Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

Member, Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

STEEL

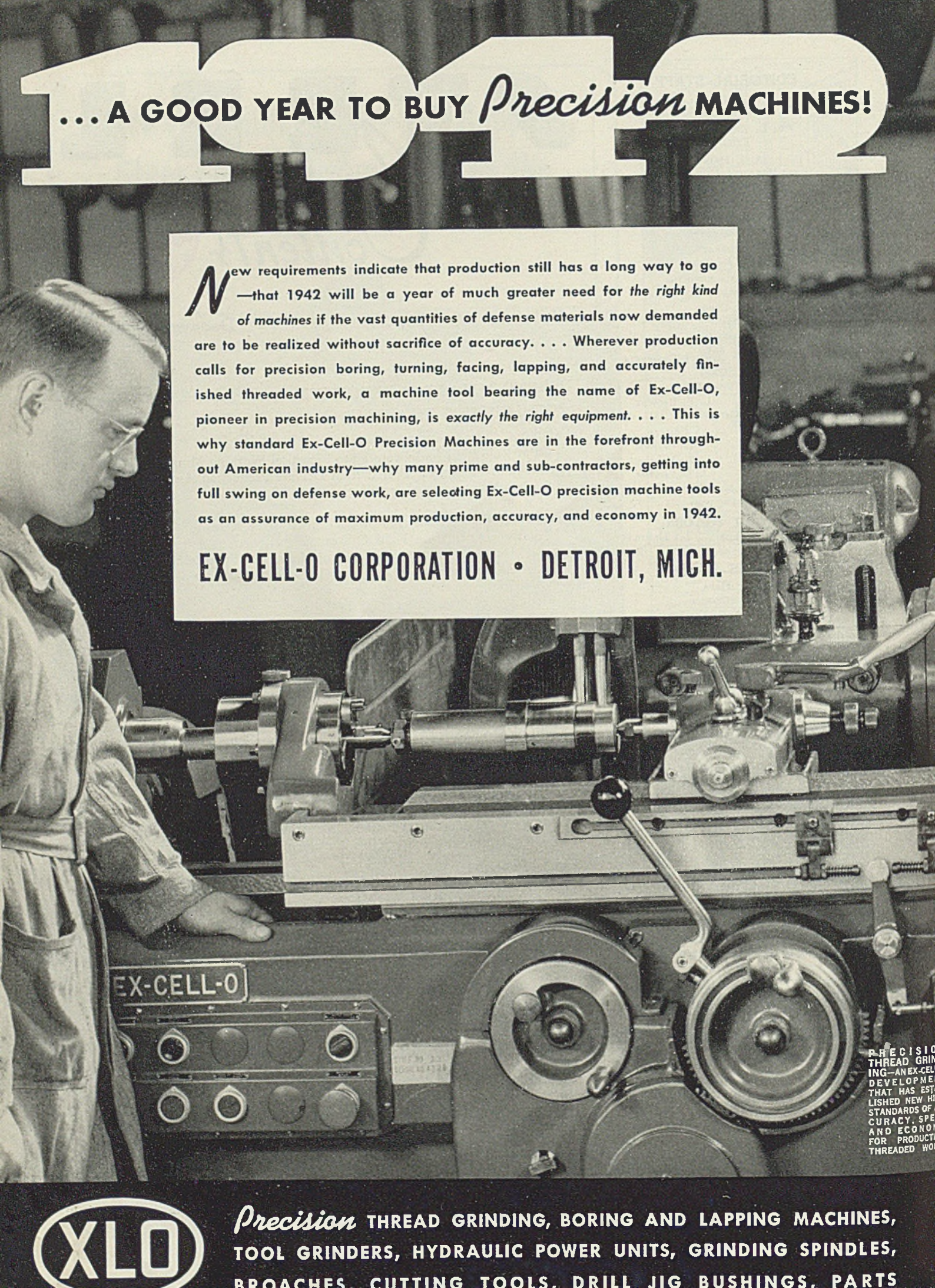
ESTABLISHED 1882

Contents

Volume 109—No. 26 December 29, 1941

PRODUCTION • PROCESSING • DISTRIBUTION • USE

1942 ... A GOOD YEAR TO BUY *Precision* MACHINES!



New requirements indicate that production still has a long way to go—that 1942 will be a year of much greater need for *the right kind of machines* if the vast quantities of defense materials now demanded are to be realized without sacrifice of accuracy. . . . Wherever production calls for precision boring, turning, facing, lapping, and accurately finished threaded work, a machine tool bearing the name of Ex-Cell-O, pioneer in precision machining, is *exactly the right equipment*. . . . This is why standard Ex-Cell-O Precision Machines are in the forefront throughout American industry—why many prime and sub-contractors, getting into full swing on defense work, are selecting Ex-Cell-O precision machine tools as an assurance of maximum production, accuracy, and economy in 1942.

EX-CELL-O CORPORATION • DETROIT, MICH.

PRECISION THREAD GRINDING—AN EX-CELL-O DEVELOPMENT THAT HAS ESTABLISHED NEW HIGH STANDARDS OF ACCURACY, SPEED AND ECONOMY FOR PRODUCTION THREADED WORK

XLO

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

HIGHLIGHTING THIS ISSUE OF STEEL

■ AS A RESULT of important revisions in Priorities Regulation No. 1, certain confusion that has existed hitherto in regard to priorities is eliminated. Each manufacturer now **(p. 21)** should have a better understanding of doing business under priorities; in particular, he knows just where he stands with respect to obtaining supplies for essential civilian products. Among other things, the revisions impose stricter limitation of inventories; they also make it mandatory to accept orders covered by B ratings. . . . To expedite procurement, the War Department **(p. 32)** has authorized all local contracting officers to place, without referring to Washington for approval, all orders involving expenditures of less than $1,000,000.

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OPM Exhibits Bits and Pieces

Renewed emphasis is being placed on subcontracting in order to enlist all facilities in the war effort. Subcontracting is to be stimulated **(p. 29)** by placing on exhibition parts wanted in volume, thus to give manufacturers an opportunity to select work which their equipment and men are able to perform. STEEL **(p. 29)** prints a list of OPM's field offices all over the country; manufacturers eager to obtain subcontracts should contact the nearest of these offices. . . . Beehive coke producers are requested **(p. 33)** not to increase prices; extras that may be charged on steel products are the subject of an OPA release; vanadium is under complete allocations; diesel engines will continue under an informal price ceiling.

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Scrap Prices Revised

"Control the wage spiral!" warns E. L. Shaner, STEEL'S editor-in-chief, who **(p. 44)** sees inflationary trends under way. . . . Machine tool prices **(p. 37)** will be discussed at a meeting to be held Jan. 7. . . . "Dubious promoters" seeking commissions on defense orders are barred **(p. 22)** from participation in defense production associations. . . . OPM moves **(p. 30)** to assure uninterrupted production of nonferrous metals in all stages. . . . Special priorities are provided **(p. 31)** on warehouse items subject to seasonal demands. . . . Further revision of scrap prices is aimed **(p. 81)** at bringing out more scrap. . . . Use of materials to develop new oil and gas wells **(p. 32)** is under control; tire rationing boards are being organized throughout the country.

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War on Illness

Industrialists, by waging war on general illness, declares Harvey M. Hall **(p. 48)** not only will reduce total man-hours lost yearly through employe-sickness, but also will realize a return of 150 per cent per workman. . . . Scrap piles **(p. 53)** offer a reserve source of nickel estimated to yield over 1,000,000 pounds per month. . . . W. E. Benninghoff **(p. 58)** describes how induction brazing in ordnance work enables unskilled operators to produce perfect work. . . . Operating with a crew equivalent to 15 per cent of that required for a comparable tonnage in tub pickling, a semicontinuous pickler **(p. 66)** for cleaning 24-inch strip handles two strands and is designed without welders, stitchers, looping pits and shears.

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Honing— How it Works

L. S. Martz **(p. 50)** throws more light on use of honing in ordnance production, describing what the process is, how it works. . . . Additional aids to facilitate and step up operations of the mechanized handling system at International Harvester are outlined **(p. 70)**. . . . In his third presentation on metal cleaning, Dr. R. W. Mitchell **(p. 54)** tells how the cleaners may be used on shell bodies, cartridge cases and other ordnance items. . . . L. L. Wyman **(p. 62)** continues his discussion on X-ray diffraction as a method of identifying metal alloys. . . . American industrialists **(p. 68)** view German developments with great interest as the need for substitute metals increases.

"KEY PEOPLE"—When You Need Steel

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

The likeable young women at the switch-board, phone-order salesmen, dispatchers, crane operators, skilled warehousemen who cut, shear and shape stock sizes to fit your specifications, truck drivers — all of them are key people at Ryerson —key people in *your* service, when you need steel!

Although the National Defense program and essential industries come first, we are putting forth every effort to serve all Industry to the best of our ability. Naturally, many sizes and certain products are out of stock. However, for the most part you can depend on Ryerson for immediate shipment of a wide range of steel products.

For best service during this period of heavy demand, "open" orders are advisable. Stock List sent promptly on request. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Buffalo, Philadelphia, Boston, Jersey City.

RYERSON *Certified* **STEELS**

RYERSON CERTIFIED STEELS

OPM Rule Restricts Inventories to "Practical Working Minimum"

✦

Priorities Regulation No. 1 amended to provide producers must accept all preference orders, including those for essential civilian needs . . . A-10 assigned defense orders not otherwise rated

✦

WASHINGTON

■ ALL orders bearing a priority rating, including B-ratings for essential civilian orders as well as A-ratings for defense orders, must be accepted by producers in preference to any unrated order. This was ordered by the OPM Priorities Division last week in an amendment to Priorities Regulation No. 1, the basic document which governs the operations of the priorities system.

Previously the acceptance of B-rated orders was not mandatory.

Required acceptance of B-rated orders is a further transitional step in the move toward allocation of scarce materials, since B-ratings are one method of designating the relative importance of civilian uses for materials after war requirements have been met.

Treatment which must be given to defense orders is clarified by a new provision which assigns a priority rating of A-10 to all defense orders not otherwise rated. This change is intended to eliminate any confusion which might arise as to the handling of those defense orders which were previously unrated, in relation to other orders which had been specifically rated A-10, the lowest rating in the A series.

Section 944.14 of Priorities Regulation No. 1 has been revised to provide a stricter limitation of inventories. Whereas producers were previously forbidden to increase their inventories beyond the amount necessary to meet required deliveries of their products, they are now forbidden to accept delivery of materials for inventory in excess of a practicable working minimum. This means that all inventories of any materials whatever must be reduced to a practicable working minimum, strictly construed, before they can be replenished. The prohibition applies to suppliers of materials for inventory as well as to producers who maintain inventories, and it covers nondefense as well as defense producers. An exception is made, however, for inventories of materials imported from foreign countries.

Includes Processed Material

A possible loophole in the inventory restriction is closed by a provision that no material may be fabricated, processed, alloyed or otherwise altered if the producer's inventory of the material in its altered form would thereby be increased beyond a practicable working minimum, unless specific authorization is granted by the director of priorities.

Another amendment will help to prevent receipt of a new, high-rated order from interfering with fulfillment of the delivery date on a previously accepted lower-rated order. Unless the new order bears an AA rating or is accompanied by specific direction from the director of priorities, it will not have to be accepted if its acceptance would necessitate pre-empting material which has already been completed to fill a previously accepted defense order which bears a lower rating, or if it would pre-empt material which is within 15 days of completion. Or, if the new order is accepted, the producer may not divert material already completed or about to be completed on a previous defense order for use in filling the new order.

Summary of important amendments follows:

All defense orders, as defined, are assigned an A-10 rating. The regulation as previously written required the acceptance of defense orders and preferred treatment for such orders, but did not specifically assign them a grade, so that the question was frequently raised as to how unrated defense orders should be treated, in comparison with orders specifically rated A-10. The change is largely one of form rather than substance, because the answer which has been given to this inquiry is that they should be rated as A-10 orders.

Paragraph 944.2 has been changed to require acceptance of B-rated orders as well as defense orders. The same considerations which led to the adoption of the original provision of the regulation requiring acceptance of defense orders led to the conclusion that all rated orders should now be made mandatory both as to acceptance and preferred treatment.

Any preference rating (including B-ratings) may be assigned to any

order before the contract or purchase order is placed. This is done in order to provide for identification of prospective purchase orders as to which acceptance is required pursuant to amendment just discussed.

Paragraph 944.7 (b) is amended so that where preference ratings and delivery dates are the same the sequence of deliveries is to be determined by the dates of receipt of the preference rating. Formerly such cases of conflict were referred to the Division of Priorities. It is believed that the proper rule is incorporated in the amendment, rather than allowing the date of receipt of the order to govern, since the preference rating is only effective when received.

Each order must bear a specific delivery date. This is done in order to terminate the practice which now exists, particularly in the PD-3 field, of specifying "immediately" as the delivery date.

Record Keeping Clarified

All allocation and limitation orders take precedence over preference ratings and, generally speaking, the more stringent restrictions take precedence over the less stringent.

General inventory restriction is revised in accordance with the policy of the Priorities Division. Hereafter no material may be fabricated, processed, alloyed or otherwise altered if the producer's inventory of the material in its altered form would thereby be increased beyond a practicable working minimum, unless specific authorization is granted by the Director of Priorities.

The regulation as originally drawn required all persons "affected by any rule, regulation or order" to keep records. This rule was difficult of application, as almost any person could be said to be affected by some order or regulation of the director of priorities. The revised provision substitutes a rule which seems to be simpler of application, viz., only the persons actually participating in any regulated transaction are required to keep records.

Original violations provision was restricted to penalties for furnishing false information. It has been expanded so that it now includes penalties for violation of any order or regulation.

Zinc Control Order Extended to March 31

OPM has extended to March 31 General Preference Order M-11 controlling distribution of zinc. Order was scheduled to expire Dec. 30. It requires all producers to set aside a percentage of zinc, zinc oxide, and zinc dust produced each month to be distributed under express direction of the Division of Priorities and provides for allocation and controls distribution of the rest.

"Dubious Promoters" Barred from Defense Production Associations

■ "DUBIOUS promoters", seeking commissions on defense jobs, were barred from participation in defense production associations in a bulletin sent by Floyd B. Odlum, Director of the Contract Distribution Division of OPM, to the various field offices.

Several former high New Deal officials recently have been severely criticized for selling their "influence" with the administration to seekers of defense contracts on a commission or fee basis.

Defense production associations are being organized by groups of small manufacturers in many sections of the country to seek and execute defense contracts or subcontracts they can not handle individually.

In order to protect legitimate production associations against trouble under the federal antitrust laws, which forbid combinations in restraint of trade, John Lord O'Brian, general counsel of OPM, and Attorney General Francis Biddle agreed recently that organization plans of each proposed association must be approved in advance by the OPM and the Department of Justice.

