week.

Copper—Visible supplies of domestic refined copper declined 20,000 tons last month to an estimated total of only 145,000 tons, equal to less than one and one-half months' requirements. Both consumption and shipments are maintaining record rates. Electrolytic is quoted 12.00c, Connecticut, by mine producers, 12.25c by custom smelters, and 12.12½c to 12.25c by brokers. Sales during the first four days of the week totaled 17,160 tons compared with only 25,057 tons and 20,305 tons during all of January and March, respectively. The market appears quiet, therefore, only in comparison with the recent huge buying waves.

Lead—Sales have dropped below production but shipments are still in excess of the output rate. Producers have only two weeks' supplies on hand but large stocks of foreign metal will avert any shortage. Prices eased $3 a ton on Monday to the basis of 5.50c, New York, and 5.35c, East St. Louis.

Zinc—Very little zinc is available at any price for delivery before February or March. Galvanizing operations have risen to 83 per cent of capacity and would be higher if sufficient zinc were available. Prime western held at 7.25c, East St. Louis.

Tin—Metals Reserve Co. was offered tin every day last week as prices held at 50.00c, c.i.f., the government's standing bid price. Sales of consumers tapered, however, as the week progressed.

Ryerson Now Stocks S.A.E. 4640 Gear Steel

Joseph T. Ryerson & Son Inc., Chicago, now carries in stock for immediate shipment S. A. E. 4640 steel in hot-rolled annealed rounds, from one to five inches, for manufacture of gears. In addition to gear use this steel is recommended for arbors, racks, worms, boring bars, spindles, clutches, piston rods, bolts, studs, ratchets, pins and other applications where resistance to shock and greater toughness are

necessary at relatively high hardness.

The company recommends it for these uses because of high fatigue resistance, toughness and ability to attain a high degree of hardness with minimum distortion in heat treating. It shows higher impact resistance at high hardness than other 0.40 carbon alloy steels in the same or slightly lower price range.

Equipment

New York — With deliveries extended into 1942 on some types of machine tools, new orders under the voluntary priority procedure are unabated with shops generally on an overtime capacity basis. Flow of supplies entering into machine tool building is steady and ample, including steel, but some broadening of the base on sources for materials is apparent, notably castings. Instances where normally castings were supplied by one or two foundries now reveal four or five are contributing to casting requirements. Not only are shops producing machine tools filled with work, but those manufacturing small tools, gages, heat-treating equipment and electrical accessories for machinery have heavy backlogs. Orders for overhead electric, jib and other types of cranes and hoists are the heaviest in years and demand for forging equipment is taxing that branch of the industry.

Seattle — Pacific Northwest dealers report a steady volume of business, some complaint being heard of slow deliveries. Both stock and factory items are moving freely. Puget Sound navy yard will open bids Dec. 30 for three transformers, switchgear, relay cables and other items. Puget Sound Navigation Co. has purchased two 2800-horsepower Busch-Sulzer diesel engines for installation in local ferries. Denver opened bids Dec. 2 for furnishing six 230-volt circuit breakers, 13 disconnecting switches for Coulee main power plant. Berger Engine Works, Seattle, is low at $18,484, for furnishing three drum hoists to Bonneville project.

Construction and Enterprise

Michigan

BATTLE CREEK, MICH.—Duplex Printing Press Co. is having plans made by Edwin Tuttle, Battle Creek, for an addition to its plant.

CHELSEA, MICH.—Peninsular Furnace & Foundry Co. has been incorporated with $25,000 capital to manufacture iron and metal products, by James D. McKnight, 730 Whitmore street, Detroit.

DETROIT — Atlas Foundry Co., 131 South Livernois street, has plans by Maul & Lentz, 1257 David Whitney building, for a one-story foundry addition, to cost about $40,000.

DETROIT—Snyder Tool & Engineering Co., 3400 East Lafayette avenue, will build a one-story 90 x 138-foot plant.

■ **Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 116 and Reinforcing Bars Pending on page 118 of this issue.**

General contract has been given to Darin & Armstrong, Fenkell avenue, at about $60,000.

