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STEEL

ESTABLISHED 1882

Contents

Volume 108—No. 19 **May 12, 1941**

HIGHLIGHTING THIS ISSUE OF STEEL

ONLY one conclusion can be drawn from recent government moves: There is not going to be enough steel to fill all civilian requirements. The order that all producers, distributors and consumers (p. 111) furnish sworn monthly statements of their metal inventories effectually will prevent consumers from building up stocks in anticipation of future shortages. Steel and other metal requirements for defense continue to multiply rapidly and last week's order (p. 45) placing all metals on the priorities critical list can result only, as time goes on, in making it more difficult to get them for nondefense purposes. The automobile industry (p. 37) will be lucky if it takes a cut of no more than 50 per cent in 1942.

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Hard-headed observers in the steel industry do not see expansion as the way out. With Washington estimating (p. 21) that combined defense, civilian and British needs will require 110,000,000 to 120,000,000 tons of ingots in 1942, civilians are bound to do with much less steel. The task involved is viewed as fantastic; it could be carried out only by hamstringing defense through diversion of materials and manpower. Furthermore, the effort could not begin to bear fruit in less than a year . . . The machine tool industry will deliver in 1941 the requested $750,000,000 worth of its product, declares F. V. Geier (p. 49). However, advices from Washington indicate machine tool demand is to be stepped up greatly.

Ambitious For Capacity

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Steel production regained some more of the ground lost in the coal strike, moving up 2½ points (p. 25) to 97½ per cent of ingot capacity . . . Finished steel sales (p. 111) are 25 per cent above current production . . . Maximum prices on scrap aluminum (p. 34) are one cent lower and premiums may be charged on secondary aluminum ingots in small lots . . . The iron and steel scrap price schedule (p. 35) has been revised . . . A plan is beig worked out (p. 46) to keep track of mill supply inventories in hands of distributors . . . Less tin (p. 50) will be used on tin cans . . . Machine tool prices (p. 32) have been "frozen" . . . Despite contrary claims, labor trouble may bog down the defense program, declares (p. 26) A. H. Timmerman.

Schedule On Scrap Revised

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For a detailed production story on tank manufacture (p. 58) where G. W. Birdsall, STEEL's engineering editor, tells of practice at Rock Island Arsenal. . . . Some of the remarkable production being obtained in our aircraft plants is typified in the story (p. 71) of expansion at Pratt & Whitney where aircraft engine assembly operations were transferred to a new plant without interrupting production. . . . Harold Lawrence continues his helpful discussion (p. 77) on how to obtain X-ray perfect welds. . . . William F. Horsch tells (p. 90) about "shatterproof" steel pipe that is helping safeguard water, oil, gas supplies in defense areas. . . . James Hait describes (p. 92) an unusually effective abrasion resistant bearing.

Tank Making at Rock Island

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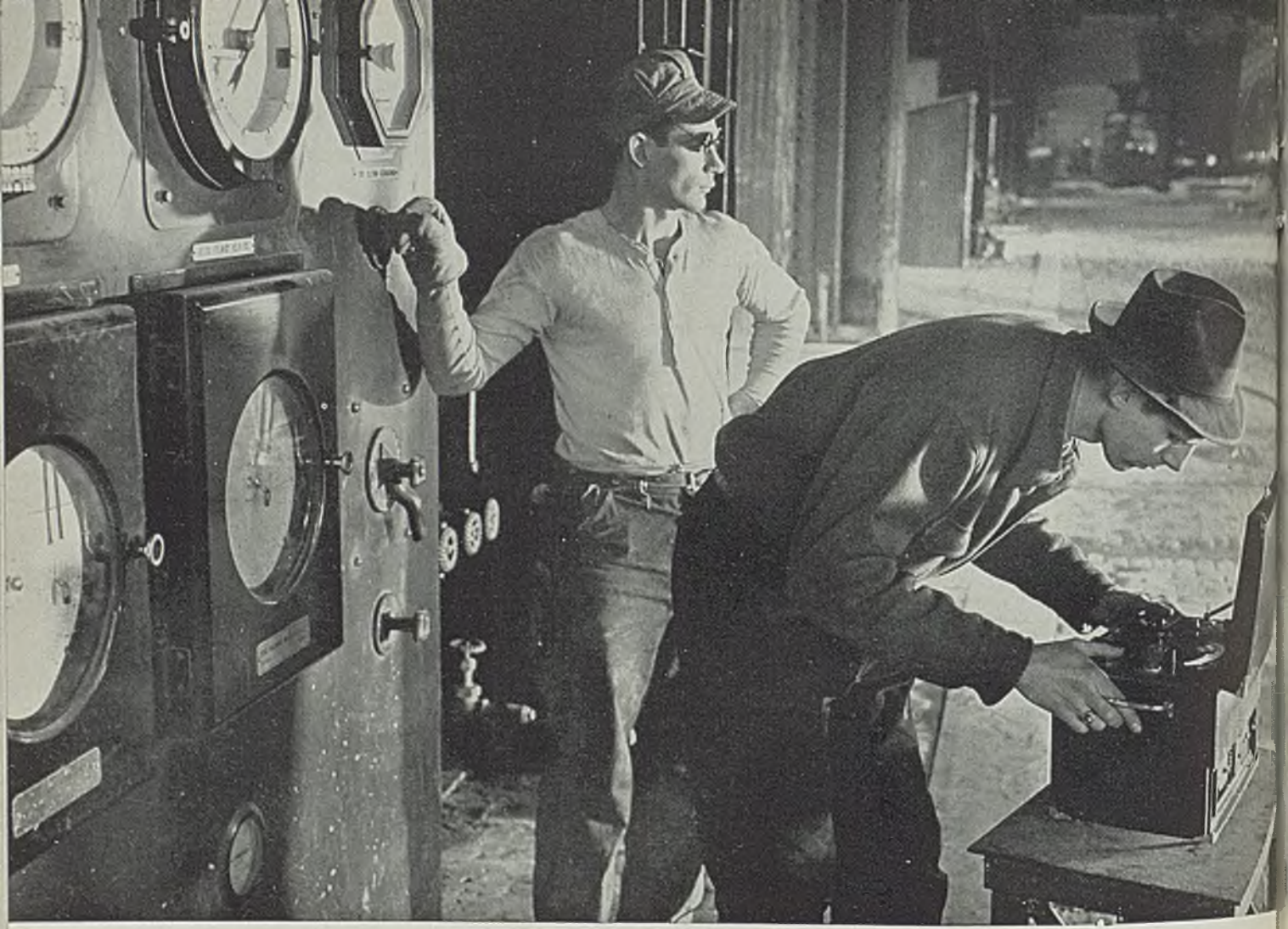
Dudley B. Clark reports (p. 84) on one of the first large scale industrial tube converters to be used in the steel industry for severe service. . . . A new tin fluxing agent (p. 95) is said to act fast, to be free from uncombined hydrochloric acid and to be especially suited for hot tinning and soldering. . . . How the metallurgy of induction hardening classifies it as "different" is explained (p. 96) by W. E. Benninghoff and H. B. Osborn Jr. where they tell about heating and quenching cycles less than a second in length. . . . Professor Macconochie answers (p. 57) some questions concerning lubricants for shell and cartridge manufacture. . . . Modern arc welding saves one company 32 per cent in cost and 17 per cent in weight of making jigs and fixtures for defense work.

Tin Fluxing Agent Is Fast



Inland is training tomorrow's skilled steelmakers

THROUGHOUT the Inland Plant are many highly talented young men—the skilled steelmakers of tomorrow. Each one is carefully chosen because of background experience with Inland, engineering or metallurgical education, and general all around character and ability.

At first, these young steel technicians are kept busily engaged in familiarizing themselves with Inland equipment, methods and standards. They then spend many months in practical training under the close tutelage of Inland master steelmakers and expert metallurgists. Step by step they learn to check current production practices, and to perform the tests made in every Inland steelmaking department. Gradually they acquire a thorough working knowledge of the way Inland produces steel of highest uniform quality, and how Inland meets the exact requirements of each customer.

These young steelmakers also assist in investigations of new processes and methods. They are trained to understand that quality steelmaking is a progressing art, that steel qualities of the past are not good enough today; and, new qualities will be in demand tomorrow.

When the time comes for these young Inland steelmakers to take over, they will be thoroughly steeped in the Inland traditions of thoroughness, quality and progress.

This training program makes certain that every department in the Inland Plants will always be manned by aggressive steelmakers of exceptional skill.

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Era of Steel Scarcity Just Ahead; Large-Scale Expansion Not Practical

OPM officials now estimate 110,000,000 to 120,000,000 tons capacity needed in 1942 . . . Washington talk deals with 25 new blast furnaces, financed by government . . . Fantastic heights for raw materials and transportation requirements

■ LAST WEEK the steel industry gave grave consideration to possible future expansion in iron and steelmaking capacity. Before the Ways and Means Committee of the House, Leon Henderson, OPACS director, insisted that the 92,000,000-ton ingot capacity which is to be in existence by March 1942 will not be enough. While he did not go into detail it was learned that OPM officials now estimate at 110,000,000 to 120,000,000 tons the combined defense, civilian and British needs in 1942.

Expansion of steel capacity, say, to 120,000,000 tons of ingots a year would be so vast an undertaking that the steel industry sees it as fantastic. It would be a confounding task in normal times. To accomplish it under today's conditions would mean diversion of vast numbers of man-hours and a large amount of material from the vital defense program.

For example, talk in government circles at Washington deals with 25 contemplated new blast furnaces, to be financed, if necessary, by the government. Construction of this number of furnaces, each with capacity for producing 1000 tons of pig iron a day, would require a total of 37,500 tons of plates and 12,500 tons of castings.

To operate these units it would be necessary to furnish to them coke and iron ore not at present available because there already is a shortage in coking capacity, while the Lake fleet of ships has all it can do to bring down a supply of ore for existing furnaces.

Twenty-five additional stacks with capacity for 1000 tons daily would consume 16,406,250 gross tons of iron ore a year. This would require extensive expansion of equipment at the mines and of the transportation system from mines to upper lake ports. To bring down this ore during the navigation season would require 40 new vessels making from 22 to 25 trips a year. The vessels considered for this calculation are the new type recently ordered, which will carry an estimated 17,500 tons per trip. These vessels require approximately 6000 tons of steel and machinery for construction or a total of 240,000 tons of steel and machinery for 40 of them. Such a construction program would entail huge expansion in shipbuilding facilities and in supplier plants. Then it would be necessary to expand unloading, transportation and storage facilities at and beyond lower lake ports on a parallel scale.

New Coke Ovens Required

Magnitude of the unloading and storage problem that would have to be solved at lower lakes ports can be indicated by some facts and figures. Fourteen standard hopper-type cars used by the Pennsylvania New York Central, Baltimore & Ohio and Erie railroads, loaded to capacity, are required to carry 1000 tons of ore. A Pennsylvania mountain type locomotive can take 33 cars away from the Pennsylvania dock in Cleveland, the bottleneck being the pull uphill from the lake shore. A day's supply of one 1000-ton furnace requires 27 carloads of ore. One dock of four Hulett machines can unload 12,000 tons of ore in five hours; it takes three years or more to train men to operate these machines.

It already is difficult to get enough coke to go around so that the requirements of coke for 25 additional furnaces would have to come from coke ovens to be constructed. Estimated coke requirements for the contemplated stacks would be 6,640,375 gross tons annually which would require in the neighborhood of 1700 new by-product coke ovens. The ovens, together with auxiliary equipment, would require a considerable tonnage of steel. By-product plants, again involving steel, would have to be built.

To make this coke 9,765,000 additional gross tons of coal would be required annually—again involving vast expansion at the mines and in transportation facilities.

For fluxing purposes these 25 stacks would require an additional 3,246,250 gross tons of limestone, again entailing expansion in productive and transportation and handling facilities.

But, that would not be enough additional blast furnaces. Counting an average of 350 producing days a year, each of these furnaces would produce about 350,000 tons of pig iron a year. Counting the fact that it now is difficult to meet expanding pig iron demand, and also that there is great difficulty in obtaining sufficient scrap, at least 82,080,000 tons of pig iron would be necessary to support steel ingot output of 120,000,000 tons annually. In 1940 pig iron ca-

pacity was 57,610,000 net tons, so that the additional tonnage that would be required comes to 24,470,000 tons. That would require 70, not 25, additional blast furnaces.

Of comparable magnitude would be the execution of the contemplated expansion in steelmaking facilities. In 1940 steel ingot capacity was 84,159,292 net tons. Expansion now under way should bring the figure to around 92,000,000 by next March.

A further expansion to 120,000,000 tons, practical steelmakers believe, is just not feasible for a number of reasons. The main one is the immense diversion from defense effort which would be needed to permit the program to be carried out. Another is the length of time that would be required to complete it. As just one illustration, the earliest delivery promise now obtainable on overhead traveling cranes is 15 months. It would be at least a year before the effort could begin to bear fruit no matter how much emphasis were put behind it.

Many Complications

There are all sorts of complications. Most of those who would have to participate in the expansion program already have serious problems due to difficulty in obtaining engineers, designers, equipment, skilled labor and materials already required for defense work. The builders of heavy steelworks equipment in most cases now are manufacturing key ordnance.

To indicate the scope of the project it may be stated that to increase ingot output from 92,000,000 to 120,000,000 tons annually 325 additional open-hearth furnaces of 150 tons capacity would have to be built. This would mean the large-scale installation of equipment of vast variety of which hot metal mixers, charging machines, cranes, locomotives, charging boxes, ingot buggies and stools, instruments, ladles, are but a few. The problem of furnishing the needed refractories alone would assume appalling magnitude.

It will be noted that the 120,000,000-ton estimate allows for United States defense, civilian and British requirements. If the program cannot be carried out—and practical steel men do not believe it feasible or desirable from the standpoint of our best national interests—then there is an important inference for steel consumers.

That is, there will not be enough steel to go around. It will become increasingly difficult to get steel for nondefense use. Indications are that the currently ordered further stepping up of airplane and other ordnance production on a scale hitherto undreamed of will result in the same situation with respect to steel that now prevails with some other materials, like aluminum and stainless steel, which for some time have been obtainable only for defense work.

The latest developments in Washington warn of the rapid trend in this direction. The control under which all producers, distributors and consumers (STEEL, May 5, p. 25) must submit sworn statements of their steel and metal inventories each month effectually will prevent consumers from building up inventories in anticipation of future shortages. The placing of all metals "except a few precious ones" in the priorities list (p. 45) is another indicator that a crack-down on "business-as-usual" is in sight. It is now clearly apparent that there will not be enough steel and other metals to support nondefense production in present volume.

Committee of 38 Named to Mobilize Iron, Steel Facilities for Defense

Committee of 38 executives from the iron and steel industry was organized last week to work with the Office of Production Management in mobilizing all the facilities of the industry for national defense. The group will be known as the Iron and Steel Industry Defense Committee.

Creation of the committee took place at a meeting of chief executives of nearly 150 companies who met May 7 in the Waldorf-Astoria, New York. Walter S. Tower, president of the American Iron and Steel Institute, presided.

Another industry meeting will be held in about three months. The committee will meet whenever it is deemed necessary.

An executive subcommittee was elected as follows: B. F. Fairless, chairman; E. G. Grace, T. M. Girdler, Henry A. Roemer, W. F. Det-

Personnel of Defense Group

T. R. Akin	President	Laclede Steel Co., St. Louis
A. K. Andrews	President	Andrews Steel Co., Newport, Ky.
S. E. Bramer	President	Copperweld Steel Co., Glassport, Pa.
W. F. Detwiler	Chairman	Allegheny Ludlum, Brackenridge, Pa.
B. F. Fairless	President	United States Steel Corp., Pittsburgh
F. R. Frost	President	Superior Steel Corp., Pittsburgh
T. M. Girdler	Chairman	Republic Steel Corp., Cleveland
E. G. Grace	President	Bethlehem Steel Co., Bethlehem, Pa.
W. W. Holloway	Chairman	Wheeling Steel Corp., Wheeling, W. Va.
C. R. Hook	President	American Rolling Mill Co., Middletown, O.
J. P. Hosack	Vice-Pres.	Mahoning Valley Steel Co., Niles, O.
Elton Hoyt II	Partner	Pickands, Mather & Co., Cleveland
F. B. Hufnagel	Chairman	Crucible Steel Co. of America, New York
E. J. Kulas	President	Otis Steel Co., Cleveland
H. E. Lewis	Chairman	Jones & Laughlin Steel Corp., Pittsburgh
Roy McKenna	President	Vanadium Alloys Steel Co., Latrobe, Pa.
Hugh Morrow	President	Sloss-Sheffield, Birmingham, Ala.
H. Niedringhaus	President	Granite City Steel Co., Granite City, Ill.
E. L. Parker	President	Columbia Steel & Shafting Co., Pittsburgh
J. H. Parker	President	Carpenter Steel Co., Reading, Pa.
J. L. Perry	President	Carnegie-Illinois Steel Corp., Pittsburgh
Frank Purnell	President	Youngstown Sheet & Tube Co., Youngstown
L. F. Rains	President	A. M. Byers Co., Pittsburgh
S. J. Reeves	Vice-Pres.	Reeves Steel & Mfg. Co., Dover, O.
Arthur Roeder	Chairman	Colorado Fuel & Iron Corp., New York
H. A. Roemer	Chairman	Sharon Steel Corp., Sharon, Pa.
E. L. Ryerson	Chairman	Inland Steel Co., Chicago
W. H. Sommer	President	Keystone Steel & Wire Co., Peoria, Ill.
C. F. Stone	President	Atlantic Steel Co., Atlanta, Ga.
W. S. Tower	President	American Iron and Steel Institute, New York
C. E. Tuttle	President	Rustless Iron & Steel Corp., Baltimore
Wilbert Wear	President	Harrisburg Steel Corp., Harrisburg, Pa.
A. C. Weihl		Pollak Steel Co., Cincinnati
E. T. Weir	Chairman	National Steel Corp., Pittsburgh
J. T. Whiting	President	Alan Wood Steel Co., Conshohocken, Pa.
D. A. Williams	President	Continental Steel Corp., Kokomo, Ind.
R. W. Wolcott	President	Lukens Steel Co., Coatesville, Pa.
E. H. Worth	President	Worth Steel Co., Claymont, Del.

wiler, F. R. Frost, and E. L. Parker.

There will be no standing subcommittees on products as originally considered. This is because of the different problems—operating, metallurgical and commercial—which are likely to develop in connection with each product. Chairman and other necessary officers may be appointed for each specific meeting.

However, there will be 17 general subdivisions, including in addition to iron and steel products, coke, scrap, aluminum, nickel and zinc. Subdivisions for iron and steel products cover pig iron, cold-finished bars, hot-rolled bars, both carbon and alloy; plates, sheets, strip, shapes, tin plate, tool steels, tubular products, wire and stainless steels.

One of the committee's early problems may be the reallocation of steel orders where they are found to be bunched with too few producers. This has been recommended in several quarters.

Institute Names Committee On Commercial Research

Appointment of a Committee on Commercial Research was announced last week by the American Iron and Steel Institute. Its work will include analysis of steel requirements of various consuming industries under the defense program, and the results will be made available to the Office of Production Management.

Membership on the committee comprises the men in charge of analyzing commercial and market conditions for five of the leading steel companies. They will make periodical reports on the conditions in and the outlook for steel markets.

C. H. H. Weikel, manager of commercial research, Bethlehem Steel Co., is chairman. Other members are D. R. G. Cowan, manager of market research, Republic Steel Corp.; K. J. Evans, manager of sales promotion, Inland Steel Co.; K. G. Fuller, manager of market research, United States Steel Corp. of Delaware, and H. K. Weir, assistant secretary-assistant treasurer, National Steel Corp.

Chief of Bureau of Ships Urges Steel Rationing

Rationing system for steel as strict as that for aluminum was recommended to the House Naval Affairs Committee last week by Rear Admiral Samuel M. Robinson, chief of the Navy Bureau of Ships.

He presented the committee an optimistic report on the progress of warship construction but said shipyards now are using materials as rapidly as they get them.

"There is not enough steel in this country for everything," Admiral Robinson testified. "Steel is going to have to be rationed like aluminum. That is a question that has got to be decided soon."

Administration sources disclosed that the administration has revised its estimate of the amount of steel that will be needed in 1942 from 91,000,000 to between 110,000,000 and 120,000,000 tons.

Metals Reserve Purchases Now Total $608,935,000

Metals Reserve Corp.'s commitments to purchase metals totaled $608,935,000 as of April 30, Loan Administrator Jesse Jones revealed last week in report to the President and Congress.

Defense Plant Corp., another RFC subsidiary, has made commitments of $511,409,447 for plant sites, construction and machinery.

Mr. Jones gave this breakdown of Metals Reserve Corp. purchases of metals:

Chinese antimony, $1,903,000, 6796 tons delivered; domestic antimony, $780,000, 250 tons delivered, 2750 on order; South African chrome ore, $24,049,000, 12,457 tons delivered, 138,593 on order; Philippine chrome ore, $3,166,000, 148,000 tons on order; Latin American copper, $140,110,000, 106,722 tons delivered, 393,777 on order; Far Eastern manganese ore, $20,533,000, 172,866 tons delivered, 393,940 on order; Latin American manganese ore, $15,023,000, 16,149 tons delivered, 439,945 on order; domestic manganese ore $53,155,000, 1,490,000 tons on order; domestic tungsten trioxide, $2,875,000, 1250 tons on order; Far Eastern tin, $168,000,000, 30,375 tons delivered, 11,350 on order; Bolivian tin, $100,000,000, 90,000 tons on order; zinc, $8,250,000, 50,000 tons on order.

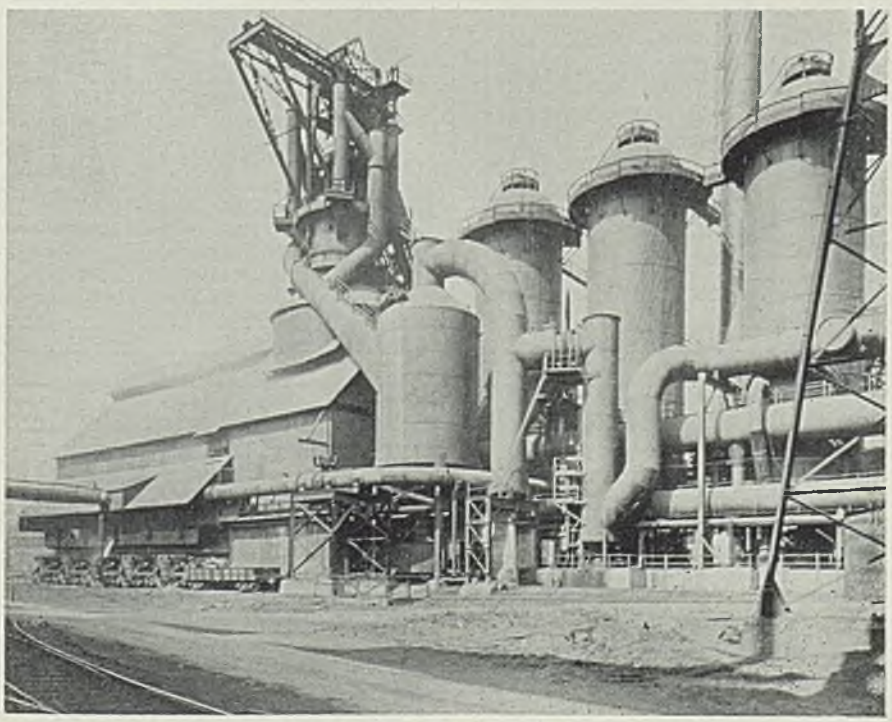
With strict controls imposed on many of the metals the government is expected to make strenuous efforts to increase stockpiles.

Shell for Rebuilt Bethlehem Stack All-Welded

The shell of this recently rebuilt blast furnace at Bethlehem Steel Co.'s Steelton, Pa., plant is all-welded.

Hearth diameter was increased from 16 feet to 18 feet. Bosh diameter is 22 feet 6 inches; height 88 feet 2 inches. Each of the three stoves, 24 feet x 100 feet, have 191,000 square feet of heating surface. The furnace has a rated capacity of 667 tons per day.

The new shell which was fabricated in seven rings varying in height from 6 feet 1¼ inches to 10 feet 1½ inches was supported during construction by attaching it at two points to the old construction. The first ring was welded to the mantle plate angle outside of the old shell, the successive rings erected and welded on the outside, the seventh ring attached to the upper ring of the old shell, after which the remaining rings of the old shell were removed and the welding on the inside of the new shell completed.



March Finished Steel Output 5,411,319 Tons

■ Finished steel produced for sale in March totaled 5,411,319 net tons, 546,383 tons more than was made during February, according to the American Iron and Steel Institute. Exports in March were 491,519 tons, or 9.07 per cent of the total, compared with 560,035 tons, or 11.5 per cent, in February.

Shipments to other members of the industry for further conversion into finished steel products aggregated 365,737 tons, against 277,863 tons in February.

For the first quarter, finished steel output totaled 15,422,703 tons of which 1,609,185 tons were shipped abroad.

During March sheets represented the most active major product, output of 1,199,469 tons being 107.3 per cent of capacity. In the "all other" classification, 1440 tons was produced, this being 186.3 per cent of capacity.

Following is a summary of reports by months, in net tons:

1940	Output	Exported	Pet. Exported
April	3,005,218	371,532	12.37
May	3,576,860	476,761	13.33
June	3,802,485	601,668	15.8
July	4,173,839	835,385	20.0
Aug.	4,649,065	1,053,110	22.6
Sept.	4,446,555	951,555	21.4
Oct.	4,937,388	783,652	15.87
Nov.	4,760,948	562,587	11.82
Dec.	4,909,448	713,802	14.5
Year	48,584,860	7,683,858	15.8
1941			
Jan.	5,163,912	558,198	10.8
Feb.	4,864,936	560,035	11.5
March	5,411,319	491,519	9.07

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

March - 1941 (period)

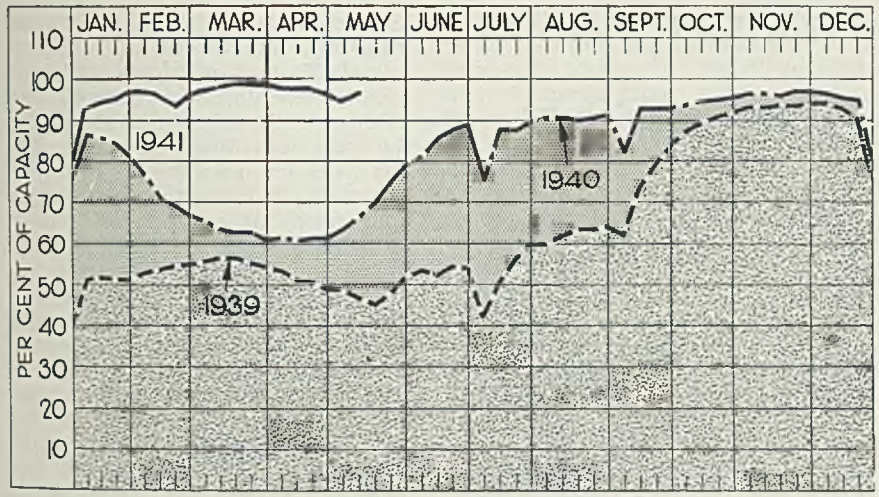
	Number of companies	Items	* Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS											
Ingots, blooms, billets, slabs, sheet bars, etc.	32	1	xxxxxxx	529,341	xxx	144,775	159,443	1,650,770	xxx	578,816	405,219
Heavy structural shapes	8	2	5,175,800	374,135	85.1	12,849	xxxxxxx	1,065,266	83.4	57,815	xxxxxxx
Steel piling	4	3	360,000	22,663	74.1	3,424	xxxxxxx	62,841	70.8	6,269	xxxxxxx
Plates—Sheared and Universal	19	4	6,178,270	456,612	87.0	43,720	2,210	1,299,360	85.3	128,320	6,665
Skelp	8	5	xxxxxxx	96,189	xxx	16,257	37,518	248,705	xxx	34,503	109,110
Rails—Standard (over 60 lbs.)	4	6	3,613,600	157,796	51.4	9,710	xxxxxxx	431,126	48.4	27,204	xxxxxxx
Light (60 lbs. and under)	6	7	302,800	17,643	68.6	7,191	xxxxxxx	50,586	67.7	20,264	xxxxxxx
All other (Incl. girder, guard, etc.)	2	8	102,000	2,012	23.2	115	xxxxxxx	5,691	22.6	1,040	xxxxxxx
Splice bar and tie plates	15	9	1,300,200	69,817	63.2	2,089	xxxxxxx	181,193	56.5	5,711	xxxxxxx
Bars—Merchant	35	10	xxxxxxx	543,707	xxx	61,480	30,980	1,618,437	xxx	192,466	185,095
Concrete reinforcing—New billet	15	11	xxxxxxx	124,043	xxx	20,375	xxxxxxx	336,395	xxx	58,954	xxxxxxx
Rerolling	17	12	xxxxxxx	10,572	xxx	1,257	xxxxxxx	29,026	xxx	2,613	xxxxxxx
Cold finished—Carbon	19	13	xxxxxxx	109,313	xxx	1,785	xxxxxxx	294,089	xxx	5,700	xxxxxxx
Alloy—Hot rolled	15	14	xxxxxxx	145,160	xxx	11,456	14,303	394,685	xxx	39,605	38,725
Cold finished	15	15	xxxxxxx	15,410	xxx	1,844	xxxxxxx	41,296	xxx	5,256	xxxxxxx
Hoops and baling bands	5	16	xxxxxxx	9,725	xxx	472	xxxxxxx	23,850	xxx	820	xxxxxxx
TOTAL BARS	52	17	12,678,585	957,930	88.9	98,669	95,283	2,737,778	87.6	305,414	223,818
Tool steel bars (rolled and forged)	15	18	127,870	8,777	80.8	443	xxxxxxx	25,432	80.6	2,174	xxxxxxx
Pipe and tube—B. W.	13	19	2,029,200	122,568	71.1	10,105	xxxxxxx	371,559	74.2	25,427	xxxxxxx
L. W.	9	20	1,080,260	39,350	42.9	3,826	xxxxxxx	114,892	43.1	6,379	xxxxxxx
Electric weld	5	21	692,520	38,045	64.7	440	xxxxxxx	92,487	54.1	1,463	xxxxxxx
Seamless	15	22	3,143,190	184,022	68.9	16,497	xxxxxxx	504,502	65.1	48,243	xxxxxxx
Conduit	6	23	152,145	11,323	87.6	215	xxxxxxx	32,621	86.9	404	xxxxxxx
Mechanical Tubing	12	24	514,975	40,792	93.2	3,291	xxxxxxx	112,418	88.5	12,799	xxxxxxx
Wire rods	18	25	xxxxxxx	131,971	xxx	17,751	21,120	381,874	xxx	47,325	63,646
Wire—Drawn	36	26	2,299,340	186,165	95.3	13,547	1,815	526,359	92.8	38,464	5,671
Nails and staples	19	27	1,137,090	72,806	75.4	6,370	xxxxxxx	208,715	74.4	15,736	xxxxxxx
Barbed and twisted	16	28	448,770	24,701	64.8	5,014	xxxxxxx	70,553	63.7	15,159	xxxxxxx
Woven wire fence	15	29	786,790	30,411	45.5	302	xxxxxxx	82,746	42.6	688	xxxxxxx
Bale ties	11	30	124,450	6,947	65.7	4	xxxxxxx	15,676	51.1	40	xxxxxxx
All other wire products	5	31	27,030	544	23.7	-	xxxxxxx	1,438	21.6	-	xxxxxxx
Fence posts	14	32	147,645	5,522	44.0	61	xxxxxxx	17,479	48.0	276	xxxxxxx
Black plate	11	33	542,935	34,027	73.8	1,147	-	89,291	66.7	3,017	8
Tin plate—Hot rolled	7	34	842,200	21,072	29.4	1,282	xxxxxxx	60,749	29.2	2,644	xxxxxxx
Cold reduced	10	35	3,038,860	231,152	89.5	18,378	xxxxxxx	605,672	80.8	50,563	xxxxxxx
Sheets—Hot rolled	23	36	xxxxxxx	669,915	xxx	26,496	22,887	1,913,409	xxx	87,158	57,264
Galvanized	14	37	xxxxxxx	159,652	xxx	10,547	xxxxxxx	458,955	xxx	33,733	xxxxxxx
Cold rolled	15	38	xxxxxxx	299,744	xxx	5,930	xxxxxxx	847,199	xxx	17,986	xxxxxxx
All other	13	39	xxxxxxx	70,158	xxx	1,733	xxxxxxx	203,825	xxx	5,690	xxxxxxx
TOTAL SHEETS	26	40	13,151,570	1,199,469	107.3	44,706	22,887	3,423,388	105.5	144,567	57,264
Strip—Hot rolled	23	41	3,522,380	180,300	60.2	7,212	25,461	512,708	59.0	22,584	67,634
Cold rolled	34	42	1,385,560	102,251	86.9	1,584	xxxxxxx	288,035	84.3	4,396	xxxxxxx
Wheels (car, rolled steel)	5	43	422,825	22,288	62.0	6	xxxxxxx	62,626	60.1	151	xxxxxxx
Axles	4	44	472,280	15,134	37.7	144	xxxxxxx	42,469	36.5	154	xxxxxxx
Track spikes	11	45	327,275	16,104	57.9	395	xxxxxxx	42,260	52.4	875	xxxxxxx
All other	4	46	9,100	1,440	186.3	-	xxxxxxx	3,438	153.2	301	xxxxxxx
TOTAL STEEL PRODUCTS	131	47	xxxxxxx	5,411,319	xxx	491,519	365,737	15,422,703	xxx	1,609,185	939,052
Pig iron, ferro manganese and spiegel	24	48	xxxxxxx	681,126	xxx	44,119	200,762	1,969,506	xxx	134,742	591,842
Ingot moulds	4	49	xxxxxxx	66,403	xxx	297	xxxxxxx	182,498	xxx	382	xxxxxxx
IRON PRODUCTS											
Bars	9	50	109,195	5,603	60.4	1	117	14,704	54.6	2	705
Pipe and tubes	3	51	109,300	5,191	55.9	52	xxxxxxx	15,197	56.4	122	xxxxxxx
All other	2	52	71,000	1,537	25.5	160	-	5,011	28.6	767	-
TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	224,995	12,331	64.5	213	117	34,912	62.9	891	705

* To be revised

Total number of companies included - 148

The estimated average yield of products for sale from ingots produced by the companies included above is 71.2 % *which applied to their total ingot capacity equals* 57,533,200 *net tons of finished rolled products. Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:*

Current month 5,045,582 *N. T.* 103.2 %
Year to date 14,483,651 *N. T.* 102.1 %



PRODUCTION . . . . Up

■ STEELWORKS operations last week increased 2½ points to 97½ per cent as effects of the coal strike diminished. Four districts gained, two declined and six were unchanged. A year ago the rate was 66.5 per cent; two years ago it was 47 per cent.

Detroit—With three open hearths idle for repairs the rate continued at 88 per cent.

St. Louis—Unchanged at 98 per cent. One producer plans to reline two open hearths this or next week.

Cincinnati — Repairs to open hearths reduced the rate 1½ points to 89 per cent.

Chicago — Rebounding sharply from effects of the coal strike, operations gained 5½ points to 101½ per cent, only ½-point below the all-time high of 102. Carnegie-Illinois Steel Corp. blew in another blast furnace May 6 and now has all its coke ovens at Joliet, Ill., in service.

Central eastern seaboard—Steady at 95 per cent. Effects of the coke shortage are still being felt. A rise is expected this week.

Buffalo — Continued at 90½ per cent although pig iron production is still low.

New England—Dropped 5 points to 90 per cent but may advance to 100 per cent this week.

Pittsburgh—Advanced 1 point to 94 per cent, with indications for further increase this week.

Wheeling—Steady at 88 per cent last week.

Birmingham, Ala.—For the tenth week continued at 90 per cent.

Cleveland — With two producers at 100 per cent and a third at 92 per cent the rate gained 4 points to 96½ per cent.

Youngstown, O.—Up 6 points to 95 per cent. Outlook for this week is 97 per cent as bessemer output will be increased.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended May 10	Change	Same week 1940	Same week 1939
Pittsburgh	94	+ 1	61.5	36
Chicago	101.5	+ 5.5	65.5	46.5
Eastern Pa.	95	None	57	37
Youngstown	95	+ 6	53	42
Wheeling	88	None	88	64
Cleveland	96.5	+ 4	71	45.5
Buffalo	90.5	None	58	35
Birmingham	90	None	83	55
New England	90	— 5	53	45
Cincinnati	89	— 1.5	61	52
St. Louis	98	None	45	51
Detroit	88	None	70	59
Average	97.5	+ 2.5	66.5	47

Steel Ingot Statistics

Estimated Production—All Companies

	Open Hearth Net tons	Open Hearth Per cent of capacity	Bessemer Net tons	Bessemer Per cent of capacity	Electric Net tons	Electric Per cent of capacity	Total Net tons	Total Per cent of capacity	Calculated weekly production, all companies Net tons	Number of weeks in month
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan.	6,271,862	99.0	451,637	76.0	205,256	93.4	6,928,755	93.9	1,564,053	4.43
Feb.	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar.	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,407,087	100.1	1,290,136	74.8	601,073	94.2	20,298,296	97.8	1,578,406	12.86
Apr.	6,130,638	99.9	395,009	68.6	232,081	109.1	6,757,728	97.6	1,575,228	4.29
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1940										
Jan.	5,356,444	85.7	285,447	56.1	122,832	77.0	5,764,723	83.4	1,301,292	4.43
Feb.	4,208,249	72.1	205,458	43.2	112,090	75.2	4,525,797	70.0	1,093,188	4.14
Mar.	4,078,843	65.3	191,568	37.6	118,772	74.5	4,389,183	63.5	990,786	4.43
1st quar	13,643,536	74.4	682,473	45.7	353,694	75.6	14,679,703	72.3	1,129,208	13.00
Apr.	3,808,031	62.9	176,419	35.8	116,024	75.1	4,100,474	61.2	955,821	4.29
May	4,583,771	73.4	258,741	50.8	125,270	78.5	4,967,782	71.8	1,121,395	4.43
June	5,222,120	86.3	305,115	61.9	130,208	84.3	5,657,443	84.5	1,318,751	4.29
2nd qtr.	13,613,922	74.2	740,275	49.5	371,502	79.3	14,725,699	72.5	1,131,875	13.01
1st half	27,257,458	74.3	1,422,748	47.6	725,196	77.4	29,405,402	72.4	1,130,542	26.01
July	5,269,701	84.5	322,567	63.5	132,357	83.2	5,724,625	83.0	1,295,164	4.42
Aug.	5,670,932	90.8	369,770	72.6	145,681	91.3	6,186,383	89.5	1,396,475	4.43
Sept.	5,535,198	91.7	365,289	74.2	155,759	101.1	6,056,246	90.6	1,415,011	4.28
3rd qtr.	16,475,831	89.0	1,057,626	70.1	433,797	91.7	17,967,254	87.7	1,368,412	13.13
9 mos.	43,733,289	79.2	2,480,374	55.1	1,158,993	82.2	47,372,656	77.5	1,210,339	39.14
Oct.	6,059,792	97.0	408,317	80.2	176,433	110.6	6,644,542	96.1	1,499,897	4.43
Nov.	5,872,162	97.1	420,448	85.3	176,497	114.2	6,469,107	96.6	1,507,950	4.29
Dec.	5,907,840	94.8	399,434	78.6	188,083	118.2	6,495,357	94.1	1,469,538	4.42
4th qtr.	17,839,794	96.3	1,228,199	81.3	541,013	114.3	19,609,006	95.6	1,492,314	13.14
Total	61,573,083	83.5	3,708,573	61.7	1,700,006	90.3	66,981,662	82.1	1,281,210	52.28

The percentages of capacity for 1940 are calculated on weekly capacities of 1,410,130 net tons open hearth, 114,956 net tons Bessemer and 36,011 net tons electric ingots and steel for castings, total 1,561,097 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth 73,721,592 net tons, Bessemer 6,009,920 net tons, electric 1,882,630 net tons.

The percentages of capacity for 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons Bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, Bessemer 6,996,520 net tons, electric 2,586,320 net tons.

Ingot Output Reduced 373,913 Tons in April

■ Production of steel ingots and castings in April totaled 6,757,728 net tons compared with the revised figure of 7,131,641 tons for March, according to the American Iron and Steel Institute. The reduction—373,913 tons—was due mainly to the coal strike and the fact April had one less working day than March. Compared with April, 1940, the increase was nearly 65 per cent.

Production was at an average rate of 97.6 per cent of capacity. The revised rate for March was 99.7 per cent. In April, 1940, the rate was 61.2 per cent.

Average weekly production in April was 1,575,228 tons, compared with 1,609,851 tons in March, and 955,821 tons in April last year.

In the accompanying table the institute has revised all figures for 1940 and 1941, to include supplementary reports.

Metals Supply, Labor Ranked Main Problems in National Defense Effort

■ INDUSTRIAL relations as they are influenced by the national defense program keynoted the forty-third annual convention of the National Metal Trades Association in the Palmer House, Chicago, May 8-9.

Problems incident to labor supply and working conditions rank second only to questions of metals supply as the country gives all-out aid to Great Britain and at the same time pursues its own constantly expanding rearmament progam.

In his presidential report, presented before an audience of 300 attending the opening session, A. H. Timmerman, president, Wagner Electric Corp., St. Louis, emphasized that the association, dealing as it does entirely in the field of industrial relations, is in a strategic position to contribute greatly, in a most practical way, to the solution of problems arising from our program for national defense. Recalling experiences during the last war, he compared the situation then with that prevailing now.

Believed in Self Reliance

"Then our people were accustomed to working hard for long hours," said Mr. Timmerman. "We were not softened by too much unemployment, leisure or recreation, and most important of all, in those days we believed in using our self-reliance to work out our own difficulties as individuals, instead of relying on our government to do everything for us. Nor were our plants so generally filled with obsolete machinery nor our business organizations so weakened by years of depression, political attacks, and high taxation. Today about the only offsetting advantage that we have is the experience our country gained from the World war.

"Of course, politics play and will continue to play a very important part in this situation. During the last decade we have seen increasing restrictions and burdens placed upon industry by government, some of which are undoubtedly retarding our defense program.

"A second factor that is contributing to our labor crisis has been the apparent failure or inability of labor leaders to control their own members. This is obvious from the great number of strikes that have been called on the most trivial issues.

"All authorities to the contrary, notwithstanding, the strike threatens to bog down the defense effort in the United States. I say this because today's growing epidemic is a far more violent disease than we have ever known in the history of American industry.

"Every single strike in defense industry to date has, in fact, been for one thing—to strengthen the labor unions in their control over employes and management, and it would appear every step taken by the government since this epidemic of strikes in defense industry started, has resulted in strengthening the hands of labor union leaders and in making the inducement to strike richer.

"In all defense strikes it appears to be the attitude of the government that the increased costs involved in granting to the union of increased wages are nothing so long as the union leaders get what they want, prestige. It is hard for the employer to stand up under such conditions and insist upon holding the reins of management, but management must do so if our free industrial system is to survive. Management cannot yield its prerogatives, and ever expect to have them returned to it. Management cannot sell its employes into the virtual slavery of union labor domination, and ever expect them to be released from the control of labor union leaders.

Would Lower Living Standard

"The loss of management control and the establishment of the closed shop and the check-off which are the ultimate goal of the representatives of union labor, mean restrictions in production, higher costs, increased prices, a lower standard of living, and, in many instances, the absolute ruination of a business. You can't buy industrial peace from a labor union. This has been demonstrated time and time again."

Mr. Timmerman stated that fortunately public opinion is becoming aroused to the situation and the pendulum is gradually swinging back. He made a plea for the association to seek maintenance of free enterprise — for management and for labor alike. Concluding he said:

"Those who would circumscribe the freedom of the manager in industry to manage—and those who would circumscribe the freedom of the laborer in industry to labor—are not contributing to the strength of our American system of free enterprise—they are attacking it and they are threatening its very existence."

There is a general lack of appreciation of the seriousness of the situation confronting the United States, declared Dr. S. S. Stratton, assistant director of minerals and metals, Executive Priorities Division, OPM, Washington. Priority controls are complex and staggering, he said, but they can be worked out with co-operation of business.

Of all priorities, Dr. Stratton stated, those for metals are causing the most trouble, 24 metals now being under some form of control.

C. G. Kopplin, production manager, Union Special Machine Co., Chicago, contributed a paper on "Fundamentals of Production Control," and described the operation of a forum on this subject by the Chicago branch of the Metal Trades Association. Production control, the speaker stated, is "to foresee, to organize, to order and to co-ordinate and control the manufacturing program."

Primary Functions Outlined

Four primary functions of production control are: (1) What to make; (2) how to make it; (3) how many to make; and 4) when manufacturing should start and when it should end. Items 1 and 3 require a fairly reliable sales forecast; item 2 is an engineering function based on operations required, machine tools and fixtures, time for each operation and class of labor; item 4 is a scheduling and dispatching function, because after a program is in operation a constant check of manufacturing against sales to forecast necessary and anticipated drastic changes in demand is vital.

"International Economic Conditions and Ideas and Their Effects on America" was a subject discussed by Dr. Julius Hirsch, New York, internationally-known authority on economics, at the first day's luncheon. After reviewing conditions prevailing abroad, particularly in the totalitarian nations, and comparing them with conditions in America, the speaker stated that in Europe and Asia the task is to ration scarcity—America's problem is to organize the abundance. Dr. Hirsch expressed the belief that when war ends international trade is very unlikely to regain its former significance and forms.

Fundamentals of industrial harmony were outlined by F. Alexander Magoun, associate professor, department of humanics, Massachusetts Institute of Technology, Cambridge, Mass., in a most illuminating address. Good profits, he said, are a result of good goods, and the latter are obtainable only by good men.

Professor Magoun's address served as the introduction to a panel discussion on job, salary and employe rating. Participating in this were: A. L. Kress, director of public relations, National Metal Trades Association, Chicago; T. J. Morton Jr., president, Hoosier Lamp

& Stamping Corp., Evansville, Ind; A. S. Redway, vice president, Farrel-Birmingham Co. Inc., Ansonia, Conn.; A. F. Sheller, executive vice president, Le Roi Co., Milwaukee; G. V. Lang, treasurer, United Engineering & Foundry Co., Pittsburgh; and R. V. Van Valkenburgh, director, production standards department, Bell & Howell Co., Chicago.

Strikes and lockouts affecting defense production were branded "treason," by Col. Louis B. Johnson, former assistant secretary of war, of Clarksburg, W. Va., in an address at the association's banquet.

He told audience of 700 that labor disturbances and debates are wasting precious time, bogging down the defense program, and must be curbed immediately. The Atlantic ocean today is "no man's land," and the United States must take steps to guarantee shipments of war materials supplies reaching England.

Leon Turrou, former ace G-man for the FBI, outlined "fifth column" activities and urged speedy legislation empowering authorities to act drastically against it.

"Supervisory Training" was a subject discussed by Bartley Whiteside, supervisor of training, Curtiss-Wright Corp., Paterson, N. J., and recently appointed consultant for OPM on training in industry.

"The supervisor of today," Mr. Whiteside declared, "must develop and maintain the enthusiasm of those in his group. He must infuse into the workman the desire to attain more closely to perfection and to increase production. He must reduce the employes' mountains of worry to mole hills. The important and outstanding function of the supervisor is to develop men. He is an educator in the real sense of the word."

"Some Union Leaders Dictators"

Some labor union leaders were branded American dictators by Congressman Howard W. Smith of Virginia, speaking at the session Friday. Settlements of some labor disputes, he asserted, are compromises on the bill of rights. Closed shop practice is contrary to the right of every worker to work without paying tribute.

Mr. Smith urged business insist on legislation enforcing law and order and warned, "Don't let service men return to find management has given away their fundamental rights." The convention unanimously adopted a resolution reaffirming adherence to the principle of free management and free working men, and restated the latter's right to work without joining a union.

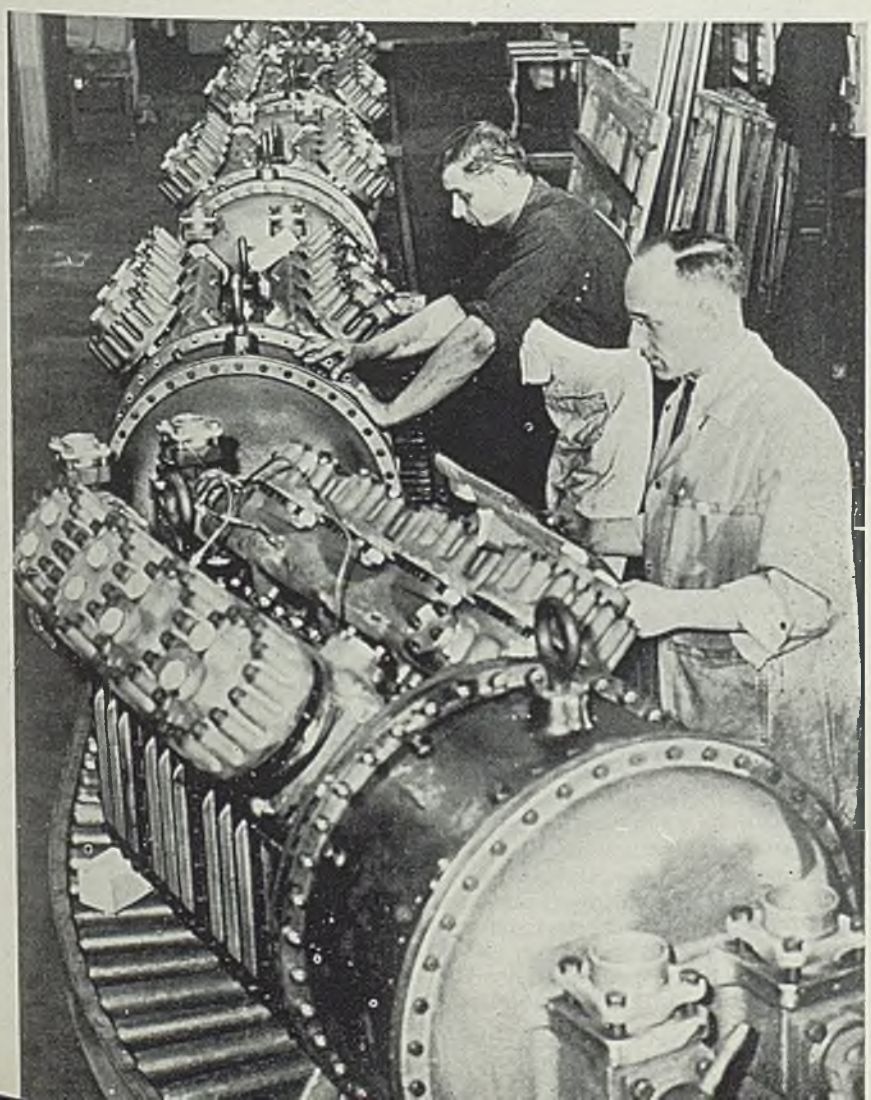
George Seyler, Lunkenheimer Co., Cincinnati, speaking on handling of grievances, suggested interviews conducted when men quit will afford insight on complaints. Prevention of grievances will pay dividends in better morale, he said. The same offense must not be permitted to happen twice. Grievances can be ascertained better when submitted in writing, he pointed out.

W. F. Coleman, W. A. Jones Foundry & Machine Co., Chicago, described a plan for training new employes, including boys and men without previous experience. Beginners are started at 50 cents an hour, boys familiar with automobiles proving most adaptable. Drill press work is given first, then boring mills, lathes, etc. No workers paid out in the first month, he said, some in the second and all in six. Difficulties attendant upon accurate micrometer measuring have been overcome through extensive use of gages.

Officers of the association were re-elected as follows: President, A. H. Timmerman, president, Wagner Electric Corp., St. Louis; first vice president, Roe S. Clark, secretary-treasurer, Package Machinery Co., Springfield, Mass.; second vice president and treasurer, H. H. Kerr, president, Boston Gear Works Inc., North Quincy, Mass.

Re-elected councilors for two years were: Dwight K. Bartlett, Builders Iron Foundry, Providence, R. I.; C. B. Fitts, Standard Electric Time Co., Springfield, Mass.; R. A. Mitchell, Pittsburgh Forgings Co., Coraopolis, Pa.; Otto G. Hitchcock, Hays Mfg. Co., Erie, Pa.; William Baker, Baker Brothers Inc., Toledo, O.; L. D. Adams, Barnes-Gibson-Raymond Inc., Detroit; J. S. Tatman, Roots-Connersville Blower Co., Connersville, Ind.; Louis Ruthenburg, Servel Inc., Evansville, Ind.

New councilors named for two years were: William H. Gates, Baldwin-Duckworth Chain Corp., Worcester, Mass.; F. K. Kilian, Kilian Mfg. Corp., Syracuse, N. Y.; William S. Armstrong, Henry Disston & Sons Inc., Philadelphia; C. R. Rosborough, Moline Tool Co., Moline, Ill.



Compact air conditioning compressors will provide cool and pure air for two defense blackout plants, at Douglas Aircraft Co., Long Beach, Calif., and the United States shell factory at Gadsden, Ala. Built by Westinghouse Electric & Mfg. Co., at Springfield, Mass., each unit provides as much cold as would be provided by the melting of 100 tons of ice daily. A total of 47 compressors will be installed in the factories, each functioning individually.
NEA photo

LABOR

Longer Work Weeks Begun In Many Defense Plants

■ PLAN for placing some defense industries on a four-shift, 160-hour-a-week basis were disclosed last week by Sidney Hillman, associate director general, Office of Production Management.

Mr. Hillman said he is working out details in co-operation with officials of the American Federation of Labor and the Congress of Industrial Organizations.

If effected, it would mean that machines in important defense industries would be idle only eight hours a week, from 7 a. m. to 3 p. m. on Sundays. This time would be used for repair and maintenance work.

The plan was worked out to meet the requirement of President Roosevelt's request for continuous production.

Only a few plants would have "round-the-clock" production at first; others would be added as time went on, Mr. Hillman explained. Each shift would work 40 hours a week. Overtime aspects of the plan would call for employes to rotate on the various shifts, each receiving an equal share of the overtime pay for Saturday and Sunday work. All overtime pay would be placed in a pool and divided pro rata among workers.

Longer work weeks already have been instituted in many defense plants. Pusey & Jones Corp., last week started a 6-day 48-hour week at its Wilmington, Del., shipyard.

Mr. Hillman, in reviewing the strike situation, claimed there are only 12,000 workers on strike in defense industries.

Lukens Steel Co., Coatesville, Pa., has signed a contract with the Steel Workers Organizing Committee, thereby averting a threatened strike. Contract provides for a wage increase of 10 cents an hour and paid vacations.

Workers at Phelps Dodge Copper Products Corp., Elizabeth, N. J. returned to work pending negotiations on wage and hour demands. They had been on strike for four weeks.

Bethlehem Signs with CIO Ship Workers' Union

Bethlehem Steel Co. has signed a contract with local 15 of the Industrial Union of Marine and Shipbuilding Workers of America, affiliated with the Congress of Industrial Organizations. Eighteen hundred employes at the company's Hoboken, N. J., shipyard are affected.

Agreement temporarily provides for no changes in wages, or other working conditions. These will be negotiated later on the basis of standards established at the Atlantic coast shipbuilding stabilization conference.

The contract, first ever made between Bethlehem and the CIO, prohibits strikes, sitdowns, slowdowns, boycotting, picketing or other interference with production. It expressly does not provide for a closed shop.

150,000 on WPA Qualified for Skilled Defense Jobs—Hunter

A nationwide survey by the Works Progress Administration shows that 150,000 experienced mechanics and industrial production workers now on WPA rolls are eligible and qualified for employment in the defense program.

In addition, Howard O. Hunter, acting commissioner, said last week, there are 154,000 with partial skills who can be quickly trained and still another 31,000 undergoing training in defense occupations on the WPA vocational training project.

"The names, addresses and occupations of these workers are available to employers either through their local WPA or United States Employment Service offices," said Mr. Hunter.

A complete file of information on the work experience of each person certified to WPA is kept in each WPA district office, he said. The file contains data on education, length of experience in previous jobs, special training, avocations, general health and other relevant facts.

MEETINGS

Clinic on Subcontracting To Be Held at Buffalo

■ A DEFENSE subcontracting clinic, with Army and Office of Production Management officials answering questions and helping to solve problems, will be held in Buffalo May 14-15. The clinic will be followed by similar ones in other sections.

Industrialists and contract holders will attend to hear Francis J. Trecker and E. B. Haines, subcontracting chiefs, explain how "All Available Facilities Can Be Harnessed to Defense Production."

Lectures on Various Alloys Provide Defense Training

A series of lectures on advanced physical metallurgy will be presented at Columbia University under arrangement with the United States Office of Education as a measure for providing intensive defense training. The first lecture on alloys of nickel will be presented by Dr. W. A. Mudge, International Nickel Co. Other speakers include Dr. C. S. Smith, American Brass Co. who will discuss alloys of copper, May 15; and A. E. Anderson, New Jersey Zinc Co., on alloys of zinc, May 22. A lecture on light alloys will be presented May 29. Additional topics are scheduled for June 5, 12, 19 and 26.

Distributors of Sheet Metal Will Meet in Cleveland

National Association of Sheet Metal Distributors will hold its annual meeting in Hotel Cleveland, in Cleveland, May 20-21. Both morning sessions are for distributors only. Tuesday afternoon session is open to mili representatives and executives, having national defense for its theme.

Electrical Groups Schedule Joint Session in Canton, O.

Electric furnace power requirements will be discussed in a joint meeting of the Pittsburgh and Cleveland sections, Association of Iron and Steel Engineers, with the American Institute of Electrical Engineers, in Hotel Benden, Canton, O., May 27. Dinner at 6:30 will precede the technical session.

March Scrap Exports Drop 27 Per Cent

■ Exports of scrap from the United States declined to 54,383 gross tons, valued at $1,027,826, in March from February shipments of 74,378 tons, valued at $1,455,512, preliminary figures released by the Durable Materials Unit of the Bureau of Foreign and Domestic Commerce reveal. Exports of this material in March, 1940, totaled 206,928 tons, valued at $3,387,037.

Addition of the March trade brought total exports of scrap during the first quarter of 1941 to 173,816 tons, valued at $3,385,873, 27.5 per cent by quantity and 30.6 per cent by value of the 629,101-ton, $11,091,893 trade in the first quarter of 1940.

Included in the March, 1941 total of 54,383 tons was 53,938 tons of iron and steel scrap, 300 tons of tin plate circles, cobbles, and 145 tons of waste-waste tin plate. The iron and steel scrap total was, in turn, comprised of 15,155 tons of No. 1 heavy melting steel scrap, 23,788 tons of No. 2 heavy melting steel scrap, 2471 tons of baled and bundled scrap, 2686 tons cast and burnt scrap, and 9838 tons of "other" iron and steel scrap.

Shipments to the United Kingdom amounted to 45,084 tons with Canada taking a total of 5475 tons. Only other market of consequence was Mexico which received 3261 tons.

Don't Hesitate To Scrap Traditions, Gear Manufacturers Are Told

■ MEETING in The Homestead, Hot Springs, Va., May 5-7, the American Gear Manufacturers Association marked the twenty-fifth anniversary of its founding. Organized in the midst of World war 1, the association now finds itself an influential factor in stimulating production of defense materiel in the shadow of another war.

At the time of the fall meeting last year the defense program had not begun to affect gear manufacturers seriously, but now there is no question as to the importance of the industry in the program, nor can there be any doubt as to the wholehearted response of those engaged in it.

The meeting reflected that spirit; true not only in the technical sessions, but also of the nontechnical addresses. For example, E. L. Shaner, president, Penton Publishing Co., who spoke Monday evening on "Procuring Materials in Times of Emergency," emphasized the rapid strides of American industry toward wartime control, as drastic or even more drastic than that which many of us recall as prevailing during the first World war.

Ingenuity Must Be Employed

Mr. Shaner urged that now—as never before—industrialists should exercise their own ingenuity in meeting procurement problems, rather than constantly calling on Washington for help, as now too often done. Material specifications should be made flexible enough so that if exact sizes cannot be obtained, on plates for instance, the nearest size should be utilized by shearing. In other words, if you can't get exactly what you want, try to get along with the next best thing before rushing to Washington for help.

Mr. Shaner also urged that more be done through regional ordnance offices rather than through departments in Washington. These local offices are staffed by competent men who have authority to settle questions of considerable magnitude without calling on Washington.

"Remember, OPM is industry's representation in Washington, but it must not be made a mere errand service for lazy manufacturers," said Mr. Shaner. On this point he was seconded by Joseph Armitage, chief engineer, Kearney & Trecker Corp., Milwaukee.

Paul Wooton, Washington correspondent, McGraw-Hill Publishing Co., who spoke at the annual dinner, painted hopeful picture of the world outlook. He viewed Italy as an occupied country, lacking in materials, broken in spirit. All occupied countries are like gigantic "fifth columns," which only can be suppressed by vast German garrisons. He predicted the democracies will win the war because of a growing determination that they must win—a spirit backed by resources greater than those of the Axis powers.

The technical program dealt primarily with ways and means of meeting defense problems in gear production. Dr. N. E. Woldman, Eclipse Aviation Corp., in his paper

W. P. Schmitter
Elected president, American Gear Manufacturers Association

"Microstructure vs. Machineability of Alloy Steel Gears" showed how steels can be selected and treated so that manufacturing can be properly balanced with theoretical characteristics desired. He made many suggestions as to how certain kinds of steels could be substituted for others, and through proper heat treatment made to serve just as well.

Dr. Woldman's paper was typical of the thinking by trained metallurgists who through practical shop contacts have come to mix theory and practical considerations in correct proportions so that good parts may be produced rapidly, a give-and-take proposition important in every defense shop.

M. Maletz, Kearney & Trecker Corp., presented a mathematical study of tooth strength determinations. Though theoretical, the paper will be helpful especially to those concerned with aircraft gears.

From a strictly practical standpoint the paper by J. L. Buehler, Indiana Gear Works, Indianapolis, was a masterpiece. In this, entitled "Some Special Problems in Aircraft Gear Manufacture," he did not attempt to deal primarily with cutting, finishing and testing but more with things which other gearmakers seldom have encountered, but which many of them will run into when exigencies of the situation force maximum "farming out" of aircraft engine parts.

"Aircraft engines are built like buggy whips or fly rods," he said. "Almost every part is built to deflect with shock load rather than to withstand it. If a part fails due to fatigue, usually the design is not strengthened but may be weakened at some other spot than the point of failure to allow enough deflection to transmit the load uniformly throughout the structure. As a consequence, the factor of safety is about the same throughout all sections of a complex part, and any point containing a tool mark, a scratch, a sharp corner, or a chemical or metallurgical segregation, will probably fail in service due to stress concentration and fatigue."

From Polishing to Machining

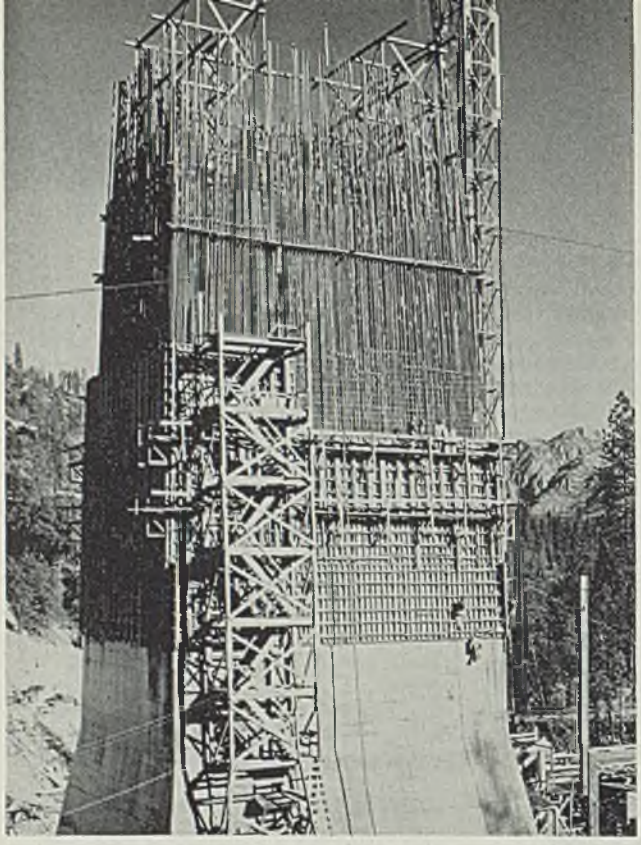
Mr. Buehler's experience has been that it is better to break in new men on a polishing or other finishing operation before putting them on a lathe or other primary machine, because in that way they get to know the importance of good initial machining. He also prefers a new man on an unusual job because old-timers try to follow tradition where no traditions exist.