Mr. Odlum advised field offices of the Contract Distribution Division as follows:

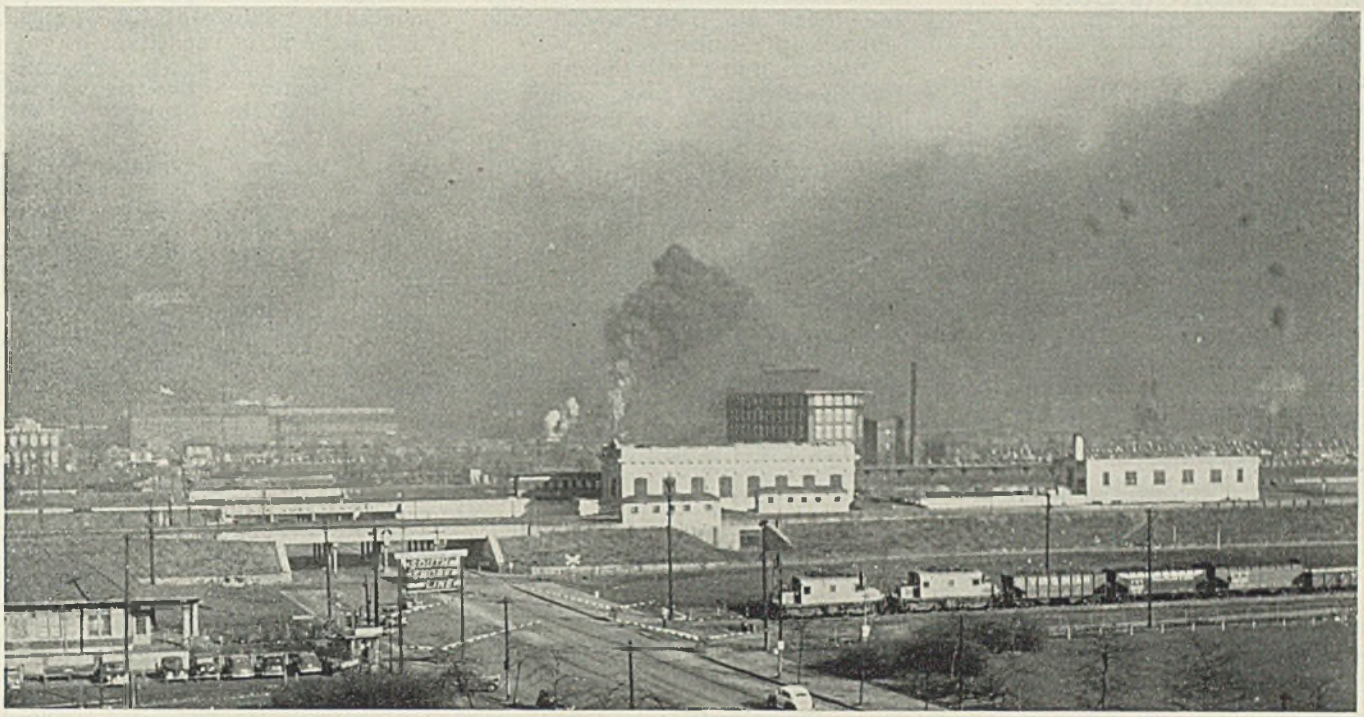
"This division, in undertaking legal clearance of proposed associations, must give consideration to the character of sponsorship of the organization in order to forestall as much as possible the activities of dubious promotional organizations collecting fees for membership and exacting payment of a percentage of the amount of defense work obtained by member-plants. Accordingly, under present policy, clearance will be limited to the following cases:

"a. A defense production association representing manufacturing units in a given community or industry, sponsored and organized by the members themselves, or by public or civic agencies acting without profit.

"b. A defense production association representing manufacturing units in a given community or

Troops Called in Welders' Jurisdictional Dispute

■ SAN FRANCISCO: Workers enter the Western Pipe & Steel Co.'s shipyards here, past lines of armed soldiers, called to prevent intimidation of workers and to escort them through picket lines of United Brotherhood of Welders, Cutters and Helpers of America. The jurisdictional labor dispute threatened to delay a billion dollars worth of vital ship production in five San Francisco bay region yards. Acme photo



■ GARY BLACKOUT: Ordinarily Carnegie-Illinois Steel Co.'s Gary, Ind., works, in the background, are clearly visible from the point at which this photo was taken. Company in co-operation with the Army has conducted "daytime blackout" smoke screen tests to see how effectively the plant could be concealed from enemy bombers. The smoke screen is developed by tar and wet coal in the furnaces, with switch engines also used as smudge pots. Tests were reported successful. Railroad bridges and depot in the foreground were not screened. NEA photo

industry organized by a manufacturing concern equipped with physical facilities for participation in the performance of defense contracts or equipped to provide substantial services in connection with performance of such contracts by other members of the association.

"As a corollary to the foregoing rules, the following rule will be applied:

"c. So-called defense production associations, organized or sponsored by third parties for the purpose of inducing membership of manufacturing units upon an agreement to pay a percentage of the amount of defense contracts obtained will not be cleared."

Mr. Odlum also called attention to the fact that standard forms of government contracts contain a "covenant against contingent fees" stated substantially thus:

"The contractor warrants that he has not employed any person to solicit or secure this contract upon any agreement for a commission, percentage, brokerage, or contingent fee. Breach of this warranty shall give the government the right to annul the contract, or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage, or contingent fees. This warranty shall not apply to commissions payable by contractors upon contracts or sales secured or made through *bona fide* established commercial or selling agencies maintained for the purpose of securing business."

Individuals or groups desiring to form defense production associations were advised by Mr. Odlum to notify the nearest field office of the Contract Distribution Division. Field offices were asked to obtain as much as possible of the following information:

(1) Name of the person or organization sponsoring the formation of such association.

(2) If the association is being sponsored other than by the participating plants or a public or civic agency acting without profit, give a brief statement of the character, background and business history of the sponsor and describe what services will be provided by such sponsor and on what basis the sponsor will be compensated.

(3) The general plan of organization of such association.

(4) The names and locations of concerns which it is proposed will participate in such association.

(5) General character of the business of each of the participating concerns.

(6) The general type of manufacturing operations which it appears the participating concerns may be qualified to engage in (textile, metal fabrication, etc.)

(7) The number of employes of the participating companies.

(8) A description of the relative sizes of participating companies.

(9) Present business and employment conditions of the participating companies, with regard particularly to the effect of priorities or material shortages.

(10) General character of employes in relation to skilled, semi-skilled or unskilled labor and relative proportions thereof.

(11) General employment conditions in the area with regard particularly to the labor demand in the area in connection with defense production.

(12) What arrangements are proposed to be made between the association and its members, or between the members themselves, for (a) subcontracting of parts and components, (b) supervision of production operations, and (c) fees to be paid or other financial arrangements.

Reprints Available

Reprints of the Bill of Rights, appearing this week on page 4, will be made available free of charge in small quantities to readers of STEEL, or at nominal cost for 5 or more copies. They will be printed on heavy stock suitable for framing or for posting on your bulletin boards. Address your requests to STEEL, Readers Service Department, Penton Building, Cleveland.

Eleven Months Steel Output Up 35.9 Per Cent

■ Steel produced for sale in November totaled 5,250,966 net tons, a decrease of 587,533 tons or 10.1 per cent from 5,838,499 tons made in October, according to the American Iron and Steel Institute. November production was 10.3 per cent greater than 4,760,448 tons produced in November, 1940. Tonnage exported in November was 502,918 tons, 29,164 tons less than October exports of 532,082 tons, 5.48 per cent lower. Shipments to other members of the industry for further conversion totaled 342,320 tons in November, 25,449 tons less than 367,669 tons shipped in October.

Production in 11 months this year totaled 59,348,347 tons, compared with 43,671,187 tons in the comparable period last year, an increase of 15,667,160 tons, 35.9 per cent.

During 1940 the companies whose reports are included below represented 97.5 per cent of total output of finished rolled products.

Production for sale less shipments to members of the industry for further conversion, related to estimated yield from ingots of 71.1 per cent, was 4,908,646 tons in November, 100.1 per cent of capacity. For 11 months the total was 55,405,553 tons, 101.5 per cent of capacity.

1940	Output	Exported	Pct. Exported
Oct.	4,937,388	783,652	15.87
Nov.	4,760,948	562,587	11.82
Dec.	4,909,448	713,802	14.5
Year	48,584,860	7,683,858	15.8
1941			
Jan.	5,163,912	558,198	10.8
Feb.	4,864,936	560,035	11.5
March	5,411,319	491,519	9.07
April	5,269,748	331,942	6.29
May	5,444,235	317,442	5.8
June	5,086,210	327,357	6.4
July	5,226,102	430,493	8.2
Aug.	5,573,666	516,540	9.3
Sept.	5,384,817	560,720	10.4
Oct.	5,838,499	532,082	9.11
Nov.	5,250,966	502,918	9.57

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

November - 1941
PERIOD

		No. of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	41	1	xxxxxxx	576,705	xxx	166,032	168,222	6,312,887	xxx	1,787,257	1,903,720
	Heavy structural shapes	9	2	5,248,400	380,873	88.2	11,896	xxxxxxx	4,222,151	87.9	159,701	xxxxxxx
	Steel piling	4	3	422,000	27,528	79.3	1,787	xxxxxxx	322,384	83.5	30,355	xxxxxxx
	Plates—Sheared and Universal	20	4	5,654,350	571,476	122.8	20,958	7,600	5,391,189	104.2	302,931	42,316
	Skelp	8	5	xxxxxxx	73,809	xxx	6,355	33,569	922,287	xxx	140,135	390,690
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	122,588	41.2	13,404	xxxxxxx	1,577,201	47.7	74,633	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	8,842	35.5	3,182	xxxxxxx	155,645	56.2	53,923	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	3,431	40.9	213	xxxxxxx	26,254	28.1	3,220	xxxxxxx
	Splice bar and tie plates	15	9	1,312,200	40,279	37.3	6,510	xxxxxxx	631,165	52.6	19,221	xxxxxxx
	Bars—Merchant	42	10	xxxxxxx	514,223	xxx	19,517	58,121	5,849,547	xxx	405,767	690,948
	Concrete reinforcing—New billet	20	11	xxxxxxx	144,688	xxx	18,349	xxxxxxx	1,490,245	xxx	194,608	xxxxxxx
	Rerolling	20	12	xxxxxxx	24,504	xxx	3,280	xxxxxxx	234,707	xxx	17,568	xxxxxxx
	Cold finished—Carbon	25	13	xxxxxxx	87,671	xxx	1,629	xxxxxxx	1,138,615	xxx	22,906	xxxxxxx
	Alloy—Hot rolled	17	14	xxxxxxx	152,234	xxx	8,461	22,523	1,720,526	xxx	127,987	252,485
	Cold finished	19	15	xxxxxxx	18,643	xxx	1,516	xxxxxxx	178,285	xxx	26,689	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	5,538	xxx	158	xxxxxxx	103,884	xxx	3,677	xxxxxxx
	TOTAL BARS	65	17	13,321,925	947,501	86.4	52,910	80,644	10,715,809	87.9	799,202	943,433
	Tool steel bars (rolled and forged)	16	18	177,550	13,287	91.0	477	xxxxxxx	137,052	84.3	6,817	xxxxxxx
	Pipe and tube—B. W.	15	19	2,092,040	132,482	77.0	7,326	xxxxxxx	1,463,454	75.4	102,611	xxxxxxx
	L. W.	7	20	760,860	33,710	53.8	1,444	xxxxxxx	385,552	55.4	21,796	xxxxxxx
	Electric weld	7	21	1,071,020	54,216	61.5	6,492	xxxxxxx	669,260	68.3	33,960	xxxxxxx
	Seamless	14	22	2,661,160	152,073	69.5	26,545	xxxxxxx	1,775,625	72.9	155,420	xxxxxxx
	Conduit	7	23	156,140	11,388	88.6	422	xxxxxxx	132,099	92.4	4,460	xxxxxxx
	Mechanical Tubing	10	24	399,000	31,394	95.6	1,762	xxxxxxx	318,718	87.3	23,276	xxxxxxx
	Wire rods	22	25	xxxxxxx	114,972	xxx	13,278	19,714	1,377,482	xxx	178,557	229,852
	Wire—Drawn	41	26	2,293,890	189,651	100.5	8,953	1,849	2,123,008	101.1	128,358	20,672
	Nails and staples	18	27	1,153,930	59,658	62.8	5,014	xxxxxxx	724,587	68.6	62,230	xxxxxxx
	Barbed and twisted	16	28	474,210	26,642	68.3	15,448	xxxxxxx	257,249	59.3	74,362	xxxxxxx
	Woven wire fence	16	29	777,785	17,793	27.8	243	xxxxxxx	277,213	38.9	1,989	xxxxxxx
	Bale ties	11	30	110,970	5,496	60.2	277	xxxxxxx	76,147	75.0	572	xxxxxxx
	All other wire products	8	31	62,380	3,406	66.4	84	xxxxxxx	34,148	59.8	1,294	xxxxxxx
	Fence posts	13	32	122,165	3,732	37.1	158	xxxxxxx	62,972	56.3	1,140	xxxxxxx
	Black plate	11	33	340,030	46,196	165.1	5,052	54	416,281	133.8	39,652	97
	Tin plate—Hot rolled	7	34	515,620	42,656	100.5	20,234	xxxxxxx	336,774	71.4	72,830	xxxxxxx
	Cold reduced	11	35	3,622,540	280,002	93.9	53,314	xxxxxxx	2,862,345	86.3	299,937	xxxxxxx
	Sheets—Hot rolled	28	36	xxxxxxx	583,251	xxx	23,378	14,465	6,905,143	xxx	285,930	185,164
	Galvanized	16	37	xxxxxxx	109,577	xxx	5,768	xxxxxxx	1,525,663	xxx	96,917	xxxxxxx
	Cold rolled	18	38	xxxxxxx	210,294	xxx	10,627	xxxxxxx	2,806,854	xxx	77,911	xxxxxxx
	All other	13	39	xxxxxxx	56,327	xxx	1,671	xxxxxxx	705,945	xxx	21,423	xxxxxxx
	TOTAL SHEETS	30	40	13,330,160	959,449	87.5	41,444	14,465	11,943,605	97.9	480,181	185,164
	Strip—Hot rolled	24	41	3,285,430	156,331	57.8	6,864	16,203	1,853,964	61.7	70,699	226,850
	Cold rolled	40	42	1,564,990	100,676	78.2	3,236	xxxxxxx	1,227,224	85.7	24,976	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,820	25,385	73.0	174	xxxxxxx	242,563	62.7	2,327	xxxxxxx
	Axles	7	44	453,470	19,597	52.5	379	xxxxxxx	181,182	43.7	3,584	xxxxxxx
	Track spikes	11	45	325,770	13,255	49.5	1,051	xxxxxxx	156,892	52.6	4,256	xxxxxxx
	All other	7	46	78,600	4,487	69.4	-	xxxxxxx	35,979	50.0	79	xxxxxxx
	TOTAL STEEL PRODUCTS	168	47	xxxxxxx	5,250,966	xxx	502,918	342,320	59,348,347	xxx	5,165,941	3,942,794
	Pig iron, ferro manganese and spiegel	31	48	xxxxxxx	690,455	xxx	14,840	279,818	7,433,316	xxx	463,833	2,537,129
	Ingot moulds	5	49	xxxxxxx	71,976	xxx	947	xxxxxxx	743,774	xxx	5,640	xxxxxxx
IRON PRODUCTS	Bars	13	50	175,915	9,301	64.3	411	770	92,703	57.6	1,401	5,333
	Pipe and tubes	3	51	109,300	6,288	69.9	343	xxxxxxx	64,183	64.2	2,659	xxxxxxx
	All other	2	52	71,000	1,770	30.3	436	-	20,707	31.9	3,840	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	15	53	291,715	17,359	72.3	1,190	770	177,593	66.5	7,900	5,333

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 *%, which applied to their total ingot capacity equals* 9,627,900 *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 4,908,646 *N. T.;* 100.1 *%*

Year to date 55,405,553 *N. T.;* 101.5 *%*

West Steel Casting Co. Marks 35th Anniversary

■ Nearly 250 employes of West Steel Casting Co., Cleveland, held a joint annual Christmas party and observation of the concern's thirty-fifth anniversary, Dec. 20.

Necessity for still greater production of war materials was explained by Lieutenant Gathercoal, United States Navy, who also commended the company and its employes for their past efforts. David Dietz, science editor, Scripps-Howard Newspapers, discussed "Industrial Activity in Cleveland Today."

Ralph H. West, president of the company, pointed out importance of the steel foundry industry and described its response to the challenge for greatly increased output. His own company, he said, has more than doubled production, and expects further increases in 1942.

Presented to Mr. West on behalf of the employes was an engraved plaque commemorating the company's anniversary. Samuel B. West presented him with a wrist watch given by the firm in recognition of 35 years' service.

Employes with one or more years' service, it was announced at the gathering, would be given a $25 defense bond. Those with less service would receive defense savings stamps in proportion.

