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STEEL

ESTABLISHED 1882

Contents

Volume 106—No. 11 **March 11, 1940**

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views The News

■ STEEL production last week (p. 17) declined 2 points, to 63.5 per cent of ingot capacity. Further drops are anticipated unless the volume of buying improves. An important part of current requirements continues to be supplied from inventories at consumer plants. In general, prospects for steel consumption over the next few months (p. 13) are fair. Too, the decline in STEEL's index of industrial activity (p. 35) has been arrested, at least for the present. Under existing circumstances last week's reaffirmation of steel prices for second quarter had no marked effects. Brightest spot is export buying which (p. 83) is at the highest level since 1918.

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See Normal Ore Stocks

While the steel industry apparently is in no danger of government interference on account of the multiple basing points pricing system, this practice (p. 34) continues under suspicion in some government quarters. It would be fine, from the standpoint of public relations, if this controversy could be eliminated permanently. Question: Can the steel industry solve this problem? Iron ore stocks (p. 30) at lower lake docks and furnaces as of May 1 probably will exceed 15,000,000 gross tons, or close to a normal carryover. . . . A new hot-rolled steel channel section (p. 33) has been designed especially for use in fabricating welded steel staircases.

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New Terms For Steel

Chief event at Washington last week was proposal by a majority of the Smith committee (p. 23) for radical changes in the national labor relations act and its administration. Chances for revision in house are considered good, in senate not so good . . . . "We believe," says a well-known authority, "that metallurgists in the near future (p. 28) will see the advantage of referring to steels in terms of hardness produced at various quenching speeds, and to parts to be heat treated in terms of cooling speeds." . . . The navy (p. 23) is trying a policy of buying steel six months ahead. . . . Job security is the subject of pertinent remarks by Mr. Grace (p. 18) to Bethlehem employes.

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Shell Making Described

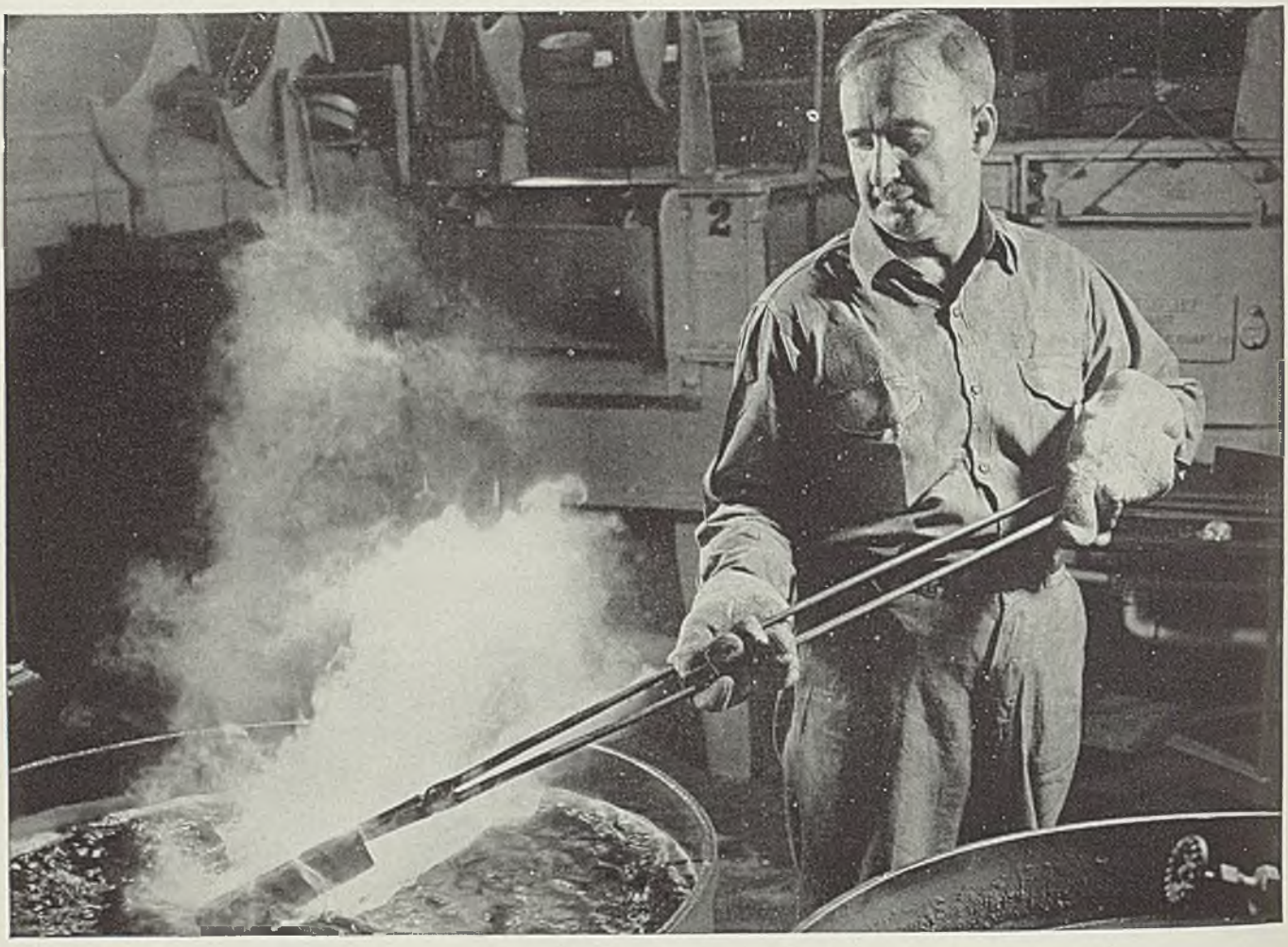
United States arsenals serve two purposes. They make available a supply of munitions for proving-ground work and they develop approved manufacturing methods. STEEL describes (p. 38) the shell manufacturing technique in use at Frankford arsenal. . . . The die casting process affords designers wide latitude (p. 42) in combining two or more parts into one integral unit. . . . In reporting on progress with the coercimeter (p. 44) the bureau of mines discusses a new method of determining carbon in high-carbon steels. It also reports an advance in desulphurization of blast furnace iron and cupola iron by treatment with calcium carbide; a pilot plant has been established.

• • •

Rolls Various Type Metals

A new 16 x 16-inch two-high mill (p. 48) performs a complete range of rolling, from breakdown to finishing, on different metals. . . . Removal of cutting oils, drawing compounds, buffing rouges and waxes from processed and fabricated metal parts is simplified (p. 51) by a new portable degreaser. . . . A new tube welding method (p. 52) produces welds whose grain structure is indistinguishable from that in the parent metal. . . . New equipment (p. 77) makes it easier to spotweld in difficult locations. . . . Recent developments (p. 60) permit superior preparation of plate edges for welding, and at higher speed and lower cost. . . . New seamless tubing (p. 78) is knitted in any shape from wire.

E C Kreutzberg



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CYCLE COMPLETE . . . . WHAT OF OUTLOOK?

By W. G. GUDE
Associate Editor, STEEL

Steelmaking back where it started to rise last September. Possibilities for spring months fair to good with European war still a major factor

■ SIX MONTHS AGO the steel industry was embarking on a swiftly ascending spiral of sales and production. Ingot output the last week of August was 64 per cent of capacity; in November it averaged 93.3 per cent. Today steelmaking is back to where it started its bulge of last fall, thereby completing a cycle which from the standpoint of rapidity and extent of expansion and contraction has never before been equalled. What of the future?

Obviously, only a seer would attempt to forecast the exact trend of business activity in coming months. Many factors complicate the outlook and each is capable of affecting industrial operations in varying degree. By examining these various factors, however, one may draw some conclusions as to the possibilities, if not the probabilities, of the future.

Most considerations of the business outlook necessarily must be made with allowance for influence of the European war. The outbreak of hostilities was responsible to no small extent for the elevated level to which domestic steel sales and production ascended last fall, but the fact steelmaking has returned to its pre-war status does not mean that effects of the international situation have been entirely dissipated.

The war influence still is very much evident in foreign sales of iron and steel products. As indicated by the chart on page 14, the trend of exports has been consistently upward since last August and for several months has moved counter to the trend of production. January shipments abroad reached a volume somewhat suggestive of activity attained during the last major war in Europe, although iron and steel foreign trade remains well below the peak of the 1914-1919 period.

It is interesting to note that exports the past six months have been more active than during the corresponding period of the 1914 conflict. Shipments in 1939, excluding scrap, totaled 2,500,000 tons, against 1,516,000 tons in 1914. The 1915 movement was 3,453,000 tons, an average of less than 300,000 tons monthly, whereas the average for the first five months of the present war was 324,602 tons. Should exports this year maintain the December-January average, the 1940 total would be 4,750,000 tons.

Comparisons with previous annual figures are given in the accompanying table. Because of wide fluctiations in pig iron shipments in several recent years, separate data are given for this commodity as well as for iron and steel combined.

UNITED STATES EXPORTS
(Excluding Scrap)

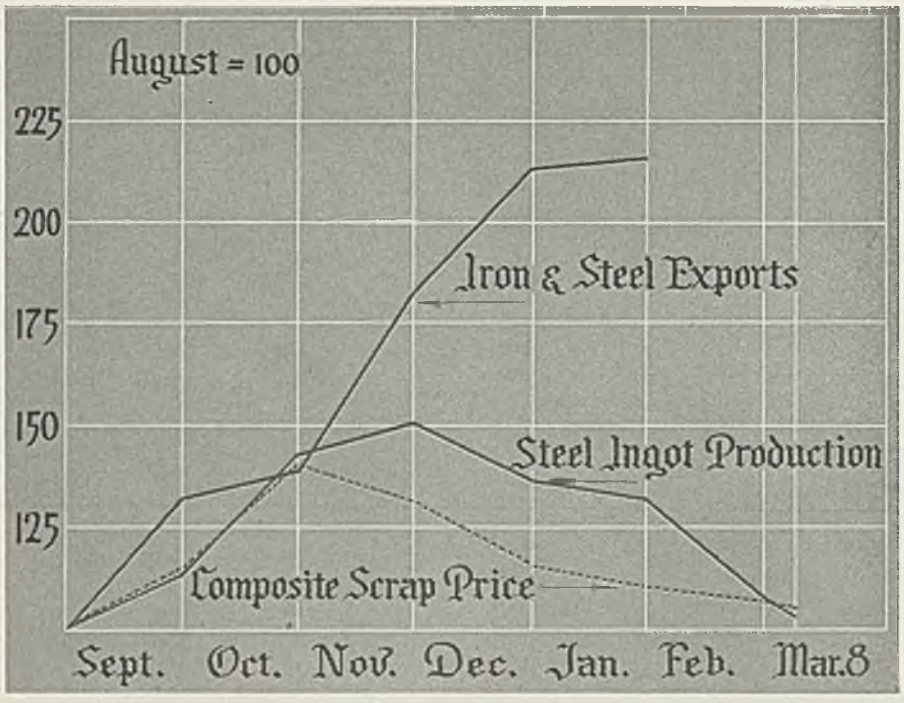
	Iron and Steel	Pig Iron
1913	2,648,000	278,000
1914	1,516,000	114,000
1915	3,453,000	224,000
1916	5,889,000	607,000
1917	6,293,000	655,000
1918	5,373,000	270,000
1919	4,372,000	321,000
1929	2,481,000	46,000
1936	1,233,000	5,000
1937	3,475,000	782,000
1938	2,149,000	433,000
1939	2,500,000	177,000

It is apparent that continuation of an important share of foreign demand depends on extension of the war. Whether quickening in actual hostilities this spring will have any marked effect on steel business from England and France is questionable, but relatively active markets in neutral countries appear in prospect so long as European belligerents are prevented from devoting their undivided attention to foreign trade.

Abrupt ending of the war—currently regarded as remote as was the prospect seven months ago that war was imminent—probably would have a psychological effect on domestic steel buyers, the result of which would be an opposite, although less intense, reaction compared with that of last September. Some industries, particularly machine tools and aircraft, would be harder hit than steel by termination of the war. Under existing conditions they appear assured of intense activity for many months.

Despite the important influence of the European unpleasantness the question of whether our domestic economy will relapse or revive hinges principally on developments at home. Here again a circumstance presents itself which may affect business sentiment sufficiently to be directly reflected in industrial activity. This factor is politics.

Every four years figures are revived to demonstrate the trend of business in past election years. These data provide no conclusive evidence that the November balloting and the campaign preceding it are invariably bad for industry, but in view of the more or less strained relationship between business and the national administra-



■ Steel ingot production and scrap prices are back to average levels of last August, but the war influence still is apparent in iron and steel exports

tion it is natural to expect political developments of coming months to have more than usual influence on commerce.

What are the prospects for the major steel consuming industries? Automobiles, railroads, containers and building and engineering construction, usually taking close to 50 per cent of total output, are considered the backbone of steel demand and to a large extent set the pace for buyers accounting for the remaining 50 per cent.

The motor industry has made a highly favorable production record since introduction of its current models last fall. If past experience may be accepted as a criterion, a relatively good calendar year is in prospect, since the trend of sales during the early part of a model season in a general way provides a clue to what may be expected in remaining months.

Statistics Misleading

Automobile production statistics may be somewhat misleading in comparisons with previous periods. January output, for instance, was the largest in history for that month, but until a few years ago new models were not introduced until December or January, consequently the latter month formerly was a period in which assemblies normally were rather low.

Automobile output this quarter may approximate that of the corresponding 1937 period—1,302.108 units. Considering that total 1937 production was the second largest in history and that dealers in many areas this winter have had to contend with unusually disagreeable weather, this showing may be considered gratifying. However, allowance should be made for the fact early-1937 assemblies were retarded by labor troubles and that a less favorable comparison is likely during the second quarter.

Stocks of new automobiles are large—possibly 475,000 to 500,000 units, compared with less than 450,000 a year ago. Both production and retail sales have shown a greater margin than this compared with 1939, but inventories last year also were somewhat excessive. This was reflected in the downward course of assemblies in April and May, normally the industry's most active selling season. Barring an unexpected slackening in spring sales, however, automotive operations should continue at the best pace in three years, even though the upturn the next 60 days may be less vigorous than in 1937 or 1936.

Most railroads have been marking time in purchases of equipment and repair material since their active buying of last fall. This probably was to be expected since delivery has yet to be made against a large part of these old commitments. On Feb. 1 the roads still had 34,559 new freight cars on order, against 6637 a year ago. A substantial tonnage of rails placed several months ago also remains to be delivered.

Unless additional orders are forthcoming unfilled business in freight cars will be scant within a few months. Car material backlogs of steel producers already have been pared considerably. Meanwhile, the carriers are experiencing fairly good earnings, despite the fact freight traffic so far this year has been retarded by moderation in the industrial tempo. Net railway operating income for January, latest figure available, was the largest for that month since 1930, exceeding 1939 earnings by 38.5 per cent and 1937 by 17.2 per cent.

Since capital expenditures by the railroads necessarily are predicated on income, a continuation of favorable earnings would be expected to stimulate the carrying out of additional equipment buying programs to compensate for the deferred maintenance accumulated in past years.

Building and engineering construction got away to a rather slow start this year, but awards of structural and reinforcing steel have been picking up lately. The weather has been an adverse factor in some instances. Public works activity is tapering, but private residential construction is promising. Total steel requirements of the industry this year should compare closely with 1939 figures.

Larger cash farm income is indicated the first half of 1940 than a year ago. This has favorable implications for sales of not only implements and tractors, galvanized sheets and wire products, but also of automobiles and other manufactured goods. The war so far has been a negative factor in solving the farm problem.

Like the machine tool and aircraft industries, shipbuilders are booked far ahead and will provide a sizable outlet for certain steel products throughout the year. This demand is not dependent on the war's continuation, current shipbuilding being almost entirely for the United States navy and commercial purposes.

Tin Plate Lagging

Tin plate production has lagged so far this year, influenced partly by heavy operations of late 1939. Additional time may be required for absorption of what excess stocks of plate and containers are in the hands of canmakers and canners but there appears good reason for expecting 1940 tin plate output to equal, if not exceed slightly, that of last year.

For six months domestic steel buying has been out of line with consumption. The tendency lately has been toward a closer relationship, this accompanying a curtailment in consumer inventories and mill backlogs. Conditions relating to delivery and prices have discouraged forward buying, the converse of the situation six months ago.

With current needs of steel users being filled partly from stocks it is probable that actual requirements are fairly close to the now prevailing level of ingot production. Since

(*Please turn to Page* 106)

War Orders Bring Canadian Steel Mill Activity to All-Time Record

TORONTO, ONT.

■ CONTINUED placing of war contracts has resulted in sharp production increase by Canadian iron and steel mills. January output set a new high for the Dominion, surpassing previous monthly record, made in 1918.

Pig iron production totaled 104,703 gross tons, compared with 94,620 in December and 57,660 in January, 1939. Output included 87,826 tons of basic, 12,533 of foundry iron and 4344 of malleable iron.

January production was obtained from eight blast furnaces, out of ten in Canada.

Output of ferroalloys, 8065 gross tons in January, compared with 10,494 in previous month and 2855 in January, a year ago.

Steel ingot production and direct steel castings reached an all-time high at 166,496 gross tons, against 150,062 in December and 78,198 in January, 1938.

Shipbuilding contracts for 14 mine sweepers totaling more than $7,500,000, were placed with British Columbia builders, according to Transport Minister Howe. Mine sweepers, to cost $620,000 each, will be built by North Vancouver Ship Repairs Ltd., North Vancouver, with orders for two; Burrard Drydock Ltd., Esquimalt, with orders for four; Victoria Machinery Depot, and Yarrows Ltd., Victoria, six; and Prince Rupert Shipyards, two.

Officials state preliminary work has been started on the extensive shipbuilding program, but steel has not yet arrived and actual construction cannot be undertaken for at least a month. It is reported initial deliveries will be from Pittsburgh. Subsequent supply may come from eastern Canada, depending on speed with which it can be delivered.

Donald M. Service, general manager, North Vancouver Ship Repairs Ltd., states Vancouver Iron Works Ltd. has been awarded contract on boilers for six mine sweepers. He also stated contract for engines has been awarded Canadian Allis-Chalmers Ltd., Toronto.

Official report from Ottawa states contracts have been placed by war supply board with Ford Motor Co. of Canada Ltd., Windsor, Ont., and General Motors of Canada Ltd., Oshawa, Ont., for 1600 army trucks each.

Other contracts placed last week totaled $1,064,259. Largest individual award was $175,766 for munitions, placed with Remington Arms Co. Inc., Bridgeport, Conn. Other orders: Aircraft supplies, Noorduyn Aviation Ltd., Montreal, $47,286; Fleet Aircraft Ltd., Ft. Erie, Ont., $18,829; Canadian Vickers Ltd., Montreal, Que., $10,843.

New Ferroalloy Plant To Start Production April 1

■ Production will start April 1 at the new Sheffield, Ala., ferroalloy plant of Electro Metallurgical Co., a unit of Union Carbide & Carbon Corp., 30 East Forty-second street, New York.

Plant will produce ferroalloys using materials made in electric furnaces with power from Tennessee valley authority.

Plan Machine and Tool Progress Show for 1941

■ Annual meeting of the American Society of Tool Engineers was held March 7-9 at the Hotel New Yorker, New York. In attendance were over 500 active members of the profession, from the United States and Canada.

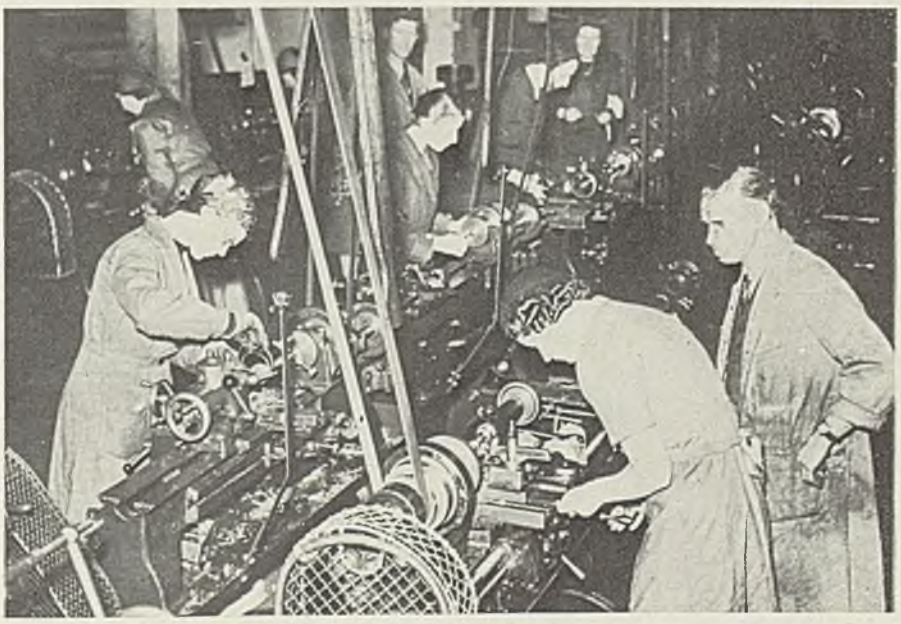
Seven technical sessions featured national authorities on timely subjects, including tooling for mass production of aircraft engines, precision gears and plastic parts, and also covered improved systems of tool engineering education.

Newly elected national officers installed at the annual dinner on Friday include: President, A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Conn.; first vice president, W. Dickett, proposal engineer, Sundstrand Machine Tool Co., Rockford, Ill.; second vice president, Eldred Rutzen, tool engineer, Cutler-Hammer Inc., Milwaukee; secretary, Conrad Hersam, consulting design engineer, Philadelphia; treasurer, Frank Crone, chief tool designer, Lincoln Motor Co., Detroit; executive secretary, Ford Lamb, Detroit. It was announced the society would conduct a Machine and Tool Progress exposition in connection with its meeting in Detroit in March, 1941.

■ First American stainless steel railway cars for export now are under construction in the E. G. Budd Philadelphia shops.

Delivery to the Portuguese National railway, which has ordered 28 of the American-built lightweight cars, is slated for early summer. Four of the cars will be completely assembled before shipment, the remaining 24 to be shipped knocked-down for assembly in Portugal under supervision of Budd company engineers.

Great Britain Calls Women to War Industries



■ Girl engineering students, responding to Winston Churchill's call for a million women needed in Britain's war industries, operating lathes at Paddington Technical institute, London. With 6,500,000 women already in paid employment in the United Kingdom, the London "Economist" estimates many more of the three or four million girls, widows and wives now unoccupied will be required to keep the proposed 2,500,000 conscripts in the field by end of 1940. Acme photo

January Steel Exports Hold Gain: War Changes Distribution Picture

■ JANUARY steel and iron exports, excluding scrap, totaled 396,064 gross tons valued at $31,153,365, compared with 394,035 tons valued at $30,099,593 in December, 1939, an increase of 2029 tons valued at $1,053,772, according to department of commerce. The corresponding figures for January, 1939, were 134,788 tons at a value of $10,214,547.

Shipments to European buyers increased from 72,657 tons in December to 109,957 tons in January, largely from increased purchases by the United Kingdom, the Netherlands and Norway. Trade with South America was slightly higher at 110,657 tons than that of December, 109,455 tons, increased shipments to Argentina and Brazil offsetting reductions in trade to Colombia, Peru and Venezuela.

These gains were offset by declines in other directions. Trade with North and Central America declined to 77,515 tons from 91,579 tons, principally because of smaller shipments to Canada. Exports to the Far East in January were 83,056 tons compared with 107,767 tons in December.

Leading individual markets in January were the United Kingdom, 45,675 tons against 22,020 in December; Canada, 43,966 tons against 50,504 tons; Argentina, 37,735 tons compared with 30,396 tons; Japan, 26,623 tons against 47,675 tons, and Brazil, 24,113 tons compared with 22,643 tons.

Tin plate exports, 64,301 tons, comprised the largest item, with nonalloy steel ingots second at 58,194 tons, including 32,222 tons to the United Kingdom, 17,081 tons to Japan and 5006 tons to Switzerland.

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

Articles	Jan. 1940	Dec. 1939	Jan. 1939
Pig iron	15,057	18,912	6,325
Ferromanganese and spiegeleisen	408	1,066	.....
Other ferroalloys	747	848	103
Ingots, blooms, etc:			
Not containing alloy	58,194	47,995	13,366
Alloy, incl. stainless	2,608	12,004	981
Steel bars, cold-fin.	2,761	2,153	1,290
Bars, iron	1,449	119	61
Bars, concrete	19,544	14,299	2,471
Other steel bars:			
Not containing alloy	22,577	22,049	6,921
Stainless steel	80	50	11
Alloy, not stainless	1,600	2,819	1,352
Wire rods	9,295	6,820	353
Boiler plate	642	1,278	1,118
Other plates, not fab.:			
Not containing alloy	21,316	26,237	9,751
Stainless steel	4	32	3
Alloy, not stainless	173	71	38
Skelp iron or steel	8,535	11,817	742
Sheets, galv. iron	984	854	429
Sheets, galv. steel	16,001	11,817	7,326
Sheets, "black" steel:			
Not containing alloy	30,569	26,432	24,268
Stainless steel	241	124	52
Alloy, not stainless	562	487	347
Sheets, black iron	2,491	2,361	576
Strip steel, cold-rolled:			
Not containing alloy	4,792	3,756	1,977
Stainless steel	97	39	56
Alloy, not stainless	40	83	11
Strip steel, hot-rolled:			
Not containing alloy	13,304	8,909	5,080
Stainless steel	3	5	100
Alloy, not stainless	35	80	1
Tin plate, taggers' tin	64,301	57,675	12,670
Terneplate	627	447	158
Tanks, except lined	1,957	4,997	1,442
Shapes, not fabricated	14,529	12,338	5,404
Shapes, fabricated	6,890	8,069	1,418
Plates, fabricated	2,107	2,528	147
Metal lath	125	235	79
Frames and sashes	164	161	41
Sheet piling	1,971	607	167
Rails, 60 lbs.	3,952	2,687	2,912
Rails, under 60 lbs.	723	2,128	85
Rails, relaying	1,154	1,626	182
Rail fastenings	381	458	642
Switches, frogs, crsgs.	381	187	183
Railroad spikes	491	530	107
R.R. bolts, nuts, etc.	369	207	73
Boiler tubes, seamless	1,539	3,952	385
Boiler tubes, welded	220	319	8
Pipe:			
Seamless casing, oil-line	13,641	14,009	3,229
Do., Welded	3,657	1,684	293
Seamless black	1,723	2,227	741
Pipe fittings:			
Mall. iron screwed	498	633	309
Cast-iron screwed	281	264	85
Pipe and fittings for:			
Cast-iron pressure	1,451	5,251	2,054
Cast-iron soil	1,304	2,074	635
Pipe, welded:			
Black steel	2,053	3,351	1,190
Black wrought-iron	416	729	492
Galvanized steel	5,539	5,581	1,496
Galv. wrought-iron	728	1,241	203
All other pipe, ftgs.	2,279	2,131	248
Wire:			
Plain iron or steel	6,621	4,914	2,022
Galvanized	3,125	4,567	2,118
Barbed	2,418	7,076	2,379
Woven-wire fencing	499	337	207
Woven-wire sc'n. cloth:			
Insect	39	41	34
Other	143	127	109
Wire rope and cable	809	916	242
Wire strand	41	140	40
Electric welding rods	283	185	88
Card clothing	1	2	6
Other wire	1,226	2,109	570
Wire nails	5,358	4,520	1,528
Horseshoe nails	121	68	66
Tacks	73	117	13
Other nails, staples	329	558	309
Bolts, machine screws	1,081	1,129	586
Castings:			
Gray iron (incl. semisteel)	442	408	259
Malleable-iron	131	203	120
Steel, not alloy	305	190	36
Alloy, incl. stainless	200	55	78
Car wheels, tires, and axles:			
Wheels and tires	771	1,730	791
Axles, no wheels	181	310	570
Axles with wheels	7	147	24
Horseshoes and calks	4	28	1
Forging, n.e.s.:			
Not containing alloy	2,006	2,029	397
Alloy, incl. stainless	287	287	8
Total	396,064	394,035	134,788
Scrap, iron and steel	185,653	204,298	225,434
Scrap, tin plate	449	743	857
Tin plate circles, strips, cobbles, etc.	326	788	782
Waste-waste tin plate	795	573	811
*Terneplate clippings	234	...	...
Total scrap	187,457	206,402	227,884
GRAND TOTAL	583,521	600,437	362,672
Iron ore	447	34,756	244

*New class.

Machine Tool Exports Again Top $100,000,000

■ Metalworking machinery exports from the United States in 1939 totaled $117,473,885, 16 per cent larger than a total of $101,656,830 in 1938, the first time exports have been above $100,000,000 for two successive years, according to the machinery division, department of commerce. While shipments were made to practically all foreign countries 81 per cent went to four countries, United Kingdom, Japan, France and Soviet Russia.

In 1929 such exports were valued at $40,804,000, declining steadily to $9,369,000 in 1933, which was the turning point. Steady recovery brought the figure back to the 1929 level in 1936, with rapid increase in the succeeding three years. The sharp increase started in 1936 with large orders from United Kingdom and Russia, with France and Japan placing increased volume in 1937. United Kingdom bought $5,450,722 worth in 1935 and $33,163,525 in 1939. Russia's purchases in 1935 were valued at $6,426,750, rising to $35,162,867 in 1938 and dropping back to $18,669,009 last year. Japan's purchases were valued at $3,436,280 in 1936 and $24,839,240 in 1939. France bought this class of machinery to the value of $4,947,293 in 1937 and $18,806,438 in 1939.

Industrial Machinery Exports at New High

■ Industrial machinery exports from the United States in January reached the record monthly total of $28,908,808, a 60 per cent gain over January, 1939, when they were valued at $18,038,333, according to the machinery division, department of commerce. Increases of 11 to 118 per cent were made in six of the seven major classifications.

Exports of power-generating machinery, except electric and automotive, totaled $1,494,777, approximately double the $746,076 value a year ago. Metal-working machinery exports in January were valued at $14,499,617, more than double those of January, 1939.

January Farm Tool Exports Show Decline

■ January exports of farm equipment continued at reduced level, totaling $3,388,501, compared with $3,521,489 for January, 1939, according to the machinery division, department of commerce. Much smaller shipments were made of tractors and miscellaneous equipment, which more than offset increases in tillage and harvesting machinery. Tillage implement exports were 30 per cent above a year ago and harvesting machinery showed a gain of 23 per cent.

PRODUCTION . . .

Steel Production Rate Drops Two Points to 63.5 Per Cent of Capacity

■ STEELWORKS operations last week declined 2 points to 63.5 per cent. Five districts made slight gains and seven went to lower levels. A year ago the rate was 56.5 per cent; two years ago it was 30 per cent.

Youngstown, O.—Rose 1 point to 41 per cent, with three bessemers and 37 open hearths in production. Youngstown Sheet & Tube Co. resumed bessemer production and Carnegie-Illinois Steel Corp. took off one open hearth. The same schedule is forecast for this week.

Chicago—Increased 1 point to 60 per cent for the first time in seven weeks, two large interests adding active capacity, more than offsetting a decline by another. Three producers held a steady rate.

Central eastern seaboard—Drop of 5 points to 60 per cent, with corresponding decline in finishing departments.

Detroit—Declined 16 points to 78 per cent as one producer took off four furnaces, the other operating eight of its ten. Indications are for the same rate this week.

Birmingham, Ala.—Down 12 points to 78 per cent, 19 open hearths now being active.

St. Louis—Rose 1½ points to 65 per cent. Shutting down two furnaces was more than offset by starting of two larger open hearths.

Pittsburgh—Off 2 points to 61 per cent as slight changes were made in active units.

Wheeling—Loss of 4 points to 90 per cent.

New England—Advance of 19 points to 75 per cent. One furnace will be taken off this week.

Buffalo—Drop of 2½ points to 55½ per cent as one open hearth was taken out of service.

Cleveland—Increased 2 points to 73 per cent on a furnace addition by one interest. This is the third consecutive upturn and a net gain in the three weeks of 6½ points.

Cincinnati—Slipped 2½ points to 54½ per cent, a new low for the year to date.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended		Same week	
	Mar. 9	Change	1939	1938
Pittsburgh ...	61	— 2	48	26
Chicago	60	+ 1	58	27.5
Eastern Pa...	60	— 5	40	29
Youngstown .	41	+ 1	52	29
Wheeling	90	— 4	74	38
Cleveland	73	+ 2	52	28
Buffalo	55.5	— 2.5	32.5	18.5
Birmingham .	78	—12	83	61
New England	75	+19	65	15
Cincinnati ...	54.5	— 2.5	43	32
St. Louis	65	+ 1.5	57.5	37
Detroit	78	—16	76	33
Average ...	63.5	— 2	56.5	30

Steel Ingot Statistics

	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	Weekly production, all companies, gross tons	Number of weeks in month
1940 **Reported by Companies which in 1938 made 98.67% of Open-Hearth and 99.90% of Bessemer.**								
Jan.	5,333,698	85.82	286,000	56.16	5,619,698	83.58	1,268,555	4.43
Feb.	4,168,892	71.78	205,733	43.23	4,374,625	69.62	1,056,673	4.14
2 mos.	9,502,590	.....	491,733	.....	9,994,323	.....	1,166,198	8.57
1939 **Reported by Companies which in 1938 made 98.67% of Open-Hearth and 99.90% of Bessemer.**								
Jan.	3,389,916	54.96	165,358	27.26	3,555,274	52.48	802,545	4.43
Feb.	3,127,340	56.15	219,948	40.16	3,347,288	54.72	836,822	4.00
2 mos.	6,517,256	.....	385,306	.....	6,902,562	.....	819,684	8.43
March	3,595,738	58.30	218,275	35.99	3,814,013	56.30	860,951	4.43
April	3,100,461	51.91	230,695	39.28	3,331,156	50.78	776,493	4.29
May	3,082,855	49.98	190,766	31.45	3,273,621	48.32	738,966	4.43
June	3,290,137	55.08	210,185	35.78	3,500,322	53.35	815,926	4.29
July	3,284,875	53.38	257,163	42.49	3,542,038	52.40	801,366	4.42
Aug.	3,938,164	63.85	276,863	45.65	4,215,027	62.22	951,473	4.43
Sept.	4,405,951	73.94	333,116	56.84	4,739,067	72.41	1,107,259	4.28
Oct.	5,587,025	90.58	454,054	74.86	6,041,079	89.17	1,363,675	4.43
Nov.	5,664,574	94.83	453,557	77.22	6,118,131	93.26	1,426,138	4.29
Dec.	5,430,546	88.24	353,604	58.43	5,784,150	85.57	1,308,631	4.42
Total	47,897,582	65.98	3,363,584	47.12	51,261,166	64.29	983,145	52.14

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.

Percentages of capacity operated for 1939 are calculated on weekly capacities of 1,392,331 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.

February Ingot Output Declines 17 Per Cent

■ Steel ingot production during February totaled 4,374,625 net tons, according to the American Iron and Steel institute, New York. This is a decline of 1,245,073 net tons from January, result of lower operating rate and shorter month. February production, however, was more than 30 per cent above February, 1939, when 3,347,288 net tons was produced.

Average weekly output in February was 1,056,673 net tons, about 17 per cent less than the January weekly average of 1,268,555 tons. In February, 1939, an average of 836,822 tons per week was produced.

Rate of capacity operated in February was 69.62 per cent, compared with a revised rate of 83.58 per cent in January and with 54.72 per cent in February, 1939.

In the accompanying table production figures for 1939 and January, 1940, have been revised to the net ton basis, following the policy of the institute to use that unit in its reports in future. Previously ingot production had been on a gross ton basis.

FINANCIAL

■ CONFIDENCE in the future was expressed by Eugene G. Grace, president, Bethlehem Steel Corp., Wilmington, Del., in company's annual report to employes. Though operations have receded somewhat from peak of recent months, said Mr. Grace, a generally good production schedule still holds. With large backlog of orders, a fair operating rate will be insured by a reasonable amount of new business.

Calling attention to impressive gains in wages and salaries paid employes over past 20 years, Mr. Grace pointed out that amount available for dividends has decreased greatly. Small return on investments in recent years, stated Mr. Grace, has raised the question:

"How long can job security be expected to continue, if profits are not sufficient to yield a fair return to stockholders, and thus attract capital to the business?"

Bethlehem has paid more than $2,000,000,000 in wages and salaries since 1920, said Mr. Grace. In the same period it has paid $90,000,000 in dividends on its common stock, "a very small percentage of its wage bill and a very small return on the investment which stockholders have made in the business."

Although 1939 net income was $24,638,384, equal to $5.75 a share on common, declared Mr. Grace, earnings from 1931-1938 inclusive averaged nothing on $350,000,000 investment represented by common stock. It has been necessary, he said, to depend on good years to provide profits to pay dividends to common stockholders, and to accumulate reserves for plant and equipment modernization.

Mr. Grace said business showed steady improvement throughout 1939. During final quarter Bethlehem's operations were at virtual capacity in steel making, shipbuilding and mining.

Report states 25,000 employes were added in 1939, increasing total to 110,000 at year's end. Employes' average weekly working time increased approximately 17 per cent. Wage and salary payments aggregated nearly $159,000,000, approximately $41,000,000 greater than in previous year. Average earnings per hour reached all-time high, 91.6 cents.

In his report to stockholders, Mr. Grace called attention to increased volume of business last year, $414,141,087, compared to $271,192,675 in 1938. Estimated net business booked aggregated $538,368,398, against $340,497,325 in previous year. Estimated net billing value of unfilled orders on hand Dec. 31, 1939, totaled $287,002,024, compared to $162,774,713 year earlier.

Cash expenditures for additions and improvements to Bethlehem properties during 1939 totaled $11,711,743, have aggregated $104,681,011 over past five years.

Aggregate taxes for 1939 were $21,191,492, against $13,183,148 in 1938. This includes $6,299,196 for unemployment, old age and railroad retirement, which totaled $4,574,092 in preceding year.

Rated steel capacity, including ingots and castings, was increased to 10,240,000 gross tons per annum, reflecting actual capacities demonstrated for first time last year.

Current assets Dec. 31, 1939, including $75,554,356 in cash, and additional marketable securities, totaled $244,226,480, compared to $180,314,698 in 1939. Current liabilities were $56,886,601, against $37,503,801 in previous year.

Inventories were placed at $116,498,566, compared to $180,314,698 Dec. 31, 1938.

Consolidated income statement:

	1939	1938
Net billings	$414,141,087	$27,192,675
Total operating charges	376,561,983	258,654,827
Net operating income	37,579,104	12,537,848
Total income	38,300,888	13,286,088
Total interest, other charges	7,494,614	7,127,608
Federal income, excess profits taxes	6,167,890	908,241
Net income	24,638,384	5,250,239
Preferred dividends paid	7,471,096	§ 7,471,096
Common dividends paid	4,775,076	.....

§ Dividends paid or payable.

Iron, Steel Consumers' 1939 Profits Show Increase

■ TOTAL 1939 net earnings of 148 iron and steel consumers aggregated $177,235,426, compared to net profit of $67,765,503 earned by the same companies in 1938. Only 14 reported a net loss for the year, compared to 53 in 1938. Previous tabulations in STEEL, Feb. 19, p. 29; Feb. 26, p. 16 and March 4, p. 38, listed 103 companies; the following includes 45:

	Fourth 1939	Fourth 1938	1939	1938
Ainsworth Mfg. Corp., Chicago	$.....	$.....	$138,243	$148,609*
American Safety Razor Corp., Brooklyn, N. Y.†	243,249	180,418	806,238	776,776
Atlas Tack Corp., Fairhaven, Mass.	33,861	5,416*	109,871	14,213
Babcock & Wilcox Co., New York§	1,668,995	63,471*	1,168,792	3,089,191*
Baush Machine Tool Co., Springfield, Mass.	.....	.....	225,068*	124,580*
Budd, E. G. Mfg. Co., Philadelphia†	344,957	94,585	218,037	1,482,442*
Budd Wheel Co., Philadelphia†	352,799	127,575	662,834	460,670*
Chicago Electric Mfg. Co., Chicago	.....	.....	86,535	40,552
Clark Metal Products Inc., Bridgeport, Conn.	.....	.....	23,501	2,632*
Clearing Machine Corp., Chicago	.....	.....	275,067‡	313,473**
Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.	.....	.....	304,656*	147,061*
Fafnir Bearing Co., New Britain, Conn.	.....	.....	1,430,542	730,223
Fairbanks, Morse & Co., Chicago	.....	.....	2,469,884	558,539
Federal Screw Works, Detroit	.....	.....	117,419*	228,538*
Foote-Burt Co., Cleveland	.....	.....	168,252	138,409*
Gabriel Co., Cleveland†	47,458*	27,981*	27,732*	55,102*
Gardner-Denver Co., Quincy, Ill.†	460,095	299,661	1,123,558	590,615
General Cable Corp., New York†	689,030	279,387*	733,166	893,714*
General Electric Co., Schenectady, N. Y.†	16,213,369	10,181,073	41,236,000	27,729,329
Geometric Stamping Co., Cleveland	.....	.....	27,771*	68,098*
Great Lakes Dredge & Dry Dock Co., Chicago	.....	.....	1,634,566	2,213,030
Hein-Werner Motor Parts Corp., Waukesha, Wis.	.....	.....	133,684	69,795
Houdaille-Hershey Corp., Detroit†	714,562	474,910	1,487,607	588,230
Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.	649,721	384,240	49,490	250,582
Lamson & Sessions Co., Cleveland	.....	.....	5,353	377,674*
Lynch Corp., Anderson, Ind.†	75,642	47,899	363,583	329,420
Marlin-Rockwell Corp., Jamestown, N.Y.†	710,694	334,152	1,658,084	722,848
Muskegon Motor Specialties Co., Muskegon, Mich.	.....	.....	187,613	68,022
Nicholson File Co., Providence, R. I.	.....	.....	1,134,864	323,454
Ohio Seamless Tube Co., Shelby, O.	.....	.....	260,874	86,128*
Page Hersey Tubes Ltd., Toronto, Ont.	.....	.....	1,126,515	736,952
Pressed Steel Car Co. Inc., Pittsburgh	26,066*	228,047*	647,650*	1,169,778*
R. G. Le Tourneau, Peoria, Ill.†	282,237	237,035	1,816,471	1,412,465
Reed Roller Bit Co., Houston, Tex.†	79,868	93,404	1,364,454	1,832,112
Republic Aviation Corp., Farmingdale, Long Island, N. Y.§	88,518	.....	524,781*	653,366*
Ryan Aeronautical Co., San Diego, Calif.	.....	.....	90,728	23,602
Seagrave Corp., Columbus, O.†	16,626	24,335	9,852	4,591*
Sivyer Steel Casting Co., Milwaukee	.....	.....	173,610	73,736*
Square D. Co., Detroit†	482,282	195,277	1,038,491	403,799
Studebaker Corp., South Bend, Ind.†	2,544,303	1,069,647	2,923,251	1,762,465*
Tappan Stove Co., Mansfield, O.	.....	.....	390,004	210,498
United Carr-Fastener Corp., Cambridge, Mass.†	246,759	268,461	534,987	269,734
Walworth Co., New York†	247,222	205,842*	205,900	1,297,878*
West Michigan Steel Foundry Co., Muskegon, Mich.	.....	.....	171,661	80,297
Youngstown Steel Door Co., Cleveland	.....	.....	801,741	49,535

*Loss; †fourth quarter statements based on the nine months' and year's statements; §preliminary statement; ‡including subsidiaries; **parent company only.

HARRISBURG STEEL CORP. EARNS $114,241 IN 1939

Harrisburg Steel Corp., Harrisburg, Pa., reports 1939 net income of $114,241, equal to 62 cents a share on common stock outstanding, compared to net deficit of $18,781 incurred in 1938.

With theoretical annual ingot capacity of 77,500 tons, corporation produces basic open hearth, carbon

and alloy steel billets, blooms and slabs, coils, couplings, cylinders, flanges, forgings, plugs, munitions and other steel products. Operations last year averaged 40.5 per cent of capacity, compared to 23.4 per cent during 1938. Net value of sales was 38.9 per cent greater.

Inventories on hand Dec. 31, 1939 totaled $643,110, compared to $463,851 year previously.

NATIONAL STEEL'S FINANCIAL STATUS TERMED "EXCELLENT"

Reporting to stockholders of National Steel Corp., Pittsburgh, Ernest T. Weir, chairman, pointed out company's financial condition was excellent, no additional financing will be necessary to cover extensive improvements program under way. Calling attention to the latter, Mr. Weir said:

"The physical condition of our properties, our standing with the trade and the quality of our entire organization, both employes and management, have never been better, and these factors are such that owners of the securities of National Steel Corp. can be well satisfied with the value behind their investments."

Wage payments to employes, according to the report, averaged $1824 last year. Total payroll in 1939 was $36,651,187, compared to $27,608,885 in preceding year. Average number of employes was 20,099, against 17,623 in 1938.

Balance sheet shows working capital Dec. 31, 1939, totaled $43,803,659, an increase of $6,266,216 over like figure at end of 1938. This improvement in position was in addition to $8,700,264 expenditures for plant and equipment.

Charges for depreciation and depletion totaled $6,856,916, compared to $5,487,985 in 1938. Taxes aggregated $6,337,541, equal to $2.88 a share on outstanding stock.

Net earnings were $12,581,836, equal to $5.71 a share on capital stock. This compares with net income of $6,661,652 or $3.03 a share in 1938 and net profit of $17,801,893, equal to $8.21 a share in 1937. Dividends aggregating $1.70 a share were paid during the year.

SAYS CURRENT CONSUMPTION EXCEEDS STEEL BUYING RATE

Belief current actual consumption of steel exceeds rate of new business received was expressed by Frank Purnell, president, Youngstown Sheet & Tube Co., Youngstown, O. In his annual report to stockholders Mr. Purnell declared he felt that when present stocks have been reduced, buying will increase again.

Although Youngstown Sheet & Tube's operations last year, based on ingot capacity, were 69 per cent greater than in 1938, volume of sales

(*Please turn to Page* 105)

140 Toolmakers Show New Wares At Bridgeport; Large Attendance

■ FEATURING the latest tools, processes, methods and machines of approximately 140 well known companies, the Industrial Tools and Equipment exhibition held at the state armory, Bridgeport, Conn., March 6-9, was one of the most successful events of its kind in New England in recent years. Probably not since the New Haven machine tool expositions of the early twenties has an industrial show drawn such heavy attendance—amounting as it did to as many as 25,000 persons per day.

Exhibition, sponsored by Bridgeport Tool Engineers Association Inc., was opened officially Wednesday by an address by Gov. Ray Baldwin, Connecticut. This address, which was broadcast, stressed importance of private enterprise—based on engineering genius and skill—as a means of giving employment to a vast number of Americans. Governor Baldwin has achieved national prominence as an outspoken champion of American industry.

While the Bridgeport exhibit included a considerable number of machine tools, the greater proportion of the booths were devoted to cutting tools; instruments of precision; small tools; details such as chains and sprockets; motors; material handling equipment; forgings and castings; control instruments; set screws and cap screws; saws; grinding wheels; bearings; cutting materials, etc. There also were a number of industrial furnaces in operation.

Paralleling the exhibition activities, the association held technical sessions at the Stratfield hotel, and on Thursday evening a banquet was held at which Commander E. R. Henning, U.S.N., spoke on "Industrial Mobilization."

The affair was of far more than local significance, the exhibitors representing all parts of the country and the visitors coming from all over New England as well as from New York. Large groups arrived from industrial centers such as New Haven, Hartford, Springfield and Worcester. Bridgeport, being in the midst of one of the most highly concentrated industrial areas in the United States as well as being itself an important industrial city, proved to be an ideal location for an affair of this kind. This was true not only from the standpoint of interest alone, but also from the point of view of sales made by the exhibitors.

Welded Steel Grating Replaces Wood Flooring

■ Steel grating welded to the stringers replaces wood flooring formerly used on this bridge over the Mississippi river at Clinton, Iowa. By laying the grating in sections, Lyons & Fulton Bridge Co. is replacing the deck without disrupting traffic. Photo courtesy General Electric Co., Schenectady, N. Y.

MEN of INDUSTRY

■ JOHN L. SULLIVAN, associated with subsidiaries of United States Steel Corp. over 25 years, has been appointed general superintendent, H. C. Frick Coke Co., with headquarters at Uniontown, Pa. He succeeds the late W. C. Hood. Mr. Sullivan was first employed as a shipping clerk

John L. Sullivan

by United States Coal & Coke Co., Gary, W. Va., in 1914, subsequently becoming plant superintendent and assistant general superintendent, West Virginia division, and assistant general superintendent of the Kentucky division. He has been assistant general superintendent of the Frick company since Aug. 1, 1939.

♦

R. L. Koeppen has been named West coast field representative for Timken-Detroit Axle Co., Detroit, with headquarters in San Francisco.

♦

Robert Burgess, general factory superintendent, Peninsular Metal Products Corp., Detroit, was elected a director and vice president at the corporation's recent annual meeting.

♦

John C. Gebhart has been appointed director of research, National Association of Manufacturers, New York. Since 1936 Mr. Gebhart has been executive director, National Economy league.

♦

William C. Dickerman, heretofore president, American Locomotive Co., New York, has been elected chairman of the board. He has been succeeded as president by Duncan W. Fraser, previously vice president in charge of manufacturing. Robert B. McColl, vice president in charge of Alco Products division, has been elected vice president in charge of manufacturing, and Noah A. Stancliffe, general counsel, has been added to the board.

♦

Max W. Babb, president, Allis-Chalmers Mfg. Co., Milwaukee, has been named by the Milwaukee Association of Commerce to act as its national councilor in the Chamber of Commerce of the United States.

♦

Claire L. Barnes, founder and chairman, Houdaille-Hershey Corp., Detroit, has resigned the chairmanship, effective March 31, but will remain a director. He was president from 1929 to 1937, when Charles Getler became president.

♦

Joe S. Thompson has been made district sales manager, Chicago office, Babcock & Wilcox Tube Co., Beaver Falls, Pa. Mr. Thompson has been with Babcock & Wilcox since 1934, and was transferred to Chicago as a salesman in 1937.

♦

W. G. McKee, the past 17 years associated with Donner Steel Co. and later Republic Steel Corp. in sales work in central New York, has recently become district representative for Rotary Electric Steel Co., Detroit, in New York state, with headquarters in Syracuse, N. Y.

♦

C. F. Christopher, formerly chief metallurgist, American Locomotive Co., Latrobe, Pa., has joined Steel Co. of Canada Ltd., Hamilton, Canada, to handle special duties. J. G. Morrow is chief metallurgist of the Steel Co. of Canada Ltd. This corrects an item in Steel, Feb. 26, page 20.

♦

J. S. Sprott has been re-elected president and general manager, Globe-Wernicke Co., Cincinnati. Ralph F. Foster has been elected treasurer, succeeding the late David B. Morrow. Other officers: Secretary, R. H. Hammer; assistant treasurer, F. E. Kebler; assistant secretary, Miller O. Dure.

♦

William C. Johnson has been made sales manager, crushing and cement machinery division, Allis-Chalmers Mfg. Co., Milwaukee. Until recently Mr. Johnson had been manager of the company's Knoxville, Tenn., district office.

Walter L. Maxson has been promoted to sales manager and chief engineer, mining machinery division of Allis-Chalmers. Mr. Maxson for many years had been a sales engineer in the mining division. Both men will have charge of all sales activities in their respective divisions, in the home office and in the field.

♦

Arthur Waldman has been promoted to chief engineer, coal mines division, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. Formerly superintendent of the company's Hamilton mine, Mr. Waldman succeeds I. W. Miller, resigned. David Brown, heretofore mine foreman, succeeds Mr. Waldman as superintendent at Hamilton mine.

♦

J. B. Templeton, formerly vice president, Templeton, Kenly & Co., Chicago, maker of Simplex jacks and equipment, has been elected president, to succeed W. B. Templeton, who has become chairman of the board. Associated with the organization since 1928, J. B. Templeton has worked in various production and sales capacities, subsequently becoming manager of the New York office, and vice president and sales manager.

♦

F. H. Winkley, since August, 1929, manager, lighting and cable division, General Electric Co., Schenectady, N. Y., retired March 1, after 31 years' continuous association with the company. A. F. Dickerson has been appointed manager, lighting division, and W. V. O'Brien, manager, wire and cable division, which divisions replace the one headed by Mr. Winkley. Mr. Dickerson formerly was manager, illuminating laboratory and lighting section, while Mr. O'Brien had been assistant to Mr. Winkley.

♦

Louis C. Edgar, associated with subsidiaries of United States Steel Corp. 35 years, and since 1936 chief

Louis C. Edgar

engineer, Pittsburgh district, Carnegie-Illinois Steel Corp., has been appointed assistant chief engineer of Carnegie-Illinois. He began as a draftsman at the Edgar Thomson works of Carnegie Steel Co. in 1905; two years later became assistant chief engineer, and in 1916, chief works engineer. Arthur V. Wiebel, since June, 1938, assistant chief engineer, Homestead, Pa., works, succeeds Mr. Edgar as chief engineer, Pittsburgh district. He joined Carnegie as an engineering estimator at the Youngstown, O., district works in 1933, later going to the Pittsburgh general engineering offices.

Arthur V. Wiebel

♦

W. James Frederick, president, Frederick Steel Co., Cincinnati, was elected chairman, Cincinnati chapter, American Society of Tool Engineers, at a meeting Feb. 27. Others elected are: Vice chairman, Thomas Kling, Lodge & Shipley Tool Co.; treasurer, Charles Carr Jr., R. K. LeBlond Machine Tool Co.; secretary, W. D. Averill, Cincinnati Milling Machine Co.

♦

Norman W. Storer, retired consulting railway engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been awarded the 1939 Lamme medal of the American Institute of Electrical Engineers, New York, "for pioneering development and application of equipment for electrical traction." The medal and certificate will be presented to him at the annual summer convention of the institute in Swampscott, Mass., June 24-28.

♦

William H. Richardson has been appointed to the newly created position of assistant general sales manager, Timken Roller Bearing Co., Canton, O. He has been with Timken 23 years, having first served as salesman in the service sales division. Subsequently he became branch manager, district manager, and later vice president and general manager of Timken Roller Bearing Service & Sales Co. When the Service & Sales company became a division of Timken Roller Bearing, Mr. Richardson was made general manager. E. H. Austin, assistant general manager, Service-sales divison, succeeds Mr. Richardson as general manager. He has been with the company 21 years.

R. P. Proffitt has been named Chicago manager for Timken. Mr. Proffitt first served as an engineer in the Timken industrial bearing division in 1923. He later worked out of the St. Louis branch office and joined the Chicago branch in 1933.

♦

Paul G. Webster, since 1936 chief order clerk, sheet division, Gary sheet and tin mills, Carnegie-Illinois Steel Corp., has been transferred to the corporation's Pittsburgh order division. Edwin L. Burton, heretofore supervisor of the production group in the order division, will succeed Mr. Webster, and Ernest C. Gerbig will become assistant chief order clerk. Mr. Webster joined American Sheet & Tin Plate Co. as an assistant cost clerk in 1912 at its Chester, W. Va., plant, and in 1933 was transferred to Gary as turn foreman in the pickling department. Mr. Burton joined the corporation in 1917 at Gary. Mr. Gerbig, formerly metallurgical order detail clerk, joined American Sheet & Tin Plate in 1912 at its Laughlin works, Martins Ferry, O., and after serving in various capacities at this plant and at the LaBelle works, was transferred to Gary in 1927.

Died:

■ DEWITT PAGE, 70, formerly president and general manager, New Departure division of General Motors Corp., Bristol, Conn., and director and a vice president of General Motors, in Florida, Feb. 28.

♦

James A. Hittle, 64, president, Hittle Machine & Tool Co., Indianapolis, maker of automobile accessories, recently.

♦

Alva L. Kitselman, 84, president and founder, Kitselman Bros. Inc., Muncie, Ind., fence manufacturer, March 4 in Loma Linda, Calif.

♦

Arthur H. Anthony, 59, president and general manager, Massillon Steel Castings Co., Massillon, O., Feb. 29 in St. Petersburg, Fla.

♦

Dr. Charles T. Hennig, 79, retired consulting metallurgical engineer of Cleveland, March 5 in Green Springs, O. He was the inventor of the Hennig purifier, used at one time as an addition in the bessemer converter.

♦

Carl F. Burkhart, 50, production manager, Federal Gear Inc., Cleveland, March 5 in that city. He had been with the company since 1919.

♦

W. J. Crowley, 54, sales manager, Otto Kafka Inc., New York, March 2 in New York. Mr. Crowley joined the Kafka organization recently, having previously been associated 16 years in a sales capacity with United States Steel Export Co.

♦

Otto Ernest Braitmayer, 67, a retired vice president, International Business Machines Corp., New York, in Raleigh, N. C., while enroute to Florida. When he retired in 1938 he had been associated with the company and its predecessor organization 50 years.

♦

Albert E. Morris, 73, well known as a steel mill roll designer, March 3 in Miami, Fla. He had been superintendent in the roll turning shops of Carnegie-Illinois Steel Corp.'s Youngstown, O., works for nearly 45 years when he retired three years ago.

♦

Hutton H. Haley, 52, manager of sales in the Michigan territory for American Foundry Equipment Co., Mishawaka, Ind., and head of Hutton H. Haley & Associates, Detroit, in Detroit, March 1. He had been active with the American company 30 years, and was prominent in the affairs of the Detroit chapter of American Foundrymen's association.