DETROIT — Anger Mfg. Co., 25900 Lahser road, has been incorporated to manufacture dies, with $10,000 capital, by Otto H. Anger, 1029 Ferdinand avenue, Detroit.

DETROIT—Federal Engineering Co. has given contract to the Austin Co., Detroit, for a $30,000 plant addition.

DETROIT—Weltronic Corp., Detroit, has given a contract to the Austin Co., Detroit, for a $15,000 addition to its plant.

DETROIT—Superior Tool & Die Co. has given the Austin Co., Detroit, contract for a new $150,000 plant.

DETROIT—Continental Aviation & Engineering Corp. is having plans prepared by Giffels & Vallet Inc., Detroit, for eight run-in buildings and four final-test buildings.

GRAND RAPIDS, MICH. — National Brass Co. has given general contract to Osternik Construction Co., Grand Rapids, for an addition and alterations to its plant. (Noted Nov. 4.)

MIDLAND, MICH.—Dow Chemical Co. has let contract to Austin Co., Detroit, for two buildings at its plant at Bay City, Mich.

MILAN, MICH.—Ideal Furnace Co. plans rebuilding of its burned foundry at cost of about $200,000.

TRENTON, MICH.—Monsanto Chemical Co., 1700 South Second street, St. Louis, is having plans prepared for a powerhouse at its new chemical plant here, the entire project costing about $3,000,000. Harley & Ellington, Stroh building, Detroit, are architects.

Connecticut

BRIDGEPORT, CONN.—Apex Tool Co. Inc., 50 Rimer street, has let general contract for a one-story 72 x 133-foot factory unit on Cherry street to C. Stalhammer, 329 Mapledale place, to cost about $40,000. Pakras & Lyon, 211 State street, Bridgeport, are engineers.

BRIDGEPORT, CONN.—Peerless Aluminum Casting Co. is building a one-story foundry 42 x 150 feet, estimated to cost $50,000.

BRIDGEPORT, CONN.—United Illuminating Co. is building a power plant addition and steel tower 100 x 200 feet at estimated cost of $40,000.

FAIRFIELD, CONN.—Bullard Co., 286 Canfield avenue, Bridgeport, Conn., has let contract to Turner Construction Co., 420 Lexington avenue, New York, for three brick and steel plant additions, to cost about $55,000.

HAMDEN, CONN. — Botwinik Bros., New Haven, are building a one-story machine tool plant 105 x 725 feet, to cost about $200,000.

HARTFORD, CONN.—Hartford Electric Steel Corp. is building a one-story manufacturing plant addition 20 x 120 feet.

HARTFORD, CONN.—Maxim Silencer Co. is building a two-story manufacturing unit 40 x 52 feet.

HARTFORD, CONN. — Colt's Patent Fire Arms Mfg. Co., 17 Van Dyke avenue, plans expansion of its plant for

production of defense munitions. War department, Washington will supply $8,000,000 for the project, most being for machinery and equipment.

MILFORD, CONN.—Waterbury Lock & Specialty Co., 203 Broad street, J. E. Peterson, president, will build a two-story 45 x 165-foot plant addition costing more than $40,000.

NEW BRITAIN, CONN.—Corbin Screw Corp., division of American Hardware Corp., is building a brick and steel plant addition to cost about $50,000.

NEW LONDON, CONN.—New London Terminal Co., Eastern Point road, plans an oil terminal to be built next spring, including tank storage, pump house, boiler plant, wharves, etc. L. Caproni, 1221 Chapel street, is engineer.

PLAINVILLE, CONN.—Standard Steel & Bearings Co. Inc. is building a brick and steel factory addition to cost about $40,000.

SHELTON, CONN.—Chromium Process Co. has awarded contract for a two-story 42 x 65-foot addition to M. Durrschmidt, Main street, Derby, Conn.

Massachusetts

ATTLEBORO, MASS. — Mossberg Pressed Steel Corp., 81 West street, Providence, R. I., is building a two-story plant addition and altering present plant. General contract to Rowley Construction Co., 260 Central avenue, Pawtucket, R. I. M. F. MacIntosh, 44 Franklin street, Providence, R. I., is architect.