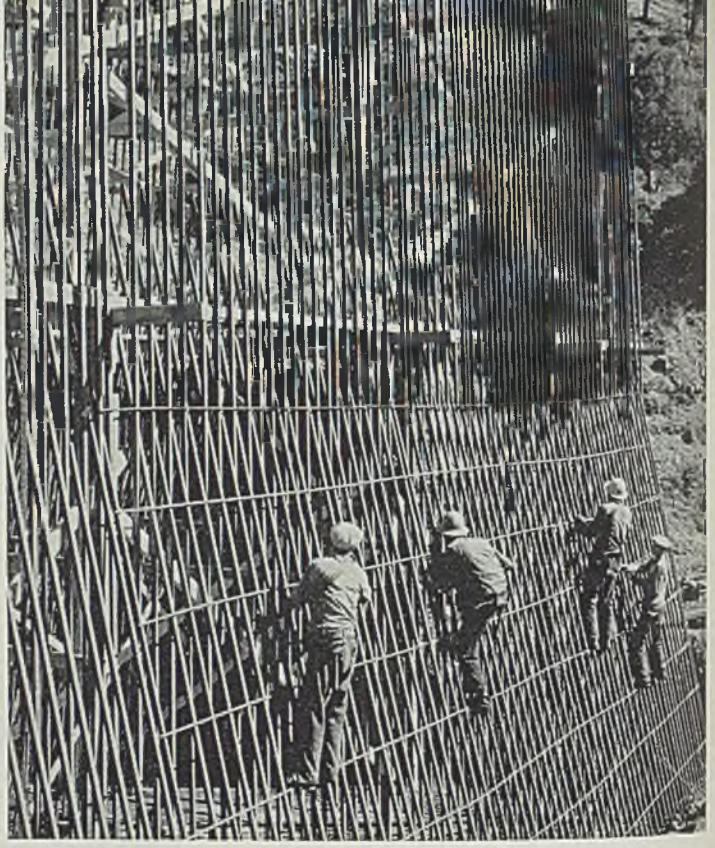
He advocated simplifying shop drawings, giving to an operator only those dimensions he needs to do his job. This simplification in his shop extends even to the use of black-and-white prints, as less "awesome" to new men. At present he is experimenting with dimensional photographs of parts as a further help to those new men.

The consensus of opinion was that the times call for many departures from traditional methods. Following Mr. Buehler's paper, D. W. Diefendorf suggested the association hold a clinic in which members could "swap" just such ideas.

New officers of the association for the coming year are: W. P. Schmitwaukee, president; John H. Flagg, president Watson-Flagg Machine Co. Inc., Paterson, N. J., vice president; L. R. Botsai, manager, Gearing Division, Westinghouse Electric & Mfg. Co., Pittsburgh. J. C. McQuiston continues as secretary. Douglas T. Hamilton, Fellows Gear Shaper Co., Springfield, Vt., was elected to the executive committee for a term of one year. It was announced that American Gear Mfg. Co., Chicago, and Pacific Gear & Tool Co., San Francisco, have joined the association.

The fall meeting will be held at Edgewater Beach Hotel, Chicago, Oct. 20-22.





Magnificent "Business as Usual" on Government Jobs

■ A DENSE curtain of steel reinforcing bars, 2 inches square and cut to 60-foot lengths with ends beveled and butt-welded, to make continuous rods from top to bottom, forms the outer face of ten gigantic piers for the Pit river bridge near Redding, Calif.

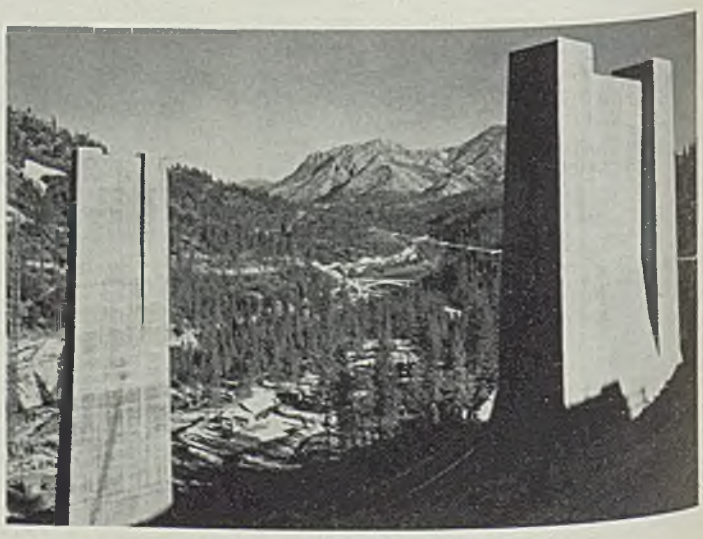
Great height of the piers, two of which are more than 350 feet above lowest bedrock, required the unusually heavy reinforcing bars, reported to be the largest ever used.

The photograph at top left shows the tallest pier, bristling with reinforcing steel. The curtain consists of rods in four parallel rows at varying distances, from 6 to 12-inch centers. Base of the pier is 90 x 95 feet.

Smaller reinforcing bars, 1-inch square, were used only at the face of cells within the piers.

The bridge will be 3687 feet long, a double-deck structure with a 2-track railroad below the 4-lane highway of the superstructure.

Stringent rules governed welding practice and technique. Each welder was required to pass a test in which he welded two joints in 2-inch



rod. Test pieces were set up in a wooden cage, made of 2 x 2-inch bars spaced just as on the job. Applicant had to reach between the wooden bars and make his welds, which were then sent to a laboratory for testing. Work of each man on actual construction is checked carefully, one of each hundred or so welds being cut out and given the same breakdown test.

Picture at top right indicates the difficulties encountered in welding the bars. Lack of space, hampering free movement, was even more pronounced at points where the batter changes, as shown in this picture, and there were more rods per square foot.

To hold the hundreds of reinforcing bars vertically, end to end and ready to weld, an elaborate superstructure of wood with steel rail falsework was required. Concreting of the piers followed welding by 50 to 100 feet.

Piers for the bridge are nearly completed, required 5465 net tons of reinforcing steel. Erection of the steel superstructure has started, with through truss construction used for the railroad and deck truss for the highway.

Has Highest Concrete Piers

When completed, the bridge will be the highest double-deck structure and will possess the highest concrete piers ever built.

First steel work of the superstructure, extending out and over the Pit river canyon, is shown at bottom left. Two completed piers, with the bridge carrying present U. S. 99 highway over the river in middle distance, are shown at bottom right. Upon completion and filling of Shasta dam, which necessitated the new structure, the old span will be submerged under 335 feet of water in the Pit river arm of Shasta reservoir. Top of the highway deck on the new bridge will be 500 feet above the river's present level and about 100 feet above water surface when the reservoir is full.

Built under contract by the United States Bureau of Reclamation, Central Valley Project, the new bridge constitutes the closing link in relocation of the Southern Pacific railroad and U. S. 99 highway.

Union Paving Co., Redding, has contract for the piers and American Bridge Co., subsidiary of United States Steel Corp., for the superstructures.

"Business as Usual, Living As Usual" Out, Says Nelson

Not only is "business as usual" over for the duration of the emergency, but "living as usual" also is over for the present, Donald M. Nelson, OPM purchasing director, told a consumers' group in Cincinnati last week.

Dislocations caused by the armament effort will affect the consumer just as it will affect industry, he said. Shortages of certain materials and the granting of priority to defense manufacture will necessitate consumers doing without some articles to which they have become accustomed.

Price control machinery already in operation will help avoid runaway price markets, however, he added.

"You will notice the difference the next time you buy a refrigerator. But—and this is the point—while you may get a refrigerator with little aluminum in it, the price of that refrigerator has not meanwhile been pushed up through the roof by unrestrained competitive buying."

Other government and defense officials last week were in the field making speeches urging greater production, greater use of all available machine and man power, greater co-operation on all sides for the all-out effort to aid Great Britain and the other democracies.

Institute Extends Standardization Program to Carbon Steels; 94 Listed

NEW YORK

■ BROADENING its program for increasing efficiency in steel production by encouraging a reduction in the number of kinds of steel ordered, the General Technical Committee of the American Iron and Steel Institute has selected a list of standard carbon steels.

The committee recently made public a list of 76 standard alloy steels (STEEL, May 5, p. 44), and a list of standards for pig iron (STEEL, May 5, p. 46).

Compositions of proven merit have been selected for the list of standard carbon steels, which is divided into five groups. A total of 94 analyses has been chosen, of which 41 are for use in semifinished steel, 59 for use in bars, and 76 for use in wire rods. Some compositions are standard for more than one type of product.

The five groups include basic open-hearth and acid bessemer carbon steels, basic open-hearth sulphurized carbon steels, acid bessemer sulphurized carbon steels, basic open-hearth phosphorized carbon steels, and acid open-hearth carbon steel wire rods.

Based on Widely Used Steels

Committee has taken as standards the ranges and limits of compositions which have been widely used by steel consumers in recent years. For such nonstandard steels as may occasionally be needed for special uses, specifications also will be based on these standard ranges and limits.

Standardization and simplification should make possible many advantages for producers and buyers, such as greater effectiveness in research work and improvement in manufacturing methods. In most cases, consumers can adopt standard steels without changing manufacturing procedure or impairing the quality of their goods. As in the case of standard alloy steels, a system of symbols has been established to identify standard carbon steels.

House Would Remove Priorities from OPM

WASHINGTON

■ Priorities officials in the defense organization were taken by surprise last week when the House overwhelmingly adopted the Cox amendment removing their division from OPM. They see trouble for the legislation when it reaches the Senate.

This rider to the Vinson bill to cloak the division with statutory powers makes it a separate entity, responsible to Congress and unable to issue priorities without approval by the Army and Navy Munitions Board.

Officials here point out the step is a complete reversal of the administration's defense policy to date. By giving chief of priorities authority to the military board it runs counter to the established policy of placing civilians above the Army and the Navy in administering the defense program.

It is interpreted as an attack on Leon Henderson, OPACS director, who was recently described in some circles as ready to assume more priorities powers. The House's action also reveals a lack of administration approval. Instead of running against Henderson the tide of the administration sentiment has been increasingly in his favor.

■ Thirty-five employes and officials of the Bausch & Lomb Optical Co., Rochester, N. Y., received gold watches May 3 in recognition of more than 50 years of continuous service with the company.

Windows of WASHINGTON

By L. M. LAMM
Washington Editor, STEEL

National Association of Manufacturers urges time element in defense revenue program be extended. Recommends means for obtaining necessary additional funds . . . OPACS order stabilizing machine tool prices amended . . . Commodity exchange establishes ceiling on "standard" copper futures . . . Bishop appointed special assistant to Henderson

WASHINGTON

■ URGING that the national defense revenue program be considered on a basis of several years, instead of merely one, Livingston W. Houston, chairman, National Association of Manufacturers' committee on government finance, presented the association's recommendations for raising the necessary funds at a ways and means committee hearing last week. They included:

A federal tax on retail sales or a general manufacturers' excise tax on products at the point of final manufacture; an increase in the present normal rate on corporation net income; decrease in exemptions and credits in individual incomes subject to taxes; an increase in the normal tax on individual incomes.

"If we assume that the defense program is to continue three years, then we might need during the next three years a total of $10,500,000,000 additional revenue for defense purposes, an average of $3,500,000,000 yearly," Houston said.

He favored establishment of "stringent" economy in ordinary government expenditures through savings in all nonessential items of nondefense spending.

Reading from a study of the growth of federal expenditures in the last decade, Houston said 114 separate categories show an aggregate increase of $3,665,197,000 in the 1942 budget over 1932. This was an increase of more than 100 per cent in nondefense expenditures, he pointed out.

"As the rearmament program progresses, it may be increasingly difficult to have our defense bread while eating the cake of unlimited special government services," he warned.

Changes in the present tax law recommended by the NAM spokesmen were as follows:

1. Eliminate multiple taxation of intercorporate dividends.
2. Permit consolidated returns for normal tax purposes.
3. Provide general extension for filing returns wherever required, conditioned on filing tentative return and payment of one-fourth estimated tax.
4. Extend two-year loss carryover provision to five years.
5. Relieve individuals from normal tax on dividends received.

"The association also renews its recommendation for repeal of the capital stock tax and the related declared value excess profits tax which are admittedly nothing more than a guessing contest within a tax structure of growing weight and complexity," Houston declared.

Changes Announced in Defense Administration's Personnel

Charles A. Bishop has been appointed special assistant to the administrator, OPACS, and will be assigned to major problems which are expected to arise from time to time. Mr. Bishop has been connected with the price stabilization division.

Sidney J. Weinberg, partner in the New York banking firm of Goldman, Sachs & Co., has been appointed assistant director of purchases, under Donald M. Nelson.

Emil J. Lever, Center Bridge, Pa., and Rudolph Marginot, Boston, have been appointed field representatives of OPM's labor supply and training section.

Laurence J. Martin, assistant to the president of Thomas A. Edison Inc., Orange, N. J., has been named by Priorities Director Stettinius to handle the new inventory control regulations. The control order was issued May 1 and affects 16 metals and classes of metals.

"We believe that no amount of law, no amount of auditing or field inspection, no potential penalties can possibly take the place of industry-wide co-operation in carrying out the inventory program," Mr. Martin said.

Emil Schram, chairman, Reconstruction Finance Corp., whose appointment as assistant to OPM Priorities Director E. R. Stettinius Jr. was announced two weeks ago, will leave both jobs to become president of the New York Stock Exchange.

Mr. Schram said he would continue his government work until arrangements are made to replace him. His acceptance of the Stock Exchange's offer was "subject to certain conditions having to do with steps that are now being taken in connection with improving the administration of the organization," he said.

Henderson Amends Order "Freezing" Tool Prices

Machine tool builders have been requested to refrain from increasing prices of new and used machine tools by the OPACS, which, however, announced it will consider modification of the price-freezing order where individual companies are unable to comply.

OPACS added to the machine tool price schedule the provision that "maximum prices of second hand machine tools are to be computed in terms of percentages of the prices of equivalent new machine tools as of March 1, 1941, and

shall not be computed with reference to current prices of new machine tools."

OPACS Administrator Henderson asked the manufacturers not to alter cash discounts, trade or volume discounts, carry allowances, methods of quoting prices, credit practices, or other trade or price policies which have the effect of increasing net manufacturers' prices.

Exchange Limits Price on "Standard" Copper Futures

Commodity Exchange Inc., New York, has agreed not to permit the opening up of new positions in the futures market for "standard" copper at prices in excess of 11½ cents a pound, Leon Henderson, administrator, Office of Price Administration and Civilian Supply, announced last week.

The action followed a suggestion by Mr. Henderson and is in line with his statement issued April 25 (STEEL, April 28, p. 29) regarding proper maximum prices for various grades of copper and brass ingot.

"Standard" copper is the term used on the Commodity Exchange to describe the base unit from which prices of other grades of copper are measured. By definition it is of lower grade than electrolytic copper and hence its price is lower than that of electrolytic.

The Commodity Exchange has informed OPACS that with electrolytic copper selling at not in excess of 12½ cents, Connecticut valley, the proper relative price for "standard" copper on the futures market should be approximately 11½ cents.

Henderson Lowers Ceiling Price on Old Aluminum Sheet, Utensils

Reduction of 1 cent in the maximum prices at which old aluminum sheet and utensils may be sold was effected last week in amendments to the Office of Price Administration and Civilian Supply's order establishing ceiling prices on aluminum.

The amendments also define quality standards and establish quantity differentials on sales of aluminum scrap in less than carlots. Changes became effective May 5.

"These amendments," Leon Henderson, OPACS administrator, explained, "have been adopted in order to give effect to customary trade practices and to forestall attempts to use the price schedule as an excuse for charging the maximum prices for aluminum scrap which does not meet maximum standards. We have tried to make it clear that the established prices of scrap are on the basis of clean and dry scrap of the highest quality and are for carload lots. Appropriate differentials must be observed where the material does not meet these standards."

Principal changes made in the price schedule follow:

(1) Maximum price at which a maker of the scrap may sell old aluminum sheet and aluminum utensils is lowered from 12 cents to 11 cents per pound. No other change is made in the maximum prices of any grades of aluminum scrap or secondary aluminum ingot.

(2) All maximum scrap prices are for clean and dry scrap and that material not meeting these standards should be sold at prices reduced below the maximum prices in proportion to the percentage of dirt and moisture.

(3) There has been eliminated the provision of Paragraph 1 of the schedule which allowed makers of scrap to request permission from OPACS to sell directly to smelters at prices as high as the established dealers' prices where such sales were customarily made prior to issuance of the price schedule. This provision had caused some makers to expect exemption in cases in which the smelter performed functions of a dealer. In lieu of this provision, there has been added a new paragraph 5, exempting from the schedule customary sales of extrusion butts and ends, sheet clippings or rod turnings of not more than one alloy, and pure clips, where such sales are made by the maker of the scrap to the producer of the material from which the scrap is made and pursuant to a written contract for the reconversion of the scrap into like material and for sale of an equivalent amount of like material to the maker. The contract prices must not, however, have been increased since March 24, 1941.

(4) Aluminum scrap which is delivered in less than carload lots must be sold at prices ½-cent under the established maximum prices set forth in appendix A.

(5) Maximum prices established by appendix B for secondary aluminum ingot are explicitly stated to be for quantities of 30,000 pounds or more. An additional ¼-cent per pound may be charged for quantities of 10,000 to 30,000 pounds, an additional ½-cent for quantities of 1000 to 10,000 pounds, and an additional 1-cent for quantities under 1000 pounds.

Dealers and smelters who have acquired high-priced inventory before March 24, 1941, may, upon application to OPACS, be granted permission to carry out commitments entered into prior to that date at prices in excess of the established maximum prices to the extent necessary to avoid loss on such inventory. Exceptions may also be granted so as to permit the charging of prices higher than those scheduled for special alloys and special processing. Requests for such exceptions should be made by presenting to OPACS a full and verified statement of the need for such exemption and the facts upon which it is to be based. In case of a special alloy. this statement would ordinarily include an analysis of the alloy.

APPENDIX A

Maximum Prices for Aluminum Scrap

(f.o.b. point of shipment)

Grade of Aluminum Scrap*	Maximum Price, cents per pound, on carload shipments† Column I Sale by Maker	Column II Sale by Dealer
Pure Clips and Cable	13.00	14.50
Segregated Alloy Sheet Clips	12.00	13.50
Old Sheet and Utensils	11.00	12.50
Mixed Sheet Clips	11.00	12.50
Cast Scrap and Forged Scrap, old and new, clean and dry	11.00	12.00
Borings and Turnings other than No. 12, clean and dry	10.00	11.50
No. 12 type Borings and Turnings, clean and dry	9.50	11.00
Pistons free of struts, clean and dry	11.50	12.50
Pistons with struts, clean and dry	9.50	10.50

*Each grade shall include all types and qualities of scrap falling within the broad category named. However, the maximum prices are applicable to scrap which meets generally accepted maximum standards in the trade.

†The price on less than carload shipments shall not exceed ½ cent under the maximum price on carload shipments.

APPENDIX B

Maximum Prices for Secondary Aluminum Ingot

(f.o.b. point of shipment)

Grade of Secondary Aluminum Ingot	Maximum Price, cents per pound, on Quantities of 30,000 pound, or more
98 Per cent Pure Aluminum Ingot	17.00
Silicon Alloys and Special Alloys	17.00
Deoxidizing Aluminum Notch Bar, granulated ingot or shot (2c extra allowed for special shapes)	16.50
Piston Alloys	16.50
No. 12 Aluminum	16.00

On quantities of	May be added to the maximum price
10,000 pounds to 30,000	¼ cent per lb.
1,000 pounds to 10,000	½ cent per lb.
Less than 1,000 pounds	1 cent per pound

OPACS Revises Maximum Scrap Price Schedules To Eliminate Inequities

■ TO ELIMINATE inequities in the original maximum price schedule for scrap iron and steel, a revised schedule was issued last week by Leon Henderson, administrator, Office of Price Administration and Civilian Supply. The amended order incorporated suggestions from sellers and consumers designed to improve operation of the price control measures and to aid in insuring an even flow of scrap to consumers. The revised schedule is published on page 116, this issue.

Among the more important changes are the establishment of classifications for several grades of scrap in addition to the 16 grades up in the original, April 3, schedule. set up in the original, April 3, schedule. New classifications include: low phos bar crops and smaller; low phos punchings and plate scrap; No. 2 cupola cast; machinery cast, cupola size; clean agricultural cast; No. 1 machinery cast, drop broken, 150 pounds and under; clean auto cast; punchings and plate scrap; heavy axle and forge turnings; and medium heavy electric furnace turnings.

Maximum prices for nearly all these grades are established for each of 34 consuming points as against only 13 in the original schedule.

Formula is set up to provide equal access to scrap supplies by consumers located at one of the 34 recognized consuming points and by consumers located outside such consuming points. The formula provides a consumer located outside a consuming point may pay as much as $1 per gross ton more than a consumer at the nearest consuming point.

Consumer Cannot Pay More

This increase of $1 is permitted only if the consumer has been served from the same source in the past. In no case may the consumer pay a sum in excess of the price established in the schedule at the point from which the scrap is shipped plus the cost of transportation.

Action has been taken to meet complaints of some consumers that they could not obtain scrap from their own areas because consumers in other areas under the original order were permitted to pay higher prices. This problem has been met by basing all maximum prices on all-rail shipments to consumers, with the exception that where shipment is by other than all-rail the maximum prices are reduced by the amount that all-rail costs of shipment exceed the costs of any other mode of transportation used.

Provision has been made to aid consumers not located on the line of a railroad to obtain scrap from that road. This has been done by permitting an off-the-line consumer, who has purchased scrap from the railroad in question in the past, to pay the maximum prices established for a consumer on-the-line plus not more than $1 to defray the expense of the off-the-line haul. An off-the-line consumer may also pay the maximum price established for the nearest consuming point even if such price is higher than the on-the-line price plus $1 for off-the-line hauling expense.

Disadvantages resulting from the fact that switching charges may differ at different points on a railroad's line are eliminated. This is done by placing consumers in different switching districts on the same railroad on a parity insofar as their ability or inability to purchase railroad scrap has heretofore been determined by the amount of the switching charges of the railroad from which the scrap originated.

Provision is made for sale of railroad scrap, for which the railroad of origin cannot be identified, at prices not in excess of the maximum established for similar grades of nonrailroad scrap.

The 3 per cent brokerage commission established in the original schedule has been replaced by a commission of 50 cents a ton, which may be paid to a broker or agent for scrap delivered to a consumer either at the maximum or a lower price.

The new schedule requires the railroads to take care of their regular on-the-line customers before shipping to consumers located off-the-line.

Pontoon Bridge Erected in 41½ Minutes

■ This pontoon bridge was thrown across the swift Chattahoochee river in 41½ minutes. In the foreground is a Chevrolet truck, assigned to the Army engineers, carrying a load of foot bridge units. The trucks also carry the bridge building equipment and tow the 10-ton pontoon boats on trailers

565,000 Miles of Roads, 100,000 Buildings, by WPA

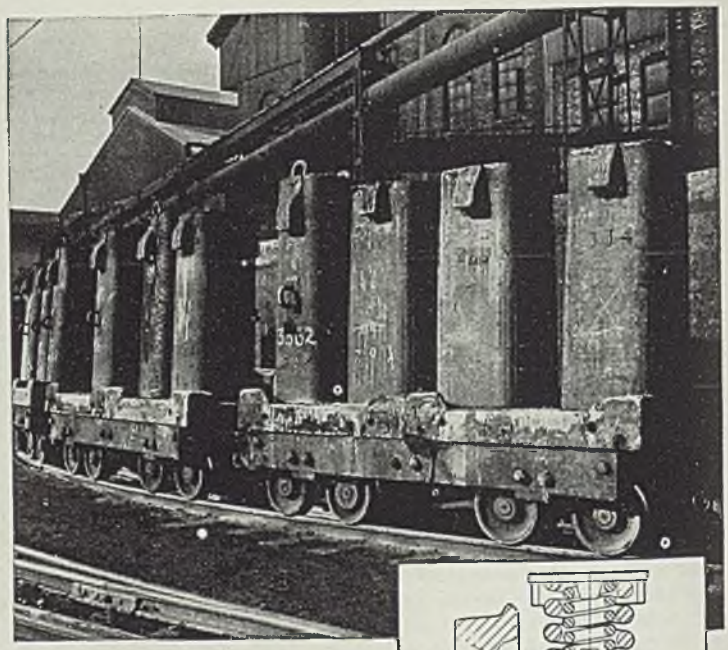
■ More than 100,000 public buildings and 565,000 miles of roads have been built or improved by WPA workers during the past five and a half years, Howard O. Hunter, acting WPA commissioner, reported last week.

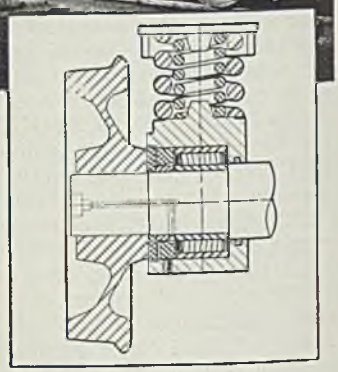
The work completed is the equivalent to 180 miles of roads and nine public buildings for every county in the United States. The WPA roads equal nearly one-sixth of the total highway mileage in the country.

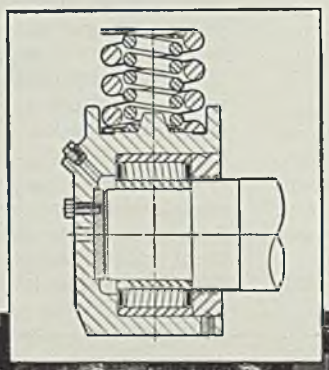
Today 14,000

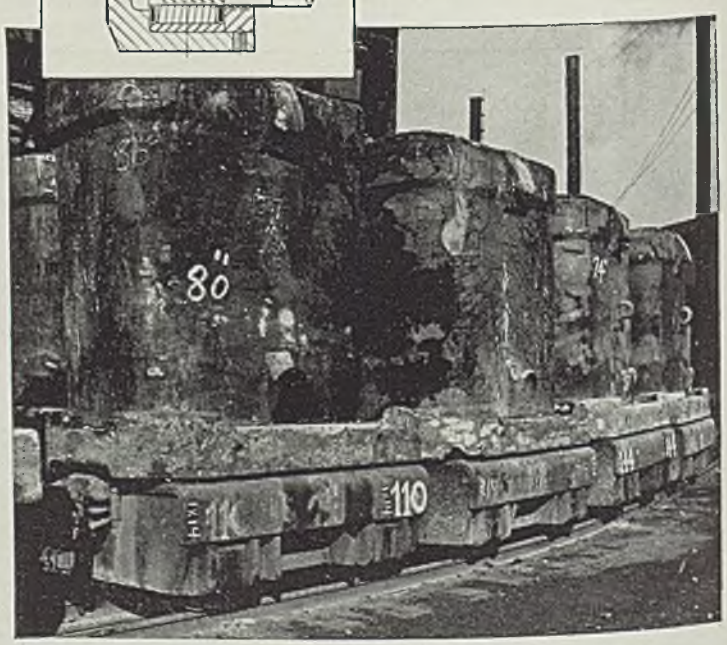
INGOT AND CHARGING CARS

KEEP ON THE GO ON HYATTS!









There are many good reasons why Hyatts have been the accepted bearings in this application for over 30 years and why they are being specified for 9 out of every 10 cars today.

Among these are their husky design, their quality manufacture . . . their dependable operation . . . their ability to "take it" under terrific impacts . . . their long life, many cars giving continuous service for 20 years *without bearing replacement.*

With ninety per cent of all cars built during 1940 Hyatt equipped, play safe and specify Hyatts for all further new purchases or changeovers.

Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey, Pittsburgh, Chicago, Detroit, San Francisco.

HYATT

ROLLER BEARINGS

STEEL

Mirrors of MOTORDOM

By A. H. ALLEN
Detroit Editor, STEEL

Slight possibility of all-out defense manufacturing while unions continue to snipe at industry for high wages and closed shops . . . Ford to build complete bombers, also steam turbines . . . Auto plants prodding material sources for additional tonnages to extend 1941 model runs into July. Production allotments for 1942 models have little significance . . . Metal inventory controls and new price regulations bring fog of confusion

DETROIT

■ STEP by step, industry moves toward all-out manufacturing for defense and aid to Britain. Each day new exhortations come from Washington; each day some new regulations covering supplies or prices of the hundreds of materials industry needs. Last week it was inventory controls on 16 classifications of metals and alloys, only a step short of actual priorities; plus revised price regulations on iron and steel scrap; plus amended aluminum scrap price controls.

In a fever of publicity, the administration tells industry it must "work around the clock," it must forget about normal consumer requirements, it must go sled-length for defense manufacturing. Insinuations are issued that industry is not co-operating, that defense production is bogging down. Talk is heard of a complete new setup of industry committees to administer manufacturing in Washington, the first such committee being one for the steel industry.

In the automobile industry there are no dissenting voices. Defense production is on schedule, even far ahead of schedule in some cases.

Already planning to produce parts and airframes for 100 bombers a month each, the big three motor car producers have known for weeks this program probably will have to be doubled at least. Ford has announced it will nearly triple this figure, now sighting on a goal of 270 units a month, with the possibility that two-thirds of these will be assembled completely in the new Ford bomber plant here.

In a couple of months production will start at Ford on Pratt & Whitney radial engines; a new magnesium foundry, already making castings on the basis of 4000 pounds per month, will be turning out better than 100,000 pounds a month. Tests on a new airplane engine, weighing less than one pound per horsepower, will be concluded shortly. Army reconnaissance cars are being turned out in large batches daily. And before long, Ford will get into production of 8000-horsepower steam turbines for defense purposes. No bogging down there.

Defense Has Priority A1AA

The same story is true at Chrysler plants, where before long 35,000 men will be at work on two hundred millions of defense orders. Normal peak employment of Chrysler is less than 90,000. General Motors' enormous chunk of defense work has been detailed too often to bear repetition. Go on down the line of motor plants and the same story holds true. Defense manufacture has priority No. A1AA.

Take the case of the Chrysler tank arsenal where the task of specifying, ordering and getting shipment on the thousands of machines and tools required was nothing short of herculean. Today the bulk of this equipment is in and ready to operate if not actually cutting and biting its way through armor plate parts. With characteristic automotive approach, E. J. Hunt, manager of the arsenal, went around to equipment sources and really bull-dozed them into shipping vital machines. When normal forms of persuasion failed, he did not stop short of using other and more effective threats to get deliveries. To him priorities were just a lot of writing on paper. What he wanted were the machines, and he wasn't taking no for an answer. And he got them.

Nowhere in the world could a job of this magnitude and complexity have been pushed through with the speed that was shown. Regardless of feelings on eventual use or disposition of the military equipment being manufactured, plant executives here regard the problem as a manufacturing job to get done, and in a hurry.

Last week, executives of the army, navy, OPM and British purchasing commission were entertained by a tour of defense plants in this area, and British taciturnity must have been amazed at what it saw. Heading the group was A. R. Glancy, in charge of the ordnance section of the OPM, a former auto executive himself. Shells, tanks, airplane engines, "blitz" buggies, aircraft parts and a host of other items were seen in production or on the verge.

But they only saw one side of the picture. It might have been a wise move to take this "committee" on a tour of a few other spots around Detroit. For example, they could have gone out to the picket line at the Ex-Cell-O Corp. and watched a group of foolish men walking up and down the street in front of the plant carrying signs scrawled with inane phrases about a "closed shop" and "10 cents an hour more wages," while inside $16,000,000 worth of vital defense production languished.

Here were men with average annual incomes of around $2800 apiece, already offered an additional $137 a year by the company,

on strike because of "inhuman" treatment by their employer. What about all-out effort for defense on their part? What of their faith in the American way of life?

Or the committee might have walked among striking cement workers who left their transit-mix trucks in a wage dispute, shutting down defense plant construction which the administration would whip-lash into completion.

Or they might have listened to a labor leader here who has privately outlined a whole series of "nuisance" strikes in the building trades industries, one to follow the other, so that a continual state of unrest would be created. Is this all-out for defense?

As long as labor unions go hog-wild in calling strikes and making unreasonable demands for wage increases, there can be no concerted progress toward full-scale defense manufacturing. If demands for wage increases were based on higher costs of living or actual stringency on the part of employes, some sympathy might be worked up for these strikes, but they are not justified on these scores. Rather they represent unions taking full advantage of unlimited powers extended to them by the federal government, plus an effort to enrich their treasuries from the enormous expansion of industrial employment now taking place.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,126
Feb.	317,520	422,225	509,233
March	389,499	440,232	533,912
3 mos.	1,063,981	1,311,949	1,567,271
April	354,266	452,433	.....
May	313,248	412,492	.....
June	324,253	362,566	.....
July	218,600	246,171	.....
Aug.	103,343	89,866	.....
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
April 12	99,260	101,940
April 19	99,945	103,725
April 26	108,165	101,405
May 3	130,610	99,305
May 10	132,630	98,480

†Comparable week.

OPM Allocates Totals for 1942 Model Production

Allotments of motor vehicles to be manufactured from Aug. 1 to July 31, 1942, issued by the OPM last week, make interesting reading but mean little in the opinion of observers here. Production for the 1941 model year is destined to total 5,289,972, a new high since 1929. Contemplated reduction is 20.15 per cent or 1,065,830 units. Three major producers have been scaled down 21.5 per cent, others 15 per cent, except for truck companies which have been cut 5 to 10 per cent.

Material shortages and deferred deliveries probably will render these figures meaningless, particularly when added consideration is given to the 30-40 per cent transfer of manpower from auto plants to defense plants, and to the exorbitant overbuying of new cars evident in the past seven months.

■ Combination of interplant rail hauling and outside road duty is provided by this Dodge 1½-ton truck at the U. S. Bobbin & Shuttle Co., Lawrence, Mass. Rail service is provided by a "railer" pilot wheel attachment, front and rear, the rear tires still providing the power despite the fact the pilot wheels carry a part of the load. The pilot wheels are raised automatically for conventional road service

Inventory Control Measure Perplexes Buyers, Sellers

The metal inventory control order issued last week from Washington brought confusion and perplexity into metal circles here. Covering nearly all forms of iron and steel and requiring both consumers and suppliers to file sworn statements that shipments in any calendar month were not sufficient to cause any increase in inventories, the order was tantamount to actual priorities.

One supplier here was advised not to become too concerned over the sweeping order, inasmuch as revisions likely would be forthcoming soon. Another declared he would have no positive way of knowing that shipments to a customer would not increase inventories, since the buyer might have ordered from several sources.

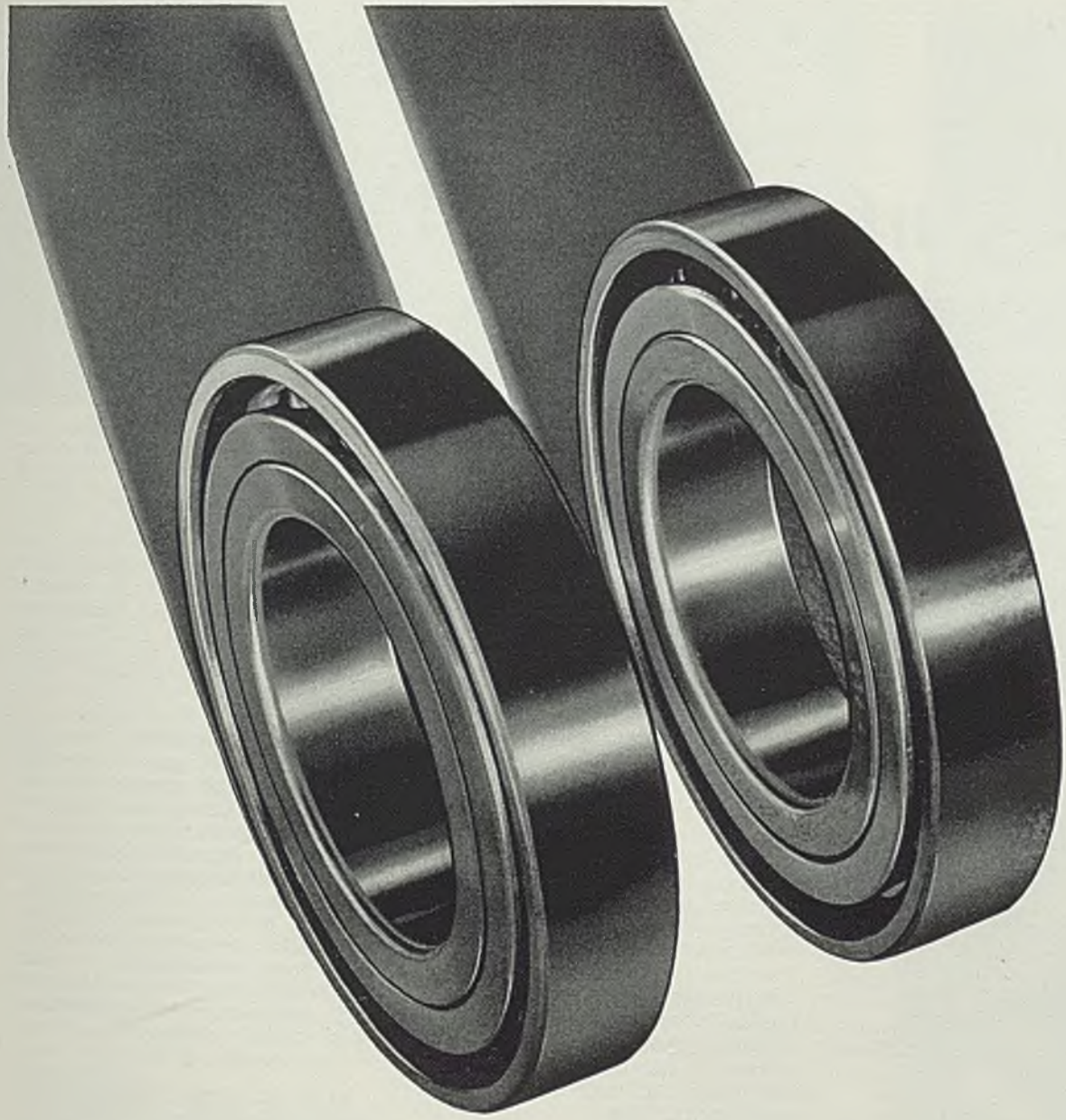
Burden of proof appears to rest with the consumers, many of whom are known to have been buying beyond actual needs and in advance of production dates. Theoretically the order, which expires July 15, should give an excellent picture of metal inventories over a two-month period, but it appears doubtful that the plan can be applied practically.

For example, suppose a supplier needs 100 tons of a certain metal in the month of June and, to protect himself, he now orders twice this amount, spreading his orders over four suppliers in 50-ton lots. One supplier delivers, say, only 20 tons on his order, another 30 tons, another 40 tons and another manages to ship all 50 tons. This means a 40-ton increase in inventories, but the buyer has no way of knowing in advance how much will be shipped on each order. What he would do, in a case like this, probably is to return 40 tons to somebody, but to whom?

Furthermore, material to be shipped in June has been ordered months ago and no buyer now can know for certain how much is going to be delivered to his plant next month. All he can do is to keep his fingers crossed, and meantime turn his entire office force over to making out sworn statements, reports, analyses and other information demanded by the OPACS.

To Spend Two Million for Aluminum Forge Equipment

Willys-Overland in Toledo, O., has received a government loan of $2,172,000 for remodeling its steel forge plant to produce aluminum forgings for airplanes. Provisions call for $102,000 to remodel the present forge building, and for $2,070,000 to purchase equipment. The company now has $20,000,000 in defense contracts.



A *must* FOR MECHANIZED WARFARE

Rapid movement is possible only with anti-friction bearings — because of their freedom from friction and wear . . . New Departure is in the forefront of America's urgent defense efforts with the rugged endurance of the Forged Steel Bearing.

NEW DEPARTURE

THE FORGED STEEL BEARING

3001

MEN of INDUSTRY

George K. Leet

W. A. Brown

Robert T. Bowman
Whose appointment as director of public relations, John A. Roebling's Sons Co., Trenton, N. J., was noted in Steel, May 5, p. 31

■ **GEORGE K. LEET,** secretary, United States Steel Corp., New York, retired May 6 after 30 years' service with the corporation. Mr. Leet in 1911 was engaged as secretary to the late Judge Gary, and has held the office of secretary to the corporation more than 19 years.

William Averell Brown, assistant general solicitor since 1918, has been elected secretary to succeed Mr. Leet. Following graduation from Harvard Law School in 1908 Mr. Brown entered the office of Bowers & Sand, New York, remaining there until 1917 when he joined the law department of the Steel corporation. A year later he was made assistant general solicitor.

♦

M. D. Galbreath is now trading as Galbreath Machinery Co., Empire building, Pittsburgh. He was formerly treasurer, Marr-Galbreath Machinery Co., which discontinued business April 30.

♦

Howard M. Dawson has been transferred from the Cleveland office of Jessop Steel Co., Washington, Pa., to the Detroit office. **D. J. Hanna** is branch manager of the new Detroit warehouse and office.

♦

Samuel B. Crouse and **George L. Haws** have been elected assistant treasurer and assistant secretary, respectively, Fable & Co. Inc., Philadelphia. They have also been elected directors.

♦

John D. Sullivan, chief chemist, Battelle Memorial Institute, Columbus, O., has been elected chairman, Electrothermic Division, Electrochemical Society.

♦

Walter L. Brown, of Huntington, W. Va., has been elected vice president and general counsel, Western Electric Co. Inc., New York. He succeeds **T. Brooke Price,** who has become general attorney, American Telephone & Telegraph Co. Elected a director at a recent stockholders' meeting, Mr. Brown also succeeds Mr. Price as general counsel for Electrical Research Products Inc., and other Western Electric subsidiaries.

L. Clayton Hill
Named vice president and general manager, Murray Corp. of America, Detroit, as reported in STEEL, May 5, p. 31

♦

Arthur L. Armantrout, since June, 1938, superintendent of industrial relations, South works, Carnegie-Illinois Steel Corp., has been transferred to the Lorain division at Johnstown, Pa., in the same capacity. A graduate of Purdue University in 1933, he joined the corporation in the physical laboratory at South works in November of that year, subsequently becoming a test engineer, director of training, and assistant superintendent of industrial relations.

♦

Frank K. Ziegler, 9 South Clinton street, Chicago, has been appointed to handle the complete line of Upton electric salt bath furnaces in the Chicago area by Upton Electric Furnace Co., Detroit.

♦

W. W. Tomes, formerly identified with the Firestone Tire & Rubber Co., Akron, O., has been placed in charge of the flow meter section, Cochrane Corp., Philadelphia. Assisting Mr. Tomes will be **W. C. Morrison,** recently associated with the Brooklyn Union Gas Co. as sales engineer.

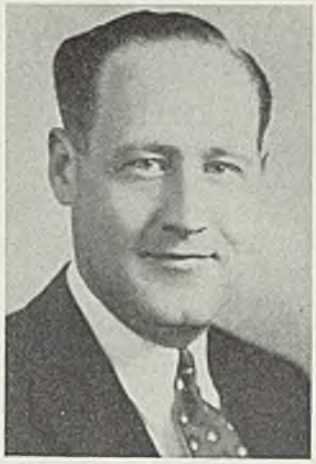
♦

Charles T. Siebert Jr., heretofore assistant treasurer and credit manager, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed assistant to the vice president in charge of sales. The following have been named as managers and assistant managers of the credit department's eastern, central and western areas:

R. J. Phipps, credit manager, and **J. C. Eichleay,** assistant credit man-

A. L. Armantrout

Ervin Manske



George A. Whitehurst

John H. Collier

ager, eastern area; **R. W. Hyde,** manager, and **R. B. Gilleland,** assistant manager, central area; **N. E. Crull,** manager, and **H. S. Gray** and **F. H. Becker,** assistant managers, western area.

♦

Ervin Manske, associated with Allis-Chalmers Mfg. Co., Milwaukee, since 1910, has been appointed general traffic manager of the company's eight plants.

Carl J. Kraus, traffic manager at Allis-Chalmers' Springfield, Ill., plant, has been named assistant general traffic manager and has been transferred to Milwaukee.

♦

R. W. Dietrich was elected president, Steel Club of Baltimore, at its fifth annual meeting at the Belvedere hotel, Baltimore, recently. **J. E. Aldridge** was elected vice president, and **Joseph H. Hager,** secretary-treasurer.

The following were elected directors: **Henry A. Lowry, Charles W. Test, John A. Maloy** and **D. Warren Bourquin. Edward P. Gary,** Rustless Iron & Steel Corp., and **Clinton V. Rogers,** Edgcomb Steel Corp., were elected to membership in the club.

♦

A. H. Frauenthal has resigned as vice president and general manager, Bantam Bearings Corp., South Bend, Ind., to establish a new factory in Muskegon, Mich., to manufacture large special roller and ball bearings, as well as aircraft parts. **R. B. Nichols,** heretofore secretary and sales manager, succeeds Mr. Frauenthal as vice president and general manager.

Mr. Frauenthal will act as consultant to the Bantam corporation for the next several months while the new plant, comprising 135,000 square feet, is being equipped. Associated with Mr. Frauenthal in the new company will be **H. H. Brooksieker,** Cleveland, an associate over 20 years, who will be vice president in charge of manufacturing, and **F. J. Donovan,** Chicago, formerly treasurer of Bantam.

♦

George A. Whitehurst, the past five years Chicago district industrial engineer, Carnegie-Illinois Steel Corp., has been promoted to assistant to chief engineer of Carnegie-Illinois, with headquarters in Pittsburgh. He has been with the corporation since July, 1931, when he joined the former Carnegie Steel Co. at Pittsburgh.

♦

John H. Collier has been elected president, Crane Co., Chicago, succeeding the late Charles B. Nolte. Mr. Collier joined Crane Co. in 1903 as a core maker's helper and progressed through various positions. He was general manager, Bridgeport, Conn., plant from 1917 to 1929; president, Cie Crane, Paris, France, and chairman, Crane Ltd., London, England, from 1929 to 1933, and vice president in charge of manufacturing from 1933 until his election to the presidency last week.

Walter Nuttall has been appointed general purchasing agent, Blaw-Knox Co., Pittsburgh, with offices in the Farmers Bank building. **J. E. McWilliams** has been named division purchasing agent of Blaw-Knox division, with offices at Blawnox, Pa.

♦

Don T. Flater, since 1936 works manager, Chrysler-Jefferson plant, Detroit, has been appointed general staff master mechanic of Chrysler Corp., succeeding **F. J. Morisette,** who is now in charge of the Chrysler gun arsenal. Mr. Flater was active with John Deere Co. over 15 years, and joined Chrysler in 1934 as foreman in the machine shop.

♦

M. J. Warnock has been appointed director of advertising and promotion, and **E. Cameron Hawley,** assistant director of advertising and promotion, Armstrong Cork Co., Lancaster, Pa. Associated with Armstrong since 1926, Mr. Warnock spent three and one-half years in the Seattle district as a salesman and later as district manager; became an assistant manager, floor division, in 1930, and early this year was named assistant general sales manager. He succeeds **John P. Young,** resigned. Mr. Hawley joined the company's advertising department in 1927.

♦

Carl J. Andrae, the past three years regional manager, Hastings Mfg. Co., Hastings, Mich., has been appointed assistant sales manager, replacement division, Wilkening Mfg. Co., Philadelphia. He was associated with Perfect Circle Co., Hagerstown, Ind., a number of years as district manager before joining the Hastings company.

♦

Glen T. Lampton, formerly engineering manager, Lycoming division, Aviation Mfg. Corp., has been appointed assistant engineer in charge of experimental engineering, Hamilton Standard Propellers division, United Aircraft Corp., East Hartford, Conn.

The engineering program of the company will be carried on by three groups, instead of two. Production engineering section will be headed by **Carl F. Baker,** assistant chief engineer, and **Thomas B. Rhines,** assistant engineer. **Alan G. Day,** project engineer, who is leaving Hamilton Standard to join its Canadian licensee, will be succeeded in this group by **Thomas E. Doherty.**

Development Engineering section will be in charge of **Murray C. Beebe,** assistant engineer, and **Charles B. Conwell** will be project engineer on hubs in this section.

Mr. Lampton will head the experimental engineering section, with **Donald W. Perin** as project engineer.

Week's Defense Awards $46,753,319; Plant Construction Contracts Few

■ TOTAL of defense contracts reported last week by the War and Navy departments was $46,753,319, a considerable reduction from the preceding week's aggregate. Most contracts were small, with awards for plant expansion and construction few and of moderate size. Following were among contracts reported:

American Bosch Corp., Springfield, Mass., lease agreement reported by Jesse Jones, federal loan administrator, for equipment, machinery and tools for airplane parts production, $761,409.

Chrysler Corp., Detroit, lease agreement reported by Jesse Jones, federal loan administrator, for building installations, equipment, machinery and portable tools to make military aircraft parts, $1,691,200.

Revere Copper & Brass Inc., New York, lease agreement with Defense Plant Corp. for new plant at Chicago to cost $2,600,000. Machinery and equipment to total $7,400,000. Plant will manufacture ammunition brass, cartridge shells, bullet jackets.

Vickers Inc., Detroit, lease agreement reported by Jesse Jones, federal loan administrator, for building, machinery and equipment used in making artillery fire control apparatus, hydraulic equipment and other products, $541,721.

Willys-Overland Motors Inc., Toledo, O., lease agreement reported to Jesse Jones, federal loan administrator, for building and equipment to manufacture airplane aluminum forgings, $2,172,000.

War department last week reported the following:

Swenson Construction Co., Kansas City, Mo., ordered to proceed with construction of buildings and utilities for O'Reilley general hospital, Springfield, Mo., pending formal approval of contract by undersecretary of war. Low bid submitted by the firm was for $1,713,500.

Medical Corps Awards

Baldwin Locomotive Works, Baldwin Southwark Division, Eddystone, Pa., testing machines, $6070.

Buck X-Ograph Co., St. Louis, X-ray and field equipment, $2056.65.

Cleveland Range Co., Cleveland, vegetable strainers, $712.

Haslam, Fred, & Co. Inc., Glendale, L. I., N. Y., adjustable jaw-props, $4350.

Pick, Albert, Co. Inc., Chicago, soup strainers, $596.

Corps of Engineers Awards

American Monorail Co., Cleveland, metal shapes, cranes, hoists, $318,182.73.

Berkeley Steel Construction Co., Berkeley, Calif., steel diesel-electric utility boat, $107,471.

Bethlehem Steel Co., San Francisco, reinforcement bars, $2315.26.

Bucyrus-Erie Co., New York, cranes, $27,020.

Forsythe Equipment Co. Inc., Long Island City, N. Y., speedcrane and generator, $17,173.45.

Foster, L. B., Co., Silvis, Ill., relaying rails and splice bars, $4461.60.

Graybar Electric Co. Inc., New York, transformers, telephone cable, $5541.51.

Haslam, John H., Salt Lake City, Utah, sewage disposal plant, Hill field, Ogden, Utah, $51,952.

Hubbard & Floyd Inc., New York, trailers, $9060.

Hussmann-Ligonier Co., St. Louis, cabinets, $3576.

International Smelting & Refining Co., East Chicago, Ill., white lead, $2964.50.

New State Electric Co., Phoenix, Ariz., electric distribution system, Phoenix military airport, Arizona, $36,195.

New York, New Haven & Hartford Railroad Co., New Haven, Conn., railroad track equipment, $8359.52.

Pitman, J. C., & Sons Inc., Lynn, Mass., kitchen equipment, $2614.83.

Richardson, L. D., & Co., Beverly Hills, Calif., drainage facilities, and clearing, grubbing, grading, paving, fencing, Sky Harbor airport, Phoenix, Ariz., $166,375.50.

San Ore Construction Co., McPherson, Kans., air navigation facilities, Santa Fe, N. M., airport, $259,901.

Savory Inc., Newark, N. J., toasters, $2951.25.

Sherman Concrete Pipe Co., Tampa, Fla., reinforced concrete culvert pipe, Drew field, Tampa, Fla., $2450.

Smith, Charles D., Fond du Lac, Wis., wall and appurtenant works, Portsmouth-New Boston, Ohio river, $448,170.36.

U. S. Steel Export Co., New York, metal cloth and mesh, $4016.40.

Washington Corrugated Culvert Co., Seattle, culvert pipe, $3536.

Watteson, R. A., Co. and Gogo & Rados, Los Angeles, sewer, water and gas systems, Phoenix military airport, Arizona, $140,799.30.

Air Corps Awards

Bendix Aviation Corp., Pioneer Instrument Division, Bendix, N. J., meter assemblies, $111,402.50.

Biggs Boiler Works Co., Akron, O., low pressure chambers, $29,466.

Blackmer Pump Co., Grand Rapids, Mich., fuel transfer pumps, $60,000.

Dietzgen, Eugene, Co., Chicago, compasses and dividers, $105,125.

Hayes Industries Inc., Jackson, Mich., wheel and brake assemblies, $32,670.

General Electric Co., Schenectady, N. Y., miscellaneous parts and assemblies, $58,918.

Jacobs Aircraft Engine Co., Pottstown, Pa., parts for engines, $110,177.01.

Manning, Maxwell & Moore Inc., Bridgeport, Conn., gage assemblies, $27,700.

Master Electric Co., Dayton, O., generator motors, $85,901.85.

Saltzman, J. G., New York, printers, $69,184.

United Aircraft Corp., Pratt & Whitney Aircraft Division, East Hartford, Conn., spare parts for aircraft engines, $222,547.89.

Quartermaster Corps Awards

Aluminum Goods Mfg. Co., Manitowoc, Wis., aluminum plates, $891.15.

Aqua Systems Inc., New York, air corps gasoline fueling system, Camp Edwards, Massachusetts, $27,862.

Backus, A., Jr. & Sons, Detroit, tool chests, $970.34.

Clyde Cutlery Co., Clyde, O., bread knives, $3920.

Continental Can Co., St. Louis, cans, filter discs, $6898.

Crosley Corp., Cincinnati, cabinets and fire units, $11,534.25.

Dietrich Bros. Inc., Baltimore, structural steel, Edgewood arsenal, Maryland, $54,000.

Ivey, Henry A., Decatur, Ga., parachute building, Lawson field, Ft. Benning, Georgia, $140,771.

Knox Stove Works, Knoxville, Tenn., cast iron griddles, $7000.

Minton, R. J., Construction Co., Orinda, Calif., temporary housing and utilities, Presidio, San Francisco, $53,563.

Nielson Erbentraut & Summers, San Francisco, rifle range and target houses for Fts. Barry, Scott and Funston, California, $21,170.

Ogden Cache Electric Co., Ogden, Utah, lookout tower, Ogden ordnance depot, Utah, $32,350.

Philadelphia Depot Factory, Philadelphia, helmets, $9451.20.

Presto Gas Mfg. Co., Chicago, field range accessories, graphite, $98,094.55.

Ranney Refrigerator Co., Greenville, Mich., component parts for field ranges, $1380.

Reeves Steel & Mfg. Co., Dover, O., can covers, $200.

Royal Silver Mfg. Co., Norfolk, Va., basting spoons, $1890.

Seymour & Peck Co., Chicago, flour sieves, $4680.

Taylor Metal Products Co., Mansfield, O., component parts for field ranges, $2965.

Ordnance Department Awards

Ace Drill Co., Detroit, twist drills, $1870.20.

Allegheny Forging Co., Pittsburgh, rail forgings, $6120.

Allegheny Ludlum Steel Corp., West Leechburg, Pa., steel, $2339.26.

Aluminum Co. of America, New Kensington, Pa., sheet aluminum, $10,836.65.

American Brass Co., Ansonia, Conn., aluminum bronze, $2537.42.

American Car & Foundry Co., Berwick, Pa., parts for tanks, $4536.20.

Ampco Metal Inc., Milwaukee, aluminum bronze, $1095.60.

B G Corp., New York, tools, $1692.70.

Barber-Colman Co., Machine & Small Tool Division, Rockford, Ill., reamers, $2880.

Bearings Co. of America, Lancaster, Pa., bearings, $2320.10.

Bear Mfg. Co., Rock Island, Ill., portable welders, $1263.

Bendix Aviation Corp., Scintilla Magneto Division, Sidney, N. Y., parts for tanks and combat cars, tools, magnetic chargers, $31,026.42; Marine Division, Brooklyn, N. Y., repeaters, $1650.

Benrus Watch Co., Waterbury, Conn., lever weights, $1750.

Black & Decker Mfg. Co., Towson, Md., portable grinders, $5185.

Blackhawk Mfg. Co., Milwaukee, hydraulic ram, $10,916.15.

Blanchard Machine Co., Cambridge, Mass., surface grinders, $7350.

Blaw-Knox Co., Union Steel Castings Division, Pittsburgh, hulls for tanks, $31,000.

Bonney Forge & Tool Works, Allentown, Pa., wrenches, double spanners, $10,470.50.

Breeze Corporations Inc., Newark, N. J., tools, $4572.50.

Bridesburg Engineering Co., Philadelphia, tools, $19,434.

Brown & Sharpe Mfg. Co., Providence, R. I., horizontal grinders, $1375.

Buffalo Forge Co., Buffalo, drill presses, $1200.

Carnegie-Illinois Steel Corp., South Chicago, Ill., bar steel, $12,376.88.

Champion Blower & Forge Co., Lancaster, Pa., portable forges, $3839.12.

Champion Container Co., Philadelphia, tubing, $2650.

Channon, H., Co., Chicago, machinist vises, $1514.20.

Chase Brass & Copper Co. Inc., Waterbury, Conn., rotating bands, brass $36,436.82.

Chicago Pneumatic Tool Co., Franklin, Pa., air hammers, $4032.95.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, small tool grinders, $6060.

Cincinnati Milling Machine Co., Cincinnati, milling machines, $5118.

Commercial Shearing & Stamping Co., Youngstown, O., end plates, $10,860.

County Supply Co., Plainfield, N. J.,

screwdrivers, hardware, $5793.39.
Crafts, Arthur A., Co. Inc., Boston, gages, $10,885.
Dixon, Joseph, Crucible Co., Jersey City, N. J., detonator cups, $2306.25.
Doehler Die Casting Co., Pottstown, Pa., ogives for fuze, $20,684.70.
Doran, James C., & Sons Inc., Providence, R. I., booster cups and plunger supports, $38,335.
Du Pont, E. I., de Nemours & Co., Pompton Lakes, N. J., blasting caps and lead azide, $317,388.
Eastern Machine Screw Corp., New Haven, Conn., die chasers, $1623.20.
Eaton Mfg. Co., Cleveland, detonator cups, $28,515.84.
Edwards, J. R., Machinery Co., South Bend, Ind., bench lathes, $1497.25.
Engineering Tool Corp., Philadelphia, tools, $2100.
Ever Tite Mfg. Co., Davenport, Iowa, cleaning rods, $22,033.35.
Ex-Cell-O Corp., Continental Tool Works Division, Detroit, mills, $1776.
General Machine Co., Newark, N. J., blenders, $1980.
General Motors Sales Corp., New Departure Division, Bristol, Conn., bearings, $20,716.06.
Greenerd Arbor Press Co., Nashua, N. H., arbor presses, $1395
Haines Gauge Co., Philadelphia, priming tools, $3950.
Hanssen's, Louis, Sons, Davenport, Iowa, machinist hammers, $2300.
Harding Machine Screw Co., East Liberty, O., primer housings and detonator screws, $94,040.75.
Hendey Machine Co., Torrington, Conn., shapers, $2764.
Independent Lock Co., Fitchburg, Mass., housings for fuze, $11,655.
Karp Metal Products Co., Brooklyn, N. Y., benches, $60,365.87.
Kato Engineering Co., Mankato, Minn., electric generators, $27,998.23.
Kidde, Walter, & Co. Inc., Bloomfield, N. J., recharge-pumps, $6785.
Krueger, H. R., & Co., Detroit, recentering machines, machinery parts, $8870.
Latrobe Electric Steel Co., Latrobe, Pa., steel, $2571.42.
Liberty Tool & Gage Works Inc., Providence, R. I., gages, $11,563.
Lyon Metal Products Inc., Aurora, Ill., shelving, $2386.05.
Magnaflux Corp., Chicago, demagnetizers, inspection machines, $8233.
Manhattan Tin & Sheet Iron Works Inc., Brooklyn, N. Y., welding tables, $1327.30.
Manning, Maxwell & Moore, Shaw-Box Crane & Hoist Division, Muskegon, Mich., electric cranes, $2695.
Mattatuck Mfg. Co., Waterbury, Conn., lead cups, screw eyes, $7486.
National Metals Co., San Francisco, magnesium powder, $5950.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., chambering machines, $28,995.
Norton Co., Worcester, Mass., plain grinders, $20,342.24.
Owens-Illinois Glass Co., Alton, Ill., priming tools, $2040.
Peterson Bros. Tool Co., Milford, Mass., gages, $1390.
Precision Mfg. Co., New York, gages, $11,058.
Prentiss Vise Co., Watertown, N. Y., jaw-faces and pipe-jaws, $3299.10.
Putnam Tool Co., Detroit, cutting tools, $3125.
Republic Steel Corp., Cleveland, barrel blanks, $22,256.
Revere Copper & Brass Inc., Chicago, bronze and brass, $1691.15.
Rivett Lathe & Grinder Inc., Boston, bench lathes, $118,236.80.
Rutledge, George, Co., Montclair, N. J., fin assemblies, $6793.57.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $3127.66.
Scovill Mfg. Co., Waterbury, Conn., detonator retainers, $8015.
Seneca Falls Machine Co., Seneca Falls, N. Y., lathes, $42,275.01.
Sheffield Gage Corp., Dayton, O., gages, $1390.
Sheldon, E. H., & Co., Muskegon, Mich., benches, $103,607.20.
SKF Industries, Philadelphia, bearings, $1881.
Snap On Tools Corp., Kenosha, Wis., socket wrenches, $1983.57.
Sowers Mfg. Co., Buffalo, mixing kettles, $4250.
Standard Gage Co., Poughkeepsie, N. Y., gages, $15,438.20.
Stanley Tools, New Britain, Conn., anvils, flatters, $1241.68.
Stewart-Warner Corp., Chicago, fuze units, $3271.42.
Sullivan Machinery Co., Michigan City, Ind., air compressors, $12,469.
Taft-Peirce Mfg. Co., Woonsocket, R. I., gages, $8635.23.
Thurston Mfg. Co., Providence, R. I., end mills, $1975.
Timken-Detroit Axle Co., Detroit, limbers, $8629.83.
Tools & Gages Inc., Cleveland, gages, $1050.
Tuthill Pump Co., Chicago, shells, $196,-140.
United Aircraft Products Co., Dayton, O., valve assemblies, $5379.90.
Union Twist Drill Co., Athol, Mass., cutters and end mills, $1953.
Van Norman Machine Tool Co., Springfield, Mass., milling machines, $85,805.
Veit & Young, Philadelphia, tools, $30,-300.
Volupte Inc., Linden, N. J., bodies, $281,-976.20.
Wadsworth Watch Case Co. Inc., Dayton, Ky., delay element parts, $130,373.75.
Wall-Colmonoy Corp., Detroit, welding electrodes, $2800.
Waltham Grinding Wheel Co., Waltham, Mass., grinding wheels, $1110.40.
Weldenhoff, Joseph, Inc., Chicago, benches, fixtures, $16,255.07.
Western Machine Tool Works, Holland, Mich., shapers, $36,058.
Williams, J. H., & Co., Buffalo, engineer wrenches, $1602.
Wilson, K. R., Arcade, N. Y., arbor presses, $1200.
Wyckoff Drawn Steel Co., Pittsburgh, bar steel, $528.59.
Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $2315.75.

Contracts reported last week by the Navy department:

Aberthaw Co., Boston, shipbuilding dry dock at navy yard, Portsmouth, N. H., on a cost plus fixed fee basis, $2,500,000.
Crucible Steel Co. of America, New York, ordnance equipment, $1,727,019.
Ex-Cell-O Corp., Detroit, substitute contract for award made Jan. 2, providing for plant facilities for manufacture of small machined parts and assemblies for aircraft engines and propellers, at total estimated cost of $3,506,657. Original contract had been for $1,689,678.
Norris Stamping & Mfg. Co., Los Angeles, ordnance equipment, $1,336,580.

Bureau of Yards and Docks Awards

Allis-Chalmers Mfg. Co., Milwaukee, one 6000-kilowatt turbo-alternator and accessories at navy yard, Washington, and one 4000-kilowatt turbo-alternator and accessories at naval operating base, Norfolk, Va., $263,522.
Bailey, William M., Co., barracks facilities at naval dry dock, South Boston, Mass., on a cost plus fixed fee basis, $279,300.
Bucyrus Erie Co., South Milwaukee, Wis., contract for completing crane-dredge YD-69 at navy yard, Pearl Harbor, Hawaii, $160,350.
Schaefer & Co., Philadelphia, repairs and improvements to refrigeration facilities at galley receiving station, navy yard, Philadelphia, $2797.
Skolnick Building Corp., New York, metal storage building at navy yard, Washington, $125,800.
Valle, Henrik, Co., Seattle, radio and sound repair shop at Puget Sound navy yard, Bremerton, Wash., $163,000.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., one condenser for 6000-kilowatt turbo-alternator at navy yard, Washington and one condenser for 4000-kilowatt turbo-alternator at navy operating base, Norfolk, Va., $41,293.