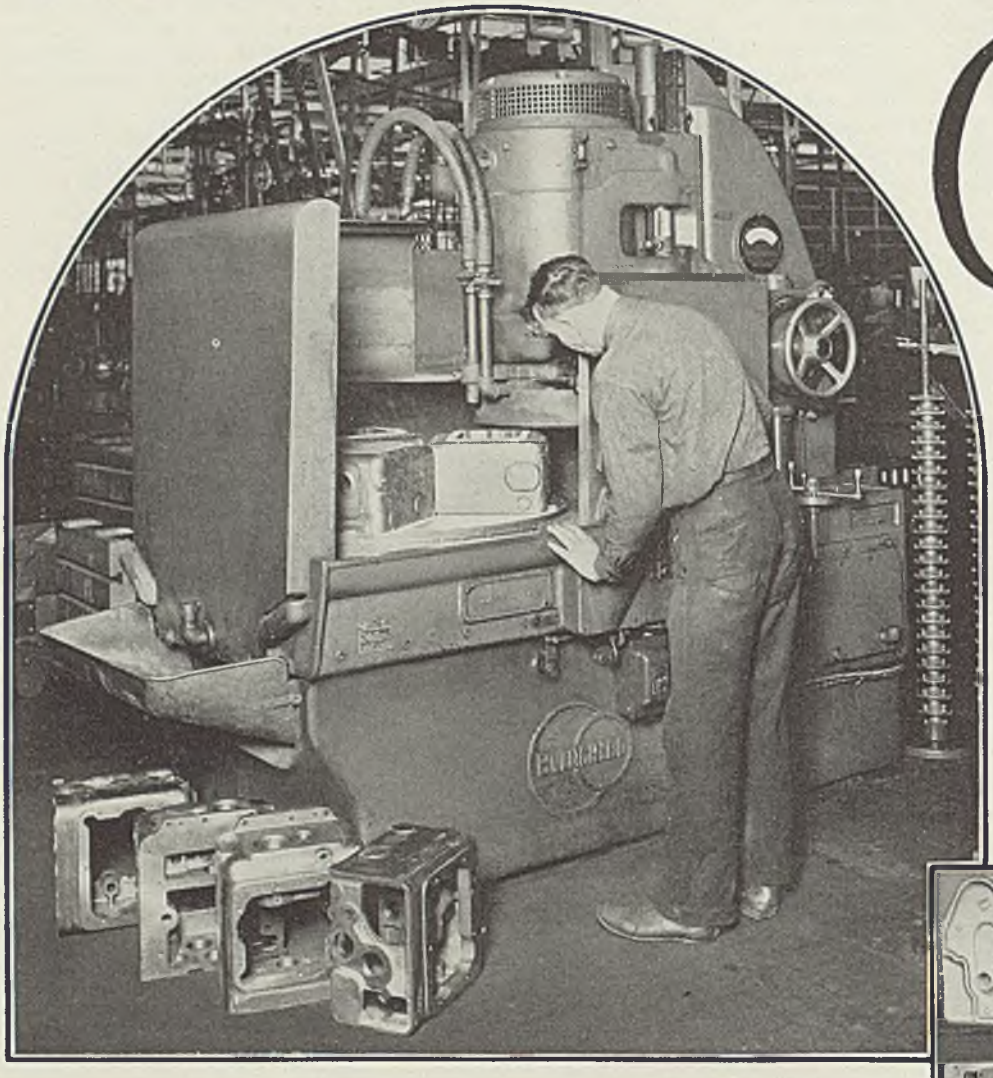
♦

Paul C. Sauerbrey, 59, vice president and general manager, Plymouth division, Chrysler Corp., Detroit, in Fort Lauderdale, Fla., March 3. He began his automotive career as a machinist in 1906, and after a period with Mason Motor Co., Flint, Mich., was associated with the Muncie Products division of Timken-Detroit Axle Co. In 1929 he joined Chrysler. He was also president of Chrysler Motors of California.

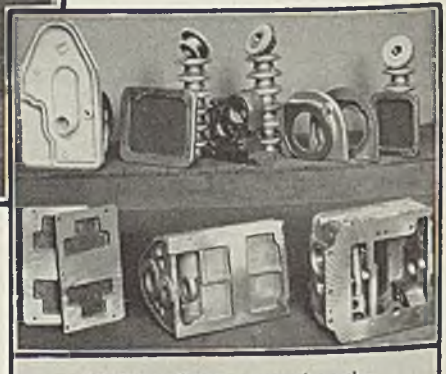
♦

Dr. Louis D. Ricketts, 80, consulting engineer, in Los Angeles, March 4. He was a director, Phelps Dodge Corp., Anaconda Copper Mining Co., and was affiliated with other copper and mining companies. He was noted chiefly for his work in designing and constructing large concentrating and smelting plants. He was a former president, American Institute of Mining and Metallurgical Engineers, and last October was elected as the James Douglas gold medalist for 1940 for his work in the mining field.

SCRAPING IS Out



when surfaces are ground on the Blanchard No. 18



Variety of parts ground on the Blanchard No. 18 at left

HERE is a good example of the way Blanchard No. 18 Surface Grinders are eliminating hand scraping on parts which require flat surfaces for oil-tight joints. 1/64″ of stock is ground off two surfaces of the cast iron gear boxes, shown above, at a production of 15 pieces (30 surfaces) per hour. These boxes are 12″ x 12″ x 18″. A Blanchard No. 18 Grinder with 36″ chuck and a column extended to take 18″ work is used, together with a Blanchard Sectored Wheel, manufactured by the Blanchard Machine Co. The result — Greater production, less spoilage, finer finish, and *elimination of hand scraping.*

Note the variety of parts, above, which are also ground on this machine — further proof of the versatility of the Blanchard No. 18.

Send us samples of your work — they will be ground free of charge — and may show you how to eliminate scraping and other costly second operations.

BLANCHARD

Send for your free copy of the Blanchard Work Book

BLANCHARD MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ PRIMARY objectives of amendments to national labor relations act offered in the house by special Smith investigating committee last week apparently involve changes in administrative policy rather than in the law itself. Committee, however, appears convinced direct congressional action is necessary to remedy evils disclosed during its recent hearings.

Observers here state careful study of proposed new legislation indicates its major objectives could be reached under labor act as now set up. However, the bill would alter present law by restricting interpretive powers of its administrators.

Testimony presented during committee's hearings indicated labor law itself was not responsible for as much misunderstanding and strife between labor and management as was its interpretation by administrators.

Most important provision included in the bill, from both employers' and employes' standpoint, would abolish present three-member labor board, and replace it with another of three members, appointed by the President, with senate's advice and consent.

Would Appoint Administrator

Change of administrative policy by removal of present personnel, would, proponents assert, settle much controversy in which labor act has become involved. President could reappoint present members only with senate's confirmation.

Separation of board's prosecuting and judicial functions, also proposed, likewise reflects change in administrative policy rather than the law's objectives. Evidence developed during committee's hearings indicated board decisions were influenced, in part at least, by board's acting both as judge and prosecutor.

Creation of administrator's office, according to proposed bill, would remedy this situation. Appointed by President, confirmed by senate, administrator would have no connection with labor board. He would hear charges, issue complaints and act as prosecutor in cases brought before the board. Administrator would be responsible for prosecuting functions, labor board for judicial matters within its scope.

Amendment has been referred to regular house labor committee, which is understood to be antagonistic to the Smith committee. Passage of the bill, or some variation of it, through the house this session seems likely. Prospects for favorable action in senate, however, appear at present remote.

Proposals Clarify Powers

Summary of the bill's important proposals, not including those listed in STEEL, March 4, p. 30:

Changes in board's power to determine representatives for collective bargaining and in calling an election except as culmination of procedure initiated by employer or specified percentage of employes.

Permission to employers to use "expressions of opinion" but not threats or coercive acts as to employes joining unions.

Redefinition of "collective bargaining" requiring employer-employe conferences for settlement of grievances, but without compulsion on either side to reach agreement.

Definition of agriculture to preclude farm co-operatives and similar organizations from the act.

Provision for statute limiting to six months period in which complaints of unfair labor practices may be filed or order for back pay upheld.

Denial to board of authority to order reinstatement of employes where evidence proves them wilfully engaged in unlawful activities or violence.

Substitution of statement that "failure" of employers and employes to bargain collectively leads to strikes, rather than employers' "denial" to employes of right to organize, and "refusal" to bargain with them.

NAVY EXPERIMENTS WITH NEW STEEL BUYING POLICY

Navy department is trying out a new steel purchasing policy by which it will make purchases for a period of six months.

In the past the navy has been buying steel by two methods: Bulk of steel for new ship construction has been bought on a period of construction contract where the navy asked for bids on estimated quantity required and where the bidder has been given a fixed price for the steel over periods ranging from two to four years.

Navy has also gone into the market every six months for structural replenishments and asked for definite bids on definite sizes and quantities of steel required for general repair work at navy yards.

In an effort to eliminate the long-term guarantee of prices on new ship construction, the navy has just issued a schedule combining new construction and repair needs in one schedule and asking for firm prices for periods of six months only. As in the period of construction contract, navy is calling for estimated quantities only, the successful bidder to receive orders from navy yards requiring the steel.

New procedure is experimental and navy officials do not know what its effect will be on bids received. If the experiment proves successful, navy experts believe that it should be advantageous both to the steel producers and to the navy. If satisfactory bids are not received in response to this invitation, it will doubtless be necessary for the navy to return to its original method of steel procurement. This bidding is on structural steel only and does not include armor plate. It is an effort to cut down

the period of obligation for contractors and give definite completion date of contracts which navy officials believe will prove attractive.

SENATE GROUP FAVORABLY REPORTS TRADE PACT BILL

Senate finance committee Friday by a 12 to 8 vote ordered a favorable report on three-year extension to the reciprocal trade agreements act.

Senator Harrison, committee chairman, said he would be ready to call the bill up for action March 11, but would allow it to be put aside for action on appropriation bills. Indications are the bill will come up for senate action this week. As reported, the bill is same as passed by house.

SAYS TRADE PACTS HURT U. S. MANGANESE INDUSTRY

Secretary of State Hull's statement to the senate finance committee recently that reductions in tariff on American commodities in trade agreements "have not inflicted any injury on any group of producers" was challenged last week by J. Carson Adkerson, president, American Manganese Producers association. Mr. Adkerson told the committee action taken on various trade agreements has "definitely and drastically injured the domestic manganese mining industry."

Mr. Adkerson challenged any person to show how the reduction in the duty on manganese ore under the agreement with Brazil "has helped anyone in the United States or Brazil, excepting only the American steel industry." He said that the only result has been to discourage further development in the American manganese industry; to jeopardize our national defense; to put $18,500,000 into the pockets of the American steel industry since 1936; and "to deprive the United States government of an equal amount of just revenue."

PROPOSAL FOR INVESTIGATION OF TIN SITUATION FAILS

Effort was made in the house last week to pass a resolution providing an investigation of the tin situation by the committee on foreign affairs. Bill failed because of opposition.

Foreign affairs committee made an investigation several years ago of the tin situation throughout the world and the idea of the resolution was to bring that information up to date. Representative Bloom called attention to the fact that during the past four years the situation has completely changed.

He said: "There is no one department or branch of the government that can supply the congress with complete information about the tin situation. Although the United States is wholly dependent upon foreign nations for its supply of tin, it consumes approximately one-half the world's production. Our normal consumption will run between 60,000 and 90,000 tons per year. In wartime this would be greatly increased. An average approximate peacetime price of tin is not far from $1000 per ton, making our annual tin bill between $60,000,000 and $90,000,000.

Opposition to the passage of the bill was voiced by Representative Faddis, Pennsylvania, who said:

"This is not a new question by any means. This matter has been investigated, investigated, and reinvestigated for a great many years. A few years ago this committee spent $10,000 in an investigation of this kind and it did not produce one iota more information than the committee on military affairs produced in an investigation it made without spending a nickel. There are downtown any number of men connected with the bureau of mines and other departments who can tell the house of representatives or anybody else in this country the exact situation with regard to tin all over the world and at any specific hour of the day."

WAGE-HOUR COUNSEL WON'T AID INDUSTRY COMMITTEES

Members of the legal staff of the wage and hour division, labor department, assigned as counsel to industry committees, in the future will not represent the committees in administrative hearings on committee minimum wage recommendations, Col. Philip B. Fleming, administrator, announces.

Rather, he declared, they will appear as impartial advocates presenting testimony and witnesses both for and against the committee recommendation. Nor will these attorneys, he said, have any part in the making or drafting of the administrator's decision on the evidence adduced at this hearing.

"The change in procedure was made," Colonel Fleming said, "to avoid appearance at these hearings that the division was taking any position one way or the other on the industry committee minimum wage recommendations.

"The act provides that after the committee has recommended a minimum wage for a given industry the administrator must hold a hearing and make his decision on the recommendation on evidence adduced at his hearing. Heretofore the industry committee has been represented at wage order hearings by the attorney on the staff of the wage and hour division who had previously acted as its counsel during its deliberations. This attorney represented only the industry committee and took no part in the consideration or drafting of the administrator's decision. But some employers and representatives of trade associations appearing at these hearings seemed to feel that this attorney in some way represented the division.

"In the future, to avoid any such misunderstanding on the part of persons appearing at the hearings, no employe of the wage and hour division will represent the industry committee at the hearing. Persons favoring the minimum wage recommendation of a committee will have to present their own case."

AWARD 41,000 GROSS TONS MANGANESE ORE CONTRACTS

Procurement division last week announced award of five contracts for manganese ore (ferro grades A and B) aggregating 41,000 gross tons.

C. Tennant Sons Co., New York, received contract for 2000 gross tons grade A ore at 62.8 cents per gross ton unit of contained manganese. Contract totaled $60,288. Commercial Engineering Co., Washington, received award for 8000 gross tons grade A ore at 60 cents per unit; total, $240,000.

L. W. Lambert, Upper Lake county, California, was awarded contract for 18,000 gross tons grade B ore at 65 cents per unit. Contract totaled $561,600.

Derivatives Inc., and Tonerde Inc., New York, were given contracts for two lots grade B ore. First totaled $47,040 for 2000 gross tons at 49 cents per unit. Second contract was $279,840 for 11,000 gross tons at 53 cents per unit.

GOVERNMENT WALSH-HEALEY PURCHASES TOTAL $601,165

During week ended Feb. 24, government purchased $601,165.41 worth of iron and steel products under Walsh-Healey act as follows: James Cunningham Son & Co., Rochester, N. Y., $62,856; York Safe & Lock Co., York, Pa., $57,050.

Lamson & Sessions Co., Cleveland, $25,816.04; Central Iron & Steel Co., Harrisburg, Pa., $12,334.61; Colorado Fuel & Iron Corp., Denver, $16,926.98 (estimated); Noland Co. Inc., Washington, $29,870.17.

Lewyt Metal Products Mfg. Co., Brooklyn, N. Y., $14,014; Bethlehem Steel Export Corp., New York, $57,759; United States Steel Export Co., Washington, $41,010.98 (estimated); American Chain & Cable Co. Inc., York, Pa., $28,882.32; Blackhawk Mfg. Co., Milwaukee, $36,012.50.

American Steel Foundries, Chicago, $141,837.40; Lukens Steel Co., Coatesville, Pa., $30,880.86; American-LaFrance-Foamite Corp., Elmira, N. Y., $19,274.55; and Standard Pressed Steel Co., Jenkintown, Pa., $26,640.

AVIATION

ALLIES FEAR OBSOLESCENCE; LIMIT STANDARDIZATION

■ ARRIVAL in New York last week of Sir Henry Self, charged with Britain's wartime aircraft production, indicated French and British governments may soon place orders with United States planemakers as part of their billion-dollar aircraft procurement program. Contracts, however, are still pending reports of a military commission now in Europe. Another snag to placing of large contracts is Allies' fear planes may become obsolete before deliveries are completed.

To avoid this possibility, allied governments probably will place only moderate-sized orders, with options for larger quantities to be taken up if current models still serve their purpose.

Original plan to confine allied purchases to three types of aircraft from three large planemakers with power to sublet has been turned down by Allies and options allowed to lapse. Present plans include a much larger segment of the industry, and a variety of types. Standardization will be permitted only in interests of speeding production and priority will not be expected over "normal" business.

To Double Capacity

Expecting a $50,000,000 order from England, probably part of the allied procurement program, Consolidated Aircraft Corp., San Diego, Calif., is planning to double capacity by adding six buildings; two of which are under construction. Expansion probably is encouraged by United States war department praise for company's new model B-24 bomber said to have a 110-foot "mystery" wing with a span much less than others for comparable ships. Bomber is propelled by four 1200-horsepower engines, will carry a 5-ton bomb load at 300 miles per hour within cruising range of 3000 miles. Described as the largest and most deadly of the army's weapons, war department has ordered 46 to cost $11,365,000. Consolidated also expects another larger order from the navy for its PBY seaplane type patrol bombers.

Douglas Aircraft Co., Santa Monica, Calif., last week passed the 15,000 mark in number of employes, and represented about one-fourth of total employes in the aircraft industry. Santa Monica plant had 11,704, El Segundo, 3323. Payroll last week was $440,000, an average of 23 million dollars a year as compared to a 10 million payroll last year.

Thompson Products, Inc., Cleveland, is adding 120,000 square feet to its plant, a 20 per cent increase, which will be devoted to aircraft parts production and engineering.

Monthly Production Rising

Meanwhile planemakers are preparing for the busiest year in their history. In spite of accelerated deliveries, unfilled orders have mounted to over $700,000,000. Although working with capacity which was expanded 30 per cent last year, monthly deliveries now average 30 millions compared to 20 millions last fall. Monthly rate this summer is expected to reach 50 millions.

Current estimated backlog:

United States army	$186,000,000
United States navy	61,000,000
Foreign	420,000,000
Domestic Commercial	30,000,000
Private	3,000,000
TOTAL	$700,000,000

According to Glenn L. Martin, president, Glenn L. Martin Co., Baltimore, trend is toward larger planes, both military and commercial, with no limit in view at present. His company has fundamental design for a 250,000-pound plane employing a minimum crew of 16. Used as a military plane, it would carry 32 tons of bombs 3000 miles. Maximum speed is 368 miles per hour. With a gasoline load instead of bombs the ship would have a range of 11,000 miles without refueling. Giant ship will not be built for some time, but company is on threshold of 150,000-pound ships.

Principal bug in military craft operating at altitudes of 20,000 feet, above effective antiaircraft fire, has been inconsistent performance of fuel systems which enable a plane to gain 22,000 feet one day and only 18,000 feet the next. Until now pumps have delivered excess fuel to engines and surplus was fed back into fuel lines. When repumped into engines fuel tended to vaporize and induce "vapor lock" and engines lost efficiency.

A new hydraulic fuel system developed by Sergt. Ralph E. Gray, Wright Field, Dayton, O., and adapted for manufacture by Pump Engineering Service Corp., Cleveland, stabilizes fuel pressures at high altitudes and will allow efficient performance and navigation well above 20,000 feet, maximum altitude undisclosed. Although technical details are secret, pump is known to be located away from engines and below level of fuel in tank.

High-Cycle Tools Increasing

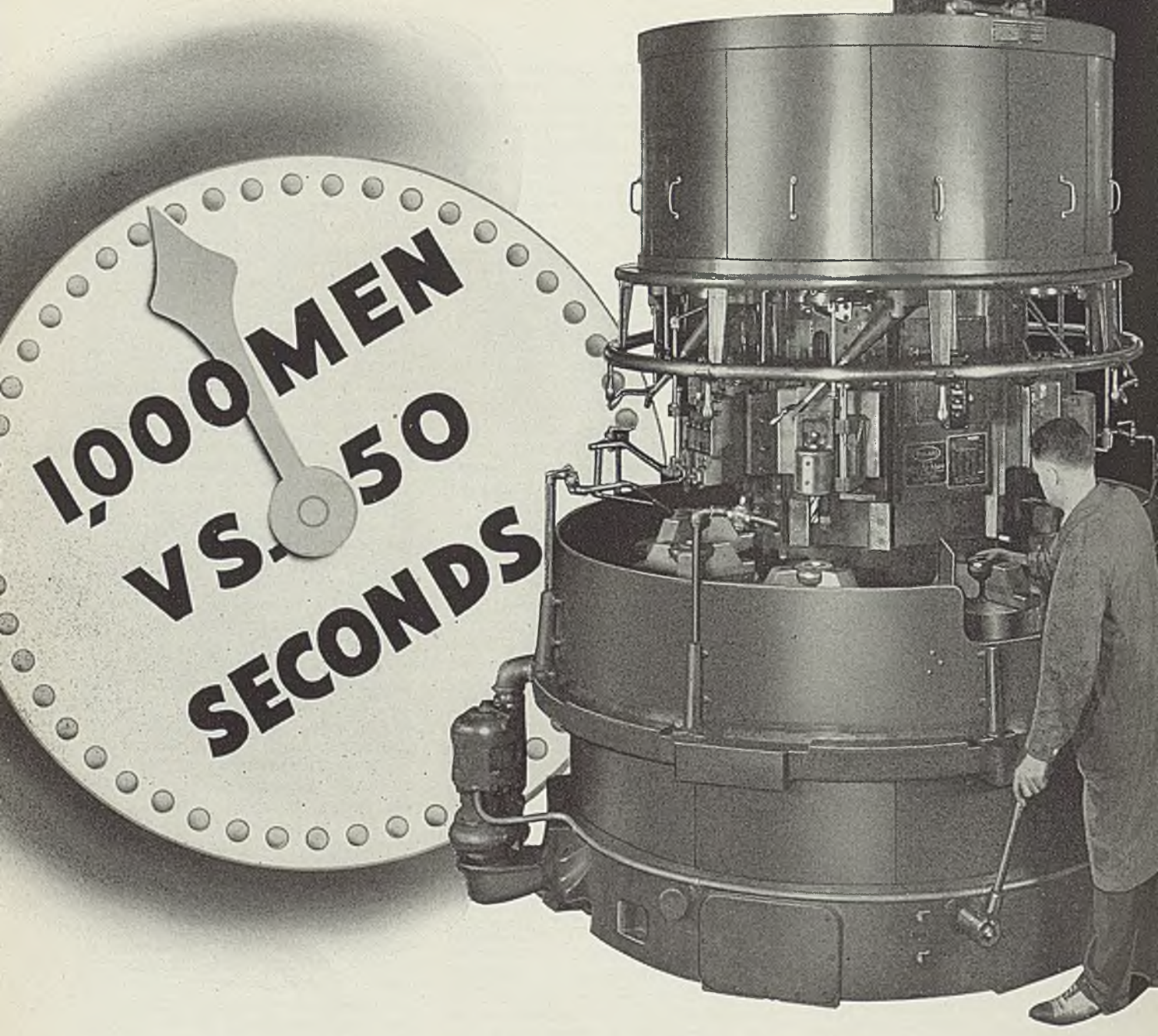
A tendency has been noted in use of high-cycle tools in aircraft plants, especially with drills. With only a 3 to 5 per cent load reduction in speed, high-cycle drills, operating on 3-phase 180 cycle alternating current at speeds near 10,800 revolutions per minute, are stepping up production as much as 300 per cent. Using twist drills with highly polished flutes and a special cutting compound, Rotor Air Tool Co., Cleveland, has developed a drill capable of boring holes as small as No. 41 in ½-inch stacks of aluminum alloy sheet with almost the speed of punching.

There are some in the steel industry who believe it is possible to convert stainless steel slabs into coils of strip in wider widths and thinner gages than now is being done commercially. Moreover, it is hinted that physical values of stainless material in these thinner gages will far exceed those of light metals now used.

Today, stainless steel is under investigation as it never has been and some astounding announcement may be made this year that certainly will interest the aviation industry, for plane builders will benefit thereby unless all indications fail.

Army Orders 500-Mile-An-Hour Planes

■ Claimed the "world's fastest", this twin-motored Lockheed P-38 interceptor pursuit plane is the first of 70 which will be delivered to United States army air corps. Official photograph by United States army air corps shows ultra-streamlining which makes possible a top speed of around 500 miles per hour. Acme photo



Over 1,000 men worked many days to build this Bullard Mult-Au-Matic—that *you* may save perhaps 50 seconds and a few cents.

But, even more important, those saved pennies and seconds represent increased sales, increased employment, increased profits *right in your own plant*, as Mult-Au-Matics play their part in helping you to build a better product for less money.

The wide scope of the Bullard Mult-Au-Matic is often not fully appreciated, even by those who own one. A wide range of sizes permits applying the Mult-Au-Matic Method to thousands of jobs even when the runs are as low as 250.

If you doubt the completeness of your information—send for a Bullard Engineer.

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MULT-AU-MATICS

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ LEGEND credits to Charles F. Kettering, genial General Motors vice president in charge of research, the following story: When the news was flashed around the world that Lindbergh had just completed his Atlantic flight—alone—someone informed Mr. Kettering and he replied, "That's fine, but did he ever try it with a committee?"

At the moment Mr. Kettering is in Florida and according to recent observation of his boss, W. S. Knudsen, GM president, has launched a research project to determine why sunlight is cold in Florida this winter. So he did not have the opportunity to witness the convening of 109 committees and subcommittees of the American Society for Testing Materials here last week at the society's annual spring meeting.

These committee meetings are the birthplaces of many of the materials standards accepted throughout the world and the task of evolving new specifications which will meet the approval of both supplier and user perhaps is not so generally appreciated as it should be.

Sandwiched into this galaxy of group assemblages was a symposium on new materials in transportation, attended by more than 200, at which seven technical papers were presented, dealing with exhaust valve materials, automotive steels, rubber, concrete, asphalt, fuels and lubrication.

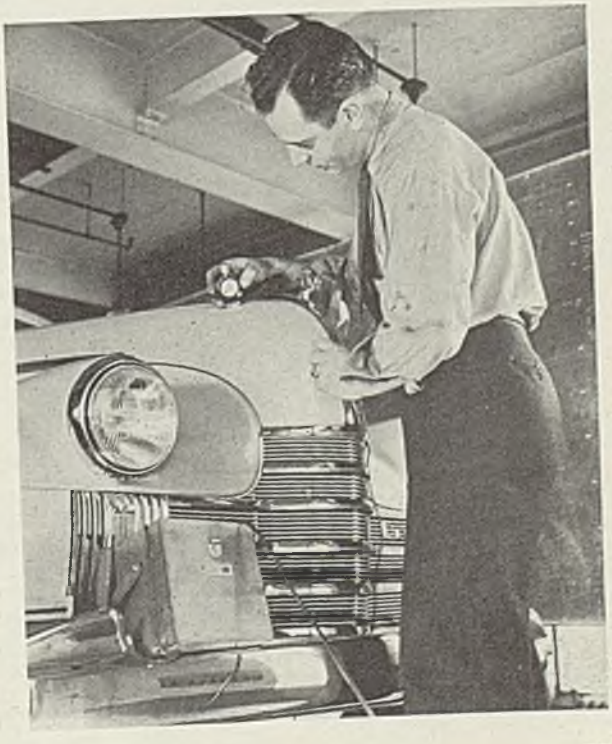
Particularly interesting to this audience was a discussion of the selection and application of automotive steels, by A. L. Boegehold, head of the department of metallurgy of GM research laboratories; W. H. Graves, chief metallurgist, Packard Motor Car Co., and E. W. Upham, chief metallurgist, Chrysler Corp., all prominent automotive metallurgists, and in constant touch with metallurgical problems.

They pointed out that present-day trends in the use of steel for auto parts have been influenced by: Advances in heat treating equipment and methods; development of experimental tests to prove materials and treatments; improved quality and uniformity of steel resulting from grain size control and hardenability testing; increased knowledge of the mechanism of fatigue failures, and an open mind on past customs and practices.

How manufacturing methods and physical requirements determine what price steel to use was illustrated by two examples—selection of suitable materials for piston pins and for camshafts. Piston pins must be strong, ductile and able to resist wear. Any of the straight carbon carburizing grades of steel such as S.A.E. 1015, 1020, X-1020, 1115, 1120, X-1314 and X-1315, or any of the alloy steels from the newer low alloys such as Amola, Grainal, low-chromium, low nickel-chromium, or the S.A.E. alloy steels such as 2015, 2115, 3115, 4615, 5115 or 4815 would be satisfactory. Most cars use one of the first seven.

Selection of a steel from this group of seven is a matter of balancing steel costs, machining costs and hardenability. An important element of machining costs is drilling and this varies with equipment

Measures Thickness of Paint Coat to 0.0001-Inch



■ Electric gage comprising electron tube, transformer, red warning jewel, sound relay and dial indicator, all in a compact unit, is used by Oldsmobile engineers to determine thickness of paint on car surfaces. When needle penetrates paint coats to steel base metal, a circuit is closed permitting high-frequency current to travel through gage and needle point. Dial indicator then records thickness of paint, to within 0.0001-inch

and accounting practice as to allocation of overhead costs.

One manufacturer uses tubing instead of bar stock for piston pins. Tubing costs more per piece than bar stock, but drilling cost is eliminated. In most plants drilling costs are lower than the added cost of tubing but if the equipment or floor space is not available, it is questionable whether the saving on solid stock would offset cost of such machining facilities.

Camshafts must resist wear and be sufficiently rigid to give satisfactory low noise level, the authors pointed out. Strength is a secondary consideration because if the design and material used provide sufficient rigidity, the shaft is inherently strong enough.

General use of the mushroom or barrel tappet of chilled cast iron or hardened steel means that camshafts capable of resisting wear under sliding motion are needed, and of a material compatible with the tappet material. Chilled iron tappets are used successfully against all five types of camshafts—heat treated steel, carburized low-carbon and heat treated medium-carbon; alloy cast iron, chilled or heat treated, and hardened pearlitic malleable iron. Steel tappets are used successfully with hardened alloy cast iron, either chilled or heat treated, or hardened pearlitic malleable iron shafts.

Data Lacking on Gear Steels

Mr. Boegehold, who presented the paper, observed that selection of materials for gears in the last five years, in common with other parts, has shown a trend in the direction of lower cost materials, a first requirement being that the steel shall have sufficient hardenability to harden fully when quenched in oil. Although this is an elementary statement, no quantitative information is available for determining the relative values of steels in various sized gears.

For scientific selection of steels from the standpoint of hardenability, two sets of data are needed—hardness obtainable in all steels at any cooling speed ordinarily encountered in quenching, and cooling speeds in gears or other parts during quenching. With this information it would be possible to predict the hardness in any part made from any steel, but much work remains to be done before complete data of this kind are compiled. A start has been made on the collection of hardness obtained in steels as a result of various cooling rates by means of the Jominy hardenability test, described on two occasions before the American Society for Metals.

Preliminary work on determining limits of hardness at each quenching speed for each S.A.E. steel was presented in a series of nine charts by Mr. Boegehold. He suggested that eventually these steels may be specified principally according to hardenability limits and only approximately as to composition limits.

"We believe," he said, "that metallurgists in the near future will see the advantage of referring to steels in terms of hardness produced at various quenching speeds, and to parts to be heat treated in terms of cooling speeds. This means of classifying steels could become so useful that metallurgists who are responsible for selection and treatment of automotive steels would acquire the habit of remembering the cooling rates of different automobile parts and what hardnesses in various steels will be caused by these cooling rates. Such procedure would eventually work toward more efficient use of alloys in steels and would cause revision of the composition ranges in alloy steels now in favor."

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,962	449,314
Feb.	202,597	317,520	.....
March	238,447	389,495	.....
April	237,929	354,266	.....
May	210,174	313,248	.....
June	189,402	324,253	.....
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
Feb. 10	95,985	84,500
Feb. 17	95,050	79,860
Feb. 24	102,570	75,660
Mar. 2	100,855	78,705
Mar. 9	103,560	84,095

†Comparable week.

	Week ended Mar.9	Mar. 2
General Motors	45,740	44,490
Chrysler	23,365	26,375
Ford	21,600	20,350
All others	12,855	9,640

■ IMMINENT appearance of a new steel for use in automotive engine exhaust valves was indicated in a paper prepared by S. D. Heron, director of aeronautical research, Ethyl Gasoline Corp., and O. E. Harder, assistant director, and M. R. Nestor, research engineer, Battelle Memorial institute, the discussion being presented by Mr. Heron. The three authors have been associated for four years in the development of this new steel which has involved numerous changes of composition to avoid manufacturing and engine operating difficulties. The testing program involved the analysis of over 1000 experimental valves, more than 10,000 hours of engine testing on the dynamometer, and over a million miles of road testing. Details of the steel are not quite ready for release.

Mr. Heron summarized the thorough investigation made by the authors into all phases of exhaust valve materials for internal combustion engines. They mentioned as one difficulty encountered the fact that most workers in the field of these valve materials have been metallurgists lacking close association with engine test laboratories and valve manufacturers. In consequence, their knowledge of the service requirements of an exhaust valve material often has been scanty.

The combination of mechanical properties which are related to the behavior of an exhaust valve in service makes a complex array. The more important are: Hot strength, creep resistance, hot hardness, ductility, hot and cold brittleness, resistance to scuffing, wear resistance, work hardening properties, effects of heat on properties, resistance to heat shock, forgeability, machinability and weldability.

Many Metals for Exhaust Valves

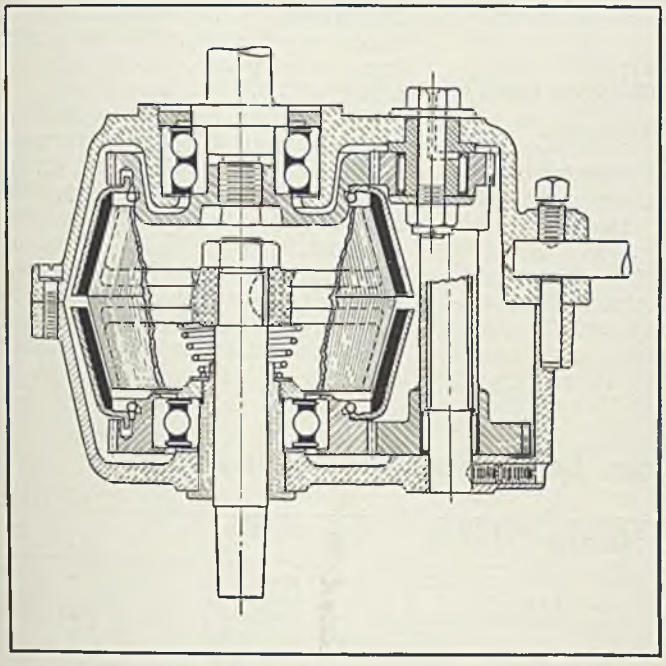
The authors classified some 30 materials available for exhaust valves, for engines of passenger cars, trucks, buses, tractors and airplanes, both in this country and in Europe. General classes are: Martensitic or pearlitic steels, ferritic steels, austenitic steels, transformation hardening or age hardening steels and nonferrous alloys.

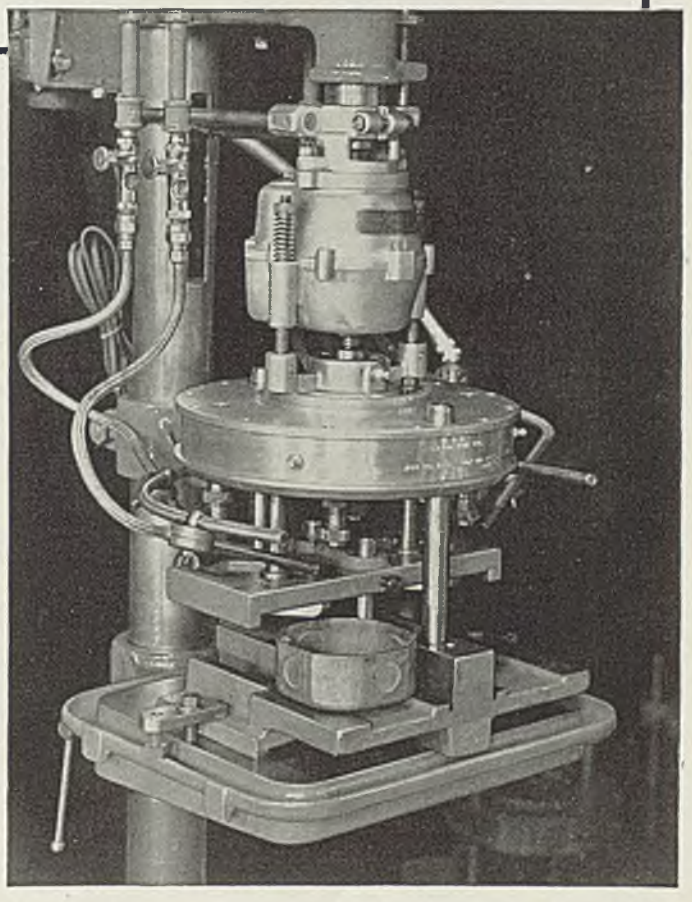
Parenthetically they mentioned as a curious fact that additives to produce free machining—titanium, selenium, etc.—have not been used in valve steels despite their considerable success in martensitic and austenitic stainless steels. It appears such additives would not produce either hot or cold corrosion resistance significantly, and the antiscuffing properties obtained with some additives might prove to be of considerable value.

Difficulties of simulating service conditions in laboratory tests led to the development of special furnaces for the heating and cooling of valve materials in atmospheres corresponding to those encountered in engines. Ethyl Gasoline Corp. now has designed a unit to accommodate 47 specimens and suitable for continuous operation without attention. A rotary hearth is used so that all specimens are given uniform exposure, the specimens rotat-

(*Please turn to Page* 66)

"TORRINGTON NEEDLE BEARINGS Run for Weeks with only Occasional Oiling"





(*Above*) View shows the Torrington Needle Bearings on idler gear and quill gear shaft in the Ettco Tapper, and single row Torrington Ball Bearing on clutch gears.

(*Right*) In the Ettco 1-B Tapper, reversing clutches impose heavy intermittent loads on the Torrington Needle Bearings. Torrington Ball Bearings are also used in this unit.

BETTER LUBRICATION with little service attention is the outstanding advantage that Ettco Tool Co., Inc., gives its customers by using Torrington Needle Bearings on idler gear and quill gear shaft in its 1-B Tapper.

In this application the Needle Bearings are subjected to heavy additional intermittent loads as the reversing clutches operate. "Bronze bushings formerly used were difficult to keep properly lubricated," say Ettco engineers. "Now we have no trouble, as the equipment can run for weeks with only occasional oiling.

"In the four years since we adopted the Needle Bearing, we have had a remarkable performance record. We are getting excellent results, and intend to use more of these bearings in other equipment of our manufacture."

You too can incorporate these advantages in your product—and you can do it at surprisingly little cost. The Torrington Needle Bearing is inexpensive to buy—easy to install. Existing designs can readily be adapted to use the Needle Bearing. It can be mounted in the simplest type of housing—takes up no more space than a plain bushing—yet has exceptionally high radial load capacity.

The Torrington Engineering Department will gladly work with you in laying out applications for the Needle Bearing in your products. For further information, write for Catalog No. 10. For Needle Bearings to be used in heavier service, request Booklet No. 103X from our associate, Bantam Bearings Corporation, South Bend, Indiana.

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Makers of Needle and Ball Bearings

New York Boston Philadelphia Detroit
Cleveland Chicago London, England

TORRINGTON
NEEDLE BEARING

See Normal Ore Reserve May 1; 1939 Mine Shipments Announced

■ IRON ore stocks at lower lake docks and furnaces May 1 probably will exceed 15,000,000 gross tons, which is close to normal carryover at the beginning of the navigation season. Stocks Feb. 1, according to the Lake Superior Iron Ore association, Cleveland, totaled 30,189,247 tons and January consumption was 5,289,308 tons. Should this rate be maintained on the average for February, March and April about half present stocks would be consumed.

Final shipping figures for 1939, as compiled by the association, show a total of 45,547,974 tons, compared with 19,549,909 tons in 1938 and 63,110,240 tons in 1937. All-rail shipments in 1939 were 475,359 tons, compared with 286,023 tons in 1938 and 587,281 tons in 1937.

Iron ore beneficiated at the mines, by washing, jigging, magnetic separation sintering and drying, in 1939 totaled 19,761,114 tons for mines in the United States ranges and 111,307 tons sintered at Helen mine on the Michipicoten range in Canada. This compares with 9,135,742 tons beneficiated in 1939 and 24,960,418 in 1937.

Manufacturers' January Inventories Increase

■ Manufacturers' inventories increased for the fifth consecutive month in January. Decline in new orders, however, was virtually checked, according to preliminary indexes compiled by the National Industrial Conference board.

Value of inventories, based on reports made directly to the board, was 130 points, 3 per cent higher than 126 points Dec. 31, and 15 per cent greater than 113 points in January, 1939. This despite a marked curtailment in production.

Board's inventories index has increased 18 per cent since August, stands 30 per cent above 1936 average, but remains 10 per cent below peak reached in October, 1937. Accumulation of stocks has been at about the same rate as that which occurred in four months following buying wave of December, 1936. Rise since last September, says the board, was not followed by general increase in prices, as was the case early in 1937.

New orders in January were at 109 points, off 1 per cent from December's 110, but 17 per cent greater than 93 points in January, 1939. Manufacturers' shipments declined 8 per cent from 128 to 118 points during January. Compared with 97 points in January, 1939, however, the index showed a gain of 22 per cent.

Indexes, based on 100 for 1936, are adjusted for seasonal variation.

Shipments of Iron Ore from Lake Superior Mines

Mesabi Range

Mine	1938	1939	Mine	1938	1939	Mine	1938	1939	Mine	1938	1939
Adams Spruce	848,648	1,640,849	Godfrey-Glen	137,727	430,415	Langdon-Harrison	1,842	.....	Quinn	.....	9,645
Agnew	174,920	132,093	Grant	176,156	601,118	LaRue	137,944	51,247	Sargent	99,840	32,365
Albany	1,249	323,207	Halobe	97,208	205,354	Leonidas	540,403	545,825	Scranton	219,817	382,931
Alexandria	219,121	46,670	Harold	83,341	38,324	Magnetic Conc.	6,361	.....	Sellers	687,636	1,904,313
Alice	33,252	122,313	Harrison	64,214	19,038	Mahoning	1,515,572	2,525,921	Shenango	31,311	173,649
Arcturus	.....	404,017	Harrison Fines	8,850	3,915	Mayas	9,252	.....	Siphon (Spring)	.....	948
Bennett	151,060	353,267	Harrison Conc.	.....	131,028	Mesabi Chief	582,907	858,824	Silver	16,172	34,250
Biwabik	.....	575,740	Hartley-Burt	258,649	809,505	Minnewas	995,590	1,393,281	Smith	6,911	7,144
Bray	944	24,163	Hawkins	161,881	123,434	Minorca	.....	3,247	Snyder	40,105	65,810
Bruce	188,490	.....	Hill Annex	585,783	2,166,603	Missabe Mt.	898,118	2,739,250	South Agnew	26,281	139,862
Burns	17,078	.....	Hill Trumbull	.....	987,918	Morris	187,115	1,325,985	So. Uno N. P.	.....	19,514
Burt-Pool-Day	189,665	893,402	Hoadley	.....	22,035	Morrison	314,633	569,378	Susquehanna	.....	618,639
Canisteo	555,194	445,545	Hull Rust	1,294,509	2,591,464	Morrow	58,440	.....	Union	.....	145,912
Chataco	52,726	83,016	Judd	55,017	10,860	N. Harrison	.....	80,280	Virginia	.....	165,017
Dale	30,537	.....	Julia-Norman	77,220	.....	N. Harrison Ann.	.....	37,400	Wacootah	121,912	317,978
Danube	138,356	312,690	Kevin	207,045	108,377	Pacific	.....	50,484	Webb	115,606	592,946
Dunwoody	1,508	43,248	Kinney	.....	1,417	Patrick-Ann	59,567	163,769	York	.....	68,141
Fraser	570,951	1,000,317	Langdon	132,637	308,715				Total	13,304,036	30,314,857
Godfrey-Burt	116,765	319,826									

Menominee

Mine	1938	1939	Mine	1938	1939	Mine	1938	1939	Mine	1938	1939
Baltic	5,509	8,224	Davidson Group	19,376	50,784	Hiawatha No. 2	64,678	187,007	Tobin	34,985	40,113
Bates	85,336	186,472	Fogarty	3,109	15,348	Homer	57,212	142,288	Virgil	36,021	29,543
Bengal	43,367	300,691	Forbes	54,940	107,030	James	81,709	167,630	Total	980,135	2,160,596
Berkshire	10,086	51,450	Globe-Cornell	34,028	51,018	Loretto	.....	21,522			
Bradley	24,394	45,571	Hemlock	75	.....	Matilda	1,716	3,474			
Buck	52,422	58,935	Hiawatha No. 1	191,897	251,464	Penn Mines	179,275	442,032			

Marquette

Mine	1938	1939	Mine	1938	1939	Mine	1938	1939	Mine	1938	1939
Athens	98,508	457,339	Gardner-Mack-inaw	14,488	49,141	Mary Charlotte	.....	74,266	Tilden	85,589	170,276
Blueberry	67,039	402,473	Greenwood	29,556	61,870	Morris	239,867	390,244	Volunteer	92,136	248,280
Cambria-Jackson	.....	272,915	L. Sup.-Holmes	.....	253,684	Negaunee	331,176	679,680	Total	1,476,257	4,907,623
Cliffs Shaft	163,021	591,370	Lloyd	112,191	477,848	Princeton	57	202			
Francis	.....	13,469	Maas	138,557	622,703	Richmond	84,606	136,432			
						Stephenson	19,466	5,431			

Gogebic

Mine	1938	1939	Mine	1938	1939	Mine	1938	1939	Mine	1938	1939
Anvil	77,380	271,195	Ironton	.....	101,094	Palms	773	.....	Sunday Lake	188,862	400,160
Cary	28,636	195,690	Keweenaw	165,446	296,998	Penokee Group	96,552	537,042	Wakefield	228,566	238,909
Eureka-Asteroid	317,667	395,417	Montreal	596,166	974,718	Plymouth	217,975	480,906	West Davis	101,408	545,941
Geneva	73,424	13,909	Newport	81,742	607,404	Puritan	103,109	286,175	Total	2,277,706	5,345,558

Cuyuna

Mine	1938	1939	Mine	1938	1939	Mine	1938	1939	Mine	1938	1939
Alstead-Hillcrest	42,400	145,647	Mangan No. 1	726	.....	Chandler	17,589	51,254	Zenith	225,867	463,833
Armour No. 1	199,242	174,829	Merritt	16,698	31,903	Pioneer	422,912	566,171	Total	929,952	1,417,360
Evergreen	24,328	141,312	Portsmouth	17,393	144,232	Sibley	127,837	161,246			
Hopkins	5,120	30,653	Sagamore	54,715	219,775	Soudan	135,747	174,856			
Louise	5,392	27,356	Wearne	63,529	125,188						
Mahnomen	152,280	249,778	Total	581,823	1,290,673						

GRAND TOTAL 19,549,909 45,547,974

Current Events In Chicago . . .

By J. F. POWELL, Chicago Editor, STEEL

■ PIPE LINE transportation of coal may become a reality, it was revealed here last week in statements by W. Homer Hartz, president, Morden Frog & Crossing Works, Chicago, and president, Illinois Manufacturers' association.

Discussing ways to stimulate Illinois coal business, Mr. Hartz mentioned as one point the piping of pulverized coal over long distances.

Transportation of coal in such a manner long has been a dream of coal men—and possibly a nightmare to railroad interests, local veterans of the coal industry have commented. Some 25 years ago, one asserted, it was proposed to pipe pulverized coal to Chicago from Carlinville, Ill.

As Mr. Hartz points out, however, definite advances have been made. R. E. Burk, Western Reserve university, Cleveland, has been working on such plans for the past two years. A few months ago he took out a patent on the process. United States bureau of mines, Mr. Hartz states, is watching the progress with great interest.

"Under the process, pulverized coal is suspended in water and pumped across country with equipment similar to that used in pumping oil," Mr. Hartz said. "Chief advantages claimed for the enterprise are that it will be more economical than rail shipment and make accessible coal deposits in rough country where the cost of building railroads is prohibitive."

Coal men here say the suspension of coal in water would neither detract nor add to the quality of the coal, although some coals possibly could not be transported in this way because their moisture content already is too high. However, it is thought a majority of coal grades could be pulverized for such shipment, and possibly even anthracite. They also point out there is a definite trend toward greater use of pulverized coal.

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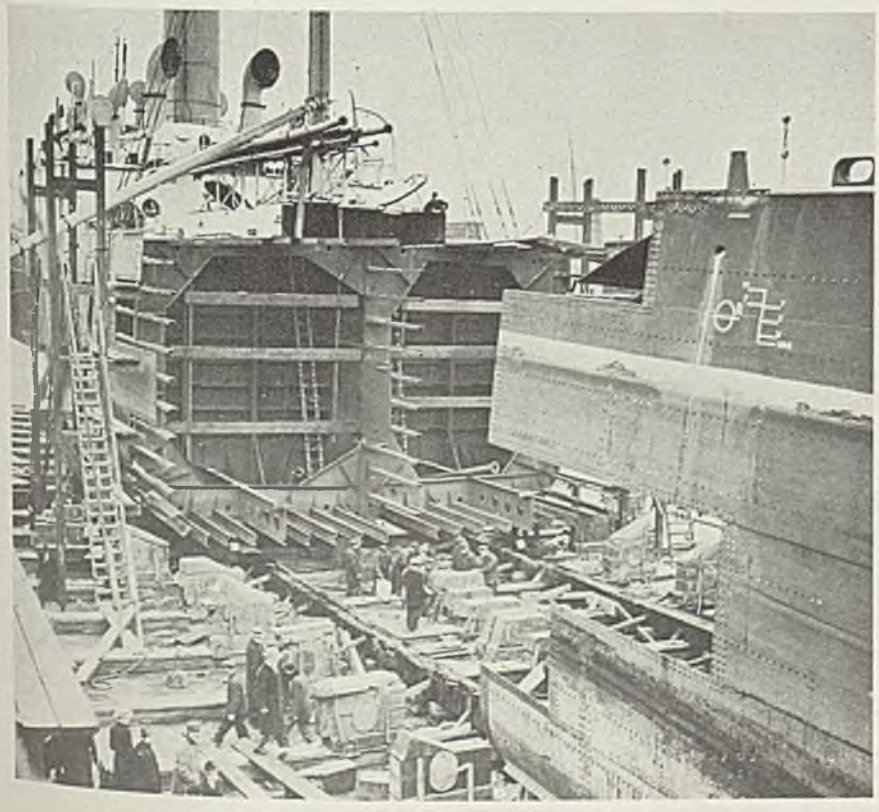
Steel producing interests look forward to closing on steel tonnages for the new building for Technological Institute of Northwestern university, Evanston, Ill. With construction scheduled to start within another month, the edifice will cost approximately $5,000,000 and will contain 5,500,000 cubic feet. Machinery and educational equipment to be installed will run to $1,500,000. The new institute is being made possible through a recent gift of $6,735,000 by Walter P. Murphy, Chicago railroad equipment executive. Chemical, civil, electrical and mechanical engineering courses will be offered students, who will attend the institute on a co-operative plan involving alternate classroom study and work in industries of the fields in which they are majoring.

Tanker's Capacity Increased 60 Per Cent

■ NOT a victim of a magnetic mine or a torpedo, this 250-foot oil tanker COMET has succumbed to a battery of pneumatic rivet chisels in process of having 74 feet of additional cargo space added amidships. In drydock at Great Lakes Engineering Works, River Rouge (Detroit), the tanker rests on cradles of 12 x 16-inch timbers which slide on the regular greased launching ways.

After riveters with 60 and 90-pound guns had chiseled off the heads and knocked out rivets securing hull plates, stringers and keel beams, cables attached to drums of two steam winches were fastened to port and starboard sides of the boat at the forward end. In a matter of 7 minutes the disconnected half was started up the ways and pulled to the position shown in the accompanying illustration.



When the two parts are the proper distance apart and have been lined up with lines and hydraulic jacks, new sections of keel beams and stringers will be riveted in place and new hull plates will be riveted to exposed edges of present plates.

Structural steel bulkheads will be set in place in the hold to make four more partitions, sealed off through the center. A 60 per cent increase in capacity will be effected, from the present 23,400 barrels to 37,800 barrels. Length will be increased from 250 feet to 324 feet. The COMET is owned by Cleveland Tankers Inc.

This is the eighth job of this sort which Great Lakes has undertaken. Previous ones have included several barges and tankers. Low-alloy high-tensile steels are used extensively for structural members, to hold down weight. Pipelines and fittings are welded, although plates, beams and stringers are all riveted. One project in which a considerable amount of additional welding was required was the conversion of a grain carrier to an oil tanker.

1939 Finished Steel Production Makes 65.3 Per Cent Increase

■ STEEL products made for sale in 1939 totaled 34,687,861 gross tons, compared with 20,993,315 tons in 1938 and 37,945,108 tons in 1937. The 1939 figure shows gain of 65.3 per cent over 1938 and is only 8.6 per cent below 1937 production.

Exports in 1939 totaled 2,176,736 tons, compared with 1,460,121 tons in 1938. Shipments to members of the industry for conversion into further finished products were 3,477,883 tons, compared with 1,925,103 tons in 1938. Estimated total steel finishing capacity based on yield from ingots of 70 per cent is 48,514,000 gross tons; in 1938 at 70.6 per cent it was 48,152,500 tons.

Production for sale, less shipments to members of the industry, totaled 31,209,978 tons, representing 64.3 per cent of capacity, against 19,068,212 tons at 39.6 per cent in 1938.

Fourth quarter production was 12,107,205 tons, compared with 8,298,565 tons in third quarter. After deducting tonnage shipped to other members of the industry for further conversion fourth quarter tonnage was 10,796,158 tons, at 89 per cent of capacity. This compares with 7,452,974 tons at 61.4 per cent in third quarter.

During the final quarter of 1939 production of cold-reduced tin plate was at 107.3 per cent of rated capacity, black plate at 102.4 per cent.

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

Fourth Quarter - 1939 (period)

		Number of companies	Items	Annual Capacity Gross tons	Production for Sale—Gross Tons: Current Quarter: Total	Current Quarter: Per cent of capacity	Current Quarter: Shipments: Export	Current Quarter: Shipments: To members of the industry for conversion into further finished products	To Date (12 Months 1939): 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.	32	1	xxxxxxx	1,297,455	xxx	211,961	741,758	3,113,274	xxx	293,933	1,947,322
	Heavy structural shapes	8	2	4,796,800	775,836	64.7	36,668	-	2,271,888	47.4	104,212	xxxxxxx
	Steel piling	4	3	309,300	42,788	55.3	2,180	-	153,061	49.5	9,618	xxxxxxx
	Plates—Sheared and Universal	19	4	5,828,310	942,744	64.7	49,860	9,631	2,515,274	43.2	210,214	20,812
	Skelp	7	5	xxxxxxx	225,254	xxx	49,410	132,227	573,061	xxx	76,362	370,821
	Rails—Standard (over 60 lbs.)	4	6	3,395,300	241,265	28.4	1,256	-	1,037,489	30.6	8,951	xxxxxxx
	Light (60 lbs. and under)	6	7	418,500	27,753	26.5	3,920	-	79,151	18.9	18,196	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	105,000	12,771	48.7	4,141	-	32,554	31.0	6,578	xxxxxxx
	Splice bar and tie plates	14	9	1,290,550	115,337	35.7	1,672	-	416,292	32.3	5,411	xxxxxxx
	Bars—Merchant	35	10	xxxxxxx	1,198,115	xxx	27,658	138,169	3,218,519	xxx	102,784	342,952
	Concrete reinforcing—New billet	14	11	xxxxxxx	276,155	xxx	40,924	-	927,633	xxx	82,460	xxxxxxx
	Rerolling	19	12	xxxxxxx	41,178	xxx	6,868	-	156,476	xxx	12,949	xxxxxxx
	Cold finished—Carbon	18	13	xxxxxxx	189,375	xxx	1,781	-	529,030	xxx	6,174	xxxxxxx
	Alloy—Hot rolled	15	14	xxxxxxx	243,323	xxx	6,938	21,447	686,768	xxx	19,084	59,695
	Cold finished	14	15	xxxxxxx	20,061	xxx	27	-	59,271	xxx	196	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	19,589	xxx	957	-	64,502	xxx	1,682	xxxxxxx
	TOTAL BARS	35	17	11,595,470	1,987,796	68.6	85,153	159,616	5,642,199	48.7	225,329	402,648
	Tool steel bars (rolled and forged)	15	18	94,160	13,658	58.0	842	-	40,283	42.8	3,397	xxxxxxx
	Pipe and tube—B. W.	15	19	1,626,800	286,706	70.5	19,904	-	850,870	52.3	40,538	xxxxxxx
	L. W.	11	20	1,316,580	105,071	31.9	10,025	-	320,463	24.3	17,352	xxxxxxx
	Electric weld	5	21	638,400	68,751	43.1	8,620	-	238,671	37.4	13,771	xxxxxxx
	Seamless	15	22	2,968,900	524,490	70.7	47,208	-	1,505,951	50.7	104,246	xxxxxxx
	Conduit	7	23	165,670	22,330	53.9	826	-	70,402	42.5	2,138	xxxxxxx
	Mechanical Tubing	6	24	265,600	49,956	75.2	2,727	-	143,627	54.1	5,058	xxxxxxx
	Wire rods	19	25	xxxxxxx	254,683	xxx	15,513	67,724	706,571	xxx	34,232	215,464
	Wire—Drawn	38	26	1,970,195	414,828	84.2	24,666	9,347	1,228,087	62.3	65,692	18,272
	Nails and staples	19	27	1,080,760	176,718	65.4	15,827	-	606,059	56.1	34,324	xxxxxxx
	Barbed and twisted	16	28	428,075	60,340	56.4	19,627	-	206,269	48.2	53,309	xxxxxxx
	Woven wire fence	15	29	695,330	61,487	35.4	454	-	244,282	35.1	1,766	xxxxxxx
	Bale ties	11	30	110,680	11,601	41.9	25	-	53,167	48.0	92	xxxxxxx
	All other wire products	5	31	24,380	1,788	29.3	-	-	5,148	21.1	16	xxxxxxx
	Fence posts	12	32	131,700	16,021	48.7	138	-	53,963	41.0	1,171	xxxxxxx
	Black plate	12	33	462,815	118,490	102.4	2,531	41,387	365,169	78.9	7,594	124,686
	Tin plate—Hot rolled	10	34	1,527,360	202,369	53.0	61,230	-	576,162	37.7	118,361	xxxxxxx
	Cold reduced	10	35	1,936,200	519,607	107.3	89,502	-	1,710,848	88.4	211,499	xxxxxxx
	Sheets—Hot rolled	26	36	xxxxxxx	1,568,654	xxx	60,505	86,833	4,343,727	xxx	223,954	206,124
	Galvanized	16	37	xxxxxxx	379,829	xxx	34,816	-	1,245,466	xxx	108,943	xxxxxxx
	Cold rolled	18	38	xxxxxxx	630,869	xxx	15,200	-	1,805,231	xxx	89,104	xxxxxxx
	All other	15	39	xxxxxxx	136,877	xxx	4,353	-	405,153	xxx	16,769	xxxxxxx
	TOTAL SHEETS	27	40	11,374,065	2,716,229	95.5	114,874	86,833	7,799,577	68.6	438,770	206,124
	Strip—Hot rolled	24	41	3,137,300	465,291	59.3	16,399	62,524	1,207,906	38.5	40,023	171,734
	Cold rolled	36	42	1,156,910	220,999	76.4	4,140	-	603,926	52.2	11,467	xxxxxxx
	Wheels (car, rolled steel)	5	43	380,320	56,922	59.9	957	-	134,598	35.4	5,266	xxxxxxx
	Axles	5	44	425,900	33,683	31.6	8,055	-	66,045	15.5	5,489	xxxxxxx
	Track spikes	11	45	300,100	33,057	44.1	875	-	106,892	35.6	2,260	xxxxxxx
	All other	4	46	9,450	3,151	133.4	-	-	8,682	91.9	101	xxxxxxx
	TOTAL STEEL PRODUCTS	136	47	xxxxxxx	12,107,205	xxx	905,166	1,311,047	34,687,861	xxx	2,176,736	3,477,883
	Estimated total steel finishing capacity based on a yield from ingots of 70.0%	-	48	48,514,000	xxxxxxx	89.0	xxxxxx	xxxxxxx	xxxxxxx	64.3	xxxxxxx	xxxxxxx
IRON PRODUCTS	Pig iron, ferro manganese and spiegel	28	49	xxxxxxx	1,566,570	xxx	60,346	673,119	4,233,788	xxx	136,020	1,278,404
	Ingot moulds	4	50	xxxxxxx	152,953	xxx	904	-	361,616	xxx	1,712	xxxxxxx
	Bars	9	51	147,200	13,225	35.9	16	718	34,123	23.2	103	1,958
	Pipe and tubes	3	52	97,730	10,996	45.0	218	-	40,640	41.6	745	xxxxxxx
	All other	2	53	63,560	4,011	25.2	807	1,680	13,873	21.8	2,443	5,247
	TOTAL IRON PRODUCTS (ITEMS 51 to 53)	11	54	250,530	28,232	45.1	1,041	2,398	88,636	35.4	3,291	7,205

Total number of companies included --- 157

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products Current quarter 10,796,158 *G.T.;* 89.0 *% of Finishing Capacity.*
To date 31,209,978 *G.T.;* 64.3 *% of Finishing Capacity.*
The above tonnages represent 70.0 *% of the ingots produced by companies whose products are included above.*

What's New at Pittsburgh . . .