Chapter To Expel Scrap Ruling Violators

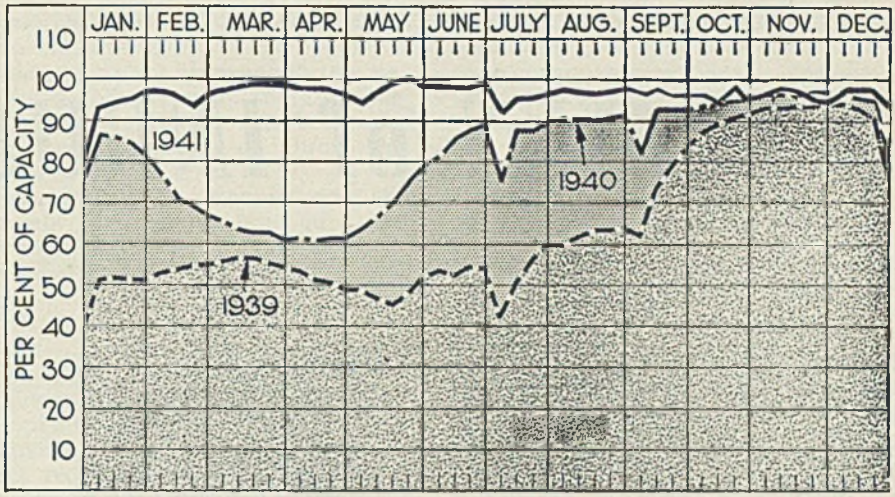
■ Northern Ohio chapter, Institute of Scrap Iron and Steel Inc., Washington, last week adopted a resolution calling for expulsion from the organization of any member who violates federal scrap regulations. The resolution:

"If a member of Northern Ohio chapter fails to abide by government instructions pertaining to the movement or shipment of his scrap to the extent that the government is required to compel him to do so, such member is to be expelled from the chapter and recommendations made to the national board that his membership in the national body be forfeited for all time."

Membership in the chapter is by firm and voting is done by firm, individual, partnership or corporation.

Auto Production Down

■ Automobile production in the week ended Dec. 27 totaled 24,620, compared with 65,875 in the preceding week, and 82,545 in the comparable week in 1940. A large proportion of the week's output was trucks. For further comparisons, see page 40.



PRODUCTION . . . . Down

■ PRODUCTION of open-hearth, basic and electric furnace ingots last week receded 4 points to 93½ per cent, due to the holiday. Three districts made small gains and nine declined. A year ago the rate was 80 per cent; two years ago it was 75½ per cent.

Chicago—Despite the Christmas season, usually showing a drop, production last week advanced 1 point to 104 per cent, the highest record ever made. Carnegie-Illinois Steel Corp. advanced to 108 per cent. All open hearths operated through without a break except for one eight-hour turn by Republic Steel Corp., which stopped to make a new water connection.

Youngstown, O.—While some producers operated through Christmas for the first time in years, the average rate for the week was down 9 points to 83 per cent. Furnaces not operated would have made steel except for the shortage of scrap. This week it is expected all producers will work through New Year's Day.

St. Louis—Six open hearths have been taken off because of scrap shortage, cutting production 15 points to 76 per cent.

Detroit—Declined 4 points to 86 per cent because of partial observance of the holiday, though most furnaces worked through.

Pittsburgh—Lost 6 points to 90 per cent, due to holiday observance.

Wheeling—Lost 1 point to 90 per cent, most producers operating the entire week.

Cincinnati—Two days idleness reduced production 12½ points to 82½ per cent.

Central eastern seaboard—Dropped 4 points to 83 per cent, though most mills ran through the entire week. Repairs caused one interest to operate its plate mill only three days.

Birmingham, Ala.—Removal of an open hearth for repair reduced the rate 5 points to 90 per cent.

Buffalo—Relighting of a repaired open hearth by Republic Steel Corp. increased the rate 2½ points to 81½ per cent.

Cleveland—Only one producer observing Christmas, the rate declined 4 points to 90½ per cent.

New England—Advanced 1 point to 85 per cent.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Dec. 27	Change	Same week 1940	Same week 1939
Pittsburgh	90	— 6	75	70
Chicago	104	+ 1	79.5	81
Eastern Pa.	83	— 4	82	77
Youngstown ...	83	— 9	78	74
Wheeling	90	— 1	76	76
Cleveland	90.5	— 4	75.5	68
Buffalo	81.5	+ 2.5	78	74.5
Birmingham ..	90	— 5	84	75
New England ..	85	+ 1	86	75
Cincinnati	82.5	—12.5	73	75
St. Louis	76	—15	79.5	77
Detroit	86	— 4	76	85
Average	93.5	— 4	80	75.5

135 Industrial Trucks Booked in November

■ Unit domestic bookings of electric industrial trucks in November totaled 135, compared with 513 in October, according to the Industrial Truck Statistical Association, 208 South LaSalle street, Chicago. Total net value of chassis only booked in the month was $487,879, against $1,812,363 in October.

Bookings included five nonelevating platform trucks with $11,540 combined net value; 95 cantilever trucks valued at $308,008; 11 light and heavy duty tractors with $20,935 aggregate value; 24 crane trucks with a total net value $147,307.

MEN of INDUSTRY

■ **JOHN SHERWIN JR.,** vice president, Cleveland Trust Co., Cleveland, is resigning that position to become a partner in Pickands, Mather & Co., Cleveland ore, coal and shipping company. Mr. Sherwin formerly was president of the Midland Trust Co., Cleveland.

♦

James B. Hayden has been elected vice president in charge of sales, Industrial Brownhoist Corp., Bay City, Mich.

♦

Howard I. Prentice, the past 14 years sales engineer, Cleveland Frog & Crossing Co., Cleveland, has been named manager of sales.

♦

H. J. Bauman, formerly superintendent, Keystone Drawn Steel Co., Spring City, Pa., and later vice president and general manager, Empire Finished Steel Co., Newark, N. J., has been appointed manager of the newly established Cold Finished Steel Division of Pennsylvania Iron & Steel Co., Los Angeles. The new plant, comprising about 40,000 square feet of floor space, cost $250,000.

♦

William H. Addis, 2344 Cumberland street, Houston, Tex., has been appointed representative for Ajax Electric Co. Inc., Philadelphia, in the southwestern territory.

♦

Ralph J. Lundrigan has joined Cochrane Corp., Philadelphia, to supervise merchandising of the new Cochrane-Becker high-pressure condensate return system.

♦

J. H. Coolidge has been appointed treasurer, Thompson Products Inc., Cleveland. Formerly executive vice president of McDonald, Coolidge & Co., Mr. Coolidge succeeds **J. D. Wright,** recently elected vice president and general manager of Thompson Aircraft Products Co., Euclid, O. Mr. Wright will also continue as secretary of Thompson Products Inc.

♦

Stuart M. Campbell has been appointed comptroller, Pittsburgh Plate Glass Co., Pittsburgh, effective Jan. 1. Formerly a member of the firm of Arthur Andersen & Co., Chicago, accountants and auditors, Mr. Campbell will succeed **M. C. Spahr,** who will retire after more than 50 years of continuous service.

John Sherwin Jr.

H. J. Bauman

Mr. Spahr will remain with the company during 1942 in an advisory capacity.

♦

K. W. Jappe, director of purchases, Hercules Powder Co., Wilmington, Del., has been elected chairman, finance committee, American Society of Mechanical Engineers, New York.

♦

Joseph C. Elliff, assistant general sales manager, and **George L. Meyer,** manager, Stewart Die Casting Division, Stewart-Warner Corp., Chicago, have been elected vice presidents. Mr. Meyer will continue as manager of the Die Casting Division.

♦

G. L. Leckner and **E. J. McKenzie,** of the Renkcel Engineering & Pyrometer Service Co., have been appointed district engineers in Michigan for Despatch Oven Co., Minneapolis.

♦

Otto P. Kossatz, 83 Whittier place, Indianapolis, has been named representative for Ajax Electric Co. Inc., Philadelphia, in Kentucky and Indiana with the exception of the South Bend, Ind., district.

♦

Raymond W. Keller has resigned as assistant to works manager, East Springfield, Mass., plant of Westinghouse Electric & Mfg. Co., to become vice president and assistant general manager, Milton Bradley Co., Springfield, Mass.

♦

Carter C. Higgins has been made assistant general sales manager, Worcester Pressed Steel Co., Worcester, Mass. The past two years he has been acting in capacity of export manager and in charge of government contract negotiations.

♦

Leo E. Clarahan has been appointed general freight traffic manager, Wabash railway, St. Louis, succeeding **C. H. Stinson,** who will retire Dec. 31, after 50 years of continuous service. **P. A. Spiegelberg** will succeed Mr. Clarahan as assistant freight traffic manager.

♦

Walter L. Cherry, president, Cherry-Burrell Corp., Chicago, celebrated his golden anniversary in business on Dec. 19. A testimonial dinner was tendered to him by his associates and he was presented with a diamond-studded platinum pin.

♦

E. V. Enevik, heretofore vice president, Uddeholm Co. of America Inc., New York, has been elected first vice president. **W. A. Olsen** has been made vice president in charge of tool steel sales; **E. W. Dutcher,** assistant treasurer, has become assistant secretary, and **James Owens** has been named assistant treasurer.

♦

Frank G. Osgood, veteran aeronautical production engineer and a captain in the Air Corps Reserve, has been released from duty at Wright Field, Dayton, O., to become works manager, Taylorcraft Aviation Corp., Alliance, O. **Ken-**

neth W. Tibbits continues as production manager, and **Raymond M. Carlson** as chief engineer.

♦

James E. Holmes, formerly associated with Republic Steel Corp., Cleveland, has been appointed assistant manager of tubular sales, Youngstown Sheet & Tube Co., Youngstown, O.

♦

Louis F. Sattele, superintendent of pipe mills, National works, National Tube Co., McKeesport, Pa., has been notified by the American Institute of Mining and Metallurgical Engineers that he has been voted the J. E. Johnson Jr. award for 1941, "in recognition of his development and practical application in blast furnace operation of fundamental slag data as outlined in a paper entitled "Effect of Magnesia and Low Alumina in Blast Furnace Slags on Furnace Operation and Desulphurization." The award will be presented to Mr. Sattele at the annual meeting of the institute in New York, Feb. 11.

♦

Paul W. Rhame, works manager, and **Charles W. Crick,** assistant to general manager, AC Spark Plug division of General Motors Corp., have been named executive assistants to the general manager. Mr. Rhame will continue to head the present machine gun production activity as well as production on new defense items, while Mr. Crick will be executive assistant on automotive and regular products.

Joseph Anderson, assistant works manager, will be works manager in charge of both defense and automotive products. **Miles Hanson,** superintendent, has been appointed assistant works manager in the machine gun department, and **Lee Sherrod,** superintendent, will be assistant works manager on automotive and regular products.

Assisting Mr. Rhame will be **Morris Allen** on machine guns and **Meredith Spear** on new defense products activity.

♦

Dr. R. G. Spencer, research physicist, Armour Research Foundation, Illinois Institute of Technology, Chicago, has been named chairman of metallurgical research to care for expanded industrial research projects recently undertaken at the institute.

Five new appointments also were announced: **Dr. W. H. Earhart,** ceramist, from the Edward Orton Jr. Ceramic Foundation, Columbus, O., and **George Stern,** metallographer, formerly associated with American Electric Metal Corp., Yonkers, N. Y., will assist in the metallurgical section.

Dr. Clyde W. Leaf, formerly with Givaudan-Delawanna Inc., New York; **Clark E. Thorpe,** from Ozo-Ray Process Corp., Chicago, and **Robert C. Bour,** formerly development chemist, Ditto Inc., Chicago, have been appointed to the chemical engineering section.

♦

Dr. John Boswell Whitehead, professor of electrical engineering and director of the School of Engineering, Johns Hopkins University, has been awarded the Edison medal for 1941 by the American Institute of Electrical Engineers "for his contributions to the field of electrical engineering, his pioneering and development in the field of die-electric research, and his achievements in the advancement of engineering education." The medal will be presented to Dr. Whitehead during the winter convention of the institute in New York.

♦

J. H. Hille has been appointed Chicago district representative, H. K. Porter Co. Inc., Process Equipment Division, Pittsburgh, with headquarters at 160 East Illinois street.

Defense Bonds, Stamps Given Foundry Employes

■ Hamilton Foundry & Machine Co., Hamilton, O., has been celebrating its fiftieth anniversary and as a feature of the observance presented defense savings bonds and stamps to all employes at Christmas.

To each employe with six months or more service before Dec. 1 was given a $25 defense bond and a 25-cent stamp as a starter for purchase of another bond. To employes with less than six months service was presented $10 in stamps in a stamp album as a starter for purchase of a $25 bond. For employes beginning service Dec. 1 or later a 25-cent stamp as an introduction to saving for purchase of a $25 bond.

These gifts were to stimulate purchase of defense bonds, both as savings and as an aid to the government in prosecuting the war.

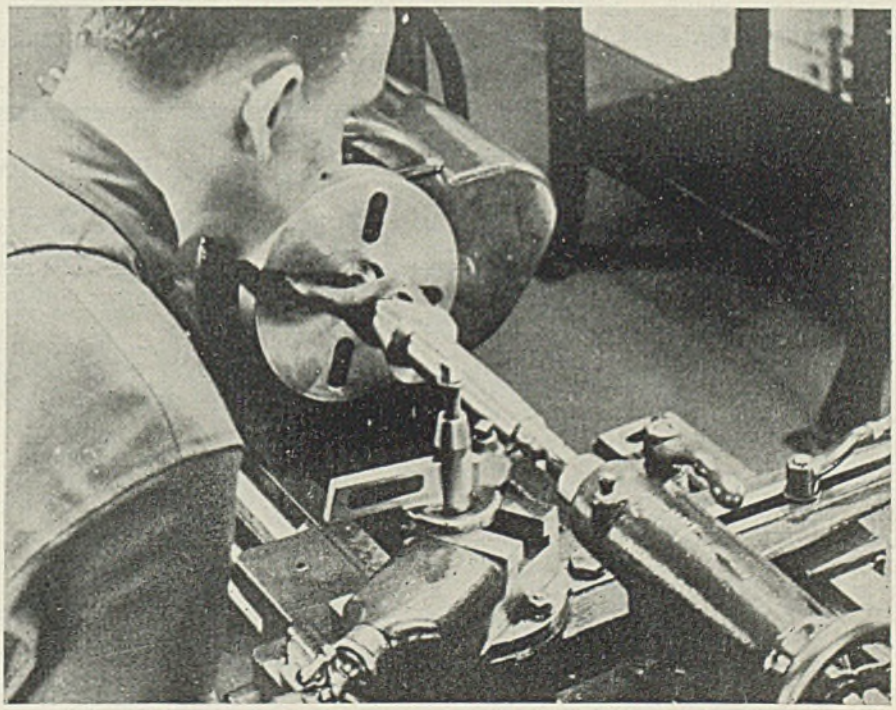
Sound Films To Aid in Training Defense Workers

■ To assist in the training of defense workers, a series of 50 sound films presenting a detailed course in the handling of machine tools in precision work are being offered to schools, war training centers and industries offering apprentice training.

The films follow a pattern developed by the United States Office of Education and were produced with the co-operation of machine tool manufacturers, vocational training experts and various industries. Seven reels are devoted to the engine lathe, five to precision measurement, five to the vertical boring mill, five to the milling machine, five to drill presses, seven to bench work, three to the shaper, two to single point cutting tools, one to centering and layout and ten to shipbuilding.

Films are being distributed by Castle Films Inc., New York.

Shown at right is a view from one of the reels on the lathe illustrating cutting a taper with compound rest and taper attachment.



Canada "Freezes" Pig Tin Stocks To Conserve Metal for War Needs

TORONTO, ONT.