PITTSFIELD, MASS.—General Electric Co., Morningside street, has let general contract for a one-story 350 x 800-foot steel frame gun director manufacturing unit to Stone & Webster Inc., 49 Federal street, Boston.

New York

ELMHURST, N. Y.—Pelotti Corp., care A. Emil, 170 Broadway, New York, will build a three-story plant to manufacture precision instruments for aircraft at 15-33 Sixty-ninth street; general contract to Austin Co., 19 Rector street, New York, at cost of about $65,000.

New Jersey

TRENTON, N. J.—American Radiator & Sanitary Mfg. Co., Klockner road, is having plans made by Prack & Prack, Federal street, Pittsburgh, for 270 x 560-foot, 211 x 240-foot and 300 x 520-foot additions at cost of about $1,000,000.

Ohio

MEDINA, O.—Medina Body Works, Walter Vedder, proprietor, Court street, will replace present plant by new building 50 x 70 feet and install electric welder and electric eye for focusing headlights.

SALEM, O.—John H. Gonda, recently resigned as chief engineer of Mullins Mfg. Co., has formed Gonda Engineering Co. and has established office and shop in Jessop pattern shop.

SPRINGFIELD, O.—Steel Products Engineering Co., 20 North Dakota avenue, will build a one-story plant addition. General contract has been given to Knowlton Construction Co., Bowling Green, O., at about $75,000. L. J. Zeller, Columbia building, is architect.

SPRINGFIELD, O.—Springfield Aluminum Plate & Castings Co., E. A. Parker, president, will build a furnace room 20 x 40 feet and small addition to storage space at 1524 South Yellow Springs street.

WARREN, O.—Copperweld Steel Co., will build a plant addition to house a 40-ton electric furnace and plant hospital. This will give company three 40-ton and one 6-ton furnaces.

YOUNGSTOWN, O.—United Engineering & Foundry Co., 319 South Phelps street, will build an addition to house construction of an unusually large forging press for the navy. Henry Mueller, at the company's Pittsburgh office, is construction engineer.

Pennsylvania

BRIDGEPORT, PA.—Summerill Tube Co., Fourth and Merion streets, A. J. Miranda, president, 6 East Forty-fifth streets, New York, will build a two-story 40 x 100-foot plant. General contract has been given D. L. Reiff, 15 East Airy street, Norristown, Pa. Crawford & Friend, Norristown Penn Trust building, Norristown, Pa., architects. Cost about $40,000.

BRISTOL, PA.—Fleetwings Inc., Radcliffe street, has plans by L. A. Riegel, East Hanover street, Trenton, N. J., for an airplane factory costing about $200,000.

CORRY, PA.—Aero Supply Mfg. Co., 611 West Main street, will build a two-story 125 x 190-foot addition costing about $150,000. Mayers & Johnson, Commerce building, Erie, Pa., are architects.

SHARON, PA.—Carnegie-Illinois Steel Corp., Pittsburgh, will convert tin mill at Sharon into tank armor plate plant by remodeling and installation of new equipment. F. B. Quigley is plant manager.

Illinois

CHICAGO—Armstrong, Bray & Co., 308 North Loomis street, manufacturer of steel belt lacing, plans a machine shop at Northwest highway and Menard street.

CHICAGO—Ingersoll Steel & Disc division, Borg-Warner Corp., will build a new plant at West Pullman, Ill., for the manufacture of shell cases for the defense program.

CHICAGO — Russakov Can Co., 850 North Carpenter street, will build a two-story 148 x 160-foot top addition at 2001 West Pershing road, at cost of about $50,000. A. Epstein, same address, is architect.

HARVEY, ILL.—Buda Co., 154th street, will build a plant addition costing $500,000.

PEORIA, ILL.—National Cylinder Gas Co. has let general contract for a new plant to G. D. Johnson, Peoria, at estimated cost of $100,000.