By R. L. HARTFORD, Pittsburgh Editor, STEEL

■ PRESIDENT ROOSEVELT is coming to Pennsylvania for a speech next Fourth of July, to dedicate the new Pennsylvania Turnpike. Between now and then a tremendous construction job must be done to meet the scheduled opening June 29.

The 160-mile superhighway remains to be built almost in entirety. Because much of the road is at relatively high altitudes, it probably will be April 1 before the frost has left the ground. In the following 90 days, 147½ miles of four-lane divided concrete highway will be built, bridges and tunnels constructed, grade and tunnels completed and details ironed out.

New highway construction records may be set. One day's paving will require 375 tons of steel, 100 cars of cement, 18,000 tons of stone, 11,000 tons of sand. The tremendous job of handling these materials will require new equipment and a greater concentration of paving equipment than has ever been assembled before. Thirty-five quarries have been established along the road to provide stone. Sand will come from Pittsburgh and Baltimore.

Construction men are watching the job with considerable interest, because this road is expected to be a forerunner of many miles to come within the next few years.

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Labor Quieter

Labor activity has quieted considerably. Shutdown at the Port Vue plant of McKeesport Tin Plate Co. was settled "amicably," although no details have been made public.

Aluminum Co. of America faces threat of a strike from the Aluminum Workers of America. Union has demanded an increase of 10 cents an hour for all workers, based on the fact the company has been able to make money in the past three years. Company has made no statements regarding the demands, and union officials declined to comment as to how far they had gone in their activity.

Steel Workers Organizing committee members in this district are fed up with the quarrel between Lewis and Green. Last week representatives of 31 lodges, numbering about 400, met and passed a resolution demanding the end of the struggle, and appealed to the memberships of both organizations to prevail upon the leaders to give up the fight.

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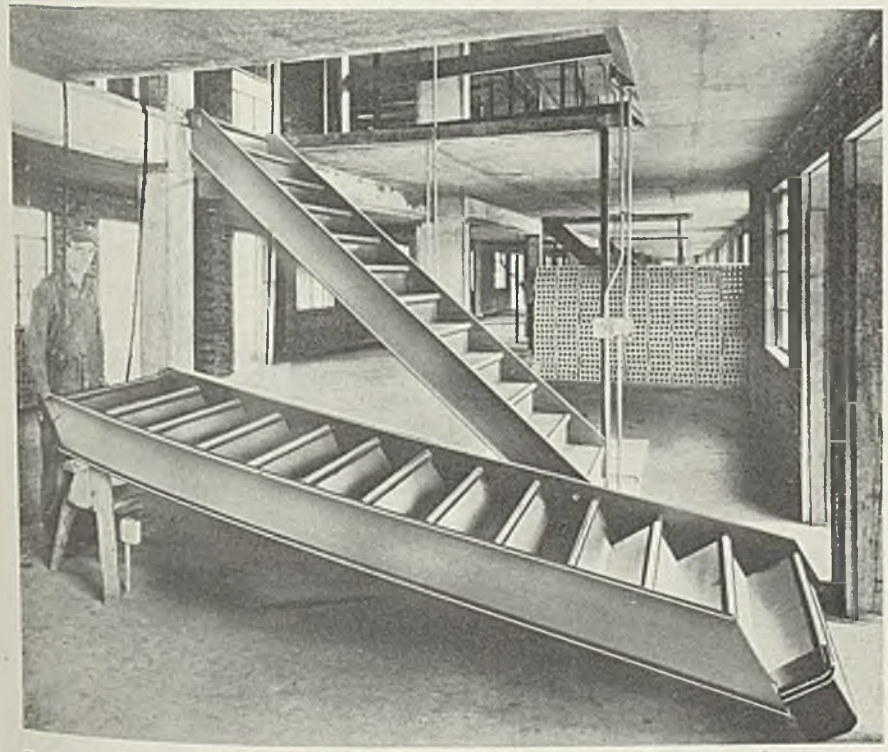
District firms are benefiting in several ways from the government's preparedness program. Some steel producers here have received considerable tonnage for naval work; others have benefited from the construction projects, such as the Panama Canal jobs, while a third class is receiving "educational orders" which allows them to tool up for production of various war materials and gives them an initial order to get into production. Latest recipient of one of this type orders is Pressed Steel Car Co. The order is for 15,000 shell forgings for the French-type "75" gun, and will require four months to complete.

New Lightweight Steel Channel For Staircases



■ To meet demand for rigid steel all-welded staircases, such as pictured here, for residences, apartments and other light-occupancy buildings, Jones & Laughlin Steel Corp., Pittsburgh, is offering a 10-inch lightweight hot-rolled steel channel section weighing only 6½ pounds to the foot. Fireproof steel stairs are expected by architects to win increasing acceptance for houses of the future

Blaeser Elected by Hot Dip Galvanizers

■ A. J. Blaeser, Joslyn Mfg. & Supply Co., Chicago, was elected president of the American Hot Dip Galvanizers' association at the annual meeting held in Pittsburgh March 1. Other officers: F. P. Auxer, National Telephone Supply Co., Cleveland, first vice president; Phelps Ingersoll, Wilcox Crittenden & Co. Inc., Middletown, Conn., second vice president; and Stuart J. Swensson, Pittsburgh, re-elected secretary-treasurer.

In addition to Messrs. Blaeser, Auxer and Ingersoll, new directors of the association include I. M. Herrmann, Acme Galvanizing Co., Milwaukee; T. M. Gregory, Hanlon-Gregory Galvanizing Co., Pittsburgh; J. B. Tate, Witt Cornice Co., Cincinnati; and Clem Stein, International-Stacy Corp., Columbus, O.

Meeting program included a number of technical papers and reports of research committees. Wallace G. Imhoff, technical director of the association, discussed the best fluxing technique in galvanizing, outlining the newest methods. C. H. Klein, National Telephone Supply Co., Cleveland, described operations in galvanizing small threaded parts, while W. G. Hartman, Lewis Nut & Bolt Co., Minneapolis, described his company's experiences in using fuel oil for heating the galvanizing kettle. Mr. Swensson read a paper prepared by Nelson E. Cook, Wheeling Steel Corp., on improvements in galvanizing equipment.

Report of the committee set up to study embrittlement of malleable castings was presented by F. M. Carlson, American Tinning and Galvanizing Co., Erie, Pa.

Steel Prices and Public Relations

■ IN DEFENDING the steel price basing system before the temporary national economic committee Benjamin F. Fairless expressed a view which can be regarded as held generally in the steel industry and in the steel consuming industries. The multiple basing points price system, he held, is "the best merchandising medium for our steel products that has been called to our attention." He declared: "The United States Steel Corp. doesn't take the position there are no justified criticisms of the system. If a better system is called to our attention we would be the first to adopt it."

STEEL feels reasonably assured, following a check of its own in Washington, that the pressure behind the attack on the steel price basing system is insufficient to bring about any governmental interference with the steel industry. At the same time, STEEL is satisfied that the attack on the steel price basing system is not merely politics. It represents an effort, on the part of men who are genuinely concerned with discharging their responsibilities as public officials, to eliminate those features of the steel price system which they view as discriminatory.

Steelmaker and Government See Problems from Different Angles

To a man who has grown up in the steel business the steel price basing system looks all right. Such a man sees the basing system as permitting a certain degree of orderliness in selling. He resents attacks on the system in the knowledge that changes cause grave dislocations in the competitive position of affected steel mills and steel consumers. He feels that the earnings record of the steel industry constitutes irrefutable proof of competition in the industry.

The government man sees another side to this picture. He is bewildered by so-called "phantom freight rates", freight "absorption" and basing price differentials. When competitors' prices on government steel tonnages are identical to the last decimal, it is practically impossible to convince him that something isn't wrong. The testimony offered in numerous government hearings in the past has failed to satisfy the critics of the steel price basing system—and they always are searching for evidence to prove this system is bad, that it is unfair to consumers. Eternally springing up in their minds is the hope that eventually they may be able to pin back the steel industry's ears in this matter of the price system.

Price Basing Controversy Is Part of The Public Relations Problem

Looking at the situation in this way it becomes apparent that the steel price basing controversy involves much more than the steel price system itself. That is, it looms importantly in the public relations of the steel industry, importantly because the industry cannot afford to be under a cloud unnecessarily, as to the government, or any of its divisions. That means that a defense of the steel price system is not sufficient. What is required is a complete elimination of the never-ending price basing controversy.

STEEL does not pretend to know how this can be accomplished. It does not know of any better plan than the one now in operation. It simply points out that, despite temporary victories, the problem continues a live one, and that it is certain to come up again and again as long as existing misunderstandings continue to prevail. The steel industry will do well to devote its best attention to the solution of this problem.

The BUSINESS TREND

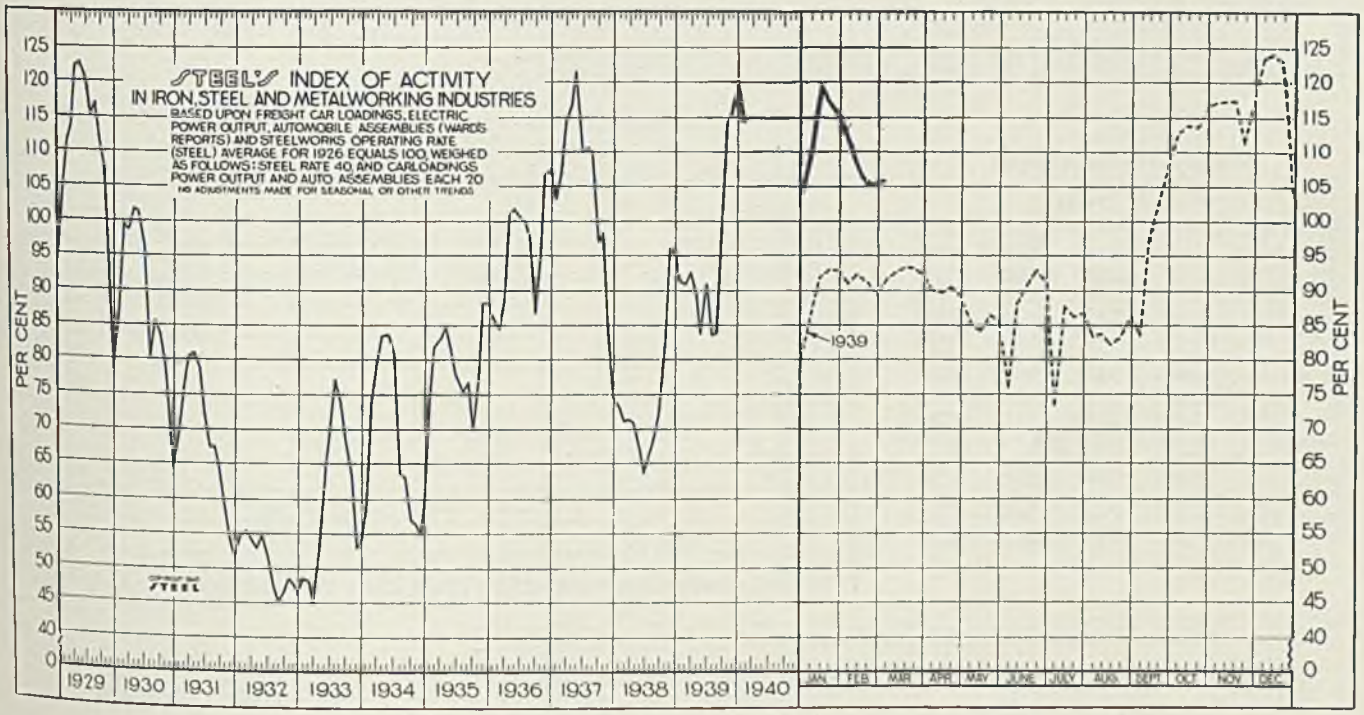
Drop in Activity Index Appears Checked

■ The downward tendency of industrial activity so far this year is reflected in STEEL's monthly index average. During February the index average declined to 105.8 from the 114.7 level recorded in January and 118.9 in December. However, the February and January monthly averages remained well above that recorded during the comparable periods of last year.

It is encouraging to note that the rate of decline of most industrial indicators has slackened considerably. Early seasonal factors are apparently retarding the downward movement to some extent.

STEEL's weekly index during the past three weeks has held steady at the 105 level. For the week ended March 2 the index gained 0.2-point to 105.6. In the corresponding period last year the index advanced 2.2 points to 91.5.

During the week ended March 2, steelmaking operations eased further to 65.5 per cent, automobile production held steady above the 100,000 units-per-week level, electric power consumption recorded a slight increase over the preceding holiday week and freight traffic gained more than seasonally.



STEEL'S index of activity gained 0.2 point to 105.6 in the week ended March 2:

Week Ended	1939	1938
Dec. 30	104.0	79.9
Week Ended	**1940**	**1939**
Jan. 6	110.3	86.5
Jan. 13	119.2	91.9
Jan. 20	117.3	93.0
Jan. 27	115.4	92.9
Feb. 3	111.6	90.7
Feb. 10	107.2	92.1
Feb. 17	105.1	91.1
Feb. 24	105.4	89.3
Mar. 2	105.6	91.5

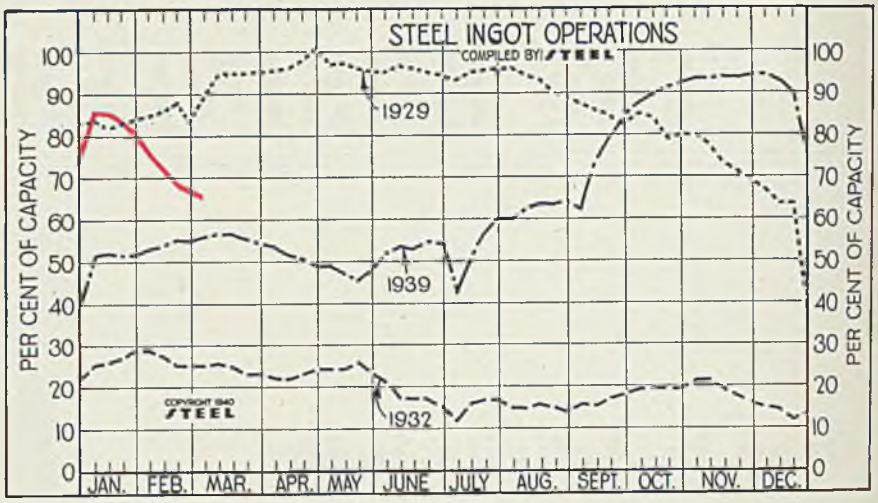
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	.....	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	.....	89.8	70.8	116.6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

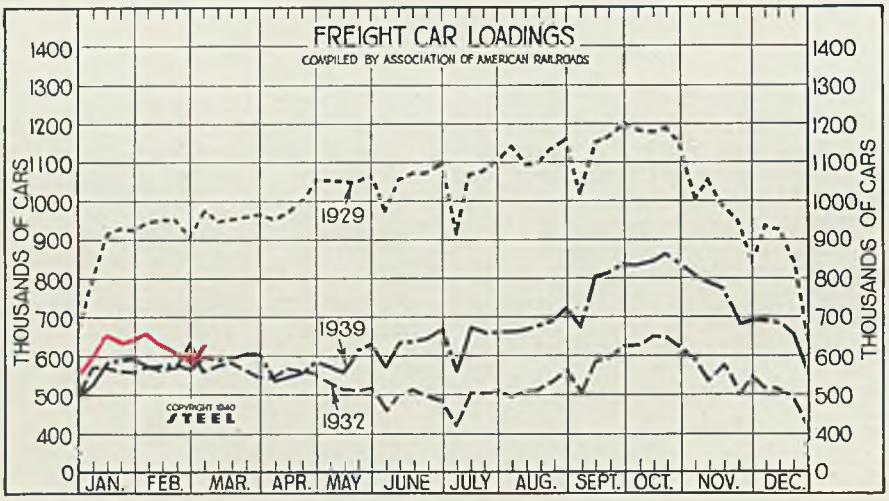
Steel Ingot Operations

(Per Cent)

Week ended	1939	1938	1937
Dec. 2	94.0	61.0	30.5
Dec. 9	94.0	61.0	27.0
Dec. 16	92.5	58.0	27.0
Dec. 23	90.5	52.0	23.0
Dec. 30	75.5	40.0	21.0

Week ended	1940	1939	1938	1937
Jan. 6	86.5	51.5	26.0	79.5
Jan. 13	86.0	52.0	29.0	79.0
Jan. 20	84.5	51.5	30.5	80.0
Jan. 27	81.5	51.5	33.0	76.0
Feb. 3	76.5	53.0	31.0	79.5
Feb. 10	71.0	54.0	30.0	81.0
Feb. 17	69.0	55.0	31.0	83.0
Feb. 24	67.0	55.0	30.5	84.0
Mar. 2	65.5	56.0	29.5	86.0





Freight Car Loadings

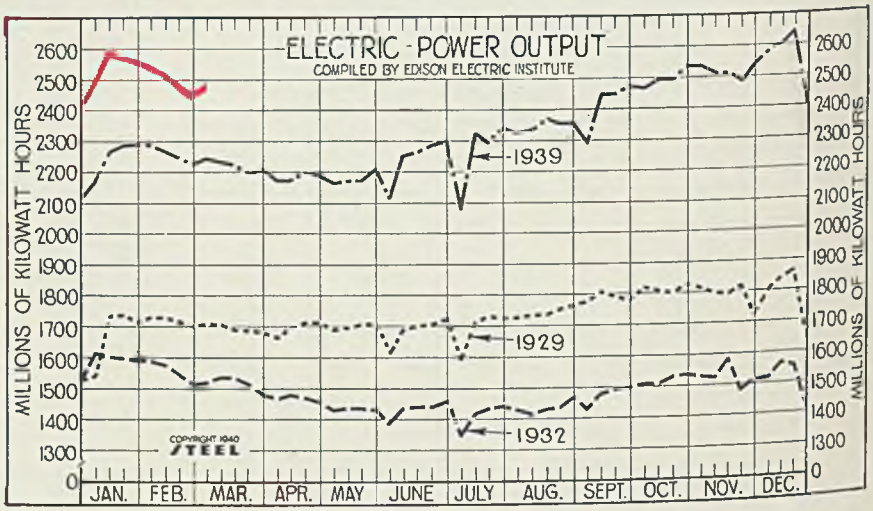
(1000 Cars)

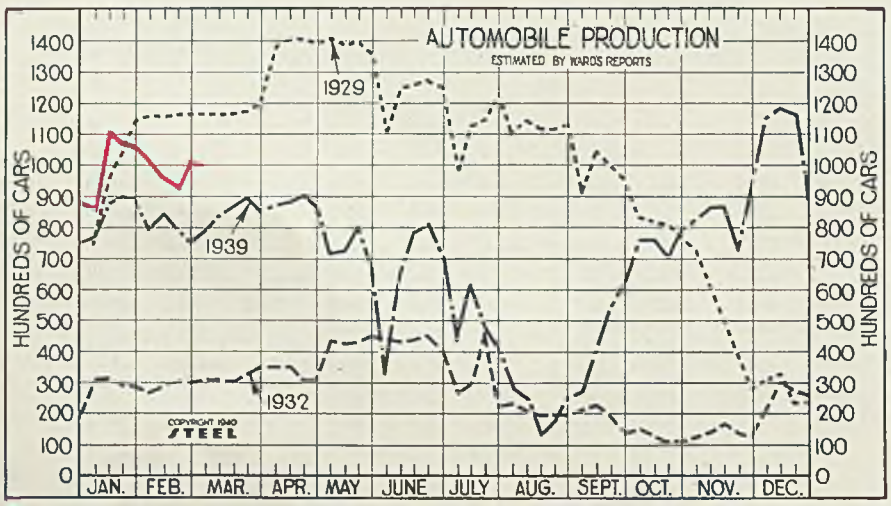
Week ended	1940	1939	1938	1937
Dec. 2		689	649	623
Dec. 9		687	619	622
Dec. 16		681	606	603
Dec. 23		655	574	460
Dec. 30		550	500	457
Jan. 6	592	531	552	699
Jan. 13	668	587	581	700
Jan. 20	646	590	570	670
Jan. 27	650	594	553	660
Feb. 3	553	577	565	675
Feb. 10	627	580	543	692
Feb. 17	608	580	536	715
Feb. 24	595	561	512	697
Mar. 2	634	599	553	734

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Dec. 2		2,539	2,286	2,153
Dec. 9		2,586	2,319	2,196
Dec. 16		2,605	2,333	2,202
Dec. 23		2,641	2,363	2,085
Dec. 30		2,404	2,121	1,998
Jan. 6	2,473	2,169	2,140	2,244
Jan. 13	2,593	2,270	2,115	2,264
Jan. 20	2,572	2,290	2,109	2,257
Jan. 13	2,566	2,293	2,099	2,215
Feb. 3	2,541	2,287	2,082	2,201
Feb. 10	2,523	2,268	2,052	2,200
Feb. 17	2,476	2,249	2,059	2,212
Feb. 24	2,455	2,226	2,031	2,207
Mar. 2	2,479	2,244	2,036	2,200

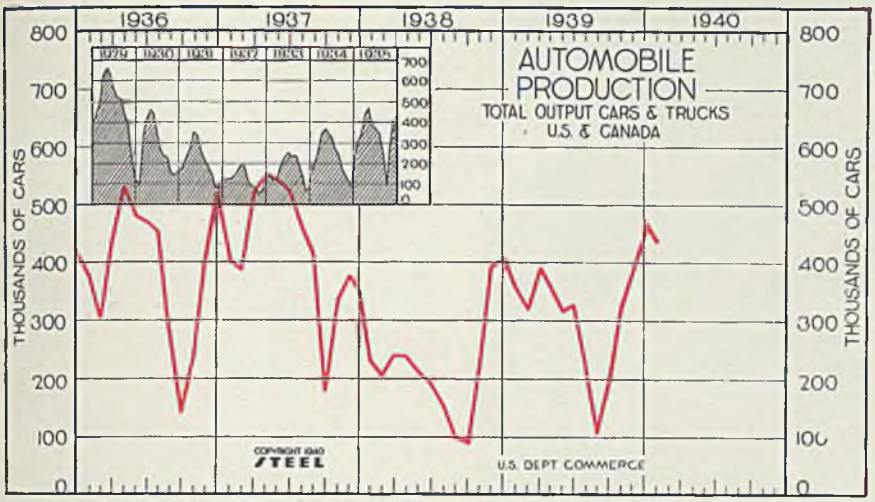




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Dec. 2		93.6	97.8	86.2
Dec. 9		115.5	100.7	85.8
Dec. 16		118.4	102.9	82.0
Dec. 23		117.7	92.9	67.2
Dec. 30		89.4	75.2	49.6
Jan. 6	87.5	76.7	54.1	96.8
Jan. 13	111.3	86.9	65.7	91.7
Jan. 20	108.5	90.2	65.4	81.4
Jan. 27	106.4	89.2	59.4	74.1
Feb. 3	101.2	79.4	51.4	72.3
Feb. 10	96.0	84.5	57.8	72.8
Feb. 17	95.1	79.9	59.1	95.7
Feb. 24	102.6	75.7	57.0	111.9
Mar. 2	100.9	78.7	54.4	127.0



Automobile Production

(Unit: 1000 Cars)

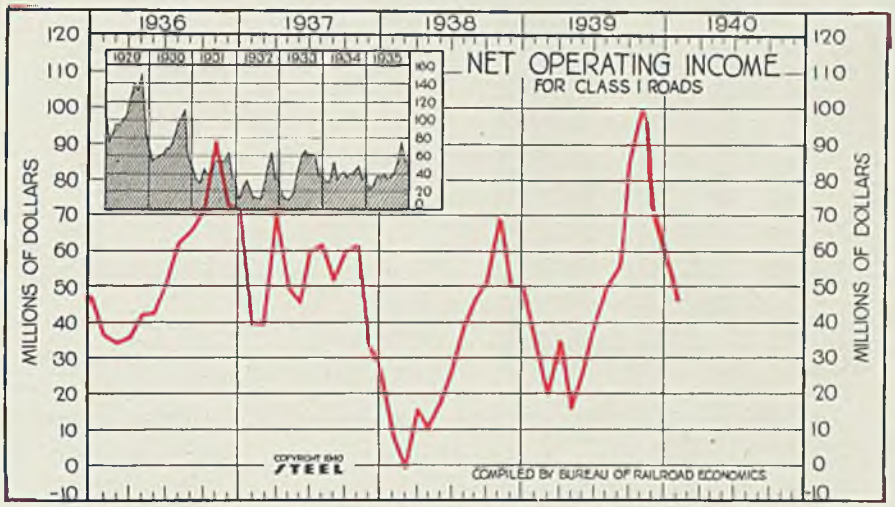
	1940	1939	1938	1937	1936
Jan.	449.3	357.0	227.1	399.2	377.2
Feb.	.....	317.5	202.6	383.9	300.8
March	.....	389.5	238.6	519.0	438.9
April	.....	354.3	238.1	553.4	527.6
May	.....	313.2	210.2	540.4	480.5
June	.....	324.2	189.4	521.1	469.4
July	.....	218.5	150.4	456.9	451.2
Aug.	.....	103.3	96.9	405.1	275.9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

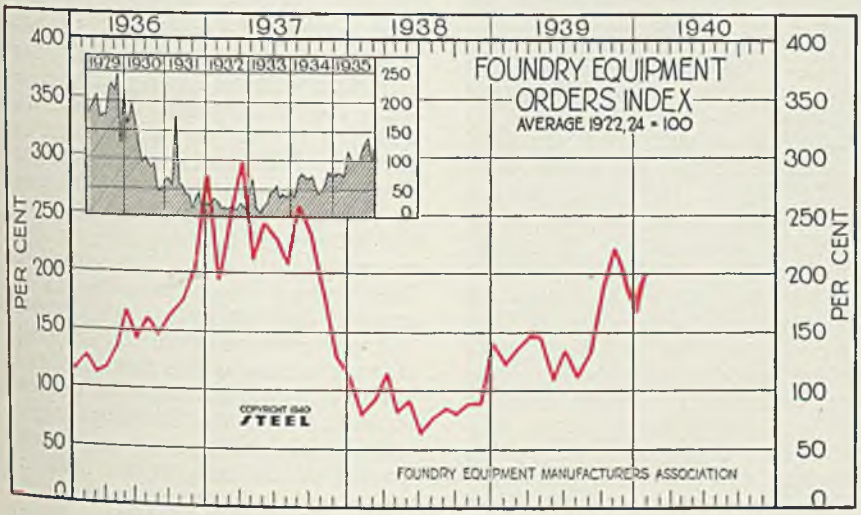
Class I Railroads Net Operating Income

(Unit: $1,000,000)

	1940	1939	1938	1937
Jan.	$45.57	$32.89	$7.14	$38.87
Feb.	.....	18.59	1.91*	38.78
Mar.	.....	34.32	14.73	69.88
April	.....	15.26	9.40	48.36
May	.....	25.10	16.67	44.24
June	.....	39.10	25.16	59.35
July	.....	49.01	38.43	60.99
Aug.	.....	54.59	45.42	50.76
Sept.	.....	86.43	50.36	59.62
Oct.	.....	101.62	68.57	60.86
Nov.	.....	70.35	49.67	32.44
Dec.	.....	60.95	49.37	25.99
Average	.....	$49.02	$31.02	$49.18

*Indicates deficit.





Foundry Equipment Orders Index

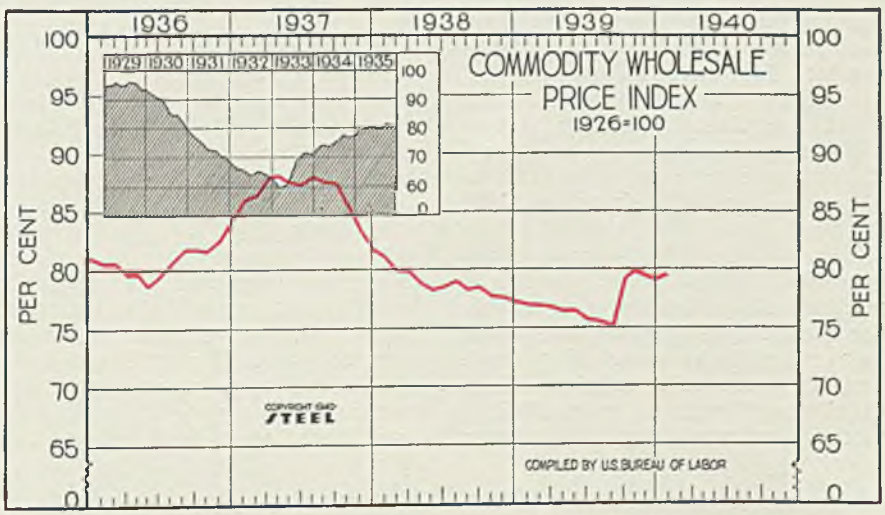
1922-24 = 100

	1940	1939	1938	1937	1936
Jan.	197.9	122.3	76.8	190.9	127.0
Feb.	.....	135.3	90.4	249.5	110.4
Mar.	.....	146.6	114.6	294.2	115.0
April	.....	146.0	79.3	208.3	134.0
May	.....	108.8	90.6	242.0	165.4
June	.....	134.6	61.2	228.2	141.4
July	.....	111.9	74.2	204.0	159.5
Aug.	.....	131.4	83.3	257.5	144.8
Sept.	.....	184.4	78.7	231.8	161.0
Oct.	.....	220.4	87.9	185.2	173.8
Nov.	.....	203.1	89.7	128.0	200.4
Dec.	.....	164.8	141.8	111.2	283.3
Ave.	.....	150.8	89.4	210.9	159.7

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

(1926 = 100)

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



By G. W. BIRDSALL
Associate Editor

Modern

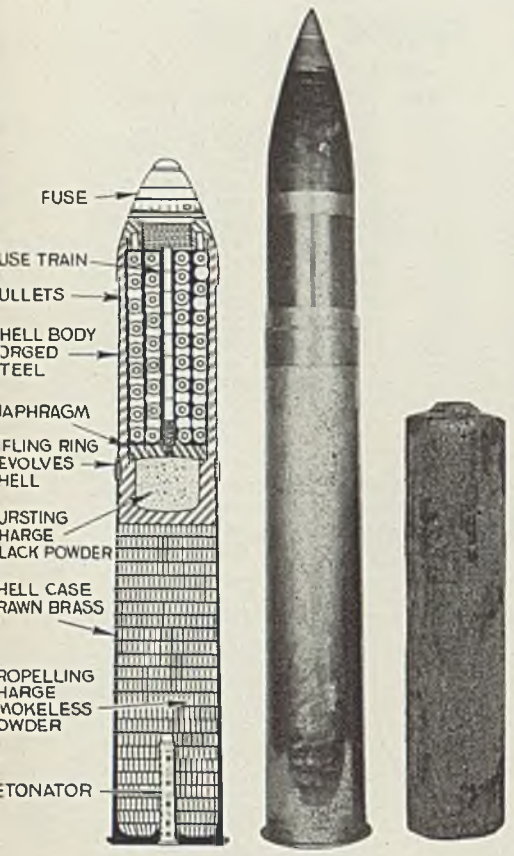


Fig. 1 (Upper left)—Common shrapnel cross section to show parts, a completed shrapnel and a shell body as it comes from the forge shop

Latest approved methods of shrapnel shell manufacture developed by United States Frankford Arsenal feature continuous mechanical handling to cut fatigue, speed movement, furnish bank ahead of each machine

■ UNITED STATES arsenals serve two purposes: They make a supply of munitions available for proving ground work and they develop methods to manufacture such munitions most efficiently. Thus an important function of arsenal operation is experimental work to determine best manufacturing methods.

As it is important that engineers and those in charge of industrial plants be acquainted with munitions manufacture, this article has been prepared to detail latest recommended practice as developed at Frankford Arsenal, Bridge street, Philadelphia, for making the common shrapnel shell.

Frankford Arsenal covers an area of almost 100 acres, employs 3000 persons, includes 48 buildings. Production is divided into three departments: Instruments, artillery and small-arms ammunition. Instrument manufacture is highly specialized precision machine-tool work. Manufacture of small-arms ammunition is done largely in specially designed automatic high-speed machines. Of the artillery ammunition produced, 3-inch anticraft shells and medium caliber shells are possibly the most important as these would be required in extremely large volume in event of hostilities. Thus development work on most efficient methods of producing these items has been emphasized. Result is the highly efficient setup described here.

Shrapnel details are shown in Fig. 1 with a completed shrapnel and a shell forging alongside. Completed shrapnel, Fig. 1, includes a brass case carrying a detonating primer and the explosive charge for propelling the projectile out of the bore of the gun. The projectile itself consists of a forged shell that carries the lead bullets, diaphragm, bursting charge and timer. This timer, or fuse, is screwed into the front end and in most cases is a combination timing and percussion fuse which can be set to explode the shell at any desired distance from the gun and also upon impact.

Flame Passes Through Tube

Flame for exploding the bursting charge is conducted through a powder train in a tube leading down through the lead bullets and diaphragm to the bursting charge held in powder pocket at the rear of the shell body, Fig. 1.

In operation, a shrapnel is placed in the gun bore and fired from the gun by setting off the detonator held in the end of the case at the very bottom of Fig. 1. This explodes the smokeless powder in the shrapnel case, driving the shell from the gun. The shell body is a forging slightly smaller in diameter than the bore of the gun but containing a groove near the lower end, or base, in which a bronze or copper band is shrunk. This band is slightly larger than the bore of the gun, but being of soft material takes the shape of the rifling grooves in the gun and rotates the shell as it is expelled. This keeps the projectile in a straight line laterally during flight.

Rapid rotation or forces of firing starts the fuse which then fires the bursting charge after the desired lapse of time. The bursting charge, usually common black powder is carried in the base of the shell in a tin cup. Located immediately above this is a diaphragm which carries the lead bullets out of the shell when the bursting charge explodes, distributing them in a fan shape. Upon exploding, most shells blow the nose out, stripping the threads that hold the members together. Thus entire fuse, fuse base, tube, diaphragm and bullets are ejected, the shell case itself acting as a secondary cannon in the air.

Of the members of a shrapnel, the shell and timer are most complicated. Fuse, or timer, is an extremely accurate mechanism produced largely from screw-machine parts, some of which may be forged prior to machining. The brass cart-

UCTION

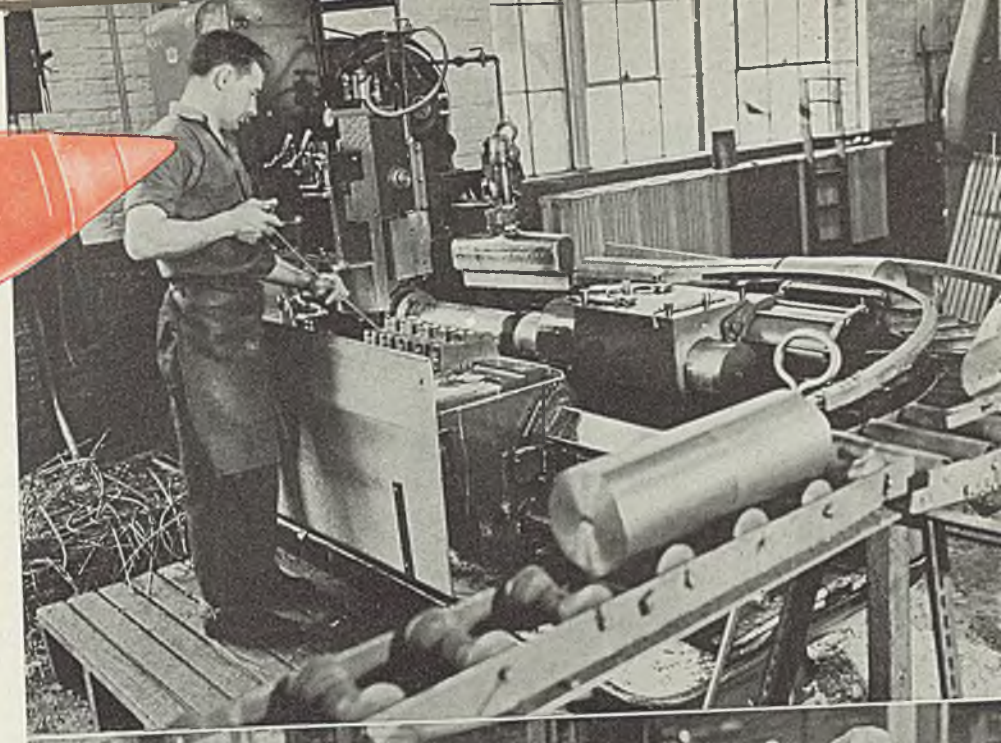
Methods

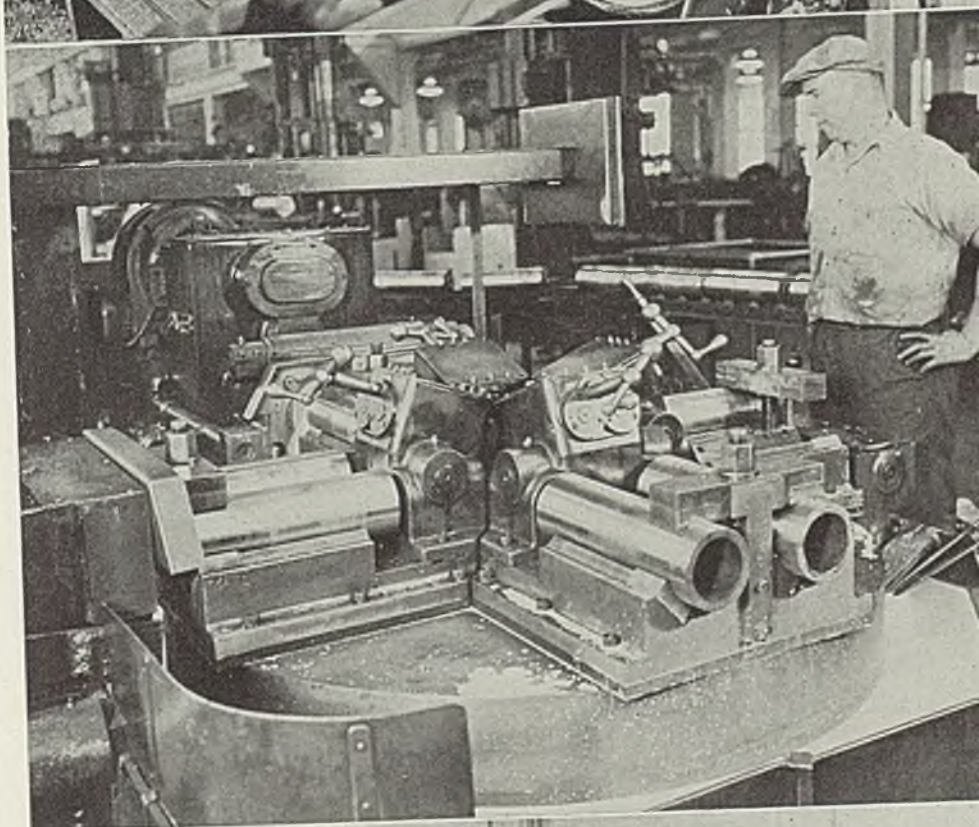
ridge case is drawn from flat sheet in a series of successive draws, is indented and headed. Several machining operations then form head and primer pocket, completing the case.

Shell bodies require considerable machining before they are heat treated, followed by finish machining operations. Thus, the machining lines split partway to take shells to the heat-treating department and to return them to the machine department after heat treating.

Forging 3-inch anti-aircraft shell bodies at Frankford Arsenal is typical of shell forging operations. The material in the form of bar stock, 2⅜ inches diameter, is cut into pieces, 22¾ inches in length. Each piece makes two shell bodies. Each shell body or end of this piece is heated and forged separately.

First step is to place end of bar in an induction heating furnace which raises one-half of the bar to forging temperature. Each of the four induction heating furnaces employed has an automatic timer connected to a bell which rings to indicate end of heating period. Timers are set to apply power to the furnace for the exact period necessary to produce the temperature desired in the work. This provides quick, uniform heating for forging with maximum speed and least delay between pieces. Also it eliminates necessity of attendance. These fac-





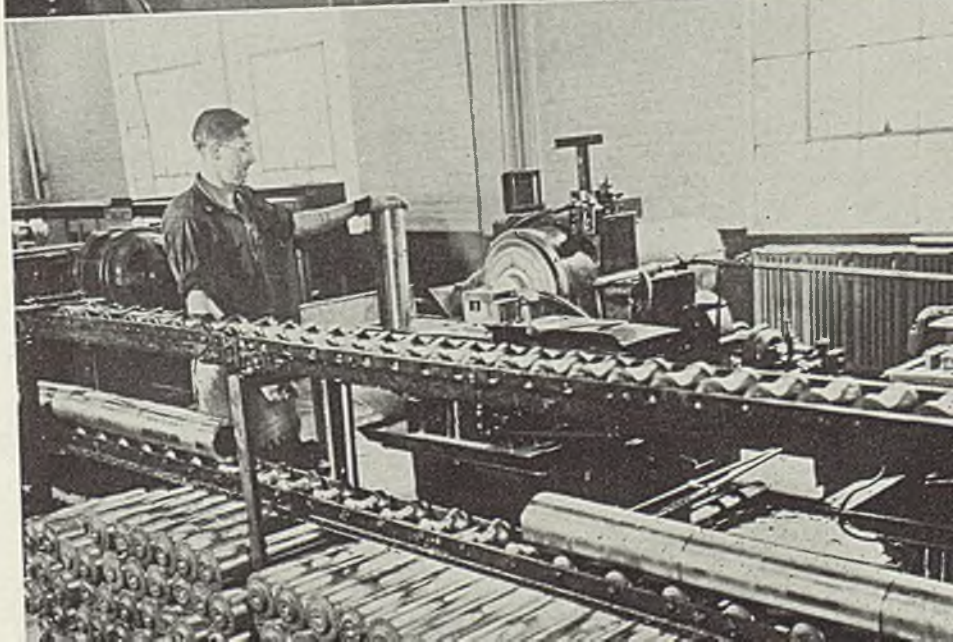
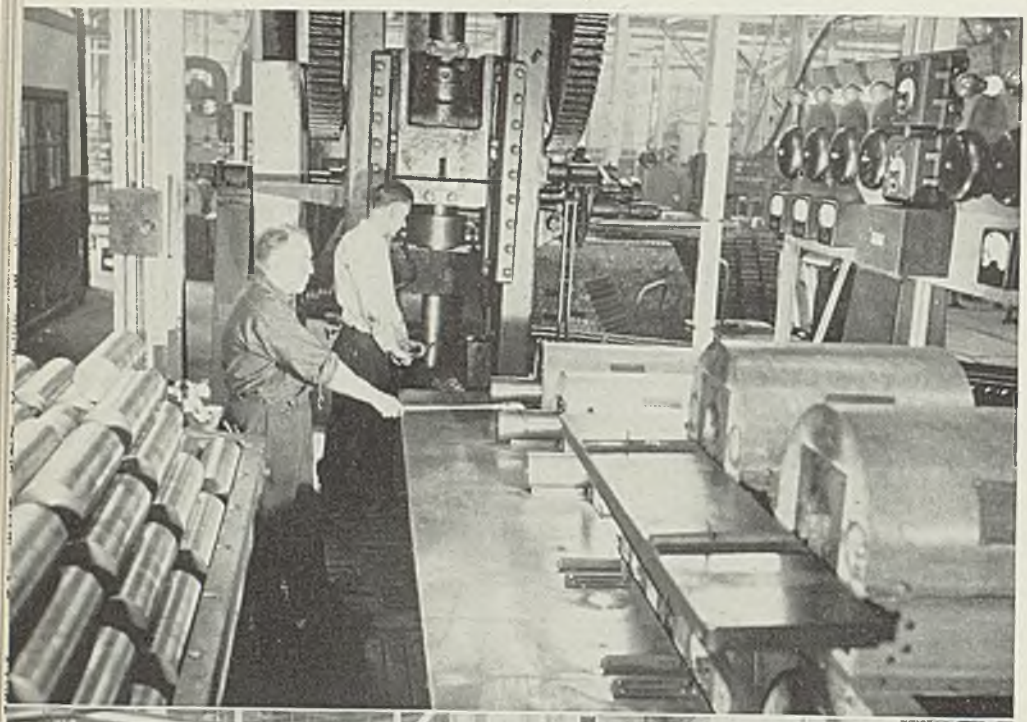
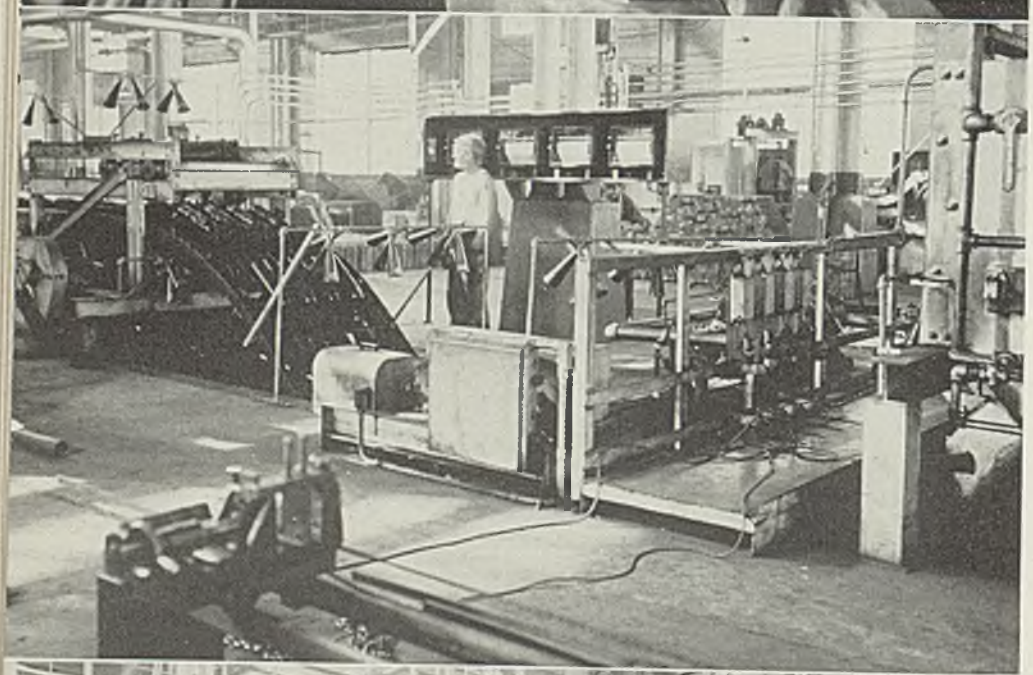


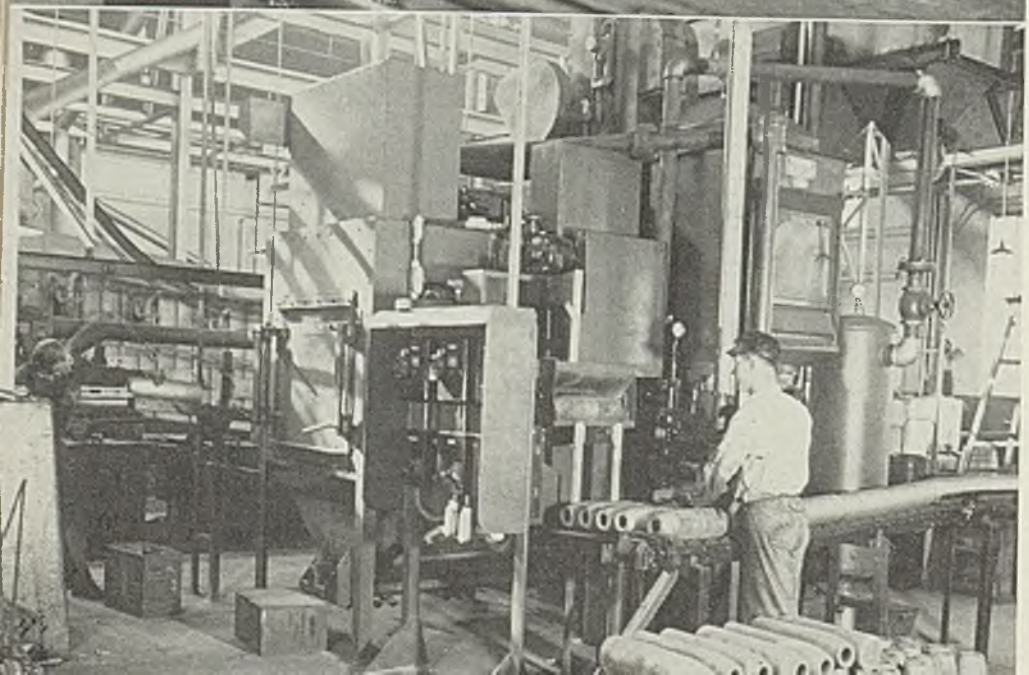
Fig. 2. (Top)—This is rough turning for concentricity, five tools working outer surface simultaneously

Fig. 3. (Center)—Open ends are faced off here, the 4-station machine accommodating two shells at each station

Fig. 4. (Bottom)—Facing off bottom or closed end of shell. Two cuts are taken simultaneously with tools stepped to remove metal at highest possible rate







tors help in producing uniformly forged pieces.

Actual forging is done in a special machine by a progressive forging die with four stations. First station grips the work near the center and reduces its diameter there sufficiently to prevent sliding of the work during the piercing which starts in the second station. Third and fourth stations complete the piercing operation. Last station also accurately sizes the inside of the forged piece. Amounts of material as well as inside and outside clearances are calculated carefully so a small amount of metal must flow to the open end, thus accurately sizing inside and outside surfaces of the piece.

After removal from forging die, the piece is reversed and the unworked end inserted in induction furnace for heating and subsequent forging. With both ends forged, piece is placed in a press and a cut-off die separates the two sections which then roll down a conveyor through the well of the forge shop and onto a concrete area immediately adjoining where they are air quenched.

Shot Blasting Removes Scale

Finish-forged piece then is about 3¼ inches outside diameter, 8½ inches long with 1⅞-inch diameter cavity, 7¾ inches deep. These pieces are forged with sufficient accuracy to eliminate necessity of machining the cavity. However, cavity is steel shot blasted to remove scale.

Operations in finishing the 3-inch shells briefly are as follows:

First step is to face open end of shell. Amount of material removed is determined by a stop bar which feeds into the cavity. Next a machining center is cut on the rear or closed end of the shell. Both of these operations employ ordinary lathes.

At third step, outside of rough forging is rough and finish machined in a 2-station machine with both automatic drive and feed.

Fig. 5. (Top)—After heating in electric induction furnaces at right, shells are "nosed" in vertical, 20-inch stroke, crank type press

Fig. 6. (Center)—Gas-fired hardening furnace at right drops shells to oil quench tank below floor level. Automatic conveyors remove and carry them to draw furnace at left. Walking beam furnaces and conveyor operate on a 10-minute "push" schedule

Fig. 7. (Bottom)—Automatic shot-blasting machine cleans bore and outside of shell with three blasting nozzles

Three of these machines are employed.

At fourth position, a ¼-inch hole is drilled and tapped. At fifth position are three automatic machines, each with six working stations and two load-unload stations. Here are performed finish machining operations.

From here, shells go to a machine which grinds three notches near the tip. Shell then is knurled, stamped with lot number, where made, etc., and banded with soft gilding metal which is a little harder than copper as it consists of about 90 per cent copper and 10 per cent zinc. This band is shunk hydraulically into a recess machined into the shell near its base, using a 6-ram hydraulic machine to compress the ring on this knurled section. Band then is machined to size, which is slightly larger than the bore of the gun in which the shell is fired. Thus when fired, soft band is compressed into rifling grooves, spinning the shell rapidly as it leaves the gun.

Spot Welding Last Operation

About the last operation on a 3-inch shell is spot welding a 3/64-inch steel cover plate on the closed end of the shell in an automatic welding machine using a large number of overlapping welds to completely seal the joint at the edge. This cover plate prevents any flame from the propelling charge, Fig. 1, from reaching the bursting charge in the shell body when fired. Although there is sufficient material retained at the base of the shell body to assure their separation, the cover plate is an added safeguard.

At each step in the complete line, go-no-go gages are employed. One out of every three shells is inspected carefully with these gages.

Manufacture of medium caliber shell bodies is quite similar, but of course involves removal of larger amount of metal during machining operations and thus requires more specialized machines to handle the work. Machining operations must be carefully integrated for maximum efficiency.

Outstanding feature of both 3-inch and medium caliber lines is the completely mechanized handling equipment provided. In most every instance, work is delivered in the form of a bank immediately ahead of the machine. Roller conveyors bring each piece directly to the work point of the machine for loading. Similarly, unloading of machine is made extremely easy by providing a conveyor section near that point. Portions of this roller conveyor system can be seen in a number of the accompanying illustrations, all of which show operations on medium caliber shells.

Due to nature of the operations, many steps involve two or more identical machines where it is impractical to bring the operation down to the rate required for the complete line. In each of these cases, the conveyor line is split or else parallels the machines at load and unload points.

Forgings for medium caliber shell bodies are not produced at the Frankford Arsenal but are shipped in from an outside source. Received in the basement of the building, forgings are trimmed to length with a hack saw and carried to the main floor on an endless chain conveyor. This automatically transfers them to first of a series of gravity conveyors.

First machining operation on medium caliber shells is to cut a lathe center in the rear of the shell.

Second machining operation, rough turning, is shown in Fig. 2. Shells are delivered directly at the work point by roller conveyor, Fig. 2. At this point, air chucks hold the forging inside the bore at one end, it being supported on the lathe center at the other. Five tools work simultaneously on the outer shell surface, thus permitting one machine to handle easily the production rate. Tungsten-carbide tools are used in this and other operations where they have been found suitable. A soluble cutting oil is distributed by a fixture shown in Fig. 2, flooding all portions of the surface.