■ CANADA'S stocks of pig tin have been "frozen" in a temporary measure designed to conserve existing supplies, pending an order which will curtail use of tin in many products, it was reported last week by C. D. Howe, minister of munitions and supply. Details of the proposed order are being completed by G. C. Bateman, metals controller, and will curtail use of tin in solders and bearing metals, and will prohibit its use in Britannia metal and black tin pipe.

Britannia metal, containing more than 90 per cent tin, is extensively used in manufacturing coffee pots, tea kettles, sugar bowls and other silver plated articles. Processors and distributors have received instructions that no virgin tin may be employed in its manufacture henceforth. Alternative base for silver plating is copper, but its use for that purpose has already been restricted by 60 per cent of average consumption in 1937-39.

Will Reduce Tin Content

Use of pig tin for any except direct war purposes has been prohibited by the metals controller. He has also requested a list of specific purposes for which tin is used by each company, and average monthly consumption for each specific purpose in 1941. "Sufficient tin will be allotted to can manufacturers for essential foodstuffs and for type metal for production of newspapers, but we shall endeavor to reduce tin content wherever possible," said Mr. Bateman.

Instructions issued manufacturers by Mr. Bateman also prohibit use of brass and bronze in numerous items employed by builders and in homes, effective March 1, 1942.

Copper, after the first of the year, may not be used for outside water connections.

Manufacture of many items of which the principal component is metal, in quantity or value, has also been prohibited after March 31 by Alan H. Williamson, controller of supplies. Included are all toys, metal furniture, electrical appliances, store and office equipment, radiator covers, metal signs, coffins and similar items. No manufacturer may sell listed items after April 30, although retailers will be permitted to dispose of stocks on hand.

Further curtailment of refrigerator and washing machine production likewise has been ordered. Issued by Mr. Williamson, the new order limits monthly output of each item to 60 per cent of the average production per month in 1940. Only exception is hand washing machines with wooden tubs.

No restrictions have been placed on production of parts intended for repair. Washing machines and refrigerators ordered by the Department of Munitions and Supply also are exempt from output restrictions, but are subject to other provisions in the order.

Department of Munitions and Supply, in the week ended Dec. 9, placed 3830 contracts with total value $10,251,465. Orders placed with United States' companies aggregated $11,504. Contracts included:

Shipbuilding: Silvers Agencies, Ltd., Halifax, N. S., $6555; Eastern Canada Coastal Steamships, Ltd., St. John, N. B., $42,500; F. X. La Chance, St. Laurent, Que., $13,400; McCall & Co., St. Williams, Ont., $6700.

Dockyard Supplies: Overseas Requisition, London, Eng., $9711; Stephens-Adamson Mfg. Co. of Canada, Ltd., Montreal, $44,400; Canadian Locomotive Works, Ltd., Kingston, Ont., $5750; Page-Hersey Tubes, Ltd., Toronto, $7853.

Land Transport: Arlington Cycle & Sports, Ltd., Montreal, $34,972; Laurentide Equipment Co. Ltd., Montreal, $10,043; T. E. Ryder Machinery Co. Ltd., Montreal, $20,410; Sicard Ltd., Montreal, $10,616; International Harvester Co. of Canada, Ltd., Ottawa, Ont., $13,525; Wilson Motor Bodies, Ltd., Toronto, $202,176; Chrysler Corp. of Canada, Ltd., Windsor, $10,818.

Aircraft: Overseas Requisition, London, Eng., $33,600; Fairchild Aircraft, Ltd., Longueuil, Que., $22,-681; Noorduyn Aviation, Ltd., Montreal, $199,237; Belleville Foundries, Ltd., Belleville, Ont., $5443; Stewart-Warner-Alemite Corp. of Canada, Ltd., Belleville, $28,215; Cockshutt Plow Co., Ltd., Brantford, Ont., $9007; Standard Tube Co., Ltd., Windsor, $7030.

Instruments: Ontario Hughes-Owens Co., Ltd., Ottawa, Ont., $7140; Neptune Meters, Ltd., Toronto, $19,380; Sutton-Horsley Co., Ltd., Toronto, $301,091; Vivian Engine Works, Ltd., Vancouver, B. C., $75,700.

Electrical Equipment: Overseas Requisition, London, Eng., $30,600; Haliburton & White, Ltd., Montreal, $16,371; John Hay & Co., Ltd., Eastview, Ont., $18,080; Northern Electric Co., Ltd., Ottawa, $22,236.

Machinery: McGregor-McIntyre Iron Works, Ltd., Toronto, $51,800.

Ordnance: Overseas Requisition, London, Eng., $149,300; Sorel Industries, Ltd., Sorel, Que., $44,360; Canadian Marconi Co., Montreal, $5700; Northern Electric Co., Ltd., Montreal, $770,000; Ferranti Electric, Ltd., Toronto, $44,400; John Inglis Co., Ltd., Toronto, $60,000.

Munitions: Overseas Requisition, London, Eng., $57,750; T. W. Hand Fireworks Co., Ltd., Cooksville, Ont., $15,876.

Metals: Consolidated Mining & Smelting Co., Ltd., Montreal, $140,-663.

War Construction Projects: W. C. Brennan Contracting Co., Hamilton, Ont., $85,000; H. J. McFarland Construction Co., Pictou, Ont., $49,838; Henry Borger & Son, Ltd., Winnipeg, Man., $62,944; Claydon Co., Ltd., Winnipeg, $84,881; Nelson

River Construction Co., Ltd., Winnipeg, $54,198; Williams, Trerise & Williams, Victoria, B. C., $80,000.

Miscellaneous: Metropolitan Electric Co., Ltd., Quebec, $28,806; Canadian Steel Stampings, Ltd., Montreal, $5803; Miner Rubber Co., Ltd., Granby, Que., $22,113; Asbestos Corp., Ltd., St. Lambert, Que., $33,276; Dominion Rubber Co., Ltd., Ottawa, $35,676; S. S. Holden, Ltd., Ottawa, $114,950; Hy-Grade Metal Products Co., Guelph, Ont., $6500; Beatty Bros., Ltd., Fergus, Ont., $36,213; International Business Machines Co., Ltd., Toronto, $75,794; E. R. Clarke, Toronto, $13,000; Instruments, Ltd., Ottawa, $12,425; La France Fire Engine & Foamite, Ltd., Toronto, $16,750; English Electric Co., St. Catharines, $6675.

Subcontracting Exhibits Opened in St. Louis

■ OPM's first "department store of subcontracting", a permanent exhibit in which samples of needed defense equipment and parts will be shown to prospective producers, was opened last week in St. Louis.

Bits and pieces of needed war goods will be exhibited by 48 holders of large war contracts and by the Army, Navy, and the United States Maritime Commission.

Articles displayed in the exhibit all will be changed from time to time as those previously shown are placed under contracts or subcontracts. A representative of the Contract Distribution Division will be available regularly to advise manufacturers who believe they can make items exhibited. In many instances, the items will be tagged with a price mark indicating the figure at which contracts or subcontracts will probably be placed.

Similar exhibits are to be opened soon in the following cities:

Philadelphia — Broad Street Station building. This exhibit, in which 29 prime contractors have already agreed to participate, will open before Jan. 1.

New York — Chanin building, 122 East Forty-second street. This exhibit, in which 31 prime contractors have agreed to participate, will open before Jan. 1.

Cleveland — Union Commerce building. Twenty-five prime contractors have agreed to take part in this display, which probably will open before Jan. 1.

Los Angeles — Western Pacific building. Will open about Jan. 5.

Chicago — Civic Opera building. Scheduled to open about Jan. 5.

Atlanta, Ga. — Hurt building. Scheduled to open about Jan. 7.

Detroit — Boulevard building, Grand Boulevard and Woodward avenue. Scheduled to open about Jan. 10.

Contract Distribution Field Offices

■ Field offices established by the OPM Division of Contract Distribution and their principal personnel are listed below. These offices provide information and engineering assistance to prospective producers of war *materiel*. Manufacturers seeking war work should take or send to the nearest field office full information regarding their equipment and the products they normally manufacture.

State	Manager		Address
Alabama			
*Birmingham	L. E. Geohegan	E. Lee Norton	301 Phoenix building
Arizona			
*Phoenix	Fred F. Schalmo (acting)		406 Security building
Arkansas			
*Little Rock	Alfred M. Lund (state director)	Charles L. Tompson (chairman, advisory committee)	304 Rector building
California			
Fresno	E. H. Cameron (acting)		Mattei building
Los Angeles	Howard Hutchins	W. S. Rosecrans	1031 South Broadway
Oakland	W. P. Collins (acting)		Financial Center building
San Diego	Paul C. Farmer (acting)		510 Union building
San Francisco	Col. Francis M. Smith		Furniture Mart
Colorado			
*Denver	Clyde C. Hartzell (state director)	Wm. L. Petrikin (chairman, advisory committee)	U. S. National Bank building
Connecticut			
*Hartford	Carl Gray (state director)		Phoenix Bank building
Bridgeport	Raymond L. French (acting)		Professional building
Delaware			
Wilmington	Bradley L. Giest (acting)		314 Penn building
Florida			
*Jacksonville	Chas. C. McCubbin (state director)	George W. Simons (chairman, advisory committee)	620 Hildebrandt building
Miami	Forrest D. Banning (acting)		514 Congress building
Tampa	Arthur B. Hale		901 Wallace South building
Georgia			
*Atlanta	W. C. Cram Jr.	Wiley Moore (chairman, advisory committee)	Suite 150, Hurt building
Idaho			
*Boise	H. W. Bogie (acting)		409 Capital Securities building
Illinois			
*Chicago	Thos. S. McEwan		Federal Reserve Bank building
Springfield	Edward Gerrity		407 Leland Office building
Indiana			
*Indianapolis	Frank Hoke (state director)		CircleTower building
Evansville	J. T. Mooney (acting)		Koenig building, Room 8
Iowa			
*Des Moines	George Beese (state director)	Vernon L. Clark (chairman, advisory committee)	505 Crocker building
Kansas			
*Wichita	Harold Hartzell (state director)	George B. Weeks (chairman, advisory committee)	517-518 Union National Bank building
Kentucky			
*Louisville	Prentiss M. Terry		200 Todd building
Louisiana			
*New Orleans	R. E. Judd (state director)	A. B. Paterson (chairman, advisory committee)	Room 423 Canal building
Shreveport	R. H. Cone (acting)		916 Giddens Lane building
Maine			
Bangor	Charles E. Walker (acting)		363 Union street
*Portland	Herbert Payson Jr. (state director)		Room 501-502, 443 Congress street

(*Please turn to Page* 30)

Smelting, Refining Firms Receive Priority Aid

■ Action to assure the complete cycle of metal production, from mining through refining, be completed without interruption has been taken.

Of the four steps essential to metal production—mining, concentration, smelting and refining—the first two are covered by Preference Rating Order P-56, which extends priority assistance to mine operators in the acquisition of necessary maintenance, repair and operating supplies. A new order, Preference Rating Order P-73, provides similar aid to accredited smelters and refiners of copper, lead, zinc, antimony, mercury and cobalt.

Primary producers engaged in these operations must obtain a serial number from the Priorities Division before the benefit of the order may be applied to deliveries. Form PD-212, marked "Ref: P-73," should be filled out by the applicant, and forwarded to the Priorities Division.

Provides Basic A-3 Rating

Under the terms of the new order a basic rating of A-3 is provided for essential repair, maintenance and operating supplies. Producers will be given an emergency rating of A-1-a for actual breakdown or suspension, and an intermediate rating of A-1-c for necessary advance provision to avert breakdown or suspension. These two latter ratings are available only after advance approval by the director of priorities. In requesting such advance approval, the producer must furnish the following information:

(1) Nature and effect of breakdown or suspension of operations, including loss of production that would result.

(2) Whether this has already taken place or whether it is necessary to make advance provision to avert a breakdown or suspension.

(3) Kind, quantity and total value of material required to repair or avert, the breakdown or suspension of operations in this case.

(4) Why the material described in (3) cannot be obtained by the A-3 rating soon enough for the purpose.

(5) Names and addresses of suppliers with which orders have been placed for the exact material required and the approximate aggregate value of material to be furnished by each supplier.

A producer, or his suppliers, in order to apply a preference rating assigned under Preference Rating Order P-73, must furnish one copy of the order, with the attached form of acceptance unsigned, to each of his suppliers with whom he places a purchase order.

Contract Distribution Field Offices

(*Continued from Page* 29)

State	Manager		Address
Maryland			
*Baltimore	G. W. Creighton (state director)	W. F. Roberts (chairman, advisory committee)	Federal Reserve Bank building
Massachusetts			
*Boston	Edward V. Hickey (state director)		17 Court street
Fall River	Harold S. Ramsay (acting)		27 South Main street
Lowell	W. E. Standwood (acting)		Sun Bldg., 8 Merrimac street
Springfield	Howard G. Philbrook		95 State street
Worcester	Dwight Clark Daniels		State Mutual building
Michigan			
*Detroit	Warren H. Clarke (state director)	Clarence Avery (chairman, advisory committee)	Federal Reserve Bank building
Minnesota			
*Minneapolis	Harold C. Timberlake	Roger Shepard (chairman, advisory committee)	Midland building
Mississippi			
*Jackson	A. G. McIntosh (acting)		610 Tower building
Missouri			
*St. Louis	F. J. McDevitt		Federal Reserve Bank building
Kansas City	R. W. Webb		Federal Reserve Bank building
Montana			
*Helena	R. E. Towle (state director)	J. E. O'Connell (chairman, advisory committee)	Federal Reserve Bank building
Nebraska			
*Omaha	Arthur Walker (state director)		501 Grain Exchange building
Nevada			
*Reno	Leonard E. Faber (acting)		Saviers building
New Hampshire			
*Manchester	S. H. Dann (acting)		Amoskeag Industries building
New Jersey			
*Newark	R. L. Kennedy (state director)	Tom Jones (chairman, advisory committee)	176 Sussex avenue
New Mexico			
*Albuquerque	George Lusk (acting)		103½ West Central avenue
New York			
*New York City	W. O. Crabtree		Chanin building
Albany	F. J. Holman		State Bank building
Brooklyn	Emile Weinberg		16 Court street
Buffalo	Thos. J. O'Rourke	John J. Lenahan	Manufacturers' & Traders' Bank building
Rochester	Mahlon Gregg		119 East Main street, Commerce building
Syracuse	T. D. Harter		302 Starrett-Syracuse building
North Carolina			
*Charlotte		Frank H. Cothran (chairman, advisory committee)	New Liberty Life building
North Dakota			
*Bismarck	Paul W. Fawcet (acting)		14 First National Bank building
Ohio			
*Cleveland	Dr. Charles Terry (state director)	Herman Lind (chairman, advisory committee)	Union Commerce building
Cincinnati	Clifford Schulte	Clifford Wright	Room 804, Union Trust building
Columbus	Benjamin J. Zuhars (acting)		305 Spahr building
Dayton	Collins Wright (acting)		1021 Third Nat'l Bank building
Toledo	Henry A. Jordon (acting)		519 Spitzer building
Youngstown	Leif Oyen (acting)		1002 Union National Bank building
Oklahoma			
*Oklahoma City	Morton R. Harrison (state director)	Fred Jones (chairman, advisory committee)	540 Key building

State	Manager		Address
Oregon			
*Portland	John G. Barnett (acting)	Thomas Harry Banfield	815 Bedell building
Pennsylvania			
*Philadelphia	Orville H. Bullitt (state director)	Thomas S. Gates (chairman, advisory committee)	Federal Reserve Bank building
Allentown	Ernest R. Follin Jr. (acting)		506 Hamilton street
Chester	Abbott Smith		12-14 East Fifth street
Erie	Harry B. Joyce (acting)		Erie Trust Company building
Harrisburg	Ritchie Lawrie Jr. (acting)		Black Stone building
Johnstown	John S. Wagoner		U. S. National Bank building
Lancaster	Arthur K. Barnes		655 Woolworth building
Norristown	Geo. Peterson Jr.		306-308 Norristown-Penn Trust building
Pittsburgh	M. F. McOmber	Alex E. Walker	406 Fulton building
Reading	John A. Archer (acting)		615 Penn street
Scranton	Alfred T. Snyder (acting)		Room 717 First National Bank building
Wilkes-Barre	W. H. Pierce		53 West Market st.
Williamsport	H. D. Stuempfle		Susquehanna Trust Co. building
York	Richard S. Cole		Manufacturer's as- Manufacturer's As-
Rhode Island			
*Providence	Walker Mason (state director)	Col. William Shawcross (chairman, advisory committee)	530 Industrial Trust building
South Carolina			
*Columbia	Harry G. Greene (acting)		Room 204-206 Manson building
South Dakota			
Sioux Falls	Fred M. Chase (acting)		309-310 Boyce Greely building
Tennessee			
*Memphis	Arthur M. Field (state director)	Arthur J. Dyer (chairman, advisory committee)	2112 Sterrick building
Chattanooga	Paul E. Shacklett		909-910 James building
Knoxville	W. W. Mynatt (acting)		202-204 Goode building
Nashville	W. G. Whitsitt		1014 Stahlman building
Texas			
*Dallas	A. J. Langford	Chas. R. Moore	Fidelity building
El Paso	L. A. Wilke	W. R. Blair	222 El Paso National building
Houston	I. M. Griffin	R. Lee Blaffer	Federal Reserve Bank building
San Antonio	P. E. Locke	Hull Youngblood	1100 South Texas Bank building
Utah			
*Salt Lake City	Bayard W. Mendenhall (acting)	Geo. M. Gadsby	432 Utah Oil building
Vermont			
*Montpelier	A. M. Creighton Jr. (acting)		12 State street
Virginia			
*Richmond	Julian Lorin Mason		Johnson Publishing building, Fifth & Cary streets
Washington			
*Seattle	F. C. Bold	J. G. Larson (chairman, advisory committee)	National Bank of Commerce building
Spokane	T. Wilber Weger		Room 629-630 Old National Bank building
West Virginia			
Wheeling	M. S. Sloman (acting)		1025 Main street, Hawley building
Wisconsin			
*Milwaukee	Clifford E. Ives (state director)	Harold H. Seaman (chairman, advisory committee)	610 First Wisconsin National Bank building
Eau Claire	Dorance W. Walters (acting)		128½ Graham avenue
Wyoming			
*Casper	H. C. Gustafson (acting)		P. and R. building

*Main office in state.