Bureau of Supplies and Accounts Awards

American Blue Print Co. Inc., New York, drawing instruments, $9810.
American Fork & Hoe Co., Cleveland, axes, hammers and sledges, $51,245.27.
American Metal Co. Ltd., New York, tin-lead, bar solder, $20,346.66.
Atlas Car & Mfg. Co., Cleveland, 50-ton diesel locomotive, electrically operated, and spare parts, $25,004.
Bogue Electric Co., Paterson, N. J., motor generator sets, $125,460.
Brown & Sharpe Mfg. Co., Providence, R. I., screw machines, $17,982.99.
Buda Co., Harvey, Ill., generating sets and spare parts, $78,406.40.
Carroll Chain Co., Columbus, O., chains and fittings, $12,127.40.
Chelsea Clock Co., Chelsea, Mass., boat clocks, $9400.
Crane Co., Chicago, gate globe and angle valves, $350,000.
Dana Tool-D Nast Machinery Co., Philadelphia, drill chucks, $9835.95.
Diehl Mfg. Co., Elizabethport, N. J., ventilating fans, motor generators and parts, $25,010.
Easton Car & Construction Co., Easton, Pa., electric trucks, $11,592.
Elliott Co., Ridgway, Pa., spare parts for use with main generating sets, $33,078.62.
Eureka Electrical Products Co., North East, Pa., copper type "G" hammers, $5297.54.
General Electric Co., Schenectady, N. Y., equipment for one portable and two permanent substations, $171,345; motor generator sets, $975,698.
General Motors Corp., Harrison Radiator Division, Lockport, N. Y., lubricating oil coolers, $9880.80.
Gleason Works, Rochester, N. Y., bevel gear generator, $10,838.17.
Graybar Electric Co. Inc., Chicago, telephone switchboards; telephone hand sets; protectors, $6798.28.
Hayes, C. I., Inc., Providence, R. I., electric furnaces, $18,500.
Jones & Lamson Machine Co., Springfield, Vt., automatic-thread grinder, $19,651.
Kearney & Trecker Corp., Milwaukee, universal and milling machines, $39,-227.25.
Kester Solder Co., Chicago, tin-lead, wire solder, $8726.30.
Lodge & Shipley Machine Tool Co., Cincinnati, heavy duty engine lathes, $56,-200.
Matthews, James H., & Co., Pittsburgh, steel figures and letters, $27,066.41.
McKay Co., Pittsburgh, chains, fittings, mooring rings, $16,546.14.
National Lead Co., Baltimore, tin-lead, wire and bar solder, $43,366.46.
Noland Co. Inc., Washington, ship carpenter's adzes, scaling hammers, $3543.31.
North American Smelting Co., Philadelphia, antifriction metal ingots, $155,-084.60.
Norton Co., Worcester, Mass., tool and cutter grinders, $6605.25.
Okonite Co., Passaic, N. J., portable, underwater cable, $14,532.
Otis Steel Co., Cleveland, sheet steel, $43,245.
Peck Stow & Wilcox Co., Southington, Conn., tinners' shears, $9667.96.
Republic Steel Corp., Cleveland, steel rivets, $114,300.
Rockford Machine Tool Co., Rockford, Ill., hydraulic shapers, shaper-planer, $56,440.40.
Service Supply Corp., Philadelphia, portable cranes, $6327.
Sidney Machine Tool Co., Sidney, O., engine lathes, $21,252.
Star Electric Motor Co., Bloomfield, N. J.,

motor generator sets, and spare parts, $266,561.
Taylor Instrument Co., Rochester, N. Y., aneroid manometers, $5212.50.
Taylor, S. G., Chain Co., Hammond, Ind., chains and fittings, $15,303.76.
Troy Chain Co. Inc., New York, chains and fittings, $7872.
Vibration Specialty Co., Philadelphia, balancing machines, $18,333.
Whitney, Baxter D., & Sons Inc., Winchendon, Mass., machines, $12,098.
Wiedemann Machine Co., Philadelphia, punching machines, $8891.
Woodhouse Chain Works, Trenton, N. J., chains and fittings, $117,015.

Canada Enlarges War Production Program

TORONTO, ONT.

■ Canadian government is enlarging its program of war materials production and has committed itself to expenditure of $400,000,000 on war industrial plants, according to C. D. Howe, minister of munitions and supply. Of this total, about three-fourths has been spent, said Mr. Howe.

Investment of government funds in industrial enterprises varies from $1000 to $18,000,000. Government-owned projects now total 169.

National Steel Car Corp. Ltd. is retooling its Malton, Ont., plant for production of Martin bombing planes. Company recently received an $18,000,000 order for bombers, the largest single award placed with a Canadian aircraft company. Planes will cost about $90,000 each, exclusive of engines and instruments which are not manufactured in the Dominion.

Department of Munitions and Supply reported 2169 contracts were placed in the week ended April 25. Total value was $11,214,065, with orders to United States companies aggregating $138,178. Orders included:

Capital expenditure: Defense Industries Ltd., Montreal, Que., $727,273; T. G. Gorman (Nova Scotia Ltd.), Montreal, $53,130; Central Bridge Co. Ltd., Trenton, Ont., $110,700; A. W. Robertson Ltd., Toronto, $200,038; Standard Machine & Tool Co., Windsor, Ont., $25,900; Macdonald Bros. Aircraft Ltd., Winnipeg, Man., $14,319; Mackenzi Air Service Ltd., Edmonton, Alta., $105,160; Coates Ltd., Vancouver, B. C., $10,399.

Metals: Allied Brass Ltd., Montreal, $49,718; A. C. Leslie & Co. Ltd., Montreal, $6059.

Munitions: Casavant Freres Ltd., St. Hyacinthe, Que., $30,285; Engineering Products of Canada Ltd., Montreal, $252,380; Rutherford Co. Ltd., Montreal, $60,000; Dominion Arsenals, Ottawa, Ont., $2,990,140; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, Ont., $6102; International Metal Industries Ltd., Toronto, $238,140.

Ordnance: Canadian Marconi Co., Montreal, $8621; National Research Council, Ottawa, $85,000; Triumph Explosives of Canada Ltd., Ottawa, $6000.

Machinery: Plessisville Foundry Co., Plessisville, Que., $10,739; Canadian Iron Foundries Ltd., Montreal, $11,613; A. R. Williams Machinery Co. Ltd., Toronto, $8293.

Electrical equipment: Canadian Marconi Co., Montreal, $53,479; Pranco Progress & Engineering Corp., Toronto, $15,746.

Aircraft: Air Ministry, England, $189,000; Fairchild Aircraft Ltd., Longueuil, Que., $50,742; Dominion Merchants Co. Ltd., Montreal, $43,674; Engineering Products of Canada Ltd., Montreal, $85,452; Noorduyn Aviation Ltd., Montreal, $6709; J. H. Connor & Son Ltd., Ottawa, $34,000; S. S. Holden Ltd., Ottawa, $5052; John Leckie Ltd., Toronto, $25,211; Canadian Western Cordage Co. Ltd., Vancouver, B. C., $18,238.

Land transport: Metallic Roofing Co. of Canada Ltd., Ottawa, $146,472; General Motors Products of Canada Ltd., Oshawa, Ont., $1,539,353; Godfredson Corp. Ltd., Walkerville, Ont., $6048; Ford Motor Co. of Canada Ltd., Windsor, Ont., $37,413.

Dockyard supplies: Pictou Foundry & Machine Co. Ltd., Pictou, N. S., $5780; General Steel Wares Ltd., Montreal, $23,850; Ontario Hughes-Owens Co. Ltd., Ottawa, $13,489; Renfrew Electric & Refrigerator Co. Ltd., Renfrew, $5389; Heaps Engineering Co. Ltd., New Westminster, B. C., $48,240.

Shipbuilding: Halifax Shipyards Ltd., Halifax, N. S., $26,365; Canadian Power Boat Co. Ltd., Montreal, $87,683.

Miscellaneous: Dominion Rubber Co. Ltd., Ottawa, $74,072; Messrs Harrison & Co., Montreal (instruments) $5474; Burke Electric & X-Ray Ltd., Toronto, $13,318; Canadian Kodak Co. Ltd., Toronto, $12,503; Dominion Chain Co. Ltd., Niagara Falls, Ont., $8845; Steel Co. of Canada Ltd., Hamilton, Ont., $5684; La-France Fire Engine & Foamite Ltd., Toronto, $23,730; Maritime Steel & Foundries Ltd., New Glasgow, N. S., $6252; National Iron Works, Toronto, $52,820; Canadian Comstock Co. Ltd., Toronto, $67,000.

War construction projects: Frontenac Construction Co., Toronto, $360,000; Sarnia Bridge Co., Sarnia, Ont., $150,000; Russell Construction Co., Toronto, $399,000; W. C. Brennan Contracting Co., Hamilton, $350,000; Ontario Construction Co., St. Catharines, Ont., $90,000.

British Buy $98,654,445 War Materials in March

■ Licenses for export from the United States of arms, ammunition and implements of war to the British Commonwealth of Nations amounted to $98,654,445 during March and to $375,688,303 during the first three months this year. Actual exports were lower, $49,196,419 in March and $119,392,491 for the first quarter.

Licenses issued to Greece during March totaled $2,942,600; actual exports were $2,306,512, mostly airplanes. Netherlands Indies obtained licenses for $1,225,295 and actual exports amounted to $2,451,650. China obtained licenses for $1,005,399 and exports totaled $338,675.

Steel Industry's Center Retreating Eastward

■ About eight miles northeast of Mansfield, O., near the tiny settlements of Olivesburg, population 50, and Paradise Hill, population 10, lies the geographic center of the nation's steel industry, as determined recently by the American Iron and Steel Institute.

Trend of the center of the steel industry was westward for many years until 1933 when it reached its most westerly point north and west of Crestline, O. Trend was reversed by the installation of additional facilities in the East.

DIED:

■ **Milton W. St. John,** 52, the past 22 years manager of by-products sales, Jones & Laughlin Steel Corp., Pittsburgh, May 1.

♦

Luther Little, 89, co-founder and former partner, A. Milne & Co., New York, April 26.

♦

Ernest W. Langdon, 65, manager, reinforcing steel department, Joseph T. Ryerson & Son Inc., Chicago, at his home in La Grange, Ill., May 1. He had been associated with Ryerson the past 32 years.

♦

F. L. Stevenson, the past 21 years manager of Cleveland branch of Vanadium-Alloys Steel Co., Pittsburgh, in that city, May 1.

♦

Raymond N. Ehrhart, former executive of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., April 30. He was an associate of the late George Westinghouse. He left the company in 1917 to become president, Elliott Co., later engaging in consulting engineering practice in New York.

♦

J. Watson Owings, 56, metallurgist, Meehanite Metal Corp., Pittsburgh, recently in Spokane, Wash. He had been with the company since 1936 and had spent his entire business career in the foundry industry.

♦

W. H. London, 52, the past 11 years district sales manager in northern California for Truscon Steel Co., at his home in Oakland, Calif., recently. He was associated with Truscon 23 years.

♦

John G. Rumney, 90, chairman of the board and founder, Detroit Steel Products Co., Detroit, in that city, April 29. He was also president, Fenestra Construction Co., Canadian Metal Window & Steel Products Co., Toronto, Ont., and King Trailer Co., Ann Arbor, Mich.

♦

Charles B. Nolte, 55, since 1935 president, Crane Co., Chicago, in that city, April 29. Prior to joining Crane Co., he served successively as manager, vice president and president of Robert W. Hunt Co., Chicago. He was a member of numerous engineering societies.

Activities of Steel Users, Makers

■ DETROIT Ball Bearing Co., Detroit, has established a branch at 127 South Water street, Saginaw, Mich., carrying a complete stock of its products. W. C. Thompson, manager of the Saginaw branch, was formerly in charge of the Grand Rapids, Mich., branch, where he is succeeded by E. J. Moore.

♦

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Dow & Co. Inc., Buffalo, distributor for its line of shovels, draglines, clamshell and lifting cranes in northwestern New York.

♦

American K.A.T. Corp., New York, has opened a Philadelphia office in the Commercial Trust building, Fifteenth and Market streets, under supervision of Frank Campbell Coe.

♦

Meehanite Metal Corp., Pittsburgh, through its offices in London, International Meehanite Metal Co. Ltd., has granted rights for the manufacture of Meehanite castings to Holman Bros. Ltd., Camborne, England.

♦

Hygrade Sylvania Corp., Salem, Mass., has awarded general contract for erection of a fluorescent lamp plant at Danvers, Mass., to the Austin Co., Cleveland. The two-story building, costing approximately $500,000, will have a structural steel frame with a brick exterior, and will have about 100,000 square feet of floor space. All fluorescent lamp manufacturing activities will be transferred to the new plant when it is completed.

♦

Auburn Steel Corp., Auburn, Pa., has established offices at 1217 Empire building, Pittsburgh. Victoria Steel & Machinery Co., a subsidiary, will also be represented at this office by E. J. Kirby, district manager.

♦

Drafto Co., Cochranton, Pa., has appointed Walter D. Briggs, 117 Liberty street, New York, and Arthur J. Moore, 1048 North Lockwood avenue, Chicago, district sales distributors.

♦

Atlantic Instrument & Tool Co. Inc., 318 Broome street, New York, has been organized to manufacture precision measuring instruments, adjustable snap gages and other tools.

♦

Chicago offices of Koppers Coal Co. and the Bartlett Hayward and Wood Preserving divisions of Koppers Co. have been consolidated and new offices are located in the Railway Exchange building, 224 South Michigan avenue.

♦

Torrington Mfg. Co., Torrington, Conn., has awarded contract to Torrington Building Co. for erection of one-story building, comprising 20,000 square feet of floor space to be devoted to manufacture of Airistocrat propeller fan blades and Airotor blower wheels.

♦

Unfilled orders at Allegheny Ludlum Steel Corp.'s Buffalo foundry are at their highest level, the company reports. Plant specializes in stainless steel castings. First quarter sales were equal to 50 per cent of the 1940 total, while 1940 itself was 212 per cent ahead of 1939.

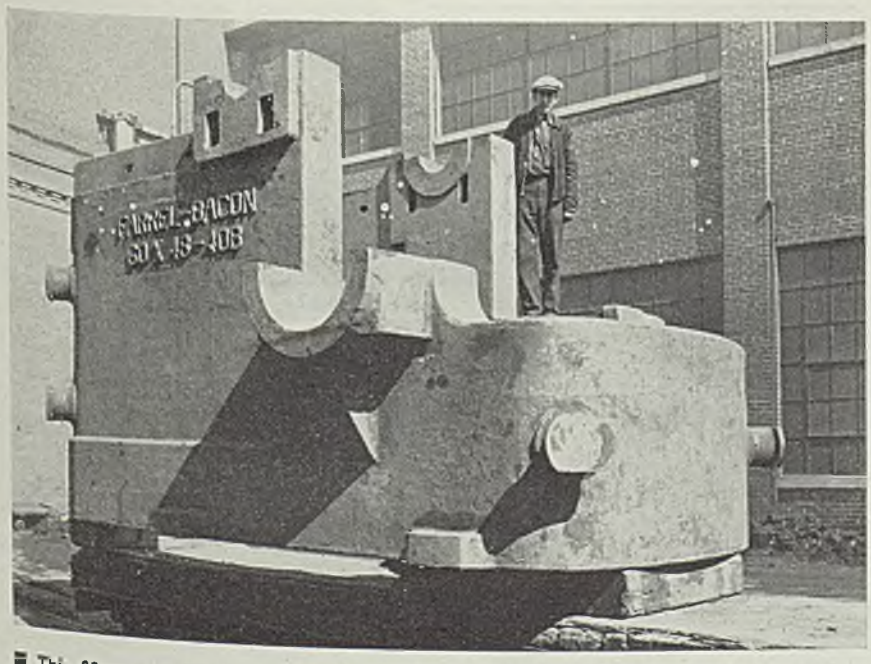
♦

Myles Inc., a new corporation organized to fabricate steel products, has leased the former foundry building of F. P. Smith Wire & Iron Works at 1643 Fullerton avenue, Chicago. Headed by Miles W. Green, as president, the new firm has subcontracts for defense work.

♦

Cutler-Hammer Inc., Milwaukee, manufacturer of electric control equipment, has established a warehouse at 131 Clarendon street, Boston, and the company's Boston sales office has been moved to new and larger quarters adjoining the warehouse. W. E. Addicks is district manager.

Casting for Stone Crusher Weighs 68 Tons



■ This 68-ton meehanite casting is one of the largest ever made in the Ansonia, Conn., foundry of Farrel-Birmingham Co. Inc. It forms the bed of a large stone crusher to be installed in the Kingston Trap Rock Co.'s quarry at Kingston, N. J.

45 Products Added to Priorities Critical List

■ Forty-five more products, including 16 metals recently placed under inventory control, were added to the priorities critical list last week. E. R. Stettinius Jr., priorities administrator, also announced in regard to the first critical list published that all items appearing on it "shall be deemed to include all fabricated, mechanical, or electrical component parts and accessories necessary for the completion, maintenance or mechanical operation thereof."

Mr. Stettinius said that all metals, except a few precious ones, now are covered.

Latest additions include acetone; antimony; cadmium; chromium; cobalt; pig and fabricated copper; diesel engines; internal combustion and steam engines for ship propulsion; all types of ferrous alloys; generators; electrical and motor dynameters including NEMA standard types meeting AIEE specifications and rules; iridium; iron and steel products including alloy steels and welding rod; lead; manganese or spiegeleisen; mercury; molybdenum; electric motors except fractional horsepower; all types of nonferrous alloys; zinc or aluminum multility plates; industrial thermometers; portable power-driven, hand and precision tools; radiosondes and equipment; electrical resistors for vessels.

Mill Supply Distributors Offer Quick Source for Many Defense Tools

■ THE MILL supply distributor now is regarded by Washington as an economic necessity as part of the defense setup. This was brought out forcefully at the triple convention of the American Supply & Machinery Manufacturers' Association, National Supply and Machinery Distributors' Association and Southern Supply and Machinery Distributors' Association in Chicago last week.

These distributors offer a quick source for a large variety of tools and supplies and often are instrumental in preventing holdups on vital defense production. A plan now is being worked out in Washington for making periodic inventories of distributor stocks so they may be drawn upon for emergency requirements of items such as cutting tools and machine parts.

Defense subjects largely pushed other topics like small order losses, research and sales meetings into the background at the three-day meeting, cut one day short by the pressure of defense activities.

Government bureaucracy and lack of appreciation of the acute problems facing the nation were blamed as factors impeding the defense program by H. K. Clark, vice president, Norton Co., Worcester, Mass. It is not realized that we are up against an unprecedented emergency, he said. Otherwise, action would be taken similar to that of industry when it finds policies and regulations no longer fit the exigencies of the moment.

There is too much argument over design, specifications and routine to be convincing evidence that the services have full realization of the nature of the emergency to the degree that they would act together, act quickly and without too much regard for the printed rules of procedure, he declared. Production of enough equipment to be useful to anybody is more important than such factors as convoying, leasing and lending, he said.

Mason Britton, Director, Tools Section, Production Division, OPM, declared that government, management and labor must join hands and do it quickly in speeding up the defense program. "It is later than you think," he said.

Six Billion for Defense in Year

Mr. Britton pointed out that the United States is trying to do in two years what Germany did in seven. Right now, Germany is spending at the rate of 20 billions a year, while the United States will spend only about six billions in the fiscal year ended June 20, 1941.

Mr. Britton cited figures to indicate the enormous quantity of materials required for defense. By this fall, six plants will require 30,000,000 pounds of brass monthly and additional plants are contemplated. The aircraft program has been stepped up sharply with additional tool requirements for 1942 estimated at more than $300,000,000.

He predicted that by March, 1942, the United States would have an army able to beat any in the field and well supplied with equipment. It will not be ready by July of this year but the situation will show improvement by October, he said.

Industry can be helpful in working out its own material problems and at the same increase production, H. F. Seymour, Mill Equipment and Supplies Unit, Tools Section, Production Division, OPM, said. As an example, one manufacturer increased production 25 per cent by eliminating 12 items from his list of products. As an extreme example of material substitution, a machine tool maker has made seven changes through the range of metals, alloys and plastics.

In Washington, there is increasing evidence of co-operation on the part of the services, he said. For instance, government specifications required galvanizing of hinges on cantonment doors. Now, a substitute coating has been specified so that the zinc may be diverted to other uses.

Few companies are encountering serious difficulties over materials but may in the next few months, he said, and as an aid in getting out defense orders, suggested tagging those for defense and nondefense. He quoted John Biggers, head of defense production, as saying some companies are building large inventories of materials which are detrimental to the defense program. However, there is a close line between good management and actual hoarding.

Considerable time was devoted to discussion of defense problems. One session was headed by W. W. Anderson, Nicholson File Co., Providence, R. I., as leader and C. O. Drayton, American Screw Co., Providence, as co-leader. Another was held jointly by the two distributing organizations, in which manufacturers largely participated.

J. S. Disston Jr., Henry Disston &

■ **Several hundred manufacturers and distributors attended the banquet featuring the Triple Mill Supply meeting last week**

Sons Inc., Philadelphia, predicted there will be no large increases in prices on small tools, due to activities of Leon Henderson's price division in Washington and pending heavier taxation. He added, however, that there probably will be some increases.

He expressed the opinion that there probably will be plenty of capacity to care for all small tool requirements but added that government departments are choking industry by placing orders for requirements too far ahead.

It will be difficult to supply distributors for the next year, H. P. Ladds, National Screw & Mfg. Co., Cleveland, said, for the reason it is difficult to obtain materials. If products requiring 100 tons of steel are shipped, 60 tons for nondefense and 40 for defense, it is possible to replace only the 40 tons, he said.

Mr. Ladds feels that industry will have little to do with running its affairs for a time. As an example, his company bid on 250,000 screw machine parts for delivery in 90 to 100 days. The order was accepted with the demand that deliveries start in two weeks.

S. W. Gibb, Yale & Towne Mfg. Co., Philadelphia, predicted that if steel prices are increased, a general price rise in electric hoists and chain blocks manufactured by his company is inevitable and probably would be extended to products of most other companies.

Labor probably will be the most important factor in determining product prices, however, according to Mr. Gibb. Rising labor costs are not an important factor in making items like chain blocks since it comprises a comparatively small part of total cost. However, the labor factor is important in a more complicated product like an electric hoist. Rejections on parts in his company's production department are out of all bounds right now, due to the labor bottleneck which means that a relatively large number of apprentices must be employed.

There may be an even greater shortage of cutting tools unless priorities are worked out more carefully, according to W. E. Caldwell, Cleveland Twist Drill Co., Cleveland. He explained that tool makers are not told not to sell for nondefense but they cannot replace the material. About 75 per cent of all cutting tools now go directly or indirectly into defense work, he estimated. Heavier demand will be encountered toward the end of the year as production speeds up.

Lower Tungsten Content Feasible

In discussing tungsten supplies, he said that while about 92 per cent of the tungsten is consumed in cutting tools, this could be materially reduced by using analyses with lower content. His company produces a molybdenum tool steel requiring only 1.5 per cent tungsten in contrast to others requiring about 18 per cent.

R. L. Hamilton, Dumore Co., Racine, Wis., said he felt manufacturers should resist the temptation to take large direct orders inasmuch as they must call upon distributors to sell their products in the future. It is essential to stick to normal sales policy, he said.

R. G. Lufkin, president, Lufkin Rule Co., Saginaw, Mich., was elected president of the Manufacturers' Association, succeeding Mr. Clark of the Norton Co. Mr. Ladds of the National Screw & Mfg. Co. was named first vice president and A. A. Murfey, Cleveland File Co., Cleveland, second vice president. A. C. Kingston, Boston Woven Hose Co., Boston, was elected treasurer. R. Kennedy Hanson continues as general manager.

The executive committee follows: C. F. Conner, B. F. Goodrich Co., Akron, O.; Irving W. Lemaux, Indianapolis Brush & Broom Mfg. Co., Indianapolis; R. D. Black, Black & Decker Mfg. Co., Towson, Md.; F. J. Tone Jr., Carborundum Co., Niagara Falls, N. Y.; H. A. Burdorf, Lunkenheimer Co., Cincinnati and E. J. Chamberlain. National Twist Drill & Tool Co., Detroit.

Following officers were elected by the National distributors' group: H. V. Waterman, Hendrie & Bolthoff Mfg. & Supply Co., Denver, president; Andrew G. Carey, Carey Machinery & Supply Co., Baltimore, vice president Areas 1 and 2; Carl A. Channon, Great Lakes Supply Corp., Chicago, vice president Areas 3 and 4; A. J. Glesener, A. J. Glesener Co., San Francisco, vice president Areas 5 and 6 and H. R. Rinehart, Philadelphia, secretary and treasurer.

The executive committee follows: F. F. Chase, Chase, Parker & Co. Inc., Boston, Area 1; W. W. Edwards, Federal Hardware Co., New York, Area 2; Charles E. Allinger, Charles A. Strelinger Co., Detroit, Area 3; E. K. Welles, Charles H. Besley & Co., Chicago, Area 4; H. J. Gundlach, Mine & Smelter Supply Co., Denver, Area 5; A. W. Lohn, Ducommun Metals & Supply Co., Los Angeles, Area 6.

The Southern Association elected J. B. Crimmins, Mills & Lupton Supply Co., Chattanooga, Tenn., president; Howard M. Schramm, Turner Supply Co., Mobile, Ala., first vice president and P. Pidgeon, Pidgeon-Thomas Iron Co., Memphis, Tenn., second vice president. A secretary and treasurer will be named later.

The executive committee follows: Edward F. Strauss, Oliver H. Van Horn Co., New Orleans; Jack B. Dale, Briggs-Weaver Machinery Co., Dallas; Harry P. Leu, Harry P. Leu Inc., Orlando, Fla.; Lloyd B. Mize, Mize Supply Co., Waynesboro, Va.

Giving More for Less, Described and Pictured for U. S. Steel Stockholders

■ SCOPE of United States Steel Corp.'s work in the defense program was illustrated at the annual meeting of stockholders last week in Hoboken, N. J., by Irving S. Olds, chairman.

Sixty-two stereopticon slides in color presented and explained by Mr. Olds emphasized his remark that U. S. Steel alone has productive capacity greater than that of Germany as now constituted.

Operating at its present rate for a full year, declared Mr. Olds, the corporation's steel production would be equal to that of Great Britain, France and Belgium combined at the time war broke out. Its rated capacity now is 29,720,000 net tons of steel ingots per year. This is about 35 per cent of the industry's total in United States, 84,152,292 tons.

The corporation's production in the first quarter of 1941 averaged 100.9 per cent of capacity, a record high. Shipments in the period also reached a new peak.

Slide films presented by Mr. Olds illustrated in continuity the story of steel in defense, from ore mines through blast furnace, open-hearth and bessemer converters to ingots, semifinished and finished steels of various types. Fabrication into finished products as cable, nails, fence, rivets and bolts was shown.

Manufacture of products required directly for rearmament, as armor plate, shell and bomb casings, gun forging blanks and helmet steels also was depicted and explained by Mr. Olds.

Forging an armor-plate-steel ingot in a 12,000-ton press was especially noted. The press, Mr. Olds pointed out, was one of three of the largest owned by commercial companies in the United States. With auxiliary equipment such a press costs $7,000,000 and requires 15 to 18 months to build and install. When armor plate capacity is expanded as now contemplated, five such presses will be in operation in this country.

Shipyard Activities Illustrated

The corporation's production of construction materials for factories and housing to meet requirements of the defense program, shipyard activities including building of maritime and naval vessels, and U. S. Steel's ocean-going fleet as an important supplier of strategic defense materials also were portrayed and explained.

Apart from this narrative, in commenting on operations, Mr. Olds stated earnings of any basic industry over the years should be sufficient to pay a reasonable amount to owners, to attract additional capital when required, and to permit provision for technological progress and future emergencies.

Average earnings on the corporation's common stock for the 5-year period 1936-40 were only 3.1 per cent, he said. In the 10-year period 1931-40, including deficit years 1932-33-34-38, deficit outweighed profit.

In 1929, income from all goods and services was $1,094,000,000. After paying for goods and services bought from others, taxes, interest and providing for depreciation and depletion, the amount available for dividends, wages and salaries was $618,000,000 or 56.4 per cent of all income. Wages and salaries took $420,000,000, or 68 per cent of the balance available for wages and dividends. Taxes were $55,000,000.

In 1940 all income was $1,031,000,000. Of this $541,000,000 was available for dividends, salaries and wages; $439,000,000 or 81 per cent of the balance available for these three purposes went to wages and salaries. Taxes were $85,420,000.

In 1929 the amount available for dividends was $197,500,000; in 1940 it was $102,200,000.

Average number of workers employed in 1940 was 0.5 per cent more than in 1929. Weekly earnings per worker averaged 4 per cent more, although the average of hours worked per week was 21 per cent less than in 1929. Cost of living was about 15 per cent less in 1940.

Directors re-elected for a 3-year term were: Benjamin F. Fairless, William J. Filbert, Leon Fraser, William A. Irvin, Junius S. Morgan and Enders M. Voorhees. William Averell Brown was elected secretary of the corporation (see page 40), succeeding George K. Leet, retired.

■ PAUSE FOR REFRESHMENT: Stockholders and officials attending United States Steel Corp.'s annual meetings at noon are served sandwiches and coffee. This time the candid camera snapped Chairman Olds, left, just waiting, and President Fairless, well under way. Wide World photo

Aluminum Curtailment Stops Specialty Plants

■ Illinois Manufacturers' Association, Chicago, reports it is receiving many inquiries from manufacturing companies which have been made inactive by the government action in allocating aluminum to defense materials.

An example is the D. & S. Metal Polishing Co., 2929 West Thirty-eighth street, which has specialized in aluminum polishing. It obtained much of its work from a pattern and foundry company which now is working on defense materials which require no polishing. The polishing company has only eight employes, but these are thrown out of work until the company can obtain subcontracts. The association says numerous aluminum foundries which have been unable to obtain defense orders are in the same position.

Delivering 1000 Machine Tools Daily, Builders Outline 100% Defense Work

■ THE REQUEST that the machine tool industry step up output in 1941 to $750,000,000 is being fulfilled, F. V. Geier, president, Cincinnati Milling Machine Co., Cincinnati, and president of the National Machine Tool Builders' Association, reported to that body at its spring meeting, in Cleveland, May 5-6.

In the first quarter output increased month by month to $57,000,000 in March. At this rate the increase this year will be $300,000,000. More than 1000 machine tools now are being delivered to defense plants daily.

In discussing President Roosevelt's demand for maximum use of machines already installed, Mr. Geier explained that this could be accomplished in three ways:

"First, operate this equipment more hours per week. This will effect a prompt increase in production. In our industry we have been concentrating on operation of critical machines and today 98.9 per cent of the men in the industry are employed in plants working two or three shifts.

"Second, release critical machines from nondefense industries. Many plants not engaged in defense work have machine tools which might be made available for defense production.

"Where production lines include a number of machines of the same type, some of them could be released by putting the remaining machines on a two or three-shift basis. The machines thereby released might be employed on defense production where they now stand, through subcontracting; or they might be moved to plants engaged directly in the defense program.

Tooling for the Job

"Third, greater production per machine. We know that this is not simply a question of working equipment more hours per week. It is also a matter of proper analysis and tooling up of the job and the establishing of conditions under which the full output will actually be realized.

"While there are exceptions, it is not too much to say, generally speaking, that machine tool equipment now installed in the plants of this country could readily yield at least 10 per cent more output per hour under proper tooling and operating conditions and in many cases the increase would be considerably more.

"Throughout the industry subcontracting is on a large and growing scale. This production of parts and machines is augmenting output by the equivalent of 10,000 men. In its own plants the industry has doubled the working force within the past year through the employment of 40,000 additional men. As fast as these men can be trained they are being used to increase assembly and build up the second and third shifts, particularly in the critical machines that limit production. . . . Even now the industry has 14,000 men in training."

Mr. Geier spoke of methods which still further increase output from key shop equipment above the 120 hours of operation per week which has been rather typical of the industry. Considerable work also is being done on Sunday.

F. V. Geier
He outlined three-point plan for maximum use of machines

"Building more machine tools is only part of the industry's defense job," said Mr. Geier. "More difficult and at least equally important is its part in helping to engineer and tool up defense plant production. . . . In defense plants, machine tool engineers are analyzing and laying out methods to secure maximum output per machine and per operator and to secure and safeguard the limits of accuracy that will assure effective operation of weapons and equipment under combat conditions."

One machine tool builder alone, he reported, is building up a trained staff of more than 80 men to render this kind of service in the field.

Mason Britton, chief, Tools Section, Office of Production Management, called on the industry to plan immediately for further expansion.

"When old customers and friends try to use force in obtaining machine tools and make threats with respect to future business the OPM should be notified and there will be crack-downs," he said. "Old customers and friends are out; everything must be secondary to the national defense."

Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt., explained that priorities do not mean that orders on books should be disturbed unless a diversion is ordered by the OPM. Top priority rating simply means that the new order comes ahead of other new orders.

Howard W. Dunbar, technical chief, Tools Section, OPM, described the impressive filing and tabulating system now in operation at Washington which makes it possible within 30 minutes to answer any question about machine tool planning, availability, production and procurement. Only a week ago, before this system was installed, it took as many as 36 man-hours to answer some of these questions. In future monthly questionnaires, Mr. Dunbar stated, machine tool manufacturers will be asked for more detail than in the past.

Accurate Statistics Essential

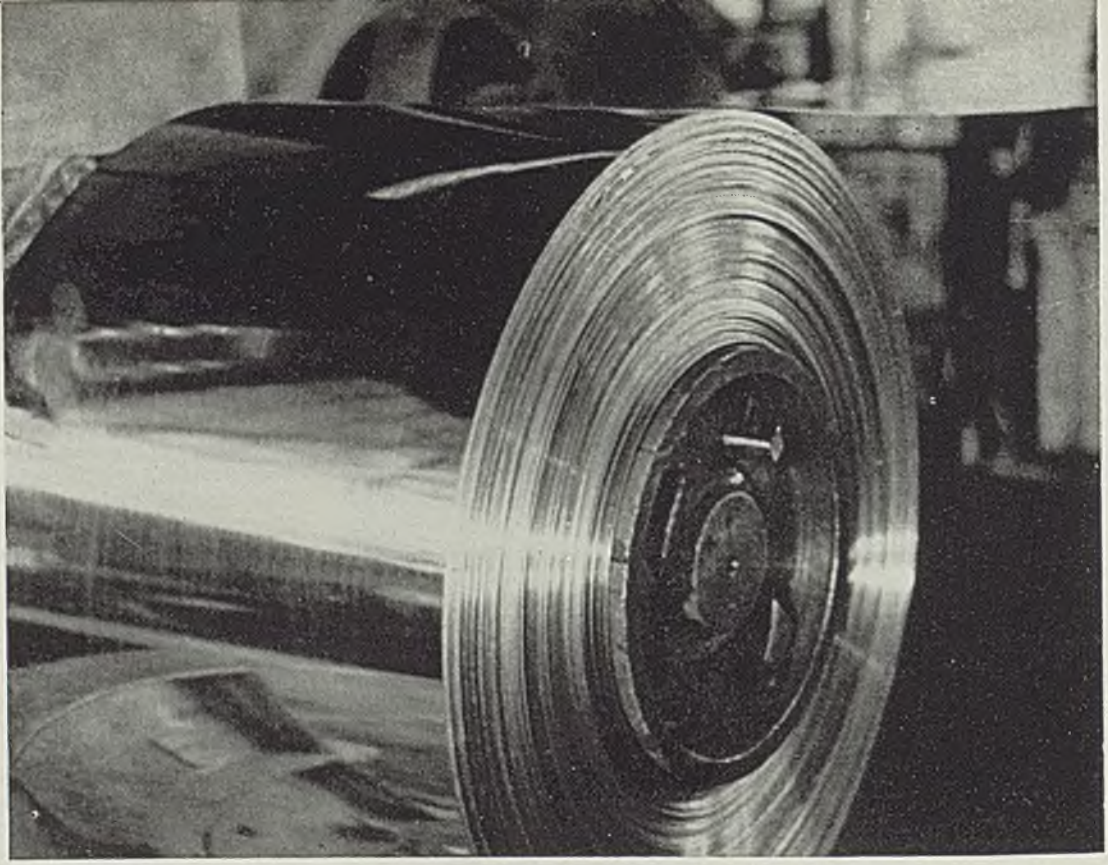
Charles J. Stilwell, president, Warner & Swasey Co., Cleveland, emphasized the need for careful collection and reporting of statistics dealing with machine tool operations. This is necessary for fullest co-operation in the defense effort.

Clayton R. Burt, president, Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn., submitted a report on the activities of the machine tool Defense Committee. Tell Berna, the association's general manager, asked the industry to take the initiative in explaining to draft boards the key position of workers in the industry. Machine tool production must not be allowed to suffer by induction of trainees into the army.

Trend is toward lighter color than the standard machinery gray. Recognizing it, a committee headed by Wendell E. Whipp, president, Monarch Machine Tool Co., Sidney, O., is conducting a ballot to determine a new standard color.

Interest in emergency conditions raised attendance to 250, largest in many years.

■ Farm implement and machinery exports in March were valued at $7,180,779, or 18 per cent less than $8,804,738 total in March, 1940, according to the durable goods unit of the Department of Commerce. The loss of trade was largely because of a drop of more than 50 per cent in exports of wheel tractors.



■ TIN PLATE IN COILS: Supplementing production of tin plate in sheet form, several manufacturers supply it in rolls. This coil weighs 4200 pounds, the strip is 5600 feet long, 20 inches wide, 0.0107-inch thick. Tin is applied electrolytically. Photo, courtesy, Crucible Steel Co.

Precious Tin: Government Orders Less on Containers

■ APPROXIMATELY 7000 tons of tin will be conserved annually for defense and essential civilian needs as result of the Office of Production Management's order to tin plate makers and can manufacturers last week to reduce the coating on most tin-plated containers and to substitute black or terne plate wherever feasible.

W. L. Batt, deputy director of OPM's production division, in issuing the order estimated it would save 17 per cent of tin used for cans. For 1941, tin consumption has been estimated at 75,000 tons. Order becomes effective May 30 and will continue indefinitely.

The order specified a 10 per cent reduction in standard tin coating, or from 1.5 pounds per base box to 1.35 pounds. Cans for high-acid foods, such as grapefruit, sauerkraut, plums and cherries, will continue to be coated with 1.5 pounds per base box. These products fill about 5 per cent of all cans used.

Representatives of canmaking companies had advised OPM officials the 10 per cent reduction for about 95 per cent of all cans made could be effected without danger. This reduction alone will save about 3800 tons of tin a year.

The order also specified terne plate should replace tin plate wherever possible. Terne plate, made of tin and lead, requires a smaller amount of tin than tin plate. Some packagers, paint manufacturers, for example, already have switched to terne plate.

Where tin or terne platings are not required, the OPM order asked that black plate be used. Black plate coated with lacquer or enamel has been found satisfactory for packing certain types of foods and nonedible products. Further advances in this direction probably will be necessitated by the new controls.

Stocks To Last 14 Months

Mr. Batt estimated tin on hand and afloat is sufficient for 14 months, but added that OPM is concerned over an eventual shortage "as all our sources are dependent upon water-borne transportation."

United States production of tin has been negligible. The Malay states are the leading mine producers and account for around 30 per cent of the total. Netherland India has ranked second in recent years, with Bolivia, Siam, Nigeria and China following. Leading smelter producers have been British Malaya, United Kingdom, The Netherlands, Netherland India and China. The war, of course, has altered the flow of tin ores to smelters considerably.

When it became evident United States sources in the Far East might be cut off by the war, plans were laid to acquire substantial stocks of tin and also to build a smelter in this country. In February the government entered into a contract with the Mining Equipment Corp. (formerly Tin Processing Corp.), New York, to build a smelter at Texas City, Tex., to smelt Bolivian ores. The company is a subsidiary of N. V. Billiton Maatschappij, Dutch East Indies.

General contract for construction of the plant is expected to be let within the next several weeks. Smelter will have a capacity for 50,000 tons of tin concentrates, or 18,000 tons of fine tin annually.

Normally a little more than half the primary tin consumed in this country goes into tin plate. In 1940, tin plate production aggregated 2,572,558 tons, highest in history with the exception of 1937 when 2,708,373 tons were produced.

Solder and bearing metals, essential for many defense purposes, account for the consumption of large quantities of both primary and sec-

ondary tin. Normally between 35 and 40 per cent of all tin consumed goes into these products.

Ten years ago tin plate production, on a tonnage basis, overtook steel rail production and has held a comfortable lead since. This resulted both from a decrease in the tonnage of rails laid and to an increase in tin plate demand, caused by more extensive use of the tinned containers for foods, beverages and to the increased popularity of smaller packages for oil.

As the chief use for tin plate is in food containers, as reported recently by the Bureau of Mines, the figures indicate more steel is being consumed for this purpose than to maintain the nation's vast network of rails.

Rail and tin plate production since 1915 are shown in table below:

	Rails Net Tons	Tin Plate Net Tons
1915	2,468,707	1,100,913
1916	3,197,060	1,276,112
1917	3,297,460	1,616,657
1918	2,845,799	1,608,124
1919	2,468,304	1,203,578
1920	2,916,610	1,539,977
1921	2,440,276	837,660
1922	2,432,389	1,353,824
1923	3,253,058	1,584,132
1924	2,725,332	1,487,616
1925	3,119,488	1,729,287
1926	3,603,767	1,875,241
1927	3,143,264	1,773,389
1928	2,965,192	1,920,738
1929	3,048,795	2,034,170
1930	2,098,021	1,859,564
1931	1,296,681	1,559,294
1932	450,874	1,104,563
1933	466,252	1,888,125
1934	1,131,451	1,683,268
1935	796,921	1,898,578
1936	1,366,228	2,355,531
1937	1,619,228	2,708,373
1938	697,642	1,601,679
1939	1,312,647	2,505,636
1940	1,678,986	2,572,558

Koppers Buys Granite City Blast Furnaces; Guns Now Among Products

■ KOPPERS UNITED CO., Pittsburgh, last week purchased the two idle blast furnaces and other properties of the Granite City Pig Iron Co., Granite City, Ill., and will have one of the stacks in blast by July of this year. In addition to the blast furnaces the properties include 80 Roberts by-product coke ovens, a by-product recovery plant, and a Bartlett Hayward benzol plant with capacity for producing 1,500,000 gallons of light oil.

The blast furnaces, of 500 and 600-ton capacities, have been shut down since 1932, and the coke ovens have been idle since 1935. Formerly they were a part of the St. Louis Gas & Coke Corp.

Koppers officials said the first furnace will be reconditioned soon. It is expected to produce 200,000 tons of pig iron a year, or more than the 189,514-ton deficit in United States pig iron production, on a production basis of 102½ per cent of rated capacity as figured in the recent report to President Roosevelt by Gano Dunn, Office of Production Management.

Majority of the pig iron production will be sold to Granite City Steel Co., whose open hearths are only a mile from the furnaces.

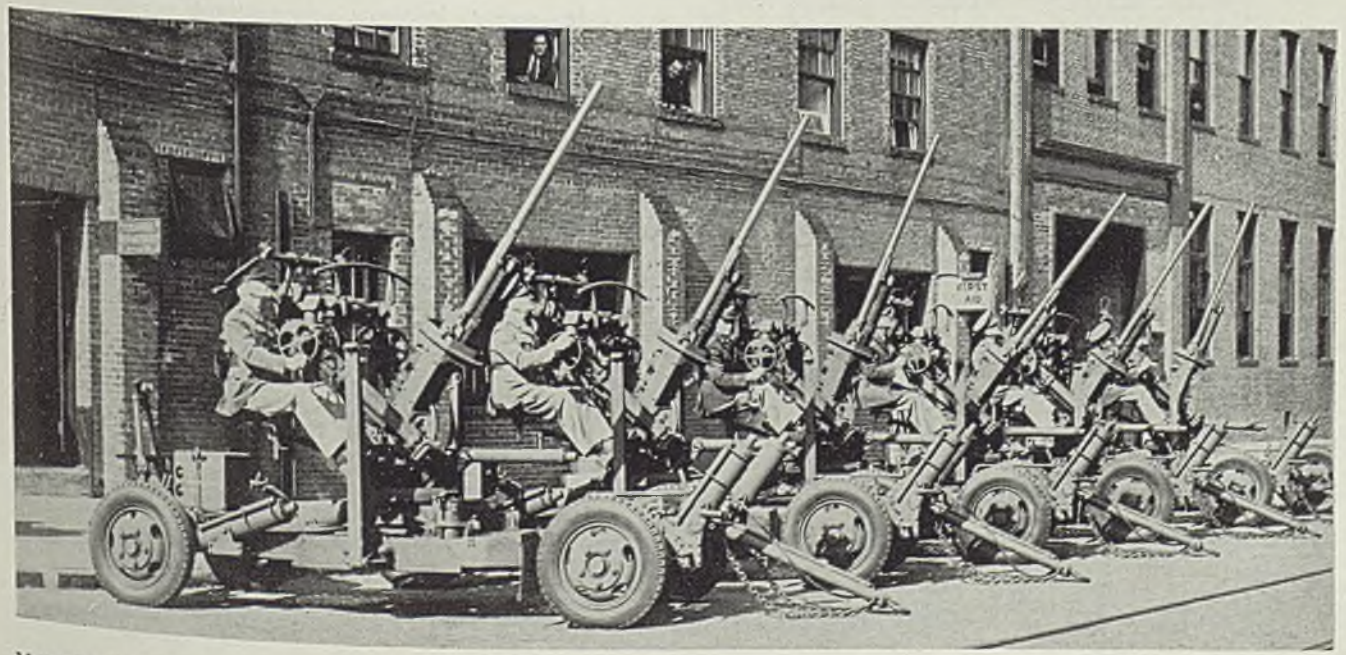
Coke ovens are in poor physical condition and it is doubtful whether they will be rehabilitated. Negotiations are underway to purchase coke from a producer in the district.

Because of the tight situation in Great Lakes shipping and the distance of the furnaces from the nearest port, it is possible an all-rail tariff from ore source to Granite City may be established.

After Granite City Steel's pig iron needs are satisfied, Koppers will offer iron on the open market.

Pig iron is not an entirely new business for the Koppers group. Although Koppers United is a holding company itself, it is indirectly in the pig iron business through control of iron-producing subsidiaries. However, acquisition of the Granite City stacks marks another step in the diversification of Koppers which during the past 26 years has grown to become a producer of products for nearly every type of industry. Primarily a processor of coal, the company performs all the operations necessary to obtain coke, coke oven gas, tar, light oils, and chemicals. It also produces highway paving, roofing and waterproofing materials, and complete plants and equipment necessary to process coal. It is a large builder of general industrial machinery and equipment.

■ **Antiaircraft guns, capable of throwing 150 rounds of high-explosive 2-pound shells a minute and designed to repulse dive bombers, recently were turned over to the Army at the Bartlett Hayward Division of Koppers Co. in Baltimore. A considerable part of the division's facilities for fabricating plates and building special machinery have been diverted from peace-time to ordnance manufacture. In photo below, a consignment of the new guns are being manned by high-ranking Army officers. NEA photo**



Industry, Fighting for America, Tripped by Social Experiments

■ EVERY person identified with industry makes liberal allowances for the fact that in times of national emergency the government must impose numerous restrictions and controls upon industrial activities.

Stockholders, executives and employes alike were willing to take President Roosevelt literally when he declared that the government might be compelled to ask citizens to forego some of their privileges but would not force them to give up any of their fundamental rights.

• • •

Therefore, most individuals in industry have swallowed each successive course of unpalatable restriction, regulation, interference and control with fairly good grace. They have been reasonably patient and forbearing largely because they are sincerely anxious to co-operate with the government in its appeal for an "all-out" effort to speed defense.

Unfortunately, recent actions of the administration are making it increasingly difficult for industry to maintain its faith in the sincerity of the government. Many things are happening which look as if officialdom in Washington is permitting minority groups to take advantage of industry's tolerant and co-operative attitude.

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Among these suspicious occurrences were those recent strikes in which sitdowns, destruction of property and other illegal acts were permitted to go unpunished. In some cases the original wrongs imposed upon employers are being compounded by the unfair conditions under which NLRB is preparing to conduct impending elections.

Another suspicious maneuver was the encouragement of wage increases in a way that caused an almost blanket increase in costs, which not only threw some smaller companies into red ink, but also complicated the price control machinery so that hopeless confusion will prevail in certain industries for a long time.

Worse yet was the lack of firmness in the coal strike, which caused industry to deplete its reserve stocks of coke, pig iron and scrap unnecessarily and to reduce its production so critically that it cannot restore operations to the former rate until weeks or months have passed.

Also suspicious and dangerous is the present tendency of the government to decentralize and scramble authority in the defense organization—instead of further concentrating it, to introduce conflict in the functioning of OPM and OPACS and to give more power to left-wing experimenters and less to competent, experienced men.

Doubtful also was the Supreme Court decision in the Phelps-Dodge case. Arrogant and untimely was the ruling of FCC to force NBC to give up one of its networks.

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In every instance cited fundamental rights were taken away from private enterprise. In no case can it be proved that the destruction of these rights will benefit the defense program. On the contrary some of them impaired production critically.

In view of this record, industry is entitled to ask whether the nation's "all-out" effort is for defense or for social experiment.

E. L. Shaner

EDITOR-IN-CHIEF

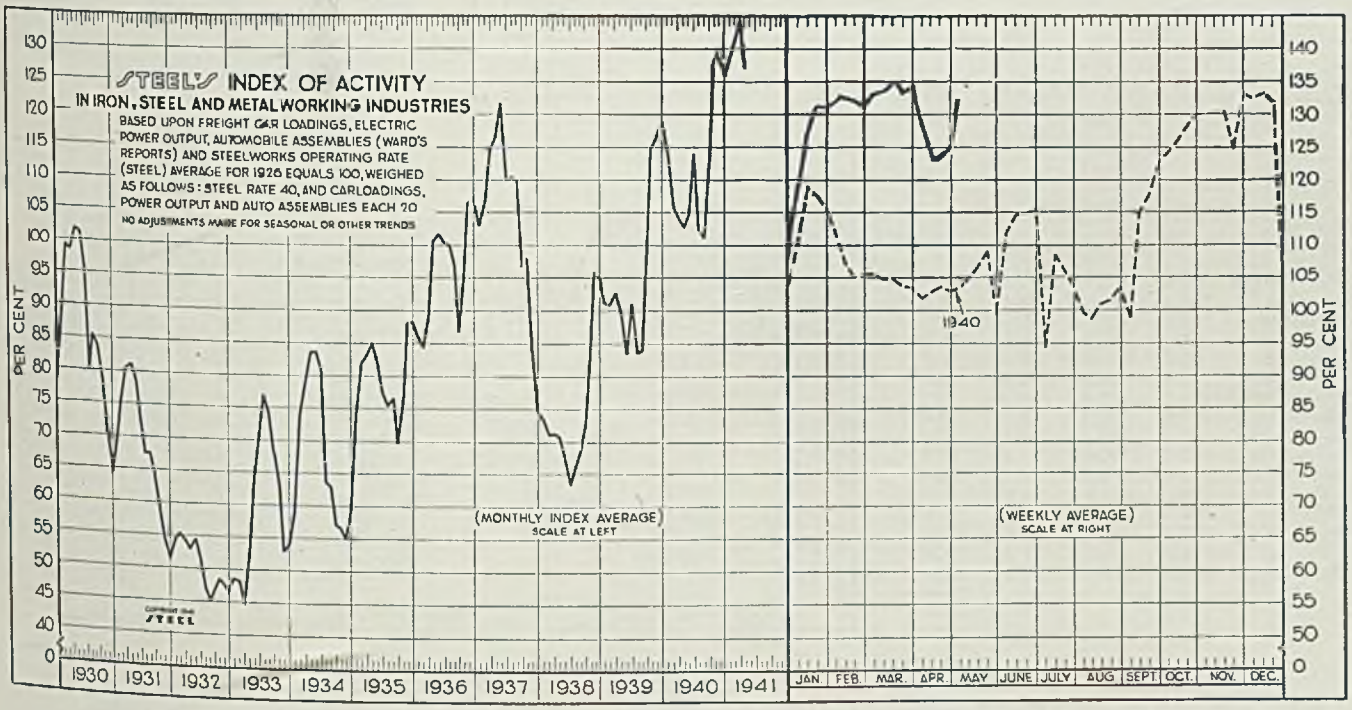
The BUSINESS TREND

April Activity Index Average Off Sharply

■ BITUMINOUS coal and Ford Motor Co. strikes were the chief factors in the decline in the April average of STEEL's index of activity. During that period the weekly index averaged 127.2, off 6.7 points from 133.9 recorded during March but exceeded the April, 1940 average of 102.7 by a wide margin.

The rebound in activity among those industries which have been affected by labor disturbances has been particularly encouraging. Automobile production, which had receded from the weekly output total of 132,000 to 99,000, is now back to the 130,000 car weekly pace and is expected to climb still further. Resumption of bituminous coal shipments has lifted revenue freight traffic to the highest level this year and further gains are indicated. Steelmaking operations are recovering rapidly but the effects of the depletion of reserves will probably not be overcome until late summer.

During the week ended May 3, STEEL's activity index rose 6.1 points to 132.6, reflecting gains in three of the four industrial indicators composing it. In the like period a year ago the index stood at 103.3.



STEEL'S index of activity gained 6.1 *points to* 132.6 *in the week ended May* 3:

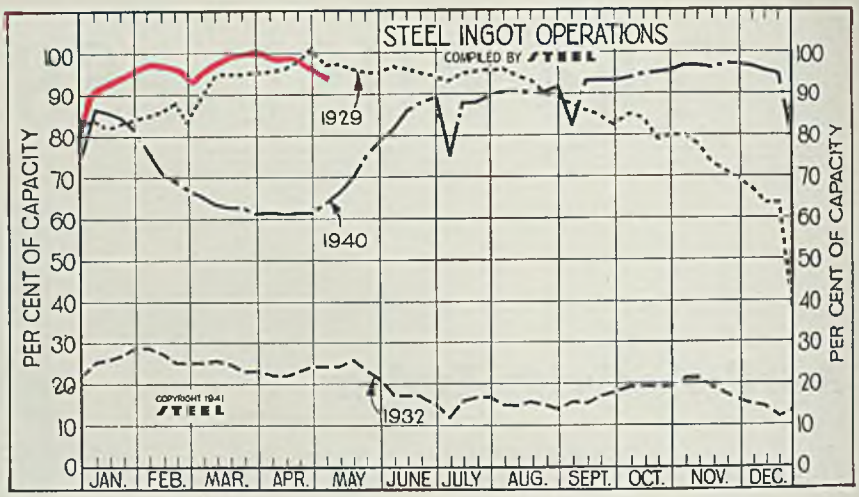
Week Ended	1941	1940
Feb. 15	132.3	105.1
Feb. 22	131.2	105.4
March 1	133.0	105.6
March 8	133.1	104.7
March 15	135.0	104.9
March 22	133.5	103.7
March 29	133.9	103.2
April 5	128.9	101.8
April 12	123.8	102.7
April 19	124.2	103.4
April 26	126.5	102.8
May 3	132.6	103.3

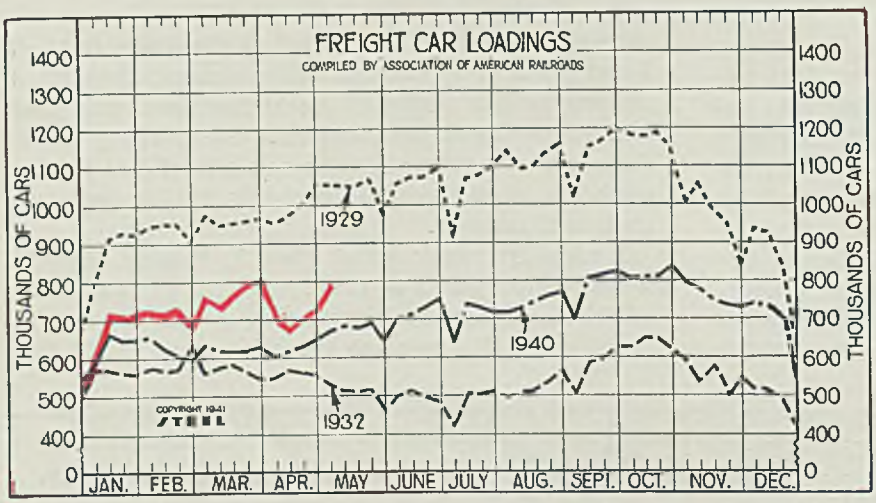
Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.5
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	.....	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	.....	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	.....	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	.....	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	.....	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3

Steel Ingot Operations

(Per Cent)

Week ended	1941	1940	1939	1938
May 3....	95.0	63.5	49.0	31.0
April 26...	96.0	61.5	49.0	32.0
April 19...	98.0	61.5	50.5	32.5
April 12...	98.0	61.0	51.5	32.0
April 5...	98.0	61.5	53.5	32.0
March 29..	99.5	61.0	54.5	36.0
March 22..	99.5	62.5	55.5	35.0
March 15..	98.5	62.5	56.5	32.0
March 8...	97.5	63.5	56.5	30.0
March 1...	96.5	65.5	56.0	29.5
Feb. 22....	94.5	67.0	55.0	30.5
Feb. 15....	96.5	69.0	55.0	31.0
Feb. 8....	97.0	71.0	54.0	30.0
Feb. 1....	97.0	76.5	53.0	31.0
Jan. 25....	95.5	81.5	51.5	33.0





Freight Car Loadings

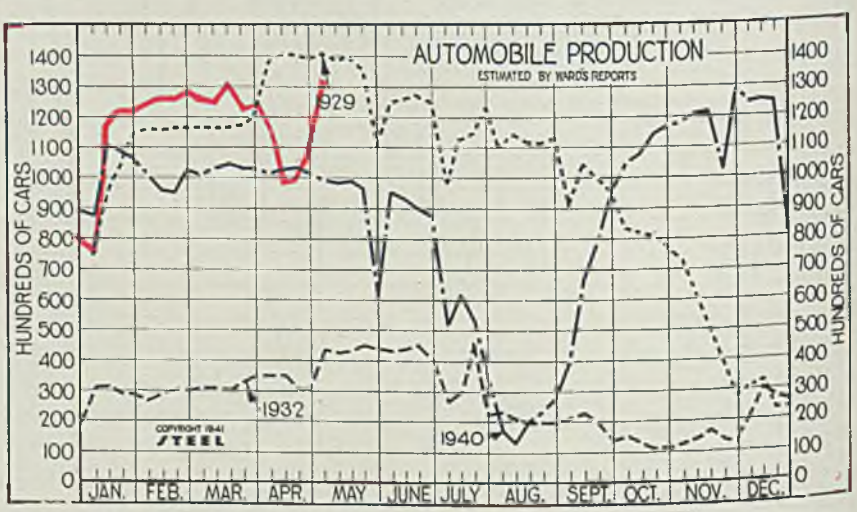
(1000 Cars)

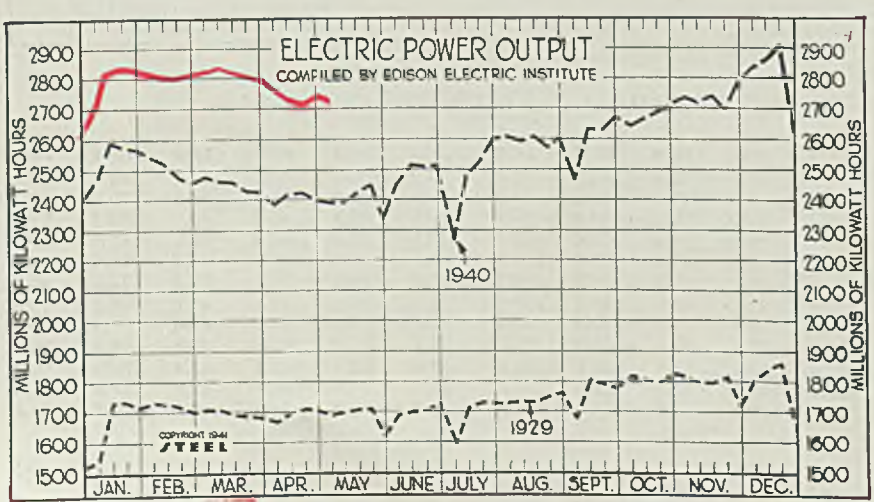
Week ended	1941	1940	1939	1938
May 3.....	794	666	573	536
April 26.....	722	645	586	543
April 19.....	698	628	559	524
April 12.....	680	619	548	538
April 5.....	682	603	535	522
March 29....	792	628	604	523
March 22....	769	619	605	573
March 15....	759	619	595	540
March 8.....	742	620	592	557
March 1.....	757	634	599	553
Feb. 22.....	678	595	581	512
Feb. 15.....	721	608	580	536
Feb. 8.....	710	627	580	543
Feb. 1.....	714	657	577	565
Jan. 25.....	711	649	594	553

Auto Production

(1000 Units)

Week ended	1941	1940	1939	1938
May 3....	130.6	99.3	71.4	53.4
April 26...	108.2	101.4	86.6	50.8
April 19...	99.9	103.7	90.3	60.6
April 12...	99.3	101.9	88.1	62.0
April 5....	116.3	101.7	87.0	61.0
March 29..	124.2	103.4	86.0	57.5
March 22..	123.8	103.4	89.4	56.8
March 15..	131.6	105.7	86.7	57.6
March 8...	125.9	103.6	84.1	57.4
March 1...	126.6	100.9	78.7	54.4
Feb. 22....	128.2	102.7	75.7	57.0
Feb. 15....	127.5	95.1	79.9	59.1
Feb. 8....	127.7	96.0	84.5	57.8
Feb. 1....	124.4	101.2	79.4	51.4
Jan. 25....	121.9	106.4	89.2	59.4





Electric Power Output

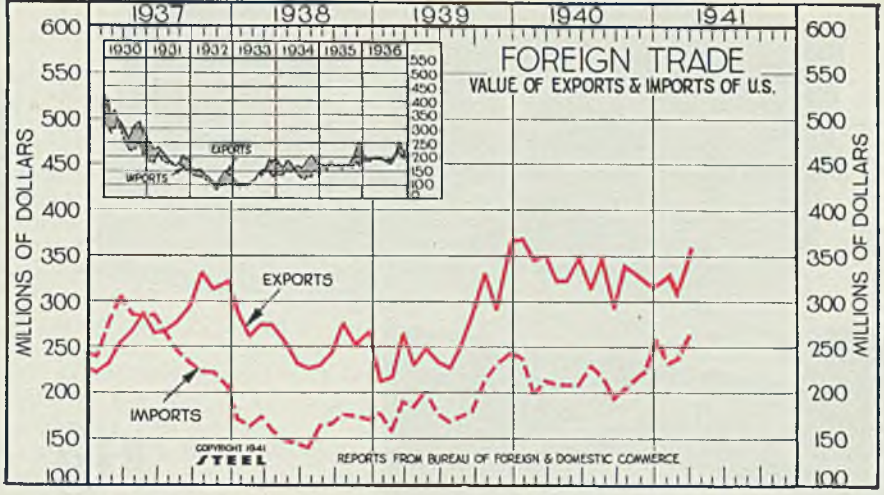
(Million KWH)

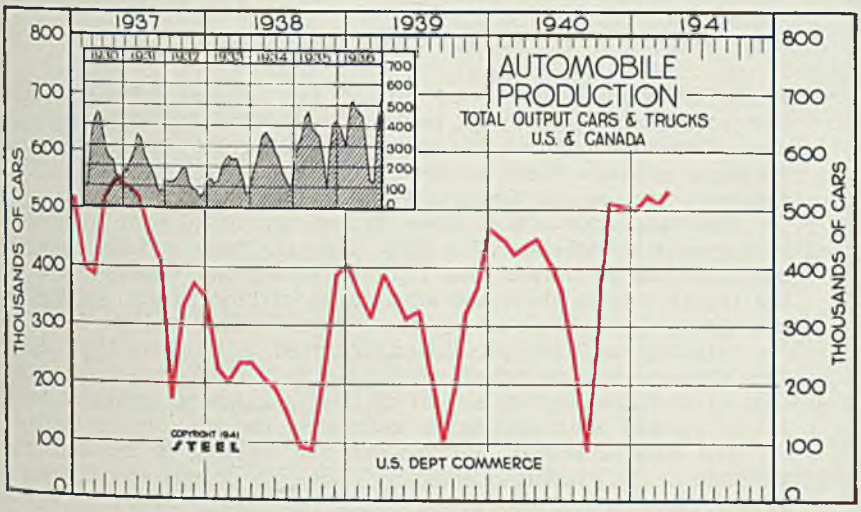
Week ended	1941	1940	1939	1938
May 3...	2,734	2,386	2,164	1,939
April 26..	2,750	2,398	2,183	1,939
April 19..	2,702	2,422	2,199	1,951
April 12..	2,721	2,418	2,171	1,958
April 5...	2,779	2,381	2,174	1,990
March 29.	2,802	2,422	2,210	1,979
March 22.	2,809	2,424	2,199	1,976
March 15.	2,818	2,460	2,225	2,018
March 8..	2,835	2,464	2,238	2,015
March 1..	2,826	2,479	2,244	2,036
Feb. 22...	2,820	2,455	2,226	2,031
Feb. 15...	2,810	2,476	2,249	2,059
Feb. 8...	2,824	2,523	2,268	2,052
Feb. 1..	2,830	2,541	2,287	2,082
Jan. 25...	2,830	2,566	2,293	2,099

United States Foreign Trade

(Unit: $1,000,000)

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





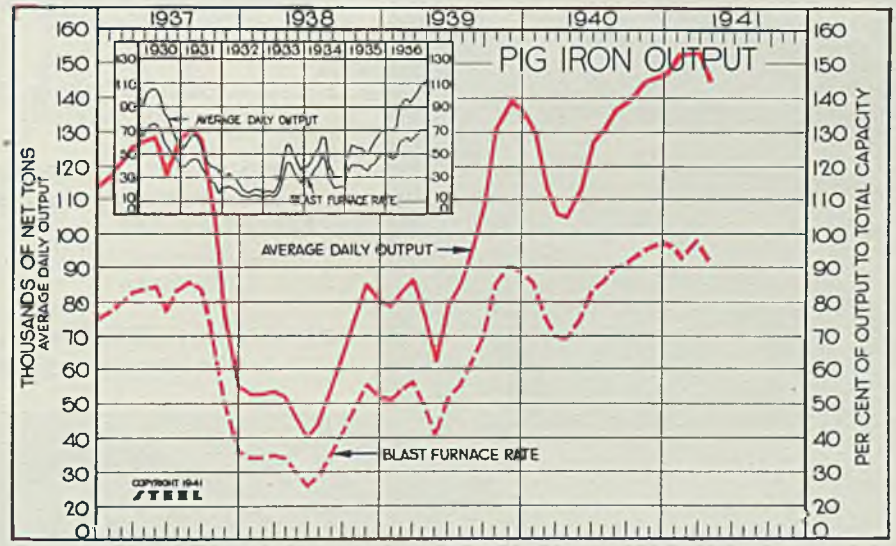
Automobile Production

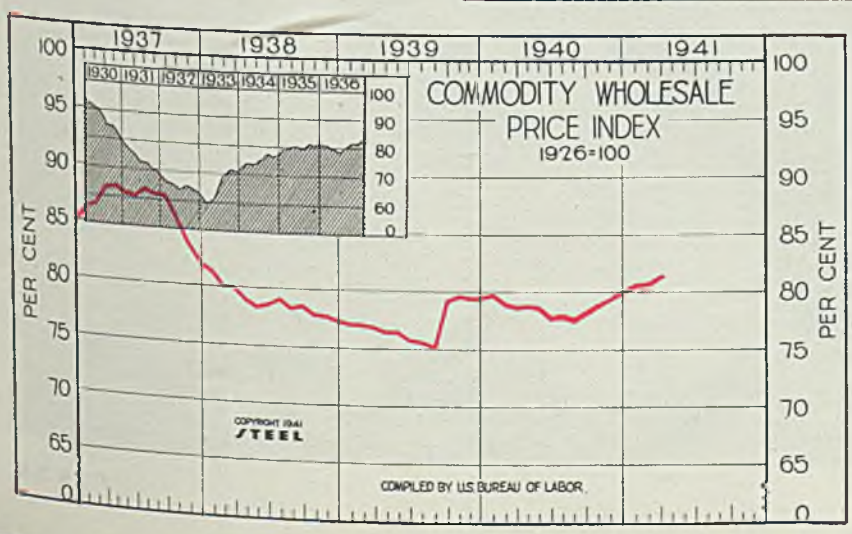
(Unit: 1000 Cars)

	1941	1940	1939	1938	1937
Jan.	524.1	449.3	357.0	227.1	399.2
Feb.	509.2	421.8	317.5	202.6	383.9
March	533.9	440.2	389.5	238.6	519.0
April	.....	452.4	354.3	238.1	553.4
May	.....	412.5	313.2	210.2	540.4
June	.....	362.6	324.2	189.4	521.1
July	.....	246.2	218.5	150.4	456.9
Aug.	.....	89.9	103.3	96.9	405.1
Sept.	.....	284.6	192.7	89.6	175.6
Oct.	.....	514.4	323.0	215.3	338.0
Nov.	.....	511.0	370.2	390.4	376.6
Dec.	.....	506.9	469.0	407.0	346.9
Ave.	.....	391.0	311.0	221.3	418.0

Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151,707	105,502	86,465	96.3	69.5	56.1
Apr.	144,723	104,635	76,732	91.9	68.9	49.8
May	.....	112,811	62,052	....	74.2	40.2
June	.....	127,103	79,125	....	83.6	51.4
July	.....	130,984	85,121	....	86.1	55.0
Aug.	.....	136,599	96,122	....	89.9	62.4
Sept.	.....	139,085	107,298	....	91.5	69.7
Oct.	.....	143,152	131,053	....	94.2	85.2
Nov.	.....	146,589	138,883	....	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	....	84.3	62.6

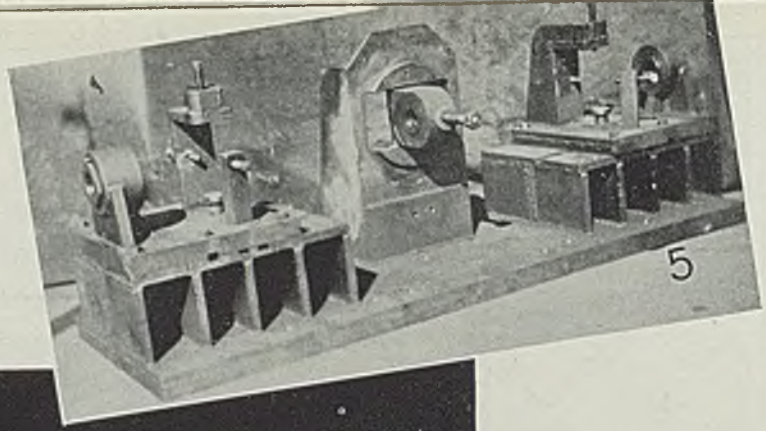


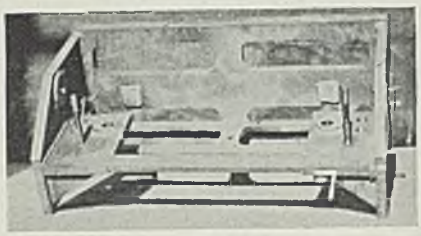


All Commodity Wholesale Price Index U. S. Bureau of Labor

(1926 = 100)

	1941	1940	1939	1938	1937
Jan.	80.5	79.4	76.9	80.9	85.9
Feb.	80.6	78.7	76.9	79.8	86.3
March	81.5	78.4	76.7	79.7	87.8
April	....	78.6	76.2	78.7	88.0
May	....	78.4	76.2	78.1	87.4
June	....	77.5	75.6	78.3	87.2
July	....	77.7	75.4	78.8	87.9
Aug.	....	77.4	75.0	78.1	87.5
Sept.	....	78.0	79.1	78.3	87.4
Oct.	....	78.7	79.4	77.6	85.4
Nov.	....	79.6	79.2	77.5	83.3
Dec.	....	80.0	79.2	77.0	81.7
Ave.	....	78.5	77.1	78.6	86.3





Jig Costs Cut

■ MODERN methods of "tooling up" for national defense production saved one company 31 per cent over time formerly required, also reduced cost and weight of jigs and fixtures by 32 per cent and 17 per cent respectively, according to figures just released by The James F. Lincoln Arc Welding Foundation, Cleveland.