In the third machining operation, the open ends are faced off in two machines, one of which is shown in Fig. 3. Each of these is a 4-station

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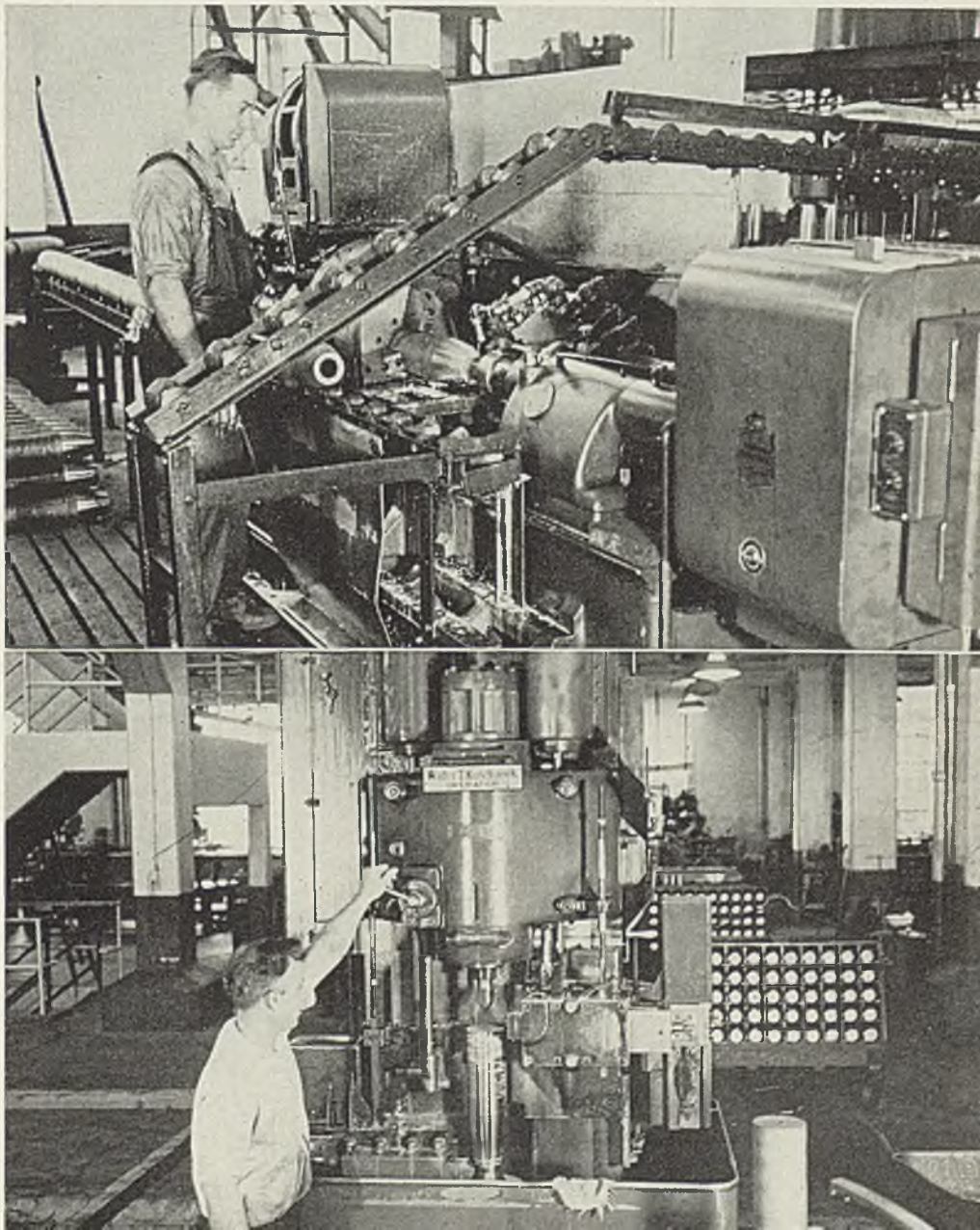


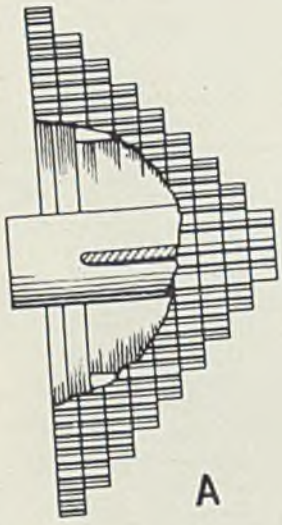
Fig. 8. (Upper)—Typical conveyor setup for getting work to and away from machines fast. A formed plate on this machine guides the cutting tool to give correct contour to nose of shell, a roughing cut

Fig. 9. (Lower)—Finishing outside diameter and nose using two tools; one operates from top downward, the other upward from bottom. A cam guides them to produce correct shape on shell

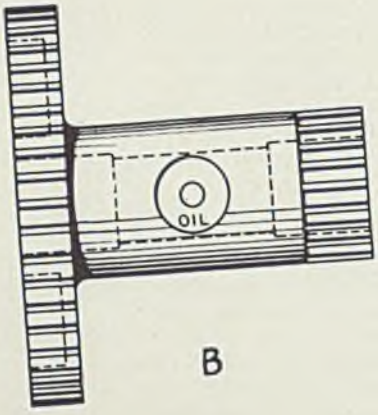
Complicate

■ A PRINCIPAL objective in modern product design is to keep number of parts to an absolute minimum. Perhaps die casting more than any one other production method permits this result to be achieved. Engineers familiar with die casting know this method often permits two or more parts to be cast integrally that ordinarily would be made separately and assembled later. Such one-piece production represents a considerable saving, as does the elimination of sizing and machining, another economy inherent in die casting.

Illustrated are a number of parts which show how such work is handled. In group 1, two or more gears are cast in one piece, often with tooth profiles so accurate as to require no machining. Stepped spur gears are produced in a similar manner. As shown in sketch A, group 1, as many as nine gears have been cast integrally in stepped form. If made by other means, the gears

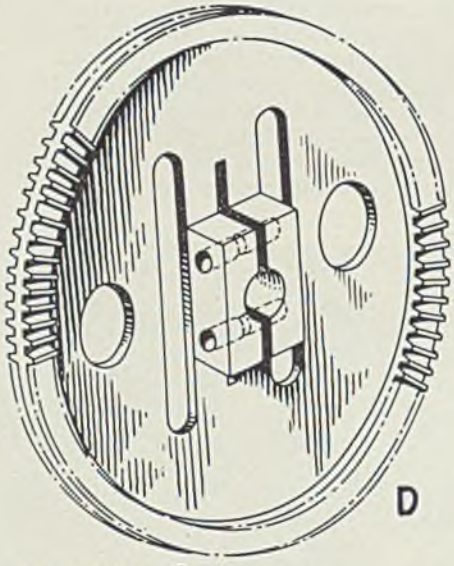


A



B

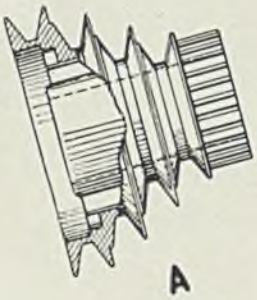
C



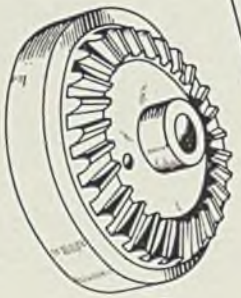
D

GROUP-1

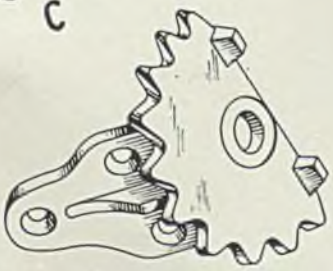
C

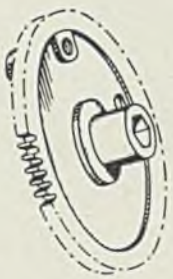


A

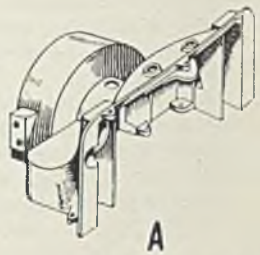


B

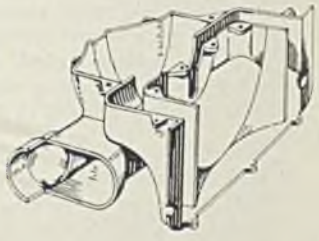




D



A



GROUP-3

One-Piece Parts Made by Die Casting

would have to be cut separately and assembled, as it would not be feasible to cut teeth against a shoulder. The zinc-alloy die casting shown also has an integral hub somewhat longer than combined thickness of the gears, but joined to them by webs to make a relatively light, hollow unit.

Cost Is Reduced

At B, group 1, a pinion and gear are cast in one piece and joined by a tubular hub. While such a one-piece unit could be forged or cut from solid stock or made as a sand casting, it would require considerable time and expense to finish the piece. In the piece shown, the only machining is in reaming the hole.

Often die-cast gear clusters combine more than one type of gear as in C, group 1. Here a spur and bevel gear are combined with a common hub having eight integral ribs with a brass bushing cast in place. No assembly work or machining operations are needed. The zinc-alloy die casting at D combines two narrow-face bevel gears on each side of a flange with a split hub. The various holes are cored as are the slots. Little or no machine work is required.

Group 2 shows gears combined with integrally cast parts. At A, a 3-step pulley for a V-belt is combined with a spur gear at one end and an integral hub. Only machining required is reaming the hole and shaving sides of V-grooves. Spiral bevel gears are readily die cast and combined with other parts as with drum or flat pulley at B, group 2. Similarly, racks and gear segments are die cast as at C, group 2. Here the segment is integral with a curved flange having two feet with cored holes for attachment to another part. Cams of almost any contour are die cast readily and often combined with gears as in D, group 2. This integral unit includes not only the cam with a recess at the center, but a pawl-shaped projection near the periphery as well as a boss near the projection for mounting some other part.

The integral hub has a hex hole, which is made as easily as a round hole. If the piece were forged, the hole would have to be drilled and broached. Cam contour is accurate.

At E, group 2, a segment of a worm gear with an integral attaching flange at right angles to the side face of the gear is shown. At other side is a pair of projecting lugs obviously difficult to machine or form accurately by other processes.

Even more intricate combinations are shown in group 4. At A, for instance, a disk is combined with a cam on each side and ratchet teeth at one portion of its periphery with a pair of journals at the ends of a

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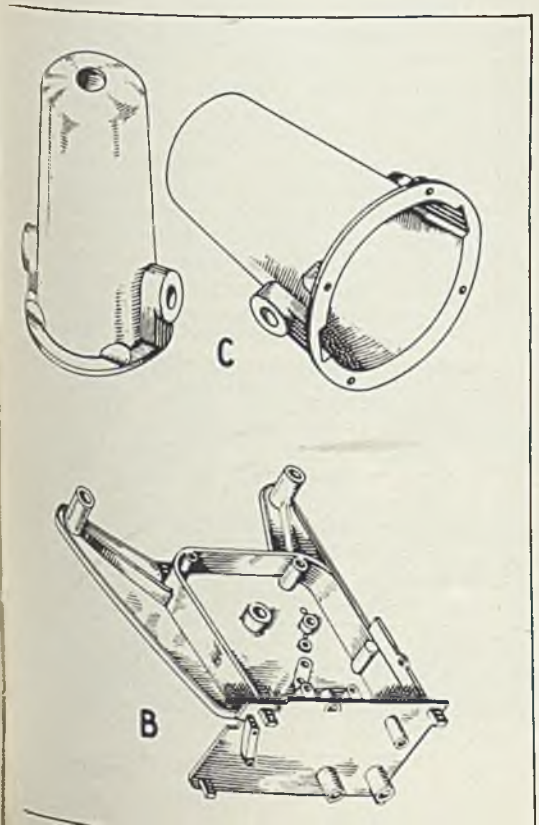

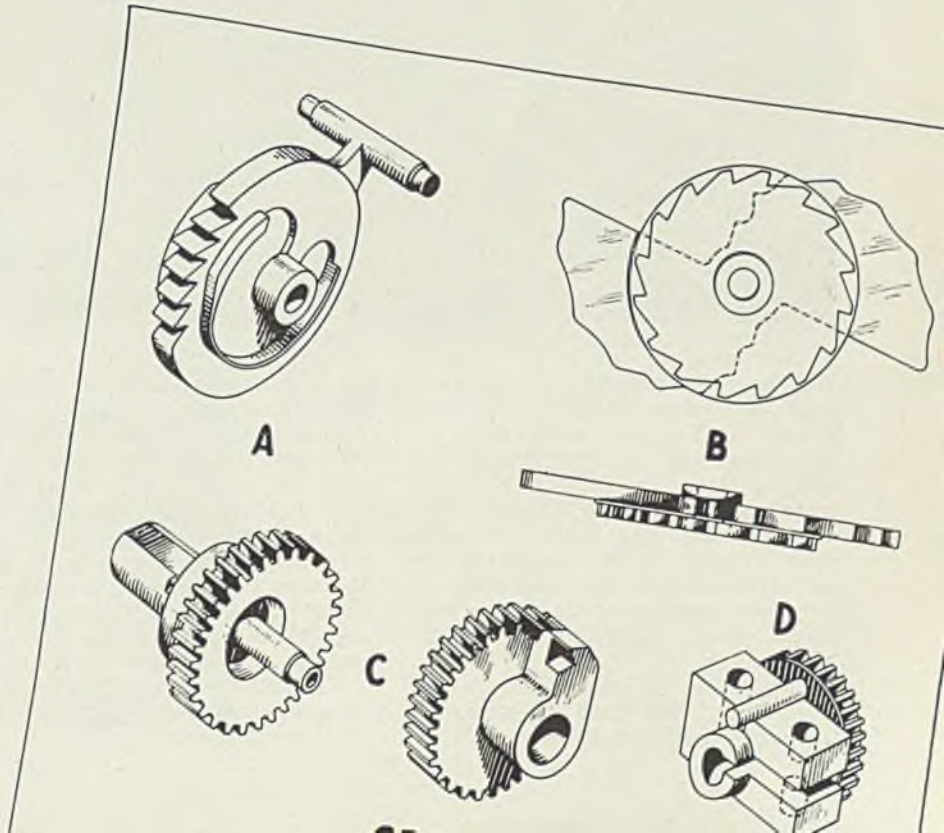

Carbon Determination

Bureau of Mines improves coercimeter for rapid checking of plain carbon steels, extending its range to high carbon analyses. Desulphurization of blast furnace iron with calcium carbide successful

■ FURTHER progress in several phases of steelmaking and ironmaking practice has been achieved during the past year by the metallurgical division, bureau of mines, Washington. In the annual report of this division for the fiscal year 1938-39, prepared under the direction of R. S. Dean, chief engineer, are summarized recent developments in connection with the coercive force method for determining carbon content in plain carbon steels; thermomagnetic behavior of cooled steel-furnace slags; and desulphurization of blast furnace iron and cupola iron with calcium carbide.

The annual report of the metallurgical division for the fiscal year 1938-39 described the coercimeter developed by the metallurgy of steel section for rapid determination of carbon in plain carbon steels (STEEL, Nov. 14, 1938, p. 63). During the past year, this instrument has proved quite suitable for the class of steel made in most plants, and a new method of determining carbon from measurements depending on the saturation value of the sample has been developed for high-carbon steels. A more compact model of the device has been constructed.

Wheeling Steel Corp. is trying, as a plant instrument, a further revised model of the coercimeter, the understanding being that any additional data obtained would be made available to the metallurgical division. The trial now has been under way for some time, with results that appear rather promising.

Data Fairly Accurate

Occasional samples show discrepancies, but for the most part the data are within necessary degree of accuracy. An interesting result has been obtained, namely, definite information concerning the relation between coercive force and carbon content in the interval above 0.70 per cent carbon, concerning which data previously had been lacking. It was found that the straight line that exists for some distance below 0.70 carbon begins to curve shortly above this point and passes through a maximum value at about 0.80 per cent or a little below, then drops rather sharply with still higher contents.

The coercimeter now in use also gives a somewhat different appearance to the shape of the coercive force-carbon content curve in the region of low carbon contents than was exhibited by the instrument used in the original investigation. Reason for this variation is not apparent at present.

Further examination of the prob-

Taken from "Report of Investigations 3480," bureau of mines, Washington.

Studying the Behavior of Atoms in Metals

■ According to Dr. Sidney Siegel, Westinghouse research laboratories, East Pittsburgh, Pa., a workable theory of the "order-disorder" arrangement of atoms would aid metallurgists to substitute exact knowledge for trial and error methods of combining metals to produce alloys, for all properties of a metal should be calculable if only the position of its atoms and forces acting between them were known.

Illustration at left shows an optical pyrometer used to measure temperature inside furnace utilized for growing single ordered crystals. Radiations pass through glass window at top of furnace and are reflected to the pyrometer by a mirror. At right, finished copper-gold crystals are cemented to quartz crystals and vibrated in various ways in a temperature-controlled oven. Precision is of paramount importance in this stage of investigation. Constant frequency generator in foreground was designed for an accuracy of one part in 10 million.

Temperature of crystal oven is held constant within limits of about ¼ degree Fahr.

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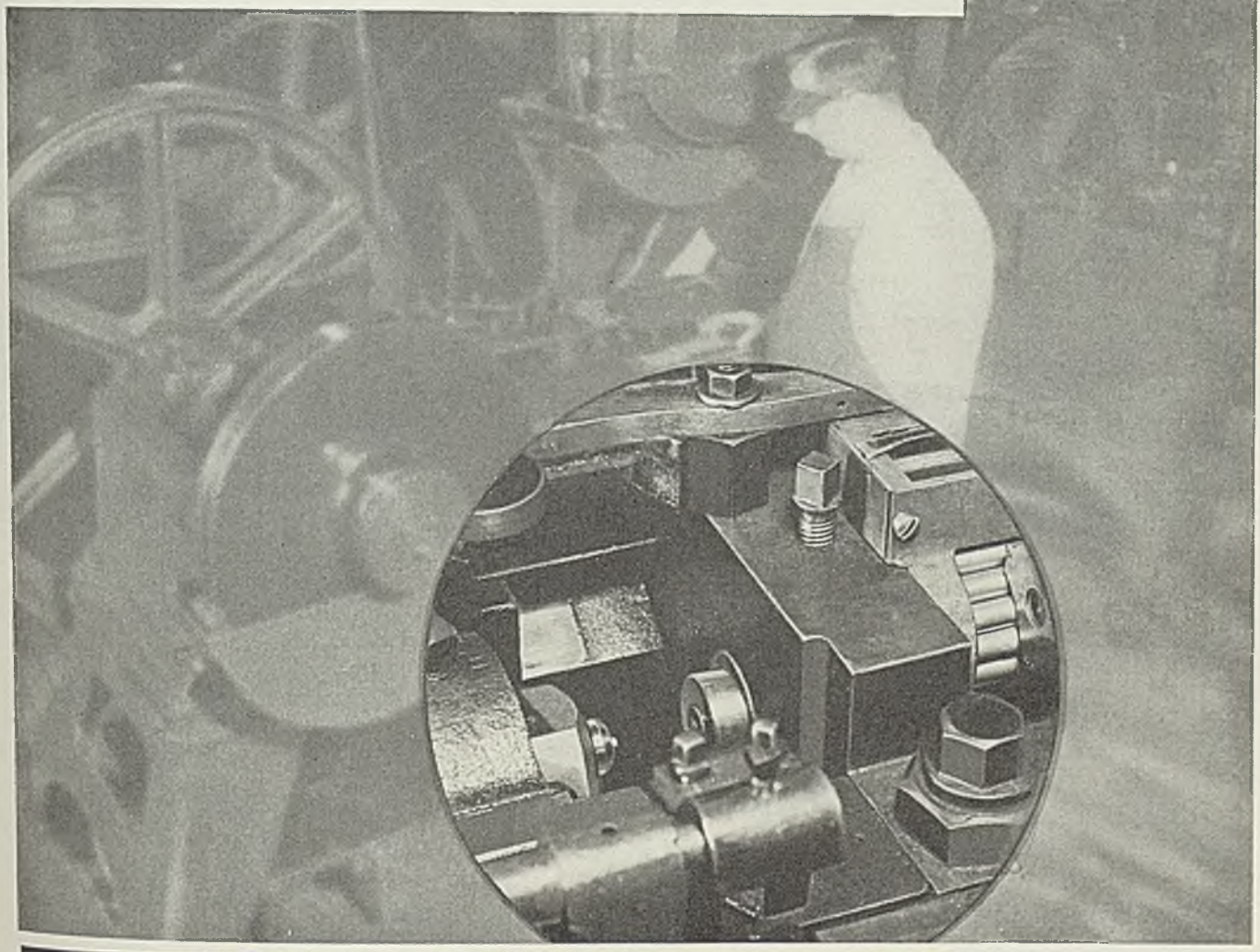

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lem indicated the possibility of establishing a correlation between carbon content and various magnetic characteristics of cast steel samples. The experiment of using the saturation value of the steel as a measure of its carbon content was made therefore. Preliminary trials showed considerable promise, particularly at the higher carbon contents, where the coercimeter is unsatisfactory. The saturation value was not measured directly, as it was preferable to determine the difference between the saturation of the tested sample and that of a standard.

Experience Unexpected Difficulty

This value was obtained by reversing a field of 3000 oersteds or more, in which both samples were placed, and observing the variation in ferric induction of the two samples. The difference in the flux in the samples was measured easily by placing identical search coils around each and connecting these in opposing series to a galvanometer. If the sample under test is exactly like the standard specimen, then no deflection is observed on the galvanometer; but if its saturation value is either higher or lower, the galvanometer will be deflected in the appropriate direction and degree.

An unexpected difficulty was met in experiments with this apparatus. At higher carbon contents, particularly above 0.85 per cent carbon, analyses of the samples used in the saturation tester ran lower than those made on the test ingots taken at the same time by the open-hearth department. The divergence was not consistent, and as a consequence

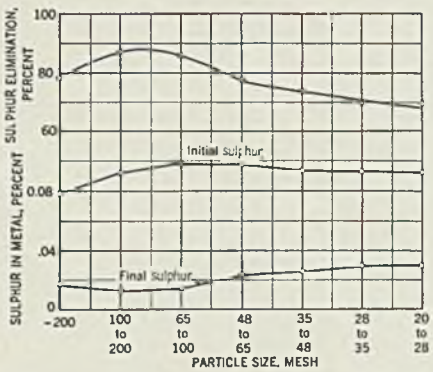


Fig. 1—Effect of particle size of carbide on desulphurization

the magnetic test was without real value, since the carbon content of the sample was apparently lower than that in the bath.

Various experiments were tried dealing mostly with the amount of aluminum required to kill the steel. After considerable investigation it was found that a larger amount of aluminum than had been realized is necessary for killing the metal in the spoon thoroughly enough to avoid all loss of carbon. This amount appears to be virtually as much for some high-carbon steels as for low, and seems to vary according to the condition of the metal in the furnace and also with the manner of adding the killing agent.

Studies of the thermomagnetic behavior of cooled steel-furnace slags, also conducted by the metallurgy of steel section of the bureau, have shown that a rise in susceptibility above 550 degrees Cent. may be expected in samples taken from the furnace during the latter part of a heat of low-carbon steel. Apparently this change occurs only in slags in which a high lime-silica ratio exists, but whether this magnetic behavior arises from the compounds formed by these substances with the iron oxide or results from variations in the degree of oxidation of the iron caused by the presence of these substances is yet to be determined. An attempt is being made to solve this problem.

Various methods of preparing samples of simple lime-silica-iron oxide slags have been tried. Melts of iron in magnesia crucibles in the high-frequency furnace were covered with mixtures of these oxides, and the molten product was removed from the top with a spoon. Besides containing an undesirable amount of magnesium oxide, these slags all appeared to contain considerable quantities of free wustite, which decomposed at a temperature as low as 250 degrees Cent. with consequent large increase in susceptibility.

Amount of Iron Oxide Excessive

Another method of preparation involved use of an iron crucible in the high-frequency furnace plus an acetylene torch on the surface of the contents. In this case, the slag was not continuously in contact with molten iron, but pieces from the top of the crucible were melted occasionally and allowed to drop into the slag. These slags had the desired lime-silica ratio but contained an excessive amount of iron oxide. They showed increased susceptibility, which began at temperatures ranging from 450 to 550 degrees Cent.

Apparatus has been assembled for melting small quantities of slag in platinum crucibles in an atmosphere of oxygen and nitrogen, which can be adjusted to any desired proportion of these two gases. The furnace for melting these materials is wound with molybdenum wire, which is prevented from becoming oxidized by the stream of hydrogen and nitrogen gases surrounding it.

A paper, "An Apparatus for Determining the Thermomagnetic Behavior of Slags and Some Preliminary Results Obtained With It," was presented by B. A. Rogers and K. O. Stamm, of the bureau, at the fall meeting of the American Institute of Mining and Metallurgical Engineers during the National Metal congress in Chicago last October.

In this paper, the apparatus was described in considerable detail and its use illustrated by magnetic susceptibility-temperature curves for ferric oxide, magnetite and wustite, the last being predominantly ferrous oxide, according to chemical analysis. The type of curve found for the wustite was shown to agree

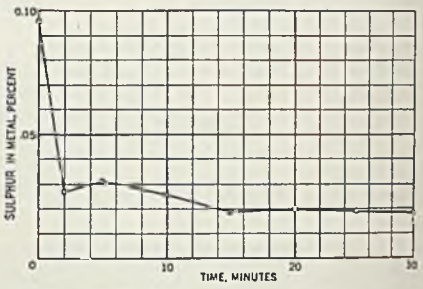


Fig. 2—Effect of time on reversion of sulphur

with what should be expected from the constitutional diagram of Jette and Foote, which appears to be the most reliable for this particular interval of the iron-oxygen system.

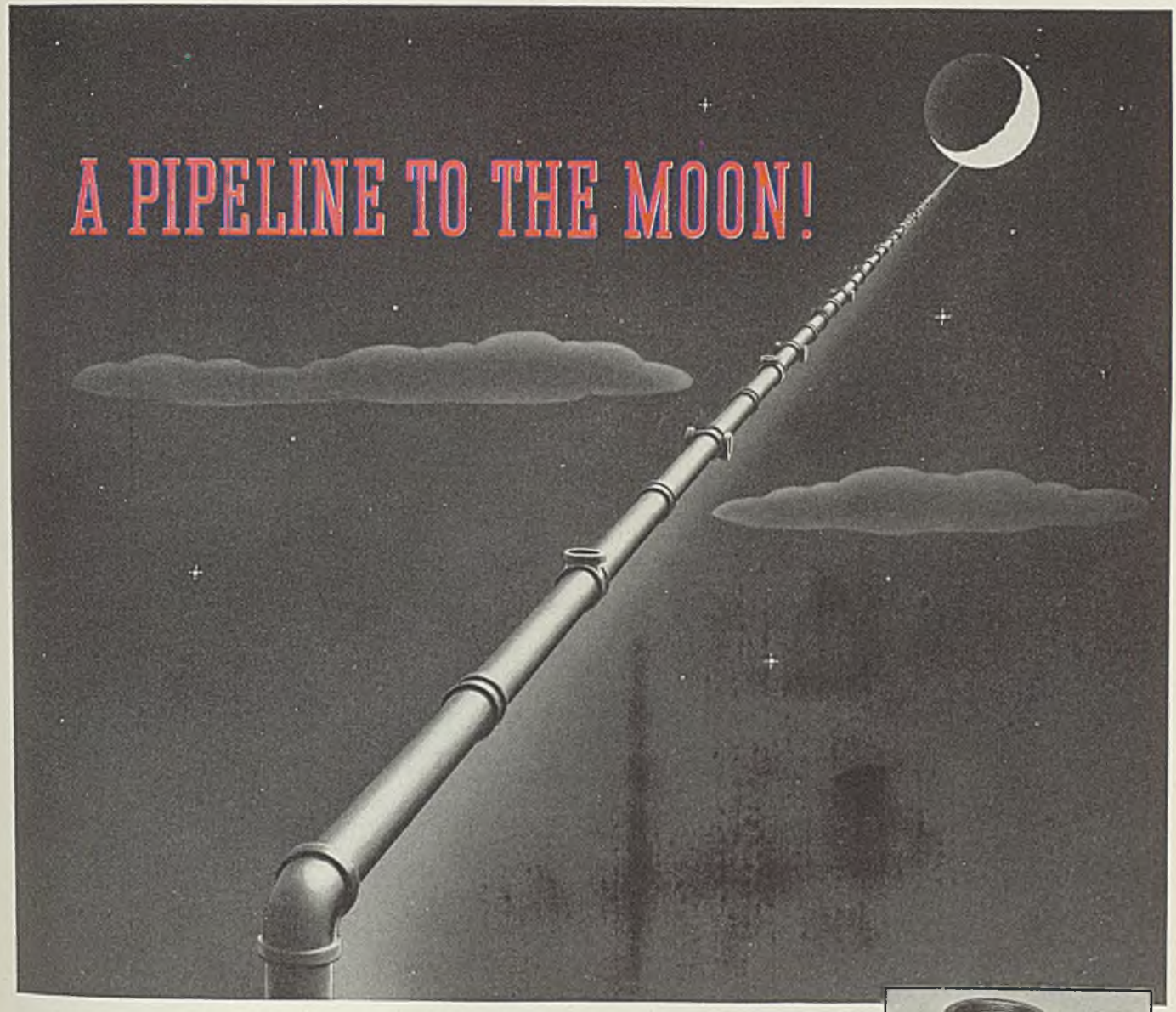
The process for desulphurization of blast furnace iron and cupola iron by treatment with calcium carbide, developed by the blast furnace studies section of the bureau, was advanced from laboratory to pilot plant scale only during the past year.

Approximately 1-ton charges of molten iron containing sulphur in the range of 0.085 to 0.10 per cent were desulphurized with a mechanical dispersing mechanism, and metal containing as little as 0.006 per cent sulphur was subsequently produced.

This process is unique, since, instead of the usual liquid-liquid reaction by which final desulphurization is accomplished in the blast furnace, the process depends on the reaction between solid calcium carbide and liquid iron. Adequate dispersion of the carbide is essential for its efficient utilization.

A year ago, use of fluxes or chemical dispersing agents with calcium carbide was reported as a result of data obtained in the laboratory. The major accomplishment of the current year, therefore, was development of a mechanical dispersing unit for adding finely-ground calcium carbide to large quantities of molten cast iron. Through successful operation of this unit, the process was advanced to pilot plant stage.

In co-operation with the St. Paul Foundry Co., St. Paul, 1-ton quantities of molten iron were desulphurized, and the metal was then used by the foundry in production of gray iron castings. Object of



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the investigation was primarily to determine how completely the sulphur could be eliminated. Results of tests proved that sulphur content of foundry iron can be reduced from about 0.09 to 0.01 per cent by addition of 15 pounds or less of calcium carbide per ton of metal.

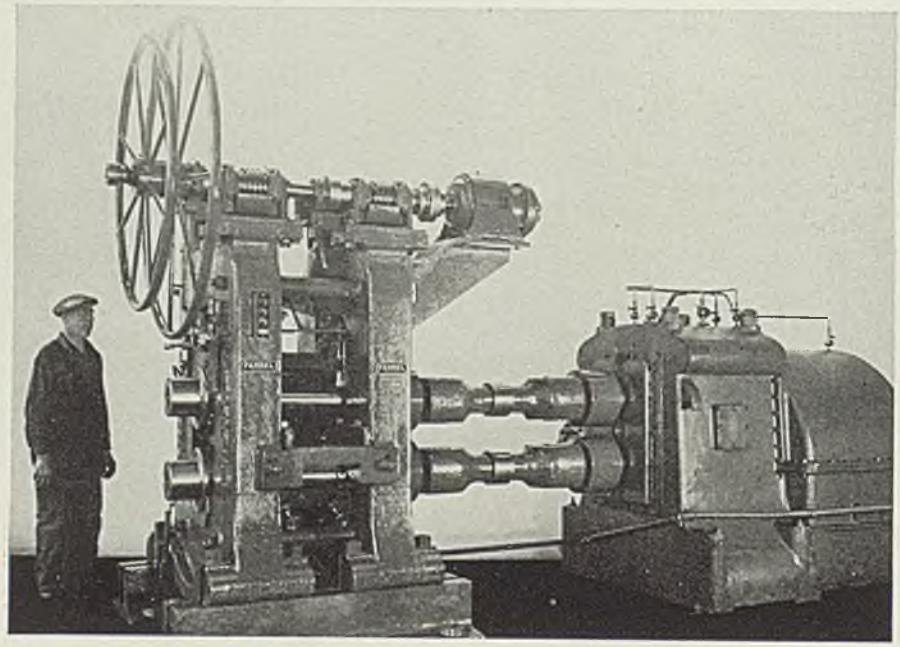
The amount of sulphur eliminated per unit of calcium carbide depends in part on the size of the carbide particles. This was demonstrated by laboratory experiments, results of which are given in Fig. 1. Calcium carbide coarser than 48-mesh was not as efficient a desulphurizer as the finer material. On the other hand, the minus 200-mesh carbide was less efficient than the intermediate sizes. Theoretically, the efficiency should increase with a decrease in particle size because of greater opportunity for contact. Actually, the minus 200-mesh material contained less CaC_2 because during grinding and screening operations part of it had reacted with moisture in the atmosphere.

An important difference between desulphurization with the alkalies and with calcium carbide is the amount of sulphur that returns to the metal when the desulphurized metal is allowed to stand without being skimmed. The alkali slag must be separated from the metal at the correct time if maximum sulphur extraction is to be obtained. Calcium sulphide, which is formed when iron containing sulphur is treated with calcium carbide, appears stable under the conditions of this treatment. Fig. 2 shows the results obtained when a charge of desulphurized metal was held for 30 minutes in contact with the high-sulphur dross.

Other desulphurizers investigated during the year included calcium-lead and magnesium-lead alloys, magnesium metal, calcium boride and a mixture of finely-ground calcium carbide and silicon. In view of the high cost and low efficiency of the metallic desulphurizers compared with calcium carbide, the investigation was not continued beyond preliminary tests. Calcium boride and the carbide-silicon mixtures were too inactive at 1400 degrees Cent. for use as rapid desulphurizers.

Microscopic examination of blast furnace slags has been continued by the blast furnace studies section, and efforts were directed chiefly toward the forms in which sulphur occurs in these slags. Calcium sulphide, manganese sulphide and ferrous sulphide form dispersions readily in molten slag. The dispersion characteristics and solubilities of these and other sulphides are being determined.

Two-High Mill for All Rolling Operations



■ A 16 x 16-inch 2-high rolling mill which performs a complete range of rolling operations on different metals has been designed by Farrel-Birmingham Co. Inc., Ansonia, Conn. It is used for all rolling operations from breakdown to finishing and is of heavy, rugged construction to handle large reductions.

Rolls are of forged alloy steel, bored to permit internal circulation of cooling water. Housings are closed top type cast in one piece of Meehanite. Rollneck bearings of bronze are carried in chocks of cast steel and arranged for water cooling. Bearings are grease lubricated by a force feed lubricator, chain driven from main reduction drive. Top roll is adjusted by a combination double-handwheel screwdown, to which is also connected a motor drive for rapid approximate positioning of roll. Top roll counterbalance is hydraulic, consisting of two hydraulic cylinders located one each directly beneath the mill housings. Rams act upon lifting yokes, which support top roll assembly through lifting rods. Delivery and feed tables are of Meehanite. Delivery table is provided with right and left hand adjustable guides. The two wipers provided, one on each roll, are felt-covered wooden blocks, spring loaded.

Mill is driven by a 100-horsepower, 450-revolutions per minute, alternating current motor which is equipped with reversing and plugging control. Motor speed is reduced to the required roll speed by enclosed double reduction drive, with which is combined the pinion stand. Gearflex coupling connects motor and drive and universal spindles connect pinion unit with the mill.

Explains Fabrication Of Stainless Steels

■ *Fabrication of U. S. S. Stainless Steels*, stiff covers, 92 pages, 6 x 9 inches; published by United States Steel Corp. subsidiaries, Pittsburgh; supplied by STEEL, Cleveland, for $1.

This book discusses in detail the technical and practical aspects of stainless steel fabrication, austenitic, ferritic and martensitic steels treated separately.

Part I, pages 1-44, is devoted to welding, riveting, soldering and joint design and includes a series of diagrams illustrating various joints commonly used in fabricating stainless steel, discussing their applications and explaining how they may be made most efficiently.

Part II, pages 45-72, takes up machining, cutting, forming, annealing and pickling operations, describing them in detail and presenting recommendations as to equipment, temperatures, solutions, etc.

Part III, pages 73-92, discusses surface finishing and protection, describing standard mill finishes and the operations and equipment involved in developing desired finishes. Laboratory corrosion data covering a wide range of chemicals and acids are presented for the four types of U.S.S. stainless steels and the chemicals, physical and mechanical properties, with notations as to abrasion resistance, cold forming and welding, tabulated for nine types of U.S.S. stainless steels.

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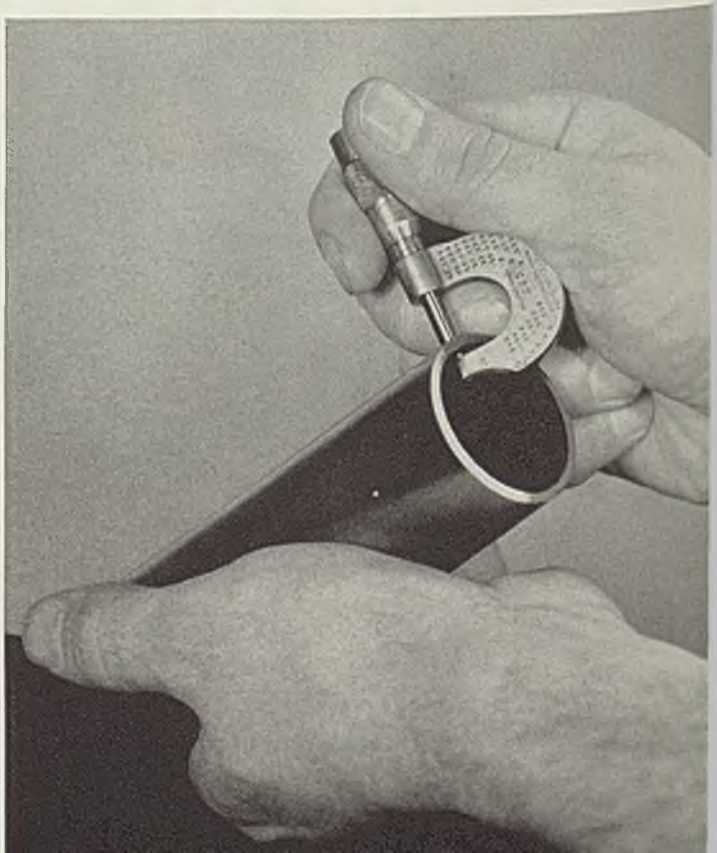


Portable Degreasers Cut Cleaning Costs As Much As 60 Per Cent

■ INCREASED speed and productivity of modern machine tools, matched by the development of high-speed tool-and-die lubricants and coolants, has so lowered the unit cost of parts production that cleaning operations often assume an exaggerated cost position.

Removal of cutting oils, drawing compounds, buffing rouges and waxes from processed and fabricated metal parts is much simplified through the use of new portable degreasers. Users advise that with the use of their present rack and tray equivalent and in some cases by making special appliances, they are able to cut their cleaning costs as much as 60 per cent with portable degreasers compared with older methods of cleaning.

Where possible, an ideal arrangement for degreasing is to place the machined or processed part directly into the degreaser from the machining or processing operation. This, of course, necessitates moving of the degreaser to or nearby the production line. This is possible with portable units such as the one in Fig. 1 which is designed primarily for screw-machine and small parts cleaning.

Work Chuted Through Cover

On a line of automotive screw machines work from one or more machines can be chuted directly from the cutoff into the degreaser through slots in the cover of the unit. When from 25 to 50 pounds of work have accumulated in the removable tray or other device inserted in the unit, parts are quickly removed. They will be found clean and ready for subsequent operations.

For cleaning stampings, die-castings, bulky and large details, units or subassemblies, a similar heavy-duty unit is employed. It is suitable for reclaiming and reconditioning mill shop, or motor equipment and a myriad of other uses outside the ordinary production requirements.

These are solvent vapor degreasers using a hydro-carbon solvent which vaporizes at 250 degrees Fahr., the vapors being about five times heavier than air. Continued vaporization causes the vapors to rise in the containers until a thermostat cuts off power to the electric calrod-type heating element. Atmospheric pressure lowers the vapors until a 10 degree drop at the thermostat cuts in the heating elements, thus providing automatic control.

Accumulated oils and extraneous matter are separated from the solvent by distillation with either of the units. Thus solvent is used over and over again; the residue being drawn off and thrown away. Cleaning is easy as units can be tipped over for easy access, a small amount of solvent then permitting thorough cleaning.

Condensation Cleans Work

Condensation of hot vapors on the parts at room temperature quickly frees and flushes oils, waxes and greases from the work. High temperature of the solvent vapor is an important aid in removing certain compounds which may be extremely viscous and require much heat to break them down sufficiently to flush free. Certain drawing compounds also cause considerable trouble in the older caustic bath and solvent vapor degreasers due to the high heat required to release them from the metals.

Too, the solvent vapor temperature being above the boiling point of water insures against steam smudge when degreasing bright work and assures a perfectly dry part when removed. As vapors alone are the primary cleaning agent, there is no oil film present to cause smoky or smudge-spotted work.

Capacity of even the small unit in Fig. 1 is high, 25 pounds to a load with about 15 loads per hour. However, one user reports satisfactory cleaning maximum loads of 75 pounds at 6 minutes per load, of closely packed stampings. Unit in Fig. 2 holds 150 pounds to a load in two trays, will degrease about 12 loads per hour. It has thoroughly degreased 650-pounds automobile engines in 35 minutes. While constructed to carry a half-ton load, a

(*Please turn to Page* 78)

Fig. 2—Larger unit has motor-driven flusher unit shown here. Holds 10 gallons of solvent, will degrease twelve 150-pound loads per hour, has operating area 36 x 30 x 22 inches. These units are made by Phillips Mfg. Co., 340 West Huron street, Chicago

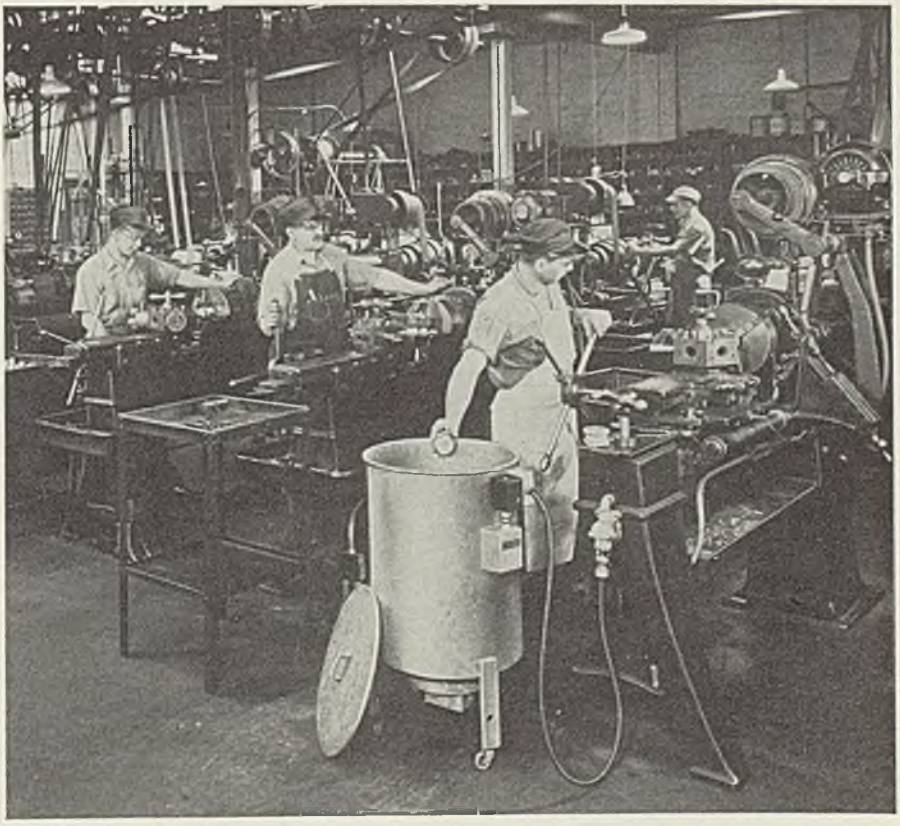


Fig. 1—Holding 3 gallons of solvent, this portable unit easily degreases 25 pounds to the load, 15 loads per hour. Uses 3750-watt electric heating unit, has operating area 22 inches in circumference, 15 inches deep

Tubes Electrically Welded

. . . by new method which produces grain structures in weld indistinguishable from parent metal. Development completed for use with low carbon and low-alloy steels, application now being made to stainless

By JOHN B. BORGAT
Consultant
1726 Rosedale avenue
Cleveland

■ EXPERIMENTAL work recently has been finished which makes possible accurate control of grain structure in manufacture of electric resistance welded tubes. The special welding machine employed dispenses with usual roller-type electrodes and employs flat contactors to conduct current to the weld. The original welder, see STEEL, Aug. 29, 1932, p. 24, has been simplified, modified and considerably improved, but essential principle of a flat contactor moving with the tube during complete welding cycle remains the same.

To produce tubes, flat strip is run through rollers to produce a circular cross section with strip edges abutted to form a seam cleft subsequently closed.

Conducting weld current through flat conductors with contacting surfaces especially shaped to provide maximum contact area provides a number of important advantages. Current contacting and transmitting surface can be as large as desired, permitting large currents to be carried easily as in no case is the transmitting area limited to a line contact or narrow transmitting surface obtainable with wheel electrodes. When using flat contacts, the contacts travel with the tube during welding and upset. This permits accurate and effective control of upset pressure and timing and so reduces number of variables in the welding cycle to give much more accurate control of the entire operation.

Electrodes remain in contact with the tube for a short period after weld current has been shut off and upset effected. This cools weld and weld zone quickly as electrodes conduct heat away from tube rapidly.

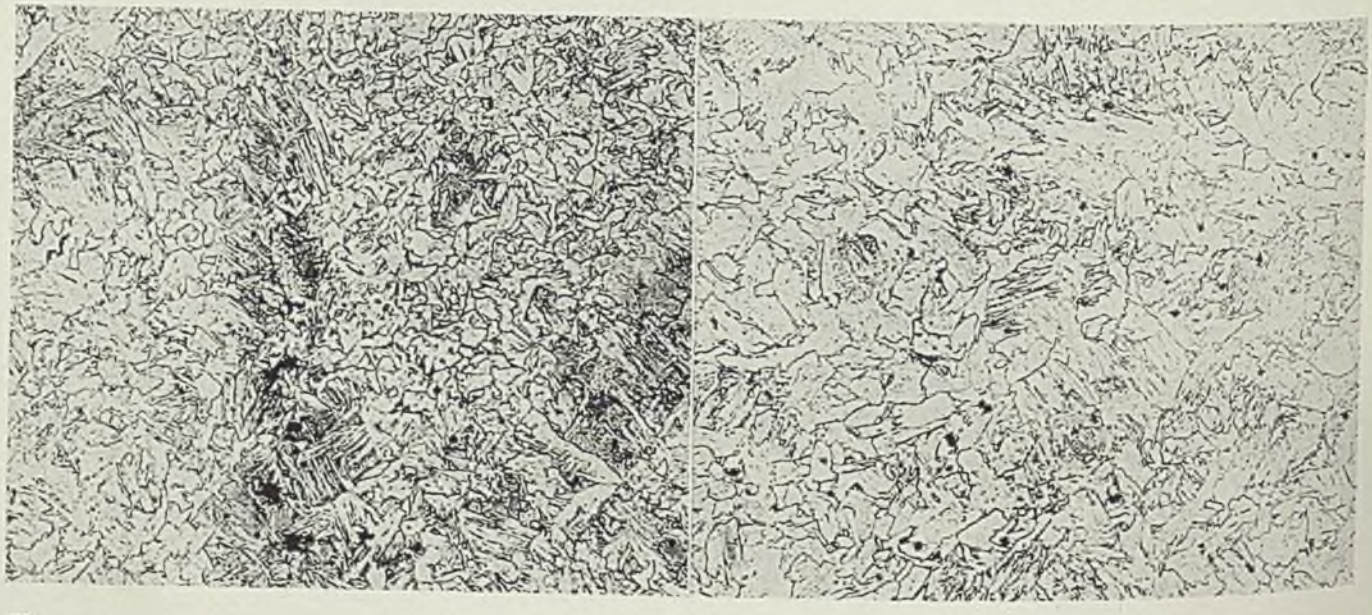
The flat electrodes used are made of commercial resistance-welding copper-alloy electrode material, subsequently silver plated with 0.005 to 0.010-inch of silver on contact areas to give lowest possible contact resistance. As there is no mechanical abrasion on the contact surfaces, the silver maintains itself over a long period of time and assures extremely low contact resistance. This provides lower losses at the weld and in the machine itself.

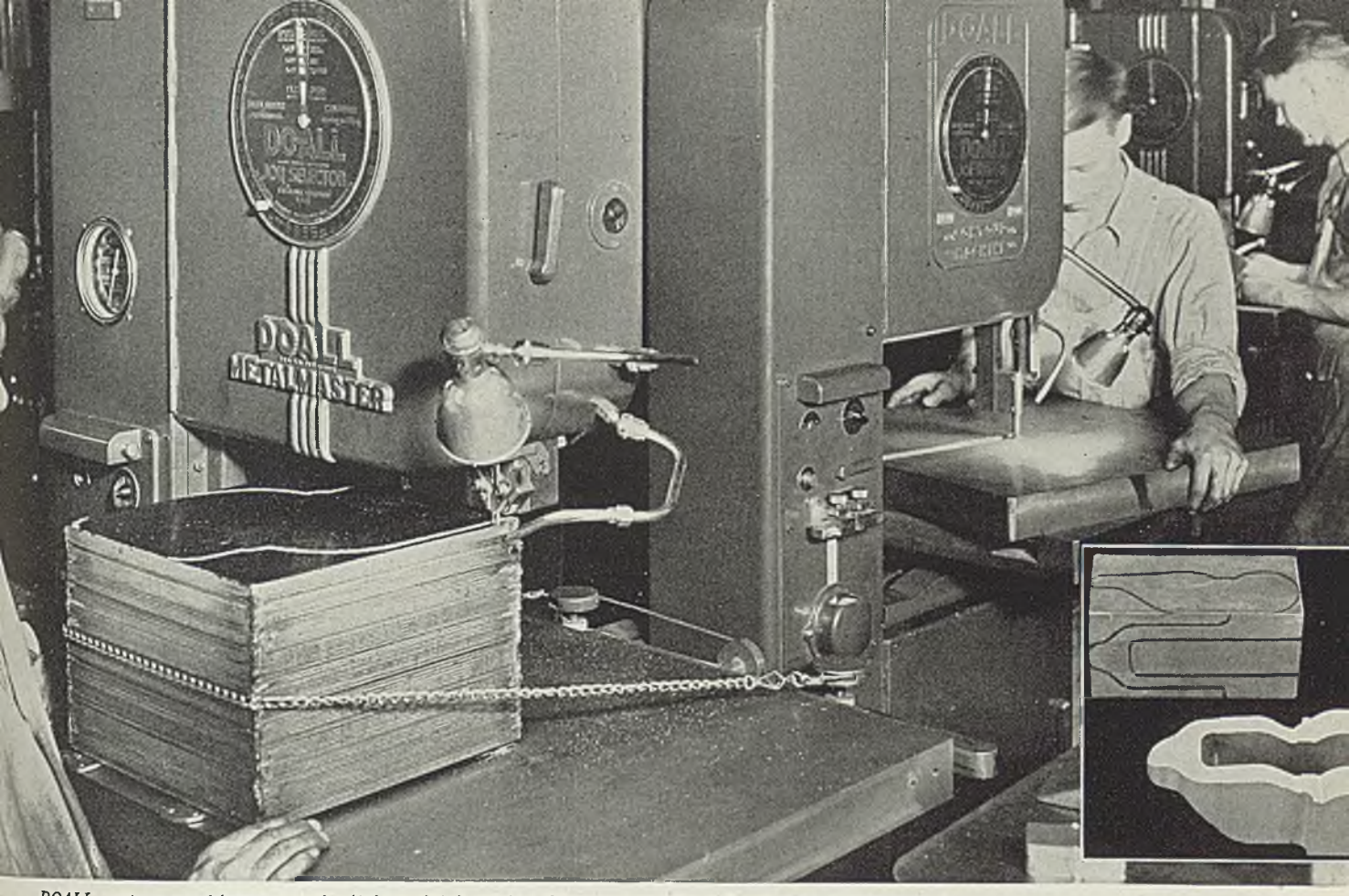
Fine grain in the weld is obtained by following a certain sequence of operations:

First, seam cleft is closed by pressure from contactors, using maximum pressure permissible. Distance between contactors is divided evenly

Fig. 1—Weld in SAE 1010 material, 0.0938-inch thick. Would have been almost perfect if given a few cycles longer duration and a trifle more upset. Shows good grain structure and bond as it is

Fig. 2—Weld at center of this view is almost impossible to locate. Joints such as this permit higher bursting pressures to be utilized; allow bending, flaring and other cold working without failure





DOALL contour machines set up for (left to right) cutting, filing and polishing. Inset: poppet lever sawed out of steel block and filed by DOALL. Courtesy Continental Machines, Inc., Minneapolis, Minnesota.

A GOOD IDEA ON PAPER BECOMES A WHIZ IN STEEL

● Last decade's development of alloys such as chromium and molybdenum made possible saw blades as narrow as 1/16-inch for cutting metal . . . gave promise of a gala comeback for the band saw—star of the lumber show at the World's Fair in '98. The idea of these new, tough, slender saws was good—on paper. How to make them actual cost cutters for the average shop was the problem.

For six years, the metal-cutting band saw went through the development mill. One improvement after another came until finally it seemed that the ideal model had been attained. It was made of seasoned castings. It worked perfectly. But it was still in the luxury class.

Then Doctors of Design went to work on the problem with *"Shield-Arc"* welded steel construction. They developed a rigid, strong, light-weight machine that produced more uniform work at less cost. (*The welded steel "Model V-16," does three times as much work as the "Model J" it replaces.*)

Result: This versatile "contouring" machine, now profitable for the average shop, is revolutionizing many machining practices for lower costs. A good idea on paper becomes a whiz in steel . . . and in sales.

"Shield-Arc" welding has turned good ideas into profits in thousands of similar cases—in manufacturing, construction and maintenance. Try this method of uniting design ingenuity with superior materials and see how it makes *your* products *stronger, more rigid, better looking* with savings in weight, time and money.* Counsel of experienced Lincoln engineers is yours for the asking. Phone the nearest Lincoln office or write THE LINCOLN ELECTRIC COMPANY, Dept. Y-6, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

LINCOLN *"SHIELD-ARC"* WELDING

Unites design ingenuity with superior structural materials for progress.

THEY BOTH HAVE IT—Both *"Shield-Arc"* and *"Shield-Arc Jr."* Welders have Continuous Self-Indicating "Job Selector" (assuring the right TYPE of arc) and Current Control (assuring the right AMPERAGE) for lowest costs on every job. Get free bulletin on these New Lincoln Welders.

* **FOR EXAMPLE.** Standard steel shapes and pressed steel parts simplify production of DOALL machines. Eliminate patterns and expensive time-consuming steps. Accurate assembly by welding limits machining operations to a quick grinding. Result: Faster production. Lower costs.

FASTER FILLETS. Users of the new "Fleetweld 8" report 10% to 30% faster fillet welding with this smooth-flowing Lincoln Electrode. For positioned and non-positioned flat fillets. Ask for free procedure bulletin.

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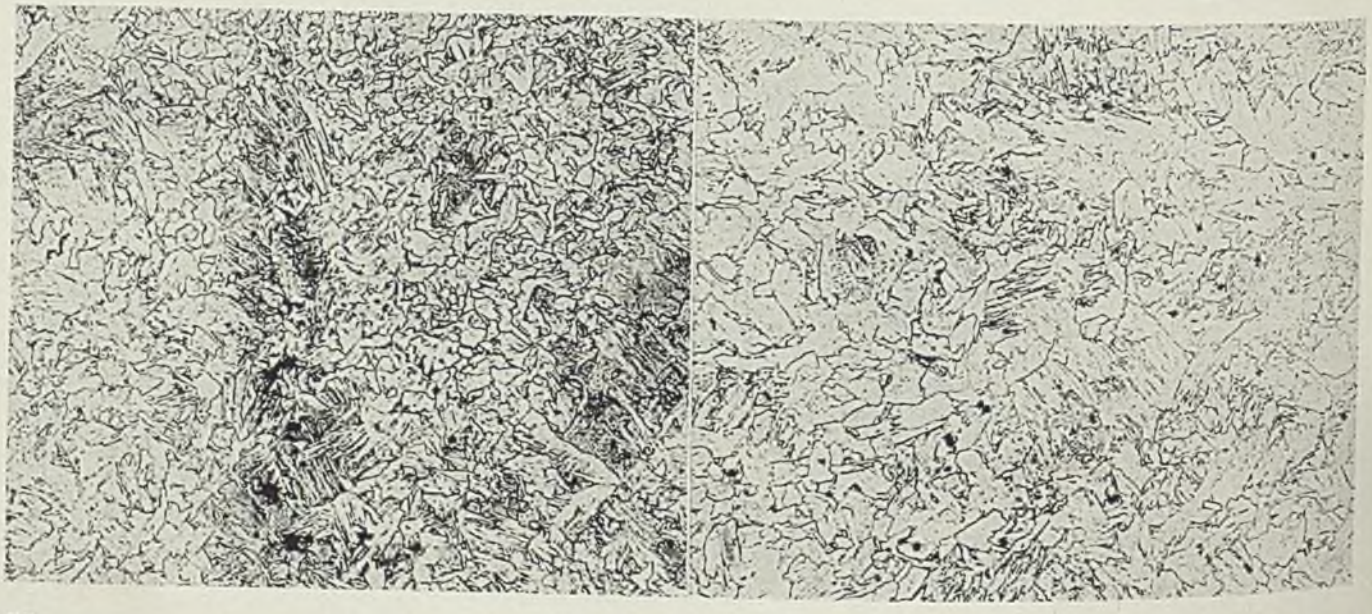

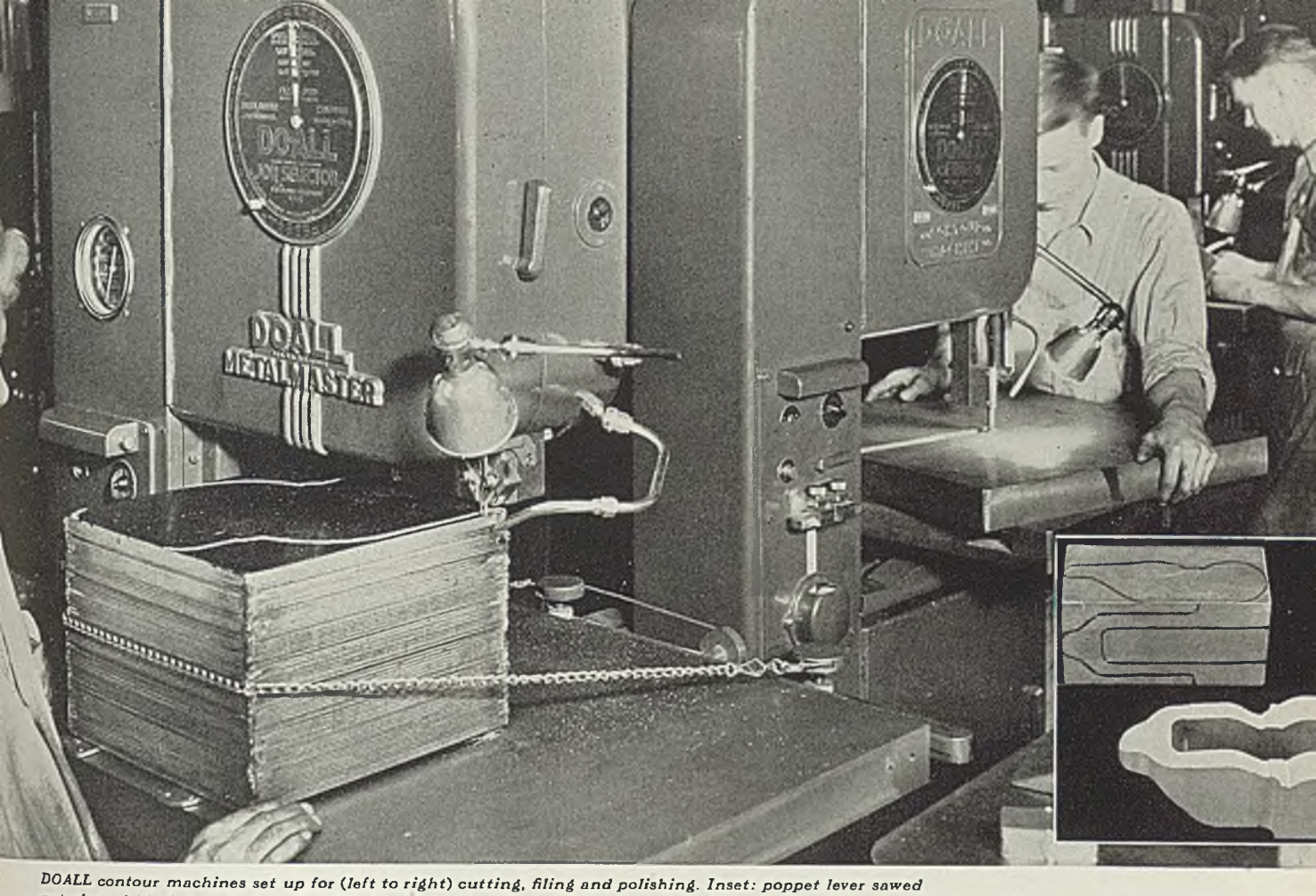

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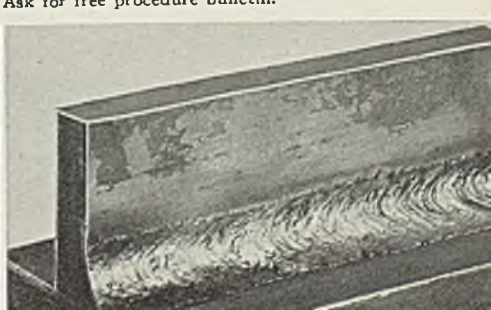


on each side of seam cleft and when weld is completed is about eight-tenths thickness of the material. For ordinary sheared or rolled stock, an allowance is made for upset equal to about the thickness of the stock.