New Order Applies to Seasonal Jobber Items

■ Steel products handled through a large number of warehouses, for which there is a heavy seasonal demand, are accorded special treatment by an amendment to the steel warehouse order, M-21-b.

Under the directive with respect to Supplementary Order M-21-b which was issued Sept. 26, jobbers were assigned quotas based on their receipts from producers during the corresponding calendar quarter of 1940 covering their orders for hot-rolled concrete reinforcing bars, pipes and tubes, wire and wire products, tin and terne plate, galvanized sheet and strip.

Latest amendment incorporates the quotas into the order itself, but permits any warehouse, by notifying his supplier on or before Feb. 1, to base his quota for the Schedule B products listed above on one-fourth of the total tonnage of such product classification shipped by the supplier to the warehouse during the year 1940.

Option will enable warehouses to make necessary adjustments in their 1942 orders for the products specified, as compared with their receipts in 1940. However, once the warehouse has chosen whether it will base its quota on the corresponding calendar quarter or 25 per cent of the whole year 1940, the method cannot be changed for any subsequent quarter in 1942.

Restricts Plate Sales

Previous limitations on the size of items of alloy, stainless and tool steel which may be sold by warehouses on unrated orders have been removed, but they may sell such items after Jan. 1 for essential maintenance and repair purposes only, and total deliveries on unrated orders for such items may not exceed 10 per cent of the average monthly deliveries of such materials by the warehouse to all customers during the first calendar quarter of 1941.

Sales of carbon steel plate from warehouse stock are restricted to defense orders after Jan. 1.

An A-9 rating was assigned by Supplementary Order M-21-b to orders for certain percentages of the quotas of specified products which warehouses may receive. The order as amended provided that this rating may be extended by a producer to his suppliers, if such extension is necessary in order to obtain materials needed to manufacture steel for warehouse account. This amendment removes any unfair competitive advantage which may have been enjoyed by integrated steel mills as compared with independent mills.

Windows of WASHINGTON

War Department moves to expedite procurement by allowing local offices to clear contracts under $1,000,000 . . . Vanadium placed under complete allocation system . . . Suspension orders issued against two violators of priority orders and regulations . . . Spare tires on new automobiles banned . . . OPA asks price ceiling for beehive coke

By L. M. LAMM

Washington Editor, STEEL

WASHINGTON

■ TO EXPEDITE War Department procurement, Undersecretary Robert P. Patterson has authorized local contracting and procurement officers to award all contracts amounting to less than $1,000,000 in their own offices without sending them to Washington for approval.

Authority also has been given for awarding of contracts totaling from $1,000,000 to $5,000,000 by the local officers, subject to clearance only by the OPM and the Chiefs of Supply Arms and Services. Contracts for more than $5,000,000 will still require clearance by the undersecretary's office. Each corps officer will determine at his own discretion whether contracts for smaller amounts should be subjected to approval in Washington.

This direction will apply also to change orders and supplemental agreements, except where changes are contemplated in the form of the contracts from the usual types. Previously, it was required that awards in excess of $500,000 be cleared through the office of the undersecretary.

In all cases where it will expedite procurement, it will not be necessary to advertise for bids on contracts. Contracts will be negotiated on a-cost-plus-a-fixed-fee basis only when the use of that form of contract is essential.

Regulations requiring approval by the OPM of all contracts of $500,000 or more will be revised.

The undersecretary of war also placed the responsibility on the chiefs of supply arms and services to see that supply contracts involving new construction or extensive new machine tool installations be not entered into unless essential, and that in any event, such new construction and machine tool installations be held to an absolute minimum.

Spare Tires on New Automobiles Prohibited

Sale, shipment or delivery by producers or any other person of new passenger automobiles equipped with more than four new tires has been prohibited by the Priorities Division.

This means that dealers as well as manufacturers cannot sell or deliver new cars equipped with new spare tires. Order is effective immediately.

Organization of local tire rationing boards is now moving forward in every state, according to OPA.

Limit Materials for New Oil, Natural Gas Wells

Use of materials for the development of new oil and natural gas wells is put under strict control by Conservation Order M-68.

Order prohibits every operator in the petroleum industry from acquiring or using materials for production purposes except under specified conditions or by specific authorization from the director of priorities.

No special authorization is needed, however for materials used to drill or complete oil wells which follow a uniform well-spacing pattern of not more than one well to each 40 surface acres, or natural gas wells which are uniformly spaced with not more than one well to each 640 surface acres. Materials may be used without limitation for experimental or exploratory wells in new fields.

Tungsten Order Extended Six Months to June 30

General Preference Order M-29, which provides for the control and allocation of tungsten metal powder, ferrotungsten, and tungsten compounds, has been extended six months to June 30, by the Priorities Division.

Supplementary Order M-29-a,

Highspots in the Week's Washington News

which exempts purchasers of 100 pounds or less of contained tungsten in any month from filing reports required of larger users, has been similarly extended. Both orders would have expired Dec. 31.

Order M-29 prohibits transactions in ferrotungsten, tungsten metal powder and tungsten chemical compounds to be processed into metal powder except as specifically authorized by the Director of Priorities. It also limits deliveries of tungsten chemical compounds to producers to be used for other purposes than the manufacture of tungsten metal powder, and the manufacture of such compounds in any calendar month, to 90 per cent of the monthly average of such deliveries or manufacture in the year ended June 30, 1941.

OPA Asks Beehive Coke Prices Be Maintained

Action to forestall an indicated 25-cent increase in the price of blast furnace beehive coke in Pennsylvania, where about 85 per cent of the nation's production originates, has been taken by OPA in the form of telegrams asking producers to make no advance beyond a price to consumers of $6 per net ton.

The telegrams were sent to 55 beehive coke producers responsible for virtually all of the output in Pennsylvania.

Beehive blast furnace coke prices in general have not changed substantially since May 1, 1941. Production, which was at a low ebb until the outbreak of the war in 1939, has risen sharply and currently is running at somewhat more than 600,000 tons monthly. Considerably more than 500,000 tons of this production originates in Pennsylvania. Except for a comparatively small amount of foundry coke, the entire output of beehive ovens is used by blast furnaces in the production of pig iron.

OPA Defines Extras Under Price Schedule No. 6

A letter clarifying the definition of "extras" which may be charged on iron and steel products under Price Schedule No. 6, Iron and Steel Products, has been sent to members of the steel industry by OPA, it was reported last week.

The letter is intended to correct any misunderstandings of the definition of "extras" permitted by the schedule and was decided upon after several violations of the provision had been noted.

The schedule states that any "extras" must have been "in effect" April 16, 1941, the ceiling date. It is the ruling of the OPA that to have been "in effect" on April 16, 1941, an "extra" must have been customarily charged on that date or during the two or three preceding years, and also must have been listed and filed with OPA. However, an "extra" is not considered to have been "in effect," even if listed and filed, if it were not customarily charged.

The letter lists several instances where "extras" have been collected in violation of the schedule by: (1) charging quality or inspection "extras" where not specified or not customarily charged; (2) requiring that higher quality material than specified be taken; and (3) reclassifying the product ordered, thereby imposing higher "extras."

Vanadium Placed Under Complete Allocation System

Vanadium has been placed under a complete allocation system. General Preference Order M-23-a, which replaces M-23, provides for monthly requests for vanadium allotments and authorizes the Director of Priorities to make monthly allocations without regard to previous preference ratings. Consumers receiving less than 50 pounds per month need not file reports.

Ninety-nine per cent of the United States vanadium supply is used in the manufacture of high-speed steel for machine tools, special castings, armor plate and alloy iron. Approximately half of our supply is produced domestically and the remainder comes from Peru.

Increased demand for alloy steel for military uses, coupled with a limited supply, are responsible for the order.

Suspension Orders Issued Against Two Metal Companies

Suspension orders have been issued by the Priorities Division against a plumbing supply house in Brooklyn, N. Y., and a metal company in Canton, O., for violation of priority orders and regulations.

"State Metals & Steel Co. Inc., Canton, made deliveries of high-grade aluminum scrap, for melting into ingots, without preference rating for the delivery, with the result that 67,000 pounds of aluminum ingots were diverted for purposes not sanctioned by the Director of Priorities," the division stated.

"Lieb & Buchalter, Brooklyn, attempted to place an order for brass pipe and copper tubing with a false statement that the order was entitled to an A-10 rating.

"Action taken against the two firms parallels the penalty imposed on a Chicago aluminum company two months ago, but the penalties imposed today are more severe in that *all* priority assistance of every kind is withdrawn while the suspension orders are in effect.

"This means that the companies will not be entitled to the use of a preference rating under General Preference Order P-100 on their needs for maintenance, repair, and operating supplies, nor can they use any other preference rating to which they might otherwise be entitled. State Metals & Steel Co. is also forbidden to deal in aluminum while the suspension order is in effect."

Spanish Iron, Steel Output Reduced by War Conditions

War conditions, resulting in curtailment of Spanish iron outlets in foreign markets, have reduced output of that country's iron mines, reports to the Department of Commerce indicate.

Heavy ore stocks have accumulated, despite larger purchases by Germany, partly due to the limitations on water transportation. Spanish mine production accordingly is operating in small shifts, the report stated, with iron ore production for the first half of the year only 797,582 tons.

Steel output totaled 358,512 tons in this period, or 3000 tons under the corresponding period of 1940; pig iron output was 257,592 tons, or a reduction of 25,000 tons under the first half of 1940, with the reduction in pig iron and steel both attributed to a shortage of coal, coke, scrap iron, ferromanganese and graphite electrodes. The steel shortage is said to be seriously crippling the Spanish government's rehabilitation program for railroads, and other construction.

Diesel Engines To Continue Under Informal Price Ceiling

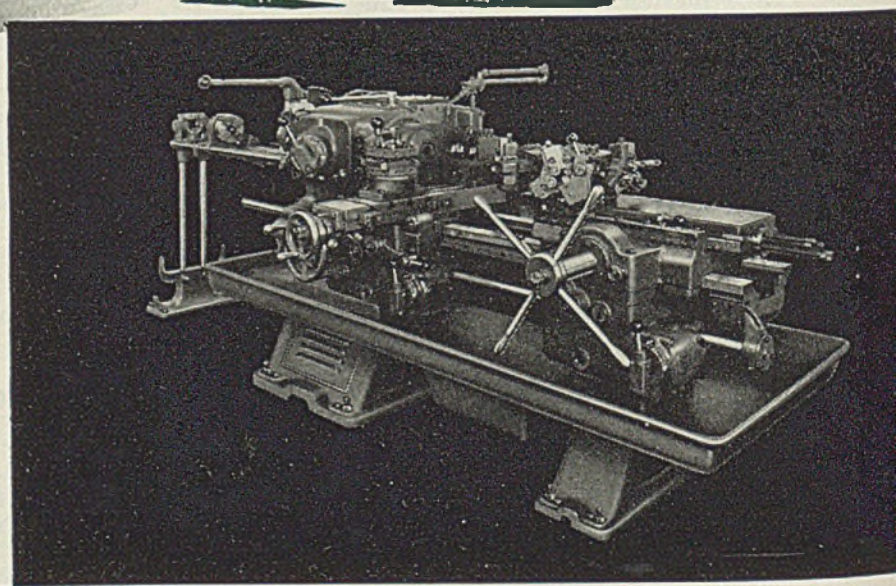
Informal arrangements whereby diesel engine prices will not be increased above the levels of Oct. 1 will be continued for the present, OPA officials have announced.

On Dec. 6, OPA requested diesel engine manufacturers to adhere to Oct. 1 prices and not to change their methods of determining prices for specially designed equipment. A meeting at which makers of 85 per cent to 90 per cent of all diesel engines were represented was held Dec. 18 at the OPA offices. Attending producers expressed the opinion that the voluntary method of keeping prices stabilized would be effective for the time being.

However, to implement the voluntary price control program, diesel engine manufacturers will be asked to file with OPA affirmations that they have complied with the request of Dec. 6.

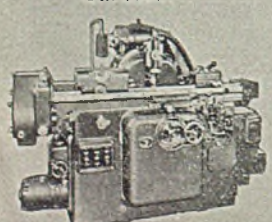
YOU WOULDN'T TRADE THIS

LIKE many an early leader in the machine tool field, David H. Hilliard received his training in the Vermont shop, of which Jones & Lamson Machine Company is a direct successor. When war broke out in 1861, Hilliard worked night and day to complete a wagon load of heavy telescopic rifles. These he drove to Concord and presented to the Governor of New Hampshire to arm a picked company of Sharpshooters.

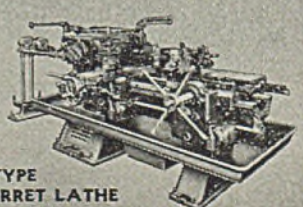


No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.

AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



RAM TYPE UNIVERSAL TURRET LATHE

FOR A WAGON LOAD OF RIFLES

IN 1861 a wagonload of rifles was a major contribution to national defense. In 1941 it might help some, but it wouldn't help enough.

Yet on the vast scale in which the fate of the world is being weighed today, one of the heaviest contributions to the survival of freedom is an intangible contribution, and it comes from the same original sources as Hilliard's wagonload of small arms.