The data upon which these figures are based were submitted in a report by officials of a large company now actively engaged in production of mobile field military equipment. The purpose of the report was to show the advantages of modern arc welding in the essential operation of producing jigs, fixtures and the like.

"Tooling up" for production required a total of 112 special jigs, dies and fixtures which were made by arc welding at an actual cost of $8,476.24 and in a total of 3696 man-hours, compared with $12,467.84 and 5264 man-hours estimated for the former method.

The figures reveal that modern arc welding is tremendously valuable in the present emergency. Not only does it permit getting vital equipment into production faster, but it also saves a high percentage of costs on "tooling up" operations.

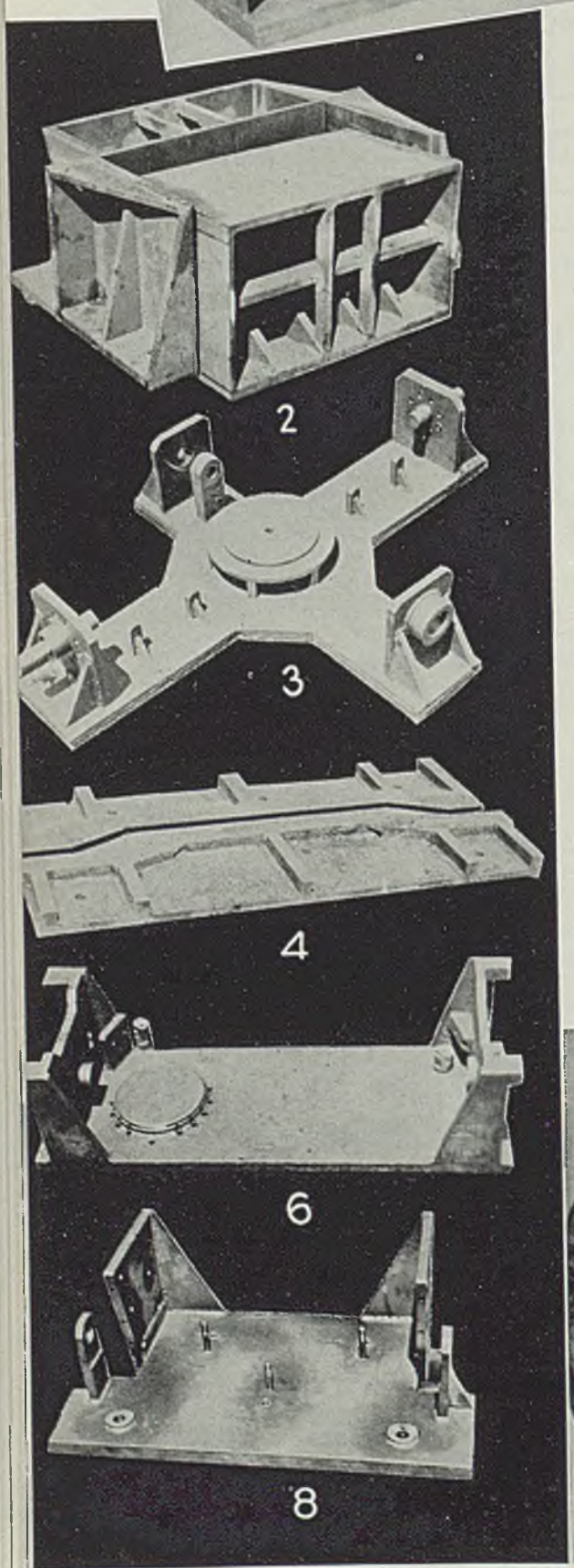


Fig. 1—Arc-welded milling fixture for circular truck part

Fig. 2—Movable and stationary die of arc-welded construction

Fig. 3—Arc-welded drill jig for front axle

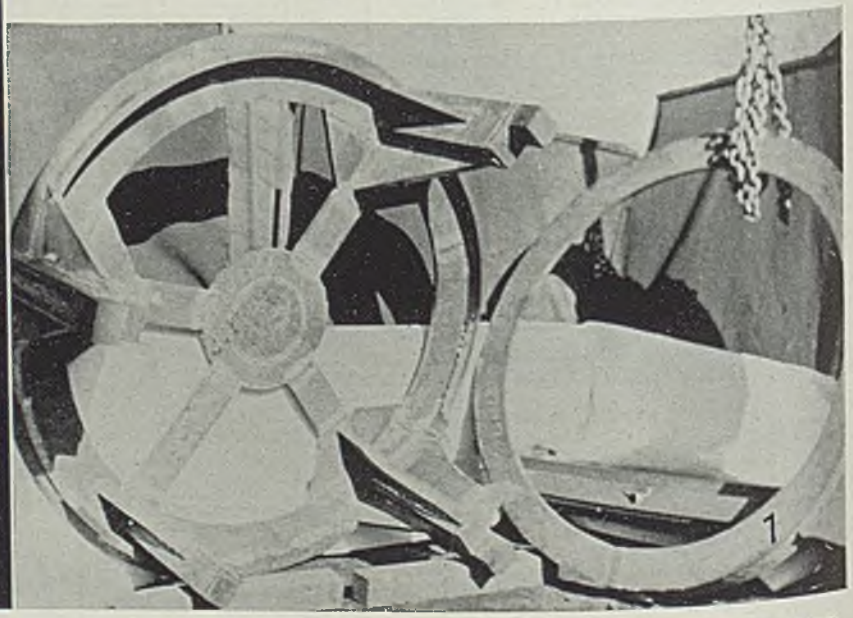
Fig. 4—Die of arc-welded construction for front steering rod

Fig. 5—Arc welded boring fixture for front axle

Fig. 6—Axle drilling fixture of all-welded construction

Fig. 7—Arc-welded drill jig for frame die

Fig. 8—Arc-welded drill jig for center plate of truck frame



New Electrodes Permit Machining

■ "Harnimoly," a new type welding electrode for welding joints and surfaces on high carbon or alloy steels that can be flame hardened up to 415 brinell, or hardened by heat treatment, is reported by Harnischfeger Corp., 4513 West National avenue, Milwaukee. It deposits metal, which after flame treatment, takes on the same qualities as the parent metal, giving a uniform hardness throughout.

The electrode has a tensile strength of 85,000 to 90,000 pounds per square inch, a yield point of 65,000 to 70,000 pounds per square inch and an elongation in 2 inches of 15 to 20 per cent. It, however, is not recommended for hard surfacing except where flame hardening or heat treatment is to be employed after welding.

Industry's Part in Arming for Defense

■ *Arsenal of Democracy,* by Burnham Finney, published by Whittlesey House, McGraw-Hill Book Co., New York; paper, 284 pp.; $2.50, postpaid.

In his position as editor of *American Machinist,* and with a background of years of experience in editorial work in the Detroit district for this publication and for *Iron Age,* Mr. Finney is well equipped to present this first realistic appraisal of industry's part in the defense program up to January, 1941, with a forecast of what may be expected in the way of production in the coming year or two.

Describing in detail the technique involved in tooling up for production of guns, ammunition, tanks, airplanes and other material required to implement democracy's arsenal, the author also discusses various bottlenecks which have arisen in the program and how they are being overcome; problems involved in training labor and management for mass production of defense items; priorities, price controls, the OPM, mass production of airplanes and other pertinent subjects.

Essentially the book represents an authoritative weighing and interpreting of industrial activity in connection with defense. As the author says, "If the reader gets a little better understanding of what the program is all about, the purpose of writing the book will have been accomplished."

In his concluding summary, Mr. Finney points out significantly, "The nation has been uncertain about going whole hog on aid to Britain at the definite risk of war. For proof, look at the relatively long period of congressional hearings and debate on the Lend-Lease bill. Talk to many people and you will realize that they are willing to give all-out aid to Britain by lip service only. The President could talk about an emergency as grave as war itself, and Mr. Knudsen could plead for recognition of the 'terrible urgency of the situation', but the conduct of most people has indicated no acceptance of such an attitude."

Nonetheless, the challenge has been issued, and American industry, or the industrial private enterprise system, if you will, involving both labor and management, is on trial. Defense must be built quickly and efficiently and unitedly. From Mr. Finney's review, it would appear this is being done.

LUBRICANTS

for shell and cartridge manufacture

By ARTHUR F. MACCONOCHIE

Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.

■ THE SERIES of articles on shell and cartridge manufacture has elicited questions concerning what lubricants are used in the various operations involved.

The National Steel Car Corp. Ltd., Hamilton, Ont., one of the largest shell manufacturers at present, employs a lubricant in piercing the shell body, this lubricant consisting of a mixture of 1 part of graphite to 5 parts of quenching oil. Standard Oil of Ohio G-5327 may be substituted for the quenching oil. This mixture is used for swabbing the piercing punch between operations.

In drawing the shell body, the punch is swabbed with the same lubricant between operations.

The next point where lubricant might be employed is in machining. The American Society for Mechanical Engineers in its *Manual for Cutting Metals* gives complete information on various lubricants recommended. Generally these are called cutting fluids since their primary function is to cool the tool. Research conducted by Cincinnati Milling Machine Co., Cincinnati, appears to indicate that the nature of the fluid used is of far less importance here than that there be plenty of it. The cheaper fluids appear to answer about as well and to produce practically as good a finish as the more expensive.

Now as regards the cartridge case. In drawing the brass for cartridge cases, soapy water works about as good as anything. Again, there should be plenty of it. In 1914-18 the boy and girl operators making bullet and small arms ammunition cartridge cases in England frequently used a flood of lubricant to "float" the component into the holes in the plate of the machine as it indexed around. Much progress, however, has been made in automatic feeds since that time.

In looking up lubricants used for brass during drawing operations, one manufacturer is reported as employing 90 per cent red mineral oil, 5 per cent rosin and 5 per cent oleic acid for light work and an emulsion of mineral oil, degras and a pigment consisting of chalk, sulphur and lithopone for heavy work. However, the writer has had no experience with this latter mixture and so cannot advise its use.

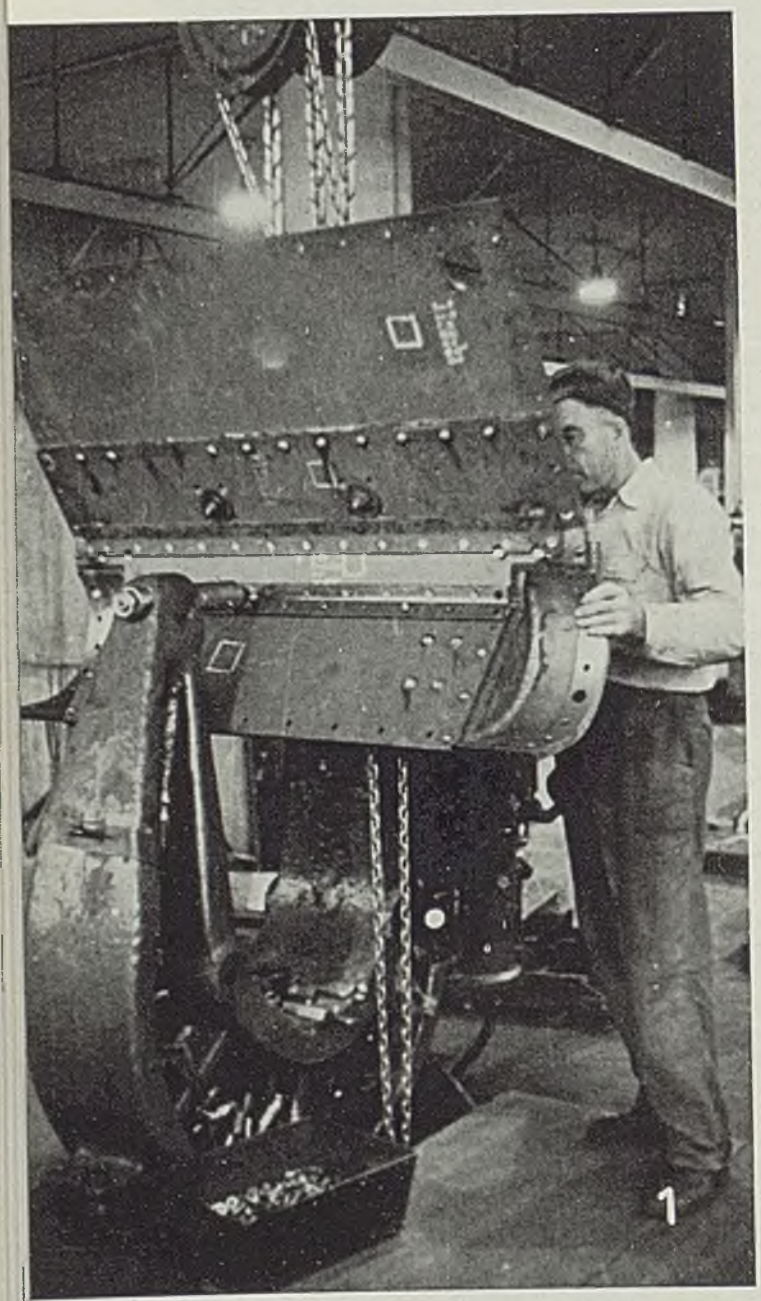
Of course, manufacturers of lubricants can offer much valuable advice, and their co-operation should be enlisted whenever embarking upon a new application where details of previous experience and modern practice may not be available.

BY G.W. BIRDSALL

Engineering Editor

MAKING

At Rock



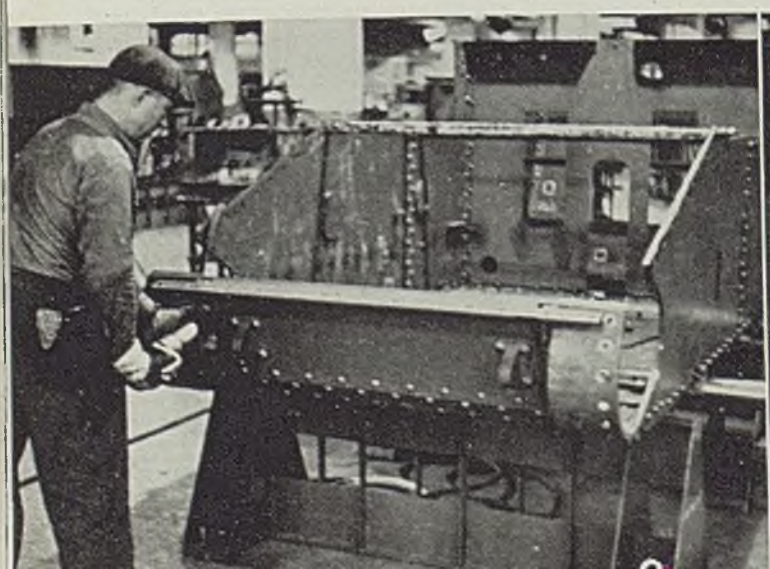
■ ONE OF this country's most important arsenals is located on a 900-acre limestone island in the Mississippi river. Known as Rock Island Arsenal, it not only serves as the Army's main supply depot but possibly is the largest ordnance manufacturing plant in the United States. From a low point of about 583 employes in 1925, a mere skeleton force, the defense program has created a real boom in the tri-city area of Davenport, Ia., and Moline and Rock Island, Ill. More than 7500 were working at the arsenal last winter with many more added since that time.

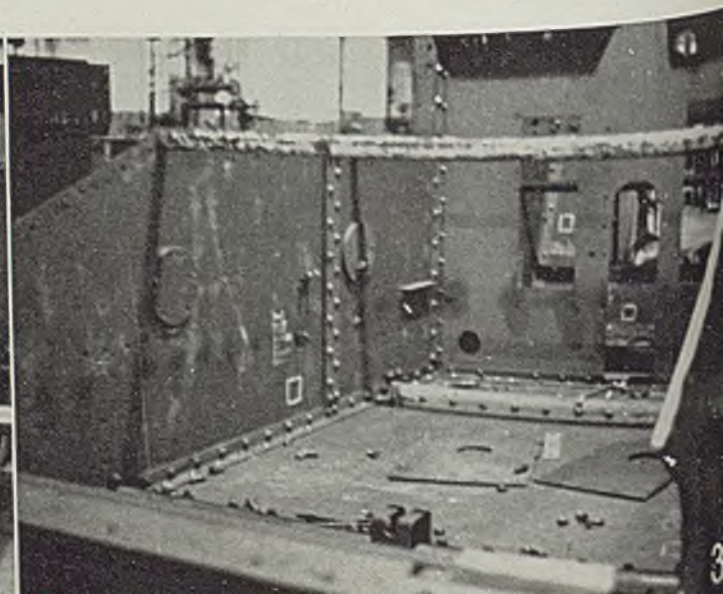
The arsenal is busy seven days a week. Many departments are running 24 hours a day to turn out gun carriages and tanks and to overhaul rifles and machine guns. In an emergency, the plant would produce about 10 per cent of the total requirements for a war. In addition, it has long served as a testing laboratory for many new developments. Thanks to the long range program of the War Department,

Fig. 1—Stationary pneumatic riveting machine handles subassemblies and certain portions of the hull until the hull assembly becomes too large. The deep throat, however, accommodates large pieces of work. Nickel-steel 5/8-inch rivets are easily set, hot or cold

Fig. 2—After assemblies become too large for the riveting machine, pneumatic hammers are used. Here the hull is starting to assume shape

Fig. 3—Close-up view of hull interior showing how armor plate and structural steel angles and flats are used to assemble the tank hull





TANKS

Island Arsenal

First section of this article last week presented the important considerations entering into manufacture of tanks and how the problems involved in production work are solved. Here is a step-by-step description of actual production work showing how tanks are made at Rock Island Arsenal, Rock Island, Ill., with some 23 illustrations to show the various operations in detail

skilled engineers in ordnance work have been designing and redesigning gun carriages, guns, tanks and other ordnance items at the arsenal for years. As a result of this long range planning, most of it done with a direct eye to production problems and their easy solution, producing armament on a production basis is no dream but an actual reality.

Rock Island Arsenal, in addition to being equipped with every latest facility for making castings and weldments and for machining and assembling them into finished products, has immense facilities for storing of war supplies.

Typical of the mass production methods now being employed in production work at Rock Island Arsenal is the line for making light tanks. As in most high-production plants, castings and small parts are made in quantity lots, finished and sent to stores, drawn from there to make subassemblies, which then are fed to the continuous assembly line in the main assembly bay which is 60 feet wide and 600 feet long.

This main assembly bay is equipped with two 15-ton cranes with 5-ton auxiliaries. As seen in Fig. 1, it is almost four stories in height, the two cranes having a clear lift of 65 feet below the maximum height of hooks.

At right angles to this main assembly aisle are a number of bays 20 feet wide and of various lengths up to 300 feet. It is here the subassemblies are made and the main assemblies started. All this is on the main floor. On galleries alongside the main assembly bay and on other levels above the subassembly lines are departments for machining, storage and the like.

As in any efficient assembly operation, as many parts as possible are made up in the form of subassemblies first before the main assembly is made. Typical subassemblies include such groups of parts as bogie units, tracks, turrets, and transmissions and propeller shaft drives. In the description of the M2 tank presented last week, the front end drive was found to consist of a constant-mesh transmission, two differential steering units and two final drive units to the sprockets.

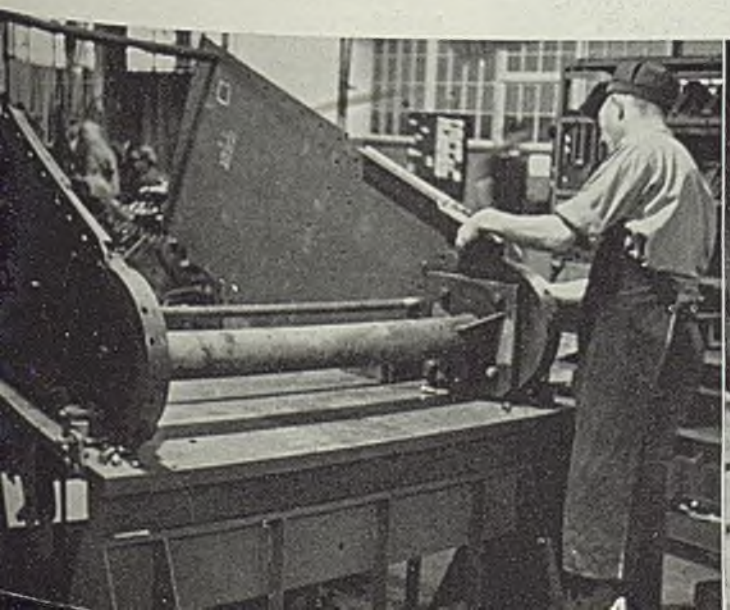
Construction of M1 Combat Car: Now known as the light tank, this unit is fitted with surface-hardened armor plate. Its construction is shown pictorially in the accompanying series of illustrations.

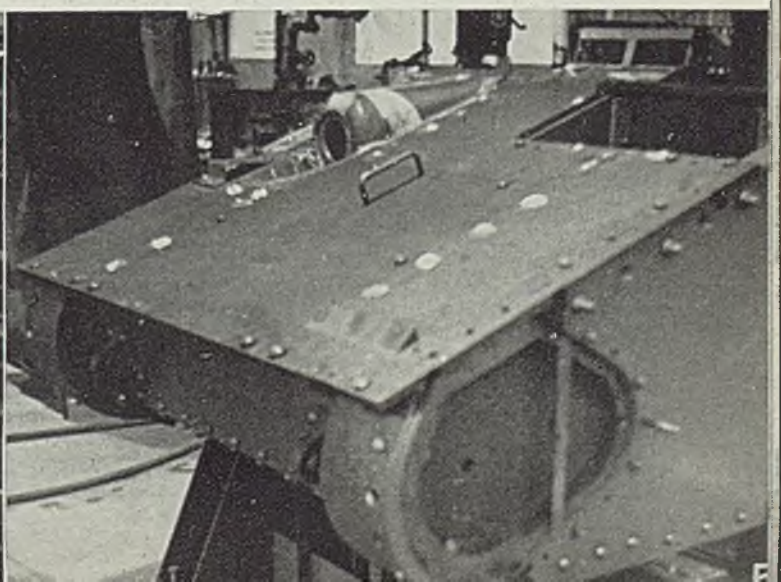
While subassemblies are being made, the hull assembly is started in one of the 20-foot bays feeding into the main assembly bay. As seen in **Figs. 2, 6 and 8**, each bay is fitted with a double monorail extending lengthwise with three or four hand hoists mounted on cross rails for handling the parts.

First step in construction of the hull is to check

Fig. 4—All assembly work is done with jigs and fixtures. Here is the fixture used to position the hull plates to assure proper fit of the transmission and drive unit assembly which goes in the extreme front compartment of the hull

Fig. 5—Front end of hull during assembly. Parts are held in place by bolts for riveting





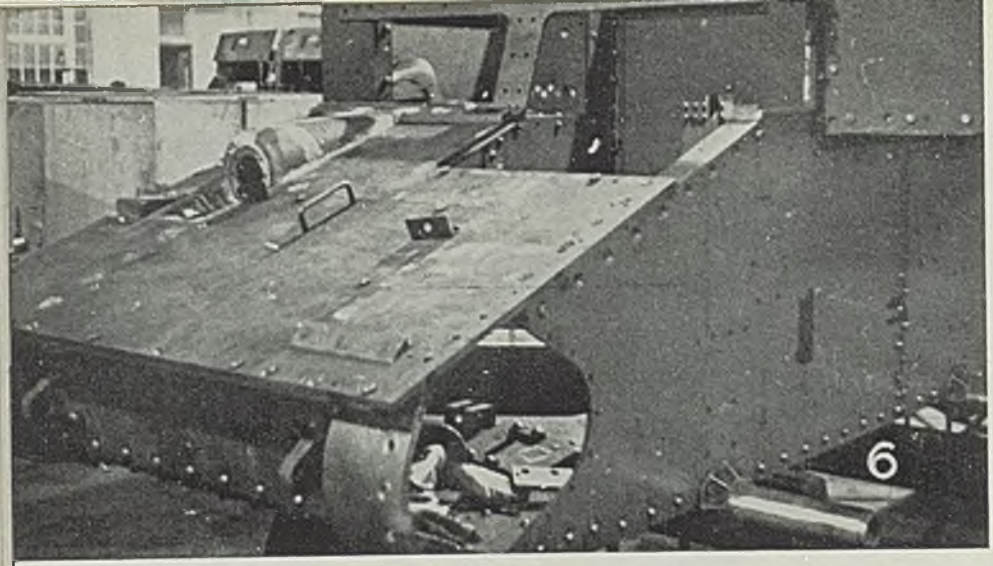


Fig. 6—Here hull superstructure has been carried on up to turret supporting ring, and the transmission fixture has been removed. This is a front view of the hull

on a templet each piece of armor plate which enters into the assembly. This is necessary to assure that proper fit is obtained without excessive strains in drawing up assemblies.

Jigs and Fixtures Used: All assemblies and subassemblies are made on jigs and fixtures. The hull is started by assembling the floor plates and part of the front end as shown in **Fig. 1.** All of the hull superstructure is riveted, using ⅝-inch diameter rivets of nickel-steel alloy, the riveting being done hot. The subassemblies are bolted into the main assemblies to facilitate servicing. Also certain access plates are bolted in place instead of being riveted.

Fig. 1 shows a stationary pneumatic riveting machine. The deep throat will accommodate quite large pieces of work. This unit easily sets ⅝-inch diameter nickel-steel rivets —the type being handled at the time the photograph was taken.

Riveting, after the assemblies become too large to handle in the stationary unit, **Fig. 1,** is done with pneumatic hammers as shown in **Fig. 2.** Sides, front and back as well as the turret of the M1 combat car whose construction is shown pictorially are made from armor plate, all of it hot-riveted to structural steel angles to form the box structure which constitutes the hull. Holes for the rivets are countersunk so the outer or exposed end of the rivet can be ground flush with the surface of the armor plate.

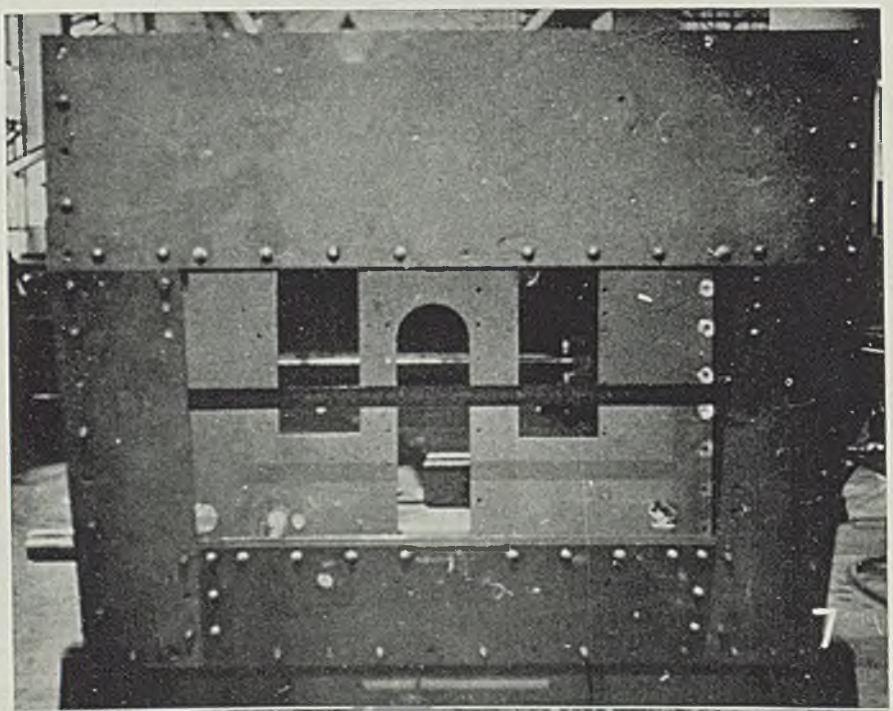
Sequence of operations in assembling the hull are as follows: Starting with the floor plates, as many small angles and parts are riveted to these as possible. It is possible to rivet one leg of many of the structural angles to a plate before fitting the plate into the hull. Then the floor plate is placed on welded structural steel supports as shown in **Fig. 2** to bring the work at a convenient height for manipulation of the pneumatic hammers used on the remainder of the riveting. The two main axles are assembled into the floor plates, the side plates added, and the superstructure brought on up to the turret.

Fig. 2 shows the hull with the floor plates assembled, the first row of side plates in place and the bulkhead separating the fighting compartment from the engine compartment also in place. The operator is working on the front of the tank in Fig. 2 with the engine compartment above him in the background.

Fig. 3 is a closeup view of the hull. Here may be seen how the box structure of the hull is formed of sections of flat armor plate joined together on the inside by structural angles.

Fig. 4 shows the fixture used to position the parts to assure proper fit of the transmission and drive unit assembly which goes in the extreme front compartment of the hull.

In **Fig. 5,** the front end and sloping front deck of the hull are be-



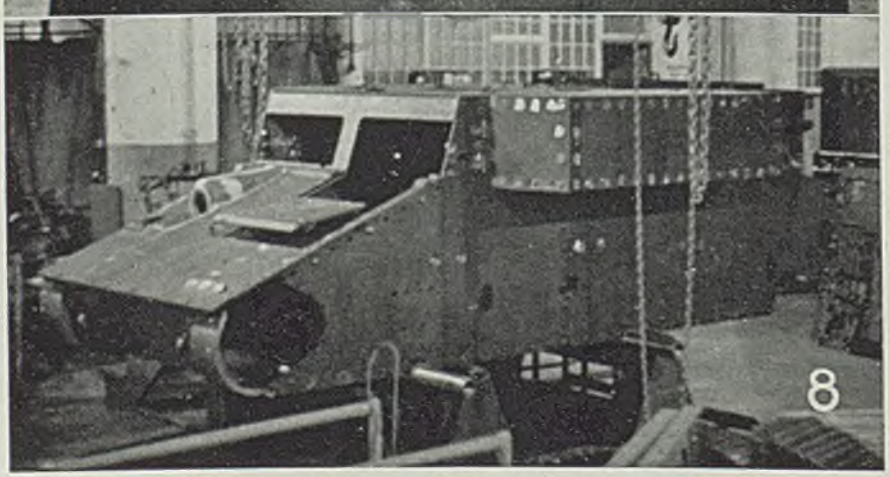


Fig. 7—Rear view of same hull showing engine compartment in the rear of the fighting compartment

Fig. 8—Here doors have been fitted into hull. Note hull is built up on steel horses which permit working at a convenient level. Note also overhead monorail and hoist used to position the parts here

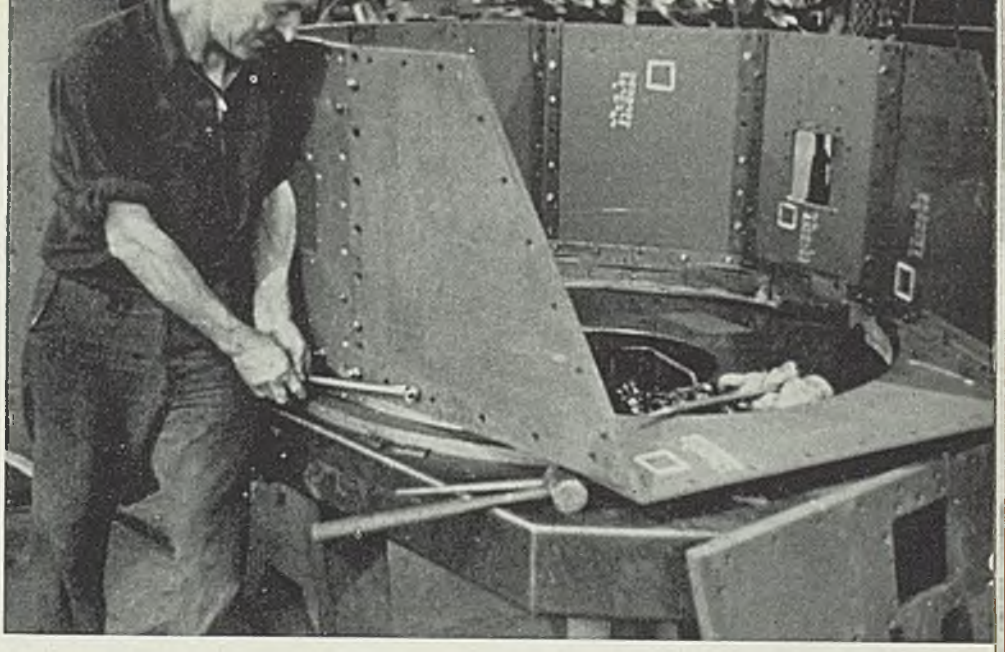


Fig. 9—Turret being assembled from armor plate and structural angles

ing fitted in place around the transmission fixture. The assembly has been lined up by bolts through some of the rivet holes in preparation for riveting. Of course the access plate shown in the center of the sloping deck will not be riveted but will be bolted to permit removal.

Fig. 6 is an oblique view of the hull with practically all the plates in place. Here the transmission fixture has been removed after the parts have been lined up and marked for riveting. Also the hull superstructure has been carried on up to the turret supporting ring. Special fixtures and check bars are used throughout all assembly operations as a means of checking and assuring proper assembly of subsequent units.

Fig. 7 is a rear view of the hull in **Fig. 6**, showing clearly the engine compartment in the rear of the fighting compartment.

Assembly operations are facilitated by 2-ton hand hoists which provide a lift of 8 feet from the floor. These operate on overhead double monorails with cross rails previously mentioned. Part of this monorail system and two of the hoists are shown in **Fig. 8.** In this view, the doors have been fitted into the hull. Doors are made by assembling armor plate and fittings in the hull department and then are matched and fitted into the hulls as soon as the hull superstructure has been built up.

Next step is to tack weld locating fixtures on the inside of the hull. These then are used to locate the lugs, which are welded to the inside of the hull to hold in place heat and sound deadening insulation.

In a similar manner other fixtures are employed to locate mounting brackets to which are attached the ammunition racks, gun mounts and other equipment.

After these mounting brackets are welded in place against inner side of the hull plates, all welds are ground smooth, and the hull moves to the spray room where it is given a primer coat. Next is applied a lining of heat and sound deadening insulation resembling Celotex. It is held in place by steel sheets on the inside, which in turn are secured to the structure by screws into mounting lugs or brackets or directly to the hull plates.

At this stage of manufacture, the hull has progressed down the length of the bay and enters the main assembly bay. Here the propeller-shaft housing is bolted in place and locating supports welded in position for mounting the engine supports using a fixture.

Turret Manufacture: At the same time the hull is being constructed, the turret is going through a similar sequence of operations in an adjoining bay. As shown in **Fig. 9,** the turret also is constructed of armor plate and structural angles. It, too, is assembled on a jig, using bolts to align the parts, followed by riveting with ⅝-inch nickel-alloy rivets applied while hot with pneumatic hammers. Outside heads are countersunk and are

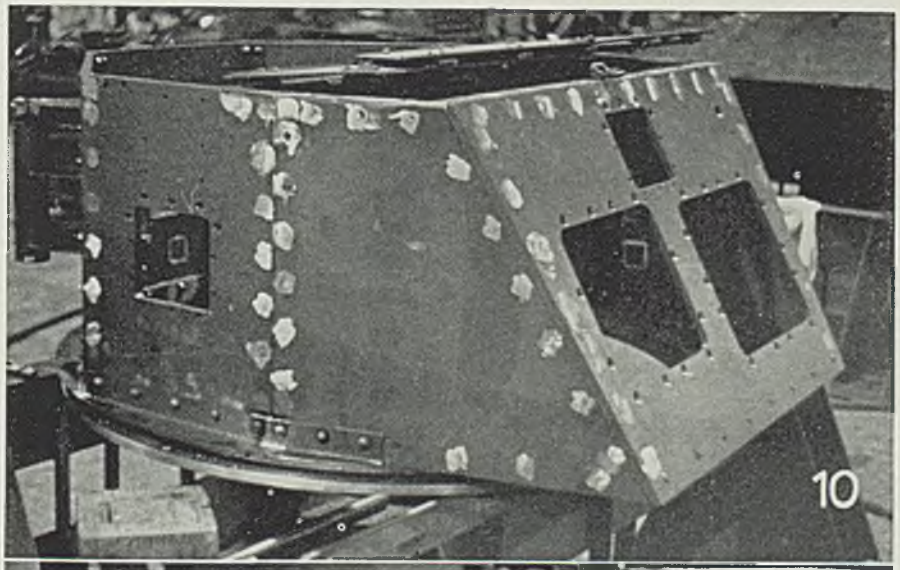


Fig. 10—Turret after riveting. White spots here are marks left by grinding the rivets flush

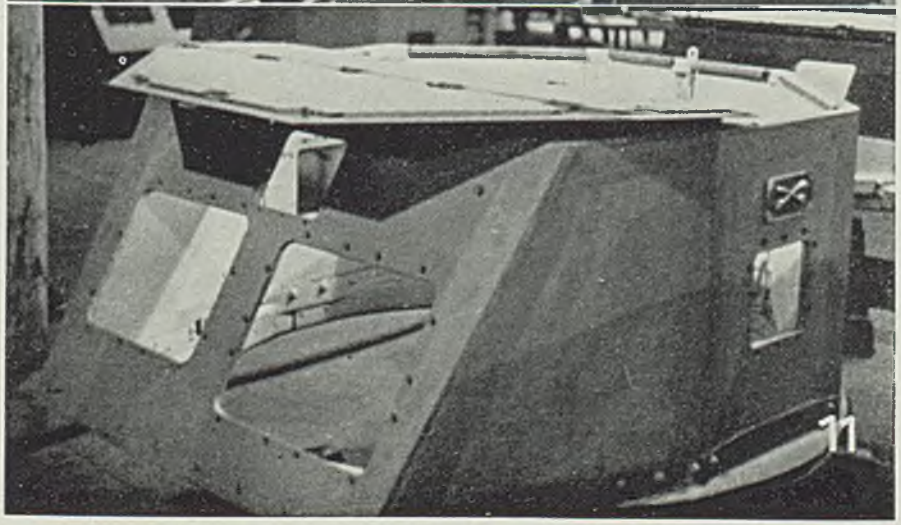


Fig. 11—Here heat insulating and sound-deadening material has been applied to the interior. Both interior and exterior have been painted

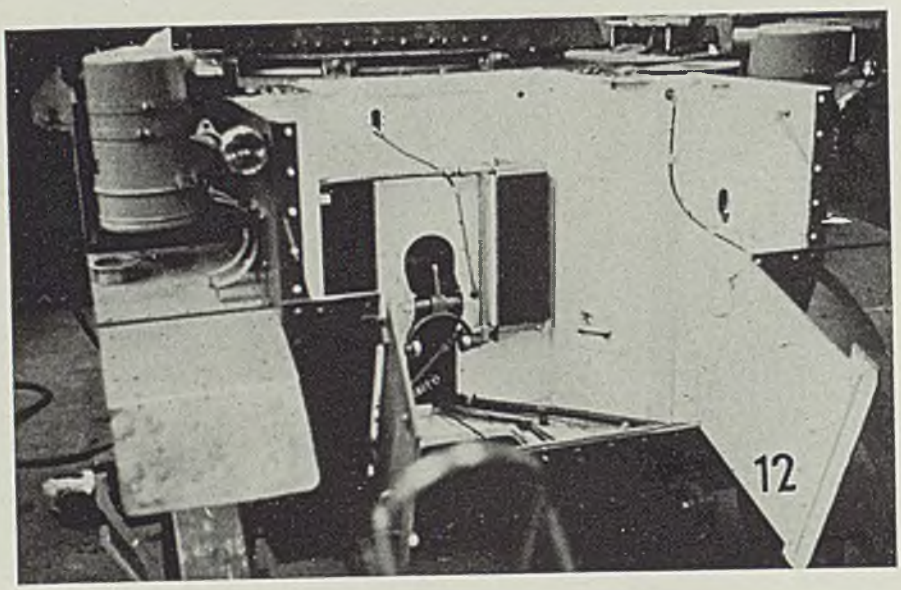


Fig. 12—This shows some of the first tank assembly operations as viewed from the rear end of the tank. Access door is mounted, heat insulating and sound-deadening material is applied to the interior of the engine compartment, some of the oiling system and wiring is seen in place, covers over the tracks have been placed on outside of tank, and other auxiliaries installed

ground flush after the assembly has been completed as shown in **Fig. 10.** The white spots along the joints in this view are the ground flush rivet heads and adjoining areas of the armor plate.

Also as in the hull, the top access doors are fitted, clips welded in place for the heat and sound-deadening material, which then is applied. The whole interior surface now is painted white as shown in **Fig. 11.**

Rear End Operations: The interior surfaces of the hull and certain subassemblies also have been painted white at the first assembly station in the main assembly bay. These subassemblies are fastened into the structure by bolts to facilitate replacement. Subassemblies added here include gas tanks, transmission, some of the controls and the track-supporting rollers on the outside.

At the second assembly station, in **Fig. 12,** the engine oiling system is assembled into the unit, access door is mounted, fenders assembled, wiring mounted. On the outside the rear idlers have been bolted in place and the main suspensions for the track. Also the final drives to the sprocket wheels have been assembled.

At the next station, the suspensions for the track have been completed, the turret mounted in place, all the wiring finished and all the controls mounted in place. On the outside of the hull, the drive sprockets and hubs are mounted.

Fig. 13—Here radial engine has been mounted in engine compartment at rear of tank, and turret has been put in place

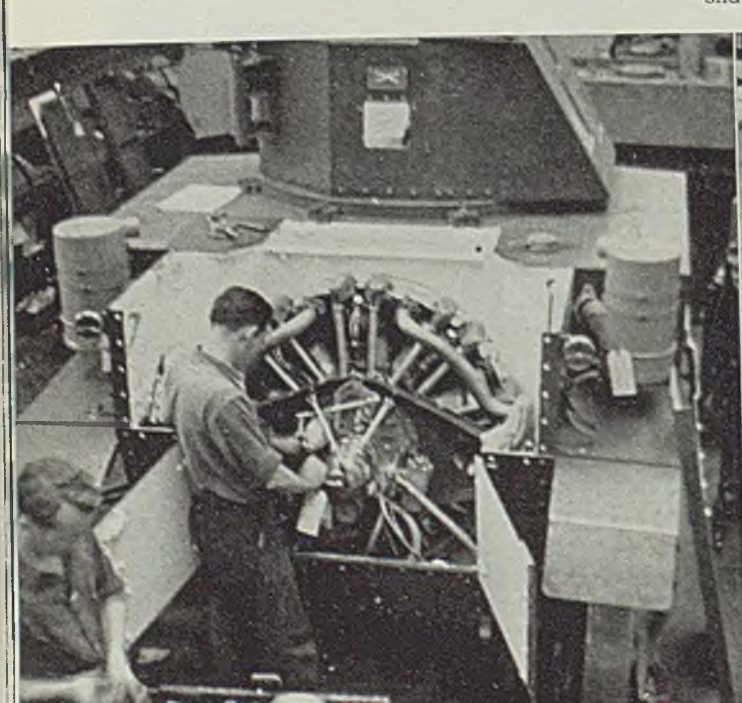
Fig. 14 — Assembly operations as viewed from fighting compartment or front end of tank. This first view shows practically bare fighting compartment with sloping front deck removed for access to interior during assembly. Certain accessories are being fitted. Builtup construction on the floor in compartment center is the propeller shaft housing

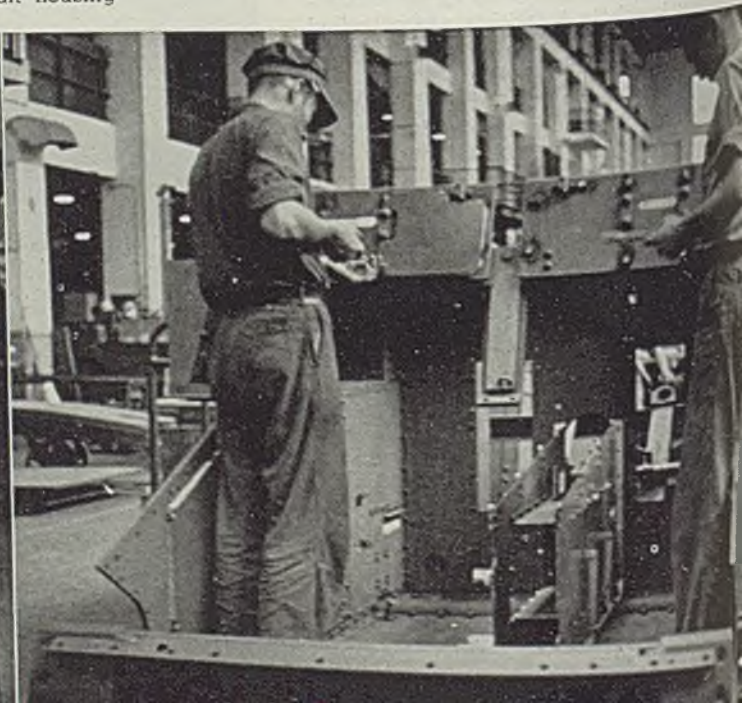
Fig. 13 shows operations at the next station, in which the engine is mounted into the engine compartment in the rear of the tank, shown also in **Fig. 12.** At this station, the tank is put down on its wheels on the floor and the main drive shaft mounted.

At the next station, the track is assembled onto the rollers, the controls adjusted, the engine started and tuned up in preparation for a 75-mile road test given all units. From the road test, the unit is given its final coat of paint.

Front End Operations: In the meantime, let's see what some of the assembly operations look like that have taken place on the front end of the tank. **Fig. 14** for instance, shows workmen assembling the doors which cover the openings at the front of the tank except for small sighting holes when the tank is in action. Note the interior of the hull is practically bare except for the heat and sound-deadening insulation which has been applied to the sides but not to the back wall separating the engine compartment from the fighting compartment. The built-up construction on the floor in the center of the compartment is the housing for the propeller shaft.

Fig. 15 shows another front view





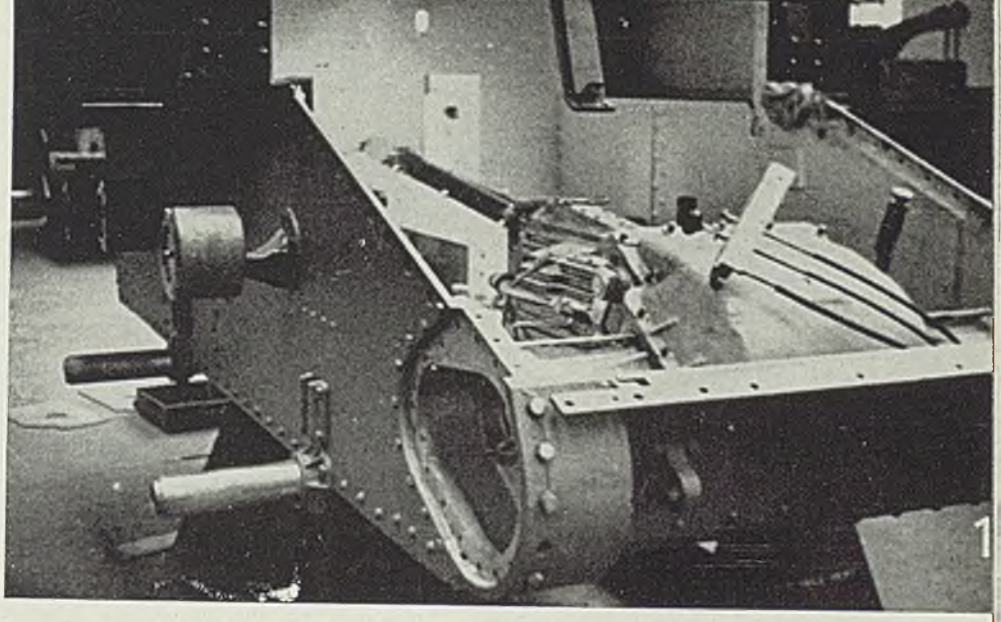


Fig. 15—Transmission and differential steering units have now been installed and a good many of the controls are in. Note the massive size of transmission units. Suspensions for upper section of the track have also been placed

of the hull with the application of the heat and sound-deadening material completed on the interior. Front end assembly consisting of transmission and differential steering units is in place. Note the size of these transmissions. They are real heavy-duty units since they must transmit 400 horsepower or more at low road speeds, involving tremendous torques. Also in **Fig. 15** a good many of the controls are in. On the outside the suspensions for the upper section of track have been placed.

In **Fig. 16** the final drives have been assembled on the outside of the hull at the front in line with the transmission and differential steering unit. Wiring and controls are all in.

Fig 17 shows one of the bogie or suspension units which is constructed as a subassembly. Note the heavy volute spring.

Fig. 18 shows this same unit assembled into the tank. The supporting brackets pivot about the shaft extending out from the hull of the tank as shown in hull construction illustrations. Also in **Fig. 18** the main drive sprockets have been added. The track drive is really a double sprocket arrangement with a separate sprocket to drive the interior edge and another sprocket to drive exterior edge of the track.

Fig. 19 shows the continuous track made from heavy rubber blocks assembled ready to be applied to the tank.

In **Fig. 20** the individual blocks seen stacked on the truck at left are being assembled into the track by applying the joining links over the pins which extend out from the block. The same links used to join the block sections engage the sprockets to drive the track. **Fig. 19** is a good close-up view of these units.

Fig. 21 shows front view of the tank with the transmission completely mounted, controls in place, and the sloping front deck bolted on. Here internal fittings are being applied, including ammunition racks, gun mounts and so on. This illustration also gives a pretty good idea of the length of the main assembly bay, 600 feet, in which these tank assembly operations are handled. One of the cranes can be seen at the far end of the bay, which is four stories high, providing a maximum lift of 65 feet under the crane hook.

Fig. 22. Here the headlights have been fastened in place on the front of the tank and the track is being

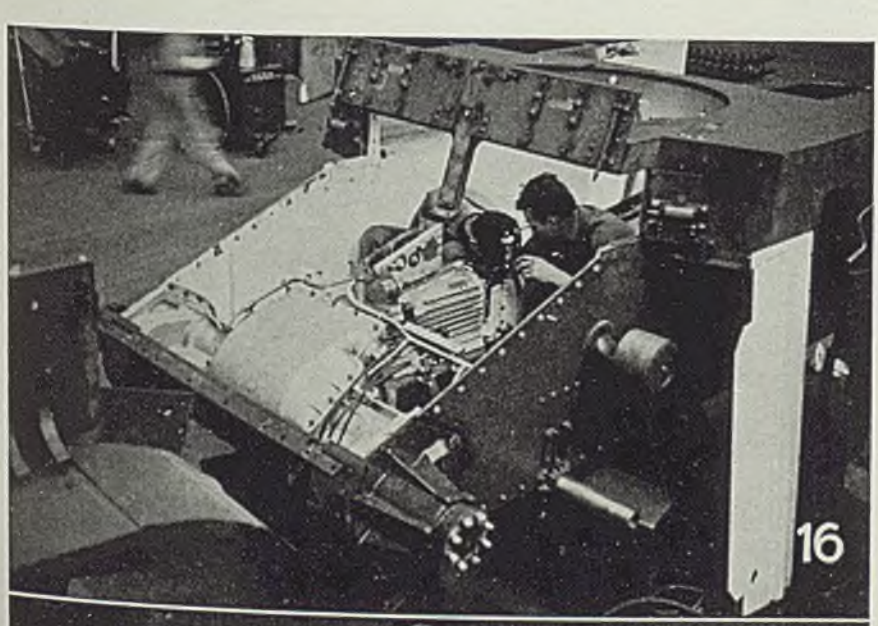


Fig. 16—Final drives here have been added to the differential steering units. Sprocket wheels are mounted on these final drives. Note engine controls and wiring are now in place in the operator's position at the left front of the tank

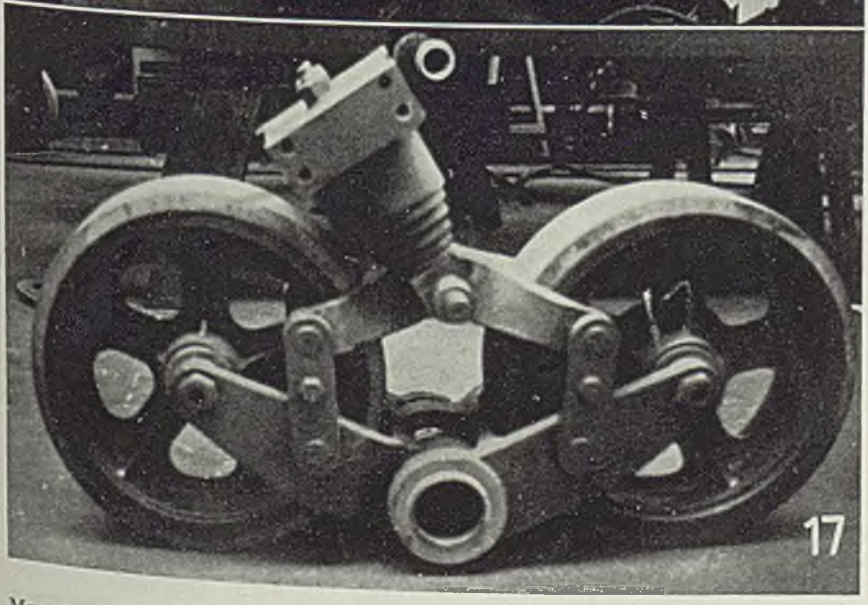


Fig. 17—This shows a suspension unit or bogie built up as a subassembly and now ready for mounting on the tank. Note the heavy volute spring at top

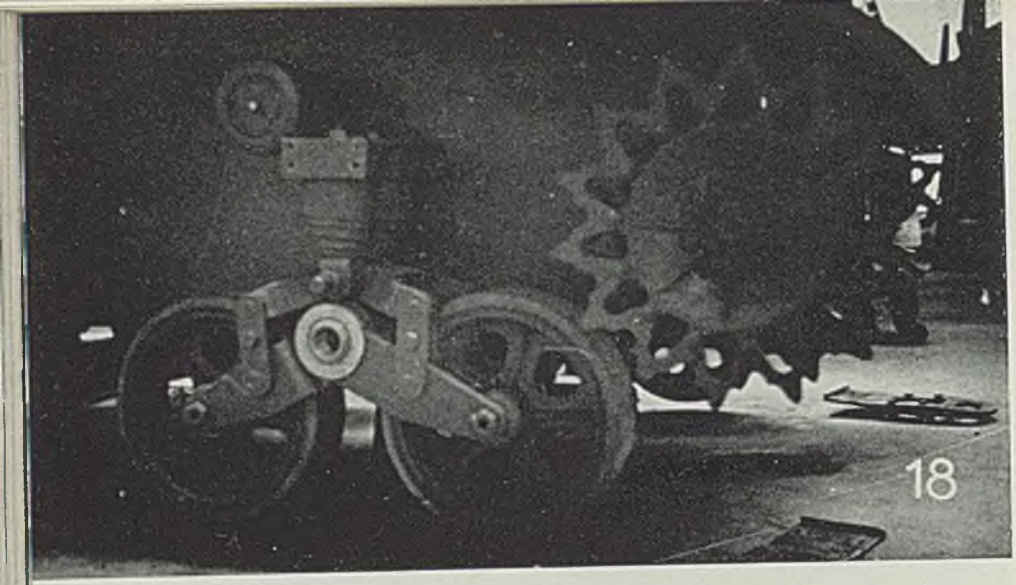


Fig. 18—Here is the same bogie unit mounted on the tank. Also the sprocket wheels are shown mounted on the final drive units at the extreme front, or right

applied. The unit is just about completed. At the left in this view are the openings into the adjoining bays which feed into the main assembly bay. All tank construction takes place on the main floor level. Machine shops and various other manufacturing facilities are located on the second, third and fourth floors and galleries.

Fig. 23 shows the tuneup station at the end of the assembly line. Here a tank larger than the M1 units previously shown in this series of illustrations is being tuned up. Its general construction, however, is very similar. The radial engine located in the engine compartment back of the fighting compartment exhausts through a hood at the rear of the testing station to a suction system to carry exhaust fumes from the building. Here the engines are started and tuned up in preparation for the road tests.

Only after completion of the 75-mile road test and final painting are the gun mounts and other working equipment assembled into the tank with the guns.

Finish applied to tanks includes first a primer of red lead followed by a filler. Then the second coat of enamel, an olive drab, is applied. The third coat likewise is olive drab enamel. All coats are sprayed except the filler. The final coat is not applied until after the road test.

While the procedure described here has been for the M1 small tank or combat car, the same principles and operations are employed in building the larger tanks. The sequence of operations is about the same as those described and the methods of handling them are almost identical.

As was pointed out in the first part of this article on tank production, the principal features which make manufacture of tanks different from manufacture of crawler tractors or other heavy equipment are those features incident to the use of armor plate. The great structural strength of this material permits the entire structure to be built on the box section or hull formed of armor plate, eliminating any necessity for framework or chassis as ordinarily employed in vehicles.

They Must Fit: Also, it involves the matter of obtaining accurate fits of the material as manufactured, otherwise the plates will not assemble properly. Due to the extreme hardness of this material as furnished for assembly, it is impossible to correct for any errors in its manufacture except by grinding off excess material. This limitation

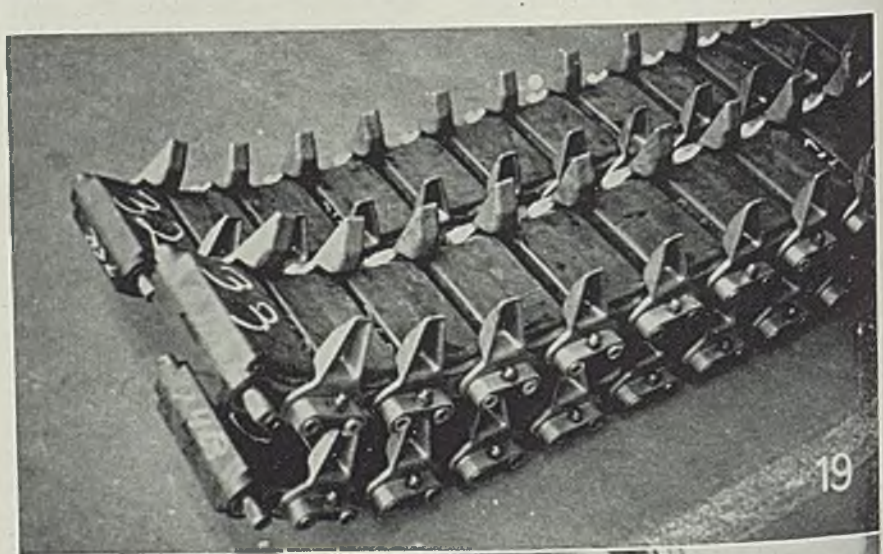


Fig. 19—Close-up view of continuous track as assembled ready to be applied to the tank. One sprocket wheel drives the inside edge of the track, a second driving the outside edge. Both sprockets drive the track through the links joining the sections of rubber block

Fig. 20—Here individual blocks are being assembled to form the track

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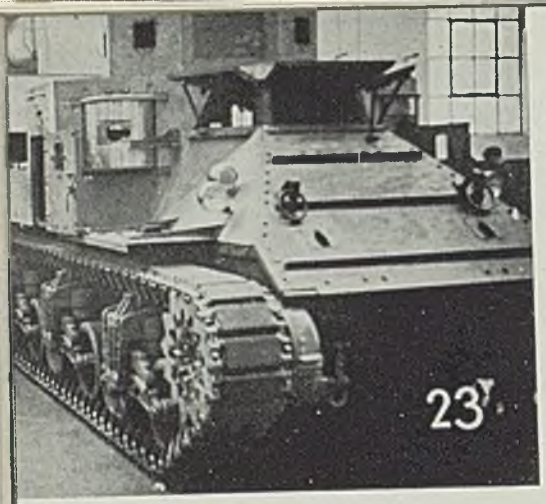


means that when starting up a production line of tanks, the first set of armor plate is assembled as a test to check for proper fit before going into production.