Second, seam cleft is exposed to passage of current of suitable strength and duration. Heating begins at point of contact between abutting edges and spreads rapidly up to the edges of the contactors, which prevent further heating by rapidly conducting away the generated heat. By providing cold hard metal immediately behind the heated and softened welding zone, sufficient mechanical supports is provided for effectively upsetting the weld.

Exact Requirements Unknown

Third, seam cleft is upset or closed further by pushing out burned metal and inclusions in the form of a burr or fin. Amount of upset ordinarily equals thickness of the material. For ordinary low-carbon steel, upset pressure of about 8000 pounds per square inch of cross section is utilized. Shape of electrodes and pressure applying means are such that direction of upset pressure coincides with tube periphery. This latter prevents circular cross section of tube from being deformed as weld is upset. The upsetting pressure mentioned is about the highest that can be utilized for low-carbon steel without crushing the metal. Lower pressures have been found not to produce the structure and bond desired. The exact requirements in welding low-alloy steel tubes are not completely known at present.

After seam cleft has been heated and closed, it is given an additional upset to forge the weld metal.

All above actions take place rapidly in sequence as tube is automatically propelled through the machine. Rate through machine does not depend upon distance between recurrent welds as this can be adjusted as desired. Rate of tube welding with flat contactors is determined by type of weld desired, balancing cost against quality. Rates already effectively utilized range between 25 and 40 feet per minute.

Fig. 1 shows weld in a low-carbon steel tube made with flat contactors. It reveals a good bond with martensitic grain structure but etched a little darker than the surrounding metal. Cooling has been extremely rapid, caused not by water but by the contactors themselves. While there are a few nonmetallic inclusions, the weld is nearly perfect. Current of a few cycles longer duration with a trifle more upset would have produced a perfect weld. This example shows one feature clearly—heating effect has been confined strictly to seam cleft as absolutely no transition zone is visible.

Fig. 2 shows grain structure through a perfect weld produced by flat contactors. It is almost impossible to detect where the joint was made except at edges where upset burr joins tube wall. Grain structure is martensitic. Here weld current, duration, closing of seam cleft, final upset and cooling have all been co-ordinated to produce a fine-grained structure throughout. Weld and weld zone are entirely free from nonmetallic inclusions. No transition zone can be found.

Micrographs Figs. 1 and 2 are at 100 diameters and are unretouched. Neither of these samples were heat treated or normalized.

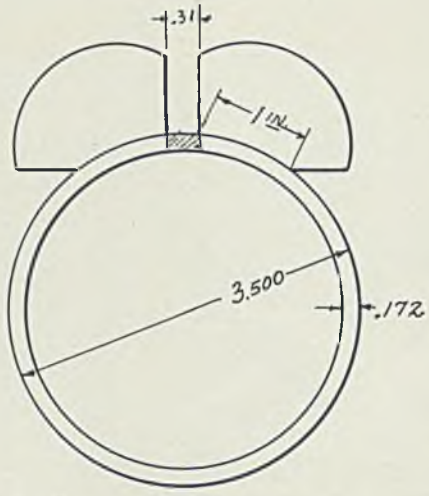


Fig. 3—Dimensions of 3.5-inch pipe analyzed. New weld method gives 50 per cent greater bursting pressures permitting smaller walled pipe to be utilized in many cases

Properties Equal Base Metal

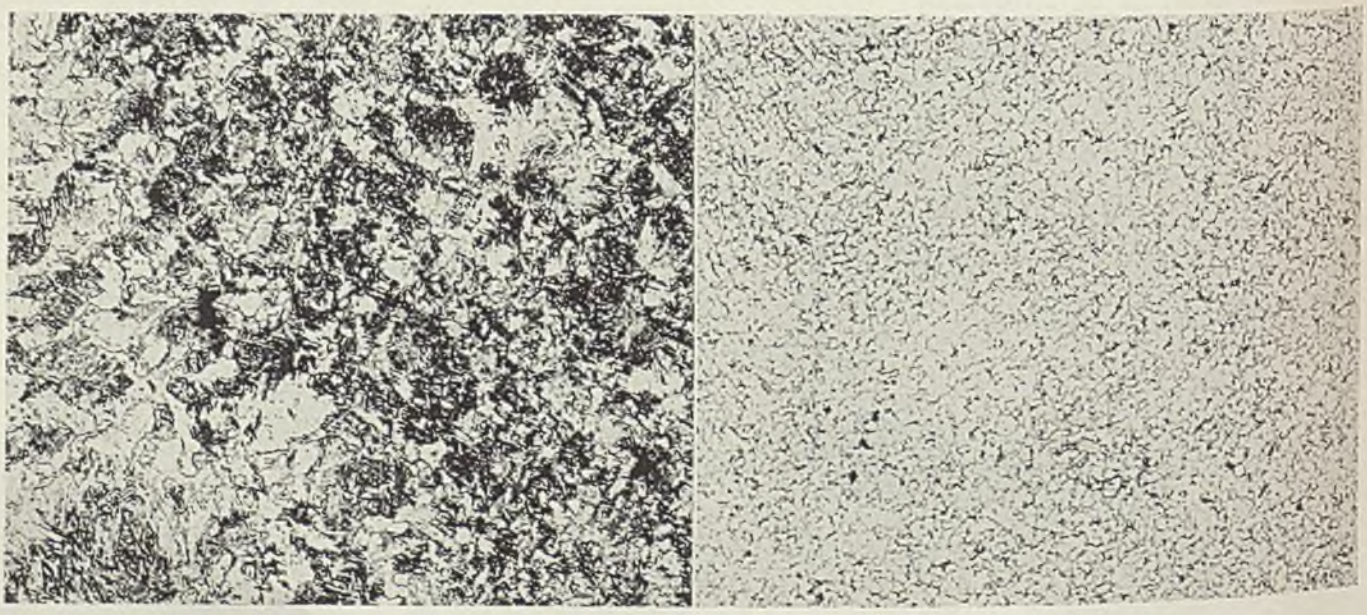
All physical tests of these welds indicate properties fully equal to virgin metal. Stock employed is SAE 1010, and thickness was 0.110-inch. Current delivered to machine was 57 kilowatts, rate of welding was 25 feet per minute.

To provide a clearer conception of how such grain-size control is obtained with flat contactors, an analysis of a weld in a pipe of 3.5-inch outside diameter will be made. Fig. 3 shows a sketch of main dimensions including wall thickness, distance between contactors, width of contacting surface. Rate of welding is 25 feet per minute. Welding

(*Please turn to Page* 79)

Fig. 4—Weld in low-alloy steel showing good bond; freedom from transition zone near weld; perfect co-ordination of welding current, time, upset, rate of cooling, etc. Wall thickness 0.078-inch. Weld is in center of this and Fig. 5 but cannot be located by grain structure

Fig. 5—Same weld as in Fig. 4 but has been normalized. Martensitic structure now changed to pearlite and ferrite. Weld cannot be distinguished from original metal



Why Not *Take a Tip* from These Fabricators? *Switch to* A-c Welding and SAVE

"REDUCED OUR POWER COSTS," writes Ryan Car Co. "Eliminated magnetic arc blow for us, too, thus permitting welding to be successfully done in corners." Arc welding helps this progressive fabricator build a lighter, stronger assembly; a-c arc welding saves him money and materials.

"BENEFITS OBTAINED WITH A-C WELDERS paid for the new equipment in eight months," reports Burnham Boiler Corporation after replacing its d-c welders and changing its methods of plant operation.

"WE GET GREATER SPEED," says Mr. W. G. Wehr, Cleveland Crane and Engineering Co. "General Electric a-c arc welding helps us make vertical and horizontal welds with ease even in corners and tight spots."

"NO WARPING WITH A-C," enthusiastically states Greene Haldeman Co. "In repairing automobile doors, decks, etc., warping of thin metal is avoided, and time otherwise required for correcting warpage is *saved*." A-c welders are good for light work, too!

May we help?

Highest welding speeds and lowest welding costs are obtainable only when using the largest electrodes and highest currents practicable for the work. For that reason we ask, "Are you using the largest electrodes and highest currents which your work can stand?"

If your shop now employs d-c welders at currents above 200 amperes, it is probable that better speed and economy could be obtained by changing to a-c welders. A-c welders avoid the troublesome arc blow encountered with d-c welders and thus permit higher welding currents and larger electrodes to be used successfully. They also save 40 to 70 per cent of the power cost of a rotating-type welder.

Many fabricators have already changed over to G-E alternating-current arc welders for better speeds and profits. The nearest G-E arc-welding distributor or sales office will gladly help you to get the best results obtainable for your particular work. Why not give them a call and get started today?

GENERAL ELECTRIC

672-2

Monorails for Aircraft

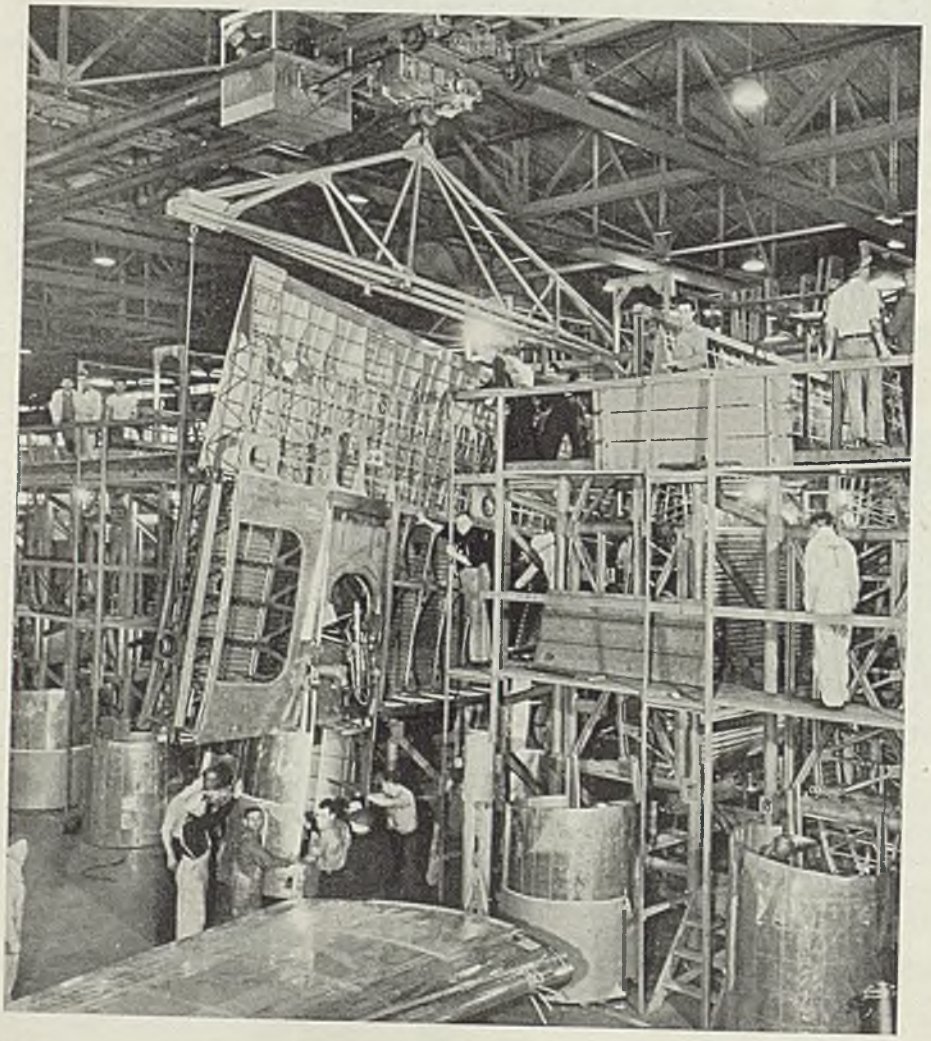
Unique monorail system serves large unobstructed areas in aircraft plant, features 162-foot clear-span underslung crane. Units interlock for multiple operation over entire length of 450-foot plant

■ DESIGNED to meet the exacting requirements of line production of aircraft, the overhead handling system at Plant 2 of Boeing Aircraft Co., 200 West Michigan street, Seattle, has justified every expectation and is regarded as a model of its kind. A description of it may serve to help other fabricating plants which may have similar specialized production problems.

Mass production of airplanes is not so large a scale as that in automobile and other plants but where a 22-ton 4-engine bomber is completed each four days, it is necessary that operations proceed smoothly, with minimum handling and in shortest time possible. This objective has been attained at the Seattle plant.

Present system contrasts strikingly with handling equipment adequate for airplane production only a few years ago. It illustrates recent sharp advances in flexibility and adaptability of overhead handling equipment.

Of the three Boeing production units, Plant 1 is devoted to primary stages of construction and fabrication of detailed parts. Subassembly work is carried on at Plant 3 where smaller component parts such as nacelles, bulkheads, cowlings, etc. are made. Output of both these shops converges at Plant 2, devoted to subassembly and final assembly operations. Here bodies, wings and other component parts are put together to make the completed airship. It is in this work that the elaborate crane system receives its severest test.



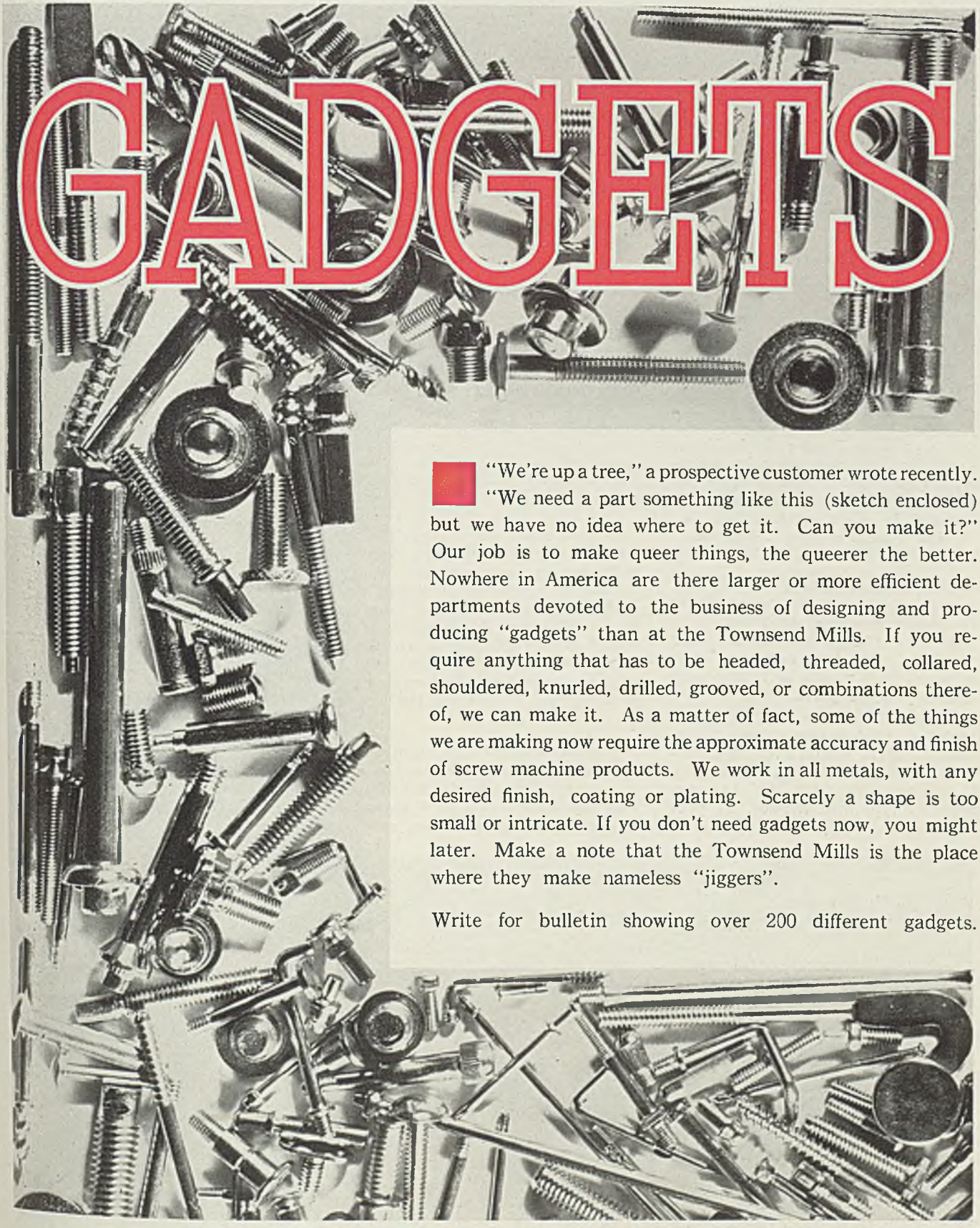
Here monorail crane is taking a wing panel, with engine nacelles attached, from its construction jig, one of a series of massive steel jigs in which Flying Fortress bombers are assembled. Elaborate scaffolding enables crews to work at several different levels at the same time

Cranes Are Smaller

At Plant 1, monorail crane system is installed but it is less elaborate than the system at Plant 2. Operations at Plant 1 do not require the extensive use of overhead equipment. Therefore cranes are smaller and controlled from the floor in contrast with Plant 2 where control is handled from cabs with operator riding with crane. At Plant 1 with a lower ceiling, hanging controls are operated from the floor by

Neither we nor our customers can name these things.....they're simply

GADGETS



"We're up a tree," a prospective customer wrote recently. "We need a part something like this (sketch enclosed) but we have no idea where to get it. Can you make it?" Our job is to make queer things, the queerer the better. Nowhere in America are there larger or more efficient departments devoted to the business of designing and producing "gadgets" than at the Townsend Mills. If you require anything that has to be headed, threaded, collared, shouldered, knurled, drilled, grooved, or combinations thereof, we can make it. As a matter of fact, some of the things we are making now require the approximate accuracy and finish of screw machine products. We work in all metals, with any desired finish, coating or plating. Scarcely a shape is too small or intricate. If you don't need gadgets now, you might later. Make a note that the Townsend Mills is the place where they make nameless "jiggers".

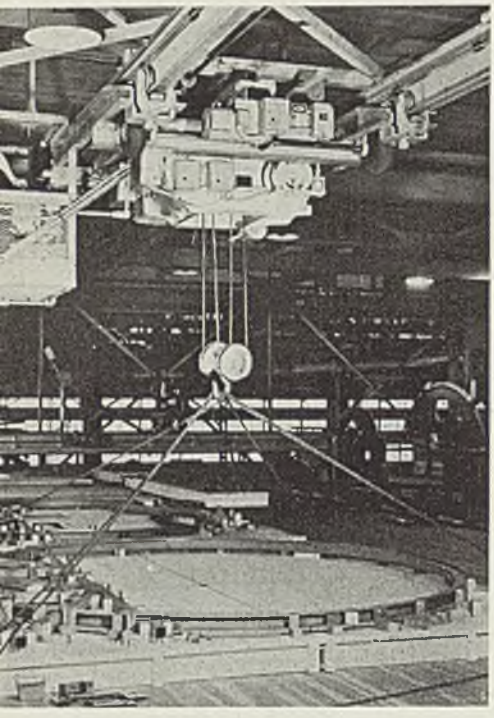
Write for bulletin showing over 200 different gadgets.

The Largest Rivet and the Oldest Wire Manufacturers in the World

TOWNSEND COMPANY

NEW BRIGHTON (*Pittsburgh District*) PENNSYLVANIA

SOLID AND TUBULAR RIVETS—SPECIAL WIRE NAILS—HEADED METAL PRODUCTS—AND WIRE SPECIALTIES—IN ALL METALS



Overhead crane lifting entire bulkhead layout jig. Note rubber airwheels contacting underside of rails to move the crane and crane bridge. Crane system installed by American MonoRail Co., 13107 Athens avenue, Cleveland

means of push buttons. As the load moves, the workman keeps pace. Overhead handling at Plant 1 is used mainly in the hammer shop for moving heavy lead and zinc dies, modeled from plastic casts and used in stamping out parts.

Plant 2, 300 x 450 feet, was completed about two years ago by Austin Co., 16112 Euclid avenue, Cleveland. Being adjacent to the airport it was designed as a low structure with flat-type roof trusses. To provide maximum open working area, these trusses have a clear span of 200 feet over main assembly and a span of 125 feet over the two subassembly bays. They provide 35 feet overhead clearance throughout the structure.

To preserve this unobstructed working area, cranes are underslung with exceptionally long clear spans. Monorail system involves 8500 feet of rail and includes what is said to be the longest clear span crane of the underslung type in existence. It measures 162 feet from end to end and is capable of carrying a 20-ton load distributed along its length or 5 tons at any point.

Cranes Equipped with Airwheels

Each subassembly bay has two 60-foot cranes which can be interlocked end to end and operated as a single unit. Electrical bridge circuits also interlock so the carrier can operate along the combined length of the two units when the crane bridges are interlocked. Crossover rails connect the cranes between bays of the plant for continuous travel along the entire 450-foot length.

The 2-rail crane bridges operate back and forth across the 300-foot width of the building along runway rails spaced about 20 feet apart. Trucks of special steel shapes roll along the runway rails. Traction is provided by Monotractor drive with balloon rubber drive wheels or airwheels set against the bottom of the rails and mounted on a shaft running the length of the crane bridge. Two 5-ton carriers, also motivated by Monotractor drive, may be switched onto any crane bridge. Each control cab has a steel grill bottom so operator can see all operations 35 feet below. The entire equipment is ball bearing mounted and operates with exceptionai efficiency. As an example, it only takes a 3-horsepower motor to move the 162-foot crane along its nine runways with a full load at 150 feet per minute.

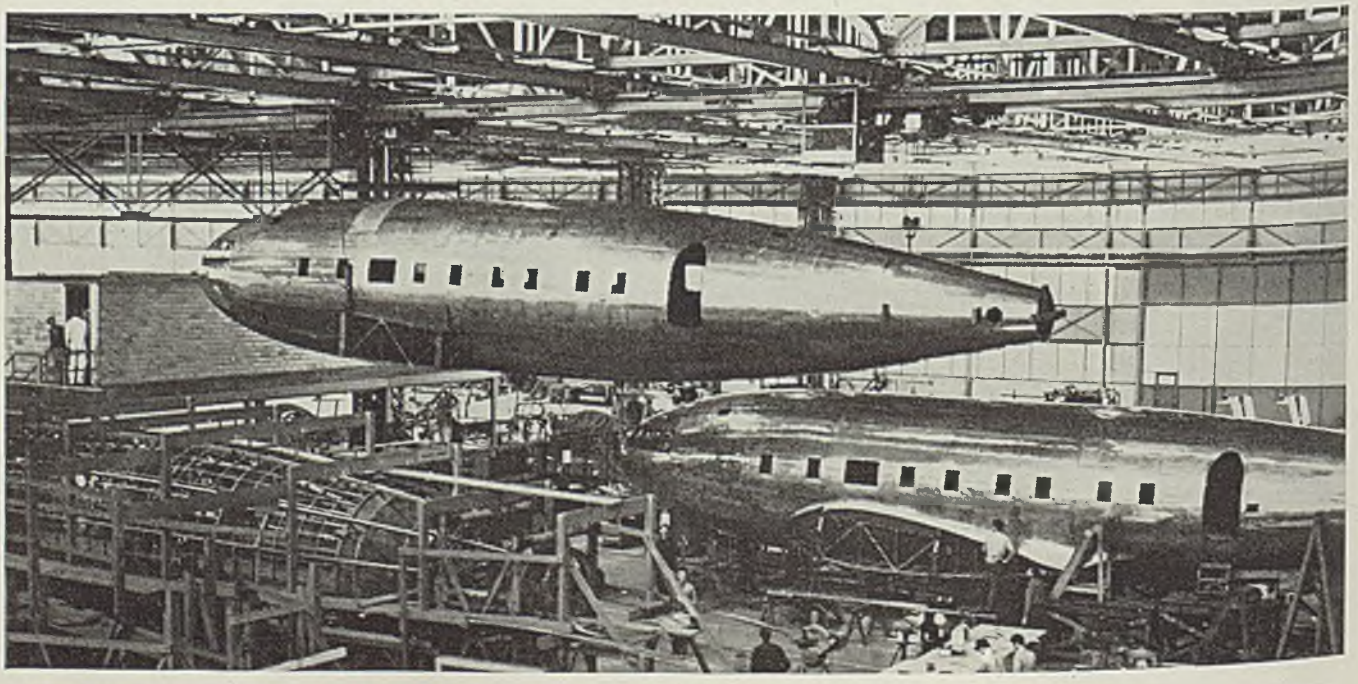
The 60-foot cranes, as well as carriers, are powered by 1¼-horsepower electric motors using 440-volt

(*Please turn to Page* 78)

Patent Rights on Furnace Clay Guns Purchased

Exclusive manufacturing and sales rights under the August G. Giese patents on blast furnace clay guns have been purchased by William M. Bailey Co., Magee building, Pittsburgh. The Bailey Company not only has exclusive manufacturing and sales rights under the Hopkins, Osolin and Ferree design patents, but is also licensed under the Hopkins method patent No. 1,780,485. The company will market the Bailey electric plunger clay gun under a combination of the Hopkins, Osolin and Ferree patents and the Giese patents.

In order to protect users from cross litigation under these two groups of patents, Bailey company believed it advantageous to all concerned to purchase rights under the Giese patents and thus be in a position to build a clay gun that incorporates all the best features for completely plugging the tapping hole of a blast furnace.



Two crane cabs operating on the same bay take completed all-metal fuselage of a Boeing Stratoliner for first "flight," from assembly jig to final assembly floor. Note extremely long span

STAINLESS STEEL *in Commercial Aircraft*

This stainless steel water rudder is the type used to resist corrosive sea water on the Pan American Airways' "Yankee Clipper" shown.

This light, strong rudder frame for a seaplane was fabricated from durable stainless steel by high-speed spot-welding.

This collector ring, made from welded stainless steel, resists the high temperature and corrosive action of exhaust gases.

DESIGNERS and operators of commercial aircraft find stainless steel an ideal material for a growing number of applications. A few examples of how stainless steel is already being used on commercial planes are illustrated. Consider these four inherent advantages of stainless steel and what they mean to you:

1. **Excellent Strength-Weight Ratio**—compares favorably with other commonly used materials. *Result:* Strength with light weight . . . more pay load . . . increased revenues.

2. **Ease of Fabrication**—by modern, high-speed welding processes. *Result:* Strong, homogeneous units . . . smoother surfaces . . . less drag . . . higher speeds.

3. **Corrosion Resistance** — immune to atmospheric corrosion. *Result:* No corrosion losses . . . lighter sections . . . less dead load. No painting . . . less maintenance . . . lasting beauty . . . passenger appeal.

4. **Strength at High Temperatures** — up to 1650 deg. F. *Result:* Fireproof . . . greater safety. Resists hot, corrosive gases . . . longer life . . . increased dependability.

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By H. E. ROCKEFELLER
Manager
Process Development
The Linde Air Products Co.
New York

Shaping Edges for Welding

Oxyacetylene cutting torch setups with multiple nozzles handle most complicated edge shaping operations in one pass. Single nozzle can make full U or J-groove in one pass with proportions easily varied

■ THERE is little question but that many welded structures today would not be economically practical without the oxyacetylene torch and shaping the edges to be joined. Also, preliminary cutting to approximate dimensions with a torch also is often a valuable shortcut. While widely used also in hand cutting of openings and irregular contours, probably most flame cutting and shaping is done mechanically. It is here the greatest economies are obtainable.

Until recently, torch preparation of edges has been confined to use of a single cutting nozzle and individual cuts. Circumferential segments, for instance, for the reducing bends in the 18-foot diameter penstocks for the Grand Coulee dam required four passes of the cutting nozzle to develop the desired edge contour, Fig. 1. Four separate cuts required here to prepare for the double-V weld shown. A curved templet was used in guiding the cutting machine.

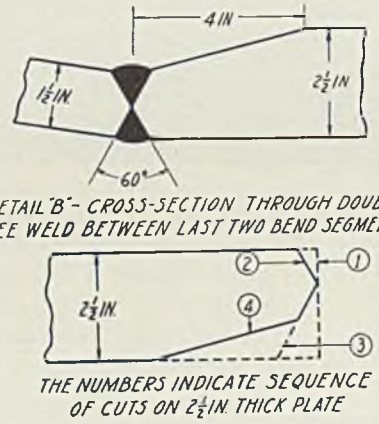


Fig. 1—Edge contour of circumferential segments for reducing-bends in Grand Coulee dam penstocks

Beveling of flanged and dished heads also is often done with single nozzle equipment such as that in Fig. 2 where the blowpipe is held in its normal mounting on a standard cutting machine, the desired bevel being obtained through use of a bevel cutting adaptor. Often use of a machine mounting plate can be eliminated by use of a flexible radial attachment as shown in Fig. 3.

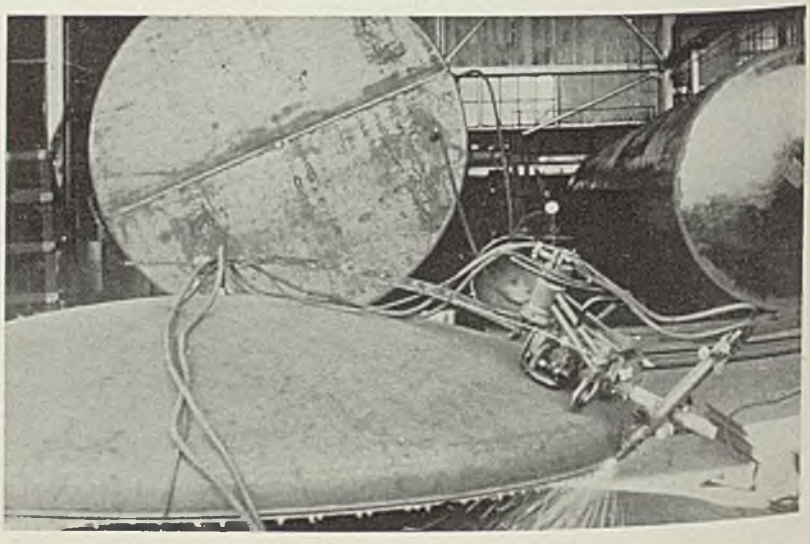
Recent developments make it possible to increase the speed, simultaneously reducing the cost of edge preparation and improving both accuracy of contour and straightness of the edges.

For some time it has been recognized generally that increased speed of cutting is obtained by a "leading lag." Holding the blowpipe in a vertical position with respect to the work produces a cut which does not extend directly through the work in line with the cutting blowpipe but lags behind, particularly at the bottom. By tilting the blowpipe nozzle forward in the direction of the cut, a leading lag is secured. While this

From paper presented at annual meeting of American Welding society, Chicago, October 1939.

Fig. 2—Cutting an outside bevel on a dished head

Fig. 3—Mounting plate, Fig. 2, can be avoided by use of a flexible radius arm attachment shown here



permits increased speed, the surface obtained is rough and unsatisfactory so a second nozzle is employed to finish the cut and permit full advantage to be taken of the speed of the leading-lag cut. The combination gives a cut surface equal in quality to that secured with a single nozzle operated at low speed.

Fig. 4 shows comparative results obtained in cutting 1-inch plate with a single nozzle and with the method just described, called the cut-and-trim method. In the latter instance, cutting speed was 36 inches per minute while single nozzle was progressed at 18 inches per minute. Oxygen consumption for cut-and-trim method was 1.28 cubic feet per foot of cut as against 1.12 cubic feet per foot of cut for the single nozzle method. The cut-and-trim method thus increased speed 100 per cent while consuming only 10 per cent more oxygen. Furthermore, the surface quality of the cut-and-trim method was superior.

Positioning of Nozzles Important

Another recent development is simultaneous operation of two or more cutting nozzles to produce a single bevel and nose, a double bevel, a double bevel with nose or other special contours. Fig. 6 shows representative contours which have been produced by simultaneous operation of multiple nozzles. Success of this method depends upon positioning the different nozzles to provide proper relationship between the succeeding reaction zones. If nozzles are too close together, one jet will foul another. If too far apart, proper heat balance between reaction zones will not be maintained. Proper positioning thus is most essential.

Fig. 4—Top, edge of 1-inch plate square cut by single nozzle. Bottom, a similar plate square cut by cut-and-trim method using two nozzles

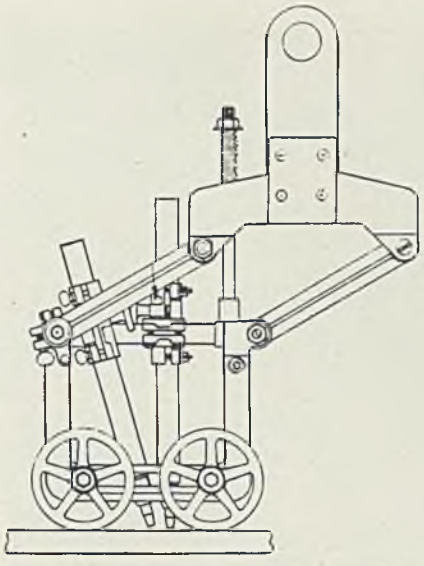


Fig. 5—Plate-riding device with floating blowpipe mechanism set up for square cutting and beveling

An essential in all shaping and cutting operations is provision for maintaining an exact interval of space between the tip of the nozzle and the plate surface. A wavy condition in the plate or sagging of the work between supports causes difficulties unless a floating mechanism or plate-riding device is used. This eliminates necessity for flattening plate mechanically and simplifies both setup and investment costs.

Fig. 5 is one design of riding device employing a pantograph arrangement to connect the cutting nozzle support with the advancing mechanism. This framing maintains desired angles of the blowpipe as they are raised and lowered with respect to the cutting machine itself. Two wheels, one on each side of the nozzles, maintain proper distance at start and finish of cut.

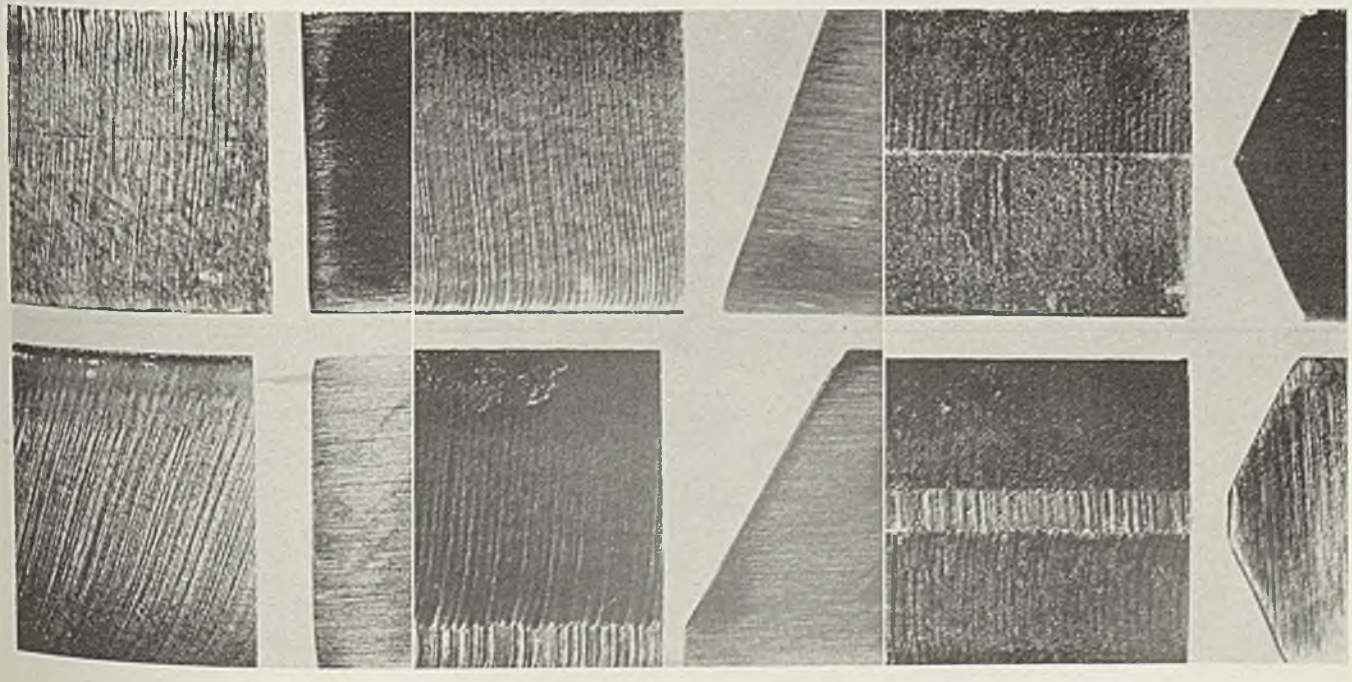
Fig. 7 shows a setup for simultaneous cutting and single-edge beveling employed on several thousand ½-inch plates measuring 6 x 13 feet. About 1 to 2 inches of excess metal was removed on the 6-foot sides. Contour specified was 22½ degree bevel angle with a 3/16-inch wide nose. Excess metal was removed economically from the 6-foot sides by flame cutting, but the 13-foot sides were planed.

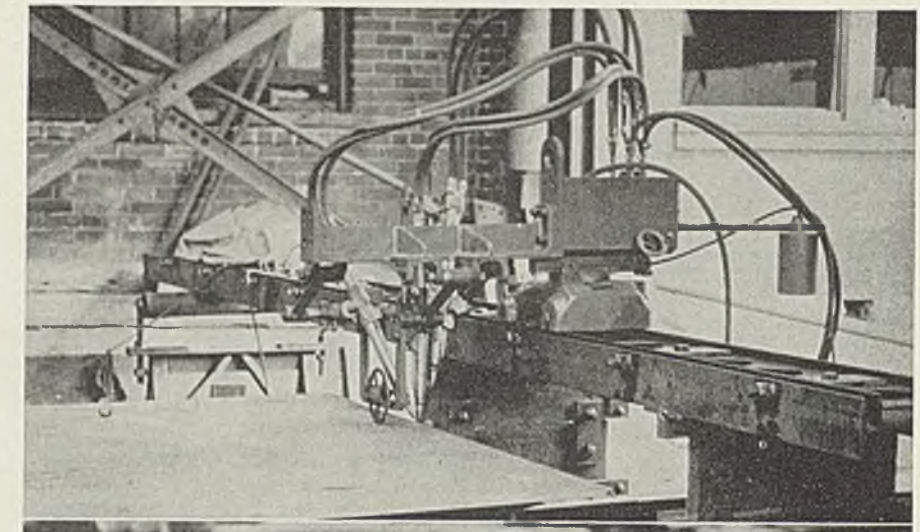
Plates Positioned for Cutting

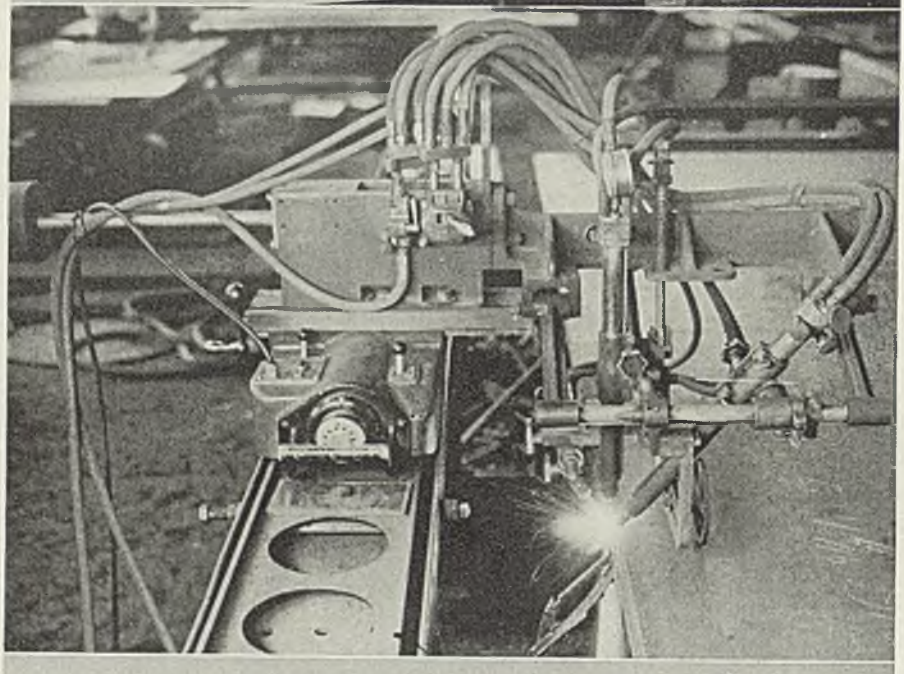
Plates were handled by an air-jack type of monorail hoist. They were lifted from a flat car near the cutting table and placed in position for cutting one edge. When this was done, plate was raised, turned and placed in position for cutting the opposite edge. Then plate was lifted from table, transported 25 feet and stacked. Cutting-machine operator performed these tasks without assistance. Also he removed any adhering slag from the cut edge. Average over-all time for handling each plate and preparing two 6-foot edges was 20 minutes. Of this time, 8 minutes was consumed in actual cutting. Approximately 30 cubic feet of oxygen and 6 cubic feet of acetylene were required for each plate.

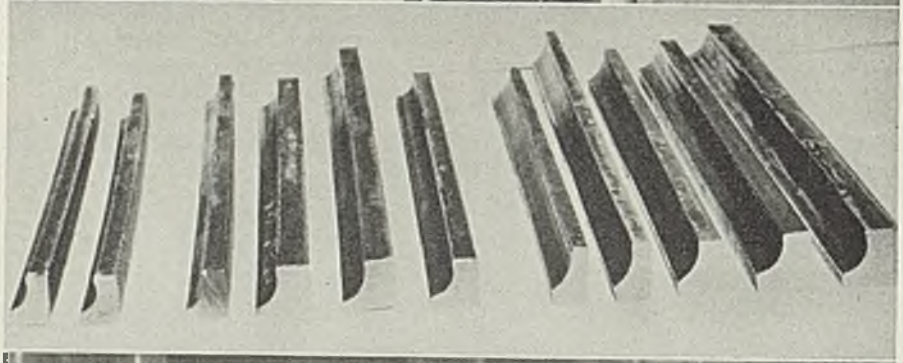
Where plates must be rolled or pressed to curvature prior to edge preparation such as in boiler drum

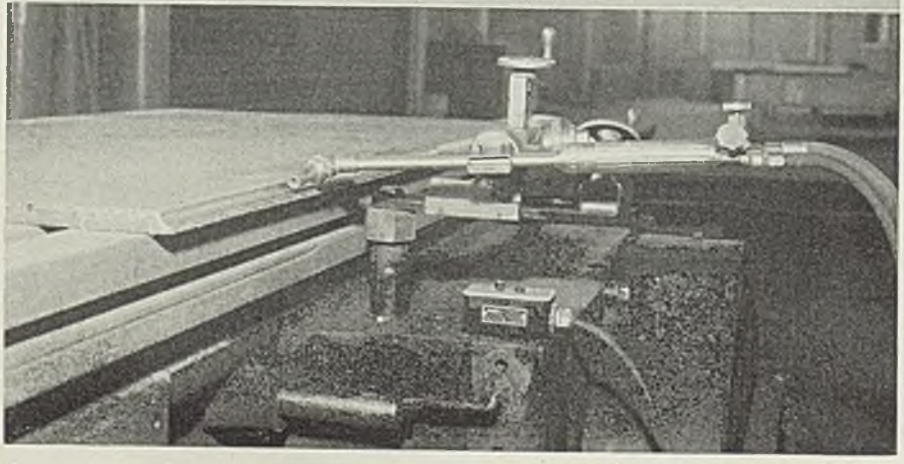
Fig. 6—Various bevel cuts in 1-inch plate. Upper left, plain bevel with single nozzle. Lower left, square cut and beveled to 30 degrees with 1/8-inch wide nose. Upper right, double-V bevel to 30 degrees. Lower right, 7/8-inch plate with double-V bevel to 30 degrees and 3/32-inch wide nose











and pressure vessel construction, simultaneous shaping and cutting afford important economies. In most instances, considerable excess metal must be provided on the plate prior to forming to insure sufficient material for the proper curvature of the finished edge. With a setup such as shown in Fig. 8, a double V is cut and the nose is prepared simultaneously with removal of excess metal. While this illustration shows the working of flat plate, curved plate can be worked in a similar manner.

In some instances where square plates are being prepared, an L-shaped setup appears to have considerable merit. Here two tracks are fixed along short and long sides of a framework which supports the plate, permitting one long edge and one short edge to be cut simultaneously. With two edges prepared, the plate is swung around 180 degrees, positioned against stops which automatically determine finished length and width, the opposite two edges then being prepared. A number of variations of this design appear to be valuable including a parallel track assembly for simultaneous cutting of two parallel edges, variation in widths of plate being provided for by a cross slide adjustment on the cutting machine.

Less Weld Metal Required

Grooving for U and J-joints is replacing common V preparation in many instances. Advantages claimed for curved groove are that it provides a more satisfactory design for deposition of the initial weld bead and requires less weld metal for the joint in the case of heavy plate. Where necessary to use a square edge on one side of the joint, the J-groove offers an improved design for the abutting plate edge.

Recent nozzle developments facilitate grooving as well as beveling plate edges. Specially constructed nozzles similate the ½-U and J-type grooves and also permit developing a full U-groove in abutting plate edges. Considerable variation in contour of plate edge can be secured with a single nozzle by charging the horizontal and vertical links of the nozzle with respect to the work. Oxygen pressure and speed of the operation are two other variables

Fig. 7. (Top)—This equipment makes square cut and bevels edge at the same time

Fig. 8. (Next to top)—Here three torches prepare double-V bevel and straight nose in one pass

Fig. 9. (Next to bottom)—Some of the various contours obtainable with a single grooving nozzle

Fig. 10. (Bottom)—Method of making J-groove contour on rectangular plates

GOOD NEWS

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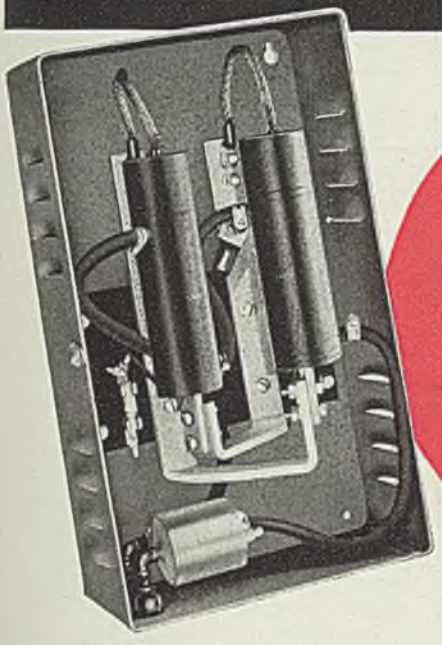

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affecting contour. Typical of the variations obtainable with a single nozzle are those in Fig. 9.

Fig. 10 shows how the grooving method is applied to rectangular plates. Here a plate is set on a planer bed in the same manner as would be employed for a tool-planing operation. A special nozzle replaces the tool to develop the complete contour in a single pass. A similar groove is developed on a circular plate by placing the plate on a turntable and rotating it past the nozzle.

Underside or topside of a welded joint can be grooved out to form a full U-groove and so permit developing a double-U welded joint. Because of the ease with which contours can be controlled, grooving often is done manually.

The operation also can be applied in fabricating. In this instance, the square sheared plates are either abutted or spaced slightly apart and a single weld bead deposited on the under side to hold the plates in position and to form a bottom shelf for the grooving operation. Fig. 11 shows an operator gouging a groove between two plates abutted together on the deck of a dredge.

Accuracy of oxyacetylene edge shaping depends upon three factors. One is the mechanical accuracy with which cutting nozzles are propelled along the desired line of cut. A second factor is the accuracy with which the cutting jet removes metal. Third factor involves plate movement or distortion resulting from heat absorbed during the operation.

Most cutting machines for edge shaping operate on tracks which determine the accuracy of nozzle movement. Propulsion units when kept in good repair will operate accurately within a few thousandths of an inch. Track accuracy depends largely upon care in preparation and maintenance. Use of portable equipment often increases the chance for mechanical inaccuracy since it is difficult to maintain track and machine adjustment if equipment is continually moved about. Maximum mechanical accuracy thus is obtained in a stationary installation with the plate brought to the machine.

Second factor, or control of cutting jet, is largely a matter of accuracy in drilling the oxygen bore and proper maintenance of the cutting nozzle. With proper care in positioning so there will be no slag interference, variation in contour from this cause will be within 0.015-inch per inch of plate thickness.

Distortion Hard to Control

Third factor, or distortion, has attracted considerable attention. It probably is the most difficult to control. With the edge expanding as the heat is applied progressively, total force due to expansion increases in magnitude as the cutting operation progresses. To relieve this force, the edge tends to assume a convex or outward bow. When cut is completed, edge temperature decreases, edge metal resumes its full strength and contracts to cause distortion.

If restraint during the heating cycle has prevented free expansion, the metal will upset upon cooling to assume a concave or inward bow. On plates ¾-inch in thickness and under, thermal stresses are relieved sufficiently by surface distortions. Here warping or buckling of the plate surfaces minimizes the edge upsetting effect. On the other hand, stiffness of the plate increases with plate thickness so distortion is reduced on plates 1 inch and over.

Experiments indicate total maximum deviation from a straight line to be expected is about 1/16-inch in flat plates having a width greater than 3 feet and regardless of their length. Where cut length is 10 feet or less or the thickness less than ½-inch, overall distortion will seldom exceed 1/32-inch. Thus for most plate-shaping operations for square-edge bevel or bevel and nose contours, the method has sufficient accuracy. Plates to be rolled into cylindrical sections subsequent to edge preparation can usually compensate for the small variations in straightness of the edge by aligning the sections for welding.

For full U-groove preparation of abutting plate edges no measurable distortion is normally encountered. Cross-sectional contour of U or J-grooves cannot be controlled with the same degree of accuracy as in planing, but because of flexibility and speed of the oxyacetylene method, acceptable commercial applications have been made. The application will be expanded as the possibilities and limitations become more thoroughly appreciated.

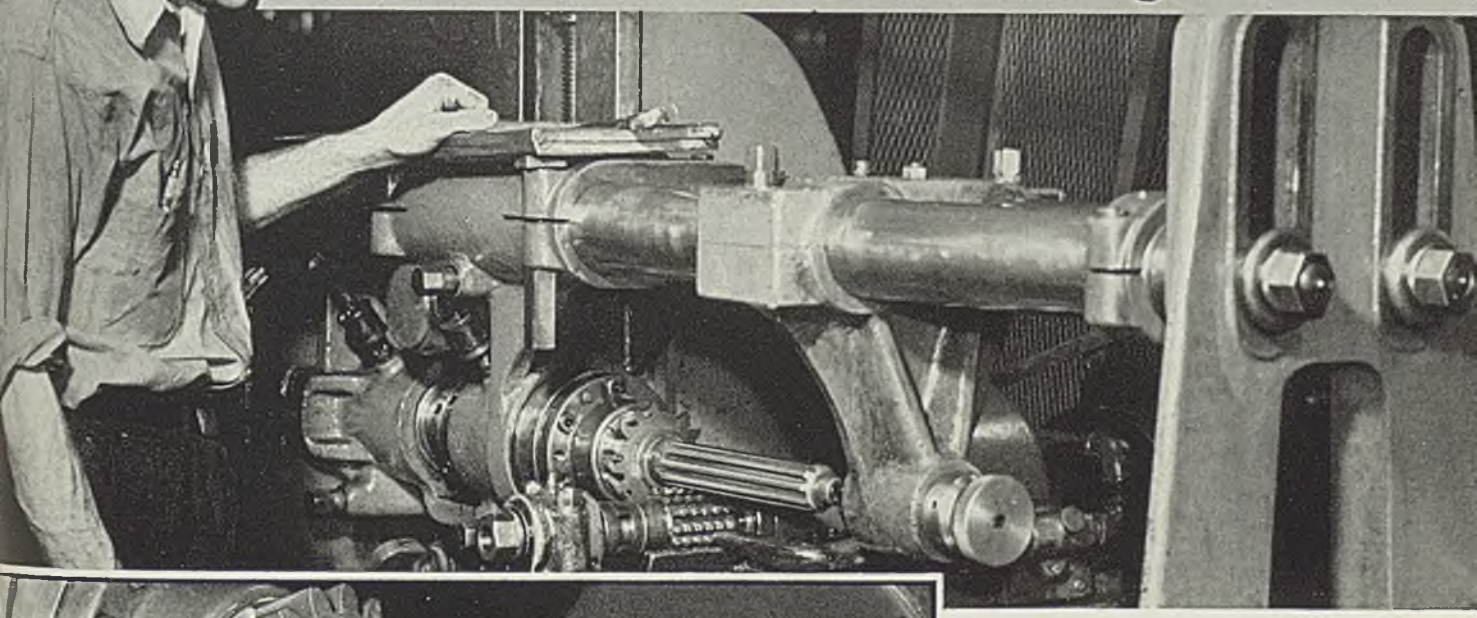
Since metallurgical effect of removing metal by the torch is similar to the actual welding operation, it is understandable why any plate material which can be welded satisfactorily usually can be shaped with a torch without special precautions. Materials containing not more than 0.35 per cent carbon will give little difficulty. Those with higher carbon content and with alloys will develop a thin hardened layer on the torch-cut surface. However, if the same precautions are followed as in welding, no trouble will be encountered. This means either the edge must be preheated prior to cutting to prevent formation of the hardened zone or reheated following the cutting operation to remove the hardness resulting from the cutting action.

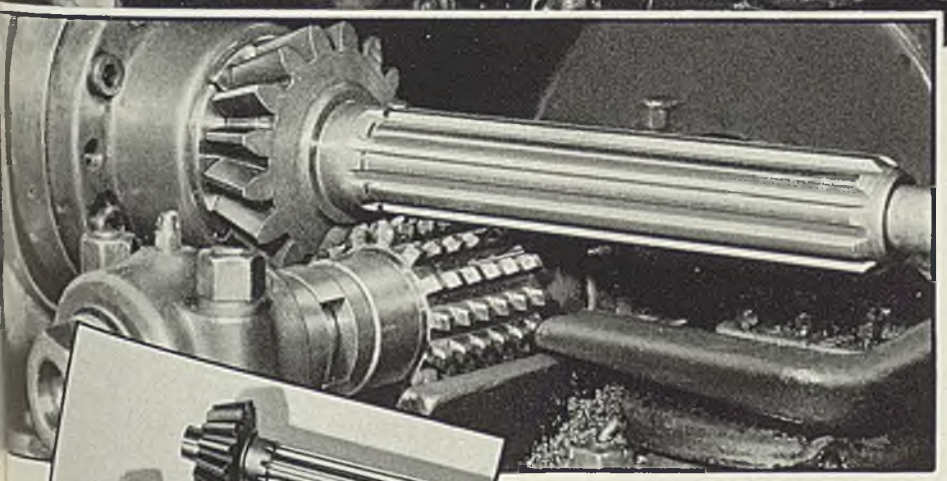
Fig. 11—Manual application of full-U grooving on deck plates of a dredge. Groove is being made between two plates butted together and welded underneath to form a shelf

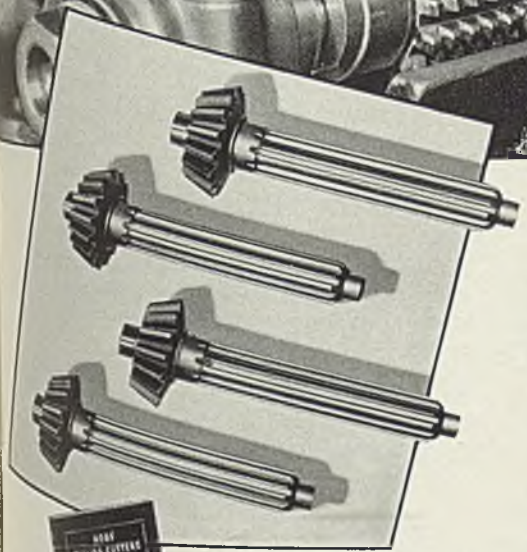
Synthetic Coating Protects Belt Covers

A synthetic coating for belting covers, developed by B. F. Goodrich Co., Akron, O., according to tests, will greatly reduce the effects of aging. Samples of conveyor belting with covers under severe tension which were coated with the synthetic composition, and exposed for six months to all varieties of weather had not shown evidences of cover deterioration. Product is known as R-60-T protective coating.