ROCKFORD, ILL.—W. F. & John Barnes Co., 401 South Water street, plans an addition 170 x 215 feet to its machine tool plant, with electrical equipment, costing about $125,000 with equipment. Austin Co., 16112 Euclid avenue, Cleveland, has contract for design and erection. Cost estimated about $90,000.

Delaware

NEW CASTLE, DEL.—Bellanca Aircraft Corp. will build a plant costing about $100,000. A. Haiduck, care the owner, is chief engineer.

NEWARK, DEL.—Board of directors, University of Delaware, Walter Hullinen, president, are considering erection of a powerhouse for central heating service at cost of about $150,000.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will receive bids as follows: Dec. 17, schedule 4276, four motor-driven ram-type universal milling machines for Wickford, R. I., Quantico, Va., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 4278 five motor-driven turret lathes for Mare Island, Calif.; schedule 4280, three motor-driven universal shapers for Wickford, R. I., Jacksonville, Fla., Corpus Christi, Tex.; schedule 4291, motor-driven precision lathe for Corpus Christi, Tex.; schedule 4283, three motor-driven universal grinders for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 4288, three motor-driven universal tool grinders for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 4289, seven motor-driven bench shapers for various deliveries; schedule 4290, pipe flanging machine for Charleston, S. C.; schedule 4291, four motor-driven drilling machines for Wickford, R. I., Quantico, Va., Jacksonville, Fla., Corpus Christi, Tex.;

schedule 4300, three motor-driven vertical boring mills for Mare Island, Calif.; schedule 4314, three motor-driven shearing machines for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 4315, three motor-driven testing machines for Wickford, R. I., Jacksonville, Fla., and Corpus Christi, Tex.; schedule 4319, three motor-driven hacksaws for Wickford, R. I., Jacksonville, Fla., Corpus Christi, Tex.; schedule 4320, three motor-driven metal-cutting shapers, same destinations; schedule 4323, four motor-driven automatic screw machines for various deliveries; schedule 4324, four motor-driven vertical boring mills for various deliveries; schedule 4327, four motor-driven hydraulic surface grinders for various deliveries; schedule 4328, six motor-driven hydraulic shaper-planers for various deliveries; schedule 4362, motor-driven ram-type universal milling machine for submarine base, Connecticut.

Georgia

MACON, GA.—Reynolds Metal Co., A. C. Linoff, general manager, Federal Reserve building, Richmond, Va., will build a munitions plant costing about $1,000,000. E. H. Miller, care owner, is engineer.

Tennessee

MARYVILLE, TENN.—Aluminum Co. of America, Pittsburgh, will build sheet mill near McGhee Tyson airport, as large as company's present plant at Alcoa, Tenn. E. M. Chandler is superintendent of aluminum fabricating plant at Alcoa.

Missouri

NORTH KANSAS CITY, MO.—American Brake Shoe & Foundry Co., Fifteenth and Macon streets, will build two-story plant addition 31 x 71 feet and will install boiler and heating system.

ST. LOUIS—Sterling Aluminum Products Inc., 2925 North Market street, has awarded general contract to John Hill Construction Co., Syndicate Trust building, for two-story 81 x 112-foot addition. Cost with equipment estimated at $40,000. (Noted Nov. 18.)

Wisconsin

LA CROSSE, WIS. — La Crosse Steel Roofing & Corrugating Co., manufacturer of sheet metal products, has given contract to Peter Nelson & Son for a two-story plant addition.

MILWAUKEE—Allen Bradley Co., 136 West Greenfield avenue, will build a six-story factory addition costing about $200,000.

Minnesota

MINNEAPOLIS—Foley Mfg. Co., W. M. Ringer, president, manufacturer of saws and saw-filing machinery, 11 Main street N.E., is building a one-story plant addition 40 x 86 feet.

ST. PAUL—Stainless Steel Products Co., 964 Berry avenue, has given general contract to M. A. Anderson, 3332 Thirty-second avenue South, Minneapolis, for a one-story factory addition 40 x 128 feet.

Nebraska

OMAHA—Omaha Steel Works plans erection of a machine shop, 55 x 300 feet, and an auxiliary building, 40 x 75 feet.