Fig. 21—Front view of tank with transmission completely mounted, controls in place and sloping front deck bolted on. Here internal fittings are being mounted, the turret ring aligned, etc. Note the main bay extending down past the assembly line in this view

Fig. 22—Here headlights and other final details are being applied along with the endless tracks which permit the unit to move under its own power

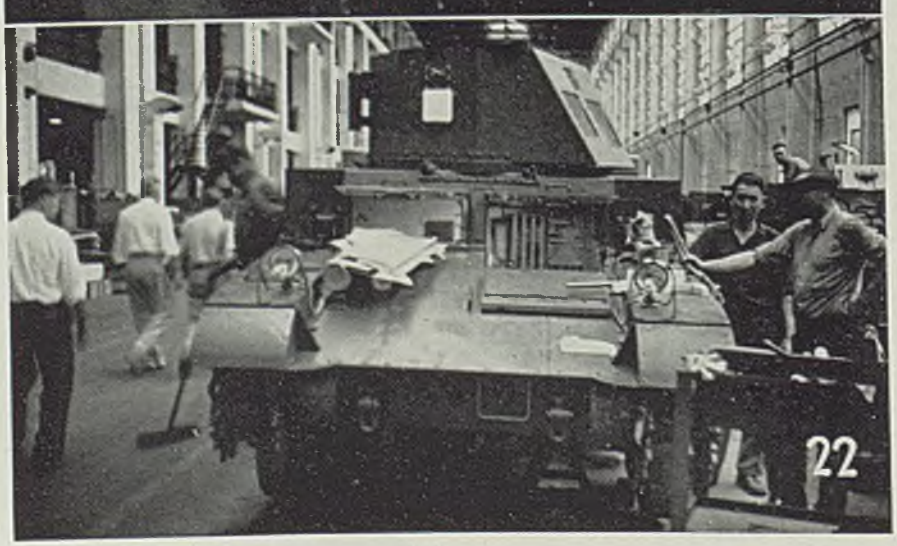
Fig. 23—Tune-up station at end of the assembly line where engines are started and tuned up in preparation for the 75-mile road test. The tank shown here is a larger unit than the others in this series of illustrations

Similarly in actual production, every piece of armor plate as received is checked on templets before attempting to assemble it into the structure.

Another feature differentiating tank construction from other heavy vehicles is the use of oversize parts in the castings which form the track suspension members. These must not only be of sufficient size to carry structural loads to be encountered, but also must withstand impacts from shell. This involves the use of so-called "armor plate" steel castings which provide the impact strength required. Machining of these parts must be handled at speeds and feeds about one-third of those usually employed on steel castings. Otherwise, no particular fabrication difficulties need be anticipated.

While guns, gun mounts, engines, transmissions and controls involve extremely precise manufacture, production of the tank hull is not the exacting work that might be anticipated—except for the factors already mentioned.

Properly evaluating the importance of the various elements and operations described will help any manufacturer to obtain a better perspective of the entire problem of tank manufacture.



Latest Data on Aircraft Tubing Available

■ Summerill Tubing Co., Bridgeport, Pa., announces the publication of its latest edition of "Aircraft Tubing Data"—incorporating design data and related information useful to the aircraft engineer and technical personnel.

In this edition the company has tried to embody most of the suggestions received since the last edition. Although some information utilized is repeated from other sources, it is incorporated with the hope of making the publication more useful by having essential references for aircraft design at the reader's fingertips.

The publication is divided into four sections: The first covers information on tubing, its manufacture, government specifications, tolerances, special shapes and what the tubing mill can supply; the second carries original text on various phases of interest to the aircraft manufacturing personnel with special attention given to welding; the third carries more complete tables giving tube properties, while the final section embodies some of the more frequently used reference data.

The publication is available to all engineers interested including students for $1.50 per copy or $2 for copies having a ring binder.

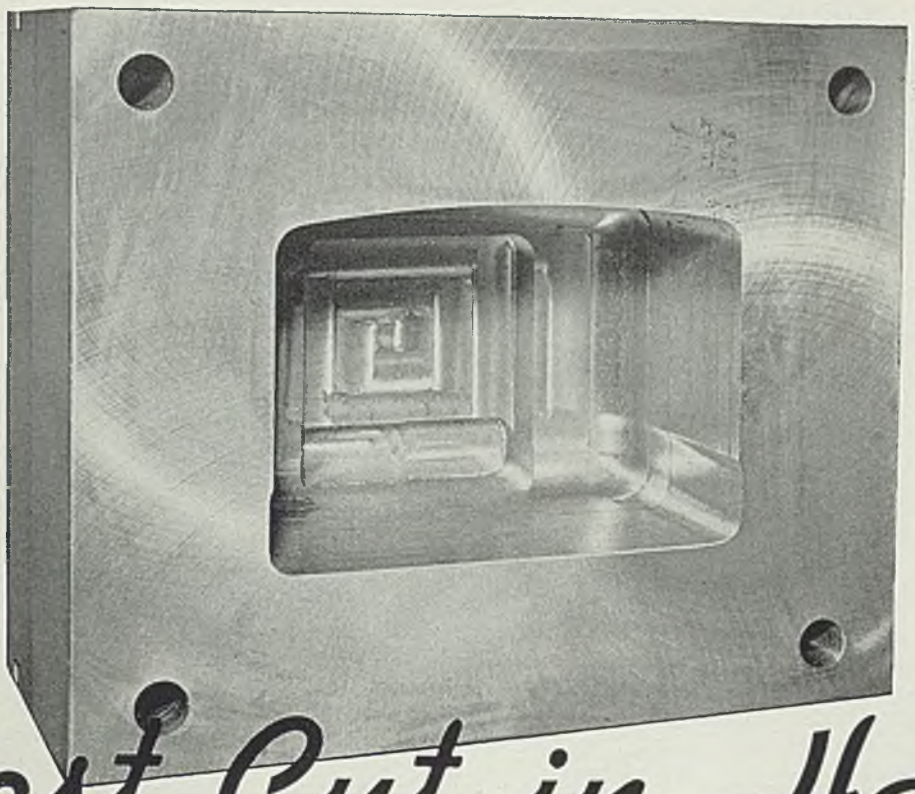
Engine Lathe Operation

■ *Running an Engine Lathe*, by Fred H. Colvin; cloth, 117 pages, 5 x 7½ inches; published by McGraw-Hill Book Co. Inc., New York, for $1.25.

A pocket-size manual designed to give the young machinist or apprentice the foundation principles of engine lathe work, it covers the lathe and its care, how to prepare work and hold it in the lathe, how to set and use tools, how to do taper work and thread cutting, all in simple, clear, step-by-step manner.

The engine lathe is still the most widely used tool in the average machine shop, in spite of enlarged use of turret lathes and screw machines. A knowledge of the varied uses of this tool will make the operation of any other machine tool comparatively easy.

Illustrations are almost entirely line drawings, clarifying the text.



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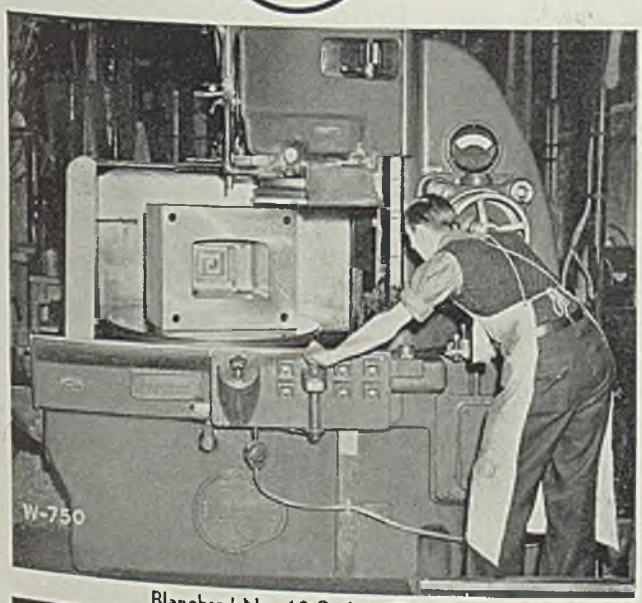

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BETWEEN HEATS

WITH Shorty

■ Say Fellers:

It's always 'bout this time of year that we start the riggers puttin' a coat or so of red paint on our smoke stacks 'round the plant. I suppose you're doin' the same thing at your plant right now, huh? Over at the boiler house this mornin' a couple of the boys were puttin' up their block 'n tackle on one of the boiler stacks, gettin' ready to daub 'er up in line with the other spring housecleanin' that's goin' on 'round the place.

Andy Koonce had shinied up the stack and made a hitch at the top while his buddy, Pete Barry, looked on. 'N when Andy came down, they attached the seat to the pulley hook. When they had 'er all locked tightly in place Pete sez:

"Hold your arms up, Andy, 'n I'll help y' into your safety belt." 'N while Andy was doin' this, Pete slips the belt on 'im 'n starts bucklin' it.

"Y' know, Andy, you remind me of a friend o' mine down in Alabama that wields a wicked paint brush, same as we do", sez Pete. "His name 's J. H. Rowe. All the fellers called 'im Jock."

"What kind of a job 's he doin'?

Handy with the Brush

"Last I heard he was workin' at the plant of the Sloss-Sheffield Steel & Iron Co. over on First avenue, in Birmingham. He keeps the boilers painted up in tip-top shape, repaints the company's trucks besides tarrin' the roofs 'round the plant."

"Whaddaya mean 'he repaints the company's trucks' such as you're sayin?"

"I mean Jock wields a wicked paint brush. Y' see not many of the fellers see 'im sittin' in a saddle suspended from a smoke stack paintin' away, but they don't know he does a lotta paintin' on canvas with oils—things like pastorals, steel plant pictures showin' lottsa action 'n seascapes."

"Yeh, I see", sez Andy. "He's got the bug doin' the fancy stuff in 'is spare time, such as y' caught me doin' the other day, huh?"

"Yeh, that's the dope. When he puts 'is workin clothes in 'is locker and rings out at the end of the turn he starts thinkin' what he 's goin' to do with 'is brushes 'n oil 'n canvas when he gits home and has 'is supper down 'n gets the kids to bed."

"Where did he learn this knack of paintin' pictures?"

"He told me he took a course in cartoonin' for six months at the Federal School of Art out in Minneapolis 'bout 10 years ago. Then he started doin' 'is stuff but he didn't stick to 'er very long."

"What's the matter, didn't he like to do it?"

Donned Baseball Suit

"Well I'll tellya, Andy. He got the itch jus' like you and me git 'er 'bout this time of the year. Y' see, he heard the crack of the ol' bat meetin' the ball 'n the feller's yellin' to the runner, 'slide, y' yap', so I guess he couldn't stand it any longer. He ditched 'is paint brushes for the time-bein' 'n put on a suit of pitchin' togs at the openin' of the season."

"Did he 'ave anything on the ball?"

"He sure did, Andy. I used to read in the papers 'bout 'im shuttin' out lots of the Southern teams. 'N he was pretty good with the stick, too. He could slug out a 3-bagger as slick as any of the geezers on 'is team."

"Who'd he play with?"

"O, he pitched for Talladega in the Alabama-Georgia league, the city hall club of Birmingham, 'n a couple of clubs in Texas. 'N then one day he decided he'd take up 'is paint brushes ag'in. So he went to work for Jefferson county down in Alabama 'n I guess half the schools in that county 'ave got stage curtains and murals that Jock made for 'em."

"Does the 'Big Boss' at Sloss-Sheffield know your friend kin do this kinda stuff?"

"O yeh. They know all 'bout 'im. Y' see, every month the company puts up a safety picture on a sign board in the yard so that the people goin' past the plant on the First avenue viaduct can see 'er. It 's Jock's job puttin' 'er up. 'Bout a year or so ago, 'round Christmas time, he put some kind of a picture up but Leon Ehrman, superintendent of the blast furnaces, called 'im over to 'is office and he sez, 'Jock, I don't care for the picture y' put on the board this time. Can't you get one that's a little more Christmasy?' Jock got the idea alright. He got the carpenters to build 'im a scaffold before the 12 x 14-foot billboard that hung on the cold blast main facin' the viaduct 'n Jock started to work. He got together some ol' tin cups, some odds and ends of paint 'n a 4-inch brush 'n an ol' 1-inch one with a lotta bristles missin'. He started wieldin' his brushes at 11 a.m. 'n when the boss came out 'round 4 p.m. to see how he was gittin' 'long, whadda suppose he saw?"

"Don't know", sez Andy.

"Well I'll tellya. It was a 12-foot painting of Christ lookin' down on them with outstretched arms, sayin', 'Thou shalt walk in thy way safely.' Men stopped work long enough to come over and see it. Motorists jammed the viaduct."

"I'll tellya, Pete", sez Andy. "Y' never can tell what's back of a paint brush. So give us a pull on the rope and we'll start workin' on our own stack."

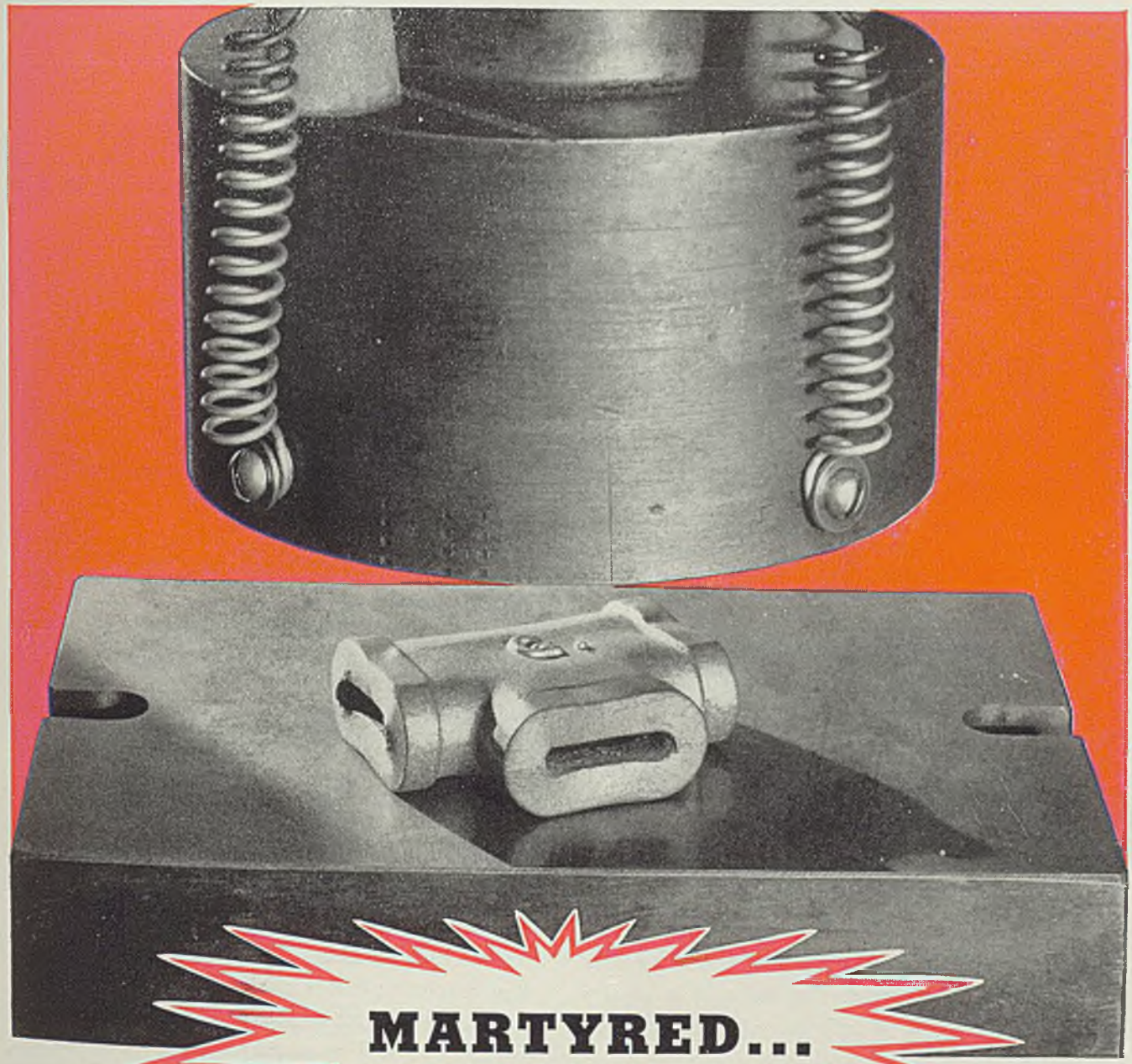
So long, fellers. I'll be seein' ya.

"Shorty" Long

Proposes Practice For Food Equipment

■ The shop standardization committee of the Food Service Equipment Industry Inc. has drafted a proposed simplified practice recommendation for food service equipment. Co-operation of the division of simplified practice of the National Bureau of Standards has been requested in submitting the proposal to the manufacturers, distributors, users and others interested for consideration and approval.

This recommendation concerns not only sizes and dimensions of complete units of equipment, but also details of construction. It will be promulgated by the United States Department of Commerce as representing the standard practice of the industry as soon as sufficient support for it has been recorded. Mimeographed copies of the recommendation may be obtained without charge from the division of simplified practice, National Bureau of Standards, Washington, upon request.



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■ Send for our 24-page bulletin *Modern Material Handling.* Describes major industrial truck handling systems; gives complete data on Edison Alkaline Storage Batteries. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.

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Part of packing and shipping department in new engine assembly building at Pratt & Whitney Aircraft. Here final adjustments are made on engines prior to shipping preparations

Efficient Materials Handling

speeds shift to new plant

Aircraft engine assembly operations are transferred to huge plant without stopping production. Carefully planned program of moving machines and production lines indicates how expansions can be keyed into present production without any let-down in output. Third day establishes new record output in this plant, so quickly are the "bugs" smoothed out

■ THE NEW addition to engine manufacturing facilities of the Pratt & Whitney Aircraft Division of United Aircraft Corp. at East Hartford, Conn., has a floor area of nearly 400,000 square feet and brings total factory floor space to approximately 1,600,000 square feet. The new building is the same size as the entire Pratt & Whitney plant of two years ago. It is devoted solely to assembling engines for the United States Army and Navy.

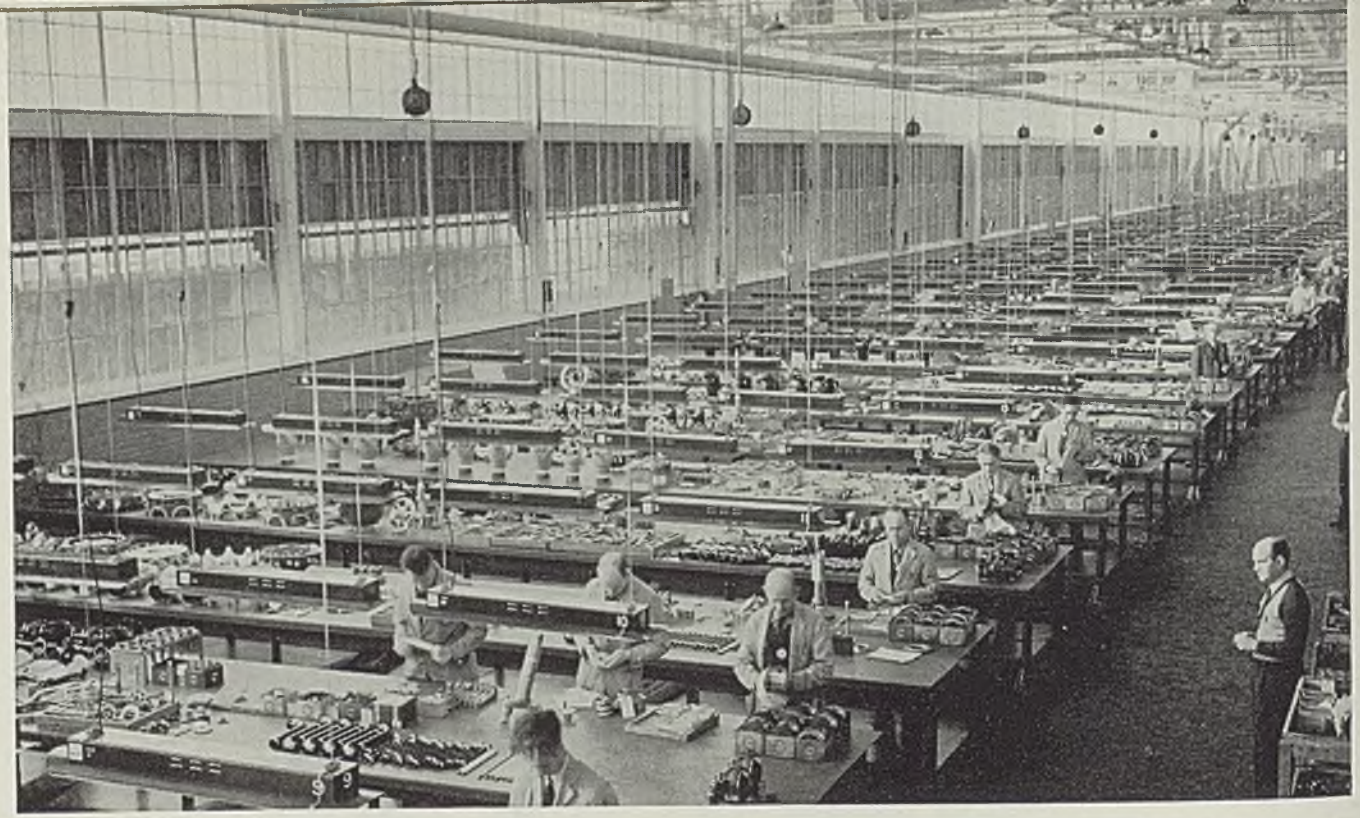
In keeping with the swift expansion of production at Pratt & Whitney Aircraft is the speed with which assembly operations were shifted to the new building. The move was carried out over a weekend and accomplished so smoothly that assembly operations in the new plant began on Monday as scheduled and proceeded without a hitch. This was only possible by careful preliminary planning of every step to assure proper co-ordination of the tremendous amount of work involved.

Plans for the move were first undertaken early last fall. A small group of experts worked out these plans to the most minute detail—determining the location in the new building of every piece of equipment and, at the same time, working the transfer of these items into a general schedule. The schedule had to provide for the conveyance of more than 400 engines in various stages of completion; of 371 inspection and assembly benches, representing a total area of 24,800 square feet; 780 bays of steel shelving, representing 23,900 square feet of storage space; approximately 340 large disassembly racks; and 44 hoists, representing an aggregate lifting capacity of 75 tons of aircraft engines. *Most important was the fact that the schedule required that the changeover occur without any loss in production.*

The date set for the beginning of the "big push" was Friday, Jan. 31. On that day, at 3:30 p.m., a small army of nearly 1000 men assembled to do the job. Half of them were assigned to the new building and half to the old assembly department. While those in the new building cleared the way for the coming inrush of traffic and marked on the floor the location of every machine, table, bench, bin and shelving bay, the others were marking each engine, each part and each piece of equipment with a tag giving its new location. Those not occupied in this work were busy maintaining the assembly of engines in the old building.

A fleet of eight tractors and four electric trucks, meantime, began hauling loose equipment to the assembly building some 400 yards away. Crews of electricians and pipe fitters started cutting out power lines, compressed air, and oil and kerosene lines in the old. As fast as a machine was slid into place in the new building, the necessary hookups were made so it could go into operation immediately.

All heavy machinery and equipment was dragged into the new plant on skids behind tractors. Engines were transferred intact on their stands. Small parts were loaded into a collection of five tons of metal boxes, several hundred wooden boxes, or placed aboard disassembly racks for the move. Certain men were appointed "spotters" to direct the loads to their destinations. At each destination point, a crew of men, headed by a foreman, took charge of the loads delivered there and saw that each item was properly located and ready for the



Line of inspection benches in new building where each engine is completely disassembled after initial test. Parts are laid out on benches and minutely inspected under battery of special fluorescent lights. Note shadowless illumination

moment when operations in the new building would begin.

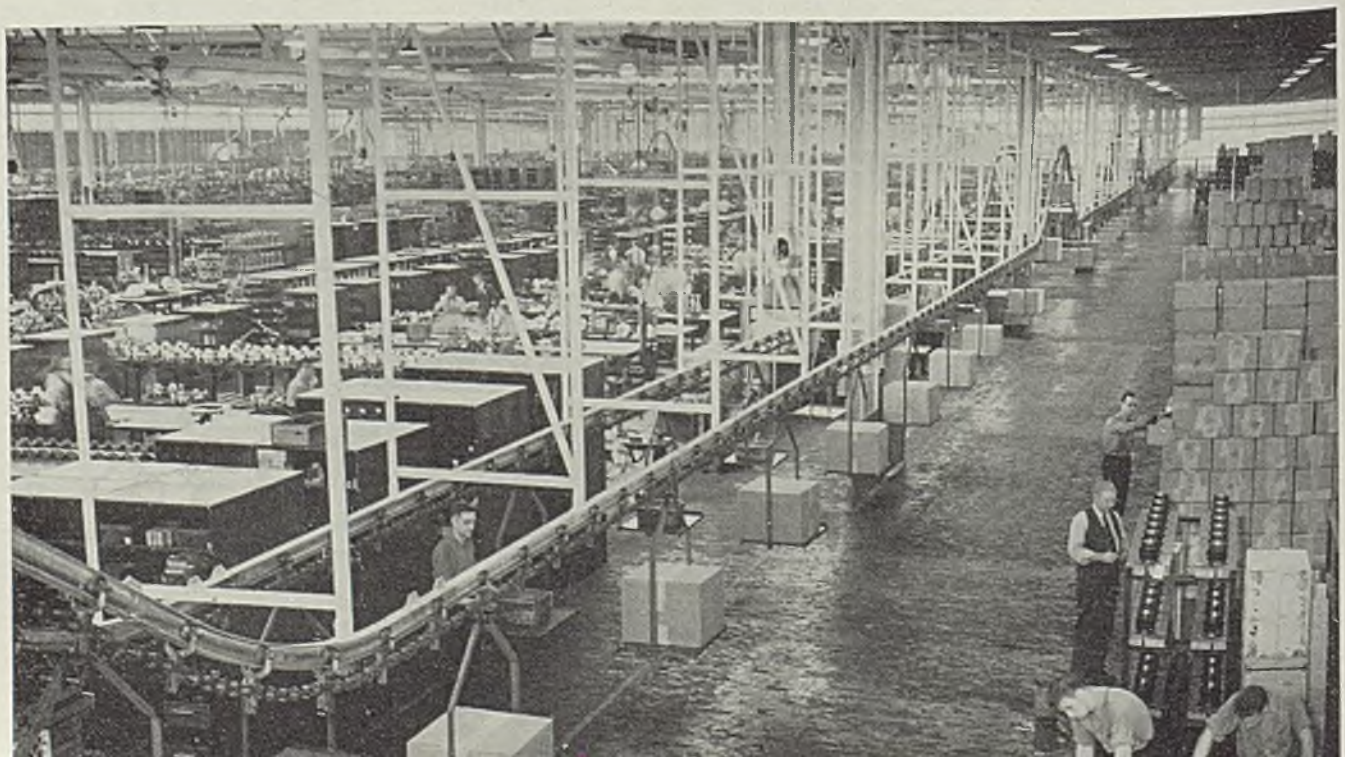
The moving process went on through Friday night and continued Saturday and Sunday, let-ups occurring only at meal times and when relief shifts came on. Engines were built in the old assembly department through Saturday afternoon, then operations were shifted to the new building. The move was completed on Sunday night at 9:40 and the new facilities were ready to continue full production operations.

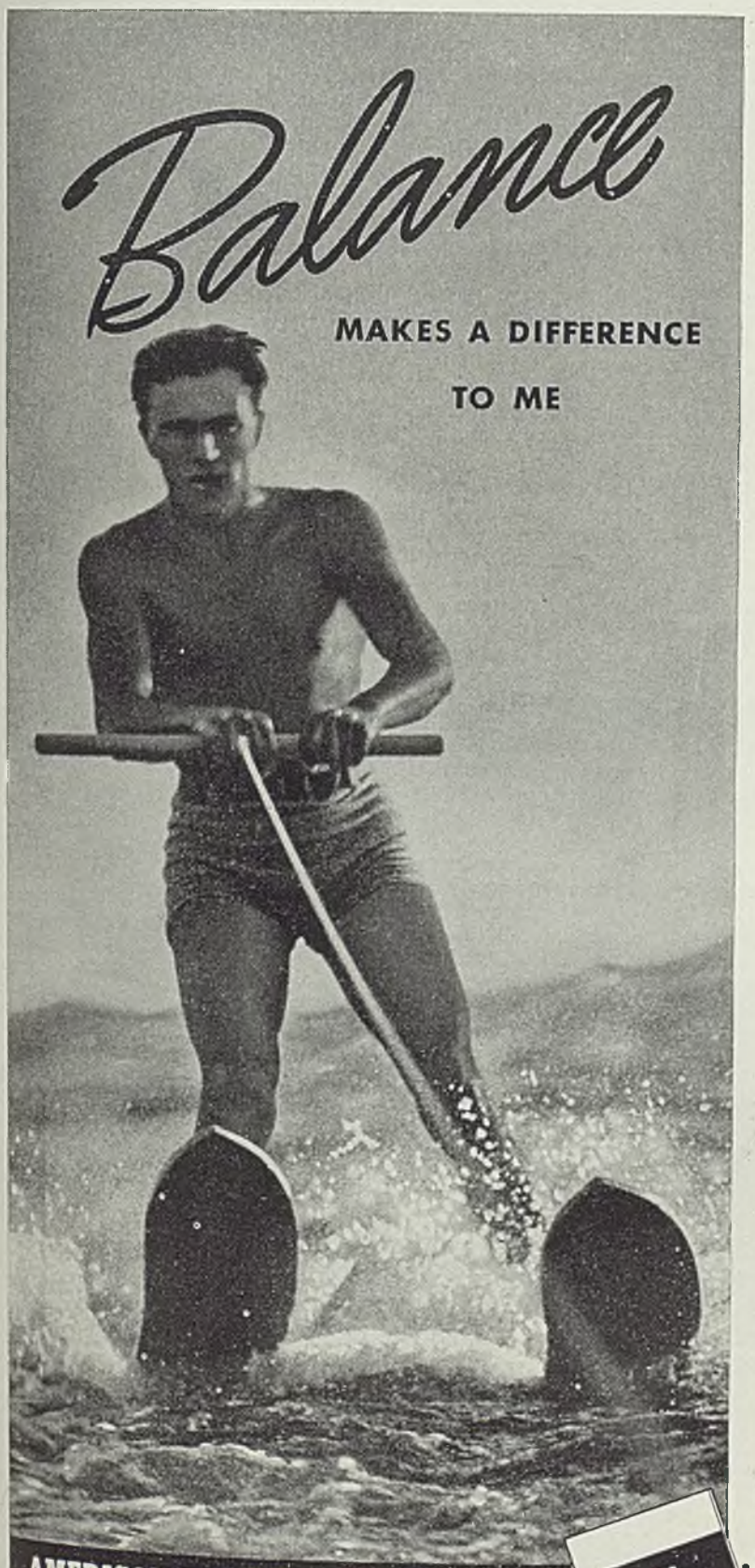
Within the next two days production was smoothed out in the new building, and on Wednesday a new high in daily output of aircraft engines was established, the daily rate for the previous month being increased by 10 per cent.

Also known as Plant F, the new addition includes more than 330,000 square feet of actual manufacturing floor space entirely devoted to engine assembly operations and related departments, such as finished stores, service stores, and bond rooms. Some of these storerooms are for small parts and are located on a mezzanine floor, while storerooms for larger and heavier parts are on the main floor. Cafeteria facilities, locker-rooms, first aid rooms, and shipping facilities occupy the remaining space.

Construction work on this building started on Sept. 5, 1940, and the steel framework was going up by Oct. 16. Actual construction was

Part of conveyor system can be seen here serving main-floor storage area. Note jump-ups in conveyors to clear aisles. This conveyor, almost a mile long, carries parts from production to storage areas and then feeds parts to assembly lines as they are needed





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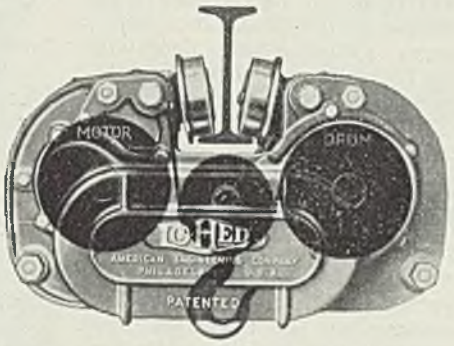

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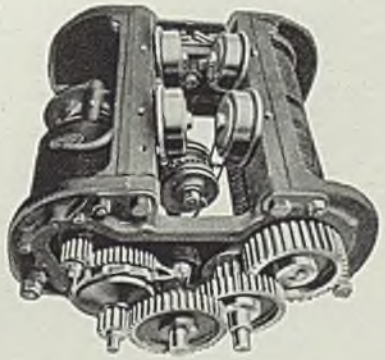

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finished Jan. 11, 1941. Installation of necessary equipment, including a conveyor system, was completed within the following three weeks.

Engine parts manufactured in the other buildings of Pratt & Whitney Aircraft converge upon the new addition for assembly into completed engines. The new conveyor system, continuous and automatic, distributes these parts to the various storerooms in the new building or delivers them from the storerooms to stations on the assembly floor. The conveyor is almost a mile long and can carry a life load of 65,000 pounds at speeds of from 10 to 35 feet per minute. Incidentally, during the changeover to the new building, the conveyor was pressed into service to deliver parts to the storerooms.

The conveyor system and other features of the building were installed to allow straight-line assembly of aircraft engines. Under this principle, parts are drawn from the storerooms as needed and are placed on the conveyor for delivery to various subassembly stations. On completion, a subassembly goes to one of the two "green" assembly lines—one for single-row and one for double-row engines—which extend down the length of the building, parallel to each other. Further along is the final assembly line, similarly divided for single-row and double-row production. Above each is an overhead monorail equipped with chainfalls and a series of switches. The switches make it possible to shift heavy parts up or down a line at any time, or to shunt a "slow" engine to one side temporarily and thus maintain an uninterrupted flow of production.

The stands on which engines are assembled on the green and final lines roll in steel channels sunk into the floor, another feature designed to promote the speed of line production.

Near the final assembly line are specially lighted inspection benches, where parts of engines which have gone through preliminary testing are examined. Suspended over each bench is a row of fluorescent light units which give out diffused daylight in such fashion as to eliminate shadows totally—a feature increasing the efficiency of inspection.

To facilitate transportation of engines from the assembly lines to the test houses and back, a 1600-foot enclosed passageway is being built alongside the new addition. It will house an overhead monorail system on which a number of engines at a time will be carried back and forth. The carrying units are to be electrically controlled.

At one end of the final assembly line is the packing and shipping department. Overhead on rails, big 5-ton electric cranes have been installed for transporting boxed engines to the large enclosed and heated railway loading platform nearby.

Beneath the assembly floor of the new building are a basement cafeteria, first aid rooms and locker rooms. The cafeteria will accommodate 800 persons at a time. Adjoining it are women's and men's first aid and locker rooms with facilities for 3400 persons.

The new addition is of the monitor steel-and-brick type of construction. It incorporates two 128-foot bays and one 2-story, 64-foot bay on which the mezzanine storerooms are located. The unusually wide bays were chosen to facilitate straight-line assembly operations. Trusses for the bays were too big to be delivered already assembled on railway flatcars, as was done in the case of previous factory additions, so they were brought in piecemeal and assembled on the job. Approximately 3000 tons of steel went into the new building.

Heat is provided through overhead wing-type rotating units. Alternately spaced mercury vapor and incandescent lamps furnish illumination. Albert Kahn, Detroit, was the architect for the building and the Turner Construction Co., Detroit, was the general contractor.

Straight-line assembly methods are well illustrated in this view looking down the "green" or preliminary assembly lines. Double-row engines are assembled on the line at left, single-row engines on the line at right. Subassembly benches to right and left of the two lines feed completed subassemblies into the lines. Engines are assembled on special cradles with crank-operated worm and gear to permit turning to convenient working angle. Cradle is on wheels, one pair of which travels down a rail laid in the floor to keep work in line under monorails overhead. At extreme left and right can be seen main chain conveyor (with aisle jump-ups) which brings parts from stock to subassembly benches

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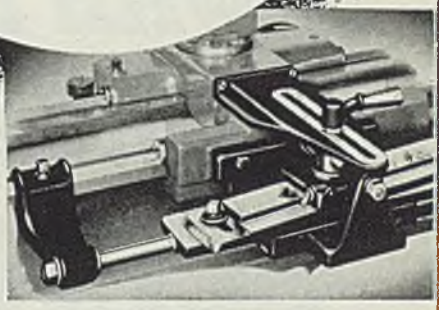

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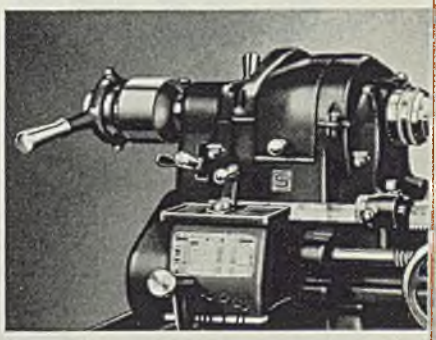

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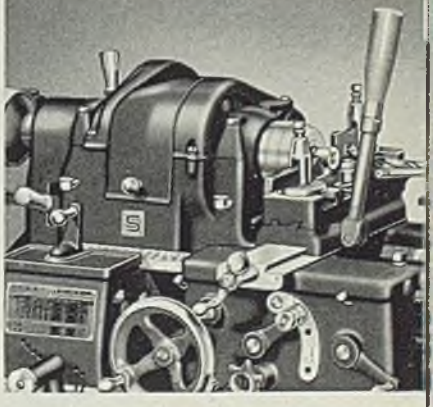

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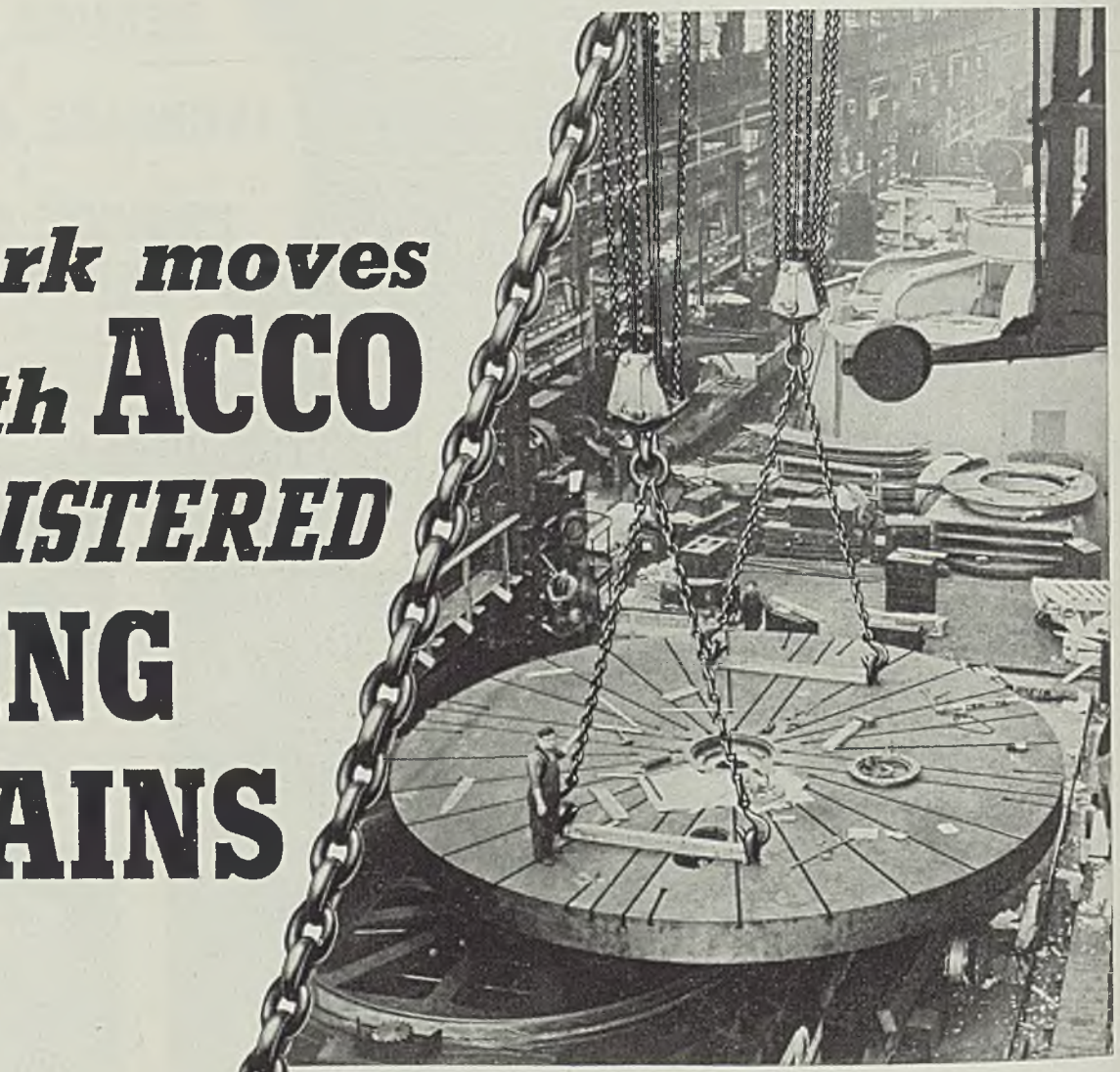

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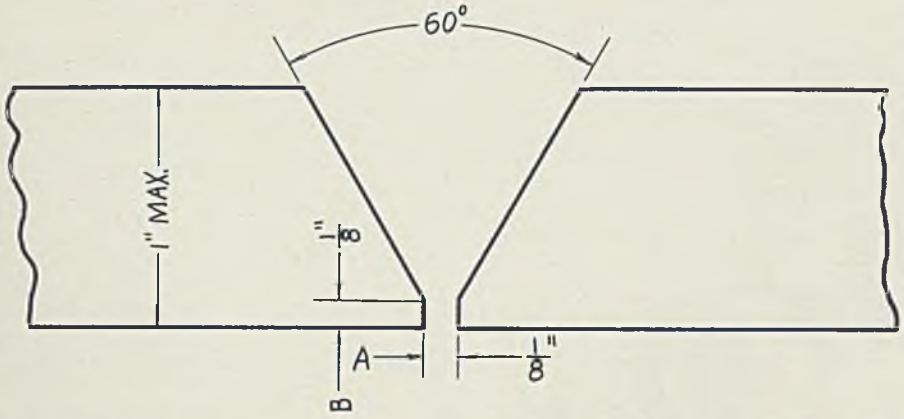


Fig. 1—Correct proportions are most essential if sound metal is to be deposited

How To Make

X-Ray Perfect Welds

Here Mr. Lawrence continues this discussion, so important in present defense work, going into a study of factors determining proportions and spacings in joint designs. Here each type of joint is considered with reference to step-by-step procedure involved in laying in only sound metal that will pass the X-ray

By HAROLD LAWRENCE
Metallurgist

(Continued From Last Week)

FIRST consideration will be given to the V-joint. Each groove, single or double, will be discussed as a single-bevel joint with the understanding that the same reasoning applies to its double-beveled cousin. Since almost all welds will be positioned, the remarks will apply to the fluid, flat-position electrode. Any qualified welder may apply the other class of electrodes wherever needed with full confidence. For some unaccountable reason, operators experience more difficulty in applying hot electrodes where electrode size must be adjusted frequently to fit the joint at hand and where this selection depends upon the judgment of the operator.

There are three important points to be studied in connection with the V-groove. See Fig. 1. These are the root spacing at A, the lip at the bottom of the groove at B, and the overall angle of bevel. While the root spacing could be eliminated, having it allows better penetration of the first pass, followed by easier chipping or gouging of the reverse side. V-joints are notoriously bad actors at the root. The confined space at this point possesses a tremendous capacity for heat, easily leading to lack of fusion. By adding a small opening at the bottom, it is possible to reduce the heat capacity by just the amount needed to assure good fusion.

The gap at the bottom of the groove must be provided with a lip as a sharp point invites disaster. The point, being able to absorb little heat, is burned away by the hot deposit, allowing the fluid metal to fall through the groove. This may result in a nasty hole in the joint.

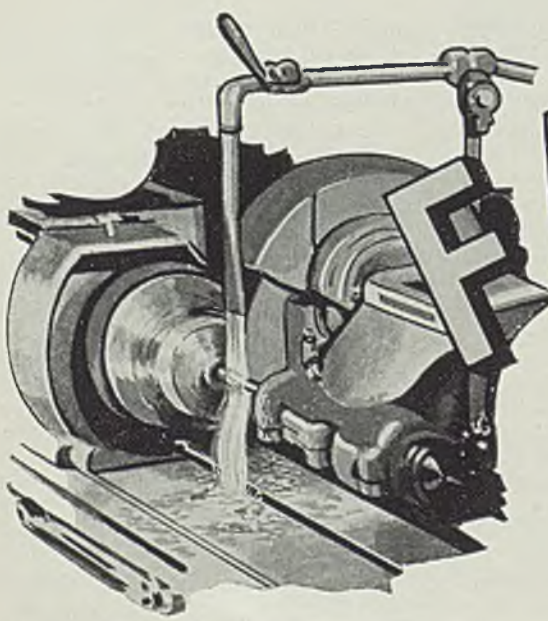
Recommends Cold Electrode

The welder must not attempt to seal such a hole with a fluid electrode. To get a consistently sound weld, use the cold-type electrode to repair the widened portion. After the repair is completed, he can return to the fluid-type electrode, but not before. The lip, therefore, is provided to prevent the welder from burning through just as the gap is specified to enable the welder to get better fusion.

The 60-degree bevel has become almost a uniform standard. In a V-joint, this angle combines ready access to the weld for cleaning with a certain economy of deposited metal. A small electrode may be selected for the first pass with 3/16-inch being a good size for experienced welders. In plants undertaking X-ray work for the first time, the 5/32-inch diameter may provide an extra margin of safety until enough work has been completed to get the feel of X-ray welding.

After the first pass, the choice of electrode sizes is simple. Use an electrode that will touch the deposited metal of the previous pass without being bound by the scarf. And remember there is a 7/32-inch electrode size available. All too often a plant fails to include this important diameter in its electrode stock. Then a 3/16-inch electrode is used by the conscientious welder at a reduced rate of deposit, while the careless operator selects the ¼-inch diameter, hoping to get by. Frequently this hope is blasted by subsequent radiographic findings and a needless, though no less costly, repair must be made.

Continuing up the joint, successively larger electrodes are employed. Some plants set a maximum limitation of ¼-inch on the electrode size. Others, and this seems the more sensible procedure, place their upper limit at 5/16-inch. Too many perfect welds have been reviewed on the X-ray viewbox to warrant a needless condemnation of the 5/16-inch diameter fluid electrode. And the cost reduction brought about by the higher deposition rate as measured by pounds of



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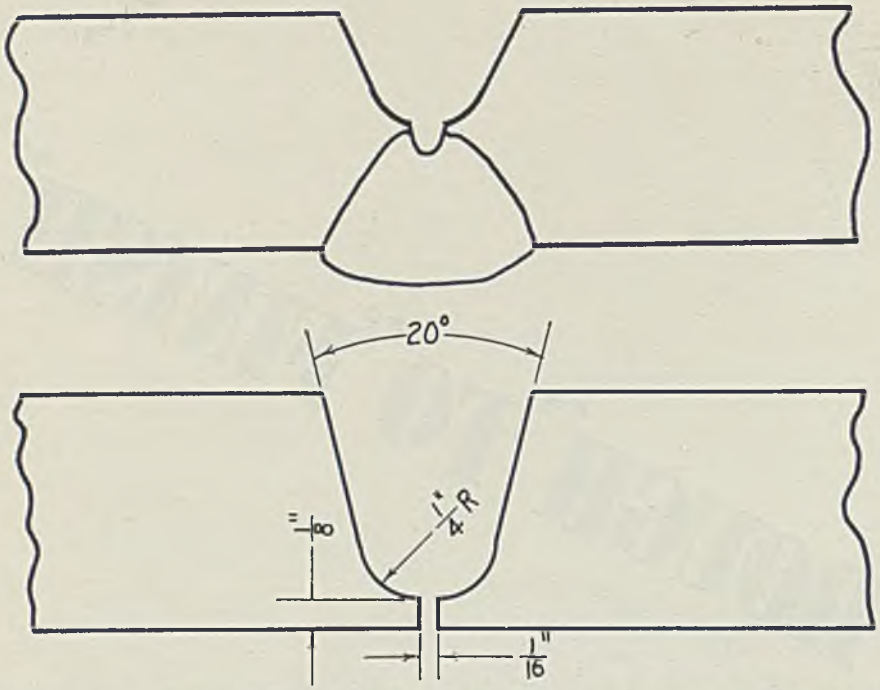

Fig. 2. (Top)—Narrow chipped groove represents unsound practice and leads to trapped slag. Fig. 3—The proportions of this U-joint have been found best from experience with X-ray work. Note lower view

metal deposited per hour is not to be considered lightly.

The last two passes in the joint require special handling. As the weld metal reaches the top of the groove where the next to the reinforcing pass is to be placed, the heat capacity of the sidewalls no longer is there. Because of this change in conditions, the current must be lowered to prevent the formation of a very wide layer. Lowering the heat encourages better slag covering, too. And a smooth deposit with close ripples results.

Finally, for the finishing pass, the current is reduced still more. By holding the electrode vertically and progressing steadily with the slag forming a perfect cover behind the arc, a cover layer of pleasing appearance is guaranteed. No undercut will be found when this procedure is followed.

Up to this point the welding of a joint has been considered without any attention being given to the necessary cleaning. Before discussing the cleaning operations themselves, let's consider who should do this work. Cleaning is best done by a welder's helper for two important reasons. As cleaning requires much less skill than welding and, of course, carries a lower hourly rate, it is poor economy to ask the welder to clean. Then, in some instances, the jarring of a chipping gun may leave some welders without adequate control of the arc immediately following their chipping stint. This is especially true when using the cold-type organic-coated electrodes as these demand a delicate touch. Arc control is less for the fluid mineral-coated electrodes.

However, should the setup of the work involve the welder in cleaning problems, let him clean. Certainly he should not stand idle if there are not other joints handy upon which he can work. With a fluid positioned deposit, there is no danger in a combined cleaning-welding routine. With work done in catch-as-catch-can positions, soundness of welds might best be served by relieving the welder of the necessity of cleaning. But this is true only where heavy peening is needed. Otherwise the good welder may remove the slag with light power tools that involve no more, possibly much less, effort than welding.

Cleaning must be a definite responsibility of the welder even though the actual work is performed by his helper. Part of the welder's training should consist in his being taught to recognize typical defects along with their cause and cure. For the occurrence of a defect in a weld is conclusive evidence of improper technique.

Naturally the obvious part of cleaning is the removal of the slag left after running each bead. With the fluid electrode, this slag is removed quite easily. And with most quick-setting electrodes, the slag parts readily after the weld has cooled. Ease of slag removal forms a definite point in electrode selection for any plant use.

Next in importance is the removal of pits and holes. Pits most often are found in the first pass put into a heavy joint. Preheating to 200 degrees Fahr. generally eliminates the cause of such pits. Unfortunately, some folks preheat everything whether preheat is needed or not. It seems to be worthwhile to try a weld without preheating first because the heating may always be done later if needed. If the base material is alloyed for higher strength, preheating may be desirable to prevent a hardened brittle heat-affected zone. In cases of doubt, the supplier of the base material and the distributor of the electrodes can be consulted for advice regarding the need for preheating.

Little Excuse for Holes

Holes are of two kinds: Those found along the sidewalls; those found in the center of the weld. As considered here, holes are defects ⅛-inch long or more as distinguished from pits which are both small and round. Holes along weld edges are an indication of faulty technique—allowing the slag to run ahead of the arc. Holes at or near the weld center customarily are attributed to inadequate heat. There is little excuse for either. Proper current conditions are easily established by correlating machine settings with electrode manufacturers' recommendations. If a wide range of currents is suggested, the average may afford the best setting. The low values are for peculiar welding situations where large electrodes may be used on plate that is essentially too thin; while the high values are given for ultra fast production work where quality of deposit is of minor importance. The intermediate values, bearing in mind that lower currents are for lighter sections and higher currents are for heavier sections, will give fine results.

All pits and holes must be removed by chipping. Many welders have the idea that they are able to burn out these defects on the next pass. Despite this belief, over 90 per cent of the defects of this type *cannot* be removed except by chipping or gouging. To attempt to burn out most defects during the deposition of the next pass is just like presenting an engraved invitation to trouble.

After the first side of the weld has been finished, chipping or gouging to sound metal before welding on the opposite side is required in all cases except where a permanent backup bar has been specified. Here, too, is a job that calls for meticulous care. More than one weld has been ruined by improper chipping. Of course the chipping must be done to sound metal. But how can the chipper know he has reached the sound part of the preceding weld? A good method is to adopt a chipping gage of correct depth. By using this gage, the chipper can remove any high

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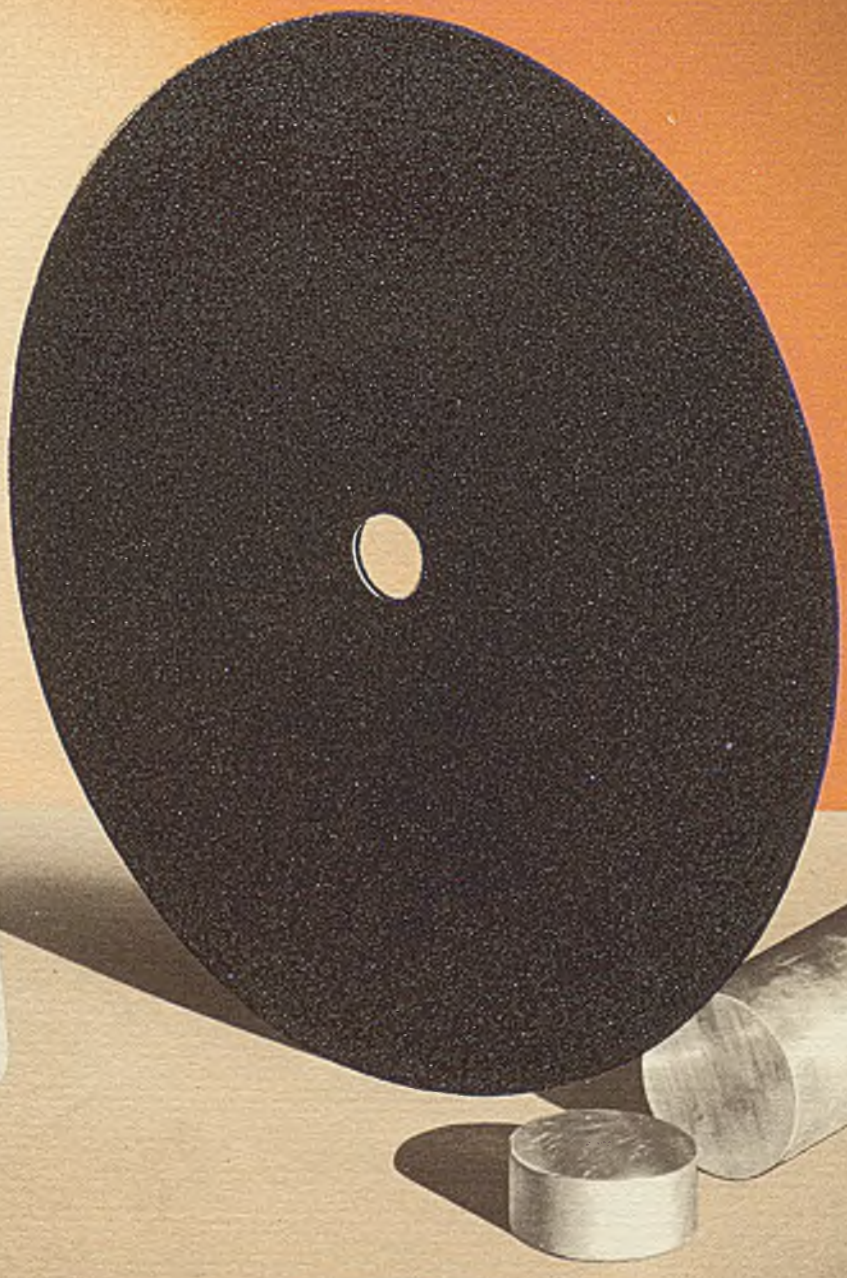

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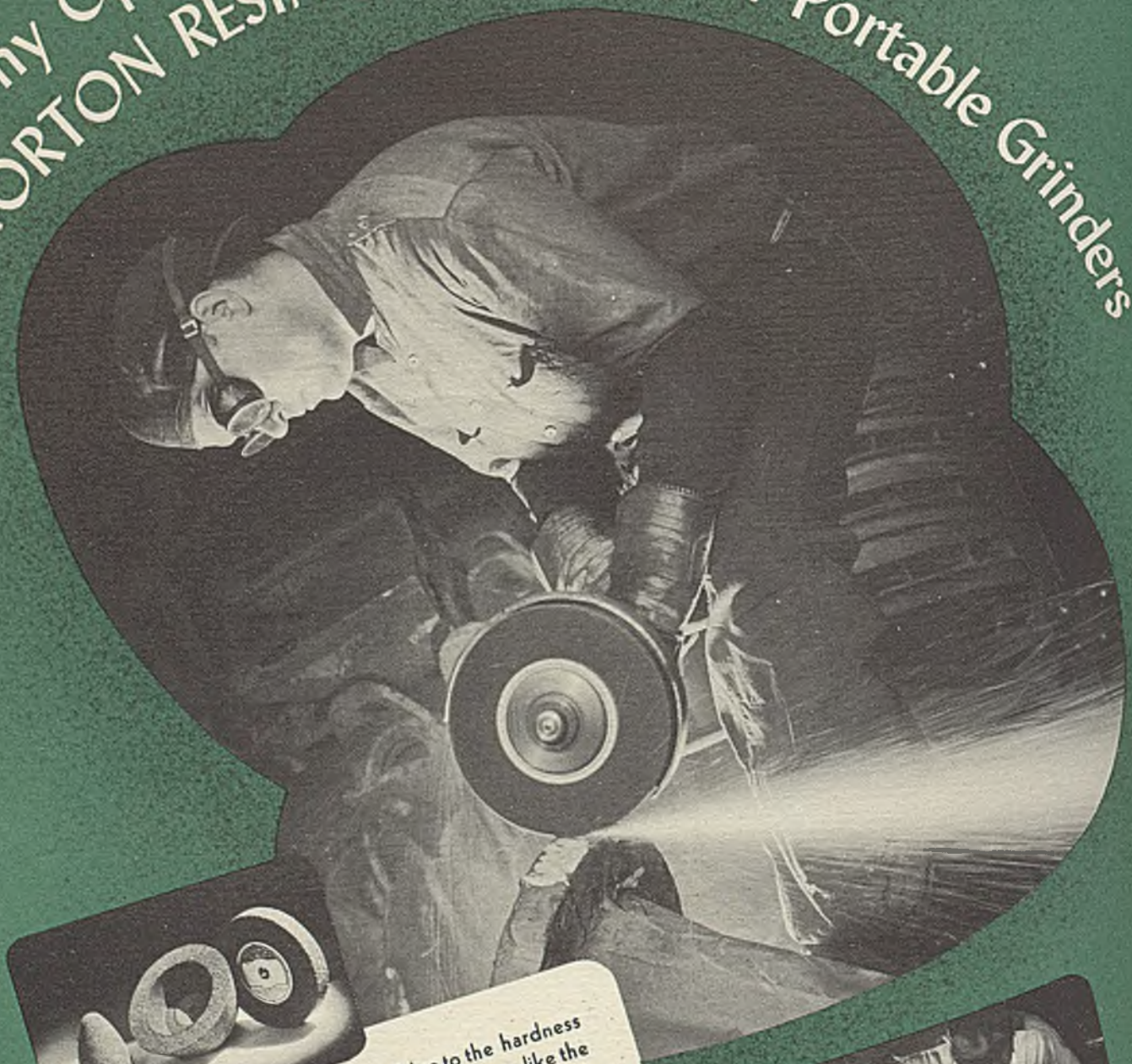

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NORTON ABRASIVES

spot left as he progressed along the groove.

In addition to being deep enough, the chipped groove must be wide enough. With single beveled butt joints that are adequately spaced, the groove design provides for a good width of chipping. With double welded joints, the possibility of trouble in this direction is greater.

In Fig. 2 is a double-U butt joint after chipping to sound metal. The chipping has been deep enough to meet good weld metal put in on the first side. But the chipped groove is much too narrow. Slag will very likely be trapped all along the center of the weld. And the bad feature of the whole effort is the fact that even a good welder will fail to see that he is trapping slag. The slag is bound very closely at the bottom on the narrow cut, leaving the exposed surface of the weld looking every bit as good as the normal bead after the slag has been knocked away.

Gouging Reveals Flaws

In keeping with the latest practice, many are turning to the use of flame gouging for some operations heretofore done by chipping. Gouging has the ability to reveal flaws and voids that might be smeared over by the smoothing action of a chipping chisel. More than once the gouging process has warranted its high gas consumption by exposing faulty workmanship that the chipping method might have glossed over. Another benefit is the ease with which the retained gouger can remove stock to any desired width.

A third advantage is the speed with which metal may be removed as gouging is fast, very fast. Yet another advantage exists where it is desired to preheat after chipping as the gouging process leaves a goodly amount of heat in the joint. In some cases the need for preheating is entirely obviated by gouging, while in other cases much less heating need be done.

Every bit as important as the V-joint is the U-joint, Fig. 3. Notwithstanding the greater cost involved in its preparation, the U-joint is less costly in the final analysis because of the saving in weld metal. While slightly more metal is needed in the lower part of the joint, much less is required to fill the uppermost portion in ½-inch plate or thicker.

Just as with the V-joint, the U-groove merits study before the correct contours are established to satisfy the demands of both ease of welding and of overall economy. Once again the question of lip and root spacing is to be considered. Here the lip must be made thicker as the curved shape of the lower portion of the groove possesses much less heat capacity than did the similar part of the V-grooved joint. This lesser heat capacity can lead to the establishment of a smaller root spacing. But this change must be made with care as the irregularities in fitup existing in even the best of shops may result in no gap at all where unevenness is present.

The radius at bottom of the groove is of prime importance as it establishes the width of the bottom of the groove and exerts a pronounced effect on heat capacity. Merely changing this radius from ¼ to ⅛-inch can invite a host of troubles: Electrode sizes are restricted; heat capacity becomes high with attendant loss of penetration; cleaning difficulties multiply rapidly.

The angle of slope adopted for the sidewalls is a less delicate variable than any of the others. As a matter of fact, the sidewalls could be made absolutely straight without impairing the weld in any way. The U-shaped deposit produced by the mineral-coated electrodes under correct conditions of operation have reduced the emphasis on the sidewall angle. However, these comments must not be interpreted as advocating the elimination of sidewall angle altogether. Better cleaning with less effort is the main argument for retaining a slight slope.

After the groove design has been agreed upon, the same considerations mentioned before in connection with the V-weld obtain. Small electrodes are required for the first pass or two to prevent burning through until a sufficient thickness of weld metal has been established to prevent this difficulty. As the bottom of the groove is the most restricted part of it, smaller electrodes are more easily manipulated there. And soundness of joint depends upon using the correct current with the proper size of electrode.

Nothing at all will be gained by choosing a large electrode and using this tool at the lower limit of its recommended current range. Sometimes this procedure is followed in the mistaken notion that increased output results, whereas tests have shown that quantity of deposit is more dependent upon current than upon electrode diameter. For a slight and even questionable gain in the rate of deposit, the risk involved appears to be disproportionately great.

The J-joint, too, calls for root and lip spacing for much the same reasons as the other joints discussed. See Fig. 4. Root spacing may be less or may even be eliminated here. Lip size may be reduced when the heat absorbing effect of the adjacent unbeveled plate is taken into consideration. But the radius at the bottom of the groove becomes even more important. For this radius, along with the angle of slope, provides the whole groove rather than half the groove as is the case with the other types. Therefore the minimum radius of ⅛-inch suggested is understandable.