50% More Pieces Per Grind on B-C Hobbing Machine







Changing from conventional to climb cutting in finish-hobbing a transmission main shaft after heat-treatment resulted in getting 50% more pieces per grind from the Barber-Colman Hobbing Machine shown above. In this instance the change to climb cutting was easily made by reversing the main drive, reversing the hob, and inserting an idler in the feed train. On Barber-Colman Hobbing Machines, Types D and V, climb cutting is interchangeable with conventional hobbing by simple adjustment of controls . . . and these machines, with hydraulic actuation and other important features, are making new high records for accuracy and finish, as well as pieces per hour, and per hob sharpening.

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Name of Part — Transmission Main Shaft.
Material — M.D. 4120 Steel.
Hardness—45-55 Scleroscope, after heat-treatment.
Outside Diameter — 1.768" max. — 1.758" min.
Length of Splines — 9", full depth.
Number of Splines — 10.
Form of Key — Involute, 30° pressure angle.
Accuracy — Spline and Shaft Axis parallel within .0002 per inch of length and selective sliding fit without perceptible shake.
Operations — Rough Hob — Heat Treat — Finish Hob after Heat Treatment.
Hob Speed — 71 r.p.m.
Feed per Rev. of Work — .068".
Pieces per Setting of Hob — 3.
Settings between Grinds — 7.
Pieces per Grind — 21.
Floor to Floor — 20.5 minutes.

Write today for Catalog K, shown at left. For data on Types D and V Hobbing Machines ask for Bulletins 1477 and 1645.

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Mirrors of Motordom

(*Concluded from Page 28*)

ing into the flame to reach their maximum temperature and then passing into a water-cooled tunnel which is filled with combustion atmosphere and reduces the specimen temperature by as much as 1200 degrees Fahr. The furnace has been operated some 21,000 hours.

■ HOW much the materials of today have become the products of yesterday's research, and how the materials of tomorrow will become the products of today's research were ably portrayed by S. M. Cadwell, director of automotive development, United States Rubber Co., Detroit, who spoke on research and development in the field of rubber.

He first recounted the results of recent research which proved that, strangely enough, rubber exhibits greater dynamic fatigue life after initial compression, extension or shear than it does when in a condition of zero strain. Thus, if a test is started with rubber under a minimum extension of about 200 per cent, the dynamic fatigue life will be at least a hundred-fold greater than when the minimum strain is zero. Results of these tests seem to indicate a new concept in the design of rubber as well as rubber-and-metal parts in the future.

Rubber Uses Increasing

Dr. Cadwell pointed to the steadily increasing usage of the so-called "synthetic" rubbers of the Neoprene, Thiokol and related types. He stated that the special properties of these materials, particularly their resistance to swelling in organic solvents, are making them increasingly popular in spite of a cost disadvantage.

A product in commercial use today which evolved from recent research is sponge rubber made by whipping air into latex and then setting this froth in such a way as to preserve the air bubbles. Automobile seat cushions, mattresses and other products now employ this foam latex to advantage.

Rubber chemists have developed a new type of sponge—produced either hard or soft—in which the individual pores or cells are insulated or walled off from each other. It is called cellular rubber and has a number of unusual properties including unique shock-absorbing qualities.

Progress is continuing in improving the adhesion of rubber to metal, even without cements. Bond strengths have improved to the point where older designs requiring compressive forces to supplement the bond can be simplified and full dependence can be placed on the rubber-to-metal adhesion to hold pieces together. Best bonds still are obtained on brass plated surfaces.

In the rubber tire field, the most significant development is the perfection of rayon tire cord fabrics by cellulose chemists. This cord material shows greatly improved strengths over cotton cords, particularly under hot and dry conditions encountered in tire service.

New Alternating-Current Adjustable-Speed Motor

■ Louis Allis Co., 133 Stewart avenue, Milwaukee, has developed an Ajusto-Spede alternating-current adjustable-speed motor which is a combination of an eddy-current clutch and a standard constant-speed squirrel-cage motor.

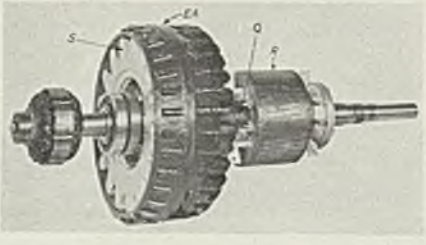
There is no mechanical connection between driving and driven members of unit as speed and torque variations are obtained by controlling magnetic excitation of clutch for any desired slip. Gradual or quick accleration of load, rapid intermittent starting and disconnecting of load and absorption of torsional impulses and vibrations are said to be accomplished without jar, shock or stress on any driven part.

Speed variation from zero to full speed at full load torque is claimed to be available, and unit is said to operate continuously at low speeds without overheating. Remote control of speed is possible.

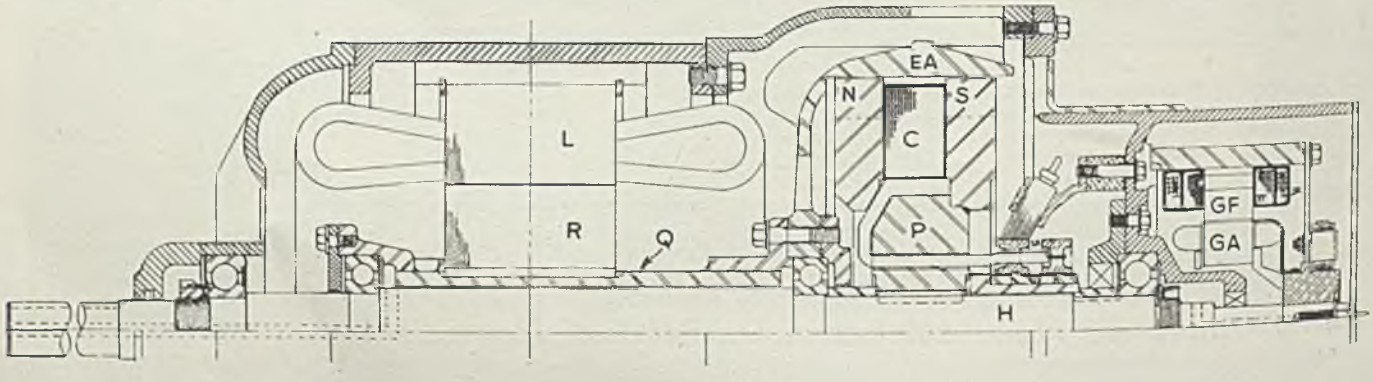
Clutch is said to be 95 to 97 per cent efficient under conditions of maximum excitation and minimum slip, and to have 150 to 250 per cent of normal full load torque of motor. Any desired slip of clutch can be obtained by controlling excitation of clutch.

Drum EA in illustration is bolted to quill Q, which is supported at each end by bearings and which also carries rotor R of a standard squirrel-cage alternating-current motor. Drum EA rotates at same speed as rotor R and is considered the driving member of the eddy-current clutch. When full direct-current excitation is supplied to coil C, assembly N-S-P is drawn around with EA at practically the same speed as EA. As the excitation in C is reduced, the slip between EA and N-S-P increases in order to hold torque constant. Hence speed of N-S-P can be made to decrease to a standstill by further reducing the excitation. As N-S-P is keyed to output shaft H, shaft can be run at a variable speed while alternating-current rotor R and EA run at a constant speed.

Maximum cooling ventilation is produced at all speeds as ventilating fan is driven by constant-speed member and not by output-speed member. Motor is suitable for shock loads as entire shock is said to be absorbed electrically and not mechanically. Motor is 72 to 78 per cent efficient for ratings 1 to 25 horsepower on basis of maximum speed and full load torque.



External view, rotating members and cross section of the new adjustable speed alternating-current motor. In cross section view, L and R are stator and rotor of a standard induction motor, EA and C are members of an eddy-current clutch and CF and GA are the field and armature of an exciter for the clutch winding

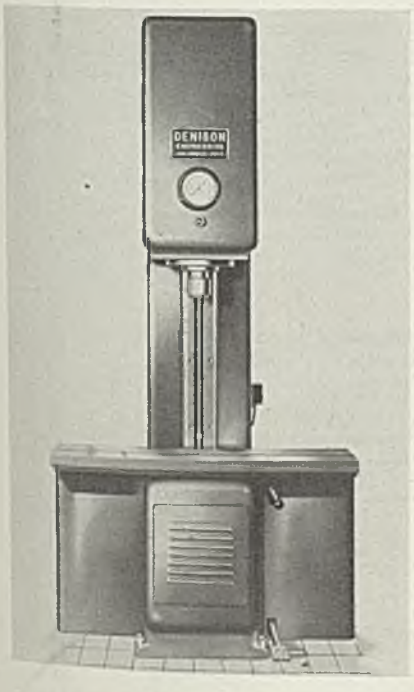


Medical Tool

■ General Electric Co., Schenectady, N. Y., has devised an Alnico magnet for removal of metal fragments from eyes and surface wounds. Sintered Alnico, an alloy of aluminum, nickel, cobalt, iron and copper, is used with a high permeability insert of nickel iron to collect the lines of flux at the point. Magnet is light and can be handled almost as easily as a pencil.

Vertical Press

■ Denison Engineering Co., Columbus, O., has developed vertical hydraulic presses Type DLSC1 for straightening, forcing and general production pressing. Press cylinder assembly consists of finished steel cylinder fitted with nickel iron cylinder heads, piston and steel piston rod. Piston rod is sealed with self-sealing packing which is subject only to low pressure and piston is sealed with metal piston rings. Cylinder is flange-mounted in upper portion of the C frame. Control valves, their operating levers and motor starter are in the throat of press frame. Hydraulic pumps, driving motors and oil supply tank are in the base. A slot runs lengthwise through work table for positioning of dies or fixtures. Ram is guided against rotation by machined guides in throat of press. End of ram is topped concentric with the ram itself for holding tools or fixtures.



Press may be operated either by a conveniently located hand lever or by a foot pedal. Maximum tonnage exerted by ram can be adjusted from its full rated working capacity in infinite steps to approximately 10 per cent of its rated working capacity.

Pyrometer Potentiometer

■ Lewis Engineering Co., Naugatuck, Conn., has developed a portable pyrometer potentiometer claimed to be unaffected by vibration and suitable for use in moving vehicles and airplanes. Instrument is said to be accurate regardless of surrounding temperatures between minus 60 and plus 115 degrees Fahr. Features include: One balancing operation; no standard cell; no suspension galvanometer, single or double range scales; low-resistance double-pivot galvanometer, and cold junction inside instrument. Instrument is compensated and measures atmospheric temperatures with thermocouples. Its dimensions, 6¼ x 9¼ x 10¼ inches, has 8-inch scale and weighs 13 pounds. Model 13PO single range (standard) costs $175 net.

Nibbling Machine

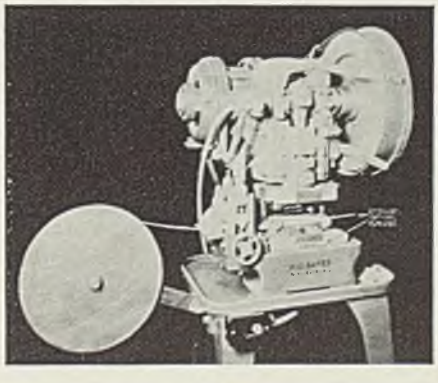
■ Andrew C. Campbell division of American Chain & Cable Co. Inc., Bridgeport, Conn., announces No. 250 nibbling machine having adjustable stroke so it can be regulated to thickness of metal. Thin templets can be used on any thickness of work.

Both the flywheel and motor pulley are designed for V-belt drive so belt can be changed quickly to any one of three speeds—350, 500 or 800 revolutions per minute. Nibbler is said to cut up to ¼-inch thick in mild steel and 3/16-inch in stainless steel up to 70 inches wide, or about double the 36-inch throat depth of the machine. Machine cuts in all directions.

Power Embossing Outfit

■ H. O. Bates, Elizabeth, N. J., announces improved power embossing outfit for embossing aluminum number tags or name plates. Press is light weight and assembled with motor and drive for operating speed of approximately 125 strokes per minute. Electric push button control is incorporated, and above the ram is attached a counter for tabulating number of tags produced at each setting.

At left is spindle or reel from which aluminum tape approximately 0.016-inch thick by ½-inch wide unwinds through roll feed. Aluminum tape is carried into die-set which contains embossing type, upper and lower mating characters.



Outfit is furnished with complete supply of interchangeable embossing type, however, automatic embossing head can be substituted for consecutive numbering.

Revolving Joint

■ Barco Mfg. Co., 1801 Winnemac avenue, Chicago, offers revolving type flexible ball joints for supplying steam, gas or other fluids from a fixed or stationary supply pipe to a rotating drum. Rotating sleeve is only part that revolves. This sleeve

DUST STORM BANISHED!

by STURTEVANT ENGINEERING

How a bad health hazard . . . tough cleaning problem . . . were eliminated!

HERE IS a striking and convincing example of the value of Sturtevant Engineering in solving dust and fume removal problems!

SCENE: The Simplicity Shakeout at a large foundry (we can't reveal the name).

VILLAIN: Big clouds of fine dust, steam, smoke—a bad health hazard.

HERO: A mighty effective Sturtevant Exhaust System.

STORY: When castings were shaken out in this foundry, great clouds of fine dust, steam, and smoke arose. This condition was a constant menace to the health of employees—presented a tough cleaning problem. What to do?

HAPPY ENDING: In went a specially designed Sturtevant foundry shakeout exhaust system—carefully engineered to exactly and effectively meet the situation. *Out went the trouble!*

Do you have a dust or fume problem? If so, we would welcome your inquiry. Let us put our over 75 years of air engineering experience at your service.

B. F. STURTEVANT COMPANY
Hyde Park, BOSTON, MASS. *Branches in 40 Cities*
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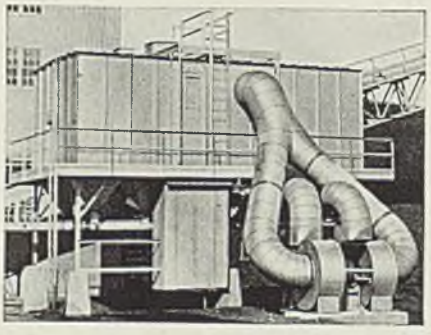
Galt, Toronto, Montreal



Sturtevant Exhauster for removing dust formed in the manufacture of roofing material at Staso Milling Co., Bound Brook, N.J.

Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

Centrifugal Fans
A wide variety of types and sizes for exhausting or blowing service, including high pressure fans. Belt, motor, or turbine driven.

Air Washers
Made in several types and wide range of capacities to meet varying requirements in cleaning, cooling, dehumidifying, and humidifying air.

Air Conditioning
Individual units of equipment or complete central systems for maintenance of desired temperature and humidity in industrial air conditioning.

Drying Equipment
A wide variety of equipment for industrial drying in connection with textile, rubber, wood, leather, chemical, food, ceramic, and many other products.

Corrosion Resisting Fans
Rubber-coated and special metal alloy fans for acid fume exhaust service. Belt, motor or turbine driven.

Axiflo Pressure Fan
Can overcome resistance of ducts, filters, prevailing winds, etc., up to 1½ in. water gauge, and possesses mechanical efficiency of over 79%. 11 sizes ranging from 18 to 60 in., with capacities up to 75,000 c.f.m. Furnished with either belt or motor drive. Wheel of acid-resisting cast aluminum.

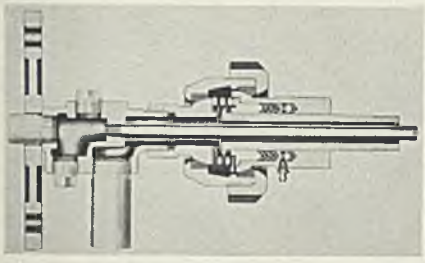
Suspended Speed Heaters
Propeller fan type, for wall or ceiling installation. Fin type heating element. For steam pressures up to 200 lbs., capacities up to 300,000 B.t.u.

Centrifugal Compressors
For industrial furnace, conveying and pneumatic tube work, gas boosting service, etc. Pressures: ½ to 5 lbs. Volumes: 50 to 50,000 cu. ft.

AND OUT GO DUST AND FUMES!

also slides in and out to take care of any end play in revolving drum. Double ball design provides flexibility to compensate for any slight misalignment or eccentricity of movement.

Adapter 18-R is used when it is desired to feed two different fluids into revolving drum or syphon out condensate through same opening. Adapter shown on print is used for spray pipes going into a steel mill cold roll. Feature of joints is that



they provide free movement in all directions. They are available in sizes from ½ to 2 inches.

Collet Chuck Carriage Front

■ Landis Machine Co., Waynesboro, Pa., announces new type of carriage front which can be used on either its Landmaco or Landis standard threading machines. Carriage front is provided with collet holding de-

vice which is actuated by a handwheel. However, separate collets are employed for each diameter of work. Outstanding advantages of new collet chuck carriage front are: Assured production of concentric threads and elimination of gripper markings on work.

Photoelectric Set

■ Rehtron Corp., 2159 Magnolia avenue, Chicago, has placed on the market a completely assembled model E-77 photoelectric and capacity relay experimental set for industrial experimental use. Set consists of a photoelectric robot relay, long-range light source with invisible-beam infrared filter and a signal-switch board equipped for both audible and visible signal demonstrations. Set can be plugged into

115-volt, 50 to 60-cycle outlet. Electric eye may be used for such applications as burglar alarm, fire alarm, traffic signal control, illumination control, inspecting and sorting, machine safety control, automatic door operator, liquid level control, smoke control and magnetic counter operation.

Grinder Blades

■ Fansteel Metallurgical Corp., North Chicago, Ill., announces centerless grinder blades faced with

Tantung wear-resisting alloy for any type of machine or grinding operation. Tantung is an alloy composed of hard particles of tantalum and tungsten carbide, uniformly distributed and firmly embedded in strong, tough matrix. Tantung facing, made in bar form, is firmly affixed to steel supports by special brazing process. Complete blades are manufactured to specification. However, facing can be applied to existing blades furnished by users, or Tantung bars are obtainable for those equipped to do their own brazing.

Light Bevel Stamp

■ M. E. Cunningham Co., 115 East Carson street, Pittsburgh, announces light bevel safety stamps which will

prevent accidents from mushrooming and spalling. Due to new alloy steel used, stamp is 35 per cent lighter. This lightness makes it much easier to handle and, in stamping finished surfaces, greater degree of accuracy is possible.

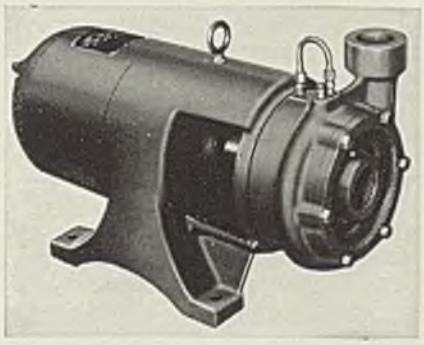
Nontippable Ink Stand

■ Eugene Dietzgen Co., 2425 Sheffield avenue, Chicago, offers nontippable inkstand for filling ruling

pens. Stand consists of 3 parts; holder for regulation ¾-ounce bottle of ink, dipper arm which closes bottle tightly, and finger-touch lever which raises a filling loop on end of arm from bottle. Loop may be lowered or raised according to level of ink in bottle or to amount of deposit desired. Stand also may be screwed to drawing board.

Centrifugal Pump

■ Worthington Pump & Machinery Corp., Harrison, N. J., announces new balanced Monobloc centrifugal



pump in which motor and pump are an integral unit. Pump is compact, yet has ample room for repacking stuffing box. Large-diameter shaft on rigid bearing mountings maintains concentricity in all rotating parts. Drip-proof motor features directed flow of ventilating air claimed to prevent drawing of moisture into motor.

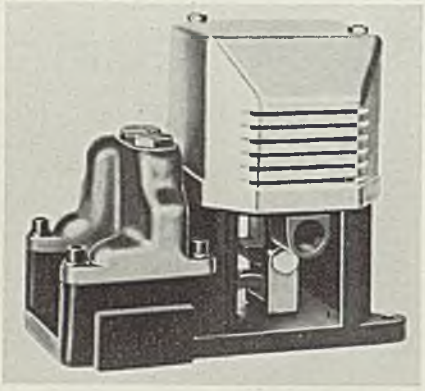
Pipe and Bolt Threader

■ Beaver Pipe Tools Inc., Warren, O., announces 71 series pipe and bolt threader for pipe from ⅛ to ¾-inch, right or left hand, and bolts from ¼ to 1 inch, right or left hand. Coarse and fine threads and American and British Whitworth standard threads are produced. More

than 100 kinds and sizes of dies are available, and it is said dies can be changed in 20 seconds without tools. Die bosses project far above face of tool body to clear chips. It is claimed even long curls from soft steel bolt stock cannot clog or jam tool. Dies are easily oiled. Self-centering universal chuck eliminates loose bushings. Tool is available in ratchet and nonratchet models. Green crackled-finish box with partitions to hold 12 sets of dies is available.

Air Valve

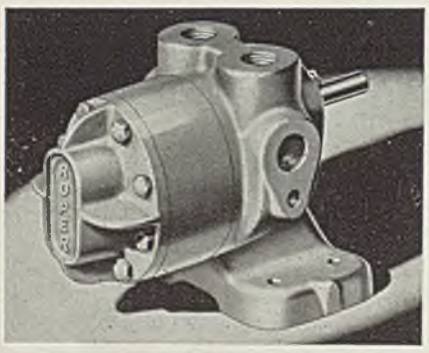
■ Ross Operating Valve Co., 6488 Epworth avenue, Detroit, has announced special model, solenoid operated, air valve built to meet demands for high-speed operation of



welding guns. Valve is said regularly to deliver 400 welds a minute on production jobs.

Rotary Pump

■ Geo. D. Roper Corp., Rockford, Ill., announces a line of rotary pumps which includes pumps in capacities of 1 to 1000 gallons per minute. Capacities at speeds up to 1800 revolutions per minute against pressures up to 1000 pounds per square inch are available. At present 21 different drives and mountings are available ranging from ordinary foot, hub and flange mounting heads to complete bedplate units for direct motor drive; gear



reduction; flat or V-belt drive. Outstanding feature of line is "hydraulic balance." It equalizes internal pressure at all points and absorbs all shock or thrust from power end of drive shaft.

High Pressure Plug Cock for Gage Lines

■ Merco Nordstrom Valve Co., 400 Lexington avenue, Pittsburgh, announces high-pressure lubricated plug cock for gage lines handling

test pressures up to 4000 pounds. Gage cock has rated working pressure for water, oil and gas of 2000 pounds. Its body is forged steel and plug is of stainless steel. Stick lubricant is inserted under lubricant screw which can be turned down. Turning screw transmits hydraulic pressure to seat, and in event cock becomes hard to turn, pressure exerted will loosen it. Special lubricants are available for steam. Unit is made ¼ and ⅜-inch sizes.

Electric Hammer

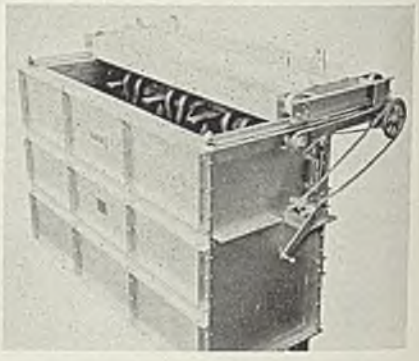
■ Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago, announces portable Thor-Nado

electric hammer featuring Sling-Shot Drive. Hammer is 13½ inches long and weighs 14 pounds. It is adapted to heavy-duty applications, including star drilling, channeling, chipping, cleaning, scaling, cutting, gouging, beading, caulking and seaming. Its capacity in concrete, limestone and brick is 1 inch. Outstanding feature of hammer is the drive whips the piston back and forth at a speed of 1600 blows per minute, acting as both power accumulator and shock-absorber. Blow of piston is not felt by operator nor is it transmitted to gear or motor. Motor is housed at right angles to piston barrel and transmits power through helical cut gears.

Heat-Treating Furnace

■ Ajax Electric Co. Inc., Frankford avenue and Allen street, Philadelphia, has introduced a furnace for heat treating aluminum alloys. On illustrated unit, in which pot measures 24 x 84 x 46 inches deep, three pairs of electrodes arranged along back wall of pot eliminate need of heating elements. Heat is generated directly in salt bath by its resistance to flow of current between narrow electrode gaps.

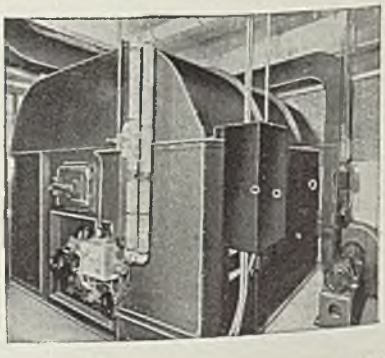
Electrodes are arranged and proportioned to produce an automatic circulation of bath. Operating principle assures uniformity of temperatures throughout pot contents. Furnace has a working tempera-



ture range of 450 to 1100 degrees Fahr. covering annealing and precipitation hardening.

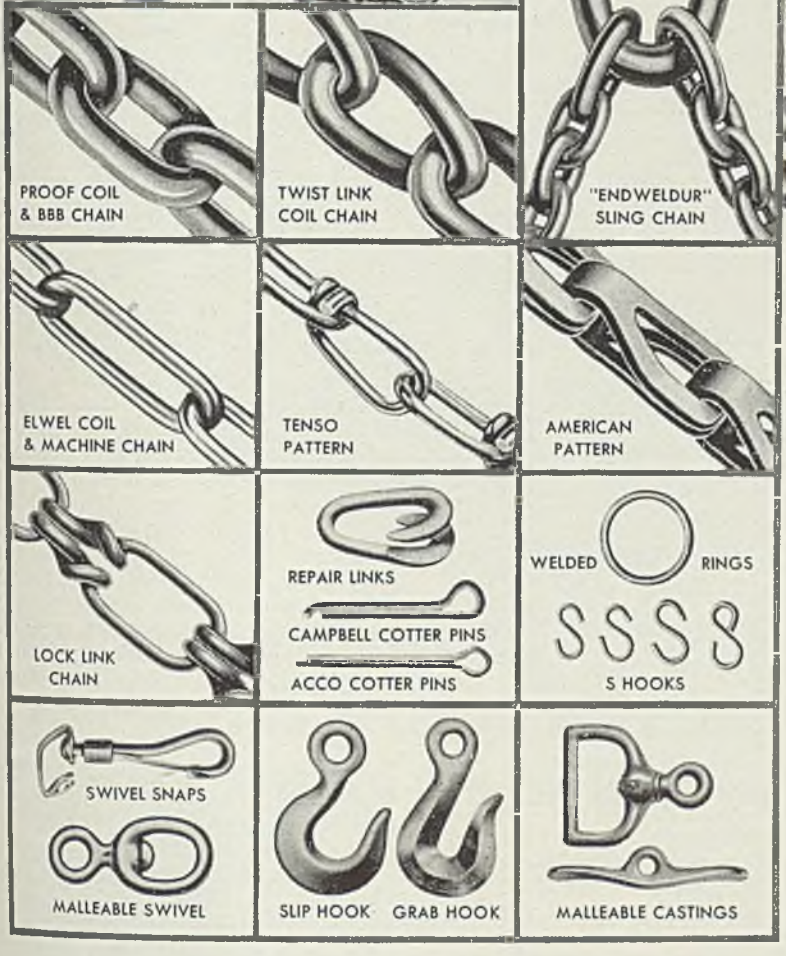
Warm-Air Heater

■ Lee Engineering Co., Youngstown, O., has designed new warm-air heater for industrial buildings. Unit is encased in steel and is self-contained. It requires no foundations and can be placed in any location. Construction of housing depends upon size. Heating elements consist of banks of black U-shaped steel tubes of various diameters with ends cemented into cast iron headers. Tubes are sep-



arated from combustion chamber by thick bridgewall and protected by

Now- the hardest alloys are *END WELDED* to make "ENDWELDUR" CHAIN



Because American Chain engineers perfected the art of welding chain links on the ends instead of the sides—and because they developed a new alloy—users are getting "4 to 1 longer chain life in tough service." Endweldur Chains stand up under elevated and subzero temperatures, moderate impact loadings and bending and gouging.

This chain hinges perfectly at every link. Each link is entirely normalized—all internal strains removed. Uniform quality provides maximum safety.

Send for this FREE booklet

It gives all the facts about Endweldur Sling Chain. Tell our engineers of your chain problems. They will be glad to offer suggestions. Address American Chain Division of American Chain & Cable Company, Inc., Bridgeport, Connecticut.

Also Chain, Chain Fittings and Attachments for Every Purpose

In the American Chain line, largest and most complete in the world there are welded and weldless chains of all types, sizes and materials—and every conceivable kind of chain fittings and attachments. All these chains, fittings and attachments are designed for your safety, economy and convenience and are thoroughly pretested in our laboratories.

SUMMARIZED: *American Chain offers a full line of welded and weldless chain—also cotter pins, eye bolts, cold shuts, lap links, round eyes, malleable castings, grab hooks, slip hooks, sash chain fixtures, screw hook hangers, shackles, S hooks, sling chain hooks, snaps, special attachments, swivels, toggles, utility jacks, welded rings, etc.*

AMERICAN CHAIN & CABLE COMPANY, Inc.

AMERICAN CHAIN DIVISION • AMERICAN CABLE DIVISION • ANDREW C. CAMPBELL DIVISION • FORD CHAIN BLOCK DIVISION • HAZARD WIRE ROPE DIVISION • HIGHLAND IRON AND STEEL DIVISION • MANLEY MANUFACTURING DIVISION • OWEN SILENT SPRING COMPANY, INC. • PAGE STEEL AND WIRE DIVISION • READING-PRATT & CADY DIVISION • READING STEEL CASTING DIVISION • WRIGHT MANUFACTURING DIVISION • IN CANADA: DOMINION CHAIN COMPANY, LTD. • IN ENGLAND: BRITISH WIRE PRODUCTS, LTD. • THE PARSONS CHAIN COMPANY, LTD. • *In Business for Your Safety*

a layer of fire clay baffle tile. U-shape of tubes permits expansion and contraction without strain and also increases turbulence of air passing through.

Diesel Tractor

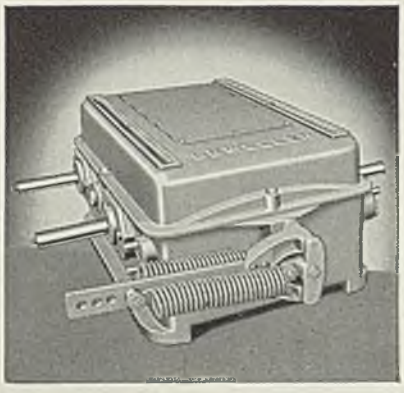
■ Caterpillar Tractor Co., Peoria, Ill., has introduced model D7 75 drawbar-horsepower diesel tractor, designed to reduce operator fatigue. It has finger tip steering and seat

is located high and well forward to give clear view of work ahead and behind. Steering clutches are operated hydraulically by a separate control.

Heavy-duty 4-cylinder valve-in-head engine has bore and stroke of 5¾ x 8 inches. Low-speed transmission provides 5 forward speeds ranging from 1.4 to 5 miles per hour; high-speed transmission has speeds from 1.4 to 6 miles per hour. For each of the first four forward speeds, there is a corresponding but slightly higher reverse, and change to corresponding reverse speed is made by pushing a lever.

Stoker Control

■ Lewellen Mfg. Co., Columbus, Ind., has designed transmission with safety control on stoker drives to regulate stoker speeds for feeding fuel at rates to maintain boiler pressure setting automatically. Control attached to boiler is set for any desired steam pressure. Slight deviation of this pressure will result

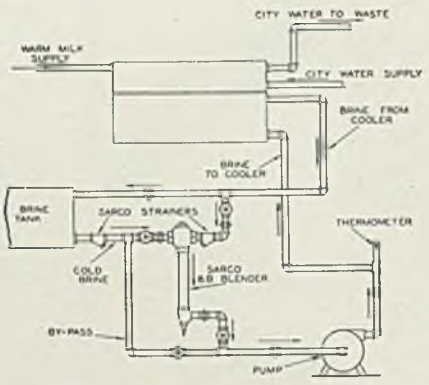


in a movement of the control which is connected to the safety lever on the transmission. Should lever move suddenly speed is changed gradually by action of springs which operates the safety device on the transmission. As control lever does not operate transmission directly, there can be no damage to the control, transmission nor the stoker.

Cooling Control

■ Sarco Co. Inc., 183 Madison avenue, New York, has developed TR-40 cooling control for engine and compressor jackets, condensers and degreasers. Control is designed to throttle flow of fresh cooling water, allowing only enough to flow to cooling system to maintain desired water outlet temperature. It is of fixed stem type, requiring discharge from jacket or coil to be piped close to inlet. Bulb is installed vertically in an enlarged section of water discharge line, as close to machine as possible.

Two types are available, differing only in bulb length, which de-



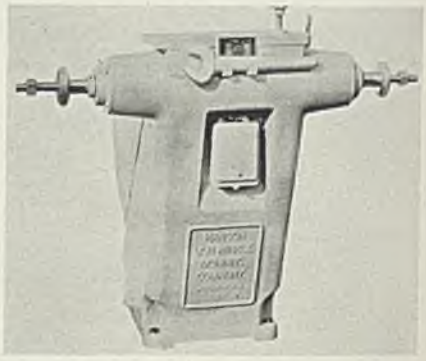
termines sensitivity or number of degrees of temperature rise which will cause valve to open wide. An internal by-pass is provided on each and can be adjusted from the outside. Both types can be equipped with fusible plug to open the valve wide automatically in event of failure. Bulbs of stainless steel or other metals are available. Maximum working pressure of control is 150 pounds.

Regulators are calibrated at factory for any desired temperature and can be adjusted by the user up to 25 degrees Fahr. higher and lower.

Buffing Lathe

■ Hanson-Van Winkle-Munning Co., Matawan, N. J., has developed Type MO buffing lathe designed for work not requiring a heavy-duty machine. As shown in illustration, good overhang for clearance is furnished. Body of lathe is heavy one-piece iron casting, and base dimensions of all sizes are 20 x 24 inches. Drive is by V-belt, incorporating quick belt changing feature. Any one spindle speed from 1800 to 3600 revolutions per minute can be obtained and other speeds can be had by changing motor sheave pulley.

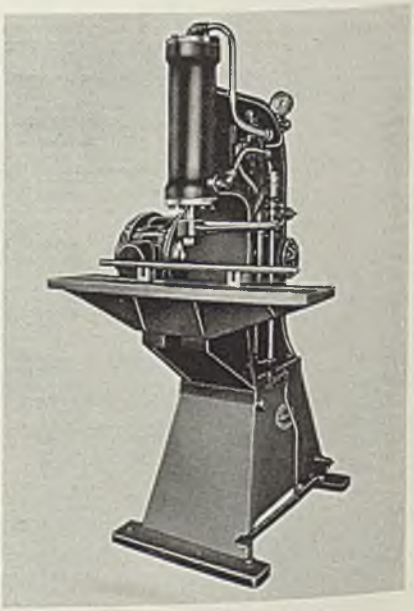
Lathe is furnished for 220, 440 and 550 volts, 2 or 3-phase, 60-cycle



alternating-current power circuit and also for special or other alternating or direct circuits.

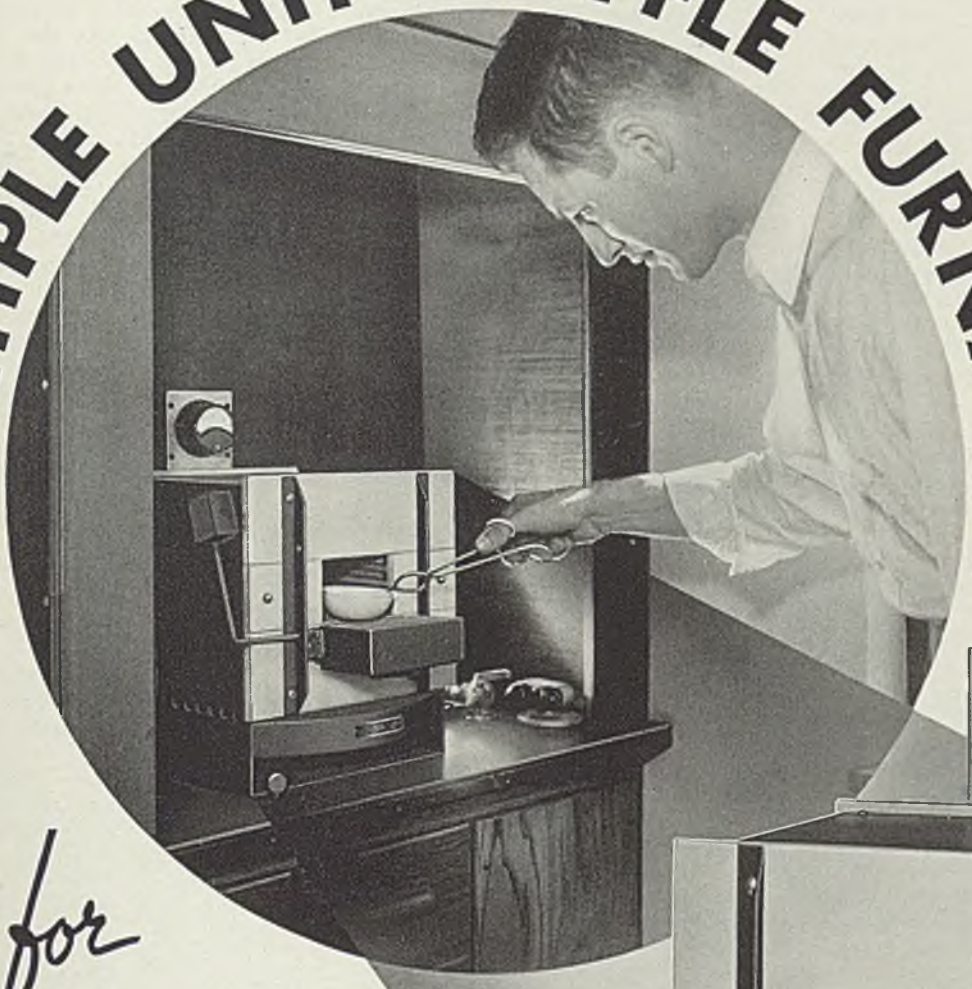
Hydraulic Press

■ Greenerd Arbor Press Co., Nashua, N. H., announces self-contained No. H-57 hydraulic press with pressure control from ½ to 6 tons on the down stroke. Frame and cylinder are semisteel. Motor and pump are mounted on opposite sides of main housing, and pump is connected between a control valve and a 16-gallon sump in base. Ram gland is packed with chevron type packings. Ram is machined of alloy steel, heat treated and ground. Its end is machined with 1-inch diameter hole, 2 inches deep, reamed and equipped with hardened shoulder plug locked in place with Allen set screws. Ram is controlled by



foot pedal and pressure will remain on work until foot pedal is released. Hand control also is part of standard equipment.

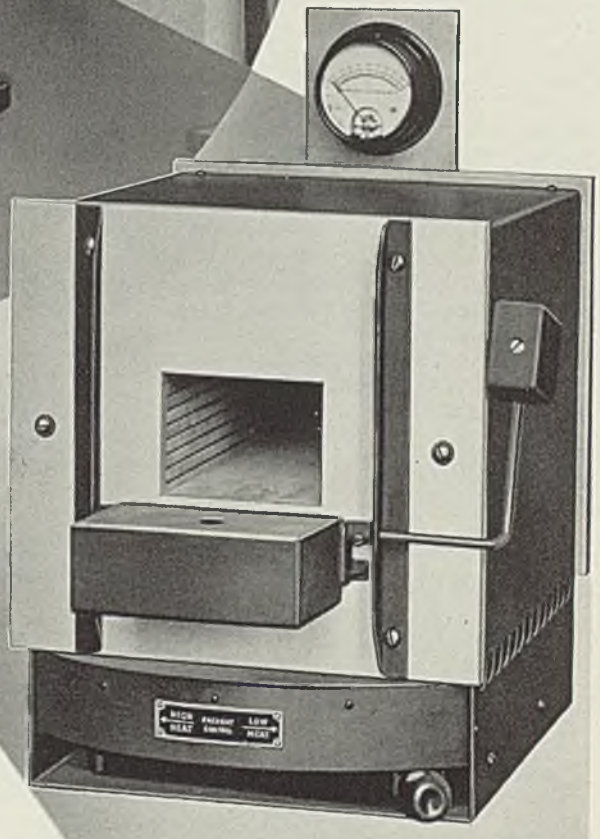
MULTIPLE UNIT MUFFLE FURNACES



for

DRYING PRECIPITATES • IGNITIONS
FUSIONS • ASH DETERMINATIONS
HEATING METALS • ENAMELING

"Compact and Efficient" was the verdict of John Strelow, Supt. of the Davenport, Iowa Sewage Treatment Department, on the Multiple Unit Muffle Furnace used in their laboratory for the ignition and burning of sewage solids. Municipal as well as Industrial Laboratories have found many uses for Multiple Unit Muffle Furnaces.



Type 62P Multiple Unit Muffle Furnace at Sewage Treatment Laboratory Davenport, Iowa

HEVI DUTY ELECTRIC COMPANY

TRADE MARK
LABORATORY FURNACES **MULTIPLE UNIT** ELECTRIC EXCLUSIVELY
REG. U. S. PAT. OFF.

MILWAUKEE, WISCONSIN

Shell Production

(*Concluded from Page* 41)

machine, accommodating two shell bodies at each station. The open end, previously sawed off, is machined here.

At fourth operation, rear or closed end of shell is faced off using three machines because of the limited speed possible on this operation. Even with three machines, each unit takes two cuts simultaneously using two cutting tools stepped to remove metal at the highest possible rate. Work is held in an air chuck. Fig. 4 shows this operation. Note double conveyor running parallel to the three machines.

Following this, closed end of shell is recentered and machining operations are interrupted while the shell body is carried on a conveyor to the forge shop.

Fig. 5 shows shell bodies being "nosed" in the forge shop. First they are heated in electric induction furnaces with automatic timers and bells to indicate end of heating period, similar to heating practice described in forging 3-inch shell bodies. Six induction furnaces are employed for "nosing," all in line at the lower level in Fig. 5, which also shows two furnaces for heating smaller shells on an upper level at extreme right. Each furnace is supplied with an ammeter showing current being taken, automatic timer adjustable over a wide range, bell to indicate end of heating period and indicator light to show when power is applied to the furnace.

Timing of power is calculated carefully to assure correct temperature of nose, or open end of shell. Upon being heated, shell is placed open end up in the vertical press shown at back in Fig. 5 where shell is pointed slightly to form the nose. The crank-type press has a 20-inch stroke.

After being nosed, shells go to the heat-treating equipment, part of which is shown in Fig. 6. Equipment here includes two furnaces and a quench tank with automatic conveyor equipment for continuous operation. Work is loaded into the hardening furnace on a conveyor wide enough to accommodate four shells in a row. Both hardening and drawing furnaces are walking-beam type and are set to operate on a 10-minute cycle.

Hardening furnace is gas-fired, using six burners to overfire on each side and four burners to underfire on each side—a total of 20. Hearth area is approximately 3 x 12 feet. Hardening furnace operates at temperatures between 1550 and 1600 degrees Fahr., according to the exact analysis of the steel being handled. Work is discharged directly from the hardening furnace into an oil-quench tank just below floor level, center Fig. 6, where the shells fall onto a conveyor synchronized with the furnaces to operate on a 10-minute cycle.

Oil in the quench tank is pumped continuously through a cooler to maintain a uniform temperature. Quench tank is protected by carbon-dioxide fire extinguishing system, the funnel-type projectors of which can be seen in Fig. 6. In event the quenching oil becomes ignited, extinguishers operate automatically to place a layer of carbon-dioxide snow and gas, smothering the flames in a few seconds. As the carbon dioxide evaporates rapidly without contaminating the quenching oil, heat-treating operations are not interrupted at all.

Conveyor lifts shells from quench tank and feeds them to drawing furnace which also has a walking-beam hearth, advancing the work on a 10-minute cycle to synchronize with the hardening furnace and quench conveyor. Drawing furnace is gas-fired, two burners overfiring at the entrance end on each side with six underfiring on each side—a total of 16. Both hardening and drawing furnaces utilize two-zone firing with automatic control, using a total of four recording pyrometer controllers shown in center, Fig. 6.

Shell Bodies Shot Blasted

After being drawn, shell bodies must be shot blasted. Heat-treated shells are cleaned in an automatic shot-blasting machine, Fig. 7. Pieces first are elevated to the machine opening on a pneumatic lift. Both bore and outside of shells are cleaned using three blasting nozzles. At extreme left, Fig. 7, an inspector can be seen examining the bores with a portable spotlight. From this point, shells are transferred to the overhead chain conveyor which returns them to the machine shop for finishing operations.

Back on the machining line, the nosed, heat-treated and shot-blasted shell bodies first receive a rough turn on the round nose, or "ogive." A formed plate guides the cutting tool through the correct contour at the machine shown in Fig. 8. Here again can be seen a good example of the special conveyor setups used in this shop to facilitate operations. Pieces received at working level on the conveyor extending from the extreme left are fed into the machine, turned and passed over the machine on a second gravity conveyor, Fig. 8, for the next operation.

At the next machine, Fig. 9, outside diameter and nose are finish turned in one of two machines. Each machine employs automatic hydraulic feed and cut with two tools traveling in opposite directions. One tool is set to move upward from the bottom and is guided by a cam to form the "ogive." The other tool operates downward from the top. Fig. 9 shows finishing of

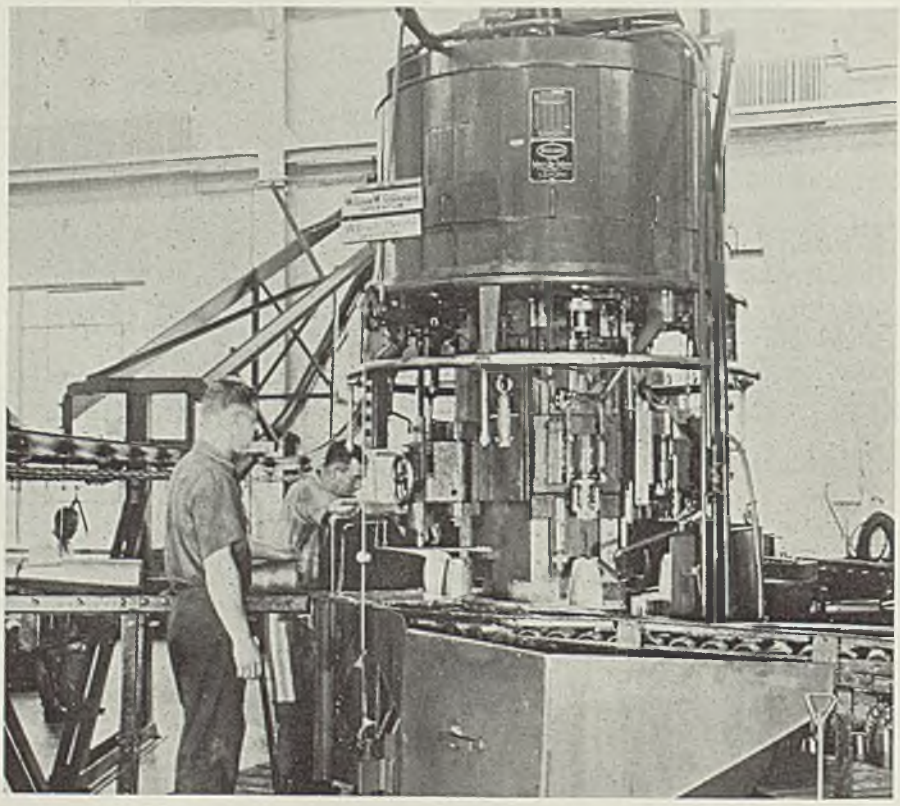
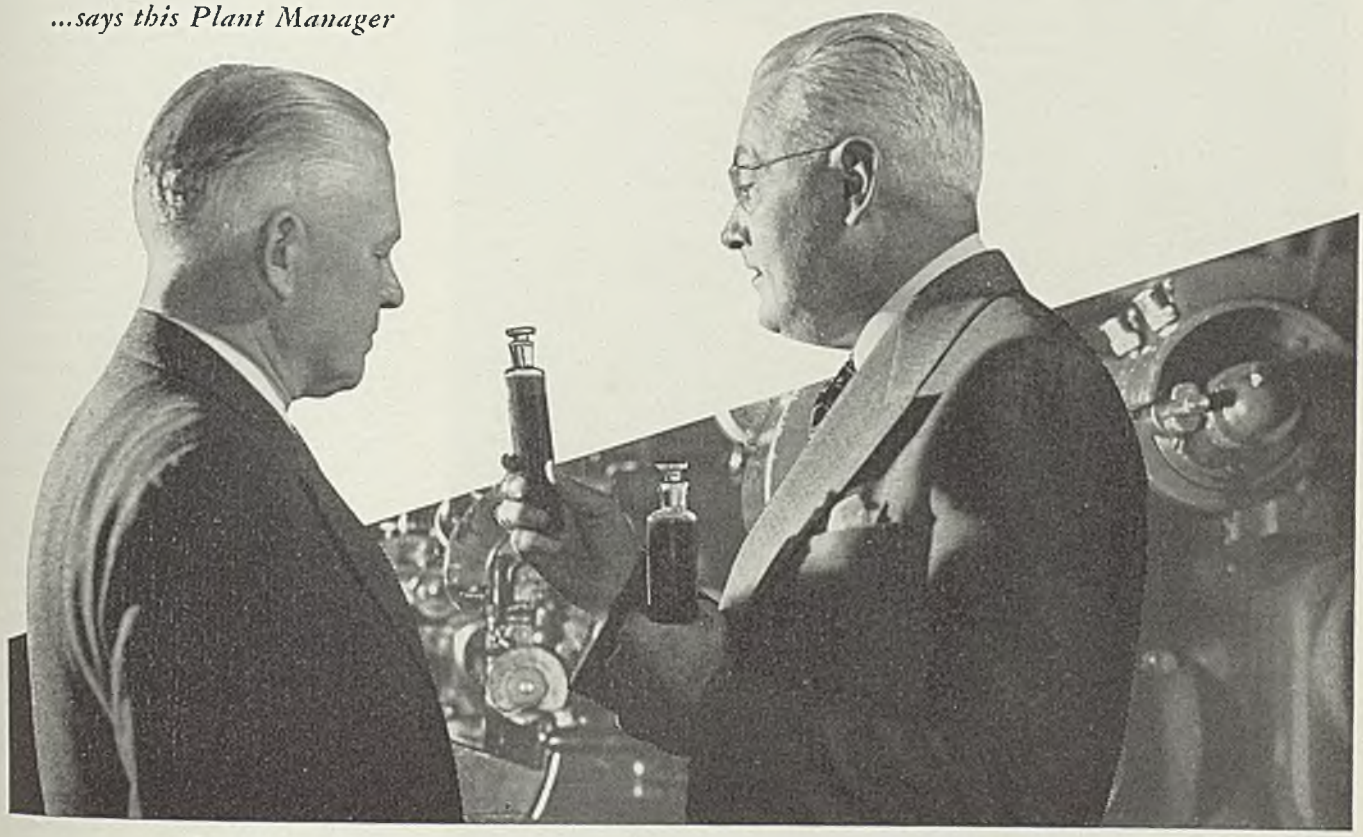


Fig. 10—One of a battery of vertical automatics used in finishing operations on nose and base of shell. These include drilling, counterboring, turning band seat, facing base, chamfering, tapping, etc.

"*These higher quality Gulf oils have helped us make a* Real Improvement in Production!"

...says this Plant Manager



"With higher operating speeds our Maintenance costs are still Very Low!"

IT has been a real economy for us to invest a few cents more per gallon in these quality oils," says this plant manager. "With better lubrication we have been able to maintain a higher rate of production with no loss of efficiency in the performance of our equipment. These benefits more than pay the entire cost of the better oils we are using."

Gulf's higher quality lubricants have been manufactured to provide an extra margin of operating safety for your machinery. Their *greater stability* shows up in long-time service! Under severe operating conditions they prove their endurance and resistance to decomposition. Because they retain their original characteristics longer, all moving parts are better protected against wear and repair expense.

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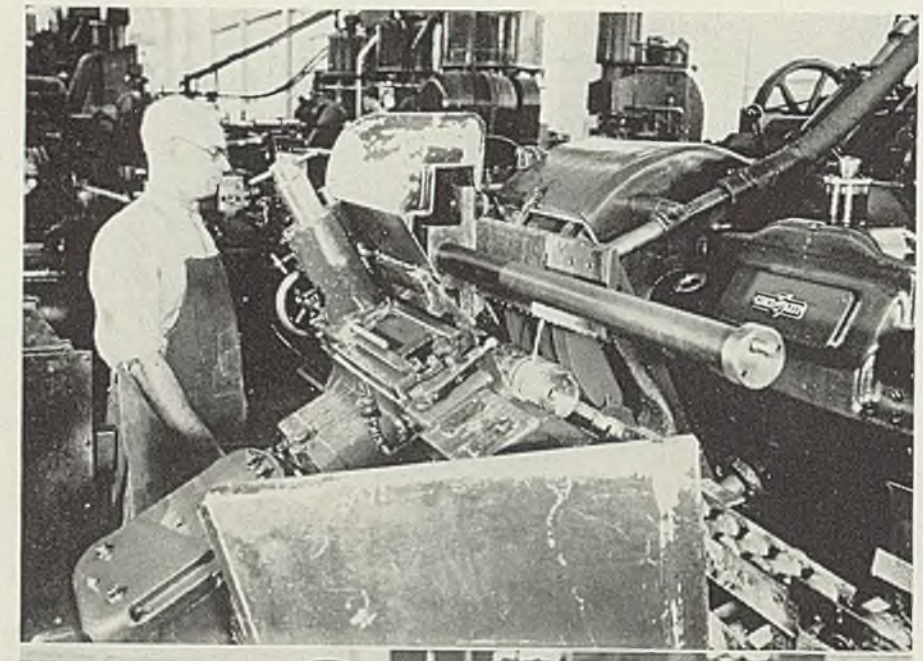

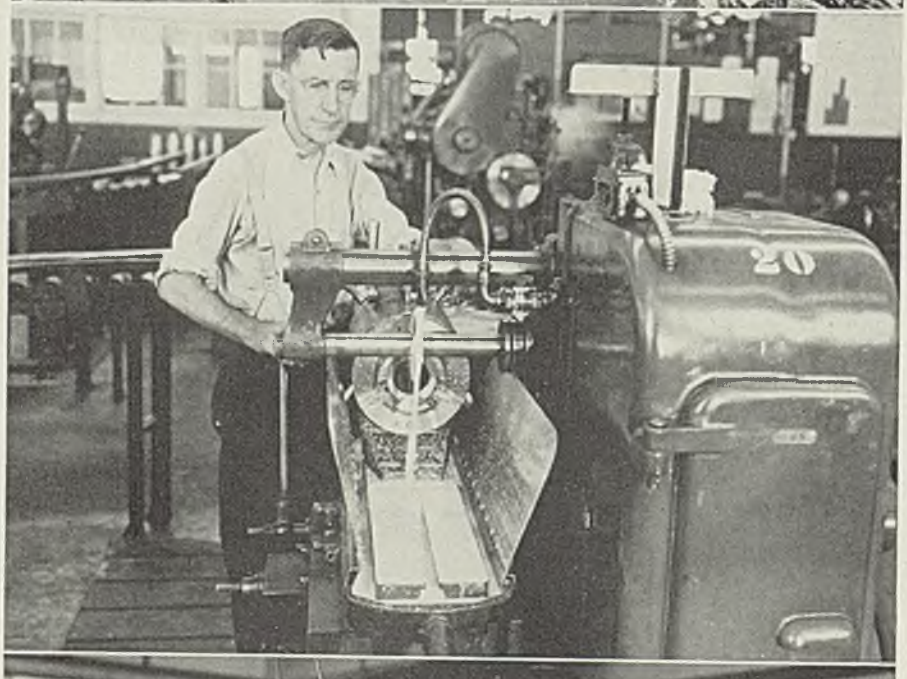

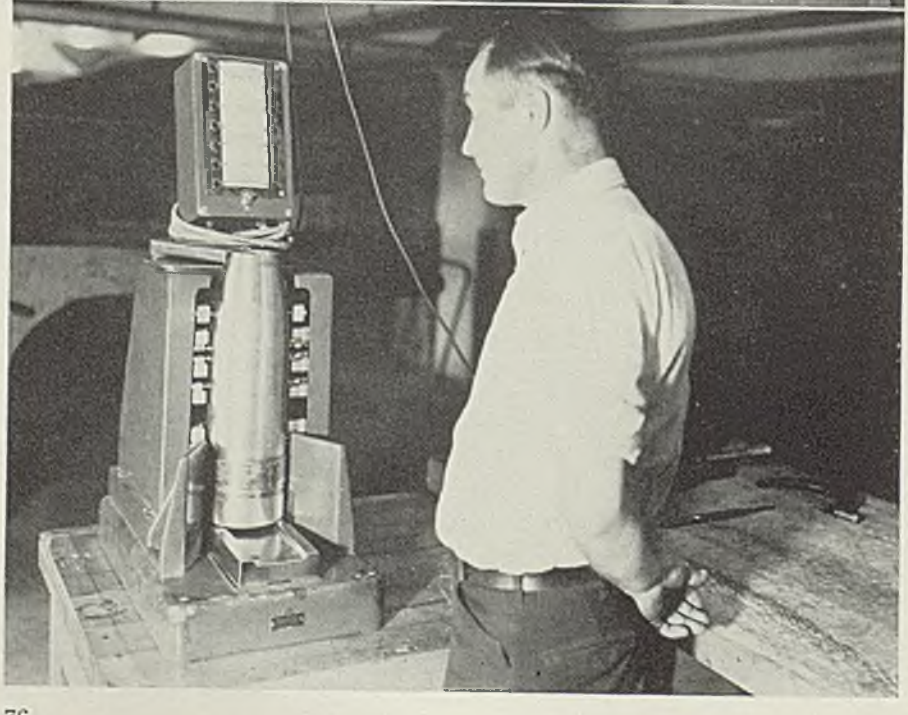

outside diameter and nose on this hydraulic-feed vertical lathe.