Iowa

AUDUBON, IOWA—City plans municipal light and power plant. Henry Curtis is city clerk. Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, is engineer.

DES MOINES, IOWA—Iowa Packing Co., Eighteenth avenue and Maury street S.E., will build a boiler plant addition 26 x 42 feet and install additional boiler equipment.

DUBUQUE, IOWA—Klauer Mfg. Co., manufacturer of metal culverts, sheet metal building products and snow plows, has given general contract to R. F. Conlon Sons Construction Co. for a one-story factory addition to its snow plow plant, 96 x 100 feet.

PAULLINA, IOWA — City plans construction of a municipal light and power plant. George W. Harris is city clerk.

California

LOS ANGELES—Texas Co. will build gasoline refinery at Los Angeles harbor, costing $1,000,000.

LOS ANGELES—Soule Steel Co. will build a plant addition at 6200 Wilmington avenue, 34 x 80 feet, costing $20,000.

LOS ANGELES—Wells Aircraft Parts Co. will build machine shop at 4140 Whiteside avenue, 93 x 150 feet, costing $17,000.

LOS ANGELES—Crosby Aircraft Corp. has been incorporated with $100,000 capital and is represented by Orville A. Rogers, 416 West Eighth street, Los Angeles.

LOS ANGELES—Los Angeles Shipbuilding & Dry Dock Co. will recondition shipway No. 1 and erect crane structures for handling steel.

SANTA PAULA, CALIF.—Anacapa Aircraft Corp. will build plant at Santa Paula airport for manufacture of primary and basic training planes, to be in operation by Feb. 1, employing 100 men.

TORRANCE, CALIF.—National Supply Co., manufacturer of pipe and oil tools, will build an addition to its plant at 1524 Border avenue, two stories, costing $41,000.

Washington

SEATTLE—J. A. McEachren Co. will build paint-shop, warehouse and machine shop, $10,000 and $60,000, respectively, the latter 150 x 175 feet, for navy at plant of Seattle-Tacoma Shipbuilding Co., Harbor Island, where 20 destroyers are to be built.

SEATTLE—Dulien Steel Products Co. has bought Rottler Boring Bar Co. plant, 1122 West Spokane street, buildings and machinery at Treasure Island exposition grounds, San Francisco, and 130 miles of 70 and 80-pound relaying rails from the Gilmore & Pittsburg railway in California.

Canada

VANCOUVER, B. C.—Department of munitions and supply, Ottawa, Ont., has awarded general contract to Carter-Halls-Aldinger Co. for erection of airplane plant here costing $1,355,000, to be operated by Boeing Aircraft Co.

LONDON, ONT.—Kelvinator of Canada Ltd., Dundas street East, will build plant addition and office building costing $75,000. London Structural Steel Co. has been awarded structural steel.

LONG BRANCH, ONT.—Department of munitions and supply, Ottawa, Ont., has let general contract to Anglin-Norcross Ontario Ltd., 37 Bloor street West, Toronto, for an ordnance building here with 100,000 square feet floor. Plans call for duplicate unit later. Allward & Guinlock, 57 Bloor street West, Toronto, are architects.

ST. CATHARINES, ONT.—English Electric Co. of Canada Ltd., George street, manufacturer of electrical equipment, will build plant addition costing $75,000 on plans by T. H. Wiley, 186 St. Paul street.

WELLAND, ONT.—Atlas Steels Ltd., Main street East, will build a plant addition costing about $100,000.

LONGUEUIL, QUE.—Denis Viger, town hall, is taking bids on pumping and filtration plant costing $20,000. Adrien Piamondon, 369 Mount Royal avenue, Montreal, is consulting engineer.

MONTREAL, QUE.—Montreal Locomotive Works has started preliminary work in connection with a plant addition 400 x 800 feet, costing about $200,000.

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Federal Works Agency, Public Buildings Administration, Washington, D. C., Nov. 26, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Dec. 17, 1940, for construction of the F. C. C. Radio Monitoring Station, Allegan, Mich. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

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