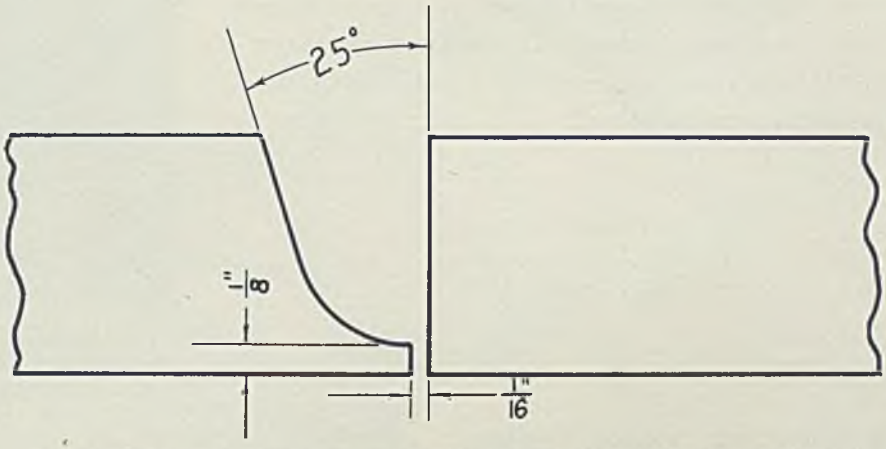

Fig. 4—The J-joint will give good results if proportioned along these lines

So much for the fundamental considerations of selection—be they electrodes, positions of welding, joint details or actual welding. Now what about the types of defects likely to be encountered and their causes? Only by associating the defect with its cause will the progressive elimination of defects become possible.

(*Concluded Next Week*)

Gives Insulation Cost

■ A calculator which makes it possible to determine quickly and easily the costs per unit of area for practically any refractory or insulation construction is being distributed by Illinois Clay Products Co., Joliet, Ill. It also shows on its reverse side the heat savings which can be obtained by insulating various parts of an existing open hearth furnace with Therm-O-Flake insulation. Persons interested in the device should address their requests to the attention of the company.

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By DUDLEY B. CLARK
Consulting Electrical Engineer
Palm Springs, Calif.

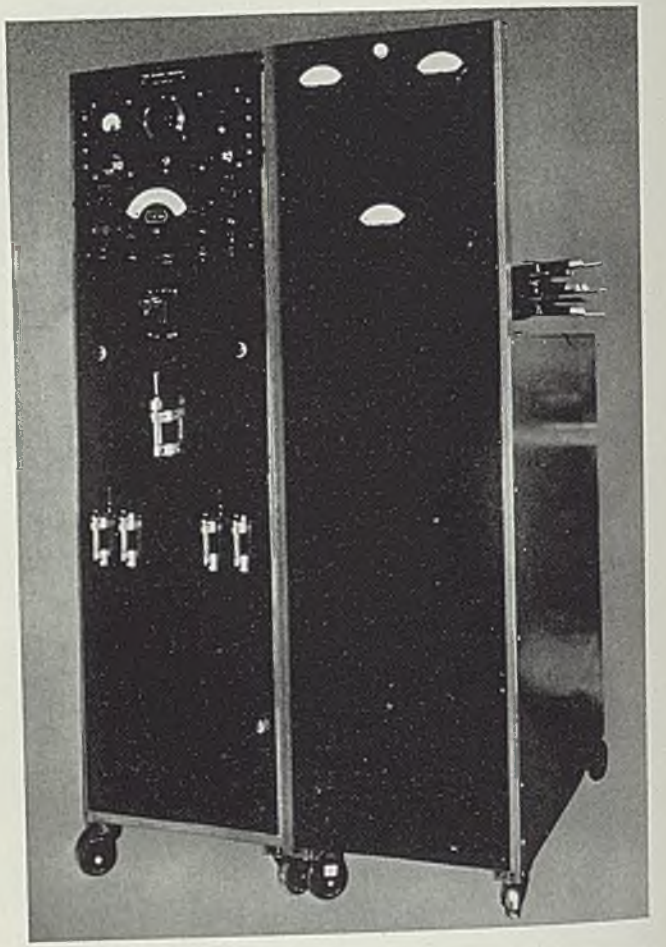


Fig. 1—Standard frequency converter of 250 kilovolt ampere output used as a standard for calibrating working units

INDUCTIVE melting, heating and surface hardening operations performed with the use of high-frequency power, are not only well accepted in their present stage of perfection, but are increasing rapidly in their scope of usefulness due to recent development in the method by which high-frequency currents are produced. Little has been said concerning the apparatus employed in producing high-frequency power which makes these heating processes possible.

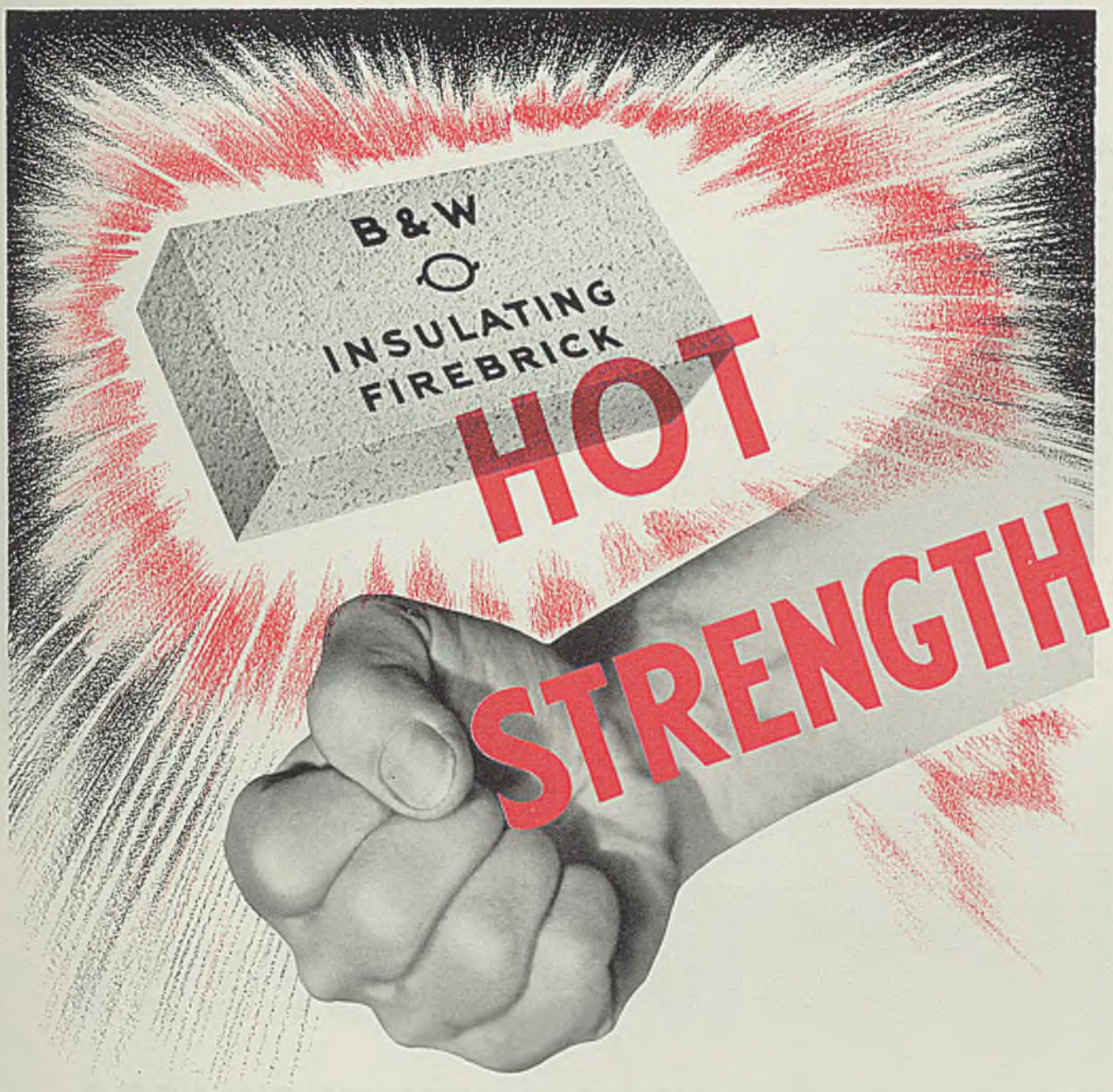
Abilities of these methods and a comparison with the new electron tube high-frequency converter and its possibilities in the industry are briefly identified as follows: Power in excess of 500 cycles and up to several thousand cycles is being produced usually on the premises of the consumer by means of (a) motor-generator sets, (b) spark gap converters or (c) electron tube converters. The latter are divided into two classes, the vacuum tube oscillator, and the gas-filled electron tube.

The motor-generator's greatest drawback for the future of inductive heating lies in the fact that the frequency of the output can not be changed conveniently. This limits its use greatly, as in the case of high-speed surface hardening of steel, the first and most important consideration is frequency. It is this that determines the depth of penetration into the surface, in a definite time limit against a fixed quantity of power. All metallurgists appreciate this but are forced to sanction the purchase of fixed frequency motor-generator sets for the motor and parts manufacturers that are nearest right for the most of the work, and let the rest suffer the consequences or attempt to harden them in some other way. The shape and size of a part limits the frequency which may be satisfactorily used to harden portions of its surface, and unless a variable frequency source is available, it is often impossible to determine the correct value. Another important item is the first cost, and still another is the time required to build such machines. Still further, the efficiency, installation expense, space needed, and the immobility after installation are often additional drawbacks.

The spark gap converter, the oldest known method of producing high-frequency currents, is strictly limited to small power applications, and has been abandoned as a method for large scale commercial hardening or melting operations. It also, is not adapted to a controlled output frequency.

The vacuum tube as a generator of high-frequency currents is, of course, capable, and the control can be made accurate, but here again is an inefficient device of high resistance that must depend on abnormally high voltages to produce comparatively small amounts of power. Much money has been spent along this line in an effort to develop this seemingly ideal source, but the high cost per kilovolt ampere and the lack of reasonable efficiency has proven it impractical for the time being. However, in small sizes, and for special purposes they furnish a tool for metallurgical and chemical research that may be invaluable, due to their higher frequency possibilities.

The gas-filled tube, usually of metal construction and water-cooled, designed for heavy duty, presented the best start to work from, in efforts to produce high-frequency in quantity. The gas-filled tube is an electron tube containing gas or vapor such as cesium, mercury, xenon, argon, etc. in sufficient amount to change the electrical characteristics of the tube over that of the high vacuum type. These tubes, however, were suitable only in the lower frequency moderately powered sets, and still did not fill the bill for high-powered jobs in



B&W Insulating Firebrick have stability under the conditions in which this characteristic has real meaning—when the brick are HOT.

Cold crushing strength is not indicative of the stability of a brick *in service*. Ability to withstand furnace temperatures without deformation is the important characteristic—this is usable, effective strength.

Because they have stability under heat, coupled with the lightest possible weight, B&W Insulating Firebrick provide long service life and high thermal efficiency.

THE BABCOCK & WILCOX COMPANY **Refractories Division** **85 Liberty Street, New York, N. Y.**

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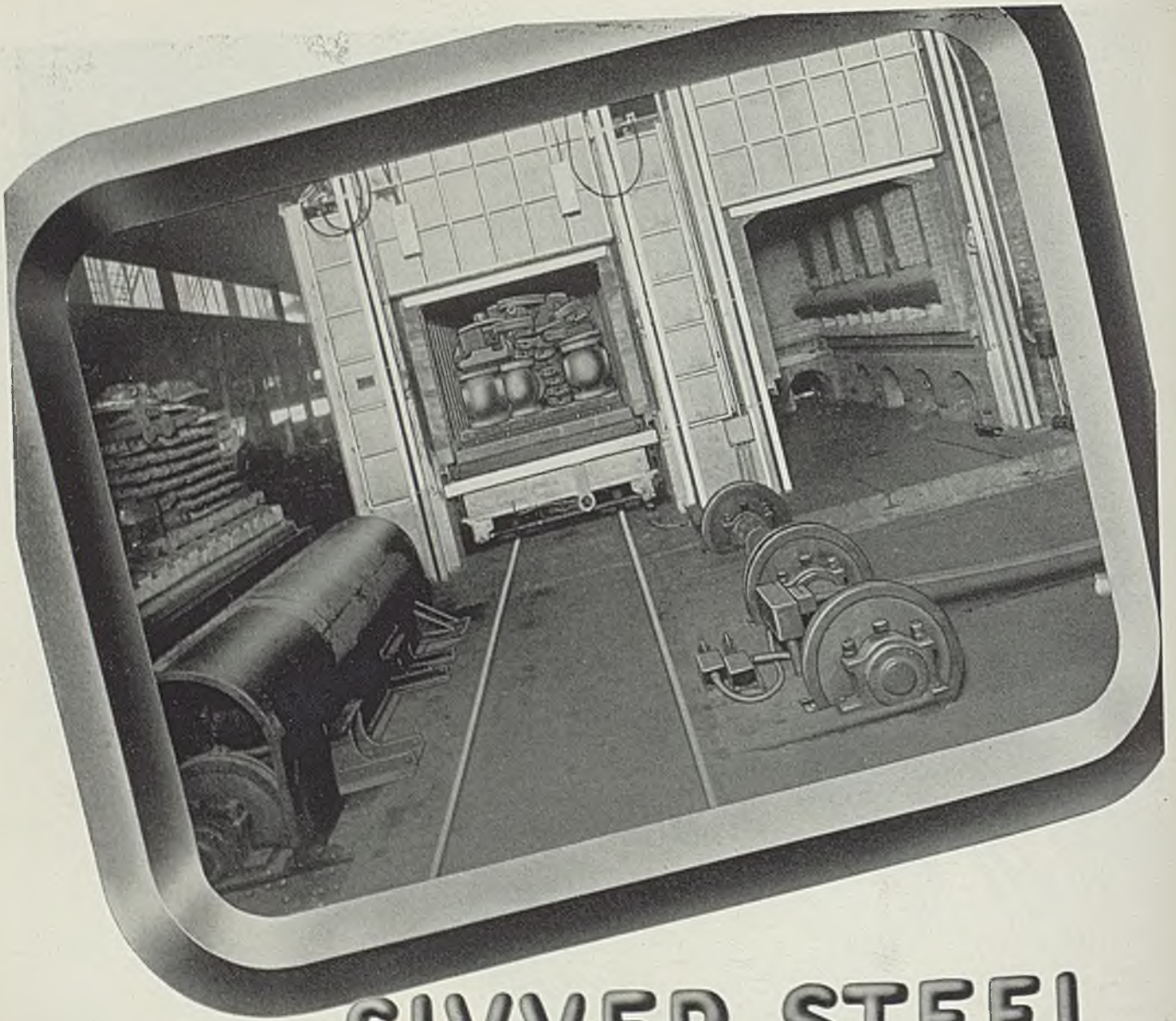


SIVYER STEEL

and HEVI DUTY FURNACES

Much of the quality of Sivyer Castings is due to the accuracy and uniformity of the heat treatment they receive. For more than fourteen years a Hevi Duty Electric Car Type Furnace has been a factor in establishing this high quality.

Write for descriptive bulletins of Hevi Duty Furnaces

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

the 2000 to 3000-cycle class. These tubes literally stepped on their own feet, due to the design of the tube, and existing circuits could not be found which afforded sufficient available time for de-ionization even where the tubes themselves were fairly fast.

After years of research with all types of tubes, the Clark laboratory has brought out a new power tube designed for the most severe type of service, and with a radical change of its interior and the fundamental circuit in which it operates. The tube does not require the maze of control equipment formerly used, and has the ability to recombine positive ions at a higher speed than heretofore.

This tube development combined with the circuit makes possible the new converter, which has features which are impossible with rotating machinery. Unless the converter is actually loaded by connecting to an induction furnace, inductor block, or some form of work, it does not draw a no-load current from the line as would a motor-generator set, which is usually left in motion between the intermittent loading of its generator end. This causes an improvement in both load and power factor and cuts down power bills to the amount needed while the heat is in progress. The full load efficiency is also greater than the rotating machine as there are no friction losses, and it has the distinct advantage of being able to tune the output frequency to the type of work undertaken. Even in melting operations, this is an advantage.

The cost of building the converter units in the sizes thus far designed, has averaged less than half that of the rotating set. This covers units from 30 to 400 kilovolt amperes. The larger the unit, the greater is the difference in cost between the motor-generator set and the tube converter, the advantage being with the tube converter to a greater extent as the size increases. The additional advantages of light weight, portability, and adjustable frequency features, make for popularizing the induction heating industry of the future.

These sets consist of a portable control board mounted directly on the chassis containing the shielded tube enclosure. This unit splits in the center and opens up for convenience in making the tubes and bus bars readily accessible. All electric controls are on the front of the board, with water-cooling connections for both tubes and transformers on the rear. The low frequency side is arranged for connection to a utility company's line or isolated alternator supplying 3-phase current at 460 to 2300 volts.

These converters are not easily injured by overloads, but as an added precaution the tubes themselves act as their own overload protection, by opening the circuit in some part of 1/120th of a second, should an overload occur. This is far faster than the fastest mechanical breaker in existence, and it does this at small maintenance expense, as there are no open arcs or mechanical movements to depend on. It is much easier to stop the beginning of an overloaded half cycle, than it is to open an overloaded breaker after the abnormal condition is well under way. This is just another practical example of how industrial electronics are serving all branches of industry through the electron tube.

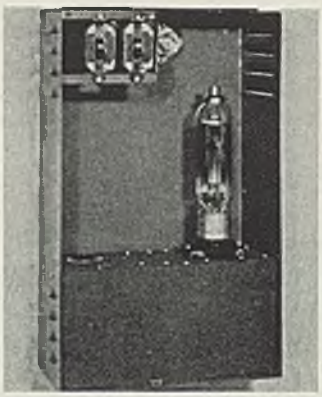
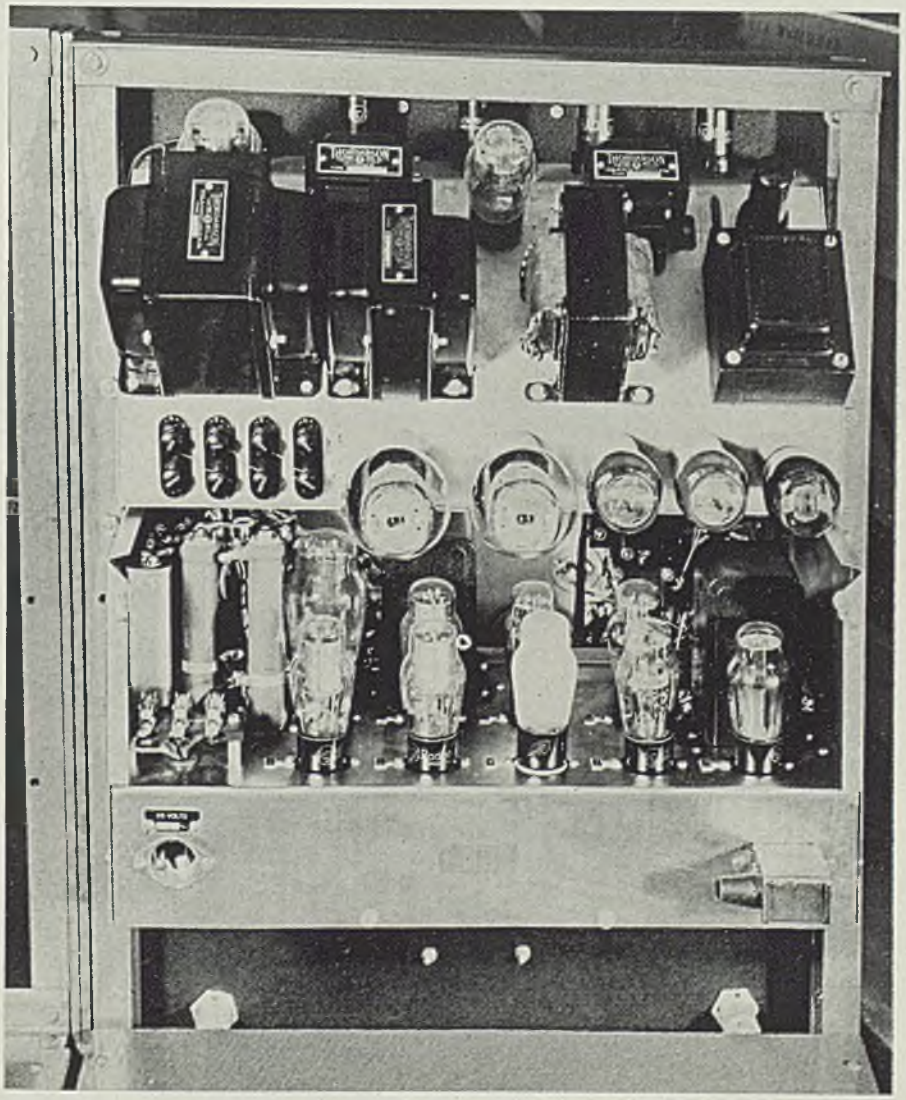


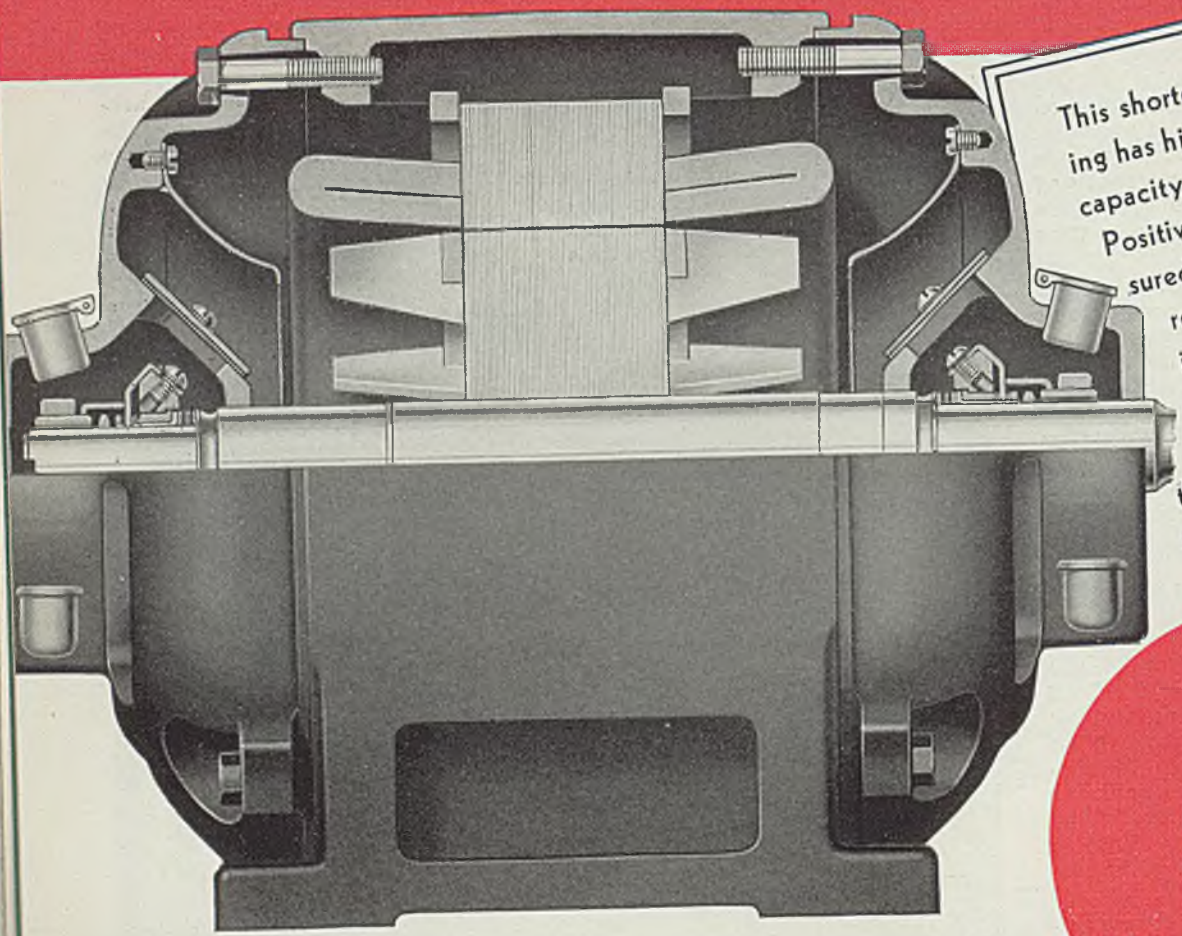
Fig. 3—Device for use with large converter in accurately timing of heat cycles for surface hardening operations

Fig. 1 shows a laboratory standard frequency converter of 250 kilovolt ampere output. This unit reads directly in frequency up to 5000 cycles per second, and is used as a standard from which working units are calibrated. This unit and its working mates are capable of picking any frequency desired, within its range, say for instance 2816¼ cycles per second and hold it there indefinitely, while increasing or decreasing the load. It is also possible to hold the load and change the frequency over wide limits, a flexible combination not previously attained, and impossible with any type of rotating machine.

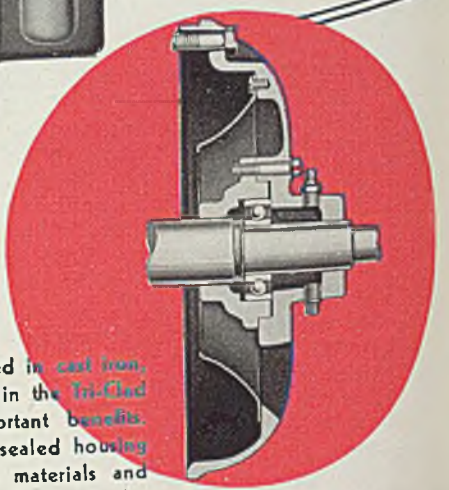
Fig. 2—Rear of frequency control panel showing tubes that control overload safety device



We Cut
YOUR MAINTENANCE WORRIES



This shortened sleeve bearing has higher load-carrying capacity and longer life. Positive lubrication is assured by its corrosion-resisting oil ring and improved spiral grooving—the bearing runs full of oil regardless of the direction from which the load is imposed.



Built for protection first...
...to last!

Completely housed in cast iron, the ball bearings in the Tri-Clad motor offer important benefits. The single-joint, sealed housing excludes foreign materials and maintains proper alignment. An improved pressure-relief lubrication system facilitates getting fresh grease where it is needed and helps to expel worn-out grease.

TRI CLAD
INDUCTION MOTOR
GIVES EXTRA PROTECTION 3 WAYS

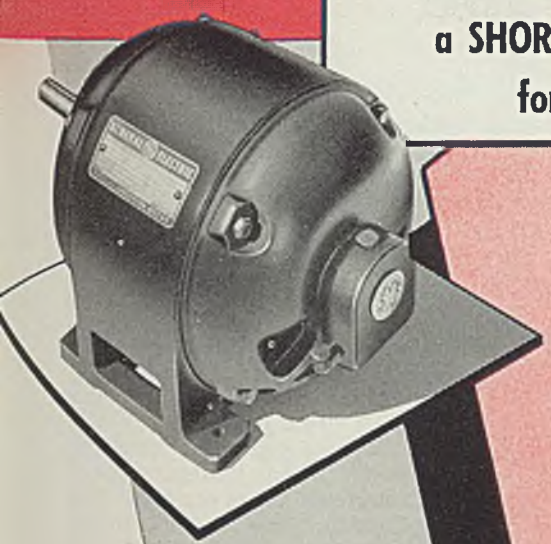
Extra Protection
against physical damage

The strong, one-piece cast-iron frame and end shields, with upper portion completely enclosed, protect vital motor parts from external blows, flying chips, settling dust, and dripping liquids.

When We Cut

THE ENDS OFF THE BEARINGS

In the Tri-Clad motor, G.E. uses a SHORTER sleeve bearing for LONGER life



Extra Protection

against operating wear and tear

For years, G-E motor designers have been experimenting with sleeve bearings of all kinds. They have found that a shorter sleeve bearing—one with new diameter-to-length proportions and a more effective type spiral grooving—is a fundamentally better bearing; that such a bearing can successfully withstand the stress imposed by short-center, hinged-base drives and similar applications.

In addition, the new sleeve-bearing housings on Tri-Clad motors are dust- and oil-tight. These and many other features are your assurance of a dependable, free-running motor.

In Tri-Clad ball-bearing motors, the bearing is completely enclosed in cast iron. There are only three major parts in the bearing assembly—the end shield, the inner cap, and the bearing itself. Close-fitting running seals keep out ball bearings' worst enemies—dust, dirt, and water.

You'll find that Tri-Clad motors are usually quiet and smooth-running; you'll find that they stay on the line when the going is tough. They'll give your production *extra protection* during *extra* years of service. Specify them on your next motor order. General Electric, Schenectady, N. Y.

Extra Protection

against electrical breakdown

Stator windings of Formex wire give extra protection against moisture, oil, abrasion, and heat shock. A tough, synthetic resin bonds the coils, and a coat of Glyptal 1201 Red on the end windings completes an insulation which maintains its strength during years of strenuous service.

GENERAL ELECTRIC

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By WILLIAM F. HORSCH
General Paint Corp.
Hill, Hubbell & Co. Division
Cleveland

"Shatter-Proof" Steel Pipe

Helps Safeguard Water, Gas, Oil Supplies in Defense Areas

Steel pipe, being shatter-proof, finds many important new applications with the expanding defense effort. Too, its tuberculation resistance from properly applied internal coatings makes it an important material for small as well as large waterworks systems

■ WHEN Allen Hazen, one of the great names in the waterworks industry, recommended over 30 years ago the use of steel water mains because steel was the strongest material known, little did he dream that steel pipe would assume the importance it has today. When he installed some of the first steel water mains in Springfield, Mass., Mr. Hazen believed that steel, a shatterproof material, should be the best material for water mains because of its strength, and he recommended that suitable linings and coatings should be developed to protect it against corrosion and tuberculation, an internal choking of mains which reduces flow capacity.

So sound was Mr. Hazen's judgment that today the ten largest cities in the United States are using steel "shatter-proof" mains. Our largest industries, ordnance manufacturing plants and our Army and Navy air bases are installing these mains. While London, England, pioneered the ferrous main over a century ago, it has now installed steel mains in many areas in view of serious trouble with breaks in the older lines. With bombs a constant menace, London can be grateful for those mains which are "shatter-proof."

Of course steel pipe must be suitably protected against corrosion. An asphalt or coal tar dipped coating was first used but gave difficulty from pin holes, "holidays" and blisters. Hand brushed applications of asphalt or coal tar in the field then replaced the dip method. In 1922, the National Bureau of Standards began to study the action of soils on buried pipe, and in 1932 they reported that *the character of the soil controls the rate of corrosion of ferrous materials and that in the same soil, all commonly used ferrous materials corrode at practically the same rate.*

With thousands of miles of steel pipe lines underground representing investments of many millions of dollars, the gas and oil industries made studies of corrosion through the American Gas Association and the American Petroleum Institute. A test of 42 types of coating revealed that mechanically-wrapped coal-tar coatings reinforced with asbestos felt were among the most effective against corrosion, soil stress and abrasion. So today mechanically wrapped coatings have largely replaced hand brushed coatings.

Coatings Applied by Machine

Such coatings are made possible through a unique coating-and-wrapping machine. After applying mechanically two separate coats of hot coal-tar enamel to a total thickness of 1/16-inch over a priming coat, tar-saturated asbestos pipeline felt is wrapped simultaneously with application of the second coat of hot coal-tar enamel. This is followed immediately by coating the outside of the felt with a minimum thickness of 1/32-inch of hot coal-tar enamel. A final wrapping of Kraft paper prevents sticking in transit and deflects sun rays. Total thickness of the reinforced coating is usually ⅛-inch.

The value of a heavy coal-tar lining in water mains was discovered in 1925, at which time many old mains were dug up in New York. The type with a heavily applied coal-tar lining after 62 years' service had its originally carrying capacity whereas dipped pipe lost almost 4/5 of its full capacity in 68 years. Capacity losses from deposits on the insides of water mains have been noted to range from 37 to 66 per cent. Now development of the "shatter-proof" steel water mains with spun coal-tar enamel linings makes this important advantage available to small industrial plants and small city water plants.

The spinning method has been highly developed. Coal-tar enamel or bituminous linings are applied by spinning while they are hot after the pipe first has been cleaned and primed cold. The liquid coal-tar primer is sprayed and brushed in place to serve as a bonding medium between the metal and the hot applied enamel. After drying, the pipe is revolved on its own axis at a relatively high peripheral speed and hot coal-tar enamel applied from a trough, from a weir or from a retractable feed line. Centrifugal force evenly distributes the enamel over the inner pipe wall. Revolving is continued until the coating has set.

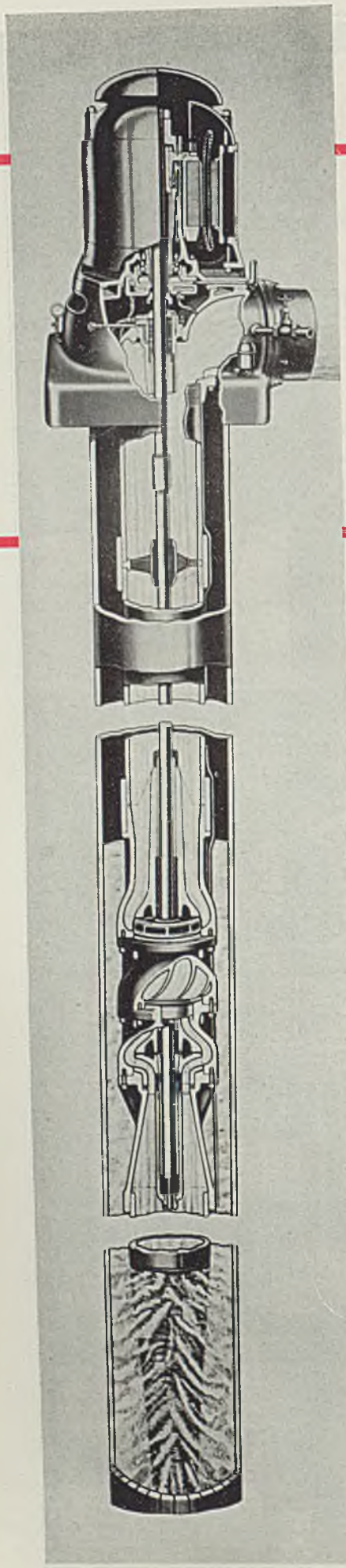
"Plasticizing" the coal-tar enamels gives linings which will stand a temperature range from 160 degrees Fahr. to 10 degrees below zero without sagging or cracking.

Another new development is the availability in lengths in excess of 40 feet. This means a further economy in the reduction of couplings needed, permitting cost of laying the pipe to be reduced as much as 25 per cent.

Multiple V-Belt Drive Data Book Offered

■ Fort Worth Steel & Machinery Co., Fort Worth, Tex., announces a comprehensive data book covering all types of V-belt drive applications. In addition to the usual data, it contains detailed information concerning the Boltrim, or demountable hub sheave which is constructed in such a way that rims of varying diameters and face widths can be mounted.

The book embodies some 64 pages and besides data on Boltrim rims and Goodflex belts, gives useful information regarding ratios, load capacities, friction losses, etc.



BEARINGS
Built Abrasion-Proof

To withstand the highly abrasive operating conditions in deep-well pumps, a bearing is produced that is noncorrosive, has a brinell hardness of 1200. This unique hardness is developed by a unique process that is detailed here

By JAMES HAIT
Chief Engineer
Peerless Pump Co.
Los Angeles

MANY deep well turbine pumps have shafts which are water lubricated and therefore in direct contact with well water. Resulting electrolytic and erosive action frequently causes premature destruction.

The most practical and economical shaft is one of carbon steel. However, at the bearing contacts, usually spaced every 10 feet from top of the well to the pump at the bottom, carbon steel is not sufficiently hard and so must be either bushed or protected with a harder facing. Pump manufacturers have had their troubles in attempting to protect the bearing contacts on the pump shaft because an ordinary shaft in a sandy well can easily score and erode, with the result that vibration sets in with subsequent rapid deterioration of the bearing.

To overcome this difficulty, spiraled bearing contacts, stainless sleeves around the shaft, plain swaged sleeves, thin chromium coats and other means have been employed. But all of these have their limitations. Some time ago, engineers of the Peerless Pump Co., Los Angeles, undertook to solve the problem by making exhaustive research. This study revealed that the most enduring pump bearing was obtained by correctly applying a combination of chromium and rubber.

The best technique in electroplating today shows the chromium deposit to be microscopically porous. It must have a protective underbase of corrosion and erosion-resisting material. A relatively thin chromium coating does not have a sufficiently hard base on the underlying carbon steel shaft to resist extreme pressure created when hard silica sand passes between the shaft and journal. There is no way to prevent sand from contacting bearings down in the well when a deep well turbine pump is water lubricated. To provide the hard base for the chromium, a monel sleeve is first applied to the shaft.

The proper combination essential for long bearing life appears to be a hard corrosion-resistant base, such as monel, armored with extremely heavy chromium, revolving within a nonrotating fluted rubber sleeve. It was found that the rubber bearing for best service should be fluted for proper lubrication, as the flutes then allow water to flush sand out of the bearing.

The value of chromium in its resistance to abrasion is obvious. But thin decorative chromium plated coatings should not be confused with the heavy hard chromium required here. This new type of bearing uses a heavy armor of chromium electrolytically deposited on the monel sleeve to which it is permanently bonded.

As compared to the ordinary bearing materials, the hardness of this chromium armored bearing is as follows: monel annealed, maximum 130 brinell; monel metal, cold worked, maximum 150; stainless steel, maximum 150; bronze (88-10-2), maximum 130; chromium-monel bearing surface, minimum 1200. This extreme hardness is an extrapolation from a hardness de-

Typical cross section through deep-well pump made by Peerless. Motor is at top of well, pump impellors at bottom. Shaft and bearings are exposed to water pumped and any sand that it may contain

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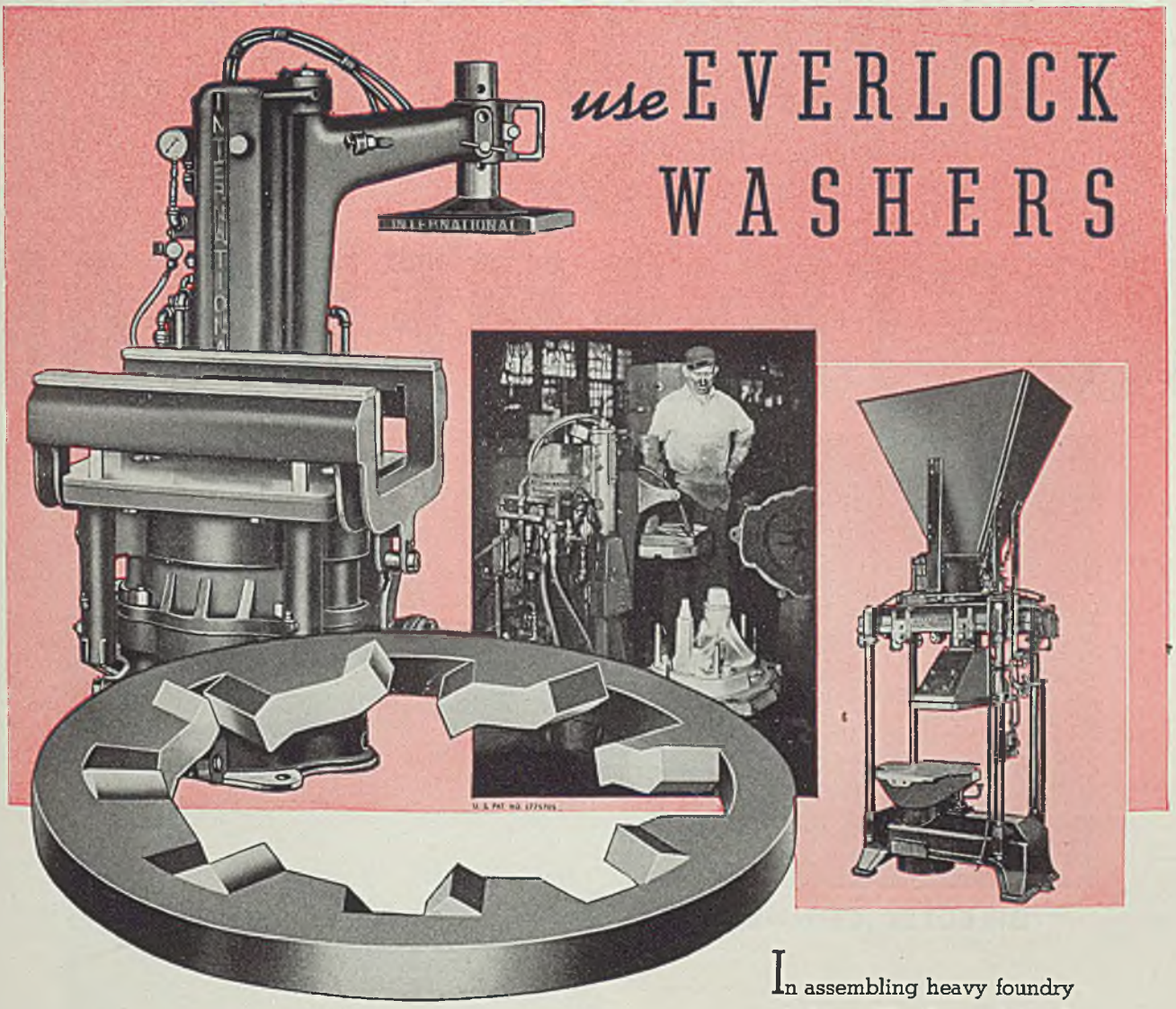

Washer Tongue Detail

In assembling heavy foundry machines, like those pictured, the International Molding Machine Company of Chicago use EVERLOCK WASHERS to stop loosening of nuts, bolts and screws . . . These massive, powerful machines are subjected to severe shocks and vibration. The core blower, pictured at the right, sets up a terrific vibration on the hopper while in use due to its action of two thousand motions per minute . . . The molding machine, pictured at the left and in the center, has a constant jolting action while in motion. The table is raised three inches and slammed down 150 times every minute . . . On this table 600 pounds or more of sand, including flask, is held rigidly in place . . . EVERLOCK WASHERS play a vital role in holding the many parts of these machines together . . . The International Molding Machine Company know that EVERLOCK WASHERS do the job more satisfactorily than any other locking devices . . . Look to EVERLOCK WASHERS for the solution of your lock washer problems . . . Listen to the enthusiastic praises of the users of EVERLOCK WASHERS and profit by their experience . . . There is an EVERLOCK WASHER of the correct size and type for every purpose.

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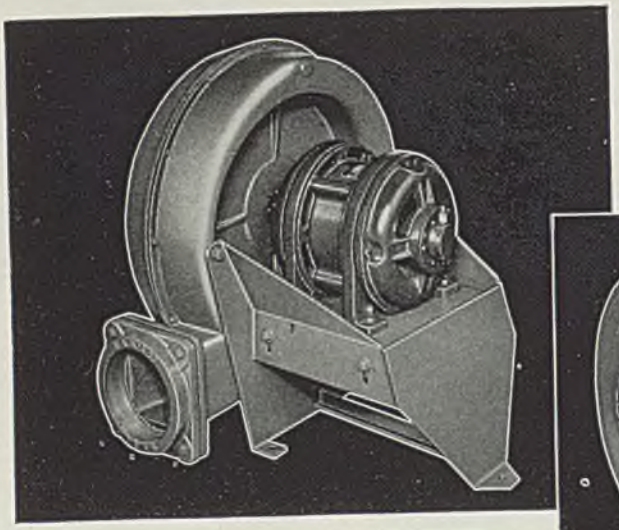

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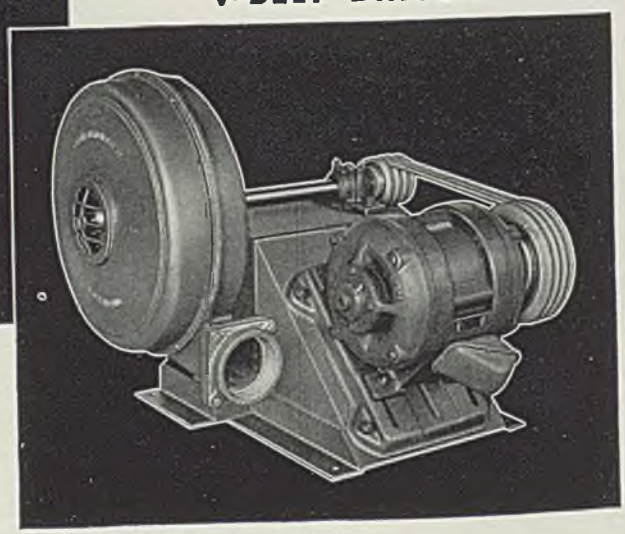

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PRESSURES from 1/2 to 2 lb per sq in

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EQUIPMENT FOR

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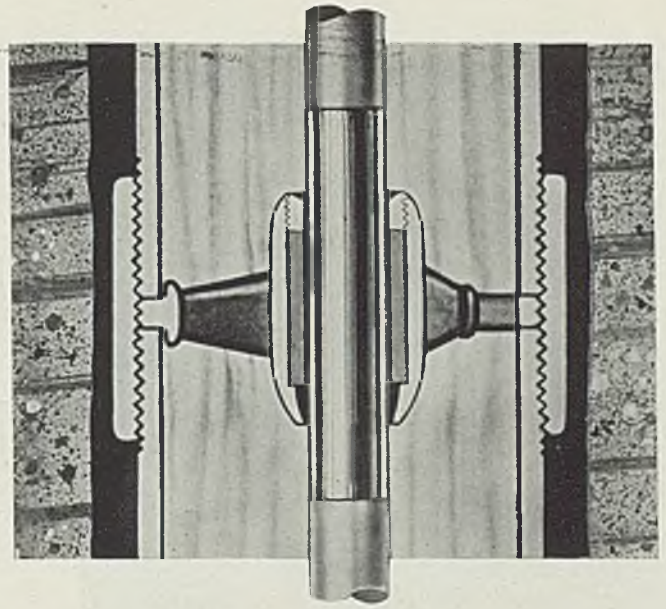
THE
NORTH AMERICAN
MFG. CO.
CLEVELAND,
OHIO

termined on the Moh Scale. This is the manufacturer's estimate of the brinell hardness as obtained by the scratch test if the brinell scale were extended. Such hardness is only obtainable by extreme coat thicknesses and cannot be measured by the conventional electroplating thicknesses.

In applying the chromium to the shaft, several operations are necessary. The pump shaft, of course, extends from motor or engine at the surface of the ground to the top bowl of the pump at the bottom of the well. At each bearing point, the shaft is undercut to the depth of the shaft threads. Then a sleeve of monel metal is slid over the shaft and swaged into the shaft recess at each bearing point. Monel is sufficiently ductile for swaging and also gives considerable increase in hardness from the cold working during the rotary swaging process. A special swaging machine is used which revolves at high speed, imparting an infinite multiplicity of swaging impacts to the sleeve. This reduces the sleeve in diameter and produces a tight, uniform grip in the shaft recess. The binell hardness of the monel sleeve before swaging is 130. After swaging onto the shaft, it is about 150.

Chromium then is heavily deposited on the monel sleeve to a thickness of 0.003-inch, which is more than 50 times the thickness of many chromium deposits. It is important that the chromium be quite thick, relatively, because previous experiments indicated that a thin chromium plate does not stand up in service.



Cross-section through cutless rubber bearing and high-hardness shaft section produced by the method described here

As a further protection to those portions of the shaft between the chromium sleeves, which are spaced every 10 feet, these areas are given two coats of a highly resistant synthetic which rust proofs the shaft, resists abrasion and reduces the action of electrolysis.

The chromium sleeve fits within a bearing journal which is held in place by a spider every 10 feet. This journal houses the cutless rubber bearing which is pressed into the guide spider and held by a locking ring. It is nonrevolvable. Tests made over a long period of time reveal that practically no abrasion occurs, even in heavily sanded wells. The longer the chromium bearing is in service, the more highly polished it becomes. It appears to be a close approach to the indestructible water-lubricated bearing.

Heretofore, when attempting to build up a deposit for such service the error of using a conventional, thin chromium thickness has been made. The monel, being softer, does not afford a sufficient hardness under the thin chromium and the chromium soon disintegrates as a result. By the process described above, a chromium coating is employed of such thickness that it builds up its own hard surface supporting body, independent of the monel. Being firmly bonded to the monel, a hard base that will not disintegrate thus is produced.

ASTM Issues 1940 Edition on Refractories

■ American Society for Testing Materials, 260 South Broad street, Philadelphia, announces publication of its latest manual of "ASTM Standards on Refractory Materials," embodying all of the specifications, tests and definitions covering these materials, giving considerable other information and data significant in this field. This 1940-41 edition supersedes the one published in 1937 and includes considerable additional material.

It includes five specifications providing quality requirements for refractories for various services: boiler service, incinerators, malleable iron furnaces, and also covering ground fire clay, and there are two classifications covering fireclay refractories, and insulating block and insulating fire brick. The fifteen standardized testing procedures, comprising a major portion of the publication, cover such matters as pyrometric cone equivalent, panel test for resistance to thermal and structural spalling of refractory brick, permanent linear change, load test, cold crushing strength, warpage, porosity, particle size of ground materials and methods of chemical analysis. Also given is a recommended procedure for calculating heat losses through furnace walls.

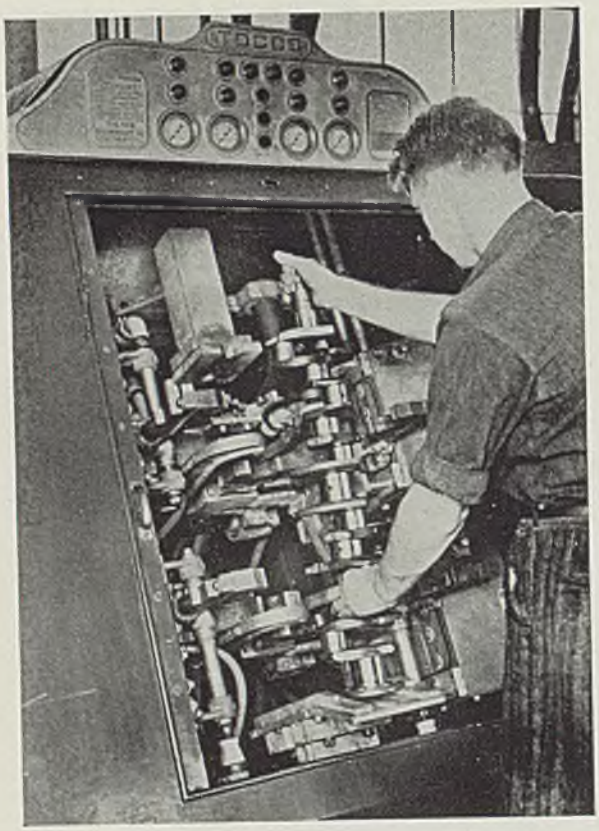
One of the most valuable activities of the society's committee C-8, which sponsors this manual, has been the development of industrial surveys of refractory service conditions, each one prepared by an authority in the industry. There is now a total of nine included. The surveys cover open-hearth practice, malleable iron, copper, and lead industries, by-product coke ovens, lime burning, glass, and portland cement industry, and stationary steam boilers.

Complete with an index, copies of this 180-page manual can be obtained from ASTM headquarters at $1.50 in board cover, or $1 75 in cloth.

Introduces Tin Flux For Hot Tinning

■ A special tin flux, "Fas-Tin-Flux," a liquid of the zinc chloride type for use in hot tinning, in the manufacture of terne plate and for soldering is reported by Hanson-Van Winkle-Munning Co., Matawan, N. J.

Containing special addition agents to assure fast action, it is made so it will be free from uncombined hydrochloric acid. The product may be poured on molten tin without danger of explosion. It will form a foamy flux blanket, which will tend to harden unless it is constantly supplied with water by a drip. This is intentional because zinc chloride is most effective as a flux when water is supplied with it to form hydrochloric acid gas in the fusion. If necessary, as much as 100 pounds of water can be used with each pound of flux placed on the molten metal. Also, increased use of water leads to brighter coats.



Details and loading unit for a vertical crankshaft induction-hardening unit

The Metallurgy of

INDUCTION HARDENING

Carbide solution rates of less than a second, higher hardness than that produced by furnace treatment, and a nodular type of martensite classify the metallurgy of induction hardening as "different." Further, surface decarburization and grain growth do not occur because of the short heating cycle as metal may be above the lower critical point for only 0.2 to 0.3-second

By W. E. BENNINGHOFF
And
H. B. OSBORN JR.
Ohio Crankshaft Co.
Cleveland

■ AN OUTSTANDING development is the successful application of induction heating to localized surface hardening on a multiplicity of parts and shapes. Yet in spite of its present day breadth of application, induction heating is still in the infant stage. The probable utilization of induction heating for heat treating metals, heating for forging and brazing, or soldering of similar and dissimilar metals, is unpredictable.

Induction hardening produces the desired degree and depth of hardness, essential metallurgical structure of core, demarcation zone, and hardened case, with a practical lack of distortion and no scale formation. The whole operation can be mechanized to fulfill production line requirements. Split second heating and quenching cycles are maintained automatically.

Heating is accomplished by high frequency currents from 2000 to 10,000 cycles, and upwards to 100,000 cycles in some instances. These produce a high-frequency magnetic field. The molecules within the steel attempt to align themselves with the polarity of the field, and with this changing thousands of times per second, an enormous amount of internal molecular friction is developed, heating the steel.

Since high frequency current tends to concentrate on the surface, only the surface layers become heated. This so called "skin effect" is a function of the frequency. Other things being equal, higher frequencies heat to shallower depths. The frictional action producing the heat is called hysteresis and is obviously dependent upon the magnetic qualities of the steel. Thus, when the temperature has passed the critical point at which the steel becomes nonmagnetic, all hysteretic heating ceases.

However heat also is developed by eddy currents induced in the steel as a result of the rapidly changing flux in the field. With electrical resistance of the steel increasing with temperature, the intensity of this heating action decreases as the steel becomes hot and is only a fraction of its original "cold" value when the proper quenching temperature is reached.

When the temperature of an inductively heated steel bar arrives at the critical, all heating due to hysteresis ceases and that due to eddy currents continues at a greatly reduced rate. Since the entire action goes on in the surface layers, only that portion is affected. The original core properties are maintained, the surface hardening being accomplished by quenching when complete carbide solution has been attained in the surface areas. Continued application of power causes an increase in depth of hardness, for as each layer of steel is brought to temperature, the current density shifts to the layer beneath which offers a lower electrical resistance.

Obviously the proper choice of frequency, power and heating time will permit almost any desired surface hardening.

Metallurgy Involved: Carbide solution rates of less than a second, higher hardness than that produced by furnace treatment, and a nodular type of martensite are points of consideration that classify the metallurgy of induction hardening as "different." Further, surface decarburization and grain growth do not occur because of the short heating cycle.

Induction hardening produced a hardness which is maintained through 80 per cent of its depth, and from there on, a gradual decrease through a transition zone to the original hardness of the steel as found in the core which is not affected. The bond is thus ideal, eliminating any chance of spalling or checking. There is a gradual transition from the martensite of the hardened zone, through the pearlitic - martensitic demarcation area, to the pearlite of the core.

The structure typical of an induction-hardened area has a characteristic appearance. The usual acicular martensitic structure resulting from conventional methods of hardening is definitely absent. Instead, we find a more homogeneous structure;

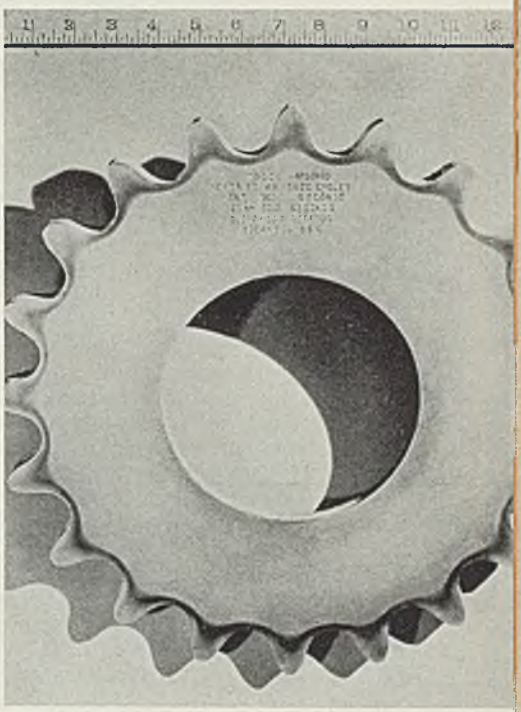
a nodular martensite of obvious greater fineness.

Complete carbide solution and homogeneity, as evidenced by maximum hardness and study of microstructure, can be obtained in a total heating time of 0.6 second. Of this time, the metal is actually above the lower critical point only 0.2 to 0.3 second. While calculations would serve to indicate that 0.2 second is required for carbide diffusion to be completed in a coarse pearlitic structure, induction hardening equipment is in operation on a production basis where complete carbide solution is obtained with the total heating and quenching cycle less than 0.2-second in length.

The fine nodular and more homogeneous martensite which results from induction hardening is more readily apparent with carbon steels than with alloy steels because of the nodular appearance of most alloy martensite. This fine structure must have for its origin an austenite which is the result of a more thorough carbide diffusion than is obtained with thermal heating. Practically instantaneous development of critical temperatures throughout the entire microstructure of the alpha iron and iron carbide is particularly conducive to rapid carbide solution and a distribution of constituents which has as its inevitable product a thoroughly homogeneous austenite. Further, the conversion of this structure to martensite will produce a martensite which possesses similar characteristics and a corresponding resistance to wear or penetrating instruments.

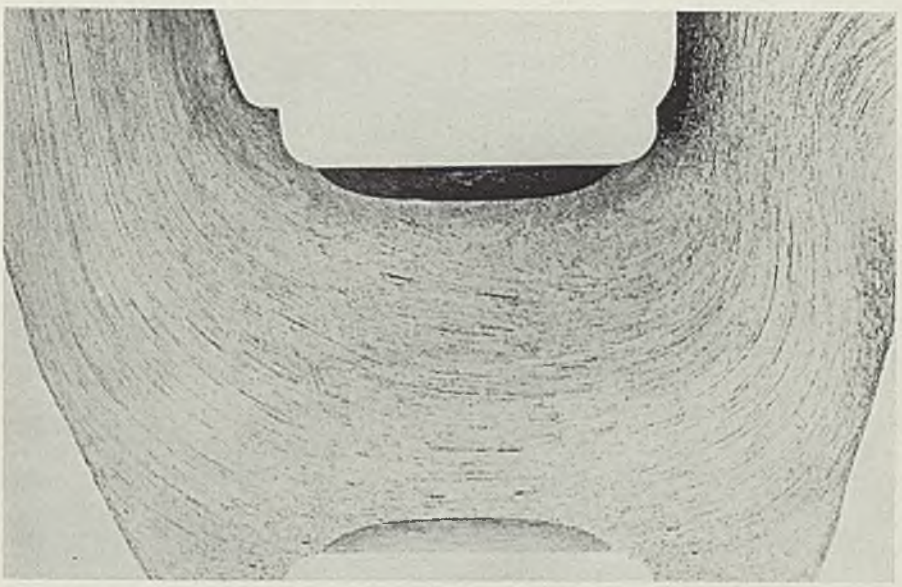
Lamellar Structures: We have examined short-time-cycle induction-hardened specimens which, at a very high magnification, show a lamellar structure in the martensitic areas. The following explanation is offered for consideration:

Carbide solution may take place evenly from the adjacent surfaces of two carbide lamellae and progress only far enough so that a microscopic examination of this crystal would not show the decrease which has taken place in thickness of these lamellae. Thus a portion of the ferrite becomes converted to austenite. The intervening region may be very low in carbon but being surrounded by the other structures of higher hardness, particularly the carbide lamellae, any hardness penetrator would indicate a value which will be an average of the high hardness and lower hardness of adjacent areas. This would not be detectable by the various etching techniques which we have employed. *No such condition can exist when a piece is inductively hardened from the proper prior structure or when heating cycles of several seconds are used.*



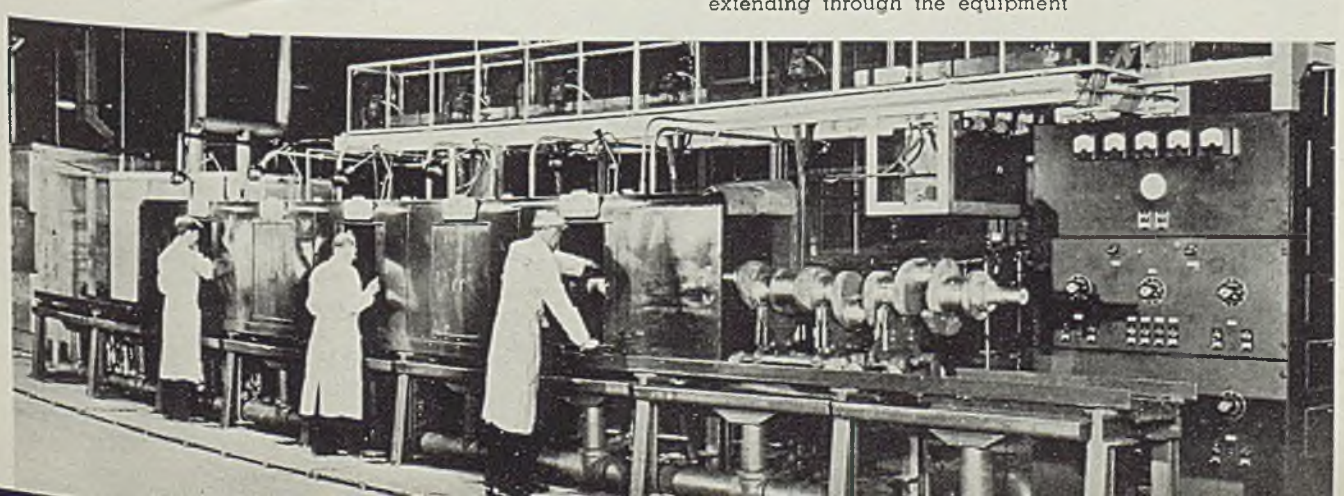
Macrostructure of induction hardened sprocket. Contour can be controlled to meet any required specification. Power for this job was 90 kilowatts, 9600 cycles per second, applied for 75 seconds. After a delay of 10 seconds, water quench was applied for 10 seconds. Resulting hardness is 55 rockwell C

Equipment: All induction hardening equipment consists of an induc-



Macrostructure of an induction hardened 4-inch crank pin bearing, SAE 1050. Surface was hardened to 55 rockwell C to a depth of 0.25-inch

Tunnel-type induction hardening line for working large crankshafts which roll through the sections on a special carriage fitted with wheels riding in a track extending through the equipment



tor, quenching auxiliaries, suitable transformers and capacitors, automatic timing controls, and a high frequency generator.

The inductor may be a single turn of copper to fit the piece to be hardened or several turns of copper tubing shaped for the same purpose. Symmetrical inductors may be used to surface harden unsymmetrical objects because of the natural tendency of the high frequency current to follow the contour of the piece. The quenching medium is supplied through the inductor by means of orifices which are an integral part of it. The same precision timing device which controls the heating cycle operates an electric quench valve.

Precise automatic control to within 0.1-second makes each hardened object a facsimile of all those before and after it. Motor-generator sets supply frequencies of 2000, 3000 and 10,000 cycles, at capacities up to 1000 kilovolt-amperes. Spark-gap-oscillator type units are used at frequencies upward of 100,000 cycles. Extremely high frequencies are available from vacuum tube oscillators; but the manufacturers have been slow in developing more economical designs of this type of high frequency generator. Indications are that the increased demand for reliable source of these higher frequencies will shortly change this situation.

The high frequency current usually generated at from 200 to 1000 volts is reduced to 20 to 50 volts in a transformer and fed into the inductor. To obtain high efficiency, the power factor is maintained as near unity as possible by connecting in the proper amount of capacitance.