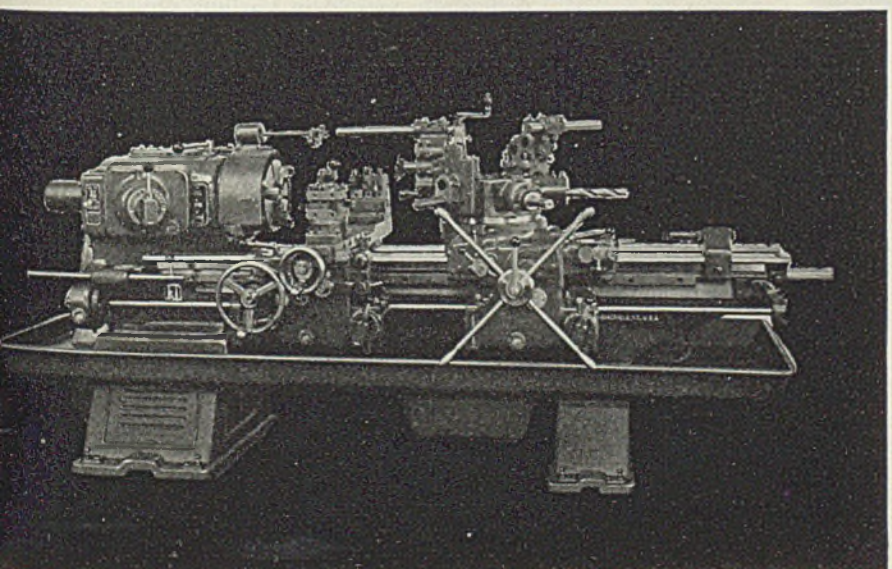
This contribution consists of the skill, experience and adaptability of a machine tool engineering and precision manufacturing organization whose continuous development began with Hilliard's predecessors over a century ago. Continued in turn by men like Hubbard, Kendall, Robbins, Lawrence, Howe and Hartness, this unbroken progress makes Jones & Lamson machine tool technique available to you in its present high speed, modern form.

With Jones & Lamson equipment you can speed defense production now, and with it later you will be in position to earn a living profit in the hard years ahead.

That's why it pays to put production problems up to Jones & Lamson engineers. That's why it is so advantageous to be Jones & Lamson equipped. Illustrated catalogs of this equipment are available, and inquiries from large plants or small receive careful study here.

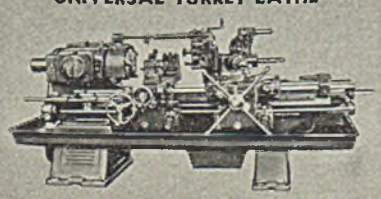
JONES & LAMSON

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

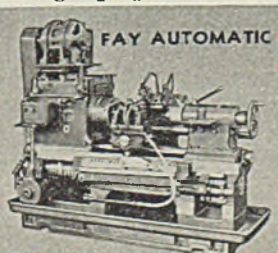


7A Jones & Lamson Saddle Type Universal Turret Lathe with standard chucking equipment.

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



SADDLE TYPE UNIVERSAL TURRET LATHE



FAY AUTOMATIC LATHES

AUTOMATIC OPENING

PROFIT PRODUCING MACHINE TOOLS

1942 Defense Construction Program Increased by Billion Dollars

WASHINGTON

■ NEW requirements brought suddenly into focus by the outbreak of war have caused OPM officials to increase by nearly one billion dollars their estimates of the amount of money to be needed for all kinds of construction in this country during 1942.

Preliminary estimates under the old defense program set the 1942 construction total at about $10,400,000,000—a slight decrease from the $11,000,000,000 expected to be spent during 1941. The new estimate is for approximately $11,250,000,000, an all-time high, of which all will be for defense construction or construction essential to health and safety.

There will be large increases next year over this year in direct military construction and government-financed defense plant expansion, defense housing and community facilities. In every other major category there will be decreases of varying degrees, according to the revised estimates.

Now in its eighteenth month, the defense construction program, measured in terms of funds available, amounts to nearly $11,000,000,000. During next year the amount expected to be used for defense construction alone will be approximately $8,650,000,000.

Value of defense work in place today is $4,900,000,000, or about 44 per cent of the $11,000,000,000 in defense funds already made available. Monthly expenditures now average about $500,000,000 and for the first time are approximating the rate at which funds for the purpose are becoming available.

Steel Fabricators in Pledge To Aid Victory

■ During the past year more than 2000 defense factories have been built or added to and construction at Army stations and Navy bases has been tremendous, fabricators of structural steel furnishing and erecting the greater part, reports the American Institute of Steel Construction, New York. They now are turning out an average of more than 200,000 tons of fabricated steel each month. Fabricators stand ready to take on direct war work, as they are equipped to produce some of the implements of war.

Indicative of willingness to serve in the emergency is the following pledge recently forwarded to Washington:

The structural steel fabricating industry, through the American Institute of Steel Construction and with a sober realization of the tremendous national task ahead of us, pledges all of its resources in man-power, trained organization, technical skills and equipment to the greatest possible effort in the fight for final victory. Vital as the industry has been in the defense program to date, its resources have not been taxed more than 60 per cent of its demonstrated capacity production. It stands ready and eager for one hundred per cent participation in the vast increase of production—not only in the construction of military structures and additional manufacturing plants, but in shipbuilding, munitions manufacture and any other war production requiring the fabrication of metals—which is now so vitally important in the fight to preserve our freedom and the American way of life.

AISC Structural Steel Standards Accepted

■ American Institute of Steel Construction, New York, recently issued a pamphlet entitled "Adoptions of the AISC Standard Specification" which notes that 268 cities and 14 governmental bodies have adopted or permit use of the specification incorporating an allowable basic working stress for structural steel for building of 18,000 pounds per square inch.

In addition and to effect a more economical and efficient use of structural steel, 429 cities and 20 public bodies have adopted or permit the use of the 20,000 pounds per square inch basic stress specification in their codes.

Chicago Clearing House Lists Supplies Available

■ Materials Clearing House Committee recently established in Chicago by the Illinois Division of the National Small Business Men's Association to aid in keeping small industry in operation by locating stagnant stocks of materials for sale or exchange, has mailed out the first list of materials reported to it. Plan is to help bring together those possessing stocks no longer needed and others with requirements for such materials.

The list, circulated throughout the Chicago district, contained more than 200 items described in detail. Response to inquiries for available materials was greater than had been anticipated. Subsequent lists, it is believed, will be even larger.

Items included: Bolts, screws, nuts, welding rods, sanding disks, copper tubing, welded tubing, hose clamps, wire screen, casters, pulleys, steel rounds, sheets and strip, brass fittings, magnet steel, rivets.

Wide range of machine tools was also listed, as were small tools, dies and punches, punches and presses, steam engines, electric motors and generators, lubricating equipment and pumps.

Committee's headquarters are at 407 South Dearborn street, Chicago.

War Manufacturers Offered Technical Aid

■ American Society for Metals, Cleveland, last week made an offer of free technical information and advisory service to companies engaged in war production involving metals, it was reported by W. H. Eisenman, secretary.

The plan embodies formation of ASM-War Products Advisory Committees in more than 50 chapter cities. To speed output of war equipment and machinery necessary for manufacture of *materiel*, the ASM board of directors has suggested each local chapter form an advisory group. Service, relating to manufacture and fabrication of metals, will be free.

It has been further suggested, Mr. Eisenman pointed out, that men especially versed in various phases of the metals fields be selected. Cross-sectional experience of local groups as those proposed are expected to be of great assistance.

The committees, according to the plan, will meet at specified times with representatives of local companies having technical questions.

Copperweld Presents Six 25-Year Awards

■ Copperweld Steel Co., Glassport, Pa., recently honored six veterans at a dinner in Webster Hall hotel, Pittsburgh, for presentation of the company's first 25-year service pins. Receiving the award were: S. E. Bramer, president; F. R. S. Kaplan, secretary; George F. Bain; Carmen Forgione; M. A. Thiem; and Michael Shyosky Sr.

Entire sales forces of both the Glassport and Warren, O., divisions of Copperweld were present at the dinner. The board of directors, administrative officers and officials of both mill organizations also attended.

W. J. McIlvane, general sales manager, was toastmaster.

Machine Tool Industry's 1941 Output To Surpass Goal of $750,000,000

■ MACHINE tool production in 1941 will exceed the $750,000,000 goal set at the beginning of the year, according to George H. Johnson, head of the Gisholt Machine Co., Madison, Wis., and president, National Machine Tool Builders' Association.

November machine tool shipments of $74,600,000 bring the total for the first eleven months of 1941 to $690,000,000, with $765,000,000 estimated for the full year. Shipments in 1940 were said to be more than $450,000,000.

"To the nation's machine tool builders," Mr. Johnson said last week, "the declaration of war is merely a formal recognition of the battle of production which the machine tool industry started to fight in the fall of 1939.

"The armed forces of our nation must be supported by all-out production in our factories—production which requires maximum supply and operation of machine tools.

"The nation's machine tool operators can best help fight the war by staying at their machines instead of leaving their jobs to enlist in the armed forces.

"More and still more machine tools are urgently required. Machine tool company employes are urged to remember that they can be of the greatest service in this war by continuing to build the machine tools needed to give the boys in the Army, the Air Corps and the Navy the planes, tanks, guns, and ships they must have to win this war.

"Local draft boards are fully cognizant of the national policy of deferment of men essential to national defense production, and decisions in individual cases are of course entirely in their hands."

To Discuss Proposed Price Schedule With OPA Officials

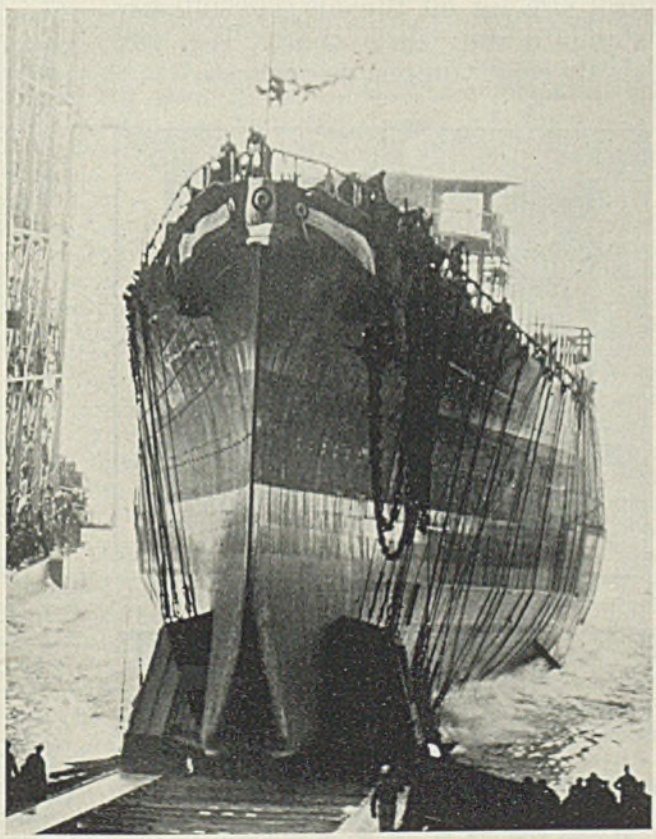
Representatives from all companies in the machine tool industry have been invited to a meeting with OPA officials on Jan. 7 to discuss details of a price schedule on new machine tools expected to be issued soon.

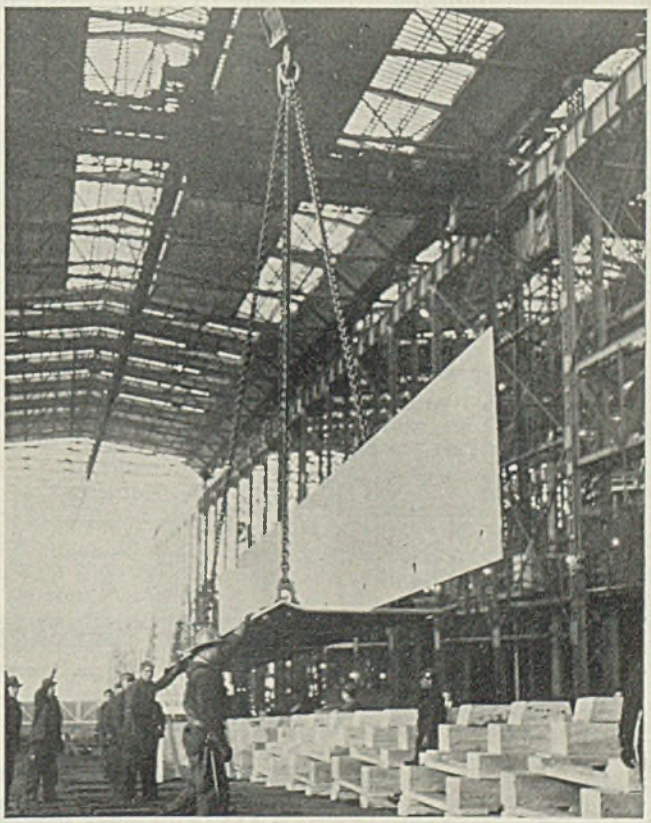
The proposed schedule has been prepared after extensive consultation with a representative group of machine tool manufacturers. The purpose of the meeting on Jan. 7 is to discuss the schedule with all the 479 companies in the industry.

Price Administrator Henderson emphasized that the schedule is not in effect as yet and that no formal action will be taken until after the meeting. New machine tool prices are subject, however, to provisions of a letter sent to the industry on May 6 requesting manufacturers to hold firm prices in effect as of that date. The position taken by OPA in the May 6 letter was reaffirmed in a letter sent to the industry Aug. 18.

■ Facilities comprising more than 1700 machines of all sizes and types are represented by 55 Midwest manufacturers who have organized as Midwest Production Association, 426 Terminal Tower, Cleveland, to co-ordinate their defense efforts, according to Charles H. Oppenheimer, executive director, last week. "One of the purposes of the nonprofit organization is to make available these facilities to prime contractors, thereby obtaining subcontracts for members . . ." said Mr. Oppenheimer.

New Cruiser Launched; Keel for Another Laid



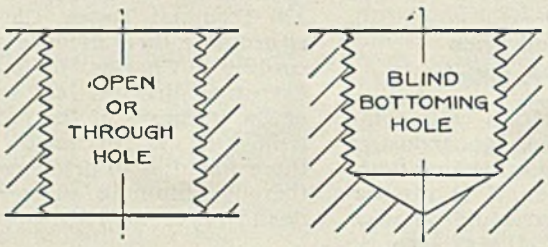


■ The 10,000-ton cruiser U. S. S. COLUMBIA, completed seven months ahead of schedule, slides down the ways at Camden, N. J., yards of the New York Shipbuilding Corp. Just before the COLUMBIA was launched the keel for a heavier cruiser, the U. S. S. ALASKA, was laid on an adjoining way. Specifications of the ALASKA were not revealed. NEA photos

Hole Hints FOR TAPPERS

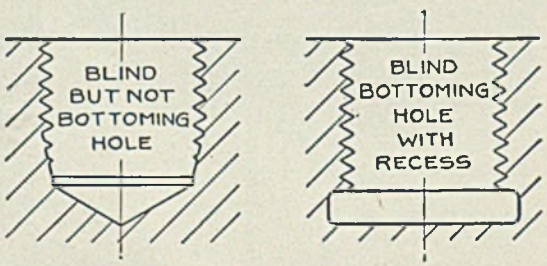
Slow production, rejected parts and broken taps, are often due to poor preparation of holes for tapping operations. Here are some points which will help you to prevent costly losses.

Always keep in mind that good clean drilling and a reasonable size maintenance are keys to better, faster tapping and with less strain on the tap and less power consumption.



For open or "through" holes in steel, use "*Gun*" or Plug Taps; stick to Plug Taps for gray cast iron and nonmalleables; for cast iron containing steel, use "*Gun*" Taps. For blind or bottoming holes, use a Bottoming Tap if the full length of the hole is to be threaded. Always be sure the drill chips are removed from the bottom of the blind hole before you start to tap.

A 100% thread depth requires 3 times the power necessary to tap a 75% thread, but is only 5% stronger. A nut with 50% thread depth will break its bolt before the thread will strip. Good manufacturing practice should provide a depth of thread not less than 62% to 75% (depending on the size) and not more than 83⅓% of the basic thread depth. Remember these facts and you will not make your drilled holes too small.