Next machine is an 8-station vertical automatic, employing six working stations and two load-unload stations. A battery of these automatic machines finishes the nose. This work includes boring, facing, chamfering, tapping and cutting the windshield groove.

Another battery of automatic machines of same type handles a similar series of operations on the base. These include drilling, counterboring, turning the band seat, facing the base, rounding the edge, etc. In Fig. 10 is shown one of two batteries of vertical automatic multistation machines employed for finishing nose and base of shell.

Next the base of the shell is stamped with the lot number, shell type, arsenal and commanding officer's initials, using a hydraulic press. Just previous to this, the fuse plug hole has been drilled and now is tapped, two shells at a time, in a 2-station fixture which permits one pair of shells to be loaded while the other pair is being tapped. Threads are lefthand and are cut in less than a minute.

Next the recessed band already machined in side of shell is knurled to receive the copper rotating bands.

Shells Checked for Weight

With band seats prepared, shells pass to the centerless grinder in Fig. 11 where the bourrelet, or surfaces of which the shell rides while loading the gun, are finished. These consist of two circular bands near the base of the shell, one on either side of the band seat. In addition, a third surface is ground near the nose end of the shell. These provide accurately dimensioned surfaces for loading and handling rigs at the gun mounting. Note three grinding wheels, Fig. 11, are used to finish the three surfaces simultaneously.

Subsequently a planetary milling machine cuts the thread in the shell nose for the windshield. At this point a beam scale set into the gravity roller conveyor checks weight of shell. If found overweight, some metal is removed by boring the cavity which otherwise is left untouched as received from shotblasting.

Fig. 12 shows special notching operation performed on the shell nose at three points, 120 degrees apart,

Fig. 11. (Top)—Three points on shell surface are finish ground simultaneously using three wheels on this centerless grinder

Fig. 12. (Center)—High-speed milling cutter is used in notching the shell at three points

Fig. 13. (Bottom)—Seven points on shell contour are checked simultaneously on this special electrolimit gage

using a high-speed milling cutter with hand-lever feed and a hand-indexing fixture. An air chuck holds the work. These notches afford a means of gripping shell parts for assembly and disassembly.

Next the copper band which rotates the projectile in the rifling grooves of the gun is prssed in place, using a 1200-pound hydraulic unit which exerts radial pressure at six points. Shell is positioned in the machine three times to make a total of 18 squeezes.

After hydraulic shrinking, the copper band is turned in an automatic lathe which also grooves, or skives, the ends of the band and stamps it automatically with a rotating tool. From this point on, gravity conveyors have rubber rollers to protect the bands during subsequent handling.

An automatic elevator takes shells to a lower floor for cleaning, inspection, painting and shipping. Shells first are immersed in a cleaning solution to remove the cutting oil, followed by a hot-water rinse.

Gage-Lights Show Imperfections

Finished shell then is weighed and stamped with its weight as this must be figured in loading the shell and in setting the timing fuse. Next it is gaged for size on the special electrolimit gage shown in Fig. 13 where seven points on the shell's outside diameter are checked simultaneously

Red and green indicating lights on the upper part of the gage automatically show sizes. If dimensions are correct, no lights are illuminated. If a green light shows at any of the seven check points, it means that dimension is oversize. A red light similarly indicates undersize.

Painting the shell follows. Cavity is sprayed with acid-proof black paint. Outside surface is sprayed in a revolving fixture through a mask which prevents paint from being deposited on the three ground surfaces. These surfaces, however, are protected by a coat of shellac which also is used to coat base of shell.

A fuse adaptor is screwed into the nose, which then is sealed by screwing in a nose plug. After being packed in wooden boxes, shells are shipped to the loading depot where the bursting charge, diaphragm, bullets and fuse are assembled into the shell body. This subsequently is assembled with the shell case and propelling charge of smokeless powder to form completed shrapnel.

Above description illustrates how a highly efficient production line for shrapnel has been set up using for the most part standard equipment now readily available and with which most industrial plants are already familiar. Thus it may constitute a valuable pattern for setting up similar production lines. Of course special tooling is necessary.

Steel Bottle Has Seamless Top, Sides

■ Unique steel bottle for beer and other beverages, known as Crowntainer, recently introduced by Crown Cork & Seal Co., 4401 Eastern avenue, Baltimore, is made entirely without side seam or top seam. Modernized appearance also has a practical effect—it facilitates exhaustion of air from the head space. Ease with which contents may be poured from the bottle is perhaps one of its chief appeals to the consumer.

Body construction of bottle is steel, rust-proof inside and outside with aluminum coating. A heavy liner of Fermax is sprayed inside the container, thus making it neutral in taste and odor.

Spot Welding in Difficult Locations

■ Making spot welds in semi-inaccessible locations, such as automobile reveal and garnish molding where, intricately shaped, thin section welding points do not stand up under continuous operation, is now being done with a combined short-circuiting gun and clamping fixture. Arrangement is said to have more than tripled production speed.

Fixture for either 1 or 2-man operation, designed and built by Progressive Welder Co., 709 Piquette avenue, Detroit, has an enclosed transformer short coupled to busbars which also serve as nesting dies for the work. A single hydraulically operated spot welding gun, of the short-circuiting type is used alternately by the two operators when production speeds require 2-man operation.

Gun used is of the pincher type, pressure being supplied by a hydraulic pressure booster. To permit its admission in the concave side of garnish molding only tip of upper electrode is of relatively thin section. Thus, ample cooling can be afforded to prolong electrode life. The lower electrode contacting busbar is of button type.

Monorails for Aircraft

(*Concluded from Page* 58)

three-phase 60-cycle alternating current. All cranes and carriers travel at 150 feet per minute so the operator can move with his 5-ton load from one end of the building to the other in 3 minutes, across the width of the plant in 2 minutes, around the quarter-mile circumference in 10 minutes, or to any intermediate spot in the shop in an equally short time.

Operator in traveling cab sits on a swivel seat with control levers and push buttons before him enabling him to immediately master any load-moving problem. Drum-type controllers direct movement of crane bridges along runways, carriers along the crane bridges and vertical hoist movements. Push buttons enable the operator to interlock cranes with crossover rails between bays of the building. Fool-proof end-stops and safety devices are installed throughout the system.

Each carrier has a 2-speed hoist which may be operated at either 20 or 5 feet per minute. An innovation in hoist operation, known as the "micro lift," permits decreasing hoist speed to less than 2 feet per minute for precision lifting operations over a range of 2 feet.

With 135,000 square feet of main floor interrupted only by two rows of steel columns supporting the roof structure and with 21,000 square feet of balcony space at one end, the building provides nearly 5,000,000 cubic feet of clear working space.

A system of tunnels under the spacious floor of Plant 2 provides space for service connections at any point without overhead wiring or piping. All service lines, including electrical conduit and piping for water, gas, steam and compressed air, enter the building from a separate power house through the 360-foot tunnel just beneath the concrete floor. This main tunnel is 6-feet wide, 7 feet high. From it six smaller tunnels branch out in either direction in lines parallel to the length of the building. They provide floor outlets for electrical and compressed air connections every 40 feet and access openings every 20 feet.

Announces New Dustless And Sliverless Copper

Perfection of a new type of copper produced under a closely guarded patented process, is announced by Wylie Brown, president, Phelps Dodge Copper Products Corp., 40 Wall street, New York.

Known as PDCP, the new copper has greater conducting power, ductility and fatigue resistance and finer surface quality. It is made without melting from electrolytic cathode copper, being converted plastically by tremendous pressure in a reducing atmosphere at elevated temperature into smooth, dense copper bars, rods, strips or other desired shapes.

Process not only eliminates the casting process but also hot rolling. It has made possible a sliverless and dustless copper surface. The copper is especially adapted to high tension and submarine cables, refrigeration and air-conditioning installations. It is particularly applicable for service where severe vibration is a problem. Its ductility permits sharper bends, easier forming and drawing.

Strand of Steel Wire Is Knitted Into Tubing

Flexible seamless tubing made with one strand of steel wire is now available through a process developed by E. H. Titchner & Co., Binghamton, N. Y. Wire is knitted in rows of resilient loops which are interlocked with other rows to form a continuous tube.

Tubing can be fabricated in many diameters and in almost any shape. The gage of wire, mesh size and diameter determines whether or not tubing will be flexible or rigid. Both, however, possess the same resistance to deformation. Product can be plated, rustproofed, enameled or coated very readily. It also can be covered with rubber, silk or fabric.

Because of its appearance, the wire can be used effectively in decorative and display fields. Industrially, it can be utilized as flexible armor for covering hose or hose connection or for electric light cords. It can be used as wire covering for moving parts in machinery, for flexible shafts or belt drives.

Liquid Removes Old Finishes from Metal

Old finishes can be removed from metal surfaces in about 2 minutes by a cream colored opaque liquid, called Metastrip, developed by Surface Finishing Co., New Haven, Conn.

Liquid can be used to strip baked enamels, varnishes, lacquers, paints, japan and latest synthetic finishes from such metals as steel, zinc, alloys, etc. In removing finish, liquid is maintained at a heat of about 190 to 213 degrees Fahr., and work immersed in it. Later it is rinsed in hot water.

Degreasers Cut Costs

(*Concluded from Page* 51)

special false bottom increases capacity to nearly a ton where needed.

Economies possible by portable degreasers are considerable as cost of current and solvent per ton is estimated at $1.25. Installation is simple as the units plug in where wanted.

For small cup-shaped or drawn parts that ordinarily would trap solvent, a manually operated tumbler is available. A motor-driven flusher delivering 15 gallons per hour at 5 pounds pressure frees work of heavy deposits of chips, oil, road dirt, or other foreign matter. Its use eliminates hours of soaking formerly required to remove crusted deposits as it loosens and flushes them free.

Die Casting Parts

(*Concluded from Page* 43)

shaft joined to the disk by a flange. While relatively simple to produce as a die casting, the cost would be almost prohibitive if made of equal accuracy by other means. Much the same might be said of part B, group 4, having a shrouded tooth ratchet at its center with a pair of cams of irregular contour. At C is a pair of spur gears with eccentric hubs. At D, group 4, is a pinion with a split hub of oblong shape and an integral pin parallel with the axis of the pinion but eccentric therewith. A split hub facilitates fastening to a shaft. If not cast integrally, this hub would be awkward to make and fasten to a pinion cut from rod stock, thus the economy is evident.

Combining two or more parts in one piece, however, is not confined to mechanical elements designed to rotate or have other motions. At A in group 3, two die castings combine a housing for a blower, a part of a shroud for a fan, lugs for supporting a motor, inlet or outlet ducts and several lugs for fastening the two castings together and to a third casting.

Although similar castings could be produced as sand molds, it would be extremely difficult to make the thin sections, accurate dimensions, smooth surfaces and small holes provided here.

Motor Housings Die Cast

Such housings, of course, can be die cast in a wide variety as shown at B, group 3, which illustrates a section of zinc-alloy die-cast housing for a movie projector. In this instance, the housing has a pair of projecting arms with tubular bosses to carry film reel shafts and a flange at right angles to the housing proper with lugs for mounting and supporting feet. Many motor housings such as C of group 3 are die cast and often have one end bell integral with supports for bearing, bushing and for brush holders with lugs for attaching polepieces; recesses and bearings for gear reduction units; mounting bosses; flanges; feet and similar parts. Although similar castings are made in sand, they are not as smooth or accurate in dimension and require much more machine work.

Parts with decorative elements often are die cast with integral elements which if made by stamping, for example, would have to be produced separately. Die-cast doors with integral hinge parts, latch parts and lock mounting bosses are a case in point. Similarly, bases for lamps are often recessed and include integral feet, flanges, bosses or tubular portions for attachment of mating parts.

From the above it is evident that die castings merit proper consideration from the standpoint of parts reduction. While each type of part involved in quantity production can be made most economically if produced by one certain process, it is not always immediately apparent which process yields optimum results. Where doubt exists, it often pays to lay down tentative designs for production by different methods and then secure estimates of cost on each design.

Welded Tubes

(*Concluded from Page* 54)

electrodes are 5 inches long. A given point in seam cleft, therefore, is exposed to current for a period of 1 second, or 120 current reversals. Distance between contactors is eight-tenths of wall thickness, or 0.138-inch when closed up, allowing an upset of 0.172-inch.

With mean specific heat of the metal at 0.150 and desired temperature at 2500 degrees Fahr., it is possible to calculate the amount of energy required as total metal to be

heated is 0.075-pound per second. To weld at the rate given, a current of about 70,000 to 90,000 amperes per square inch is required, and energy is expended at a rate of about 30,000 watts per second in the weld.

Contact area is about 5 square inches for each contactor, a current density of around 14,000 amperes per square inch. With improved contact surfaces described above and prepared hot-rolled tube stock, contact resistance is on the order of 5 to 10 microhms. Power loss due to contact resistance therefore is around 25,000 watts at each contact. Tube stock directly in contact can readily absorb 60,000 watts per second without injurious effect. The water-cooled contactors can dissipate easily 40,000 watts per second, or a total of 100,000 watts can be dissipated, four times the energy required for the weld. This analysis means that tube thickness could be increased considerably before limits of the machine would be approached.

Compared with roller contactors, it is easy to see how extreme difficulties are encountered in controlling grain size with that equipment where contact resistance between rollers and tube stock is on the order of 25 to 50 microhms, area of contact is about 1 square inch when cold. About 120,000 watts per second then is dissipated in heat at each contact point with 70,000 amperes passing through the weld. With energy at contact areas amounting to about four times that expended in weld, it is easy to see why it is almost impossible to avoid grain growth and other troubles.

Low-alloy high-tensile steels are welded by the same equipment with excellent results. A typical low-alloy steel may show: Carbon, 0.10 per cent; copper, 1 per cent; nickel, 2 per cent. Tensile strength is 90,000 pounds per square inch. Yield point is 75,000 pounds per square inch. This steel is easily worked, has good welding qualities and high corrosion resistance. Hot-rolled low-alloy steel in strips sheared from sheet has been found to form readily into tubing with the usual means. Production of welded tubes from such material with the flat-electrode welder requires a considerably higher current density and more effective cooling than ordinary low-carbon steel. However, a correspondingly higher rate of welding is possible. This is due to the alloying elements imparting thermal and electrical qualities to the metal which make it behave differently than low-carbon steel. As far as other factors are concerned, low-alloy steel welds like mild steel.

Fig. 4 shows a low-alloy steel weld with a good bond, martensitic grain structure, freedom from transition zone and freedom from flow lines. All these indicate perfectly co-ordinated values of current, duration, upset, rate of cooling. Wall thickness is 0.078-inch.

Fig. 5 is same weld, normalized. Martensitic grain structure has been changed into pearlite and ferrite. Weld cannot be distinguished from original metal.

Entirely new fields for welded pipe are opened up by grain-size control now possible with improved flat-contactor tube welding. It is possible to produce a fine-grained structure at much lower cost than at present. Also, tubing wall thickness may be increased, yet the same fine-grained structure retained in the weld.

The method appears applicable to a wide variety of materials, being already found suitable for low-carbon and low-alloy steels with work on stainless steels under way.

Effect on present pipe system may be considerable. While electrically welded tubing of standard wall thickness is not manufactured in diameters under 4 inches, it is possible to make pipe with standard wall thicknesses down to ½-inch in diameter by the new method.

Due to the almost perfect grain structure produced at the weld, such a weld joint can be regarded as 100 per cent mechanically. This raises the permissible loading or bursting pressure considerably.

Thus it is entirely possible that the present pipe system could be replaced with thinner walled pipe yet retain or increase the actual bursting pressure values. Considerable inroads already have been made on established uses of steel pipe in modern plumbing by fixtures and piping originally developed for automobile and refrigerator industries. of installation, flexibility, utility and accessibility for repair. This inroad is progressing rapidly with new adaptations almost daily.

Pipe System Revised

To enable steel piping to keep abreast with these developments and possibly win new applications, a revised piping system such as the one suggested herein, see Table I, may prove advantageous. Sizes and threading according to the revised system, Table I, develops a 25 per cent increase in bursting pressure. This table gives principal dimensions of pipes from ⅛ to 6 inches inclusive. Sizes ⅛, ¼ and ⅜ are not threaded but are suitable for any standard pipe connectors and fittings. Although threaded pipe connections are rapidly being replaced with welded joints, a new thread system, Table I, has been worked out to conform more closely with the SAE system.

Form of raw material also offers some choice as ordinary skelp, hot-rolled strip, and sheets sheared to the required width have all been found to weld readily. In preparation for welding, scale adjacent to the seam cleft may be removed where desired using a simple device developed for that purpose.

Fine-grained electrically welded pipe can be bent, flared, threaded and otherwise hot and cold worked without the slightest crack or failure in the weld. As a matter of fact, water pipes can be frozen a number of times before rupturing.

Manufacturing costs are considerably lower than for furnace-welded pipe. Scrap losses are about 12 per cent less and there are no crop ends.

Adoption of proposed pipe system outlined in Table I will reduce weight of pipe for given pressure about 33 per cent compared with usual butt welded pipe and about 16 per cent compared with lap welded pipe.

It is entirely possible that application of low-alloy and corrosion-resistant steels will be greatly extended in the form of electrically welded pipe.

While no welders of this type are in commercial operation as yet, experimental work has been done with full size machines. It is from these results that the above conclusions are drawn.

TABLE I

Proposed System For Effective Utilization of Pipe with High Strength Electrically Welded Joints

Nom. Size	O.D.	I.D.	T.	Max. Press.	Thread Per In.	Length of Thd.	Thickness Under Thd.
⅛	.375	.306	.0344	11.050		No Thread	
¼	.500	.412	.0438	10.500		No Thread	
⅜	.625	.512	.0563	10.800		No Thread	
½	.840	.684	.078	11.150	24	.534	.043
¾	1.050	.894	.078	8.925	24	.548	.042
1	1.315	1.127	.0938	8.550	18	.683	.048
1¼	1.660	1.472	.9038	6.775	18	.707	.047
1½	1.900	1.682	.109	6.900	18	.724	.062
1¾	2.125	1.907	.109	6.150	18	.740	.061
2	2.375	2.125	.125	6.300	16	.757	.073
2½	2.875	2.595	.140	5.850	16	1.138	.082
3	3.500	3.156	.1719	5,900	16	1.200	.114
3½	4.000	3.625	.1875	5.630	16	1.250	.128
4	4.500	4.094	.203	5.400	12	1.300	.129
4½	5.000	4.564	.218	5.250	12	1.350	.143
5	5.563	5.127	.218	4.670	12	1.406	.142
6	6.625	6.157	.234	4.230	12	1.513	.156

Taper of thread, ⅜-inch per foot, or ¾ inch per inch, is included. All dimensions in inches.

< < < HELPFUL LITERATURE

(1)—Abrasive Cutting

American Chain & Cable Co. — Illustrated catalog No. 302. Machine set-ups for regular and special jobs, including slot cutting in hardened tubular valves, production cuts on peculiar shapes, cutting of large forged sections, etc., are shown, and specifications and descriptions of the Campbell abrasive cutting machine are given.

(2)—Lapping Machines

Ex-Cell-O Corp. — 4 page illustrated bulletin No. TW-1570. Design and structural features, and method of operation of the internal lapping machine for precision work, are shown. Simple operation and rapid stock removal are features. Lapping stones and mandrels are also covered.

(3)—V-Belt Drives

The B. F. Goodrich Co.—24 page illustrated catalog section No. 2180, in which the proper selection and use of fractional horsepower V-belt drives are described in nontechnical terms. The necessary steps in selection of V-belts, sheaves and pulleys are set forth and numerous tables are included for the reader's assistance.

(4)—Gear Production

Michigan Tool Co.—52 page illustrated booklet, containing articles on factors affecting gear production, including gear finishing, curve shaving, lapping hints, and location of gear troubles. Descriptions and specifications of complete line of gear finishing machines are given.

(5)—Conveyors

Link-Belt Co.—48 page illustrated book No. 1700. In addition to numerous illustrations of typical conveyor installations in American industry, this book contains several pages of statistics and text on the theme that machines have been largely responsible for present American development. A non-technical book.

(6)—Springs

Fort Pitt Spring Co.—36 page illustrated catalog No. 4. Elliptic springs, freight truck springs, equalizing springs, compression springs, coil springs and helical springs are shown and described. Heat treatment of springs, specifications, formulas and other tables are included.

(7)—Machinery

Allis-Chalmers Manufacturing Co.—32 page booklet No. B-6057, in which are conveniently listed more than 350 bulletins available from that company. The directory includes 280 items on power, electrical and industrial machines; about 40 instruction books and repair part bulletins, and 38 catalogs and folders on tractors, farm equipment and road machinery.

(8)—Vent Sets

B. F. Sturtevant Co.—4 page illustrated bulletin No. 406. "Rexvane" vent sets, ready-to-run centrifugal blowers for air-conditioning, ventilating and fume exhaust are described. Nine sizes are available, with rotors ranging from 6" to 24" in diameter, and capacities run from 250 C.F.M. to 6000 C.F.M. at ¼". S. P. Dimensions and specifications are included.

(9)—Insulating Concrete-Mix

The Babcock & Wilcox Co.—Bulletin No. R-19, describing B & W insulating Concrete-Mix, a material used for rammed monolithic or cast shapes. Two grades are described, one for direct exposure or backing-up at temperatures to 2000° F., and the second for temperatures to 2200° F. Light weight, ease of working and high strength are characteristics.

(10)—Roller Bearings

Shafer Bearing Corp.—Illustrated catalog No. 15, in which a new type of double row roller bearings in two sizes is announced. The "DE" series is a self-contained double row angular contact type. Concave rollers are a feature. Specifications, dimensions and load rating data are given.

(11)—Conversion Table

McKenna Metals Co. — This cutting speed conversion table for "Kennametal" steel cutting carbide tools gives the proper formula for determining set-up, and tells how many revolutions per minute the work must turn to secure best results on material from ½" to 8" in diameter.

(12)—High Speed Steels

Crucible Steel Co. of America—8 page folder No. TS-300, describing seven grades of "Rex" high speed steels. Working instructions, characteristics and alloying elements of each are given. Branch offices and warehouses of the company are listed.

(13)—Process Control

The Foxboro Co.—8 page illustrated booklet No. 241. Contains discussion of systems for control of related or coordinated steps which, in their proper succession, constitute a definite process cycle. A schematic diagram and description of instruments employed are included. Data and operating suggestions are given.

(14)—Packaging

Acme Steel Co.—4 page folder No. Ad 14. Fifty-nine sketches show various methods of using Acme Steelstrap in packaging materials and products for shipment. Numerous photographs show applications of Steelstrap in actual use.

(15)—Gear Oils

E. F. Houghton & Co.—8 page illustrated bulletin No. 2-148. "Vital E. P." gear oils were developed to stand the high load limits imposed in modern industrial machinery. Their characteristics and advantages are set forth in this bulletin. Physical properties and recommended uses for seven grades are outlined.

(16)—Welding and Cutting

The Bastian-Blessing Co.—36 page illustrated catalog No. R-155. Describes complete line of welding and cutting equipment. Engineering data on recommended tip sizes for welding various metal thicknesses and data on tip sizes and gas pressures for cutting iron and steel from ⅛" to 18" thick is also included.

(17)—Testing Machine

W. C. Dillon & Co., Inc.—4 page illustrated bulletin, describing the new Dillon tensile strength testing machine for testing rods, tubing, wire, flat metals, castings, weldings, chain and nonmetallic materials. Simple and accurate, this machine develops up to 25,000 pounds tension.

(18)—Hose

United States Rubber Co.—34 page illustrated booklet No. M9333, "Hose Hints," in which proper selection and use of industrial hose of all kinds is discussed. Various types of hose construction are shown and methods of manufacture are described. Engineering tables are included.

(19)—Socket Screws

The Bristol Co.—Bulletin No. 840, in which prices and sizes of "Bristo" socket screws are given. Multiple-Spline design is said to give added strength. "Bristo" set screws are available in sizes as small as No. 4, and cap screws in sizes as small as No. 3 wire size.

(20)—Segment Saw

Pittsburgh Saw & Tool Co.—8 page illustrated bulletin, in which is described the segment saw design which is said to produce increased feeds and faster cutting speeds. Construction and method of securing segments are described and full specifications and list prices are included.

(21)—Scrap Handler

American Hoist & Derrick Co.—4 page bulletin No. SB-2. The American Gopher crawler crane equipped with lifting magnet and generator is illustrated and described in scrap iron handling service. Low cost one man operation, ability to operate on soft and uneven ground, and fast material handling are features.

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(22)—Foaming Compound

The William M. Parkin Co.—4 page bulletin describing "Sumfoam," a pure and concentrated foaming compound for use in pickling tanks. It is soluble in hot or cold solutions and prevents acid fumes and excess spray from the acid tanks. Its chemical reaction and advantages in use are cited.

(23)—Lathes

Pratt & Whitney—24-page illustrated bulletin No. 448. Completely describes 12, 14 and 16-inch model "C" lathes. Constant speed motor drive, main drive clutch, headstock gearing, lubrication, spindle speeds in geometrical progression, etc., are featured. Specifications are given.

(24)—Industrial Trucks

The American Pulley Co.—20 page illustrated catalog and price list No. T-39. American pressed steel industrial hand trucks for handling all kinds of materials, and various types of industrial truck wheels for replacement, are described. Dimensions and specifications are given.

(25)—Ferrous Metal Cleaning

American Chemical Paint Co.—4 page bulletin No. 4-2, describing "Deoxylyte" an inhibited acid used for pickling and cleaning ferrous metals. It is said to remove light annealing scale, neutralize rust-producers, retard rust and prepares surfaces for painting. Other products are also covered.

(26)—Paper Adhered Metal

American Nickeloid Co.—4 page folder "It Peels Right Off," in which a new paper protected surface for American Bonded Metals is described. Surface finish is protected during stamping, cutting and other operations and the paper is peeled off when operations are completed. A sample is included.

(27)—Taper Strip Flask

The American Foundry Equipment Co. —12 page illustrated catalog No. 67. Six improved features and a new type corner construction for all models of this company's taper strip flasks are covered. Improvements are said to increase rigidity and accuracy, and make for easy handling.

(28)—Toilet Partitions

The Sanymetal Products Co., Inc.—20 page illustrated catalog No. 77. A wide range of styles, colors, finishes and materials for partitions in toilet rooms, wash rooms, shower rooms and locker rooms is shown. Typical layouts and tion hardware are also shown.

(29)—Seamless Drawn Shells

The Crosby Co.—4 page illustrated folder, in which standard seamless drawn shells made from an unusually large stock of standard dies are described. Available metals, sizes and gages are covered. Low cost is a feature.

(30)—Crane-Hoist Control

Shepard Niles Crane & Hoist Corp.—8 page illustrated bulletin No. 129. Single speed and selective 5-speed push button control for electric cranes and hoists is described. Numerous installation views and detailed description of the control units are included.

(31)—Pipe Unions

Rockwood Sprinkler Co.—4 page illustrated bulletin describing "Dualsteel" unions, (regular nut and hammer lug nut,) standard Rockwood union with two molybdenum steel seats and a 300 pound malleable Vulcan union. Price list is included.

(32)—Seamless Boiler Tubes

Jones & Laughlin Steel Corp.—12 page illustrated bulletin No. AD18. Advantages of using seamless boiler tubes, together with full information on their production, characteristics and specifications are covered. Chemical and physical properties are discussed.

(33)—Aluminum Ladders

Aluminum Ladder Co.—24 page illustrated catalog No. 3. Eighteen standard types of ladders and stages for building, painting, roofing, cleaning, repairing, storage, filing and other work in industrial plants, offices and warehouses are described. Sectional ladders, scaffold ladders and special types are also covered.

(34)—Hollow Screw Products

The Allen Manufacturing Co.—20 page illustrated catalog No. 39, in which are shown many types of Allen hollow screws and their applications. Specifications and prices are given. Included are several engineering tables.

(35)—Diesel Engine

American Locomotive Co.—16 page illustrated booklet illustrating and describing large diesel engines for towboat, marine, industrial locomotive and plant standby service.

(36)—First-Aid Supplies

Davis Emergency Equipment Co.—Illustrated catalog, describing industrial first-aid kits, dressings, treatments, supplies packed in unit cartons, splints, stretchers, and blankets.

(37)—Wire Safety Slings

Broderick & Bascom Rope Co.—6 page illustrated folder describing typical types of "Yellow Strand" plaited safety slings. Maximum flexibility combined with high strength are features.

(38)—Bright Annealing

The C. M. Kemp Mfg. Co.—8 page illustrated bulletin No. 101.14. Describes atmos-gas equipment for bright annealing. The constant analysis monitor for automatic compensation of changes in specific gravity of fuel gas, thermal value of fuel gas and variation in combustion air supply is fully described.

(39)—Electric Lighting

General Electric Co.—"New Horizons" by Matthew Luckiesh is a reprint of his address presented to the Middle West Service Company conferences last November, and traces the development of lighting as well as other electrical improvements through the ages.

(40)—Roller Chain

Morse Chain Co.—24 page illustrated bulletin No. R-54. Information on construction, capacities and application of roller chain. A positive oil feed system in each link of this chain assures adequate lubrication. Engineering tables are included.

(41)—Small Tools

The Billings & Spencer Co.—176 page illustrated catalog No. 42. New wrenches and tools of both Billings Vitalloy and carbon steel, together with information on the complete line of forged small tools are included in this conveniently indexed general catalog.

(42)—Silvery Pig Iron

The Jackson Iron & Steel Co.—20 page illustrated booklet describing the various mixes that can be made from "Jisco" silvery pig iron under different melting conditions. Brands and analysis ranges are covered.

(43)—Storage Batteries

Gould Storage Battery Corp.—50 page, loose-leaf type, illustrated bulletins 1000, 1200 and 1500. Sealed-in-glass storage batteries, copper oxide rectifiers and "Struc-Steel" battery racks for industrial applications are shown and described.

(44)—Threading Machines

The Geometric Tool Co.—12 page illustrated bulletin No. TM-1. Three sizes of precision threading machines for material up to 1" diameter are described and their principal features outlined. Specifications are given.

(45)—Shovels, Cranes, Etc.

Northwest Engineering Co.—64 page illustrated catalog No. TWOO, in which shovels, cranes, draglines, pull-shovels and skimmers, and other products are described. "On-the-job" pictures show these units in operation. Design and specification information is given in detail. Conveniently thumb-indexed.

(46)—Machining Ampco Metal

Ampco Metal, Inc.—8 page engineering data sheet No. 72, describing recommended cutting tool materials, designs and suggested speed and feed range for machining Ampco Metal. Prepared in cooperation with the Carboloy Company.

STEEL
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Buying Slow To Gain; Output Drops Further

Demand insufficient to support steelmaking despite slight pickup in some products. Scrap prices are holding

MARKET IN TABLOID ★

Demand

Sustained or slightly more active.

Prices

Most quotations reaffirmed for second quarter.

Production

Down 2 points to 63½ per cent.

■ STEEL buying is sustained but is insufficient to prevent a further shrinkage in production of ingots. Steelmaking slipped 2 more points last week to 63½ per cent, or ½-point below the rate prevailing the two weeks prior to last Sept. 1.

While operations have lost all the gain accumulated during last fall's war-stimulated spurt, steel consumption is in better volume than indicated by the restricted amount of new business. Improvement in buying lately has been scattered rather than general, with consumer inventories still supplying an important part of current requirements.

Steelmaking a year ago was 56½ per cent, the highest level attained the first half of 1939. Precedent calls for a downward trend the next few months, but unusual market conditions since last September have distorted the common seasonal pattern. However, more substantial improvement in buying will be necessary to supplant dwindling backlogs of mills and to prevent additional curtailment in production.

Recent announcements that current prices on iron and steel products will be extended into second quarter have had little effect marketwise. This move was taken for granted, in view of the relatively good stability of quotations lately, but buyers are not interested in forward coverage. Even those users who have worked off excess stocks are content to purchase for only early needs.

Automobile companies the past few weeks have placed fairly large steel orders. Part of the tonnage is for current delivery and has been responsible for bolstering steel shipments from some areas. Only comparatively small additional buying for 1940 models is in prospect. Motor car assemblies continue brisk, increasing 2705 units last week to 103,560, the best figure since late January. A drop of 3000 units in Chrysler output was more than offset by higher schedules of Ford, General Motors and independent manufacturers.

Export markets continue to furnish a sizable share of current steel bookings. Foreign business in most products is sustained near the improved volume recorded earlier in the year. January exports—latest available figure—totaled 396,064 tons, compared with 134,788 tons a year ago and 244,933 tons last September. Should exports maintain the December-January average, total 1940 shipments would be 4,750,000 tons. This would be the heaviest movement since 1918, with 5,373,000 tons. The 1939 total was 2,500,000 tons.

Structural shape and concrete reinforcing bar orders have moderated, following a sharp bulge a week ago. A fairly large tonnage is pending, however, and approach of open weather is expected to be accompanied by better activity in building construction. Standard pipe, galvanized sheets and certain wire products, also affected adversely by the severe winter, likewise are counted on for improved demand soon.

Except for the placing of 10 freight locomotives and 18 switchers by the Milwaukee road, railroad equipment markets are quiet. A moderate amount of freight car business is pending and some roads are understood to be considering additional car buying that will be carried out if freight traffic is sustained.

February freight car awards totaled 1147. Orders the first two months this year of 1507 units compare with 2262 a year ago, with 134 in 1938 and with 22,778 in 1937.

With tin plate specifications still lagging, production again is lower. Last week's rate of 53 per cent was a drop of 3 points. Demand is trailing the pace of a year ago, this resulting to a large extent from unusually active buying and output in late 1939.

Scrap prices generally are unchanged in quiet markets, and for the second consecutive week the composite holds at $16.67. A year ago the average was unchanged at $14.96.

The steelmaking trend again was mixed last week, with curtailment in the national rate intensified by sharp reductions in districts which previously had not shared in the general decline. These included losses of 16 points to 78 per cent at Detroit and 12 points to 78 at Birmingham. Other drops were 2 points to 61 at Pittsburgh, 5 points to 60 in eastern Pennsylvania, 4 points to 90 at Wheeling, 2½ points to 55½ at Buffalo and 2½ points to 54½ at Cincinnati. Increases were 1 point to 60 at Chicago, 2 points to 73 at Cleveland, 1 point to 41 at Youngstown, 1½ points to 65 at St. Louis and 19 points to 75 in New England.

COMPOSITE MARKET AVERAGES

	Mar. 9	Mar. 2	Feb. 24	One Month Ago Feb., 1940	Three Months Ago Dec., 1939	One Year Ago Mar., 1939	Five Years Ago Mar., 1935
Iron and Steel	$36.83	$36.83	$36.83	$36.97	$37.18	$36.40	$32.36
Finished Steel	56.10	56.10	56.10	56.10	56.10	56.50	54.00
Steelworks Scrap..	16.67	16.67	16.67	16.98	17.88	14.98	10.75

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

	Mar. 9, 1940	Feb. 1940	Dec. 1939	Mar. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.25c
Steel bars, Chicago	2.15	2.15	2.15	2.25
Steel bars, Philadelphia	2.47	2.47	2.47	2.57
Iron bars, Chicago	2.25	2.30	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	2.225	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.15
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.15
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.20
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	2.45

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	1.98	1.92

Pig Iron

	Mar. 9, 1940	Feb. 1940	Dec. 1939	Mar. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.27

Scrap

Heavy melting steel, Pittsburgh	$17.25	$17.75	$18.50	$15.75
Heavy melt. steel, No. 2, E. Pa.	16.00	16.31	17.60	13.375
Heavy melting steel, Chicago	15.75	15.75	16.25	14.25
Rails for rolling, Chicago	18.25	18.25	19.75	17.25
Railroad steel specialties, Chicago	18.50	18.50	18.50	16.25

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast points	2.60c

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 points	3.65c

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 points	4.00c

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	4.50c

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	3.35c	3.95c

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 points	2.60c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c

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 points	2.70c

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 points	2.75c

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 points	2.75c

Iron

Chicago	2.25c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

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.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

**Subject to a deduction of 25 cents per 100 lbs. in lots of 20 tons or over of one size, in lengths of 30 feet or over, for shipment at one time to one destination.*

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	3.30c
Woven wire fencing (base C. L. column)	67
Single loop bale tie, (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, Detroit, delivered 2.70c / 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni 1.10
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring flats 0.15
6100 bars 1.20
6100 spring flats 0.85
Cr. N. Van. 1.50
Carbon Van. 0.85
9200 spring flats 0.15
9200 spring rounds, squares 0.40
Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast points	2.70c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

	U.S.S.	S.A.E.
Semifinished hex.	67	70
⅛-inch and less.	64	65
⅛-1-inch	62	62
1⅛-1½-inch	60	..
1⅝ and larger	..	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset. 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific coast ports	2.90c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅛-inch and under	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75	off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld. 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to 47/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.45.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	6.75c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.§	19.38	....	18.38	24.00
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	21.00	....	....	....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	....	23.50	....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	....	23.66	....
Boston from Birmingham	24.12	....	....	....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	....	....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	....	....	....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	....
Cincinnati from Birmingham	23.06	....	22.06	....
Cleveland from Birmingham	23.32	....	22.82	....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	....	....	....
Newark, N. J., from Bethlehem	25.53	26.03	....	....
Philadelphia from Birmingham	24.46	....	23.96	....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81

	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	23.50	23.50	23.00	....
St. Louis from Birmingham	†23.12	....	22.62	....
St. Paul from Duluth	25.63	25.63	....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do. barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot.. 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 2.00-2.10

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; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots... $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb..... 1.35
Do, less-ton lots..... 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls... $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill.... 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots.... 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots. 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do, spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract... 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. $2.60
200-lb. kegs, lb. 2.75
Do, 100-200 lb. lots.. 3.00
Do, under 100-lb. lots

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: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	4.16	5.16	3.85	3.85	5.66	3.81	4.78	4.86	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	4.50	3.51	4.09	8.59	7.19
Philadelphia	3.85	3.85	4.35	3.55	3.55	5.25	3.55	4.55	4.75	3.51	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	6.40	4.20	4.40	4.25	3.42	3.75	8.15	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.75	3.35	3.65	8.15	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.72	3.20	3.75	8.15	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.50	4.84	3.40	3.80	8.45	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.67	3.45	4.00	8.50	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.35	4.30	4.60	3.50	3.75	8.15	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	5.00	3.85	4.34	8.84	7.44
Milwaukee	3.63	3.73	3.73	3.68	3.68	5.28	3.48	4.43	4.98	3.54	3.88	8.38	6.98
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	4.32	4.95	3.61	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	....	....
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	3.75	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.54	4.54	4.33	4.33	5.93	4.24	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, any quantity in New York, 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis, Tulsa; 1500 and over in Chattanooga, Philadelphia; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis.

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 Rates of Exchange, March 7

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports	£ s d	Continental Channel or North Sea ports, gross tons: Quoted in dollars at current value	**Quoted in gold pounds sterling	£ s d
Foundry, 2.50-3.00 Si.	$23.58	6 0 0	$33.23		3 18 0
Basic bessemer	.....	.....	19.59		2 6 0N
Hematite, Phos. .03-.05	24.56	6 5 0	.....		.....
Billets	.....	.....	$31.95		3 15 0
Wire rods, No. 5 gage	.....	.....	60.49		7 2 0
Standard rails	$41.27	10 10 0	$48.99		5 15 0
Merchant bars	2.35c	13 9 0	2.76c		7 5 0
Structural shapes	2.12c	12 2 6	2.85c		7 10 0
Plates, ¼ in. or 5 mm.	2.25c	12 17 6	3.19c		8 8 0
Sheets, black, 24 gage or 0.5 mm	2.98c	17 0 0	2.98c		7 17 0°
Sheets, gal., 24 ga., corr.	3.41c	19 10 0	4.47c		11 15 0
Bands and strips	2.04c	12 5 0N	2.76c		7 5 0
Plain wire, base	3.41c	19 10 0N	3.23c		8 10 0
Galvanized wire, base	4.07c	23 5 0N	3.90c		10 5 0
Wire nails, base	.....	.....	3.71c		9 15 0
Tin plate, box 108 lbs.	$ 6.29	1 12 0	.....		.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs		Belgian Francs		Reich §§Mar	
Fdy. pig iron, Si. 2.5.	$21.81	5 11 0(a)	$17.57	788	$29.66	875	$25.33	63
Basic bess. pig iron	20.53	5 4 6(a)	.....	.....	27.12	800	27.94	(b)69.50
Furnace coke	6.94	1 11 8	5.02	225	10.51	310	7.64	19
Billets	36.84	9 7 6	25.93	1,163	43.22	1,275	38.79	96.50
Standard rails	1.95c	11 3 0	1.59c	1,588	2.06c	1,375	2.38c	132
Merchant bars	2.45c	14 0 0††	1.45c	1,451	2.06c	1,375	1.98c	110
Structural shapes	2.17c	12 8 0††	1.41c	1,414	2.06c	1,375	1.93c	107
Plates, ¼-in. or 5 mm.	2.19c	12 10 6††	1.85c	1,848	2.42c	1,610	2.29c	127
Sheets, black	3.06c	17 10 0§	2.19c	2,193‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.50c	20 0 0	2.85c	2,850	4.80c	3,200	6.66c	370
Plain wire	3.41c	19 10 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.58c	14 15 0††	1.63c	1,632	2.18c	1,450	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. N—Nominal.

**Gold pound sterling not quoted. §§Last prices, no current 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.	16.00-16.50
Bos. dock No. 1 exp.	15.00
New Eng. del. No. 1	14.00
Buffalo, No. 1	16.50-17.00
Buffalo, No. 2	14.50-15.00
Chicago, No. 1	15.50-16.00
Chicago, auto, no alloy	14.50-15.00
Chicago, No. 2 auto	12.50-13.00
Cincinnati dealers	12.50-13.00
Cleveland, No. 1	16.00-16.50
Cleveland, No. 2	15.00-15.50
Detroit, No. 1	†12.50-13.00
Detroit, No. 2	†11.50-12.00
Eastern Pa., No. 1	17.00-17.50
Eastern Pa., No. 2	16.00
Federal, Ill.	13.25-13.75
Granite City, R. R.	14.25-14.75
Granite City, No. 2	13.50-14.00
Los Ang., No. 1, net	12.50-13.00
Los Ang., No. 2, net	11.50-12.00
L. A., No. 1 f.a.s.	16.00-17.00
L. A., No. 2 f.a.s.	15.00-16.00
N. Y. dock No. 1 exp.	14.00
Pitts., No. 1 (R. R.)	18.00-18.50
Pittsburgh, No. 1	17.00-17.50
Pittsburgh, No. 2	16.00-16.50
St. Louis, R. R.	†14.25-14.50
St. Louis, No. 2	†13.50-14.00
San Fran., No. 1, net	12.50-13.00
San Fran., No. 2, net	11.50-12.00
Seattle, No. 1	14.50-15.50
Toronto, dlrs., No. 1	11.00
Valleys, No. 1	16.50-17.00

COMPRESSED SHEETS

Buffalo, new	15.00-15.50
Chicago, factory	15.00-15.50
Chicago, dealers	13.50-14.00
Cincinnati, dealers	12.00-12.50
Cleveland	15.50-16.00
Detroit	†13.00-13.50
E. Pa., new mat.	17.00-17.50
E. Pa., old mat.	14.00-14.50
Los Angeles, net	10.50-11.00
Pittsburgh	17.00-17.50
St. Louis	†11.00-11.50
San Francisco, net	10.50-11.00
Valleys	16.00-16.50

BUNDLED SHEETS

Buffalo, No. 1	14.50-15.00
Buffalo, No. 2	13.00-13.50
Cleveland	11.50-12.00
Pittsburgh	16.00-16.50
St. Louis	†8.50- 9.00
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	10.00-11.00
Cincinnati, dealers	8.00- 8.50
Detroit	†9.00- 9.50
St. Louis	†8.00- 8.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	13.00
Buffalo, No. 1	14.50-15.00
Chicago, No. 1	14.50-15.00
Cincin., No. 1, deal.	9.00- 9.50
Cincin., No. 2 deal.	3.00- 3.25
Cleveland, No. 2	9.50-10.00
Detroit, No. 1, new.	†12.00-12.50
Valleys, new, No. 1	15.50-16.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	10.00-10.50
Chicago	9.25- 9.75
Cincinnati, dealers	5.00- 5.50
Cleveland, no alloy	8.50- 9.00
Detroit	†7.00- 7.50
Eastern Pa.	10.00-10.50
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	10.50-11.00
St. Louis	†6.00- 6.50
San Francisco	5.00
Toronto, dealers	6.75- 7.00
Valleys	10.50-11.00

SHOVELING TURNINGS

Buffalo	12.50-13.00
Cleveland	9.50-10.00
Chicago	9.50-10.00
Chicago, spcl, anal.	12.50-13.00
Detroit	†8.50- 9.00
Pitts., alloy-free	12.00-12.50

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†4.00
Buffalo	10.50-11.00
Cincinnati, dealers	3.75- 4.25
Cleveland	9.50-10.00
Eastern Pa.	9.50
Detroit	†7.25- 7.75
New York	†5.75- 6.00
Pittsburgh	8.00- 8.50
Toronto, dealers	6.00

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†9.50-10.00
Chicago, elec. fur.	16.50-17.00
East. Pa. elec. fur.	16.50-17.00
St. Louis	†10.00-10.50
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem.	†8.00- 8.25
Buffalo	10.50-11.00
Chicago	9.25- 9.75
Cincinnati, dealers	3.75- 4.25
Cleveland	9.50-10.00
Detroit	†7.25- 7.75
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†5.00- 5.50
Toronto, dealers	6.25- 6.50

RAILROAD SPECIALTIES

Chicago	18.25-18.75

ANGLE BARS—STEEL

Chicago	17.50-18.00
St. Louis	†14.50-15.00

SPRINGS

Buffalo	19.50-20.00
Chicago, coil	18.50-19.00
Chicago, leaf	17.50-18.00
Eastern Pa.	21.00-21.50
Pittsburgh	20.50-21.00
St. Louis	†16.25-16.75

STEEL RAILS, SHORT

Birmingham	16.00-16.50
Buffalo	21.50-22.00
Chicago (3 ft.)	18.00-18.50
Chicago (2 ft.)	18.50-19.00
Cincinnati, dealers	19.00-19.50
Detroit	†19.50-20.00
Pitts., 3 ft. and less	20.50-21.00
St. Louis, 2 ft.& less	†18.00-18.50

STEEL RAILS, SCRAP

Birmingham	15.50
Boston district	†14.00-14.50
Buffalo	17.00-17.50
Chicago	16.00-16.50
Cleveland	18.50-19.00
Pittsburgh	18.50-19.00
St. Louis	†15.25-15.75
Seattle	18.00-18.50

FROGS, SWITCHES

Chicago	†15.25-15.75

PIPE AND FLUES

Chicago, net	10.00-10.50
Cincinnati, dealers	9.75-10.25

RAILROAD GRATE BARS

Buffalo	11.50-12.00
Chicago, net	10.00-10.50
Cincinnati, dealers	8.50- 9.00
Eastern Pa.	15.00
New York	†10.50-11.00
St. Louis	†10.00-10.50

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	18.00-18.50
St. Louis, No. 1	†10.25-10.75
St. Louis, No. 2	†13.50-14.00

FORGE FLASHINGS

Boston district	†10.00-10.25
Buffalo	14.50-15.00
Cleveland	15.00-15.50
Detroit	†11.50-12.00
Pittsburgh	15.50-16.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	18.00-18.50

LOW PHOSPHORUS

Cleveland, crops	21.50-22.00
Eastern Pa. crops	21.00-21.50
Pitts., billet, bloom, slab crops	21.50-22.00

LOW PHOS. PUNCHINGS

Buffalo	19.50-20.00
Chicago	17.50-18.00
Cleveland	17.50-18.00
Eastern Pa.	21.50-22.00
Pittsburgh	19.50-20.00
Seattle	15.00
Detroit	†13.25-13.75

RAILS FOR ROLLING
5 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	18.00-18.50
New York	15.50-16.00
Eastern Pa.	20.00-21.00
St. Louis	†17.50-18.00

STEEL CAR AXLES

Birmingham	19.00-20.00
Boston district	†16.00-16.50
Chicago, net	20.50-21.00
Eastern Pa.	22.00
St. Louis	†18.00-18.50

LOCOMOTIVE TIRES

Chicago (cut)	18.00-18.50
St. Louis, No. 1	†15.00-15.50

SHAFTING

Boston district	†17.00-17.25
New York	†18.00-18.50
Eastern Pa.	23.00-23.50
St. Louis, 1¼-3¾"	†16.50-17.00

CAR WHEELS

Birmingham, iron	16.00
Boston dist., iron	†13.00-13.25
Buffalo, steel	21.00-21.50
Chicago, iron	17.00-17.50
Chicago, rolled steel	17.50-18.00
Cincin., iron, deal.	16.50-17.00
Eastern Pa., iron	20.00-20.50
Eastern Pa., steel	21.00-21.50
Pittsburgh, iron	18.50-19.00
Pittsburgh, steel	20.50-21.00
St. Louis, iron	†15.00-15.50
St. Louis, steel	†16.00-16.50

NO. 1 CAST SCRAP

Birmingham	15.00
Boston, No. 1 mach.	†14.50
N. Eng. del. No. 2	14.00-14.50
N. Eng. del. textile	17.75-18.25
Buffalo, cupola	16.50-17.00
Buffalo, mach.	17.50-18.00
Chicago, agri. net	12.50-13.00
Chicago, auto net	14.50-15.00
Chicago, railroad net	13.50-14.00
Chicago, mach. net	14.00-14.50
Cincin., mach. deal.	16.00-16.50
Cleveland, mach.	20.00-21.00
Detroit, cupola, net	†14.50-15.00
Eastern Pa., cupola	19.50-20.00
E. Pa., No. 2 yard	15.50-16.00
E. Pa., yard fdry	16.50-17.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	17.50-18.00
San Francisco	14.50-15.00
Seattle	16.00-16.50
St. Louis, breakable	†13.75-14.25
St. Louis, agri. mach.	†16.00-16.50
St. L., No. 1 mach.	†17.00-17.50
Toronto, No. 1 mach., net dealers	15.50

HEAVY CAST

Boston dist. break.	†12.50-12.75
New England, del.	15.00-15.50
Buffalo, break	14.50-15.00
Cleveland, break, net	15.25-15.75
Detroit, auto net	†15.50-16.00
Detroit, break	†11.00-11.50
Eastern Pa.	18.50
Los Ang., auto, net.	13.00-14.00
New York break	†13.50-14.00
Pittsburgh, break	15.00-15.50

STOVE PLATE

Birmingham	10.00
Boston district	†10.50-11.00
Buffalo	13.50-14.00
Chicago, net	8.50- 9.00
Cincinnati, dealers	7.75- 8.25
Detroit, net	†9.00- 9.50
Eastern Pa.	15.00
New York fdry.	10.00
St. Louis	†11.00-11.25
Toronto dealers, net	11.50

MALLEABLE

New England, del.	21.00
Buffalo	16.50-17.00
Chicago, R. R.	18.50-19.00
Cincin., agri., deal.	13.25-13.75
Cleveland, rail	20.50-21.00
Eastern Pa., R. R.	21.50-22.00
Los Angeles	12.50
Pittsburgh, rail	21.00-21.50
St. Louis, R.R.	†16.00-16.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	14.00-15.00
Swedish low phos.	14.00
North African low phos.	14.00
Spanish, No. African basic, 50 to 60%	14.00
Chinese wolframite, short ton unit, duty paid	$23.00-23.50
Scheelite, imp.	$23.50-24.50
Chrome ore, Indian, 48% gross ton, cif.	$26.00-28.00

Manganese Ore
Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	48.00-50.00
So. African, 50-52%	48.00-50.00
Indian, 49-50%	nom
Brazilian, 48-52%	46.00-48.00
Cuban, 50-51%, duty free	61.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

Steel Prices Are Reaffirmed

Current iron and steel prices generally are being extended into second quarter.

An announcement by Carnegie-Illinois Steel Corp. last Wednesday reaffirmed its present prices on hot and cold-rolled carbon and alloy steel products. It also stated that these prices will apply on shipments to and including June 30, 1940, for delivery and consumption in the United States, but that any shipments made after that date will be invoiced at the prices in effect at the date of shipment.

Other producers either have taken like action or have indicated they will follow suit.

Some pig iron producers have opened second quarter books at unchanged prices. In other instances sellers have taken no formal action but express willingness to accept forward business at current quotations.

Sheets, Strip

Sheet & Strip Prices, Pages 84, 85

Pittsburgh—Releases are slightly heavier and the recent decline in sheet mill operations appears about ended at around 60 per cent. A good volume of automotive business has been placed the past few weeks, although the total has been somewhat disappointing to sellers. Price reaffirmation, which was generally expected, will bring in some business from buyers who habitually hold up commitments when a price announcement is pending. Export prices are down to domestic levels, but expanding inquiry promises better orders, which have possibilities of strengthening the market.

Cleveland — Increased automotive needs provide principal support to sheet demand. Miscellaneous buying is spotty and practically unchanged from the rate of recent weeks. Galvanized sheets continue slow but are counted on for better activity soon. Relatively early delivery is available on most sheet grades.

Boston—While narrow cold strip orders are fairly numerous, they are generally small, consumers placing tonnage only to fill gaps in stocks. Buying is about 50 per cent of capacity. Mill backlogs continue to decline, with re-rolling operations also on the down-grade. Automotive partsmakers have not resumed purchasing in volume. Sheet buying continues light, jobbers and large users having covered through the quarter except on scattered gages and finishes around which new buying revolves.

New York—Further improvement in narrow cold strip buying has halted. Consumption appears to be holding, but users are still drawing substantially on inventories. It is becoming increasingly apparent buyers covered on tonnages well above immediate and prospective needs last quarter and have not been required to re-enter the market for large tonnages. Buying is about 50 per cent of capacity and finishing operations are declining.

Philadelphia — Sheet sales are slightly better in some directions. At least two stovemakers have entered the market for enameling sheets, and manufacturers of galvanized roofing products also are more active. E. G. Budd Mfg. Co. is working on an order from Fruehauf Trailer Co. for 10,000 truck trailers, this year's schedule calling for 2000 units. The total order requires 9000 tons of 18-8 stainless steel strip, divided among six mills. Budd has ex-

panded its plant and added new equipment to handle the work.

Buffalo — Buying indicates the previous recession is flattening out but has yet to reveal a definite upturn. However, consumer stocks have been pared the past few months and enhance prospects for better business. Galvanized sheets continue slow.

Cincinnati—Demand is increasing, particularly for automotive material. Galvanized sheets continue dull, apparently the result of previous stocking and recent unfavorable weather. Reduced inventories of miscellaneous sheet users are indicated in requests for quick shipment.

Birmingham, Ala.—Sheet orders are in somewhat greater volume, and are expected to show a more marked improvement within the next few days. Output is around 80 per cent. Some increase is noted in production of cotton ties.

Plates

Plate Prices, Page 84

Pittsburgh — Plate production is holding fairly well, particularly for marine use. Releases from shipbuilders have been good, and barge construction now under way along the Ohio river is relatively active.

Boston—Improvement in plate buying is slow, current demand being confined to scattered orders in less-than-car lots. Specified work, including tanks, is light while fabricating shops are operating spasmodically with small backlogs. Meanwhile specifications and releases from shipyards are well maintained.

New York—Plate buying is a little more active but still is below the volume expected when more favorable weather stimulates demand for building purposes. With prices reaffirmed for second quarter, contracting for that period is proceeding slowly, particularly among warehouses who still have fairly large stocks.

Philadelphia — The Chester, Pa., shipbuilder is expected to compete actively for six single-screw, bulk oil tankers, designs 72 and 72-A, requiring about 24,000 tons of plates, on which bids open March 19. This interest is launching an average of one ship per month. Sturgeon Bay Shipbuilding & Dry Dock Co., Sturgeon Bay, Wis., is low on a 125-foot steel boat for department of the interior, bids March 4. New York Shipbuilding Corp. is distributing plates for two light cruisers just awarded, but carbon steel requirements of 4500 tons for both are less than expected. Mills express disappointment over recent navy yard releases, these often being for less than carlot and resulting in a freight penalty since the steel was sold on a delivered basis. Export business is fair but prices have weakened. Miscellaneous demand shows little improvement.

Toronto, Ont — Placing of approximately $40,000,000 in shipbuilding contracts with Canadian builders has resulted in heavy demand for plates by shipbuilders. To obtain quick delivery orders for several thousand tons of plates have gone to United States mills. Demand for boiler and tank plates also is showing improvement.

Birmingham, Ala.—Plate bookings are reasonably steady, and some of last year's business is to be worked off. Some shipbuilding orders are being filled, but most tonnage is for tank manufacturers.

Seattle — Largest tonnage, unstated, pending is involved in proposed Seattle terminals for Richfield Oil Co., 11 steel tanks, total capacity 500,000 barrels. J. J. Downey, en-

gineer in charge, has returned to Los Angeles, where contracts are expected to be placed soon. Local shops report seasonal volume of repair work and small jobs involving less than 100 tons each. Shipyards have normal number of overhaul contracts.