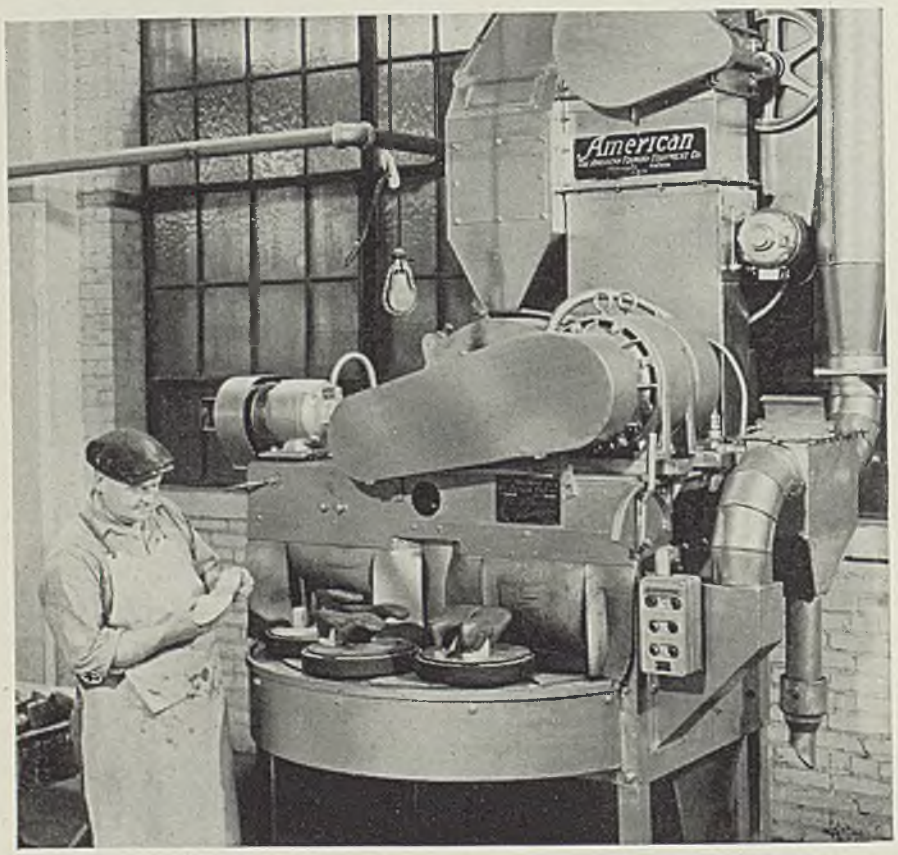
Excitation Adjusted Automatically: Power for each hardening operation is controlled and maintained by the field excitation of the generator. Occasionally a fixed excitation will not produce a constant power output as the electrical characteristics of the steel change with rising temperature. In such instances an automatic control system changes the external resistance of the field circuit at preset, split second intervals while the power is on.

Range of Application: The carbon content of the steel to be hardened must be sufficient to produce the desired hardness although, as has been pointed out, higher hardness is possible with this method of hardening. A fine grain size is preferable, yet not always essential. Due to the excessive demands put on crankshafts, it has been found advisable for such and similar parts to use a heat-treated structure which is predominantly sorbitic, or a normalized structure having a grain size comparable to the heat treated. Low carbon steels with carburized case; medium and high carbon steels, both regular and alloy; and ordinary cast iron in a malleable pearlitic condition can all be hardened as desired. Generally speaking, any steel which will respond to a heating and cooling operation may be hardened or heat treated by electric induction.

Does Many Varied Jobs: In addition to the selective surface hardening of steels, there have been other applications of induction heating of rather a unique nature. Hardening a piece of steel and brazing to copper and other metals may be done simultaneously. A small section of a previously hardened object can be drawn or softened to a condition permitting ready machinability.

Heating for forging and upsetting has been found to be a particularly satisfactory use for induction heating. The speed with which this may be accomplished has made it readily adaptable to the high production requirements of forming equipment, and scale problems are reduced to a minimum. Tip annealing of brass cartridge shells at the rate of 100,000 per hour is provided with a single induction heating unit.

Preparing Metal Lasts for Metallizing



■ This American Foundry No. 1 Wheelabrator Multi-Tablast machine installed at Clark Metal Last Co., Mishawaka, Ind., is an important unit in the manufacture of metal lasts for making leather footwear. In substituting metal for wooden lasts, some method had to be incorporated to bend the nails over after they were driven through the sole. The problem was solved by an arrangement of tacking points for the leather insole and by metallizing or spraying of a thin metal coating of carbon steel on the sole of the last. Metallizing at first failed because of the lack of a perfect bond between the two metals. This problem was overcome by the machine shown. It roughens the last by blasting it with No. 18 metallic grit thereby providing the proper bonding surface

Issues Bulletin on Fireclay Brick

■ A 6-page booklet, Technical Bulletin No. 76, entitled "Super Duty Fireclay Brick," has been issued recently by American Refractories Institute, Pittsburgh. It covers the method of manufacture of fire-brick but does not cover the special class of brick that are given special high-fired treatment or are made with a large amount of calcined clay. Communications regarding the bulletin should be addressed to S. M. Phelps, Refractories Fellowship, Mellon Institute, Pittsburgh.

HELPFUL LITERATURE

1. Tool Steels

Carpenter Steel Co.—16-page illustrated booklet, "Spotlight a New Hidden Way To Get More From Your Present Production Set-up," shows method of evaluating essentials of good tools. Matched set method of tool steels is explained. Case records of results with this method are given.

2. Reduction Drives

American Pulley Co.—12-page illustrated catalog No. R-41 describes reduction drive which is claimed to be economical method of providing driven speeds from 11 to 215 revolutions per minute. Unit mounts directly on driven shaft. Output speed can be changed by varying ratio of primary belt drive. Typical applications are shown.

3. Fluorescent Lighting

Fleur-O-Lier Manufacturers—16-page illustrated booklet entitled, "50 Standards for Satisfaction," explains scope of engineering and electrical specifications which form basis for certification of "Fleur-O-Lier" lighting units.

4. Die Casting Machines

G. & N. Manufacturing Co.—10-page illustrated portfolio type manual, "Production Costs Go Down," describes die casting machine of all-welded construction. Details of hydraulic operated units with locking pressures up to 250 tons are shown. Specifications of machines are included.

5. Flexible Couplings

Poole Foundry & Machine Co.—70-page spiral-bound illustrated catalog No. 40 explains value and advantages of flexible couplings. Dimensions and capacities of standard, medium duty, heavy duty, mill motor, disengaging, jordan engine and shear pin types are given.

6. Traveling Bridge Clamp

Dravo Corp.—4-page illustrated bulletin No. 215 outlines features of rail clamps for traveling bridges which provide positive and economical clamping on single and double rail tracks. These clamps are applicable to movable structures such as cranes, ore bridges and gantry cranes which are subject to heavy stresses and strain in severe wind.

7. Salt Tablets

Fairway Laboratories — 16-page illustrated bulletin, "Keep Your Workmen on their Feet," relates history of prevention of heat sickness in industry. Salt tablets in various containers, as well as different type of dispensers are described.

8. Rust Preventive

Parker Rust Proof Co.—28-page illustrated bulletin, "Parkerizing—Rust Prevention for Iron and Steel," explains advantages of this finish which converts surfaces of iron and steel to insoluble phosphate coating which is highly resistant to corrosion. Equipment required, typical applications and other information are given.

9. Geared Head Lathes

Axelson Manufacturing Co.—Six illustrated bulletins describe various sizes of 24-speed geared head lathes which range in size from 14 to 32-inch swing. Specifications are given. Front and rear views show features of design.

10. Seamless Tubing

Babcock & Wilcox Tube Co.—Card folder No. 103A gives technical data on seamless tubing wall thickness. Comparison with various gages in use today is given, as is thickness of tubing in inches and millimeters.

11. Pickling Compound

American Chemical Paint Co.—52-page illustrated bulletin No. 13 discusses advantages resulting from use of "Rodine" inhibitor which, when added in small quantities to pickling baths, greatly retards attack of acid on steel without affecting in any way acid's ability to remove scale. General instructions and other informative data are included.

12. Industrial Products

Philip Carey Co.—12-page illustrated bulletin, "Proved Protection Against Wasted Profits," explains savings effected by heat insulations for temperatures from subzero to 2500 degrees Fahr. on piping and equipment, and describes corrugated roofing and siding, roof coatings, flooring and similar industrial products.

13. Heat Treating Products

National Copper Paint Corp.—6-page bulletin No. 113 describes line of "Sel-Car" heat treating products. Material is sprayed or brushed on metal to be heat treated. It provides surface protection for sheets against carburization and scaling, and allows for selective cyaniding in liquid baths by means of special application.

14. High Speed Steel

Latrobe Electric Steel Co.—4-page illustrated bulletin presents information on "Double Six" high speed steel. Enumerated are data on composition, forging, hardening, annealing, drawing, and usage. Charts and tables amplify text.

15. Heat Treating Containers

Michiana Products Corp.—18-page illustrated catalog lists available patterns of carburizing, annealing boxes, retorts and other heat treating containers. Principal dimensions are shown, and on each page, diagram indicates approximate style of container.

16. Valves

Homestead Valve Manufacturing Co.—4-page illustrated bulletin No. 114025 covers blow-off valves, plug valves, air shut-off valves, and pipe line valves for use in battleships, armament presses, and other national defense projects. Specifications and features are given for each type.

17. Heating Cable

General Electric Co.—4-page illustrated bulletin No. GEA-3539 gives complete information on "G-E" heating cable. This flexible, lead covered cable can be bent and formed readily to fit almost any low temperature electrical heating job involving temperatures of 165 degrees Fahr. or less.

18. Sling Practice

Macwhyte Co.—4-page illustrated technical reprint "Safe Sling Practice" contains hints on handling of wire rope. Chart gives sling loads, and series of diagrams show correct and incorrect methods of making hitches.

19. Boring Machines

Ex-Cell-O Corp.—4-page illustrated bulletin No. 31101 is descriptive of style 1212-A junior, double end, precision boring machine. Details of unit for boring, turning and facing of medium size and smaller parts are shown. General specifications of this machine are given.

20. Synthetic Rubber

B. F. Goodrich Co.—20-page illustrated "Compounding Manual for Hycar O. R." contains receipts for compounding this oil resistant type synthetic rubber. Subjects discussed include accelerators, adhesion to metals, cements, heat resistance, lamination, mixing, molding, solvents and vulcanization.

21. Draft Instruments

Hays Corp.—20-page illustrated bulletin No. 41-472 is technical report on drafts. Four sections, replete with diagrams and charts, discuss what draft is, how draft is measured, where to measure draft and pressure in modern steam plant, where to connect draft gages on various types of fuel feed, and how to install draft gages, respectively.

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HELPFUL LITERATURE

(Continued)

22. Electric Furnaces

Ajax Electrothermic Corp.—16-page illustrated bulletin No. 14 covers 20-kilowatt converter and line of electric furnaces. Discussed in detail are principles of induction heating, advantages, construction of furnaces and converter, types and life of linings and refractories, and types of available crucibles with prices.

23. Magnetic Separators

Dings Magnetic Separator Co.—8-page illustrated bulletin, "Magnetic Alchemy in the Metal Industries," discusses use of magnetic pulleys for removing magnetic metals from foundry sand, application of separators for removal of iron from nonferrous scrap, and materials handling with lifting magnets.

24. Hydraulic Power Saw

Peerless Machine Co.—12-page illustrated catalog contains information for companies who have defense contracts for heavy artillery. Action photographs point out advantages of "Peerless" hydraulic power saws in cutting square billets for shell forgings, round stock for rifle barrels, and tool steel as required for forging dies.

25. Pillow Block Base Plates

Link-Belt Co.—8-page illustrated bulletin No. 1882 tells about welded steel base plates which provide convenient efficient and economical adjustment of bearings for shaft alignment. They can be used with babbitted or roller bearing pillow blocks. Tables list prices, dimensions and weights.

26. Cold Header Die Steel

Jessop Steel Co.—12-page illustrated booklet announces "New Process" cold header die steel, clean, non-porous steel developed especially to meet severe service conditions encountered when cold-heading bolts, screws, rivets, nails, buttons, and other small metal objects. Complete information on heat treatment is included.

27. Gear Lapper

Michigan Tool Co.—4-page illustrated bulletin No. 995 is devoted to information on "Michigan 995" two gear lapper. Details of construction, features of operation, and specifications are listed.

28. Machine Units

Ahlberg Bearing Co.—8-page illustrated bulletin, "Simplex Machine Units," is devoted to information on line of machine units designed to simplify installation of ball bearings in many kinds of equipment. These units give to designer economical means of using ball bearings in equipment where bearing housing is either part of machine or must of necessity conform to manufacturer's design.

29. Fire Brick Manufacture

A. P. Green Fire Brick Co.—16-page illustrated booklet is pictorial presentation of various stages in manufacture of fire brick. Shown in color are clay pits, grinding and mixing equipment, molding presses, drying kilns, and testing laboratory.

30. Diesel Engines

Fairbanks, Morse & Co.—12-page illustrated bulletin No. AOB100.2 is entitled, "Modernizing Your Diesel." It explains how early model "Fairbanks-Morse" diesel engines may be rebuilt in keeping with newest design at little cost. This procedure is claimed to eliminate obsolescence.

31. Drill Sharpener

Pratt & Whitney division, Niles-Bement-Pond Co.—Illustrated bulletin No. 450 describes design and features of deep hole drill sharpener. Basic principles of operation are shown in sectional photographs. Complete specifications are listed in tabular form.

32. Recirculating Furnaces

Despatch Oven Co.—12-page illustrated bulletin No. 81 explains operation and features of recirculating convected air industrial furnaces for all heat treating processes from 275 to 1200 degrees Fahr. Specifications for various sizes and types of furnaces are given.

33. Bronze Valves

Hancock Valve division, Manning, Maxwell & Moore, Inc.—8-page illustrated bulletin No. 5248 features superfinished "500 Brinell" bronze valves. Their applications are ennumerated together with data on construction advantages. Tables give weights and dimensions.

34. Steel

W. J. Holliday & Co.—12-page illustrated bulletin, "85 Years of Holliday Steel," graphically presents information on company's plants. Shown are warehouses; stocks of steel in structural shapes, rods, bars, plates, sheets, pipes, and tubes, and various plant operations.

35. Dust Control Equipment

American Foundry Equipment Co.—12-page illustrated booklet gives reasons why dust conditions in industrial plants should be controlled and how these dust problems can be handled properly. "Dustube" dust collector, high efficiency cyclone dust collector, and wet disposal unit are described.

36. Bearings

Bantam Bearings Corp.—24-page illustrated bulletin No. 104H gives complete information, specifications and engineering data on quill and needle roller bearings, ball thrust bearings, roller thrust bearings and self-aligning thrust bearings. Data are included on speed factors, tolerances, fitting practice and capacities.

37. Voltage Regulators

Allis-Chalmers Manufacturing Co.—4-page illustrated bulletin No. B-6137 shows how Type VD rocking contact voltage regulators may be applied to direct current problems in steel mills, paper mills, electro-plating and chemical plants, and in process industries. Wiring diagrams supplement text.

38. Diesel-Electric Sets

Caterpillar Tractor Co.—20-page illustrated bulletin No. 6344 contains detailed description of diesel engine and self-regulating generator. Installations in many industrial plants are shown. Specifications are given on eight sizes of electric sets which are available.

39. Portable Grinders

Norton Co.—26-page illustrated bulletin No. 1328 discusses grinding and finishing with portable equipment. Use of grinders in foundry cleaning rooms, steel mills, in railroad and car shops, stone industry, and tool room and die shops is reported in detail. Tables give recommended speeds and types of wheels for each operation.

40. Tipped Cutting Tools

McKenna Metals Co.—32-page general catalog No. 41 presents complete information on "Kennametal" cutting tools and blanks. All types of tools are described, prices and dimensions are listed, and diagrams indicate various design angles. Section is devoted to information on how to select proper tools, and how to grind them.

41. Segment Saw

Pittsburgh Saw & Tool Co.—8-page illustrated bulletin describes "Pittsburgh" segment saw. Among information reported is data on sizes, advantages, how to order, and prices on complete blades, segments and wedges. Actual size photographs show details of construction.

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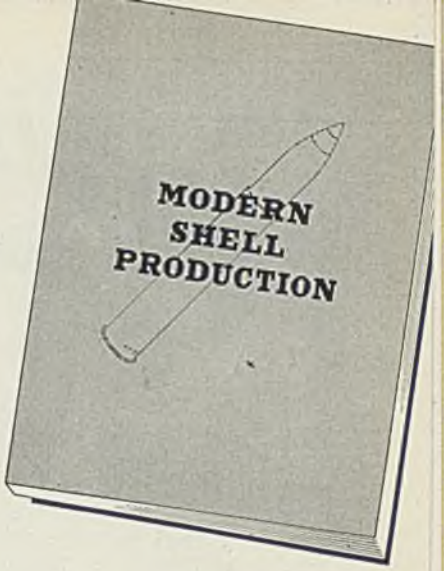

A 76-page reprint handbook on "MODERN SHELL PRODUCTION", consisting of the series of articles on high explosive shell by Professor Arthur F. Macconochie, Head, Department of Mechanical Engineering, University of Virginia; F. G. Schranz, General Manager, Baldwin-Southwark Division, Baldwin Locomotive Co.; and Professor W. Trinks, Department of Mechanical Engineering, Carnegie Institute of Technology, appearing in recent issues of STEEL. Also included is an article by Engineering Editor, G. W. Birdsall on the production of shrapnel shell at the Frankford Arsenal.

This handbook represents a wealth of information on modern shell production not available elsewhere in printed form. It is intended to assist manufacturers—many of whom still are to be mobilized—in swinging effectively into the production of armament. It is intended also to stimulate creative thinking and thus help enlist the full resources of American inventive and productive genius in the defense of our country.

In addition to the series of articles contained in this handbook, other articles appearing currently, or shortly to appear in STEEL will cover the technique of manufacturing tanks, range-finders, cartridge cases for large shell, gun carriages, fire-control apparatus, fuzes, aerial bombs, depth bombs, torpedo propulsion mechanisms, automatic rifles and machine guns, anti-aircraft guns and ammunition, heavy guns, small arms and small arms ammunition.

Contents

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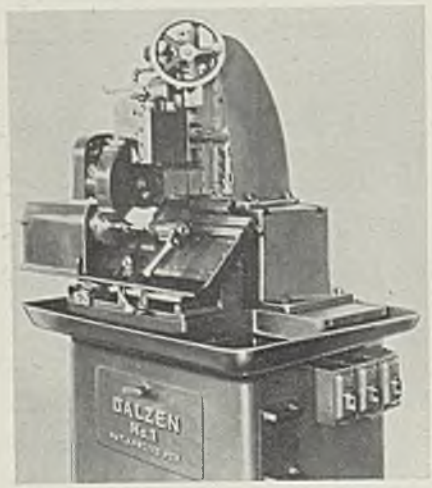
Industrial Equipment

Vertical Thread Grinder

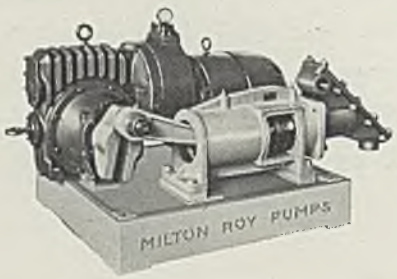
■ Dalzen Tool & Mfg. Co., 511 Leib street, Detroit, announces a new vertical thread grinder, said to be one of the first of its kind in the industry. It makes a departure from the conventional design of thread grinders. Instead of approaching the work from the side, the wheel does it from above. In this position the head is directly over its own base and a constant equilibrium is



maintained. Thus the weight is always down on the feed screw. Being in an upright position the grinder conserves floor space. It has a capacity of 18 inches between centers, 6 inches in diameter, and can produce 10-inch length threads any place on the 18-inch shaft, right or left hand, with the same lead screw. The head pivots and can be set to a maximum of 25 degrees either side of center to produce right or left hand threads. A cam arrangement having a master cam with an adjustable fulcrum block and pickoff gears provides for making of variable relief on any number of flutes in taps. The machine occupies floor space of 38 x 48 inches and stands 75 inches high.

Step-Type Valve

■ Milton Roy Pumps, 1308 East Mermaid avenue, Philadelphia, has introduced an improved step-valve for chemical and proportioning pumps. It is reported to retain all the advantages and characteristics of the original stepvalve and, in addition, to make the entire interior of the valve-body accessible for cleaning by the removal of a cover plate. The valve automatically discharges all air and eliminates air-binding. It also discharges all small particles of dirt. Illustration here shows step-valve embodied on a large pump capable of pumping 1200



gallons per hour against an operating pressure of 100 pounds per square inch. All parts in contact with the solution being pumped, including double ball-checks, seat and piston, are of acid bronze. This pump has a 3½-inch piston, with 6-inch maximum stroke, operating at 86 strokes per minute. The stroke is readily adjusted to change the capacity of the pump from zero to maximum. The driving motor is a 7½-horsepower unit.

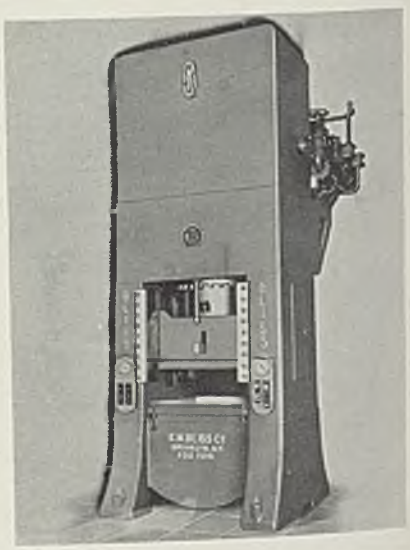
Vacuum Pump

■ Gast Mfg. Corp., Hinkley street, Benton Harbor, Mich., has introduced a new model vacuum pump which may be used as a machine accessory. Complete with 1/12-horsepower motor, it is compact and light in weight. Deluxe assembly includes chromium plated and polished parts for hospital, labora-

tory and surgical work where attractive appearance is desired. The pump is of the rotary type, operating without gears, springs or valves, and is asserted to be efficient, vibrationless and quiet in performance. A slight adjustment converts it from vacuum to pressure service. Pump and motor measure only 8½ x 4½ inches, and it can be lifted easily and moved by grasping a convenient handle incorporated. Air capacity of the 5F5 is 0.5-cubic foot per minute.

Drawing Press

■ E. W. Bliss Co., Fifty-third street and Second avenue, Brooklyn, N. Y., has introduced a new 750 ton Hydro-Dynamic press for drawing operations. It has many operating features such as an intermediate pressing cylinder which gives a higher speed at low pressures (under 350 tons) and yet has available a maximum pressing capacity of 750 tons (at normal pressing speed). This feature is of value in deep drawing work. With the pumping unit supplied with this press the following press speeds are obtained: 665 inches per minute—quick advance speed; 56 inches per minute—pressing speed for pressures up to 350 tons; 27 inches per minute—for pressures from 350 tons to 750 tons; 720 inches



per minute—return speed. Press frame is of rigid, 4-piece, fully shrunk, steel tie-rod frame construction, with the bed, uprights and crown cross keyed together. An all-electric control governs both production operation and die setting. Speed changes and the reversl of the press slide may be controlled by either position or pressure in the system. The electric control devices are mounted in the side housing of the press. An adjustable bar knock out is furnished in the slide while the bed is arranged to receive a liftout or a cushion if desired.

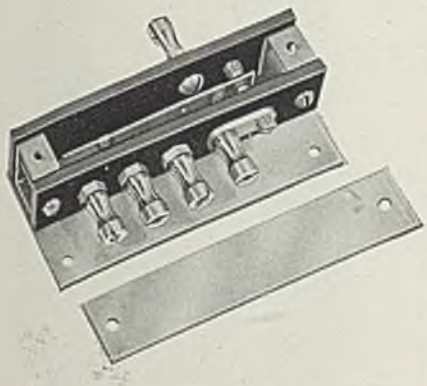
Turret Simplifies Operation of Machine

■ Oster Mfg. Co., 2057 East Sixty-first place, Cleveland, announces a new 6-station turret for their No. 601 Rapiduction machine recently placed on the market. With this addition the unit can be converted into a simple, plain head, hand-operated

system. The cooling air in the system is forced through large air passages surrounding the motor closure at a velocity which resists clogging and keeps the air passages clean.

Time Delay Switch

■ Betts & Betts Corp., 551 West Fifty-second street, New York, announce a time delay switch to provide a predetermined time delay in electrical control. It is for laboratory and industrial application in conjunction with magnetic relays and is generally used where temperature changes are fairly constant and slight variations in timing are not detrimental. (Special compensating switches are provided where accurate delay is essential). It also is provided with four ter-



minals, two for the heater coil, two for the main circuit and adjustable within the time limits of one second to five minutes. Switches of this type are available in immediately or not immediately recycling styles; normally open or normally closed models.

Refrigerating Units

■ York Ice Machinery Corp., York, Pa., reports a new line of Freon-12 self-contained refrigerating units

varying in size from 1/5 to ½-horsepower. The smallest unit in this line stands 12¾ inches high and is 20 inches long by 15⅞ inches wide. All units in the line with the exception of the 1/5-horsepower size are supplied for three different operating speeds—depending on whether high, medium or low suction-pressure operating conditions are desired. They all feature operating economy, high B.t.u. capacity and low sound level.

Safety Goggle

■ American Optical Co., Southbridge, Mass., announces a new on-center safety goggle of the spectacle type for protecting workers' eyes. Its features include a double-braced bridge developed for hard usage, comfortable rocking pads, insulated heat resisting perspiration-proof temples, three eye and bridge sizes for maximum comfort and efficiency and the added protection of Super Armorplate clear or Calobar lenses. In addition, this goggle can be obtained with wire-mesh side shields which provide extra protection against particles striking from the sides. These screens are noncorrosive and easily cleaned.

Smoke Detector

■ Worner Products Corp., 1019 West Lake street, Chicago, announces a smoke detector for auto-

matic safety control of air conditioning and ventilating systems. It is an electronic self-contained unit and can be attached to any air duct to detect the passage of smoke.

Features of the unit are the visible operating indicator and a dust-tight lens that can be easily removed, cleaned and replaced without stopping the ventilating equipment or entering the duct.

Splashproof Motors

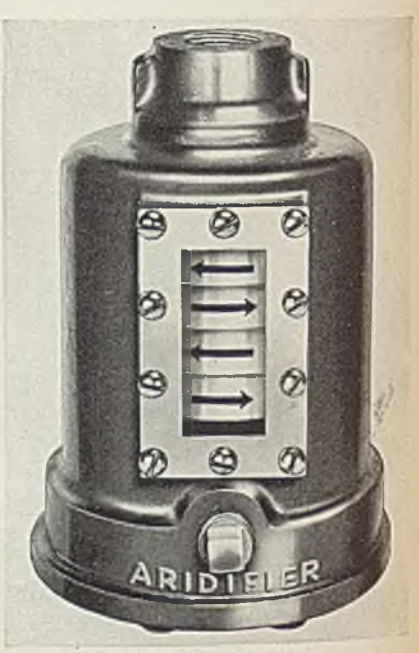
■ General Electric Co., Schenectady, N. Y., has introduced a new line of Tri-Clad splashproof, ball-bearing, polyphase induction motors in sizes from 1 to 15 horsepower to meet the needs of applications where splashing water and other liquids are present.

Outstanding features include sturdy cast-iron stator frame and end shields that resist rust and corrosion, Formex wire windings highly resistant to moisture, and protected ball bearings. Each motor has ventilated openings in its stator frame, and end-shields are baffled to block the entrance of splashing liquids. An arrangement of cast baffles within the side openings of the stator frame blocks splashing from the side.

The motor's winding has a covering coat of tough Glyptal No. 1201 Red. Ample space for making connections easily and quickly is afforded by the unit's liquid-tight cast-iron conduit box which is built into the frame of the motor.

Air Cleaner Employs "Tell-All" Unit

■ Logan Engineering Co., 4912 Lawrence avenue, Chicago, is now equipping its Aridifier air cleaner with a window to show what goes on inside the housing while in operation. The window is incorporated in the housing wall and enables the user



to see each rotor pick up speed as air is applied to the air line, to which the unit is installed. An arrow painted on the edge of each rotor indicates the direction of rotation and shows how each rotor quickly picks up speed. The cleaner will remove all condensed moisture, oil and fine scale from air and gas lines. It needs no attention other than periodic drawing off of accumulated water and dirt.

Meter Attachment For Surface Analyzer

■ Brush Development Co., 3333 Perkins avenue, Cleveland, has developed a new meter attachment which when used with its surface analyzer provides a visual indication of "RMS average height of irregularities" expressed in micro-inches. Its use permits the actual heights and depths of surface irregularities, as recorded on the analyzer chart, to be readily and accurately observed in terms of "RMS" values for the same trace.

The company also recently introduced its new calibration standards by which it is possible to check over all calibrations of the instrument and the wear on the tracer point.

Are You Rolling Shell Rounds?

You'll need **"Techni"**

PROCESS ALLOY STEEL ROLLS

"TECHNI" Process Alloy Steel Rolls have great strength, excellent finish, unusual wearing quality, resistance to slippage and are anti-fire cracking. These extra qualities you get with rolls are made possible by the "TECHNI" Process, an exclusive development of Mackintosh-Hemphill, which regulates the quality and grain size of the rolls with as much exactness as the best modern steel practice regulates the quality of steel. Make sure you get the best—order "TECHNI" Process Alloy Steel Rolls.

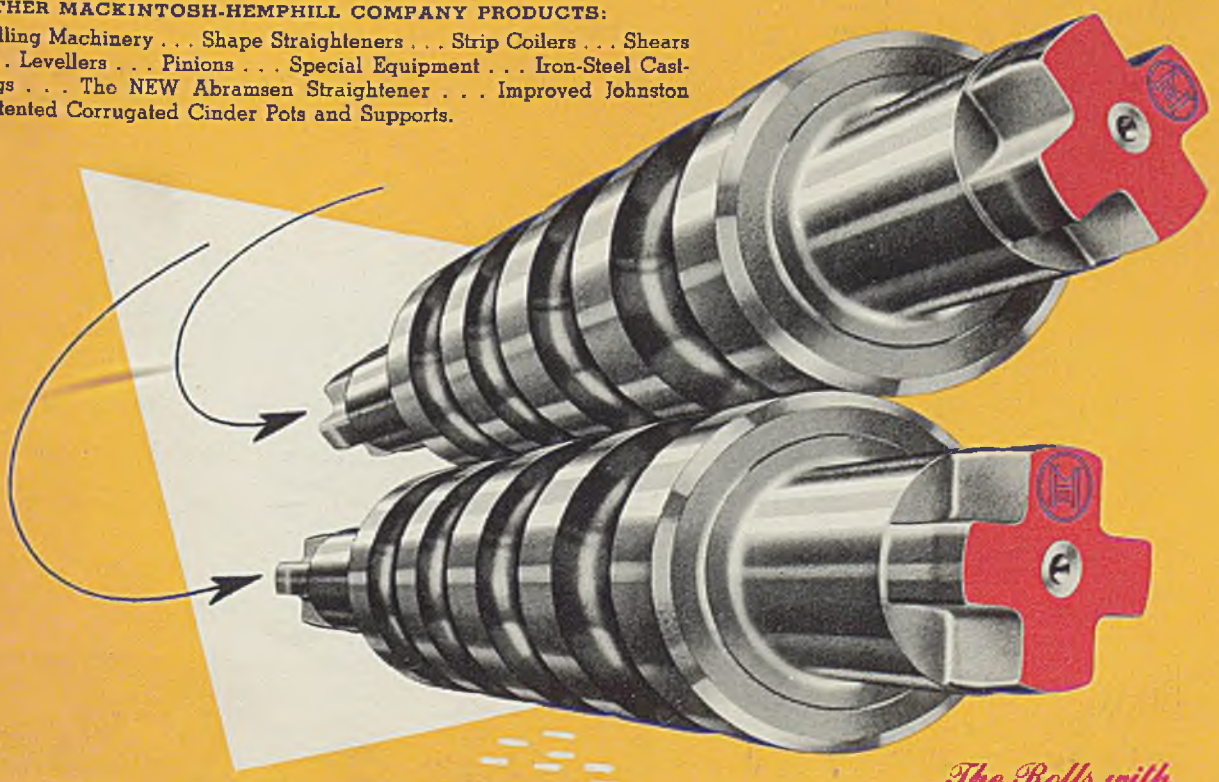
Since 1803—Pioneers, Engineers and Builders

MACKINTOSH-HEMPHILL COMPANY

PITTSBURGH AND MIDLAND, PA.

OTHER MACKINTOSH-HEMPHILL COMPANY PRODUCTS:

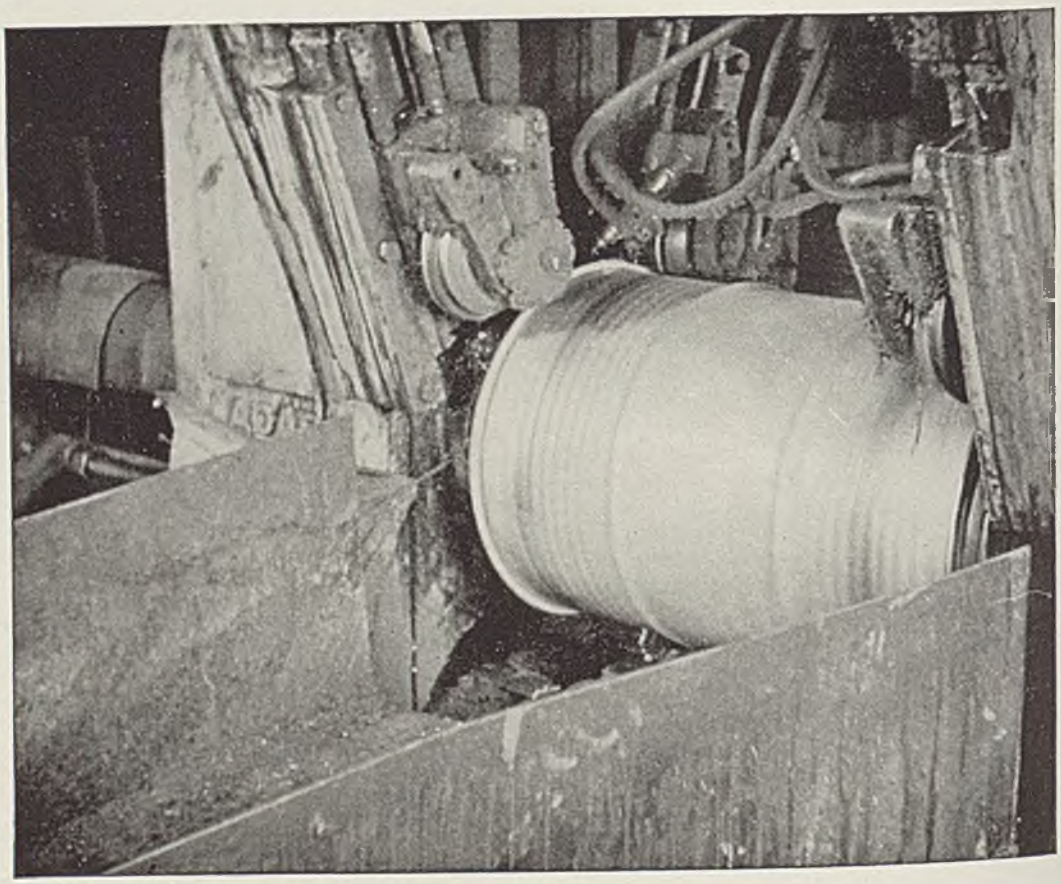
Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports.



The Rolls with the Red Wabblers

THEY ROLL MORE TONS PER ROLL-DRESSING

FASTER SURER WORK



with Bethlehem Steel Sheets

Production of all sheet articles is faster, surer work when you use Bethlehem Steel Sheets, because uniformity of all characteristics is rigidly controlled. Hot-Rolled or Cold-Reduced, you can rely on Bethlehem Sheets for the Constant quality that makes for smooth, swift, production, fewer rejects and better finished products.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Additional Regulations On Steel Placed Rapidly

All steel items now are on critical list. This may be leading to complete priorities. Big capacity gain agitated.

MARKET IN TABLOID ★

Demand

Orders at 125 per cent productive capacity.

Prices

Dissatisfaction with frozen levels is widespread.

Production

Up 2½ points to 97½.

■ STEP BY STEP developments are leading rapidly to imposition of complete priorities on steel which may soon relegate steel available for civilians to the vanishing point. Following the imposition of an inventory control plan announced a week ago all grades of iron and steel as well as all other metals in the so-called "precious" group have been added to the critical list of the Army and Navy Munitions Board. "Iron and steel products including rolled and drawn, forgings, castings and pig iron" are now placed on this critical list among many others from acetone to zinc plates.

Moreover Washington is revising rapidly its concept of needed steel capacity. As against present capacity of 83,000,000 tons yearly OPM recently talked in terms of 92,000,000 tons needed, with a further estimate of 110,000,000 to 120,000,000 tons yearly by next year to provide adequately defense, British needs and American civilians. These figures appear fantastic and their realization at this moment seems highly problematical, particularly since it takes much steel and skilled manpower to build up steel capacity.

Thus new blast furnaces needed would take larger tonnages of plates for their building. New ore vessels would have to be constructed, involving many more thousands of tons of plates. Structural steel for new mill buildings, sheet piling for new docks, steel for new machinery to operate the new mills, steel for more freight cars and ships to carry materials, reinforcing bars for more concrete construction, galvanized sheets for storage sheds—all would be involved and at the time when they are already painfully scarce.

By the end of this year the ordinary citizen may find procurement of goods involving steel most difficult, with a scarcity perhaps not to be compared with the first world war because of the more highly mechanized warfare of today.

Finished steel sales are being made at the rate of 125 per cent of production. Such excess percentage over production is due to some extent to continued anticipation of consumers' needs. However, present sales may not result in complete deliveries for civilian needs. It is being predicted, for instance, that automobile makers will be fortunate to get 50 per cent of their 1941 model tonnages, the government already having specified a 20 per cent curtailment in steel buying and auto manufacture.

At no time this year has the steel picture changed more rapidly than the present era. Now comes an estimate that up to 5,000,000 tons of steel will be needed by the railroads by the end of the year to build 100,000 more cars and necessary track. The commandeering of ships for transport of goods to Britain has disrupted hauls of steel and other basic commodities to the Pacific Coast by rail and water. Now all-rail hauls are indicated, with many cars returning empty, thus tying up more rolling stock.

Not in years has the steel industry felt more strongly on any matter than present frozen steel prices after recent substantial raises of wages. Many are convinced that some way a price advance on steel is bound to come in a few months, if not sooner. There are patent injustices, which Washington will probably be liberal in correcting, for small integrated companies. Thus one maker of especially wide plates finds outlets throughout the country because of this specialty, but would be compelled to absorb freight rates on long hauls under the present ruling.

Pig iron inventories at foundries average 30 to 40 days' consumption, except in silveries which are strictly hand-to-mouth. Coke supplies average two weeks, the paucity being due largely to the coal strike.

Scheduled automobile production for last week was 132,630 units, up 2020 for the week, comparing with 98,480 for the corresponding week of 1940.

Steel ingot production recovered 2½ points from the coal strike lag to 97½ per cent last week, a faster recovery than many had expected. Advances took place at the following centers: Chicago by 5½ points to 101½, Pittsburgh by 1 to 94, Youngstown by 6 to 95, Cleveland by 4 points to 96½. Declines were in two centers, New England by 5 points to 90 and Cincinnati by 1½ points to 89. The following were unchanged: Eastern Pennsylvania at 95, Buffalo at 90½, Birmingham at 90, St. Louis at 98, Detroit and Wheeling at 88.

STEEL's three composite price groups for last week were unchanged: iron and steel at $38.15, finished steel at $56.60 and steelworks scrap at $19.16.

COMPOSITE MARKET AVERAGES

	May 10	May 3	Apr. 26	One Month Ago April, 1941	Three Months Ago Feb., 1941	One Year Ago May, 1940	Five Years Ago May, 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.22	$37.33	$32.92
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	52.20
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.95	16.00	14.39

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

	May 10, 1941	April 1941	Feb. 1941	May 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.25
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	2.21	2.225	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	May 10, 1941	April 1941	Feb. 1941	May 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.17	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.20	$20.75	$18.00
Heavy melt. steel, No. 2, E. Pa.	17.75	18.00	18.50	16.00
Heavy melting steel, Chicago	18.75	18.80	19.25	17.25
Rails for rolling, Chicago	22.25	22.65	23.75	21.25
Railroad steel specialties, Chicago	23.75	23.75	23.55	20.25

Coke

Connellsville, furnace, ovens	$5.50	$5.50	$5.50	$4.75
Connellsville, foundry, ovens	6.00	6.00	6.00	5.75
Chicago, by-product fdry., del.	12.25	11.75	11.75	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorfed

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 303	No 304
Bars	24.00	26.00	25.00
Plates	27.00	29.00	29.00
Sheets	34.00	36.00	36.00
Hot strip	21.50	27.00	23.50
Cold strip	28.00	33.00	30.00

20% Ni.-Cr. Clad

Plates	18.00*
Sheets	19.00

**Annealed and pickled*

Straight Chromes

	No. 410	No. 416	No. 430	No. 442
Bars	18.50	19.00	19.00	22.50
Plates	21.50	22.00	22.00	25.50
Sheets	26.50	27.00	29.00	32.50
Hot strip	17.00	18.25	17.50	24.00
Cold stp.	22.00	23.50	22.50	32.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.43c-2.57c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Roofing Ternes

Pittsburgh base, package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Detroit, delivered	2.25c
Cleveland	2.15c

Buffalo	2.15c
Birmingham	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing

New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55
(Per Pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	59
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.70c
Detroit, delivered 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20

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

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham.	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68 off
Do., ⅝ and ¾ x 6-in. and shorter	66 off
Do., ⅞ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	66	70
⅝-1-inch	63	65
1⅛-1½-inch	61	62
1⅝ and larger	60	--

Hexagon Cap Screws

Upset 1-in., smaller 68 off

Square Head Set Screws

Upset, 1-in., smaller	74.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off	

Welded Iron, Steel, Pipe

Base discounts on steel pipe. Pitts., Lorain, 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	51
¾	66½	55
1—3	68½	57½
Iron		
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel		
2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½
Iron		
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe

Steel		
1 to 3, butt weld	67½	
2, lap weld	60	
2½ to 3, lap weld	63	
3½ to 6, lap weld	65	
7 and 8, lap weld	64	
Iron	Blk.	Galv.
¾ butt weld	25	4
1 and 1¼ butt weld	29	10
1½ butt weld	33	12½
2 butt weld	32½	13
1½ lap weld	23½	4
2 lap weld	25½	6
2½ to 3½ lap weld	26½	8½
4 lap weld	28½	12
4½ to 8 lap weld	27½	11
9 to 12 lap weld	23½	6

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cutlengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs
(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point Buffalo, Canton, Chicago.	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to 11/32-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch	$52.00
12-18-inch	54.00
18-inch and over	56.00

Coke

Price Per Net Ton
Beehive Ovens

Connellsville, fur.	$5.00- 5.75
Connellsville, fdry.	5.25- 6.00
Connell. prem. fdry.	6.00- 6.60
New River fdry.	6.50- 7.00
Wise county fdry.	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	12.60-13.05
Chicago, outside del.	11.50
Chicago, delivered	12.25
Terre Haute, del.	11.75
Milwaukee, ovens.	12.25
New England, del.	13.75
St. Louis, del.	12.25
Birmingham, ovens.	8.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del	12.05
Buffalo, del.	11.75
Detroit, del.	11.50
Philadelphia, del.	12.13

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	14.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	13.75c
Do. (1000 lbs. or over)	12.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$30.00

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.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	....	19.38	24.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	24.50
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	....	....	....
Sharpsville, Pa.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	....	24.50	....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	....	25.11	....
Boston from Birmingham†	25.12	....	....	....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	....	....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	....	....	....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	....
Cincinnati from Birmingham†	24.06	....	23.06	....
Cleveland from Birmingham†	24.12	....	23.62	....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	....	....
Newark, N. J., from Birmingham†	26.15	....	....	....
Newark, N. J., from Bethlehem	26.53	27.03	....	....
Philadelphia from Birmingham†	25.46	....	24.96	....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	....
St. Louis from Birmingham	†24.12	....	23.62	....
St. Paul from Duluth	26.63	26.63	....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	23.50	do., del. Chicago	30.34
		Lyles, Tenn., high phos.	28.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $29.50; 6.51-7—$30.00; 7-7.50—$30.50; 7.51-8—$31.00; 8-8.50—$31.50; 8.51-9—$32.00; 9-9.50—$32.50; 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	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c
less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. tl., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot ¼c lb. higher

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots $0.00c
Do., spot $5.00c

88% chrome, cont. tons 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00
35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Struc-tural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.75	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.54	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	6.90	....	....
Seattle	4.00	4.00	5.20	4.00	4.00	5.75	4.00	6.50	5.25	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.15	4.15	6.40	4.30	6.50	5.50	....	6.60	10.55	9.80
San Francisco	3.90	4.40	6.00	3.90	3.90	5.60	3.90	6.40	5.65	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	5.85	.	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.25	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 Portland; 300-9999 Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.75c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.29	1	11	4

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 2 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.15	1	15	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500 ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton, cif.	$43.00-46.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	....
So. African, 48%	68.00-70.00
Brazilian, 46%	63.00-65.00
Chilean, 47%	65.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

IRON AND STEEL SCRAP PRICES

Maximum Prices Announced by Office of Price Administration and Civilian Supply

	Pittsburgh, Wheeling, Steubenville	Youngstown, Canton, Sharon	Chicago, Kokomo, Peoria	S. Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.75	$18.25	$19.50	$19.25	$18.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.75	18.25	19.50	19.25	18.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.75	17.25	18.50	18.25	17.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.75	17.25	18.50	18.25	17.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.75	16.25	17.50	17.25	16.50
Mixed borings and turnings	15.25	15.25	14.00	13.50	14.00	13.50	14.75	14.50	13.75
Machine shop turnings	15.50	15.50	14.25	13.75	14.25	13.75	15.00	14.75	14.00
Shovel turnings	16.50	16.50	15.25	14.75	15.25	14.75	16.00	15.75	15.00
No. 1 busheling	19.50	19.50	18.25	17.75	18.25	17.75	19.00	18.75	18.00
No. 2 busheling	15.50	15.50	14.25	13.75	14.25	13.75	15.00	14.75	14.00
Cast iron borings	15.75	15.75	14.50	14.00	14.50	14.00	15.25	15.00	14.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.75	17.25	18.50	18.25	17.50
No. 1 cupola	21.00	21.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00
Heavy breakable cast	19.50	19.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50
Stove plate	19.00	.....	16.00	18.00	18.50	18.00	15.75	19.00	13.00
Low phos. billet, bloom crops	25.00	25.00	23.75	23.25	23.25	23.25	24.50	24.25	23.50
Low phos. bar crops and smaller	23.00	23.00	21.75	21.25	21.75	21.25	22.50	22.25	21.50
Low phos. punch., plate scrap	23.00	23.00	21.75	21.25	21.75	21.25	22.50	22.25	21.50
No. 2 cupola	20.00	20.00	19.00	21.50	22.00	21.50	21.00	19.00	20.00
Machinery cast cupola size	22.00	22.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Clean auto cast	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Punchings and plate scrap††	22.00	22.00	20.75	20.25	20.75	20.25	21.50	21.25	20.50
Punchings and plate scrap§§	21.00	21.00	19.75	19.25	19.75	19.25	20.50	20.25	19.50
Heavy axle and forge turnings	19.50	19.50	18.25	17.75	18.25	17.75	19.00	18.75	18.00
Medium heavy elec. furnace turnings	18.00	18.00	16.75	16.25	16.75	16.25	17.50	17.25	16.50

	St. Louis	Kansas City	Detroit	Duluth	Birmingham¶	Chattanooga	Radford, Va.	New England‡	Pacific Coast§
No. 1 heavy melting	$17.50	$16.00	$17.85	$18.00	$17.00	$.....	$.....	$15.50	$14.50
No. 1 hyd. comp. black sheets	17.50	16.00	17.85	18.00	17.00	.....	.....	15.50	14.50
No. 2 heavy melting	16.50	15.00	16.85	17.00	16.00	.....	.....	14.50	13.50
Dealer No. 1 bundles	16.50	15.00	16.85	17.00	16.00	.....	.....	14.50	13.50
Dealer No. 2 bundles	15.50	14.00	15.85	16.00	15.00	.....	.....	13.50	12.50
Mixed borings and turnings	12.75	11.25	13.10	13.25	12.25	.....	.....	10.75	9.75
Machine shop turnings	13.00	11.50	13.35	13.50	12.50	.....	.....	11.00	10.00
Shoveling turnings	14.00	12.50	14.35	14.50	13.50	.....	.....	12.00	11.00
No. 1 busheling	17.00	15.50	17.35	17.50	16.50	.....	.....	15.00	14.00
No. 2 busheling	13.00	11.50	13.35	13.50	12.50	.....	.....	11.00	10.00
Cast iron borings	13.25	11.75	13.50	13.75	12.75	.....	.....	11.25	10.25
Uncut structurals and plate	16.50	15.00	16.25	17.00	16.00	.....	.....	14.50	13.50
No. 1 cupola	20.00	15.00	19.00	21.00	17.75	20.00	21.00	22.00	18.00
Heavy breakable cast	18.50	13.50	17.50	19.50	16.25	.....	.....	20.50	17.00
Stove plate	14.50	12.50	12.75	.	12.00	.....	.....	14.00	14.00
Low phos. billet and bloom crops	22.50	21.00	22.85	23.00	22.00	.....	.....	20.50	.....
Low phos. bar crops and smaller	20.50	19.00	20.85	21.00	20.00	.....	.....	18.50	.....
Low phos. punch. and plate scrap**	20.50	19.00	20.85	21.00	20.00	.....	.....	18.50	.....
No. 2 cupola	19.00	14.00	18.00	20.00	16.75	19.00	20.00	21.00	17.00
Machinery cast cupola size††	21.00	16.00	20.00	22.00	18.75	21.00	22.00	23.00	19.00
No. 1 machine cast, drop broken, 150 pounds and under	21.50	16.50	20.50	22.50	19.25	21.50	22.50	23.50	19.50
Clean auto cast	21.50	16.50	20.50	22.50	19.75	21.50	22.50	23.50	19.50
Punchings and plate scrap††	19.50	18.00	19.85	20.00	19.00	.....	.....	17.50	-
Punchings and plate scrap§§	18.50	17.00	18.85	19.00	18.00	.....	.....	16.50	-
Heavy axle and forge turnings	17.00	15.50	17.35	17.50	16.50	.....	.....	15.00	14.00
Medium heavy elec. furnace turnings	15.50	14.00	15.85	16.00	15.00	.....	.....	13.50	12.50

*Claymont, Del., Coatesville, Phoenixville, Harrisburg, Pa. †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Portland, Oreg., Seattle; ¶Prices are for scrap delivered to the Birmingham, Ala., consuming point, excepting scrap for Birmingham consumption originating west of the western boundary of Alabama. In the latter case the Birmingham, Ala., consumer may pay $1 more than the prices indicated under "Birmingham"; **¾-inch and heavier, cut 12 inches and under; ††may include clean agricultural cast; ‡‡under ¾-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under.

Maximum Prices for Iron and Steel Scrap Originating from Railroads

	Pittsburgh, Wheeling, Steubenville	Youngstown, Canton, Sharon	Chicago, Kokomo, Peoria	S. Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 Railroad grade heavy melting steel	$21.00	$21.00	$19.75	$.....	$19.75	$19.75	$20.50	$20.25	$19.50
Scrap rails	22.00	22.00	20.75	.....	20.75	20.75	21.50	21.25	20.50
Rerolling quality rails	23.50	23.50	22.25	.....	22.25	22.25	23.00	22.75	22.00
Scrap rails 3 feet and under	24.00	24.00	22.75	.....	22.75	22.75	23.50	23.25	22.50
Scrap rails 2 feet and under	24.25	24.25	23.00	.....	23.00	23.00	23.75	23.50	22.75
Scrap rails 18 inches and under	24.50	24.75	23.50	.....	23.50	23.50	24.25	24.00	23.25

	St. Louis	Kansas City	Detroit	Duluth	Birmingham	Chattanooga	Radford, Va.	New England‡	Pacific Coast§
No. 1 Railroad grade heavy melting steel	$18.50	$17.00	$18.85	$19.00	$18.00	$.....	$.....	$16.50	$15.50
Scrap rails	19.50	18.00	19.85	20.00	19.00	.....	.....	17.50	16.50
Rerolling quality rails	21.00	19.50	21.35	21.50	20.50	.....	.....	19.00	18.00
Scrap rails 3 feet and under	21.50	20.00	21.85	22.00	21.00	.....	.....	19.50	18.50
Scrap rails 2 feet and under	21.75	20.25	22.10	22.25	21.25	.....	.....	19.75	18.75
Scrap rails 18 inches and under	22.25	20.50	22.60	22.75	21.75	.....	.....	20.25	19.25

*Philadelphia, Wilmington, Del. †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Portland, Oreg., Seattle.

NOTE: Where the railroad maker of scrap operates in two or more of the consuming points named above, the highest of the maximum prices set out above for such consuming points shall be the maximum price at consumer's plant at any point on the railroad's line, except: Where a railroad from which scrap originates operates in two or more consuming points having different switching charges, the price of such railroad scrap: (1) To a consumer located within a consuming point having the highest switching charge, shall not exceed the maximum on-the-line price established above; (2) To a consumer located within a consuming point not having the highest switching charge, shall not exceed the maximum on-the-line price established above less the difference between the switching charges at that consuming point and at the consuming point having the highest switching charges; (3) To a consumer located on the line of the railroad at a point having no switching charges, shall not exceed the maximum on-the-line price established above less the highest switching charge at any consuming point on the line; and (4) To a consumer located off the line of the railroad, shall not exceed the maximum off-the-line price established below less the highest switching charge at any consuming point on the line.

Scrap

Scrap Prices, Page 116

Announcement Wednesday of revised maximum prices on scrap and new regulations, by Leon Henderson, administrator of the Office of Price Administration and Civilian Supply, gives a better understanding of the situation. Changes are largely the result of conference with scrap interests and clarify many points on which the original price announcement did not touch. Details of the new regulations will be found on page 35 of this issue.

While the announcement is regarded as helpful in understanding the aims of the government it has resulted in a further pause in trading until the regulations can be digested and fully understood. One feature of much importance is a formula for allowances to remove restriction on shipments to centers where freight rates are adverse. Another is setting of prices on railroad scrap and the method of its distribution.

First reactions to the new schedule are mixed, some interests regarding it as a long step in clarifying the situation and others finding fault with many details. In the New York district a drop of 50 cents per ton has occurred in prices based on eastern Pennsylvania delivery, with indications of a reduction up to $1 per ton on scrap grades. Dealers in the Birmingham, Ala., district believe the differentials between Chattanooga, Tenn., Radford, Va., and Birmingham are not equitable.

Dealers have been concentrating on shipments of higher priced contracts, the deadline on which was May 10. In spite of efforts part of this tonnage will remain unfilled. Meanwhile scrap is coming out in rather limited volume and this is expected to decline further with expiration of the more remunerative prices.

Some buying at established prices has been done, especially by steel mills, in advance of the deadline for delivery of previous purchases, as stocks have been somewhat depleted during the past few weeks. Foundries are taking all the cast scrap they can obtain and while sunplies have been meager no actual shutdowns have been noted.

The new announcement covers export prices as well as domestic. Maximum prices, including scrap of railroad origin, f.a.s. at all Atlantic ports, are to be the price at domestic consuming point nearest place of export, less transportation cost to ports, plus a uniform charge of $1 per ton. At Gulf of Mexico ports the maximum price for No. 1 heavy melting steel shall be $15 per gross ton f.a.s. point of export, plus $1 per ton. Other grades will take differentials in domestic prices, from a base of $15, plus $1 per ton.

Tin Plate

Tin Plate Prices, Page 112

Buying continues heavy, building up backlogs. Production is high and inventories continue to in-

crease, the current rate of 85 per cent production being higher than consumption.

Canners are beginning to report increases, however, with early packing seasons getting under way. It is probable the inventory figures will begin to recede within the next 30 days as major canning work begins on fruits and vegetables. General line can demand continues undiminished, and miscellaneous business is better, particularly where tin plate is being used as a substitute for aluminum and other metals.

Tin plate for export to British Empire consumers is taking an increasing share of American production. Emphasis has shifted from tin bars to finished plate, to save shipping space for munitions. Instead of furnishing semifinished steel to Welsh tin mills, to be rolled into plate and reshipped to Empire points, American mills are now finishing the plate and shipping direct.

Sheets, Strip

Sheet & Strip Prices, Pages 112, 113

Sheet and strip demand continues to expand, with deliveries extended well into 1942, and consumers are seeking to cover further ahead. National defense specifications steadily interrupt schedules and push nondefense production further back.

Delivery promises on hot and cold-rolled and galvanized sheets have been extended from first half, 1942, to last half. Wide strip delivery has moved from 7-8 months to 8-9 months. Only occasionally is there opportunity to give earlier rolling when an opportunity appears in a mill schedule.

Demand for galvanized sheets for army housing is increasing but shortage of spelter is restricting production, operations now being below the 75 per cent level maintained in recent weeks.

A current inquiry for 2000 to 3000 tons of hot-rolled and pickled galvanized sheets for Panama has been modified to allow painting or enameling in view of the impossibility to obtain galvanized. It has been suggested that painted sheets are better for defense construction as it is less visible from the air than galvanized.

Straight chromium grades of stainless steel sheets are not obtainable until late third quarter, with wide material somewhat tighter than narrow. Priorities on chromium-nickel sheets have diverted sufficient demand to straight chromium grades to cause generally inadequate supply for all types of stainless material for other than extended delivery.

Some difficulty is being experienced by sheet producers in obtaining sufficient semifinished material to meet rolling capacity.

While reduction in automotive output will reduce demand for sheets, it is not believed this will be sufficient to relieve pressure materially and some sheetmakers believe it will be necessary to curtail automobile production even further.

Cotton tie demand in the South has added to production of strip, seasonal demand being heavy.

Cold strip bookings are off slightly, the result largely of producers turning down more tonnage. An eastern buyer is having trouble placing 1000 tons of strip for cable wrapping. Sellers believe they ultimately will be forced to take any direct defense tonnage and most mills now are giving regular customers preference on defense needs. Hot strip mills generally are sold through the year and some are not accepting further tonnage.

Plates

Plate Prices, Page 112

Plate mill books are heavily loaded for six to seven months, with an increasingly large share destined for shipbuilding, especially in the eastern section. Consumption for other than defense uses is further restricted and this is expected to become more pronounced as additional construction is developed. At present deliveries are not promised before the end of the year, always subject to deferment as further defense orders are received. Numerous inquiries for domestic and foreign shipment are being turned down. Consumers normally buying all their requirements from mills are seeking material from warehouses but the latter have scant supplies in relation to demand.

Requirements for ship plates

have caused OPM to seek additional tonnage from mills in the Middle West as seaboard suppliers have filled their books far ahead. Great Lakes Steel Corp., Detroit, is undertaking a $3,500,000 extension of its wide sheet mill to allow rolling of plates up to about 1-inch thickness.

Railroad car builders find difficulty in obtaining delivery of plates and other steel to meet their programs now under way or projected. No priority for car steel has been granted and ship steel has been given right of way, with the result some car builders have been forced to limit operations and may be forced to close until shipments are resumed. With estimates of 100,000 cars required this year, steel requirements are expected to reach 3,000,000 to 5,000,000 tons.

PLATE CONTRACTS PLACED

320 tons, 80,000-barrel tank, White Fuel Co., South Boston, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, tank, Fall River Gas Co., Fall River, Mass., to Chicago Bridge & Iron Co., Chicago.

110 tons, tank, Atlantic Terminals Corp., Newington, N. H., to Chicago Bridge & Iron Co., Chicago.

Unstated tonnage, tank, American Optical Co., Southbridge, Mass., to Chicago Bridge & Iron Co., Chicago.

PLATE CONTRACTS PENDING

22,800 tons, 24 emergency vessels, United States Maritime Commission, no sub award yet placed by contractors, Richmond Shipbuilding Corp., Richmond, Calif.

22,800 tons, 24 emergency vessels, United States Maritime Commission, no sub award yet placed by contractors, California Shipbuilding Corp., Los Angeles.

11,400 tons, 12 emergency vessels for United States Maritime Commission; no sub award yet placed by contractors, Oregon Shipbuilding Corp., Portland, Ore.

408 tons, including 208 tons for pontoon and 200 tons for dredge pipe, Wake Island; bids in.

400 tons, pressure vessels for Union Oil Co., San Francisco; bids opened.

325 tons, 1,000,000-gallon standpipe, navy yard, Portsmouth, N. H.

298 tons, 82,000-barrel tank, Hawaiian Electric Co., Hawaii, T. H.; bids in.

Bars

Bar Prices, Page 112

Although sold out for the year on many sizes, bar mills are able to meet delivery promises on a large majority of current shipments and consumer requirements generally are being met fully. Buyers are becoming more accustomed to the necessity for forward coverage but mills prefer not to book beyond the year end. Some difficulty is encountered occasionally from shortage of billet supplies to meet the unusually heavy rate of operation. Numerous bar mills are being operated three shifts.

As in other steel products, schedules are continually disarranged by reception of priority orders requiring rearrangement of rolling. Defense demand is on the increase

and other orders are being set back.

Orders for shell components have taken an upward spurt, with heavier tonnage in prospect. Close to 4,500,000 tons of shell steel will be required for a program now getting under way. Ship requirements are expanding and the machine tool industry is pressing strongly for shipments. Consumers without high preference ratings are having considerable difficulty in getting tonnage. Producers have so much pressing defense work on books for early shipment that they are unable to accept considerable other tonnage of this character. Government specifications are so exacting that considerable rejections are being met.

Pipe

Pipe Prices, Page 113

Demand for standard steel pipe is heavy and requirements of government-financed defense plants demand spot shipments in nearly every case, requiring initial shipments from stock and mill shipments following immediately. Some recent purchases were for three-day delivery. It is impossible to build stocks at mill or warehouse. Line pipe is in strong demand and delivery is behind production. Large pipe output is hampered by shortage of steel plates.

Users of cold-drawn seamless mechanical tubing are substituting hot-rolled seamless, because of difficulty of obtaining supplies. Priority demand has absorbed the supply indefinitely. Delivery on hot-rolled is working up from about 12 weeks at present.

Producers of cold-drawn mechanical tubing are considering each inquiry on the basis of its importance to defense work. However, even if the inquiry has a high preference rating it stands little chance of being accepted for delivery in the near future, as there is terrific pressure for the heavy tonnages on order for various rearmament preparations. Deliveries on boiler tubing are not so extended. Much of this tonnage is scheduled for ship work and is not needed immediately. Consequently other requirements can be worked in without too much delay. However, with the ship program expanding greatly, congestion appears inevitable.

CAST PIPE PLACED

1000 tons, 4 to 12-inch, hydrants and gates, Spokane, Wash. to Hughes & Co., Spokane, for Pacific States Cast Iron Pipe Co., Provo, Utah; service and valve boxes and accessories to Crane Co. and Olympic Foundry Co., Seattle.

950 tons, 4 to 12-inch, Spokane, Wash., to Pacific States Iron Pipe Co., Provo, Utah.

700 tons, various sizes, airport, Windsor Locks, Conn., to Warren Pipe Co., Everett, Mass.

500 tons, various sizes, military airport, Phoenix, Ariz., to United States Pipe & Foundry Co., Burlington, N. J.

302 tons, 6 to 12-inch, Pasadena, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

300 tons, 2 to 12-inch, Shelton, Wash., to United States Pipe & Foundry Co., Burlington, N. J.

236 tons, 6 to 10-inch, Class 250, Burbank, Calif., to National Cast Iron Pipe Co., Birmingham, Ala.

CAST PIPE PENDING

209 tons, ordnance work at Hermiston, Oreg.; bids being taken by contractors, J. A. Tertling & Sons.

Semifinished Steel

Semfinished Prices, Page 113

Difficulty in obtaining cargo space for additional steel shipments to Great Britain is being reflected in efforts to convert semifinished steel into finished products in this country. In large measure finished products go to empire destinations and conversion here takes some load off British mills and saves ocean transportation. This plan is being applied to tin plate and may be widened to include wire products, bars and small shapes, which will lighten shipments of semi-finished to Great Britain and re-shipment of finished products to empire consumers.

Wire

Wire Prices, Page 113

Wire and wire products are in heavy demand and cold-finished strip produced in wire mills is in especially tight situation, due to demand for cartridge clips. Heavy tonnages of industrial protective fencing is noted, for use at plants producing munitions. Shortage of

zinc causes some delay in finishing this material, which must be weather protected.

There are scattered instances of curtailment of production in some finishing departments, due to lack of rods, although no serious delays are apparent. Forward orders are offered in unabated volume and more consumers are seeking place on books for first quarter. Most producers, however, are not booking that far in advance. More defense orders are appearing, increasingly upsetting regular production schedules.

Rails, Cars

Track Material Prices, Page 113

Domestic freight car orders in April involved 10,052 units and brought the total for the first four months to 38,803.

Buying during the first four months was at a rate in excess of 117,000 cars annually. Should this rate be maintained, 1941 would witness the heaviest buying in many years and the general trade expectation is that this rate not only will be maintained but even substantially exceeded, in view of large requirements now being discussed in Washington in connection with the defense program.

Last month's total of 10,052 was the second largest monthly figure this year, being surpassed only by 15,169 cars awarded during January. Further comparisons follow:

	1941	1940	1939	1938
Jan.....	15,169	360	3	25
Feb.....	5,508	1,147	2,259	109
March...	8,074	3,104	800	680
April....	10,052	2,077	3,095	15
4 mos....	38,803	6,688	6,157	929
May.....	.....	2,010	2,051	6,014
June	.....	7,475	1,324	1,178
July.....	.....	5,846	110	0
Aug.....	.....	7,525	2,814	182
Sept.....	.....	9,735	23,000	1,750
Oct.....	.....	12,195	19,634	2,537
Nov.....	.....	8,234	2,650	1,232
Dec.....	.....	7,181	35	2,581
Total ..	.....	66,889	57,775	16,303

LOCOMOTIVES PLACED

Canton, one 600-horsepower diesel-electric switch engine, to Electro-Motive Corp., La Grange, Ill.

Navy, one 50-ton diesel-electric locomotive, to Atlas Car & Mfg. Co., Cleveland.

Newfoundland Railway, one 2-8-2 type locomotive, to Montreal Locomotive Works Ltd., Montreal.