The tougher and harder the material, or the deeper the tapped hole, the smaller the thread depth you can safely adopt.

Punched holes in thin sheet metal tend to cause taps to "load" and break. See that punched holes are not too small. Same with cored or forged holes in casting or forging. It pays to drill them.

As a guide to the most practicable drill size for all threads, consult any standard tap drill chart. We will gladly send you one on request.

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

GREENFIELD TAP AND DIE CORPORATION • GREENFIELD, MASSACHUSETTS

Detroit Plant: 2102 West Fort St.
Warehouses in New York, Chicago and Los Angeles
In Canada: Greenfield Tap and Die Corp. of Canada, Ltd., Galt, Ont.

GTD GREENFIELD

TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

Mirrors of MOTORDOM

Automobile industry anticipates future production quotas will be established on a month to month basis . . . Precedence given war work may make passenger car manufacturing impractical . . . Decreased output multiplies sales problems. Dealer mortality expected to be heavy, but may be tempered by increased repair business . . . UAW-CIO advances new plan to relieve disemployment

DETROIT

■ RARELY before has the automobile industry been placed in as uncertain a position as prevails at this time. The question of how many passenger cars and light trucks it will be permitted to build after January remains to be answered and probably won't be until some time next month. Should additional quotas be issued, they will likely be on a month-to-month basis. Meanwhile, a large part of the industry's purchasing, manufacturing and sales organizations is marking time.

So many factors complicate the outlook for future operations it is impossible to predict the industry's status in coming months. It is recognized that the precedence given war work may in time pre-empt such a large part of plant facilities as to make passenger car manufacturing impractical, even should sufficient raw material be available to permit any sizable number of cars to be made. And there is no assurance on the latter score.

Chief of the raw material question-marks naturally is rubber. Success of the Japanese in their attempted invasion of Malaya and the East Indies, from which sources comes 95 per cent of the world's crude rubber supply, and in their interference with the shipping lanes from that area no doubt will be one of the chief determining factors in subsequent schedules allotted the motor industry.

Tires To Be Rationed

While there has been no suggestion that the government has become resigned to total and indefinite cessation of crude rubber imports, steps taken to conserve what supplies are on hand appear based on the possibility that we must depend entirely on reclaimed and synthetic material to augment present crude stocks in coming months. The fact that strict rationing of new tires goes into effect next month has inspired some speculation over whether or not similar treatment may be in store for distribution of new automobiles.

So far no official hint of such a move is heard, although the organization being set up for rationing tires could perform a similar function in the case of cars or any other civilian articles or materials.

Automotive sales departments are experiencing most of the grief which restricted operations impose on the industry. Any extended period of a dearth of new cars would demoralize dealer organizations which have been carefully built up in recent years. The problem of apportioning the available supply always is a knotty one when excessive demand prevails. At the moment matters are made still worse by the fact sales departments are unable to advise their outlets of what may be expected a month or so in the future, other than that there will be still fewer cars for them to sell.

Repair Work To Increase

The mortality in the dealers' ranks may be heavy, but it will be tempered to a certain extent by the probable increase in repair business. Until a clearer picture of future production is obtained, dealers generally are lessening pressure to sell cars on hand. In a number of cases distributors are flatly refusing to part with their stocks until after the first of the year, or until the supply situation is clarified.

Used car stocks are fairly large, but sales in recent weeks have not been in the volume that might be expected, considering the high level of employment and wages. In some of the most active industrial centers where employment is near an all-time peak, sales lately have lagged 25 to 35 per cent behind the pace a year ago. In view of the fact that new car registrations in November were about 45 per cent less than last year it becomes evident that the overbuying of the past 12 to 18 months and the rising trend of taxes, living costs and car prices are placing an effective brake on the automobile market in general.

UAW-CIO has come out with a new plan for tooling automobile plants for war work. The plan supposedly would put several hundred thousand laid-off workers back on the payrolls within 90 days, and was announced about the same time last week that motor car and parts interests were testifying at Washington that approximately 260,000 persons would be made at least temporarily idle by the latest curtailment in production quotas.

The union's idea briefly is that the industry pool its resources and attack one tooling program at a time, the selection of the order in which the jobs would be handled being left up to the government. The large companies would be designated prime contractors, giving their tooling requirements to a central procurement agency consisting of representatives of industry, labor and the government. The agency would distribute the work on the basis of efficiency and speed. Production would be handled along similar lines, with subcontracting pushed to the limit.

Find Tooling Plants Idle

Describing the priorities system as "self-defeating and confusing," and charging that tooling of plants is delayed by attempting to carry on a number of projects simultaneously, the union claims that a coordinated plan would take the chaos out of the conversion program and re-employ close to 100,000 workers a month.

In connection with the plan the UAW stated that a survey of idle tooling machines in the Detroit area, completed Dec. 15, showed that in 114 tool and die shops and departments, both jobbing and captive, only 46.3 per cent of available working time was used. Since this was figured on a 24-hour, seven-day

working week, time employed actually was fairly high, though admittedly short of what is desirable for an all-out war effort. Incidentally, 90 per cent of the facilities at Ford's tool and die building at the Rouge plant are now devoted to war work, about 50 per cent being for the bomber project. Including tool shops of other departments, the Rouge plant has been assigned 1,500,000 tool hours.

Wildcat strikes, the bane of the industry for many months, have not entirely disappeared here. Chrysler experienced a walkout by the Sunday night shift at the Detroit Tank Arsenal after a number of employes were sent home for violating rules against smoking on the job. The plant was forced to close about 3 in the morning, but the day shift went to work as usual on Monday.

Labor finds itself against a stone wall in that many workers are being made idle for a reason over which management has no control. Hence the attempts to find some way by which the transition from passenger cars to war work can be speeded and thereby avoid an extended period of unemployment. Also foremost in the unions' mind is the desire for a more prominent voice in the decisions on how and where war work is to be placed.

General Motors has stated it is unable to continue its income security and layoff benefit plans under the unusual conditions created by the war. These plans provided for wage advances in periods of temporary low employment and layoffs resulting principally from model changes. Last week the corporation announced it was forced to discontinue the benefits because of the permanent curtailment of production.

Metal stamping plants in the automotive and parts industry, especially the bigger ones, are finding it difficult to obtain a large amount of war work without adding new facilities. The trouble is that the country's stamping capacity is large in relation to the ordnance demand for stamped parts. In addition, some of the major automobile body builders with heavy overhead are equipped principally for mass production of large parts and are unable to compete with smaller producers on a price basis for many of the government contracts which have been available. The fate of some of these body plants for the remainder of the emergency still is uncertain.

Trucks currently are supplying the bulk of automobile production and, because of the demand for military and industrial purposes, this branch of the industry faces a relatively good outlook except for the light delivery models. Passenger car assemblies, generally suspended last week, are tentatively scheduled for resumption Jan. 5 or 6.

Automobile Production

Passenger Cars and Trucks—United States and Canada
By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
Sept.	192,679	284,583	248,751
Oct.	324,689	514,374	401,360
10 mos.	2,895,059	3,674,434	4,432,551
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Wards Reports

Week ended:	1941	1940†
Nov. 22	76,820	102,340
Nov. 29	93,495	128,783
Dec. 6	90,205	125,690
Dec. 13	95,990	125,625
Dec. 20	65,875	125,350

†Comparable week.

Automobile production figures for the week are to be found on page 25.

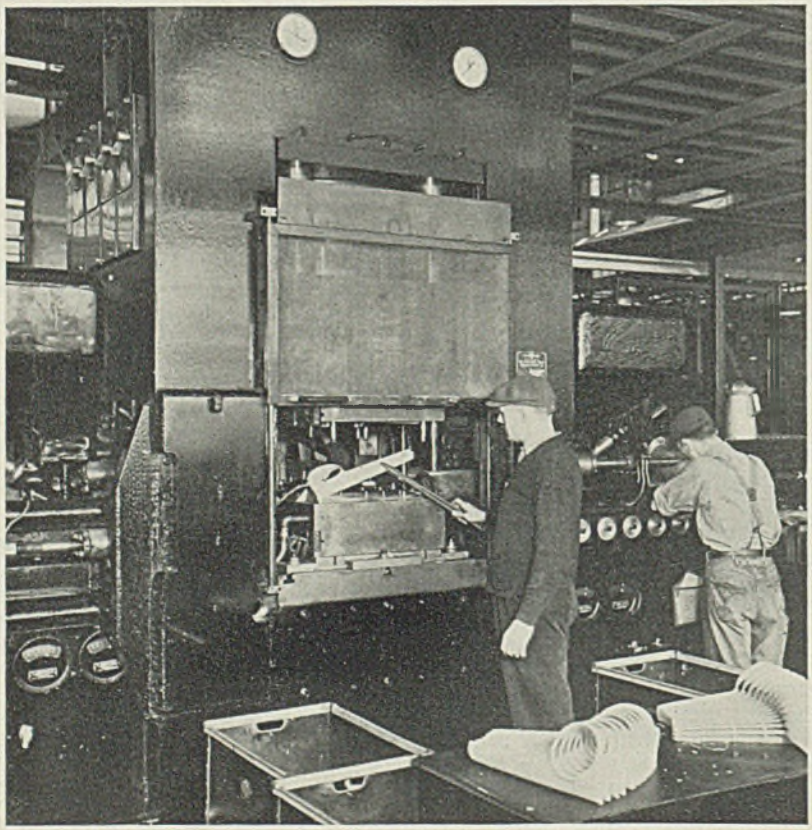
Most Plastics Reported Under Priority Control

■ Many plastics, regarded throughout the year as replacements or substitutes for scarce metals, have themselves been placed under priorities control, it was reported last week by E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. This despite production increases of as much as 200 per cent in certain types.

Further increases, the company declared, are largely conditioned by priority regulations, availability of raw materials and procurement of additional manufacturing equipment.

Much larger use of transparent plastics like "lucite" for windshields, windows, turrets, navigation "blisters" and other parts of modern aircraft is cited probably the most significant development of the year in the plastics industry. Application of plastics in manufacturing generally has also greatly increased, it was reported.

Surveys conducted by Du Pont this year showed 39 plastic parts on a composite electric refrigerator, more than 30 on a composite radio, and varying from scores on small airplanes to hundreds on large aircraft.



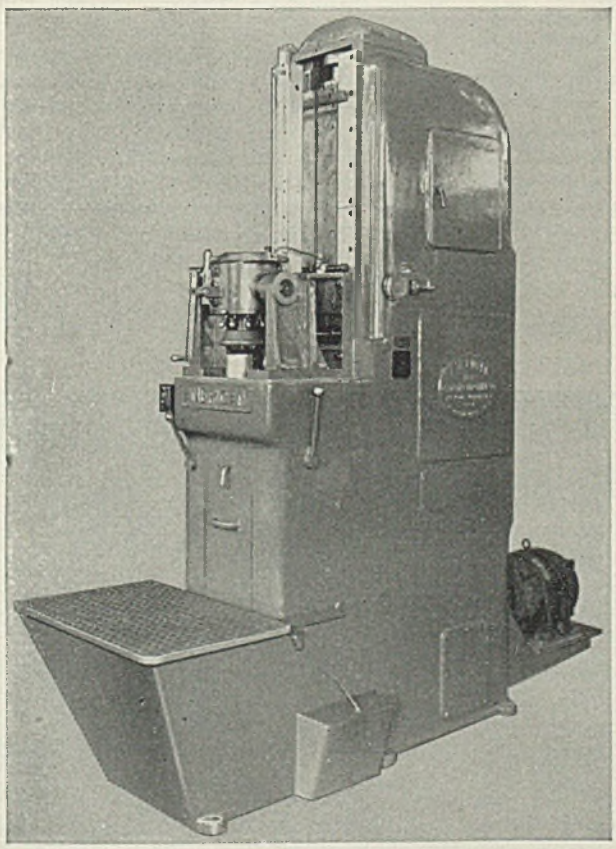
■ Plastic moldings that form the smart new instrument panels of the 1942 Ford cars pour out of this huge hydraulic press at the rate of two complete sets every minute. Eight distinct operations are automatically performed by this injection molder, which was specially designed for the job. Granular tenite fed into the hopper is heated to make it plastic and injected into molds where it is subjected to 500 tons of clamping pressure. The picture, made as the press opened, shows four moldings—two left and two right panels—about to be removed

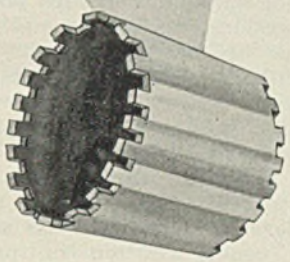
Previous Production of MASTER ROD BEARINGS

3 PER 8 HOUR DAY

AMERICAN Production

10 PER HOUR





The AMERICAN T-6-36 3-way vertical hydraulic broaching machine arranged for pull down operation, shown to the left, is set up for rapid broaching of 18 tongues on the ends of master rod bearings. These bearings are used in radial aircraft engines. The part broached is $3\frac{13}{16}$" O.D., $3\frac{1}{2}$" long with $\frac{1}{8}$" wall. Sides of the tongues must be held parallel and tongue width within .003" a tolerance of .004" on the tongue depth and index of the tongues within .001" is maintained.

Previous production on this operation which required milling and finish grinding was 3 completed parts per 8 hour day. AMERICAN production is 10 completed parts *per hour* and the grinding operation has been entirely eliminated. This is another example of AMERICAN aid to National Defense.

AMERICAN BROACH & MACHINE COMPANY

ANN ARBOR, MICHIGAN, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

Division of SUNSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

WING TIPS

Auto industry's special ability in tooling and production control has been of vital importance in stepping up output of Allison engine, although technique is far more detailed and precise than in auto engine building . . . 70,000 individual parts inspections necessary before final test run . . . Payroll expanded from 900 to 12,000 in space of two years

■ SUCCESSFUL adaptation of the Allison engine to what can be considered mass production, at least in the aviation industry, has been made possible by a careful gearing of the automotive industry's genius at tooling, methods and production control to the best talent of aircraft engine specialists in such phases as inspection, engineering and maintenance of that extra-quality which must be built into air engines. About a year's time has been necessary to realize full co-ordination of these two special talents in the million and a quarter square feet of Allison plants at Indianapolis.

Mass production in the sense of full conveyorization of parts in process and automatic handling of parts into and out of machines is obviously difficult of achievement and of little practical value when you are talking in terms of even 50 engines a day. The reason for this is that, compared with automotive practice, there are so many operations involved on each separate part, such a high ratio of machine-hours versus time-in-transit, that the savings possible in materials handling are of small moment to final cost.

Requires 97 Machine Operations

Compare a single part: The average automotive engine connecting rod, a plain carbon steel forging, gets by with 20 machining operations, all fairly simple and standard. It is produced by the thousands each day with an average of about 0.2 man-hours of labor per rod. The Allison rod, forged from high-quality S.A.E. 4620 steel, requires 97 machining operations, some of them highly specialized contour finishing, and calls for 11 man-hours of labor —five times the operations and 55 times the labor time of the standard automotive connecting rod.

The same story is true with other parts. Cylinder barrels of S.A.E. 4620 steel weigh in the rough forged condition about 14 pounds and have wall thickness of ½-inch. By the time they have passed through the necessary machining operations and have been gas carburized and tempered to 300 brinell hardness on the core and Rockwell C58 on the 0.045-inch case, they have wasted away to 4 pounds each and minimum wall thickness of around ⅛-inch. The crankshaft, weighing 750 pounds in the rough, is machined and ground down to a mere 120 pounds.