San Francisco—No new inquiries of size have come into the market during the past week or two and no large awards were placed. So far this year 15,292 tons have been booked, compared with 12,561 tons for the same period a year ago. Pending business includes close to 6000 tons for replacement work on the Los Angeles aqueduct and 488 tons for a 24-inch welded steel pipe line for the Sierra Light & Power Co., Reno, Nev.

Plate Contracts Placed

170 tons, 1,400,000-gallon tank, Pepsi-Cola Co., Long Island City, N. Y., to Chicago Bridge & Iron Co., Chicago.

Plate Contracts Pending

4500 tons, two light cruisers, navy, awarded New York Shipbuilding Corp., Camden, N. J.

Bars

Bar Prices, Page 84

Cleveland—Buying continues fairly active in number of purchases, but small size of individual orders holds down the aggregate. Curtailment in consumer inventories the past few months is reflected in such spot buying which is for prompt delivery. Alloy bars are relatively more active than carbon grades.

Chicago—Buying of carbon and alloy bars, while improved in a number of instances, still is relatively slow. Leading consumers, such as automotive companies and partsmakers and agricultural implement makers, are taking a substantial tonnage but are not buying actively. March orders will better those of February. Alloy bars show more signs of improvement than carbon grades.

Boston—All six bidders quoted 4.66c, delivered, on 268 tons of nickel-steel bars for chain-making, Boston navy yard, the contract to be awarded by lot. Bids also are in on 152 tons, pearlitic manganese rod, and 81 tons, chromium-molybdenum steel rod for delivery at the naval station, Newport, R. I. Demand for alloys continues to feature activity in bars, although buying has declined slightly. Machine tool and aircraft builders are steady buyers. Carbon steel bars are less active and spotty. Jobbers are placing little tonnage.

New York—Business is receiving strong support from machine tool builders and airplane engine manufacturers. Government shop buying also is holding well. Miscellaneous demand is barely steady, continuing the trend of previous weeks. Deliveries are as prompt as at any time this year, with only smaller sizes of carbon bars and special alloys requiring delayed shipment.

Philadelphia—France so far has taken no action on a preliminary order for 1500 sets of light gun forgings. Additional lots of 1000 each may follow the first order, if the latter is placed. Bars still are relatively more active than most other products, but mill backlogs, especially in carbon grades, are dwindling. Prices are firm.

Birmingham, Ala.—Bars continue one of the most active steel products, but are quieter than a few weeks ago. Estimates place production at around 85 per cent.

Buffalo—Inquiries are slightly heavier, according to some producers, but buying continues light. As a result, production is sustained at the expense of backlogs.

Pipe

Pipe Prices, Page 85

Pittsburgh—Pipe sales hold at about the February level. Standard pipe consumption still is restricted in some sections by the weather, but this condition is only temporary. Shipments from consigned stocks have been light, this resulting in price irregularity in secondary markets. Oil country goods are quiet, except in the Illinois field, but shipments have increased with the resumption of river traffic. Line pipe business is confined to small lots. Mechanical tubing is slow, but export inquiry is fair, with prices at or above domestic levels.

Chicago—Milwaukee has placed 1232 tons of cast iron pipe and fittings for waterworks improvement, and smaller orders have appeared from Detroit and Flint, Mich. A number of minor lots are pending for WPA projects. Such demand has been irregular lately.

Boston—Cast pipe inquiry continues below normal for this season when first half requirements usually appear. While such inquiry is up slightly, improvement is slow. Merchant steel pipe moves spottily, the most promising outlet, housing projects, having been covered. Miscellaneous buying accounts for most volume through secondary sellers. Resale steel pipe prices are subject to shading in some districts.

New York—Steel pipe sellers look for substantial improvement in demand shortly. Weather conditions have held up considerable building work expected to be released soon. Numerous small jobs, rather than large individual tonnages, offer most promise.

Birmingham, Ala.—Pipe bookings have failed to materialize in anticipated volume, but have shown some slight aggregate improvement over the past week. Operations are three days a week in most instances, the output being confined largely to small sizes.

Seattle—Heaviest awards of the year featured the week. Spokane placed 772 tons of 6 and 12-inch with H. G. Purcell, Seattle, and 214 tons of 8-inch with Pacific States Cast Iron Pipe Co., Provo, Utah. Purcell also has taken 400 tons for Everett, Wash., 187 tons of 16-inch for East Forty-fifth street, Seattle, and 160 tons of 4-inch for Seattle.

Cast Pipe Placed

772 tons, 6 and 12-inch for Spokane, Wash., to Hugh G. Purcell, Seattle, for United States Pipe & Foundry Co., Burlington, N. J.

400 tons, 6 to 12-inch for Everett, Wash., to Hugh G. Purcell, Seattle.

214 tons, 8-inch for Spokane, Wash., to Pacific States Cast Iron Pipe Co., Provo, Utah.

187 tons, 16-inch for East Forty-fifth street improvement, Seattle, to Hugh G. Purcell, Seattle.

160 tons, 4-inch for Seattle, to Hugh G. Purcell, Seattle.

Cast Pipe Pending

160 tons, 4 to 8-inch for Moses Lake, Wash.; bids to W. E. Bunnell, clerk, March 15.

Steel Pipe Pending

Unstated, 2700 feet, 18 and 24-inch for Spokane, Wash.; bids March 7.

Unstated, 230 pieces welded steel pipe and fittings for Coulee dam; bids to Denver March 7.

Tin Plate

Tin Plate Prices, Page 84

Tin plate production is down to the low point for the year to date, off 3 points to 53 per cent. Releases for general line cans have been fair, but despite the approach of spring, specifications generally are lighter than a year ago. Smaller container

manufacturers generally have large stocks. Tin plate prices have been reaffirmed for next quarter, as expected. The subject of prices has attracted little interest, except in the export market, which has been active and which has seen tin plate sold at below the domestic level for the first time in many months.

Rails, Cars

Track Material Prices, Page 85

Domestic freight car buying in February, involving 1147 units, was the best since November last year, when 2650 freight cars were placed, and brought the total for the first two months of 1940 up to 1507. This compares with 2262 for the first two months of 1939; 134 in the corresponding period of 1938 and 22,778 in the same period in 1937. Further comparisons follow:

	1940	1939	1938	1937
Jan.	360	3	25	17,806
Feb.	1,147	2,259	109	4,972
2 mos.	1,507	2,262	134	22,778
March	.....	800	680	8,155
April	.....	3,095	15	9,772
May	.....	2,051	6,014	4,732
June	.....	1,324	1,178	548
July	.....	110	0	1,030
Aug.	.....	2,814	182	1,475
Sept.	.....	23,000	1,750	1,216
Oct.	.....	19,634	2,537	1,355
Nov.	.....	2,650	1,232	275
Dec.	.....	35	2,581	275
Total	.....	57,775	16,303	51,611

A leading locomotive award involves 10 freight engines and 18 diesel switch engines for the Chicago, Milwaukee, St. Paul & Pacific. The freight engines were placed with Baldwin Locomotive Works, Eddystone, Pa., while 12 of the switch engines went to Electro-Motive Corp., La Grange, Ill., three to American Locomotive Co., New York, two to Baldwin and one to General Electric Co., Schenectady, N. Y. In addition 25 caboose cars will be built by the Milwaukee in its Milwaukee shops. Atchison, Topeka & Santa Fe contemplates the purchase of diesel-electric passenger locomotives.

Leading eastern roads are understood to be considering additional car and locomotive programs if carloadings hold near present levels. Foreign locomotive inquiries include 24 for Iranial State railways, Teheran, Iran. No additional report has been heard relative to a French inquiry for 75 to 100 locomotives. Eastern platemakers are figuring on material for ten locomotives pending for the Chesapake & Ohio.

Car Orders Placed

Chicago, Milwaukee, St. Paul & Pacific, 25 cabooses, to its Milwaukee shops.

Tennessee Copper Co., eight air-dump cars to Pressed Steel Car Co., Pittsburgh.

Car Orders Pending

Chicago, Burlington & Quincy, 50 steel-sheathed box cars, 50-ton capacity; bids asked.

Locomotives Placed

Chicago, Milwaukee, St. Paul & Pacific, 28 locomotives, comprising 10 freight engines, to the Baldwin Locomotive Works, Eddystone, Pa., and 18 diesel switch engines, 12 to the Electro-Motive Corp., La Grange, Ill., three to American Locomotive Co., New York, two to Baldwin and one to General Electric Co., Schenectady, N. Y.

Rail Orders Placed

Los Angeles harbor commission, Los Angeles, 150 tons 128-pound rail plus accessories, to Columbia Steel Co., San Francisco.

Semifinished

Semifinished Prices, Page 85

Pittsburgh — Semifinished specifications were heavier last week, and apparently the biweekly buying common during 1938 and early 1939 has

been resumed. Sheet bars constitute the bulk of new business, although there has been good demand for wire rods and skelp.

Wire

Wire Prices, Page 85

Pittsburgh—Wire demand continues slow, with little new business noted in manufacturers' material but with slightly better activity in merchant products and firmer prices in the export market. Most buying of manufacturers' wire is hand-to-mouth. Jobber buying of merchant items has increased somewhat, although the increase is insufficient to establish a definite trend. Export demand continues to increase. Other producers are expected to follow the price change announced recently by Pittsburgh Steel Co. on galvanized wire and to reaffirm other prices for second quarter.

Cleveland — Changes in demand are small, except for better activity on the part of automotive interests and in export markets. Expansion in rural buying of merchant products awaits milder weather, with the outlook rather promising. Mill operations continue at the reduced level attained recently. Extension of present prices on hot-rolled rods has been announced by American Steel & Wire Co. Manufacturers' wire and merchant products are unchanged for the present but are not covered by the quarterly announcement of this producer.

Boston—Wire orders are largely to fill open spots in consumer inventories, and incoming tonnage has leveled off at the recently improved rate of about 50 per cent of capacity. While there has been some improvement in demand for spring wire from the furniture trade, the upturn has been less than expected. Users in numerous instances are still drawing heavily on inventories. Collyer Insulated Wire Co., Pawtucket, R. I., has a large cable and wire contract for the navy, awarded by lot. Rope departments make a relatively better showing in new business than most others. Shipments continue above incoming volume, with further reductions in finishing operations noted.

New York—Wire buying has leveled off at the recently slightly improved rate, there being no resumption of purchasing on a broad and sustained scale. New orders are mostly for filling gaps in consumer inventories, with users still operating substantially on stocks. Such orders are fairly numerous but generally small individually. With backlogs further reduced, scattered additional curtailments in finishing operations are being made.

Birmingham, Ala.—Wire products are beginning to feel some slight stimulation from spring buying, but do not show marked improvement. All specifications are in good demand and output is better than 80 per cent.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 85

Some sellers are more hopeful over business prospects. Automotive requirements have expanded, and building needs are slightly heavier in some districts. Extension of steel prices leads to the belief no important changes will be made in bolt and nut quotations on opening of second quarter books.

Republic Steel Corp. has been awarded 110 tons of common bolts for miscellaneous requirements of the Brooklyn navy yard on a bid of $13,225, delivered.

Young Radiator Co., Racine, Wis., has appointed Ameresco Inc., 50 Church street, New York, as export distributers for its products.

Shapes

Structural Shape Prices, Page 84

Pittsburgh—Shape orders are principally for public works but include a sprinkling of private jobs. The latter constitute the majority of inquiries. Pickup in industrial projects causes fabricators to be optimistic over the outlook, in view of the substantial tonnage pending. Prices are fairly steady, with shading reported in some cases.

Chicago—Structural inquiries and awards are heavier, improvement coming principally from outside districts. Orders are headed by 2605 tons for Oklahoma state highway bridges.

Boston—Private construction still lags, with some expansion by the airplane industry, awards including 240 tons for an addition at Hartford, Conn., placed with a Detroit shop. Most pending tonnage is for government work. Bridges up for bids are small.

New York—Following the placing of 30,000 tons, structural steel contracts have declined sharply. Inquiry is featured by grade crossing eliminations, such projects closing March 20 at Albany taking 2500 tons while additional contracts for the Long Island railroad on Long Island, including the long delayed Atlantic avenue work, Brooklyn, may take close to 60,000 tons. First bids are expected to be asked shortly.

Seattle—The week's awards exceeded 750 tons but no important new projects have developed. Bethlehem Steel Co. has taken more than 400 tons for trashracks for the Bonneville dam and Pacific Car & Foundry Co., Seattle, will furnish 150 tons stop logs for the same project. S. Morgan Smith Co. has the contract to supply three 96-inch valves, Howell-Bunger type, for the Mud Mountain dam, Washington state, 55 tons each, low at $97,000.

San Francisco—While inquiries for structural shapes continue to come out slowly, a fair tonnage was placed during the week, totaling 5150 tons. This brought the year's aggregate to 45,675 tons, compared with 30,127 tons for the same period last year. Considerable interest is being displayed in the outcome of bids just opened for a graving dock at the Mare Island, Calif., navy yard, calling for 1500 tons of sheet steel piling and 1100 tons of structurals.

Toronto, Ont.—Interest continues active in building with heavier demand for structural steel. Contracts awarded during the week include 500 tons to Hamilton Bridge Co., for tin plate mill for Steel Co. of Canada, Hamilton; 500 tons to London Structural Steel Co., Ltd., London, Ont., for addition to London Hosiery Mills, and 200 tons to Dominion Bridge Co., Ltd., Toronto, for addition to John Inglis Co.

St. Louis—Two large construction jobs are in prospect. One is a housing development here, to cost $7,682,400 and involving two separate projects. Sites have been announced for the buildings. The

Shape Awards Compared

	Tons
Week ended March 8	13,210
Week ended March 2	43,070
Week ended Feb. 24	14,121
This week, 1939	16,042
Weekly average, year, 1940	20,198
Weekly average, 1939	22,411
Weekly average, February	31,399
Total to date, 1939	234,686
Total to date, 1940	201,975

Includes awards of 100 tons or more.

other is a Mississippi river toll bridge, 3640 feet long and costing about $3,500,000, planned to be built south of Jefferson Barracks, Mo.

Shape Contracts Placed

2605 tons, bridges, McIntosh, Bryan, Pittsburgh and Custer counties, Oklahoma, to Capitol Steel & Iron Co., Oklahoma City, Okla.

1500 hundred tons, buildings, Midway Island, to Columbia Steel Co., San Francisco.

975 tons, Eel River bridge, Scotia, Humboldt county, California, for state to Judson-Pacific Co., San Francisco.

750 tons, factory building, A. C. Spark Plug division, Flint Mich., to Indiana Bridge Co. Inc., Muncie, Ind.

625 tons, trash racks, Bonneville, Oreg., for army engineers, awarded as follows: 465 tons to Bethlehem Steel Co., Bethlehem, Pa., and 160 tons to Pacific Car & Foundry Co., Seattle.

700 tons, government hangar, Sitka, Alaska, to Columbia Steel Co., San Francisco.

550 tons, substations for power house, Bonneville, Oreg., for interior department, to Lehigh Structural Steel Co., Allentown, Pa.

600 tons, plant addition, B. F. Goodrich Co., Oaks, Pa., to Bethlehem Steel Co., Bethlehem, Pa., through Hughes-Foulkrod Co., Philadelphia.

550 tons, buildings 4 and 18, Willowbrook, N. Y., for state, to Bethlehem Steel Co., Bethlehem, Pa.

510 tons, bridges, Harper and Osage counties, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

400 tons, four crane bridges, Brooklyn, N. Y., for navy, to American Bridge Co., Pittsburgh.

340 tons, Lincoln dial center, Washington, for Chesapeake & Potomac Telephone Co., to Barber & Ross Inc., Washington.

315 tons, bridge FAGM-2A, Quay county, New Mexico, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.

300 tons, bridge, project 7955, Crutchfield, S. C., to Virginia Bridge Co., Roanoke, Va.

290 tons, bridge FAS 2-A (1), Mayes county, Oklahoma, to Tulsa Boiler & Machinery Co., Tulsa, Okla.

275 tons, assembly building No. 7, Lockheed Aircraft Corp., Burbank, Calif., to Consolidated Steel Corp., Los Angeles.

240 tons, addition, Hamilton Standard Propeller division, United Aircraft Corp., East Hartford, Conn., to R. C. Mahon Co., Detroit; R. G. Bent, Hartford, general contractor. Concrete Steel Co., Boston, awarded reinforcing bars.

220 tons, addition to store, for W. T. Grant Co., Denver, to Midwest Steel & Iron Works Co., Denver.

200 tons, addition, high school, Malverne, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

180 tons, power plant alterations, Commonwealth Edison Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago.

165 tons, three 96-inch Howell-Bunger valves for Mud Mountain dam, Washington state, to S. Morgan Smith Co.

160 tons, Bluepoint, Inc., oyster plant, General Foods Corp., Greenport, N. Y., to Phoenix Bridge Co., Phoenixville, Pa.

155 tons, alterations, factory building, Chicago, to New City Iron Works, Chicago.

140 tons, section of upper dock, for Armour & Co., Chicago, to Duffin Iron Co., Chicago.

125 tons, bridge over Housatonic river, Milford, Conn., for state, to American Bridge Co., Pittsburgh.

120 tons, addition to warehouse No. 1, for city of Los Angeles, to Bethlehem Steel Co., Los Angeles.

120 tons, bridge No. 146-1, Apple River, Ill., for Illinois Central railroad, to Joseph T. Ryerson & Son Inc., Chicago.

100 tons, two 90-inch valves for Wickiup dam, Oregon, to Joshua Hendry Co., San Francisco.

Shape Contracts Pending

2500 tons, grade crossing elimination projects, New York state, bids March 20, Albany.

1500 tons, various buildings, for Aluminum Co. of America, Vancouver, Wash.

1200 tons, plant addition, Andrew Jergens Co., Belleville, N. J.; bids March 20.

1200 tons, two cruisers, navy, awarded New York Shipbuilding Corp., Camden, N. J.

650 tons, machine room No. 3, for Kimberly Clark Corp., Neenah, Wis.

350 tons, extensions to building, for Aluminum Co. of America, Cleveland.

330 tons, store building, for F. W. Woolworth Co., Springfield, O.

250 tons, bridge, Forty-Ninth street, Philadelphia; bids March 14.

250 tons, storage building, for New England Greyhound Lines, South Boston.

225 tons, building, South Brooklyn Savings bank, Brooklyn.

190 tons, bridge, Lawrence county, Pennsylvania; bids March 15.

150 tons, escalator, John Wanamaker store, Philadelphia; bids March 11.

150 tons, plant addition, for Rheam Mfg. Co., Chicago.

150 tons, alterations to Third avenue station, for Brooklyn Edison Co., Brooklyn, N. Y.

150 tons, garage, for Coca Cola Bottling Co., Detroit.

125 tons, bridge repairs, New York Central railroad, Highlands, N. Y.

125 tons, highway curbing, contract 12-B, New York.

110 tons, storeroom, for Timken Steel & Tube Co., Canton, O.

110 tons, repairs to bridges, for New York Central railroad, Highland Falls, N. Y.

100 tons, annex to hangar, Chanute Field, Rantoul, Ill.

Unstated, heating plant Leavenworth, Wash., reclamation bureau hatchery; bids at Coulee dam, March 28.

Reinforcing

Reinforcing Bar Prices, Page 85

Pittsburgh—Export business has picked up considerably and may act as a strengthening influence on domestic prices. The latter are still spotty and considerably below quoted levels in some sections, particularly on larger jobs. Inquiries are light, but several large orders have been placed recently.

Chicago—The market is quiet, although awards are slightly more numerous. A number of small inquiries have appeared, but large jobs are few. Orders include 374 tons for the local subway and 270 tons for a track elevation at Winnetka, Ill.

Boston—Small lots predominate in reinforcing steel and while the number of projects is fairly large, tonnage is not impressive. A bridge and highway contract, Peabody-Danvers, Mass., 150 tons, has been placed. Concessions continue even on relatively small orders.

New York—New reinforcing steel buying and inquiry have slumped. A Buffalo mill booked 550 tons for a New Haven, Conn., housing project, and several hundred tons for grade crossings, upstate New York, go in March 20 at Albany. New inquiry and pending tonnage immediately active in this district, however, is lower. Concrete bar prices continue to sag.

Seattle—Important tonnages have failed to develop and current demand is confined to small lots. Local mills are operating on reduced schedules as conditions dictate. Most orders are for public works. Reclamation bureau projects involve largest pending tonnages, 135 tons for a unit of the Roza project, Washington state, J. A. Terteling & Sons, Boise, Idaho, general contractors, reinforcing to be supplied by Bethlehem Steel Co. H. J. Adler Construction Co., Yakima, Wash., is low at $144,104 for another unit same project, involving 425 tons of concrete bars and 12 tons of gates.

San Francisco—Demand for reinforcing bars is quiet and awards aggregated only 1924 tons, bringing the aggregate for the year to 18,706 tons as compared with 46,860 tons for the corresponding period in 1939.

Toronto, Ont.—Reinforcing steel awards are gaining, with orders for

Concrete Bars Compared

	Tons
Week ended March 9	3,679
Week ended March 2	6,684
Week ended Feb. 24	2,155
This week, 1939	5,273
Weekly average, year, 1940	7,158
Weekly average, 1939	9,197
Weekly average, February	5,457
Total to date, 1939	113,394
Total to date, 1940	71,580

Includes awards of 100 tons or more.

the week totaling around 2000 tons. Dominion Reinforcing Steel received contract for 200 tons for John Inglis Co. plant addition at Toronto.

Reinforcing Steel Awards

550 tons, housing project, New Haven, Conn., to Buffalo Steel Co., Buffalo; William L. Crow Construction Co., New York, contractor.

500 tons, Ramona housing project, Los Angeles, to Blue Diamond Corp., Los Angeles.

390 tons, unit A, Parkside housing, Detroit, to Truscon Steel Co., Youngstown, O.; O. W. Burke Co., contractor.

375 tons, subway, section S-9-C, Chicago, to Republic Steel Corp., Cleveland, through Olney J. Dean Steel Co., Chicago; Kenny Construction Co., contractor.

350 tons, treasury department, invitation A-8697, Los Angeles, to Judson Steel Corp., San Francisco.

270 tons, track elevation, Winnetka, Ill., to Truscon Steel Co., Youngstown, O.

250 tons, bureau of reclamation, invitation B-13,139-A, Odair, Wash., to Bethlehem Steel Co., Seattle, Wash.

200 tons, bridge, Clinton, Okla., to Sheffield Steel Corp., Kansas City, Mo.; Moran-Buckner Co., contractor.

161 tons, state highway project 264, Cuyahoga and Geauga counties, Ohio, to Republic Steel Corp., Cleveland, through Builders Structural Steel Co.

160 tons, animal house, Parke Davis, Detroit, to Truscon Steel Co., Youngstown, O.; Eslinger-Misch Co., contractor.

158 tons, bureau of reclamation, invitation A-5800-A, Acequia, Idaho, Bethlehem Steel Co. Bethlehem, Pa.

115 tons, bridge Housatonic river, Milford, Conn., to Concrete Steel Co., New York.

100 tons, Schmidt bottling house, Detroit, to Joseph T. Ryerson & Son, Inc., Chicago.

100 tons, bridge, Plaistow, N. H., to Truscon Steel Co., Youngstown, O.

Reinforcing Steel Pendin

1300 tons, Carrville, La., federal hospi A. Fornell Blair, Decatur Ga., low general contract.

700 tons, grade eliminations and hi way projects, New York; bids Ma 20, Albany.

600 tons, building, Grocers' Finance C Washington.

500 tons, Nimrod, Ark., dam, Perry a Yell counties, Arkansas; Russ Mitch Inc. and Brown & Root, Houston, Te low on general contract.

430 tons, Fern Ridge dam, Lane coun Oreg.; bids to reclamation burea which will supply materials.

428 tons, Panama canal, schedule 3915.

425 tons, unit Roza dam project, Was ington state; H. J. Adler Constructi Co., Yakima, Wash., low; materials bureau.

290 tons, piers, railroad bridge, Kett Falls, Wash.; bids at Coulee dar March 27; materials by reclamation bu reau.

275 tons, factory, Southern Biscuit Co Richmond, Va.

250 tons, school, Sisters of St. Domini Detroit.

200 tons, Washington state Kettle Fall bridge piers; S. S. Mullen, Seattle, gen eral contractor.

200 tons, Elizabeth Park housing Akron, O.

140 tons, bridge and overpass, Hamden Conn.

105 tons, highway project, Narragansett, R.I.; bids March 20, state purchasing agent, Providence.

100 tons, postoffice, Ontario, Calif.; Sarver & Zoss, 1015 West Fourteenth street, Los Angeles, low on general contract at $76,000.

Ferroalloys

Ferroalloy Prices, Page 86

New York—While no definite conclusions can yet be drawn, most leading trade interests believe there will be no change in ferroalloy prices for second quarter. Books will probably be opened sometime this week.

Although steelmaking operations continue to ease slightly, ferromanganese sellers look for reversal before the month is over and do not expect a much further drop. Consequently, with March a longer month and with stocks in consumers' hands continuing to dwindle most sellers believe that the move-

ment of ferromanganese this month will be a little heavier.

Ferromanganese is quotable at $100, duty paid, eastern seaboard, and domestic spiegeleisen, 19 to 21 per cent, at $32, Palmerton, Pa., and 26 to 28 per cent, $39.50.

Pig Iron

Pig Iron Prices, Page 86

Pittsburgh—The market is dull, with little new business appearing and shipments somewhat lighter. It appears March deliveries will be smaller than in February. Prices are unchanged but are given little test. Production still is declining, the district now having 33 stacks active out of 50. This compares with 21 active a year ago and 40 one month ago. The 1939 high was 42.

Cleveland—Producers will accept second quarter pig iron business at current prices but have made no formal announcement regarding opening of books. Buying is light, most consumers still having sufficient tonnage due against previous orders to accommodate needs for the near future. Shipments are fairly steady, with foundry operations generally sustained.

Chicago—Shipments so far this month are even with the like February period. Some foundries not releasing last month will call for iron during March. Books have been opened for second quarter at unchanged prices, but no forward buying is reported. Recent orders have been few and small, and for delivery this month. Shipments of by-product foundry coke, after showing a 10 per cent improvement last month are holding on a par with the first ten days of February.

Boston—Pig iron sellers have opened books for second quarter at unchanged prices, but are taking little tonnage for that period. Buying has declined further, sales being in small lots for quick shipment. While demand for castings by the machine tool trade is well maintained, total foundry melt tends downward.

New York—At least one seller has opened books for second quarter unchanged prices, with several others indicating they will probably make no change in their quotations. Little contracting has been reported for next period. Indications point to much better shipments this month than in February. Export inquiries are increasing, particularly from Scandinavian countries, but various complicating factors delay placing of orders. Largest inquiries, including 5000 tons for Sweden, specify low phosphorus, high manganese, high silicon iron.

Buffalo—March shipments give definite indications of exceeding February volume, based on the movement to date this month. Producers still have a fairly heavy tonnage on books for first quarter delivery but hope to clear up a large part of this before April. Foundry operations vary from three to five days weekly. Producers are expected to accept second quarter business at current prices, although no official announcement has been made. Pig iron production has advanced to 71 per cent of capacity with lighting of the fifth stack of Bethlehem's Lackawanna plant.

Philadelphia—Sellers are none too optimistic over second quarter prospects for new business. Many consumers are fairly well covered for that period by purchases last September. Comparatively little business has been booked so far this year, orders including 1000 tons placed recently by a steel foundry.

Behind the Scenes with STEEL

Our Friend Al

■ Every month the Aluminum Co. of America publishes a *News-Letter* reporting progress in the application of the light weight metal and generally commenting on this and that. It's a good job, too, but what a shock we got from the February issue. The very opening paragraph tells about how they have a "mad" on this fellow Shrdlu for deliberately slighting their favorite metal. Of course, the reference is to that piece a few weeks ago about the copper with the tin badge, nerves of iron, muscles of steel, heart of gold, silver hair, etc., etc. Our trouble was simply taking too much for granted—and let it never be said that we would even think of slighting our Pittsburgh friends. We didn't mention the copper's name before, but hasten now to introduce him as our old friend, Al U. Minum, of the Pennsylvania Minums. The boys say he's sort of light, but plenty tough.

Who's Elmer?

■ It seems kind of silly but when you reach the end of this sentence you will be about one-half mile east of the spot you occupied when you began reading it. (If you don't believe it ask Elmer).

Covering Territory

■ Our friend, Percey E. Wright, consulting engineer, out in Florence, Arizona, must have been snowed in, or something, this winter. Just arrived by pony express are his "Season's Greetings (Thanksgiving to Groundhog Day, Inclusive)." It's pretty clever, though, and gives us an idea on how to save a whale of a lot of time and postage.

Next Week's Special

■ If you're doing any stamping or drawing don't let next week's issue slip by you without spending some time reading "How To Anneal For Superior Drawing Qualities," written by J. N. Crombie of Carnegie-Illinois. How to avoid grain growth with resulting fracture is pointed out along with information on how to detect and correct wrong procedures. It may save you some dough.

A-sittin' & A-thinkin'

■ Each one of us has two ends; one to sit on and one to think with. Our success depends upon which one we use the most. It's sort of a case of *Heads You Win And Tails You Lose.*

Did You Get It?

■ Answer to last week's problem by Thomas A. Edison is 1200 feet a second. That is the speed of sound and when our super-greyhound gets rolling that fast he will no longer hear the pan.

Prize Offer

■ Maybe you like war problems better these days. A mechanized army, 20 miles long, travels at a steady speed of 10 miles an hour. A courier on motorcycle leaves the rear of the column as it starts on its march. Traveling at a steady speed he rides to the head of the troops, immediately turns around and reaches the rear just as the army completes its travel. What distance did the courier ride? The correct answer is worth an *Antonio & Cleopatra.*

Highspots

■ Top honors this week have to be split between that very snappy looking bit of Electromet promotion on page 59 and the intriguing pipeline to the moon by Grinnel Co. on page 47.

Tell All

■ And incidentally, if you want to find out a few more things about good industrial advertising, drop a line to the Associated Business Papers, 369 Lexington Ave., New York, and ask them to send you a copy of *Tell All.* You'll find it well worth your while.

SHRDLU

Foundry stocks are double those of a year ago.

Cincinnati—Buying of pig iron is confined to small lots, even though books have been opened for the second quarter, at reaffirmed prices. Forward covering has not started. Melters appear confident material will be available at unchanged prices whenever needed and hence ignore forward commitments.

St. Louis—Melters continue to hold down inventories, buying only for immediate needs. The result is that shipments and sales for the first two months of 1940 have been off considerably compared with the corresponding period last year. Indications are that there will be no increase in price for second quarter.

Birmingham, Ala.—Pig iron production remains on the basis of 16 active blast furnaces, one being down at Sloss and one at Republic.

Toronto, Ont.—While demand is gaining, sales continue below the closing weeks of 1939. While most sales continue to small melters new interest is appearing from the larger users, and in anticipation of enlarged demand producers are adding to stocks.

Scrap

Scrap Prices, Page 88

Pittsburgh—Some additional weakness has appeared in scrap, but there is no definite downward trend. Dealers refuse to part with what little material they have in yards at current figures, except in a few cases where they are pressed for cash. This activity is the cause for a few scattered sales at slightly below the quoted range, but such prices do not necessarily represent the true level of the consumer market. Releases on previous purchases are small and there is no indication of new buying in any volume.

Cleveland—Scrap trade is quiet, melters taking no interest, and prices are steady. Movement is confined to small lots of factory or shop material, yard operations being curtailed.

Chicago—Purchase of a significant tonnage of steel scrap by a leading consumer is expected soon. With this pending, some dealers have been able to get $16 for No. 1 heavy melting steel. The recent $15.50 to $16 range on this grade has become nominal, but the coming mill transaction is expected to establish the market. Meanwhile, prices as a whole are substantially unchanged. Trading has continued light, but tone of the market is stronger.

Boston—With more cargo space

available, buying for export to fill orders is stimulated at unchanged prices for heavy melting steel grades, $15 to $15.50 being paid for dock delivery of No. 1. Domestic demand has not improved, although prices are steadier and in a few instances slightly higher for shipment to eastern Pennsylvania. New England consumers are buying little and prices are barely steady with No. 1 machinery cast ranging from $17.50 to $18, delivered at most points.

New York—Prices for domestic shipments are somewhat steadier, though No. 1 machinery cast is down 50 cents for nearby delivery. Domestic buying is light, with rejections rather more prevalent than usual. Foundries are placing few orders. Export demand is maintained, with more vessels available. Prices for barge delivery are unchanged except that No. 2 cast is down 50 cents to $12.50.

Philadelphia—The market appears definitely firmer. Consumer buying is absent, except for additional purchases of heavy cast at $18.50 and stove plate and grate bars at $15, but no holdups are reported on shipments and supplies are none too plentiful. It is understood a Baltimore district mill has re-entered the market on the basis of $17 for No. 1 steel and $16 for No. 2. Export shipments from this area are heavier, with buying prices $15.25 for No. 2 steel and $16.25 for No. 1.

Buffalo—Sentiment in the market has been buoyed by the sale of approximately 10,000 tons on the basis of $16.50 to $17 for No. 1 steel and $14.50 to $15 for No. 2. While the weather still is retarding offerings, supplies still are ample for dealer coverage. Dealers' yard stocks are only moderate.

Detroit—Impact of a 16-point drop in the local steelmaking rate has had a naturally depressing effect on scrap activity, but prices are holding nominally. Buying is desultory, with dealers and brokers inclined to continue bearish over the outlook.

Cincinnati—Iron and steel scrap is dull, ascribed to continued light demand. Prices remain unchanged although several items are nominal. Volume buying is absent and mills appear intent on reducing scrap inventories. Shipments have declined with the steelmaking rate.

Birmingham, Ala.—Scrap shows continued signs of weakness but prices are unchanged.

St. Louis—Dealers are paying 25 cents a ton more for some items of melting steel to cover on contracts for heavy tonnages sold recently. Shipments from the country have not been as large as had been expected with the break in the cold weather, and dealers are endeavoring to stimulate the movement. However, there is little new buying by mills.

Seattle—The market is weak and lifeless. Dealers are accumulating stocks in anticipation of improved demand. Mills are not buying and foundries show little interest. Small orders are coming from Japan but shippers face a marked scarcity of steamship space.

Toronto, Ont.—Demand has been more pronounced. Consumers are in the market for spot and future delivery and booking is now being carried into second quarter. Offerings of scrap also are in better volume from collectors in the Toronto area, although no deliveries are appearing from northern Ontario. Inventories of cast scrap in dealers yards are down while consumers also have greatly reduced stocks of this material, resulting in better demand. Prices are firm.

San Francisco—Export to Japan is practically at a standstill and no new commitments have been made in recent weeks. Domestic open-hearth furnaces continue to buy only

for replacement. The general tone is weaker and further decreases in prices for No. 1 and No. 2 heavy melting steel and compressed sheets is expected. No. 1 heavy melting steel, f.o.b. cars, metropolitan district, Los Angeles and San Francisco, continues to hold at $13.50 to $14 a net ton with No. 2 at $12.50 to $13 a ton. Compressed sheets are quoted at $12 to $13 a net ton with borings and turnings at $5.50 to $6 a net ton.

Steel in Europe

Foreign Steel Prices, Page 87

London—(*By Cable*)—Commercial users of steel in Great Britain find greater difficulty in obtaining deliveries and placing orders. Export tonnage also is curtailed, owing to increasing volume of government war contracts. Steel producers are fully booked through first half year. Shipyards are working at capacity. Further improvement is being made in deliveries of iron ore and semi-finished steel.

Ministry of supply has announced, effective March 5, an advance of 5s to 10s in the main range of maximum steel and iron scrap prices, with a few specialties advanced 12s 6d. The change had been expected and is designed to bring out larger domestic supply.

Belgium and Luxemburg report fairly good export demand, most business being diverted to France and Great Britain.

Warehouse

Warehouse Prices, Page 87

Pittsburgh—Prices have been raised 25 cents per 100 pounds on quantities of 500 to 999 pounds of alloy steel cold-drawn rounds and hexagons and hot-rolled alloy bars. Other quantities are unchanged. If the combined weight of either hot-rolled alloy bar items or cold-finished alloy bars is less than 300 pounds, $1.75 per 100 pounds is to be added to the base price.

Cleveland—Business is spotty but fairly steady, with a moderate improvement looked for in the March total. Weather has been a retarding factor for a number of weeks.

Chicago—Base price on galvanized sheets has been reduced 25 cents to $4.60 per 100 pounds on lots of 500 to 1499 pounds. Quantity extras are unchanged, but the deduction on 1500 to 3499 pounds has been raised from 15 cents to 35, and on 3500 pounds and over the new deduction is 40 cents instead of 25.

New York—Volume this month is slightly above that of February with demand for specialties and alloys well diversified. Heavier products continue to lag behind the general trend.

Philadelphia—Warehouses report their customers slightly busier but without influence on steel sales. However, a seasonal gain appears in prospect in such items as galvanized sheets, fencing, boiler tubes and small tanks.

Buffalo—Base price on galvanized sheets has been cut 25 cents to $4.25, thereby bringing this grade more in line with the usual relationship with quotations in other markets. Sales generally are a trifle heavier.

Cincinnati — Steel jobbers find chief support from industrial activity. Sales are near the daily averages of February. Prices are unchanged.

St. Louis — February warehouse business is estimated at about 22 per cent ahead of a year ago and about 10 per cent ahead of January. A factor was withholding of shipments for January delivery on account of the cold weather which prevailed in January and early February.

Seattle—Jobbers report heavier volume than a month ago, most orders coming from public works projects. Private buying is limited. Sheets, light plates, bars and shapes are in best demand.

Iron Ore

Iron Ore Prices, Page 88

New York—Although there has been little buying of chrome ore in this country so far this year, increasing demands abroad have had a stimulating effect on prices quoted by importers and have caused importers to withdraw from the market here recently on some grades.

A particular case in point has to do with Turkish chrome ore. At the moment quotations are available on only one grade, 48-49 per cent lump ore, which has just been advanced to $29 to $30 per gross ton, c.i.f. seaboard. No offerings are available on the 45 to 46 and 40 to 44 per cent grades, nor on Turkish concentrates. One leading seller indicated that once new prices are available, they will be on a substantially higher basis than those which have been more or less nominally in effect until recently.

Indian chrome ore, on the other hand, shows little change, with prices on 48 to 50 per cent lump ore holding at $26 to $28 and on 43 to 45 per cent lump ore around $20 to $22. Transvaal concentrates, 48 to 49 per cent, appear to be hold-

ing around $25 and 45 per cent, $20.

Tungsten ore prices have been stronger recently, although both Chinese wolframite and domestic scheelite are unchanged at the equivalent of $23 and $23.50, duty paid, per short ton unit.

Equipment

Seattle—Demand for machinery and equipment has developed seasonal activity, turnover showing increase over a month ago. Westinghouse is low to Bonneville project at $272,600 for furnishing four 230-kv oil circuit breakers and Pennsylvania Transformer Co., Pittsburgh, low at $158,011 for seven 12,500-kva transformers. Same agency has called bids March 19 for four 15 kv circuit breakers, Spec. No. 842, for St. Johns and Ampere stations. Pacific Electric Mfg. Corp., San Francisco, is low at $39,856 to United States engineer, Bonneville, for two circuit breakers and General Electric Co., Portland, low at $152,240 for eight units.

Nonferrous Metals

New York—Only light buying interest was noted in leading nonferrous metal markets last week. Prices generally held steady, although tin moved higher.

Copper—Outstanding development of the week was the announcement that the French government had purchased 75,000 tons of copper on the basis of 11.50c, f.a.s., New York. Metal will be supplied chiefly from foreign properties of American owned companies. Electrolytic was available from all leading first hand sellers at 11.50c, Connecticut, and from resellers at 11.75c. Export copper held steady at around 11.60c to 11.70c, f.a.s. New York.

Lead—Turnover was about equivalent to producers' intakes and was augmented on Friday by purchases by two large buyers. Undertone of the market remained firm at 5.10c, East St. Louis.

Zinc—Sentiment in the market was strengthened by the active rate of shipments in the face of tapering operations at galvanizing mills. Since consumers' needs are well covered fresh demand was light at the unchanged 5.75-cent level.

Tin—Prices advanced in the domestic market to around 48.00c before easing on dull demand to 47.87½c on Friday. The advance was attributed to the influence of the London market which rose steadily on heavy demand, of which part was speculative.

Antimony—Occasional carlots are still being booked in antimony but

daily business generally is confined to caselots. Prices held on the basis of 14.00c, New York, for American spot and nominally 16.50c, duty paid New York, for Chinese spot.

Tide Water Associated Oil Co., New York, has established a new office and warehouse at 1122 South boulevard, Charlotte, N. C., for distribution of its products. R. H. Mariner has been made regional manager, and W. H. Young Jr. will assist him in a sales capacity.

Nonferrous Metal Prices

Mar.	Copper Electro. del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin New York Spot	Straits Tin New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
2	11.50	11.50	11.25	47.50	47.00	5.25	5.10	5.75	20.00	14.00	35.00
4	11.50	11.50	11.25	47.25	46.75	5.25	5.10	5.75	20.00	14.00	35.00
5	11.50	11.50	11.25	47.50	47.00	5.25	5.10	5.75	20.00	14.00	35.00
6	11.50	11.50	11.25	47.62½	47.12½	5.25	5.10	5.75	20.00	14.00	35.00
7	11.50	11.50	11.25	48.00	47.62½	5.25	5.10	5.75	20.00	14.00	35.00
8	11.50	11.50	11.25	47.87½	47.50	5.25	5.10	5.75	20.00	14.00	35.00

*Nominal.

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high) 18.31
Copper, hot rolled 20.12
Lead, cut to jobbers 8.50
Zinc, 100 lb. base 11.00

Tubes

High yellow brass 21.06
Seamless copper 20.62

Rods

High yellow brass 14.26
Copper, hot rolled 16.62

Anodes

Copper, untrimmed 17.37

Wire

Yellow brass (high) 18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York 7.25-7.50
Cleveland 8.25-8.50
Chicago 7.75-8.00
St. Louis 7.75-8.25

Heavy Copper and Wire

New York, No. 1 .....9.00-9.25
Cleveland, No. 1 .....9.00-9.25
Chicago, No. 1 .....9.00-9.25
St. Louis 8.75-9.25

Composition Brass Turnings

New York 7.00-7.25

Light Copper

New York 7.00-7.25
Cleveland 7.00-7.25
Chicago 7.00-7.25
St. Louis 6.75-7.00

Light Brass

Cleveland 4.25-4.50
Chicago 4.50-4.75
St. Louis 4.50-4.75

Lead

New York 4.50-4.75
Cleveland 3.75-4.00
Chicago 4.25-4.50
St. Louis 4.00-4.25

Zinc

New York 3.00-3.25
Cleveland 2.50-2.75
St. Louis 3.25-3.50

Aluminum

Mixed, cast, Cleveland 8.75-9.00
Borings, Cleveland 6.75-7.00

Clips, soft, Cleveland 15.75-16.00
Misc. cast, St. Louis 8.75-9.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads .12.00
Standard No. 12 aluminum...14.50-14.75

Lindsey Wire Weaving Co., Cleveland, of which A. F. Crossman is president, about April 15 will begin replacement of the original unit of its plant. The company has filed application for a $110,000 building permit. Construction of the new manufacturing plant will go over the present structure and when completed the old structure will be taken out, a department at a time. Manufacturing operations will be continued throughout period of construction.

FINANCIAL

(*Concluded from Page* 19)

in dollars was only 38 per cent greater. This, said Mr. Purnell, was due to lower selling prices.

Net profit for the year was $5,004,484, equal after payment of regular preferred dividend, to $2.50 a share on common. This compares with a net deficit of $658,934 in 1938 and net income of $12,190,649 or $6.79 a share on common in 1937. More than two-thirds of the total earnings, said Mr. Purnell, were earned in last four months of 1939.

In addition to usual maintenance charges, $19,686,264 was expended last year for plant improvements. Properties valued at $3,717,082 were dismantled or otherwise disposed of.

Taxes aggregating $4,297,000 accrued last year, compared to $3,685,000 in 1938. Social security taxes totaled $1,494,000, against $1,116,000 in preceding year.

Consolidated income statement:

	1939	1938
Net Volume of Sales	$117,027,997	$84,664,566
Consolidated Net Income Before Fixed Charges	15,639,325	9,057,563
Total Charges for Interest, Depreciation, Depletion of Minerals, etc.	10,634,841	9,716,497
Net Earnings	5,004,484	658,934*
Cash and Investments in United States Securities Dec. 31	15,299,557	26,333,686
Current Assets Dec. 31	86,209,968	93,579,879
Current Liabilities Dec. 31	13,836,154	10,204,878
Ingot Capacity Operated	64.4%	38.0%

*Loss.

TRUSCON STEEL CO. NETS $560,249 PROFIT IN 1939

Truscon Steel Co., Youngstown, O., Republic Steel Corp., subsidiary, reports net 1939 profit of $560,249, equal to 73 cents a share on common stock outstanding. Net deficit incurred in 1938 was $813,057.

Aggregate sales in 1939 were $25,327,714; in 1938, $16,174,357.

Unpaid dividend accumulations on 7 per cent cumulative preferred totaled $34.83½ a share on Dec. 31, aggregated $1,157,829.

GENERAL ELECTRIC 1939 NET INCOME TOTALS $41,236,000

Preliminary statement of General Electric Co., Schenectady, N. Y., reports net 1939 income of $41,236,000, equal to $1.43 a share on common. This is an increase of 49 per cent over $27,729,329 or 96 cents a share earned in 1938. Cash dividends of $1.40 a share were declared, paid.

Sales billed aggregated $304,680,000, an increase of 17 per cent over $259,484,000 in 1938. Orders received in 1939 totaled $360,748,000, approximately 43 per cent more than in previous year.

Provision for total taxes was $21,013,000, an increase of 32 per cent over $15,632,000 in 1938. Current assets totaled $205,734,000; current liabilities were $40,110,000.

♦

Cleveland-Cliffs Iron Co., Cleveland, reports $3,378,394 net income for 1939, equal to $6.93 a share on preferred stock, compared to net profit of $755,759 or $1.55 a share on preferred in 1938. Net earnings in 1937 were $5,020,933, equal to $10.30 a share on preferred.

MEETINGS

A.F.A. ARRANGES PROGRAM FOR CHICAGO CONVENTION

■ AMERICAN Foundrymen's association has named Charles E. Wilson, executive vice president, General Motors Corp., Detroit, to present the board of awards address at its forty-fourth annual convention in Chicago, May 6-10. Mr. Wilson will speak on some phases of industrial business management.

Tentative program for the convention lists a wide variety of technical sessions, shop courses, round-table luncheons and social events. Sessions of the malleable and nonferrous divisions have been scheduled for the first part of the week, those of the steel and gray iron divisions the latter part. The banquet will be served on May 9.

The exhibition to be held in International Amphitheatre in connection with the convention is expected to be the most extensive in recent years and the best attended. The show will be open on Saturday, May 4, for the benefit of local foundrymen. Daytime convention sessions will be conducted at the Amphitheatre, evening sessions at the Palmer House.

OHIO A.S.M. TRI-CHAPTER MEETING IN COLUMBUS

Cincinnati, Dayton and Columbus chapters of the American Society for Metals will conduct their annual tri-chapter meeting at Battelle Memorial institute, Columbus, O., April 24. The program will provide morning and afternoon technical sessions and a luncheon at noon at Pomerene Hall of Ohio State university.

Papers to be presented at the morning session include: "Quenching Media and Related Problems," by Howard Scott, engineer in charge of metallurgical section, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; "Interrupted Quenching," by J. L. Burns, assistant superintendent, wire division, Republic Steel Corp., Chicago; and "Cylinders Bore-Hardened by Induction Heating," by L. R. Jackson, metallurgical physicist and assistant supervisor, Battelle Memorial institute.

At the afternoon session E. E. Legge, American Steel & Wire Co., Worcester, Mass. will contribute a paper on "Austempering of Steel"; and E. E. Thum, editor of *Metal Progress,* will speak on "Why Do Steels Harden?"

Dr. S. L. Hoyt, technical advisor, Battelle Memorial institute, will serve as technical chairman.

SCRAP INSTITUTE GROUP PLANS MEETING IN SOUTH

Members of the North Carolina committee of the Southern chapter, Institute of Scrap Iron and Steel Inc., will hold a weekend meeting March 16-17 at the Alamance hotel, Burlington, N. C. Scheduled are a dance on the evening of the first day, and dinner and business session on the second. Edwin C. Barringer, executive secretary of the institute, New York, will speak.

TOOL DEALERS MEETING IN ATLANTIC CITY IN MAY

Associated Machine Tool Dealers of America will conduct its spring convention at the Claridge hotel, Atlantic City, N. J., May 13-14. Thomas A. Fernley Jr., 505 Arch street, Philadelphia, is executive secretary.

Republic Steel Corp. To Rebuild Three Furnaces

■ Three blast furnaces rebuilding projects are or will shortly be underway in Republic Steel Corp. plants according to C. M. White, vice president in charge of operations.

Largest of the three is rebuilding of No. 1 blast furnace in Cleveland to increase its capacity from 550 tons to 1000 tons. New furnace will be 105 feet high with an increase in hearth diameter from 17 to 25½ feet. This is the fourth 1000 ton furnace which the corporation will have.

In Birmingham, Ala., all the steel work on one furnace at Thomas plant is being rebuilt. Hearth diameter is being increased from 16 to 17 feet to increase capacity about 35,000 tons per year. New high uptakes are being installed to decrease flue dust production and increase yield of furnace. Work already has begun and will be completed in about 60 days.

In Youngstown one blast furnace is being relined and part of the shell plates replaced while furnace is down for general improvements and repairs.

Business Outlook

(*Concluded from Page* 14)

the latter is receiving partial support from backlogs and since it is questionable to what extent buyers may permit inventories to decline before renewed buying is forthcoming to bolster mill operations, there is no assurance that the decline in steelmaking has spent itself.

Scrap markets, which as early as last October forecast the subsequent swift descent in open-hearth activity, have yet to give evidence of an early reversal in steel ingot production. Nevertheless, the definite check to the previous shrinkage in buying, when coupled with the more gradual tapering in operations, suggests that a resistance point for both supply and demand is near.

Current consumption appears capable of supporting a steelmaking rate of 60 per cent or better. The outlook the next 90 days for domestic steel use and export shipments combined is for no worse than a small tapering from present levels but also has possibilities of moderate expansion between now and the time when mid-year influences usually tend to restrict industrial activity.

Canadian-U. S. Trade Gains as War Result

■ Trade volume between United States and Canada has increased appreciably since the outbreak of war, according to a survey by the Bank of Nova Scotia, Halifax.

Canada's merchandising exports to the United States, excluding wheat, rose from 267 million dollars in 1938 to 339 millions last year, and at the same time imports from the United States advanced from 425 million dollars to 497 millions.

About half the year's gain in exports occurred following outbreak of war, while practically all of the upturn in imports was concentrated in the last four months of the year.

In the case of imports, primary cause of the rise has been the upturn of industrial activity in Canada and the accompanying preparations for increased wartime production. Heavy industries have been particularly active and the volume of industrial construction has been expanding. Both developments have increased requirements for American equipment, parts and materials.

Difficulty of obtaining imports from overseas as a result of shipping, exchange and other wartime problems have tended to increase further Canada's reliance on American sources of supply.

Referring to the outlook, the review says Canada's imports of certain types of products from the United States likely will continue at high levels as the magnitude of Canada's war effort increases. As a great war supply base for the Allies, Canada will require a large and consistent flow of equipment, machinery and parts, and industrial raw materials and fuels from across the border.

Active Blast Furnaces On Feb. 29 Totaled 157

■ Actual coke production in United States in February totaled 2,950,618 gross tons, according to complete reports from blast furnace operators. Average daily rate of production was 101,745 gross tons. These figures are essentially as reported in STEEL, March 4, p. 26, in a compilation involving some estimation.

Active blast furnaces Feb. 29 totaled 157 instead of 158 as reported. In addition to the stack changes listed last week, Rockdale furnace, Tennessee Products Corp., in Tennessee, was blown in; and Harriet Y furnace, Wickwire Spencer Steel Co., in New York, and National No. 1 furnace, National Tube Co., in Pennsylvania, were taken out.

U. S. Shipbuilding Gains in February

■ United States shipyards had 249 ships, aggregating 1,179,240 gross tons, under construction March 1, according to American Bureau of Shipping classification. Included are 143 sea-going vessels representing 1,123,460 gross tons, 102 miscellaneous vessels totaling 309,005 gross tons and one Great Lakes vessel of 6000 gross tons. This is an increase over the 222 vessels on the ways on Feb. 1, aggregating 1,157,365 gross tons and the 180 vessels of March 1, 1939, totaling 697,110 gross tons.

■ House magazines of Allegheny Ludlum Steel Corp., Brackenridge, Pa., and Sperry Gyroscope Co., Brooklyn, N. Y., were cited for honorable mention by House Magazine institute, New York. *Steel Horizons*, Allegheny Ludlum's publication, and Sperry's *The Sperryscope* were praised, along with other entries, for high quality of editorial matter and general attractiveness.

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Seven words of ordinary length make a line.
FIRST LINE IN BOLD FACE TYPE
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Bids Wanted

Federal Works Agency, Public Buildings Administration, Washington, D. C., Feb. 23, 1940.—Sealed proposals in duplicate will be publicly opened in this office at 1 P.M., Standard Time, Mar. 22, 1940, for construction of the U. S. P. O. at Brevard, N. C. 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.

Castings

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PENNSYLVANIA

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84" Pond Vertical Boring & Turning Mill, 2-swivel heads, 72" table, 54" under rail, power elevation to rail, friction feed, cone drive. Good condition.

LATHE

24"x20' Lodge & Shipley Selective Geared Head, for motor drive, swing 27½", 14' 9" centers. Serial over 27,000. Excellent.

MARR-GALBREATH MACHINERY CO.
53 Water St. Pittsburgh, Pa.

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NEW RAILS—5000 tons—All Sections—All Sizes.
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ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.
Buy from One Source—Save Time and Money
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L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

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Rolling mill, 18 or 20 inch four high. 4½" to 5" power driven work rolls. Furnish full description and quote lowest cash price.

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ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

✦ ✦ ADVERTISING INDEX ✦ ✦

Where-to-Buy Products Index carried in first issue of month.

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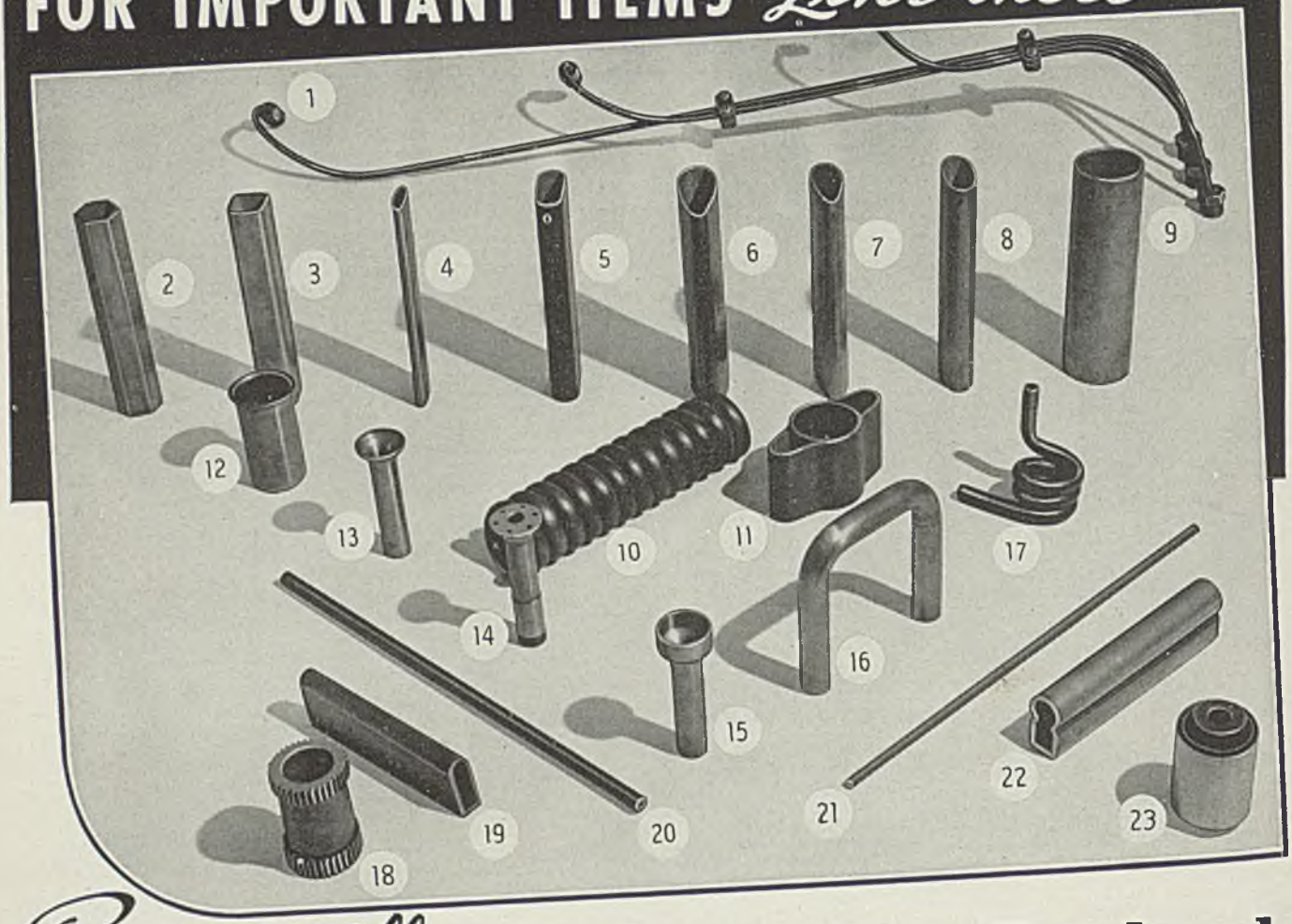

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