Philadelphia, Bethlehem & New England, two 600-horsepower diesel-electric switch engines, to Electro-Motive Corp., La Grange, Ill.

South Buffalo, three 1000-horsepower diesel-electric switch engines to American Locomotive Co., New York.

Texas Pacific-Missouri Pacific Terminal, New Orleans, one 660-horsepower diesel switcher, to American Locomotive Co., New York.

Wabash, one 660-horsepower diesel switcher, to American Locomotive Co., New York.

CAR ORDERS PLACED

American Gas & Electric Co., six 100-ton well cars, to American Car & Foundry Co., New York.

Chicago & North Western, 500 fifty-ton steel sheathed box cars, to American Car & Foundry Co., New York.

Chicago Rock Island & Pacific, 1000 fifty-ton box cars to Pressed Steel Car Co., Pittsburgh.

Chicago, Rock Island & Pacific, nine streamlined stainless steel coaches, including two diners, to Edward G. Budd Mfg. Co., Philadelphia.

Inland Mine & Stone Co., six air dump cars, to Pressed Steel Car Co., Pittsburgh.

New York Central, 14 hundred-ton transformer cars, to Despatch Shops Inc., East Rochester, N. Y., a subsidiary.

Republic Steel Corp., two air dump cars, to Pressed Steel Car Co., Pittsburgh.

Sanderson & Porter Co., 50 box cars, to General American Transportation Co., Chicago.

Tennessee Coal, Iron & Railroad Co., five air dump cars, to Pressed Steel Car Co., Pittsburgh.

Union Pacific, 100 caboose cars to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.

United States government, 50 thirty-ton, 6000-gallon tank cars and 50 thirty-ton flat cars, to American Car & Foundry Co., New York.

Utah Copper Co., 75 100-ton ore cars to Pressed Steel Car Co., Pittsburgh.

CAR ORDERS PENDING

Atchison, Topeka & Santa Fe, 100 cabooses; bids asked.

Carnegie-Illinois Steel Corp., thirty 125-ton ingot cars, pending.

Chicago, St. Paul, Minneapolis & Omaha, 500 box cars, pending.

Missouri Pacific, 1050 cars, including 800 fifty-ton box cars, 50 seventy-ton cov-

cred hoppers, 200 fifty-ton automobile cars; court permission granted.

Norfolk & Western, 25 seventy-ton steel gondolas, bids asked.

BUSES BOOKED

San Diego Electric Railway Co., San Diego, Calif., 11 motor coaches, to a.c.f. Motors Co., New York.

Structural Shapes

Structural Shape Prices, Page 112

Leading fabricators estimate that 80 per cent of current contracts are for defense. One large fabricator notes that 40 per cent of bids result in contracts for him. Promised deliveries are slipping behind the average five months' span which prevailed near the end of April. However, an easier delivery situation is noted on plain structurals in some centers. Thus Philadelphia reports that some standard sections are available for August delivery, an improvement. A Cleveland distributor of a wide variety of steel notes that alloy steel and structurals are relatively plentiful in his stocks.

In many sections fabricators complain of being compelled to buy some sizes and shapes of plain material from warehouses, thus increasing costs. Large tonnages of structurals will be required in railroad car building, the desire being for 100,000 more freight cars by the end of the year. More railroad facilities are needed because of commandeering of ships for transport of goods to Britain.

Decline of inquiry and sales is considered a breathing spell. One of the largest awards has been 26,000 tons for an aircraft assembly plant at Tulsa, Okla., divided between the American Bridge and Virginia Bridge companies.

SHAPE CONTRACTS PLACED

4200 tons, mill building, Chase Brass and Copper Co., Euclid district, Cleveland, to American Bridge Co., Pittsburgh through Stone & Webster Engineering Corp., Boston.

3000 tons, tremie trusses, naval graving dock, Bayonne, N. J., to Bethlehem Steel Co., Bethlehem, Pa., through Bayonne Associates Inc., contractor.

2872 tons, transit shed, naval air station, San Diego, Calif., to National Iron Works, San Diego, Calif.

2000 tons, buildings, Western Cartridge Co., East Alton, Ill.; 1400 tons to Joseph T. Ryerson & Son Inc., Chicago, 600 tons to Superior Structural Steel Co., St. Louis; United Engineers & Constructors Inc., Philadelphia, contractor.

1300 tons, Goodyear Rubber Co. bagging plant, Charlestown, Ind., to International Steel Co., Evansville, Ind.

1475 tons, bridge-viaduct, Berry's Creek and Erie railroad, route S-3, sect. 1, Rutherford, N. J., to American Bridge Co., Pittsburgh, through Fehlhabor Pile Co., New York, contractor.

1200 tons, core building, St. Louis ordnance plant, St. Louis, to Mississippi Valley Structural Steel Co., Decatur, Ill.; Fruin-Colman-Massman Co., St. Louis, contractor.

1100 tons, power plant, Standard Oil Co. of Indiana, Wood River, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

1100 tons, H-piling, Hamilton county, Ohio, bridge project, to Carnegie-Illinois Steel Corp., Pittsburgh.

950 tons, service building, Philadelphia navy yard drydocks, to Bethlehem Steel Co., Bethlehem, Pa.

900 tons, partial requirements, powder plant, Sandusky, O., to Waghorne-Brown Co., Boston, Bethlehem Fabricators Inc., Bethlehem, Pa., to fabricate; E. B. Badger & Sons Co., Boston, contractor.

773 tons, steel piling, state highway bridge, Salt river, Jefferson county, Kentucky, to Bethlehem Steel Co., Bethlehem, Pa.; Ryan Construction Co., Evansville, Ind., contractor.

650 tons, state highway bridge, Troy, Mont., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

600 tons, handling facilities, Mare Island navy yard, Calif., to Herrick Iron Works, Oakland, Calif.

600 tons, plate shop, Richmond Shipbuilding Corp., Richmond, Calif., to Bethlehem Steel Co., San Francisco.

500 tons, 100 freight cars, Pacific Fruit

SHAPE AWARDS COMPARED

	Tons
Week ended May 10	29,710
Week ended May 3	49,393
Week ended April 26	15,490
This week, 1940	32,341
Weekly average, 1941	33,712
Weekly average, 1940	28,414
Weekly average, April, 1941	28,441
Total to date, 1940	332,056
Total to date, 1941	640,536

Includes awards of 100 tons or more.

Express Co., San Francisco, to Western Pipe & Steel Co., San Francisco.

490 tons, grade elimination, Erie railroad, RC-41-3, Chautauqua county, New York, to American Bridge Co., Pittsburgh, through Boyer Construction Co., contractor.

475 tons, state highway bridge 5907, Little Falls, Minn., to Minneapolis-Moline Power Implement Co., Minneapolis.

450 tons, state bridges, Troy and Effingham, N. H., to American Bridge Co., Pittsburgh.

400 tons, telephone building, Trenton, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

400 tons, foundry addition, Joshua Hendy Iron Works, MacDonald & Kahn Inc., San Francisco, for erection at Sunnyvale, Calif., to Judson-Pacific Co., San Francisco.

350 tons, building, New Bedford Gas & Electric Co., New Bedford, Mass., to Belmont Iron Works, Philadelphia.

310 tons, airplane parts plant, Bedford, O., Jack & Heintz Inc., to Bethlehem Steel Co., Bethlehem, Pa.

300 tons, plant addition, Armstrong Cork Co., Millville, Pa., to Bethlehem Fabricators Inc., Bethlehem, Pa.

280 tons, coal handling structure, Commonwealth Edison Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; bids April 15.

270 tons, buildings, government airport, Middletown, Pa., to American Bridge Co., Pittsburgh.

270 tons, assembly shop, Richmond Shipbuilding Corp., Richmond, Calif., to Washington Iron Works, Seattle, Wash.

265 tons, temporary air corps, warehouses, units 6, 7 and 8, Middletown, Pa., to American Bridge Co., Pittsburgh.

250 tons, eight ordnance buildings, Pine Camp, N. Y., to Butler Manufacturing Co., Kansas City, Mo., through John W. Cowper Co. Inc., Buffalo.

250 tons, state bridge, Effingham-Freedom, N. H., to American Bridge Co., Pittsburgh.

220 tons, factory addition, Fitzgibbons Boiler Co., Oswego, N. Y., to American Bridge Co., Pittsburgh.

215 tons, bridges, 188.63, 324.06, 365.14, Oregon, for Union Pacific railroad, to American Bridge Co., Pittsburgh.

175 tons, pedestrian bridges, navy yard, Brooklyn, N. Y., to American Bridge Co., Pittsburgh.

165 tons, state bridge, route 3, section 359-SF, South Holland, Ill., to American Bridge Co., Pittsburgh.

160 tons, building, Acme Rubber Co., Trenton, N. J., to Bethlehem Fabricators Inc., Bethlehem, Pa.

160 tons, power plant, Syracuse, N. Y., to Leach Steel Corp., Rochester, N. Y.; United Engineers and Contractors, Philadelphia, contractors.

150 tons, radio shop building, Puget Sound navy yard, to Isaacson Iron Works, Seattle; Henrik Valle, Seattle, contractor.

140 tons, torpedo storage buildings, Hawthorne, Nev., for government, to American Bridge Co., Pittsburgh.

125 tons, bridge, route 169, Monroe county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, Ohio Bell Telephone Co., Garfield-Cedar exchange, Cleveland, to Fort Pitt Bridge Works, Pittsburgh.

110 tons, turntable, Southern Pacific Co., San Francisco, to American Bridge Co., Pittsburgh.

SHAPE CONTRACTS PENDING

5000 tons, shell loading line, Kingsbury ordnance plant, Laporte, Ind., for government; Bates & Rogers Construction Corp., Laporte, Ind., contractor.

3000 tons, additional plant unit, General Electric Co., Pittsfield, Mass.; Stone & Webster Engineering Corp., Boston, contractor.

1600 tons, two warehouses, Jeffersonville, Ind., for government.

1000 tons, additional ways, ship yard, South Portland, Me.; taking bids.

930 tons, lift bridge, Southern Pacific Co., Lathrop, Calif.; bids in.

850 tons, steam plant addition, Rochester Gas & Electric Co., Rochester, N. Y.

650 tons, service building, Philadelphia, for navy.

600 tons, plant additions, du Pont Co., Richmond, Va.

500 tons, magnesium plant, Permanente Corp., Cupertine, Calif.; bids soon.

500 tons, extension, California Wire Cloth Co., Oakland, Calif.; bids soon.

500 tons, telephone building, Randolph central office, San Francisco; bids May 12.

450 tons, state bridge, route 59-A, Lake Forest, Ill.

450 tons, store, Philadelphia Savings Fund, Philadelphia.

400 tons, H columns, DeHaro housing project, San Francisco; bids soon.

350 tons, underpass, bridge 5777, Duluth, Minn., for state.

300 tons, bridge and gate house, navy yard, Portsmouth, N. H.; bids May 14.

275 tons, arch bridge, Portsmouth, N. H., for bureau of yards and docks.

255 tons, office and garage, Braun Baking Co., Pittsburgh.

215 tons, building, Philadelphia Savings

Fund society, Philadelphia.

200 tons, bridges, Vineland and Avondale, Colo., for state.

190 tons, store F. W. Woolworth Co., Covington, Ky.

180 tons, bridge repairs, various locations, Chicago, Milwaukee, St. Paul & Pacific railroad.

175 tons, floating caisson, hydro plant, Watts Bar dam, Tennessee, for Tennessee Valley authority.

165 tons, engine room extensions, central power plant, Philadelphia, for navy.

155 tons, state bridge 209-C (5), Gillette, Wyo.

150 tons, DuPont Country Club, Wilmington, Del.

150 tons, eight additional warehouses, Hill Field, Utah; N. P. Severin Co., Chicago, contractor.

140 tons, plant additions, Eastern Machinery Co., Cincinnati.

125 tons, state bridge, FAP-103-E (1), Placerville, Colo.

120 tons, overpass, FAGM-48-A (1), Denver, Colo., for state.

115 tons, state bridge, Garland, Utah.

110 tons, beam bridges, Halifax, Va., for state.

108 tons, bridge, Utah county, Utah, for state; bids opened.

105 tons, manufacturing building, Chandler-Evans Co., Meriden, Conn.

103 tons, bridge, San Miguel county, Colo., for state; bids opened.

102 tons, bridge, Denver county, Colo., for state; bids opened.

Reinforcing Bars

Reinforcing Bar Prices, Page 113

Continued placing of defense orders continues to upset scheduled deliveries of bars. Belated bar deliveries have delayed many building and engineering projects. Paradoxically, there is still some price cutting in jobber markets In some cases this approaches the ludicrous, where the distributor is fighting valiantly for an increase in tonnage allotted to him by mills so he can fill cut-price contracts. Mill protection on lower-priced contracts is out of the question in most cases, so the loss is borne directly by the distributor. Deliveries on nondefense jobs, where the buyer can find mills willing to accept, run 12 weeks or more.

REINFORCING STEEL AWARDS

1000 tons, Plum Brook ordnance plant, Sandusky, O., to Truscon Steel Co., Youngstown, O.; E. B. Badger & Sons, contractors.

800 tons, housing project, Bridgeport, Conn., to Truscon Steel Co., Youngstown, O., through Wilcox Construction Co., New York.

800 tons, grade elimination (CH-41-1), Astoria, N. Y., to Joseph T. Ryerson & Son Inc., Chicago; J. Leopold & Son, contractors.

500 tons, delivery building, Hochschild & Kohn Co., Baltimore, to Bethlehem Steel Co., Bethlehem, Pa.; Morrow Brothers, contractors.

500 tons, offices, International Telephone Development Co., Newark, N. J., to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., contractor.

400 tons, plant, Marquette Cement Co., Des Moines, Iowa, to Sheffield Steel Corp., Kansas City, Mo.

400 tons, grain elevator, Great Falls, Mont., to Sheffield Steel Corp. Kansas City, Mo.; Ryan Construction Co., contractor.

350 tons, building addition, Spiegel Inc., Chicago, to Inland Steel Co., Chicago; Campbell - Lowrie - Lautermilch Corp., Chicago, contractor.

317 tons, addition to plant, Victor X-Ray Division, General Electric Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; James Stewart Corp., Chicago, contractor.

300 tons, grain elevator, Shelby, Mont., to Sheffield Steel Corp., Kansas City, Mo.; Ryan Construction Co., contractor.

286 tons, administration barracks, Schofield Field, T. H., to Bethlehem Steel Co., San Francisco.

280 tons, Monessen Coke and Chemical Co., Monessen, Pa., to Truscon Steel Co., Youngstown, O.; Rust Engineering Co., contractor.

275 tons, laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

252 tons, Treasury Department, Invitation 10897, San Francisco, to Truscon Steel Co., San Francisco.

CONCRETE BARS COMPARED

	Tons
Week ended May 10	8,965
Week ended May 3	5,534
Week ended April 26	20,775
This week, 1940	7,945
Weekly average, 1941	11,871
Weekly average, 1940	9,661
Weekly average, April, 1941	18,030
Total to date, 1940	153,207
Total to date, 1941	225,555

Includes awards of 100 tons or more.

240 tons, three highway spans, Montana and Idaho, to Bethlehem Steel Co., Seattle.

223 tons, utility building and repairs to turbine room, unit 17, Commonwealth Edison Co., Chicago, to Inland Steel Co., Chicago; Herlihy Mid-Continent Co., Chicago, contractor; bids April 16.

217 tons, four bridges in Soland county, Calif., for state, to Gilmore Fabricators Inc., San Francisco.

200 tons, Washington state highway projects, to Northwest Steel Rolling Mills, Seattle.

190 tons, highway bridges 2140 and 2141, Columbus, Ind., to Bethlehem Steel Co., Bethlehem, Pa.; R. L. Schutt, contractor.

180 tons, highway project 21, Hamilton county, Ohio, to Pollak Steel Co., Cincinnati; J & F. Harig Co., contractor.

175 tons, bars and mesh, airport, Windsor Locks, Conn., to Igoe Bros., Newark; Wilaka Construction Co., New York, contractor.

160 tons, warehouse, Brinks Express Co., Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Edward L. Scheidenhelm, Chicago, contractor.

160 tons, defense project, Irvington, N. J. to Truscon Steel Co., Youngstown, O.; Lord & Burnham Co., contractor.

150 tons, garage and storage building, Coca Cola Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; Krahl Construction Co., contractor.

100 tons, army projects, Alaska, to Bethlehem Steel Co., Seattle, by U. S. engineer.

100 tons, highway project, No. 23, Sycamore, Ill., to Laclede Steel Co., St. Louis; Millburn Bros. Inc., contractor.

100 tons, pumping station, U. S. engineer, W. Springfield, Mass., to Truscon Steel Co., Youngstown, O.

100 tons, plant, Marquette Cement Co., Des Moines, Iowa, to Republic Steel Corp., Cleveland, through Truscon Steel Co., Youngstown, O.

100 tons, addition, Kohl & Madden Printing Ink Co., Chicago, to Concrete Steel Co., Chicago; B-W Construction Co., Chicago, contractor.

100 tons, bridge, New Haven railroad, New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through George F. Collins Co.

REINFORCING STEEL PENDING

5975 tons, earthfill dam, San Gabriel River near Azusa, Calif.; bids about June 9 by U. S. engineer office, Los Angeles.

2000 tons, bridge, Salinas River, Calif., for state; bids soon.

2000 tons, tunnels, Pacific Gas & Electric Co. Pulga and Cresta, Calif.; contract to T. E. Connolly, 461 Market St., San Francisco.

2000 tons, 730-foot pier, Puget Sound navy yard, Wash.; A. W. Quist and Sound Construction & Engineering Co., Seattle, joint low.

1700 tons, substructure Washita River and Rock Creek bridges; U. S. Engineer's Office Dennison, Tex.; bids May 16.

1000 tons, state highway projects, Connecticut, bids May 12; also opening May 19, Hartford.

800 tons, Valencia housing project, San Francisco; Meyer Bros., 750 Portola Ave., San Francisco, contractor.

700 tons, shipways, Federal Shipways & Dry Dock Co., S. Kearny, N. J.; W. Kidde, contractor.

600 tons, blast furnace, American Rolling Mill Co., Ashland, Ky.; Arthur G. McKee, contractor.

550 tons, housing project, Providence, R. I.; bids May 13.

500 tons, tape plant, Minnesota Mining Co., St. Paul, Minn.

455 tons, Hivetia housing project, Sacramento, Calif.; Campbell Construction Co., Sacramento, Calif., contractor.

400 tons, defense housing, navy yard, Brooklyn, N. Y.; Corbetta Construction, New York, contractor.

384 tons, gymnasium, University of Nevada, Reno, Calif.; bids soon.

375 tons, substructure, Canal street bridge, Chicago; bids May 21.

356 tons, warehouse and boiler house, veterans hospital, Hines, Ill., for government; William R. Goss Co., Chicago, low; bids May 6.

350 tons, jail, Fresno, Calif.; bids in.

350 tons, dam, Blue Mountain, Ark. for U. S. Government; Meyers & Goen, Salem, Ind., low.

348 tons, viaduct and bridges, Hartford county, Connecticut; bids May 12.

340 tons, soap plant addition, Lever Bros., Baltimore; Stone & Webster, contractor.

300 tons, Western H. S. and power plant, Lansing, Mich.; bids May 12.

300 tons, airport, Madison, Ind.; O'Connor & Simmons, contractors.

220 tons, utility building, Commonwealth Edison Co., Chicago.

200 tons, airport, Hillsgrove, R. I.; bids May 23, U. S. engineer, Providence.

200 tons, buildings, Standard Oil Co. of Indiana, Wood River, Ill.; bids May 14.

200 tons, highway project, Holyoke-West Springfield route; bids May 16, Boston.

189 tons, science building, Northern Illinois State Teachers College, De Kalb,

Behind the Scenes with STEEL

Steel Center

■ We see where the geographic center of the steel industry is nestled, temporarily at least, between those up-and-coming cities of Olivesburg and Paradise Hill, Ohio—populations 50 and 10 respectively. Digging into Dun & Bradstreet's we find one of Olivesburg's leading citizens is apparently Elias H. Ebenshade who runs the filling station on the corner there by the store. Elias is probably sittin' out there now in his rocker wonderin' what it's all about. Here he reads about Olivesburg bein' the center of the steel industry and then he reads the steel industry is operating at full capacity or better, and what happens? Nothing. Besides his regular customers the only extra gas he's sold for three weeks was to that feller from down near Cincinnati who stopped by day before yesterday and asked how to get back on the road to Mansfield.

Home Town Boy

■ We see, also, where our favorite radio comedian has wet his toes in the metalworking business. Bob Hope, screwball extraordinary, now has an interest in Hope Metal Products Inc., run by nephew, Milt Hope, here in Cleveland. If and when Jerry Colonna is made chief engineer and Brenda and Cobina take over the office, industrial science will no doubt be given a thorough shellacking.

Saying It Nicely

■ Putting thoughts into colorful words: Editor-in-chief E. L. Shaner in discussing NDAC, OPM, OPACS, et al—"Past errors of the administration will seem trivial to the major blunder it will make if it persists in *compounding this omelet* of authority . . ."

Modern Army

■ Will someone please explain these few miscellaneous items listed under some recently awarded defense contracts for the army?—Skeet outfits, $2485; Damask doilies, $139,590; 3,335,155 yds. mosquito netting, $687,077; 165 Alaskan nurses' caps, $1320; and 1 pr. horsehide overmits, $1.90.

Tread Lightly

■ The defense program has opened up unexpected new markets for, of all things, nonsparking mule shoes. Ampco Metal of Milwaukee reports powder plants figure this as excellent explosion insurance.

Like Hot Cakes

■ We're still slightly amazed at the response on the reprint handbooks on Modern Shell Production. The press run has been upped again, so plenty of copies are still available. You'll find an order coupon this week on page 101.

Coming Home

■ A good Chicago advertising agency friend (whom we'll call Wally) tells this one on himself. As a hobby and sideline, Wally runs quite a stock farm and takes particular pride in breeding some very fine bulls. What's more he lovingly names them after his various business associates, much to their chagrin and his delight. A neighboring farmer called Wally over the other day to look over some new stock he'd just brought in and one big bull became very incalcitrant, refusing to budge through the gate despite all coaxing. So the farmer picked up a stick and with a sound thrash cracked him across the rear and shouted unwittingly, "Get the h——— through there , *Wally!*"

In Fond Memory

■ Quentin Reynolds titles his new book "The Wounded Don't Cry" but we understand there are frequent yips of anguish from his feminine admirers who inveigle the author into autographing their copies. Mr. Reynolds inscribes copies for maids and matrons alike with the waggish line, "In memory of that glorious weekend at Lake Como."

SHRDLU.

Ill.; W. H. Franklin Co., Springfield, Ill., low.

175 tons, highway project and bridge, Saugus-Revere, Mass.

175 tons, two additional warehouses, Jeffersonville, Ind., for government; Pearson Construction Co., Benton Harbor, Mich., low; bids May 6.

175 tons, flood control project, U. S. Engineering Department, Binghamton, N. Y., section 1; Binghamton Construction Co., Binghamton, contractor.

140 tons, highway project, Sutton, Mass.

130 tons, yard repairs, Chicago, Atchison, Topeka & Santa Fe railway.

120 tons, municipal opening, Rutland, Vt.; bids May 5.

108 tons, bridge 5955, Minnesota state highway commission, Pederson Bros., low.

100 tons, store, Montgomery Ward & Co., Madison, Wis.

100 tons, factory, Ferry street, Alameda, Calif.; Moore & Roberts, 700 Buchanan street, Berkeley, Calif., contractor.

Unstated, quay and wall, Puget Sound navy yard; bids May 28.

Pig Iron

Pig Iron Prices, Page 114

Pig iron shipments have not regained full volume preceding the coal strike but production has increased and conditions are becoming better each week. A number of blast furnaces have been blown out for repairs and this is curtailing the supply materially. Some of these are scheduled to resume within a short time. Stocks at foundries and steel works have diminished in the past month but no serious curtailment is apparent so far.

Sellers are not soliciting third quarter business but some small tonnages are reported to have been taken at prices prevailing at time of delivery. Shipments of some tonnage now on books probably will extend into third quarter.

Shortage of iron supplies is causing some buyers to seek tonnage outside the territory usually supplying them and prices quoted on such inquiry usually is f.o.b. furnace rather than the nearest basing point. Thus shipments and sales from Boston to New Jersey and Baltimore are being quoted on the furnace basis with consumers paying carrying charges. Barges took 1500 tons to New Jersey recently to meet a pipe shortage and iron is moving by rail to Baltimore from New England, thus to expedite delivery.

In the export market Great Britain is inquiring for 240,000 tons of bessemer iron for shipment over the remainder of the year.

Southern iron production is at capacity and shipments to northern melters is at a high rate, with pressure for more being exerted.

To meet heavy demand for pig iron, the New England furnace continues to draw on inventories despite capacity operations which have prevailed for months. Tonnage booked is in excess of supplies and shipments are large despite the fact all tonnage offered is not being taken. Some large consumers have accumulated heavy inventories and the effect of inven-

tory checks to start next month will be watched carefully as regards the limited few with such stocks. Following the arrival of one of the first ore shipments to clear the Lakes, ore arrivals are now substantial at Everett to meet estimated requirements of 15,000 tons daily.

Pacific Coast

Seattle—Major construction project up for figures is development of a new terminal for the Alaska railroad at Passage Bay, bids called by United States engineer, Seattle, May 12. This job involves 11.2 miles of standard gage track and drilling of 18,000 feet in two tunnels, also heavy excavation. Contractors will require powerful equipment.

The coastwise wage agreement reached by shipyards and metal trades unions is in effect but the basic increase of 15 cents an hour, retroactive to April 1, is working a hardship on smaller metalworking shops in executing current contracts.

Rolling mills report steady volume of orders for merchant bars. Concrete commitments are heavy and additional small tonnages are being placed. Much of this comes from United States engineers, army and navy purchasing offices as public projects are in full swing in this area. Largest project pending, a 730-foot pier at Puget Sound navy yard, involves 2000 tons, general contract awarded. Another quay at the same yard will be put up for figures May 28.

No large shapes jobs are pending. Shipyards are using heavy tonnage of plates. Fabricating shops report many small jobs but in some instances difficulty is experienced in obtaining materials. Cases are cited where Eastern mills refused to quote because of the coal strike. Cyclops Iron Works, San Francisco, will furnish a 125-ton crane for Bonneville project's Covington station.

Jobbing business continues steadily in large volume. Stocks are low with deliveries uncertain. Scrap is moving to mills at the maximum of $13.50 and $14.50 for No. 2 and No. 1, respectively. Cast iron is scarce and foundries are trying to stabilize the market at around $16, dealers having higher ideas.

San Francisco — The structural market was the most active one of the week and 7026 tons were placed, bringing the aggregate to date to 166,842 tons as compared with 66,553 tons for the corresponding period in 1940. Pending business exceeds 51,000 tons. Plate orders have not yet been placed for 60 emergency vessels for the United States Maritime Commission by the contractors, Richmond Shipbuilding Corp., California Shipbuilding Corp. and Oregon Shipbuilding Corp., or on 8000 tons for five naval tankers awarded to Seattle-Tacoma Shipbuilding Corp. This amounts to 35,800 tons.

Movement of cast iron pipe continues strong and most distributors find it difficult to obtain new ma-

terial for yard stocks. Awards totaled 2303 tons and brought the year's aggregate to 21,080 tons, compared with 11,690 tons for the same period a year ago.

While awards were limited to lots of less than 100 tons, over 60,000 tons are expected to be placed within the next 30 days. These inquiries include 56,000 tons for 60 emergency vessels for the United States Maritime Commission and 12,000 tons for five naval tankers. So far this year bookings aggregate 211,051 tons, compared with only 23,760 tons for the corresponding period in 1940.

Demand for reinforcing bars continues to improve and pending business calls for more than 14,000 tons. Awards totaled 1622 tons, bringing the aggregate for the year to 41,212 tons, compared with 54,984 tons for the same period last year.

Canada

Toronto, Ont.—Pig iron buying is well sustained and inquiries indicate that demand exceeds supply. While there has been some tightening in supply recently, no actual shortage prevails and melters have been successful in obtaining sufficient merchant iron to meet current needs, but no stock accumulation is possible. Melters in some instances have been trying to increase orders, but producers are not interested. Current sales are confined to spot needs, with no forward delivery reported for the past week or two.

While there is still some confusion regarding cast scrap prices, trading continues heavy. Local dealers state that new orders are more numerous and sales exceed those of a month or six weeks ago. Fairly wide spreads are reported in machinery cast prices in the various consuming centers. Some local consumers are still offering up to $24 and $25 net ton for machinery cast, while others with supplies on hand are offering $21.50. Dealers also have wide spread in buying prices. Most are paying up to $22 for cast scrap to fill contracts and new higher priced orders. Supplies of cast scrap are in better volume, but there is no surplus, some dealers finding difficulty in obtaining sufficient machinery grades to fill demands. Arrangements are proceeding which are expected to stimulate offerings from household interests that can pick up a few pounds. In a previous campaign of this nature, Toronto householders collected upward of 700 tons and it is expected the new effort will result in big tonnages as it is to be carried to all parts of the Dominion.

Demand for steel scrap, all grades, is advancing steadily. Steel mills are maintaining capacity operations and scrap consumption in the past year has increased more than 50 per cent. Dealers report better supplies from automobile wreckers and from collectors in the rural districts, but demand is well in excess of the current available supply.

Steel Exporters Expect Changes in Ruling

While still awaiting clarification of Leon Henderson's price fixing order of April 15, steel exporters, following brief unsettlement at time of announcement, are continuing business as usual.

Price administrator is said to recognize possible need for change in the ruling, certainly need for clarification, and is willing that steel exports continue much as heretofore, pending further word.

Some exporters here look for the whole matter to be cleaned up within another fortnight. Meanwhile, exporters are being confronted with increasing demand from neutral countries and British colonies especially, but actual volume of orders is declining, due principally to pressing demands here.

However, exporters and Washington, too, appear alert to necessity of meeting certain export demands in addition to needs of the United Kingdom and Canada. Disposition is to be as liberal as possible with legitimate requirements of South American countries and to see that British colonies and some of those of the invaded European countries get fair consideration.

As noted in previous issues there has been a particular spurt in tin plate demand from British colonies. Buying for the United Kingdom, with financing to be done by this country, is expected to be increased substantially in the near future, or as soon as the actual mechanics of placing business under the lease-lend law have been finally worked out.

Despite the lull in British buying over recent weeks, England is said to be in no pressing need for most American steel products, as she has managed to build up good backlogs.

Steel in Europe

Foreign Steel Prices, Page 115

London—(*By Cable*)—Intensified domestic steel and iron production in Great Britain is being supplemented by increasing American and Dominion imports. The raw materials situation is satisfactory although more scrap is wanted. The supply of ore is increasing, both domestic output and imports. The tin plate market is quiet. Sheets and galvanized sheets are entirely reserved for war purposes.

Fluorspar

Fluorspar Prices, Page 114

Fluorspar supplies are ample for all needs and shipments are being made promptly. Prices are firm at $20 to $21 per net ton. Imported material is scarce under present ocean carrying conditions.

Ferroalloys

Ferroalloy Prices, Page 114

Sellers of ferroalloys declare that pressure for tonnage is now about as great as it has been any time

this year, notwithstanding the fact that steelmaking operations have not fully recovered from the coal strike and in all probability will not average as high this month as in April.

Prices are steady, with ferromanganese $120, duty paid, Atlantic and Gulf ports, and domestic spiegeleisen, 19 to 21 per cent, at $35, Palmerton, Pa.

Nonferrous Metals

New York—National defense and British war work is taking an increasingly large portion of available metal supplies. Practically all aluminum is being consumed in such industries while the nation's largest copper producer and its fabricating subsidiaries are getting 55 to 60 per cent of their business from war work.

Copper—Priority ruling on shipments is expected soon as consumption is averaging more than 135,000 tons per month while production is averaging about 85,000 tons and imports about 35,000 tons. This leaves a deficit of some 15,000 tons a month. Prices remained firm on the basis of 12.00c Connecticut but scrap prices have not declined to that level.

Lead—Consumption is averaging about 70,000 tons a month while purchases are averaging about 75,000 tons. About 10,000 tons of the latter total consist of foreign metal and, in view of difficulties connected with importation of metal, may require a slightly higher price than the present 5.85-cent domestic level.

Zinc—The government has stated there will be enough zinc for armament work and perhaps enough for 75 per cent of normal peacetime requirements. Production has started a steady rise due to the expansion of production facilities. Lack of zinc holds the galvanizing rate at 60 per cent of capacity.

Tin—OPM has ordered a reduction of 10 per cent in the amount of tin on tin plate in order to conserve supplies. Domestic consumers continued to absorb all the tin currently offered and at prices ranging from 51.75c to 52.25c a pound.

Manganese Ore Output

Production of manganese ore in the United States in March was 1800 long tons, the Bureau of Mines reported last week on the basis of statements from producers who accounted for 87 per cent of 1939 production.

Shipments of ore containing 35 per cent or more manganese were 2000 tons during the month and producers' stocks at the end of March were 2100 tons, the bureau said. In February production was 2500 tons, shipments were 2400 tons and producers' stocks at the month's end were 2300 tons.

Rate of shipments averaged 2442 tons monthly in 1939, when the total amounted to 29,307 tons.

Nonferrous Metal Prices

May	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
3	12.00	12.00	12.25	51.75	51.12½	5.85	5.70	7.25	17.00	14.00	35.00
5	12.00	12.00	12.25	51.75	51.25	5.85	5.70	7.25	17.00	14.00	35.00
6	12.00	12.00	12.25	52.00	51.50	5.85	5.70	7.25	17.00	14.00	35.00
7	12.00	12.00	12.25	52.25	51.75	5.85	5.70	7.25	17.00	14.00	35.00
8	12.00	12.00	12.25	52.25	51.62½	5.85	5.70	7.25	17.00	14.00	35.00
9	12.00	12.00	12.25	52.12½	51.75	5.85	5.70	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.00-9.25
Cleveland	9.50-10.00
Chicago	8.75-9.00
St. Louis	9.00

Heavy Copper and Wire

New York, No. 1	10.00-10.25
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	9.75-10.00
St. Louis	10.00

Composition Brass Turnings

New York	8.75-9.00

Light Copper

New York	8.00-8.25
Cleveland	8.00-8.50
Chicago	7.75-8.00
St. Louis	8.00

Light Brass

Cleveland	4.50-5.00
Chicago	6.25-6.50
St. Louis	5.00

Lead

New York	4.85-5.00
Cleveland	4.75-5.00
Chicago	4.75-5.00
St. Louis	4.50-4.75

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	4.75-5.00

Aluminum

Mls., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

Officers Elected by Warehouse Chapters

■ Additional chapters of the American Steel Warehouse Association, Cleveland, reported elections of officers last week, as follows. Previous elections were reported in STEEL, April 28, page 96.

CENTRAL STATES: President, **Herbert Douglas**, Central Steel & Wire Co., Chicago; vice president, **L. B. Kildwell**, General Steel Warehouse Co. Inc., Chicago; vice president, **E. G. Fisher**, National Steel Co., Chicago; treasurer, **H. J. Lord**, Scully Steel Products Co., Chicago; secretary, **A. J. Kueber**, Steel Warehousing Corp., Chicago; national director, **C. H. Bradley**, W. J. Holliday & Co., Indianapolis.

CONNECTICUT: President, **R. B. Shearer**, The C. S. Mersick and Co., New Haven; vice president, **S. H. Hascall**, The Blodgett & Clapp Co., Hartford; secretary-treasurer, **G. S. Brousso**, The C. S. Mersick & Co., New Haven; chapter director, **R. B. Shearer**, The C. S. Mersick & Co., New Haven.

MISSOURI: President, **G. E. Helmovics**, Milcor Steel Co., Kansas City, Mo.; vice-president, **F. J. Daugherty**, Gate City Iron Works, Omaha, Neb.; secretary-treasurer, **Fred L. Evans**, Steel Mfg. & Warehouse Co., Kansas City, Mo.; national director, **Henry Neef**, Gate City Iron Works, Omaha, Nebr.

BUFFALO: President, **R. B. Barnett**, Peter A. Frasse & Co. Inc., Buffalo; vice-president, **W. Barry Huntley**, Brace-Mueller-Huntley Inc., Rochester, N. Y.; secretary-treasurer, **T. W. Knight**, Wheelock, Lovejoy & Co. Inc., Buffalo; national director, **J. F. Rogers**, Beals, McCarthy & Rogers Inc., Buffalo.

DETROIT: President, **N. A. Wade**, Edgar T. Ward's Sons Co., Detroit; secretary-treasurer, **E. W. Lynch**, Union Drawn Steel Division, Republic Steel Corp., Detroit; national director, **E. M. Vehmeyer**, Joseph T. Ryerson & Son Inc., Detroit.

NEW YORK: President, **Charles Kramer**, Scully Steel Products Co., Newark, N. J.; vice president, **William C. Hughes**, Bright Steel Corp., New York; vice president, **H. B. Royer**, Jones & Laughlin Steel Service Inc., Long Island City; secretary-treasurer, **Paul O. Grammer**, Grammer, Dempsey & Hudson Inc., Newark, N. J. Mr. Kramer was also elected as national director.

NORTHWEST: President, **L. H. Williams**, Williams Hardware Co., Minneapolis; vice president, **Joseph Paper**, Paper, Calmenson & Co., St. Paul; secretary, **Winter Dean**, Nicols, Dean & Gregg, St. Paul. Mr. Williams was also elected as national director.

PHILADELPHIA: President, **J. W. Patrick Jr.**, Peter A. Frasse & Co. Inc., Philadelphia; secretary-treasurer, **J. M. Mead**, Joseph T. Ryerson & Son Inc., Philadelphia; national director, **Guy P. Bible**, Horace T. Potts Co., Philadelphia.

PITTSBURGH: President, **J. H. Fogwell**, Scully Steel Products Co., Pittsburgh; vice president, **J. M. Hilbish**, Jones & Laughlin Steel Corp., Pittsburgh; secretary, **D. Davis**, Bethlehem Steel Co., Carnegie, Pa.; treasurer, **F. B. Lorenz**, Edgar T. Ward's Sons Co., Pittsburgh; national director, **A. W. Herron Jr.**, Jones & Laughlin Steel Corp., Pittsburgh.

ST. LOUIS: President, **George K. Conant**, Sligo Iron Store Co., St. Louis; vice president, **H. G. Thompson**, Scully Steel Products Co., St. Louis; secretary, **Bruce Haines**, E. E. Souther Iron Co., St. Louis; treasurer, **E. W. Fleer**, Schurk Iron Works Inc., St. Louis. Mr. Conant was also elected as national director.

RFC Purchasing More Strategic Metals

■ Purchases of strategic metals by the Reconstruction Finance Corp. have not increased in price despite some increases in the open market, Jesse Jones said last week. Some increases in freight costs have occurred, however.

Mr. Jones said RFC still is buying copper at 9½ cents a pound.

Equipment

Cleveland—Washington is again urgently calling for further speed in production, tool builders speed izing that the chief method of doing so will be by increasing working forces by second and third shifts of the same size as first shifts. It is interpreted that prices of machine tools are frozen, even though they may not be specifically designated by Washington. Bookkeeping burdens increase as Washington ever seeks more information. One large tool builder here has four full-time employes making such reports and expects to enlarge this staff shortly. A recent survey covered the amount of nickel used in the machine tool industry.

Seattle—Volume of sales shows increase, all items in strong demand. Delivery guarantees cannot be made in some lines, as defense materials take priority. Road construction and maintenance equipment shows heavy turnover. Bonne-

ville project has awarded a $45,797 contract to General Cable Corp. for control conductors and to General Electric Co. at $29,426 for circuit breakers, and $6100 contract to Coliyer Insulated Wire Co., Pawtucket, R. I., for switchboard wire at Ampere station. Fort Lewis has opened bids for three transformers and Puget Sound navy yard for compressor. Lincoln county, Washington, will open bids May 12 for two trucks and gas power shovel. King county, Washington, has called bids at Seattle May 21 for asphalt layer, two bulldozers and two bucket loaders.

Construction and Enterprise

Ohio

AKRON, O.—Emmett Mold Inc., George Emmett, president, has been incorporated from Millheim Die Casting Co., R. F. D. No. 2, Springfield township. Tentative plans have been prepared for a one-story plant addition 40 x 100 feet.

BELLEFONTAINE, O. — Harlow B. Salter and J. J. Rardin, officers of Fisher Brass Inc., Marysville, O., will build a foundry plant with 6000 square feet floor space here, for production of rough plumbing fixtures, globe valves, etc. Homer B. Fuson will be superintendent.

CLEVELAND—Park Drop Forge Co., 730 East Seventieth street, will build one-story plant addition 147 x 240 feet, including 250-ton crane. Total cost estimated at $125,000. Arthur E. Rowe, engineer, is in charge of plans. (Noted April 21.)

CLEVELAND — Cleveland Graphite Bronze Co., St. Clair avenue and East 168th street, Ben F. Hopkins, president, has plans by John H. Graham, architect, Hanna building, who will take bids on general contract for a windowless one-story factory building with about 400,000 square feet floor space, a three-story administration building 45 x 400 feet and two-story personnel building 60 x 600 feet. Mechanical trades are not included.

Additional Construction and Enterprise leads may be found in the list or Shapes Pending on page 123 and Reinforcing Bars Pending on page 125 in this issue.

CLEVELAND—August Kirchner, 857 East 188th street, will establish a machine shop at 1149 Norwood road, in a structure with 1500 square feet floor space, negotiations for a lease being under way.

DEFIANCE, O. — Defiance Machine Works has let general contract to Baker-Shindler Contracting Co., Defiance, for an addition of 10,000 square feet to extend foundry and pattern shop.

EAST PALESTINE, O.—S. B. McClure and associates have organized company to manufacture fractional horsepower gasoline motors. Plant will be equipped for production when test period has been passed.

NILES, O.—Niles Machine & Welding Co., 3141 Pratt avenue, is completing new factory at North Main street and Cleveland avenue, 80 x 80 feet and will move shortly. Some new metalworking machinery will be required. Louis Tripody heads the company.

Connecticut

BRIDGEPORT, CONN.—Locke Steel Chain Co., 1085 Connecticut avenue, will take bids soon for a plant addition costing $40,000. Wescott & Mapes Inc., 130 Orange street, New Haven, Conn., is engineer.

TORRINGTON, CONN. — Torrington Mfg. Co., 70 Franklin street, has let general contract for a one-story 100 x 221-foot plant on Treat street to Torrington Building Co., 187 Church street, at about $66,000.

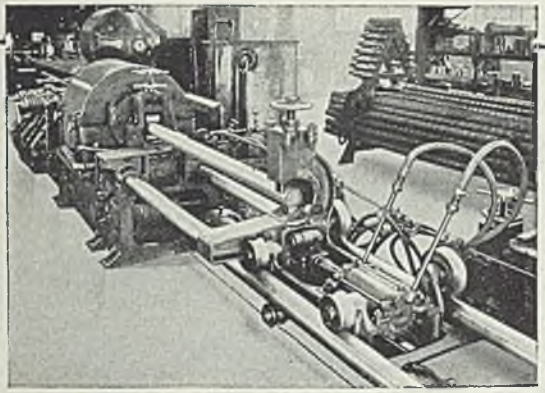
Massachusetts

NORTH QUINCY, MASS.—Boston Gear Works Inc. has let general contract to Austin Co., 19 Rector street, New York, for design and construction of a two-story 40 x 80-foot plant.

WEST SPRINGFIELD, MASS.—Perkins Machine & Gear Co., Circuit avenue, will build a one-story 35 x 220-foot plant. General contract to Ernest F. Carlson Inc., 1694 Main street, Springfield, Mass.

New York

BROOKLYN, N. Y.—Sherron Metallic



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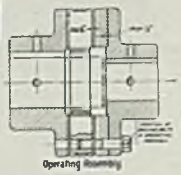

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Corp., 1201 Flushing avenue, will let contract soon for a one-story plant costing $60,000. Kolb & Miller, 31 Union street, New York, are architects.

BROOKLYN, N. Y.—Robbins Drydock & Repair Co., Erie basin, will build a one-story 100 x 150-foot blacksmith shop at 2-46 Halleck street, costing about $40,000. Bids taken March 31 were rejected and will be readvertised. Albert Kahn & Associates Inc., 345 New Center building, Detroit, are architects.

ELMIRA HEIGHTS, N. Y.—City is considering construction of a sewage disposal plant and sewerage system.

New Jersey

BLOOMFIELD, N. J.—General Electric Co., 5 Lawrence street, will build a two-story 75 x 75-foot storage and manufacturing addition and one-story 24 x 40-foot extension, costing about $50,000.

KEARNY, N. J.—Newark Brass & Foundry Corp., 320 Schuyler avenue, will build a one-story 50 x 100-foot foundry. Breitenbucher & Jastremsky, 114 North Second street, Harrison, N. J., are architects.

Pennsylvania

CORRY, PA.—Precision Products Co. N. F. Ames, president, Third avenue and West Main street, will build a one-story plant costing $40,000.

EASTON, PA.—C. K. Williams & Co., 640 North Thirteenth street, will build a boiler house, general contract going to Collins & Maxwell Inc., Easton Trust building, for building and equipment, costing about $200,000. (Noted March 17.)

McKEES ROCKS, PA.—Fort Pitt Spring Co., H. Miller, vice president, 4 Johns street, is rebuilding its factory at cost of about $50,000.

Michigan

CRYSTAL FALLS, MICH.—Wisconsin-Michigan Power Co., M. G. Gorrow, assistant general manager will apply to government for permit for dam on the Michigamme river with potential capacity of 22,500 horsepower, costing about $1,250,000. Holland, Ackerman & Holland, 20 North Wacker drive, Chicago, are engineers. (Noted March 17.)

DETROIT—John J. Buehing Co., 14521 Schaefer highway, has been incorporated with $25,000 capital to manufacture sheet metal stampings, by John J. Buehing, 15421 Linwood avenue.

DETROIT—Natural Gas Burner Co., manufacturer of gas burners, has been incorporated with $10,000 capital, by Blaine T. Colman, 250 California avenue.

DETROIT—Precision Thread Grinding Co., 8651 Tireman avenue, has been incorporated with $20,000 capital to conduct a machine shop, by Frederick W. Kasten, 14658 Woodmont ave.

DETROIT—Ferry Tool & Die Corp., 18703 Mt. Elliott avenue, has been incorporated with $16,000 capital to deal in tools and dies, by John C. Dysarz, 6521 Michigan avenue.

Illinois

JOLIET, ILL.—Public Service Co. of Northern Illinois, 72 West Adams street, Chicago, has let contract for superstructure of new power plant on Des Plaines river to Powers-Thompson Construction Co., 27 South Chicago avenue, Joliet, at estimated cost of $750,000. Sargent & Lundy, 140 South Dearborn street, Chicago, are consulting engineers.

Indiana

EAST CHICAGO, IND.—Continental Roll & Steel Foundry Co., 144th street, has let general contract for a two-story plant addition to Chris Hansen Co., 604 State Line avenue, Hammond, Ind., at cost of $40,000. W. S. Hatton, 5231 Honman avenue, Hammond, Ind., is architect.

Maryland

RIVERDALE, MD.—Engineering & Research Corp. is receiving bids for a 60 x 260-foot plant addition. Federal loan administration has made lease agreement to provide for construction and equipment at about $200,000. Machine tools and aircraft parts will be manufactured.

North Carolina

ROCKY MOUNT, N. C.—City has awarded general contract to V. B. Higgins Co., Greensboro, N. C., for complete sewage treatment plant costing about $530,000. J. E. Sirrine & Co., Greenville, S. C., engineers, designed plant, for treatment of mixed industrial and domestic sewage. Same company recently let contract for sewer outfall lines at about $250,000.

Wisconsin

ARGYLE, WIS.—Village, J. R. Arnot, clerk, will take bids soon on equipment for municipal sewage disposal plant, costing about $100,614. W. G. Kirchoffer, 22 North Carroll street, Madison, Wis., is consulting engineer.

NEW RICHMOND, WIS.—City, Anna Halverson, clerk, is having plans made for municipal sewage disposal plant. Williams & Burlingame, 418 West Willard

street, Stillwater, Minn., are consulting engineers.

SUPERIOR, WIS.—Lake Superior Shipbuilding Co., Fred A. Russell, president, is erecting a shipfitting building 70 x 200 feet and will make other yard improvements. New furnace will be installed in punch shed. Company has $2,000,000 navy shipbuilding contract, including two 10,000-ton self-propelled oil barges.

Minnesota

MINNEAPOLIS—District public works officer, Lt. Commander E. B. Cary, Great Lakes, Ill., will open bids May 20 for shops and hangar at naval reserve aviation base, Wold-Chamberlain airport, Minneapolis, including hangar 202 x 362 feet, assembly and repair building 102 x 162 feet, steam plant 40 x 46 feet, paint and dope spray building 33 x 63 feet, garage 37 x 125 feet, engine storehouse 32 x 82 feet, magazine, sentry house warmup platform, etc. Monorails and crane runways are included.

MINNEAPOLIS — Minneapolis-Moline Power Implement Co., manufacturer of tractors and agricultural machinery, will build a plant addition 140 x 300 feet, to cost about $300,000. A further extension is also planned.

NORTH ST. PAUL, MINN.—Dobbins Mfg. Co., manufacturer of metalware products, will rebuild plant recently burned with loss of about $60,000.

ST. PAUL—Stainless Steel Products Co., manufacturer of steel barrels and other products, has let contract for plant additions and rebuilding burned portion of plant.

Kansas

DAMAR, KANS.—WPA has approved construction of waterworks plant, including pumphouse, equipment and elevated tank, costing about $27,000. Paulette & Wilson, Public Utilities building, Salina, Kans., are engineers.

WHITEWATER, KANS.—WPA has approved construction of waterworks system at estimated cost of $140,000. Survey will start soon, by Paul Ross, clerk. Paulette & Wilson, Public Utilities building, Salina, Kans., are engineers. (Noted March 10.)

Nebraska

SEWARD, NEBR.—City will take bids soon for 250,000-gallon elevated steel water tank. Carl McGrew is city clerk, Paulette & Wilson, Salina, Kans., are engineers.

VERDON, NEBR.—City, Lafe Stewart clerk, is taking bids May 19 on municipal waterworks plant. H. H. Henningson, Standard Oil building, Omaha, Nebr., is consulting engineer.

Iowa

GARNER, IOWA—City, H. V. Reed, clerk, is taking bids to May 14, revised date, on construction of sewage treatment works, including primary clarifier, sludge digester and sludge drying beds. (Noted April 14.)

GRUNDY CENTER, IOWA—City will hold election May 19 on $200,000 bond issue for construction of municipal light plant.

WEBSTER CITY, IOWA—City, E. R. Compton, clerk, C. C. McCarthy, city manager, is taking bids on municipal light and power plant addition.

WEST UNION, IOWA—City, J. L. Cline, clerk, is having plans prepared for addition to sewage disposal plant costing about $21,000, with equipment. E. E. Schenk, 214 Waterloo building, Waterloo, Iowa, is consulting engineer.

Colorado

BOULDER, COLO.—Department of Interior has recommended to the President that dam and hydroelectric power plant costing $41,000,000 be built on Colorado river 67 miles below Boulder dam, with estimated capacity of 225,000 kilowatts.

Montana

GLENDIVE, MONT.—Dawson county, R. C. Pierce, county engineer, will take bids soon for one-story machine repair shop 60 x 100 feet.

California

LOS ANGELES—General Aircraft Instrument Service has been formed by L. Marvin Say and will be established at Los Angeles municipal airport.

LOS ANGELES—Aero-Alloys Co. has been formed by Walter J. Cunningham to conduct business at 5511 Boyle avenue.

LOS ANGELES—Engine Parts Co., 4705 Eagle Rock boulevard, has been formed by Philip E. Hungerford.

LOS ANGELES—American Tool Products Co., 5722 South Central avenue, has been formed by Wade E. Miller and William J. Mead.

LOS ANGELES—Blue Wibard Tool Co., 8913 Olin street, has been formed by N. N. Hesceltine.

LOS ANGELES—California Sheet & Metal & Mfg. Co., 1773 North Main street, has been formed by Julius Braunstein.

Oregon

PORTLAND, OREG.—Hobart M. Bird, president, Columbia Steel Casting Co., has bought 18-acre site and buildings of Pacific Car & Foundry Co. Same buyer bought 30 acres of industrial property several months ago. No plans for expansion have been made.

Washington

SEATTLE—Doran Co., 63 Horton street, manufacturer of ship propellers, will rebuild immediately two buildings recently burned and will repair or replace crane and other equipment.

SEATTLE—Seattle-Tacoma Shipbuilding Co. has let contract to J. A. McEachern Co. for sheet metal, pipe and machine shop 48 x 150 feet and gate house.

Canada

BROCKVILLE, ONT.—Lion Grinding Wheels Inc., Pearl street, has given general contract to Walter Patterson, 35 William street, for a plant addition costing about $50,000.

LEVACK, ONT.—International Nickel Co. of Canada Ltd., Copper Cliff, Ont., has let contract to Carrington Construction Co., Sudbury, Ont., for a dry-house here, at cost of about $40,000.

OSHAWA, ONT. — General Motors Corp. of Canada Ltd., William street East, has given general contract to H. A. Wickett & Co. Ltd., 156 Front street, East, Toronto, Ont., for a plant addition costing $150,000.

TORONTO, ONT.—Standard Sanitary & Dominion Radiator Ltd., 800 Lansdowne avenue, will build a plant addition costing about $100,000, with equipment. General contract has been given to Milne & Nichols, 57 Bloor street West. Prack & Prack, 36 James street South, Hamilton, Ont., are architects.

WELLAND, ONT.—Atlas Steel Ltd., Main street, has let general contract to Pigott Construction Co., Pigott building, Hamilton, Ont., for a plant addition costing $100,000.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd. will build a further plant addition costing $71,000, general contract to Hein Construction Co., 172 Aylmer avenue.

MONTREAL, QUE.—Montreal Light, Heat & Power Consolidated, 107 Craig street West, has let general contract to Bremner Norris Co., 2049 McGill College avenue, Montreal, for erection of substation on St. James street West, costing $150,000.

MONTREAL, QUE.—Canadian Car & Foundry Co. Ltd., 621 Craig street West, is taking bids, no closing date, for forge shop at Longue Pointe, costing about $50,000. Spence, Mathias & Burge, 2063 Union avenue, Montreal, are architects.

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1—2.8 HP. Link Ratio 48.4:1
14—3 HP. 400 AH. Cleveland ratio 60:1
23—3/5 HP. Thomas 2 speed ratio 1 side 100 to 1, other side 5 to 1
2—5 HP. 100 RT Cleveland ratio 15:1
1—5 HP. 400 AH Cleveland ratio 70:1
1—7½ HP. 200 AH Cleveland ratio 80:1
2—7½ HP. 400 RT Cleveland ratio 80:1
3—7½ HP. National Tube Co. ratio 46.67:1
5—10 HP. 600 AT Cleveland ratio 90:1
2—50 HP. D. O. James ratio 3.4:1
1—150 HP. R. D. Nuttal ratio 1.6:1

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GEAR CUTTER, Spur 84" Newark, M.D.
GEAR PLANERS, 37" and 54" Gleason Bevel, M.D.
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18" Canton Portable Alligator Shears
12" ram x 15' stroke Hydraulic Accumulator, 1500 lbs. pressure
500 Ton Bethlehem Steel Shell Presses
6x12" HPM Vertical Triplex Pump, 700 lbs. pressure, 200 GPM, NEW. Class JJJ Pump.

Address Box 365
STEEL, Penton Bldg., Cleveland

IF YOU WANT TO BUY OR SELL

good used or rebuilt equipment or materials—Place an advertisement in this section. Write STEEL, Penton Bldg., Cleveland, Ohio

CONTRACT WORK

CLASSIFIED

Positions Wanted

EXPERIENCED STRUCTURAL AND plate shop superintendent, now employed. Exceptionally successful in handling men. Experienced in both estimating and sales. Available on short notice. Address Box 470, STEEL, Penton Bldg., Cleveland.

ADVERTISING MAN WANTS POSITION with manufacturer or agency handling industrial accounts. Thorough knowledge of and ability to create and produce trade paper advertising, booklets, catalogs, house organs, publicity material, etc. Twenty years experience with three manufacturers, seven years on heat treating equipment. Available at once. Salary requirements modest. Can submit samples and recommendations. Reply Box 439, STEEL, Penton Bldg., Cleveland.

WE CAN HELP YOU TO CONTACT high calibre men to fill specific jobs you have in mind—

Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry.

When you have an opportunity to offer, use the Help Wanted columns of STEEL.

Castings

OHIO

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO., INC., North Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys, Semi-steel. Superior quality machine and hand molded sand blast and tumbled.

Help Wanted

YOUNG METALLURGICAL OR MECHANIcal engineer graduate qualified for general and research machinability work on stainless steels. Some knowledge in operation of machine tools desired. State training, experience and salary. Address Box 476, STEEL, Penton Bldg., Cleveland.

WELDING SUPERVISOR—THOROUGHLY competent man to take charge of welding department well established Canadian Company—Pressure and General Plate Work—Permanent position for qualified man. Address Box 477, STEEL, Penton Bldg., Cleveland.

YOUNG GRADUATE METALLURGIST with practical knowledge of the processing of stainless steels. Should be experienced in the investigation of metallurgical problems of stainless steels in production and development. State training, experience and salary. Address Box 475, STEEL, Penton Bldg., Cleveland.

SALESMAN EXPERIENCED IN SPECIALty welded mechanical tube field by large tube manufacturer. Such man to handle and develop welded tube sales separately. Apply with full particulars to Box 474, STEEL, Penton Bldg., Cleveland.

DESIGNERS, DETAILERS, AND TRACERS on blast furnace, open hearth, rolling mills and auxiliary steel plant equipment. Give full particulars in letter for interview. H. A. Brassert & Co., First National Bank Bldg., Pittsburgh, Pa.

STRUCTURAL STEEL DESIGNER AND engineer wanted by large fabricator. Must be thoroughly experienced and accurate. Give full information on training, experience and compensation received in first letter. Address Box 473, STEEL, Penton Bldg., Cleveland.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 30 words, 5.00, each additional word .10; all capitals, minimum 30 words, 6.50, each additional word .13; all capitals, leaded, minimum 30 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05; all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge.

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SALARIED POSITIONS
$2,500 to $25,000

This thoroughly organized advertising service of 31 years' recognized standing and reputation, carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

For Sale

For Sale—In Pittsburgh

4 STORY INDUSTRIAL WAREHOUSE

Sacrifice Price

190,000 sq. ft.—heavy floor capacity, sprinklered. 11-car siding, Penna. R. R. Phone, Wire or Write

JAMES P. DONOVAN

Oliver Building Pittsburgh, Pa.

Phone ATlantic 3280

ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

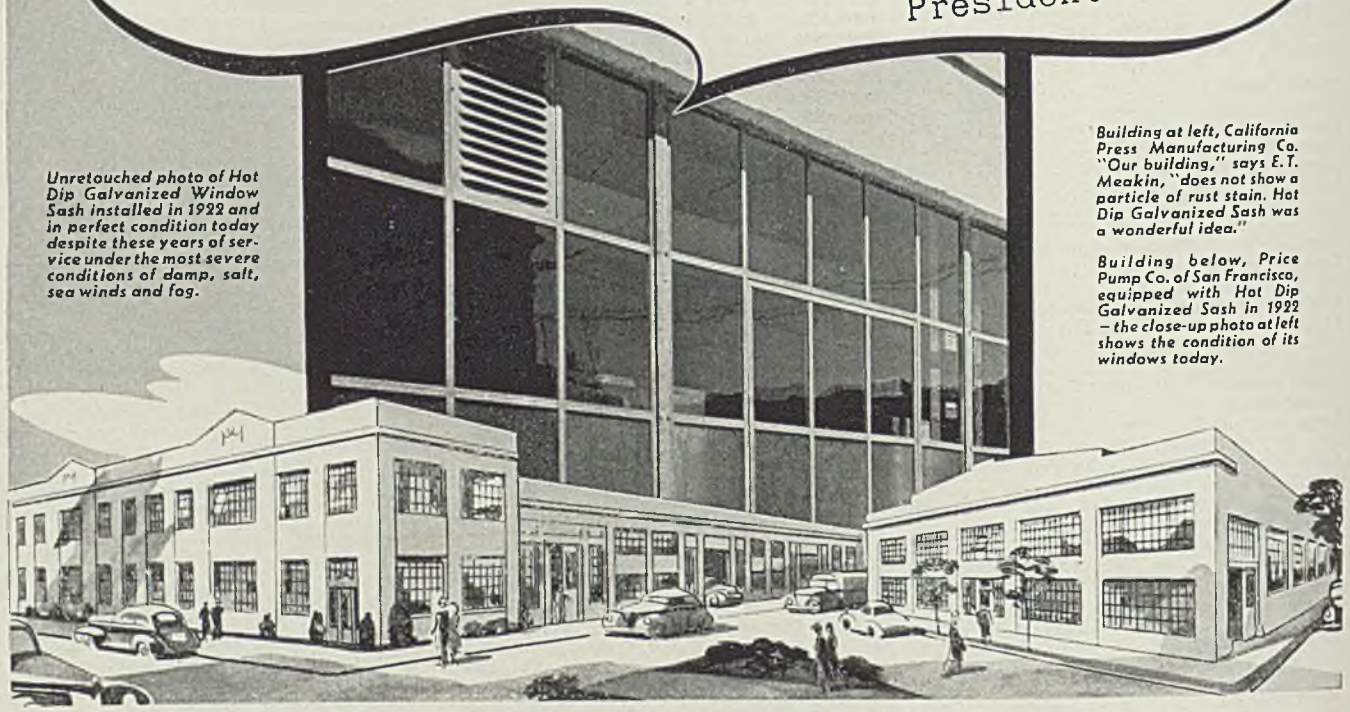
ADVERTISING INDEX

Where-to-Buy Products Index carried in first issue of month.

..."am glad to say that we installed Hot Dip Galvanized Sash on our two new buildings because of the excellent service we received on the old one."

CALIFORNIA PRESS MANUFACTURING CO.

E. T. Meakin
President



Unretouched photo of Hot Dip Galvanized Window Sash installed in 1922 and in perfect condition today despite these years of service under the most severe conditions of damp, salt, sea winds and fog.

Building at left, California Press Manufacturing Co. "Our building," says E. T. Meakin, "does not show a particle of rust stain. Hot Dip Galvanized Sash was a wonderful idea."

Building below, Price Pump Co. of San Francisco, equipped with Hot Dip Galvanized Sash in 1922 — the close-up photo at left shows the condition of its windows today.

19 YEAR OLD WINDOW SASH

CONTINUES TO DEFY RUST BECAUSE IT'S

HOT DIP GALVANIZED

From coast to coast, countless installations of Hot Dip Galvanized Steel Sash stand as irrefutable evidence of its long, low-cost life . . . There is no substitute for *genuine* Hot Dip Galvanizing . . . This rust preventive process automatically guarantees a *thicker* coating of zinc fused as an inseparable *part* of the steel beneath. It is the most practical and economical rust protection known to modern metallurgy . . . Patronize members of this association and *know* that you are getting a genuine *quality* hot dip job on *every* order. Write for literature. American Hot Dip Galvanizers Association Incorporated, American Bank Building, Pittsburgh, Penna.

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE

Acme Galvanizing, Inc., Milwaukee, Wis. ★ Acme Steel & Malleable Iron Works, Buffalo, N. Y. ★ American Tinning & Galvanizing Co., Erie, Pa. ★ Atlantic Stamping Co., Rochester, N. Y. ★ Atlantic Steel Co., Atlanta, Ga. ★ Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N.Y. ★ Diamond Expansion Bolt Co., Inc., Garwood, N.J. ★ Equipment Steel Products Division of Union Asbestos and Rubber Co., Blue Island, Ill. ★ The Fanner Mfg. Co., Cleveland, O. ★ John Finn Metal Works, San Francisco, Cal. ★ Thomas Gregory Galvanizing Works, Maspeth, N.Y. ★ Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa. ★ James Hill Mfg. Co., Providence, R.I. ★ Hubbard & Co., Oakland, Cal. ★ Independent Galvanizing Co., Newark, N.J. ★ International-Stacey Corp., Columbus, O. ★ Isaacson Iron Works, Seattle, Wash. ★ Joslyn Co. of California, Los Angeles, Cal. ★ Joslyn Mfg. & Supply Co., Chicago, Ill. ★ L. O. Koven & Brother, Inc., Jersey City, N.J. ★ Lehigh Structural Steel Co., Allentown, Pa. ★ Lewis Bolt & Nut Co., Minneapolis, Minn. ★ Missouri Rolling Mill Corp., St. Louis, Mo. ★ The National Telephone Supply Co., Cleveland, O. ★ Penn Galvanizing Co., Philadelphia, Pa. ★ Riverside Foundry & Galvanizing Co., Kalamazoo, Mich. ★ San Francisco Galvanizing Works, San Francisco, Cal. ★ The Sanitary Tinning Co., Cleveland, O. ★ Standard Galvanizing Co., Chicago, Ill. ★ Wilcox, Crittenden & Company, Inc., Middletown, Conn. ★ The Witt Cornice Company, Cincinnati, O.

FROM OUR FILES — CASES NOS. 0432-3-4, Steel Sash, Hot Dip Galvanized by SAN FRANCISCO GALVANIZING WORKS. Additional evidence furnished on request.