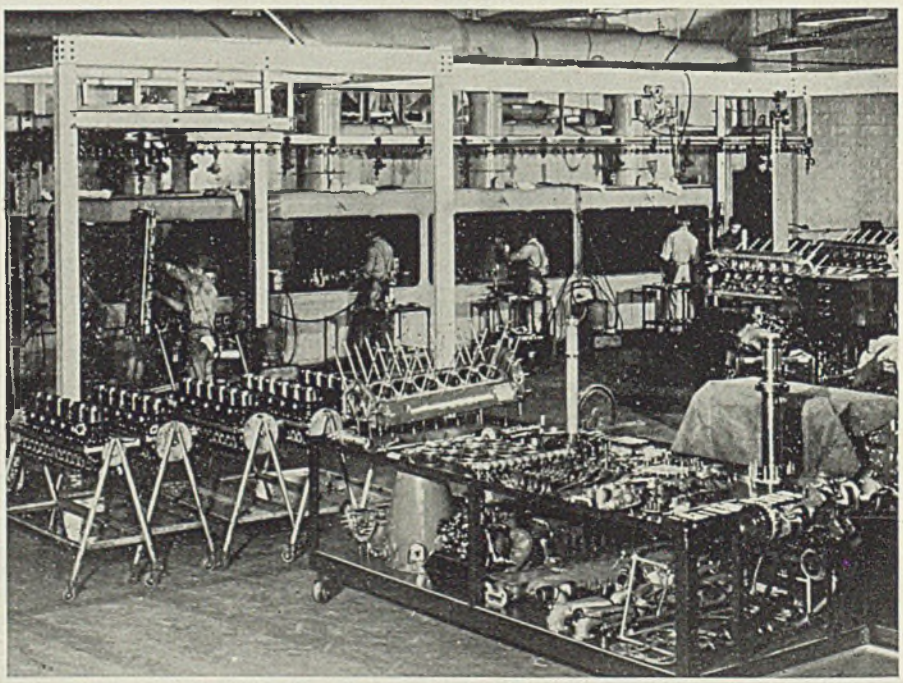
■ **This is the second and final instalment of an article on the Allison Division of General Motors Corp., concluded from STEEL, Dec. 15.**

Special operations such as overall shotblasting of connecting rods and crankshafts after they have been finish ground are adapted to give maximum protection against the possibility of fatigue failures starting from microscopic cracks.

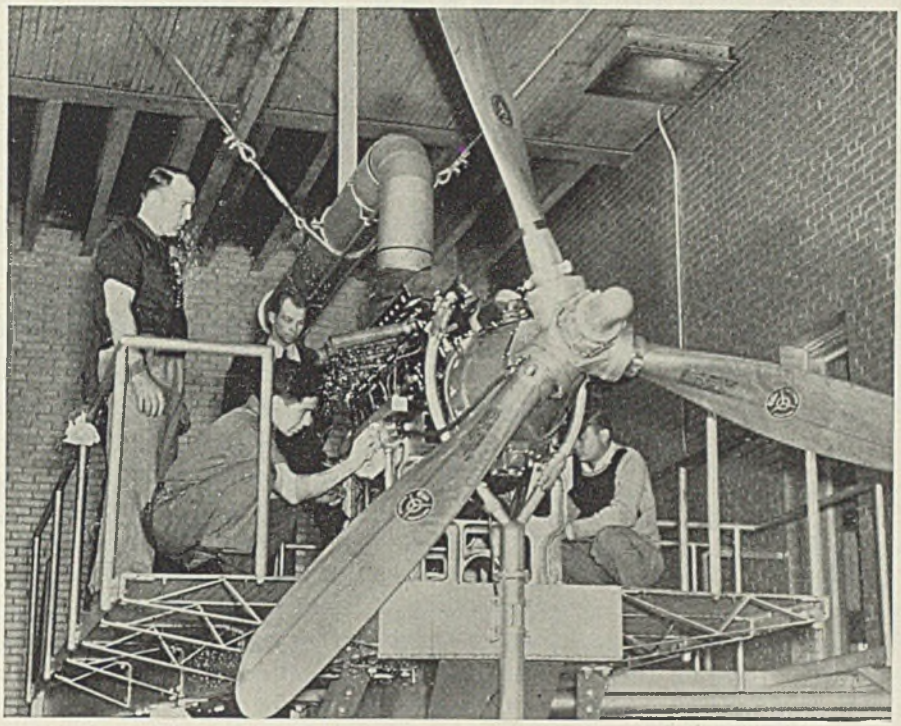
Complete Teardown Between Two Runs in Test Cells

The Allison, in common with all other types of aircraft engines, must go through a 7-hour "green" run on the test stand after initial assembly, then a complete teardown to the last bolt and washer, cleaning, inspection of each part, oiling, reassembly and a final 3-hour test run before shipment. If any defective parts are discovered in the inspection after teardown, the engine must be reassembled for a penalty run and a second teardown.

All these things take time and contribute to the cost of the engine.



■ After "green" test run on engine, it is completely disassembled and parts placed on these wheeled tables for inspection before reassembly. In backaround are cleaning booths for washing oil from engine parts



■ Engine mounted in test cell, with electric propeller attached, preparatory to test run

For example, it takes a crew of five men about 3 hours to tear down an engine; then 3 or 4 hours are entailed by cleaning and inspection; and the reassembly crew needs another 5 hours to get all the parts together again.

It may be asked: Why go through all this minute inspection and testing when the quality of incoming parts is assured 100 per cent by preliminary tests, and the necessary tooling and gages have been provided to insure perfect duplication and interchangeability of parts in process? The answer is simply that the Air Corps officials believe it is an essential step to insure the dependability of finished engines. It is true that the percentage of parts rejected by inspectors after the "green runs" is infinitesimal, also that failures might show up after the final run which were not apparent in the teardown. Nevertheless the teardown is believed to give American engines an added something which may prove invaluable in combat. In passing, it might be pointed out that the rejection rate on parts in process is necessarily high—around 10 per cent—by virtue of the 70,000 inspection hurdles which each engine must negotiate.

Of vital importance, therefore, are the production control methods set up for keeping tab on incoming materials, parts in process and equipment performance. Supervised by the engineering department, this control extends from the specification of detailed requirements in purchased materials and regular tests on all such materials to weekly checks on heat treating equipment, plating equipment, chemical treatments for magnesium and aluminum, and even on oils and fuels. At the same time the engineering department must keep informed on latest developments in materials and processes, as well as on the steady flow of small design changes in the engine.

Planning Reduces Size of Rough Parts Inventory

In traversing the main manufacturing section of the plant the visitor is impressed with the clock-like integration of machining operations and assembly of various parts. This is the secret behind any kind of mass production — insuring the right quantity of the right parts being at the right place at the right time. This sort of planning also materially reduces the rough parts inventory necessary. The old idea was to have possibly three to six months' supply of parts always on hand. Careful scheduling of production has cut this down to, possibly, 30 days' supply, and on some parts even to a day-to-day basis.

From a new aluminum foundry at Anderson, Ind., comes a steady flow of upper and lower crankcase sections, water jackets and cylinder heads which pass through a multitude of boring, reaming, milling and other machine operations, and finally to anodizing and coating with baked-on enamel.

Fit between upper and lower crankcase sections is highly important in this engine, and no gaskets can be used. So, the sections are hand lapped on a 3 x 5-foot cast iron surface plate on which is spread a mixture of 100 grit alumina and mineral spirits as a lapping compound. Two men grasp the casting and whirl it over the table in a figure-eight motion for 15-20 minutes, after which the joint is perfectly flat and can be bolted up to the other section to make an oil-tight fit.

Machining departments are divided roughly into ferrous and non-ferrous sections, and from them parts go to subassembly departments and finally to a separate main assembly section. Here the motor is mounted in a special cradle which may be moved along a line and the engine can be tipped to any angle for convenient assembly and installation of parts and accessories.

When completed the engines are moved by truck to a brick-lined test cell in the center of which is a reinforced concrete pier with mounting fixtures for holding the engine. A Curtiss electric propeller is mounted in place, fuel and oil lines from storage tanks in the basement are attached. Exhaust stacks are bolted on so that visual examination of exhaust flames from each cylinder is possible. Technicians retire to control rooms and the engine is started.

After the green run and final test the engine is trucked to the shipping department where it is covered with transparent waterproof paper and crated for shipment, with a complete set of tools for servicing.

Experienced Men Only 25 Per Cent of Working Force

Coexistent with the problem of physical expansion at Allison has been the problem of personnel expansion. In November, 1939, when production got under way there were 900 on the payroll, comparing with the 12,000 now at work. Most of these men are in the 18-30 age group. A recent survey of 5500 engaged in manufacturing operations showed about 25 per cent had previous experience when they were hired. The rest were trained on the job, most of them by the extra-man method—putting a trainee to work on a machine along with an experienced man.

Training also has been given to about 350 foremen, and special courses are provided to familiarize mechanics, both plant men and army men, with the operation and maintenance of the engine. A new type of training program for operators has been devised as a prelude to "on the job" training. Known as the "vestibule school" method, it involves putting new men through a training shop before they enter the plant.

STEEL

Control the Wage Spiral!

■ BEGINNING Dec. 15 about 2,000,000 workers in shipyards and engineering industries in England received a wage increase of 5 shillings per week. This represents an addition of more than $100,000,000 to the annual payrolls, although the increase granted was only one-fourth of that demanded by the men.

This wage boost, coming on the heels of previous upward adjustments, is worrying the British government. A writer for *The New York Times* reports that official circles fear rapidly increasing wages are threatening the government's commodity price policy.

• • •

Reading between the lines from this side of the water, it is easy to understand why British officialdom is concerned. It is not a horizontal wage increase which hurts; it is the endless chain of events which are set in motion.

British workmen in shipyards and engineering industries asked for sharply higher pay for two reasons: First, because the high deductions for taxes leave an amount for the wage earner inadequate to cope with the higher cost of living. Secondly, recent increased wages granted to unskilled workers and to agricultural labor (which, incidentally figured in the higher cost of living) narrowed the margin of compensation rightfully due skilled workers for their skill. An upward adjustment in skilled wage rates was deemed necessary to restore the traditional differential.

This almost perfect example of the dreaded spiral should interest every American. We have been and still are courting trouble identical with that which now has reached an acute stage in England.

The higher wages recently awarded the American railroad employes upped the annual payroll of the roads by more than $310,000,000. On Dec. 13, with the tacit encouragement of the government, practically all of the Class I railroads petitioned the Interstate Commerce Commission for increased freight and passenger tariffs.

These include a 10 per cent rise in passenger fares, an increase of 5 or 6 cents per net ton for carrying coal and coke, 4 to 6 cents more per gross ton on iron ore, and roughly a 10 per cent increase on all other freight rates.

These advances in railroad rates will yield about $357,000,000 in additional revenues—just about enough to balance the increase in wage rates and other mounting expenses incidental to wartime conditions.

If we are to follow this pattern in connection with all wage demands that are presented, we will find ourselves in a predicament so serious that no makeshift control on prices, such as that now exercised by OPA, will be effective.

• • •

Already we hear talk of new demands for higher wages early in 1942. Trial balloons have been sent up to test the public reaction to a 15 per cent hold-back on wage earnings. Meanwhile Congress shies off from any suggestion to curb wage increases or to control the prices of farm products.

We are virtually begging fate to throw us into a relentless inflationary spiral. Now that actual war is upon us, Congress, when it reassembles in January, should have the courage to ignore the pressure blocs and to pass a price control bill with teeth in it.

E. L. Shaner

EDITOR-IN-CHIEF

Dec. 29, 1941

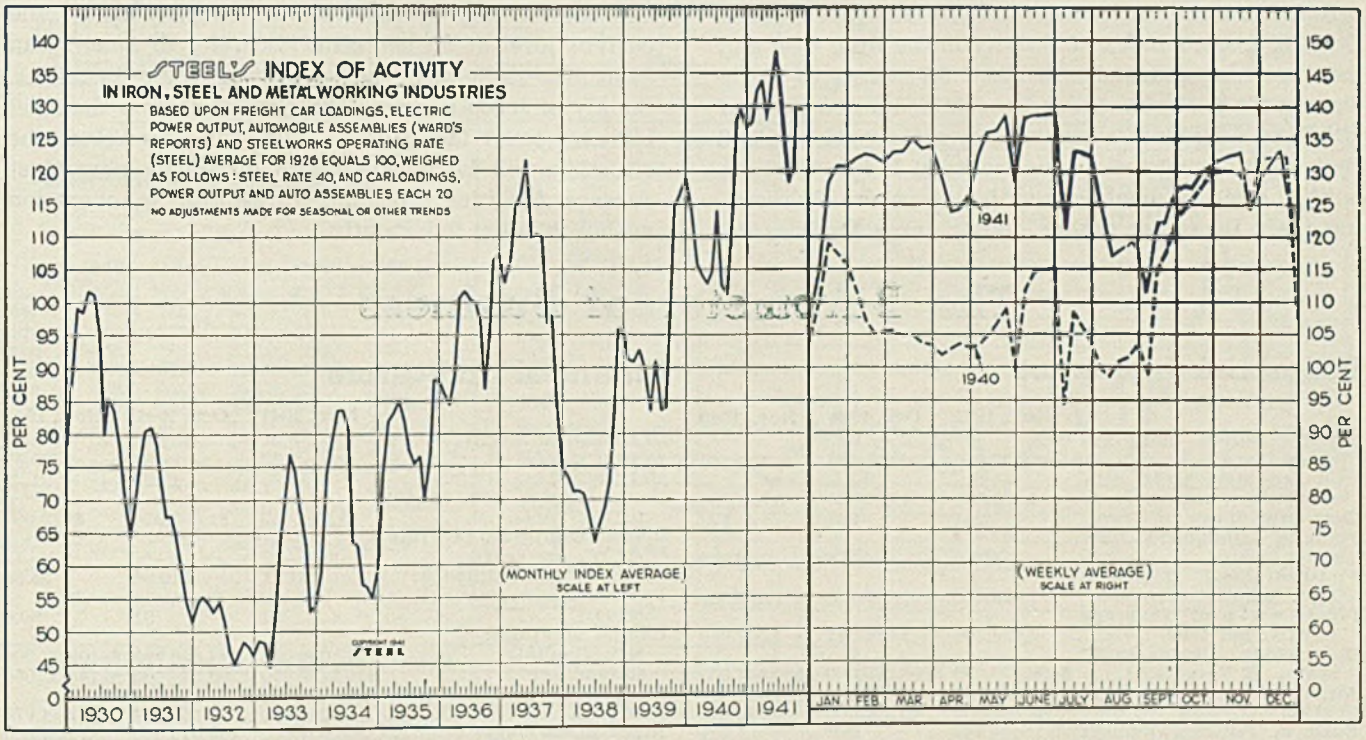
The BUSINESS TREND

More Steps Taken To Curb Civilian Goods Output

■ FORETASTE of what will occur in some industries during 1942 is indicated by the recent OPM order placing general restrictions on the use of rubber and on the sales and shipments of rubber products and tires. Further reduction in previous quotas for passenger car and light truck production for December and January and revoking of February quotas pending additional study is also indicative of the situation. Other products are expected to become practically non-existant for the ordinary consumer. Recent orders have been put into effect limiting use of tungsten, chromium, molybdenum, alloy steels, copper, tin, zinc, electrical household and farm equipment, and numerous chemicals.

Sudden change from a normal to a war-time economy cannot be accomplished on such a vast scale as now planned without serious disruption of activity in many industrial lines. The new system of allocations will largely displace priorities in the immediate future. SPAB has taken definite steps to work out a 1942 production program for each industry.

Close co-operation of both labor and government with industry is essential if this country is to successfully meet the new and tremendous war demands.



STEEL'S index of activity declined 6.7 *points to* 126.5 *in the week ended Dec.* 20:

Week Ended	1941	1940
Oct. 4	128.0	124.4
Oct. 11	127.9	126.0
Oct. 18	130.2	128.3
Oct. 25	131.4	129.9
Nov. 1	131.9	130.2
Nov. 8	132.3	130.3
Nov. 15	131.8	130.3
Nov. 22	124.1	124.7
Nov. 29	129.7	132.6
Dec. 6	130.9	132.5
Dec. 13	133.2	132.6
Dec. 20	126.5†	132.4

†Estimated.

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	129.9	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	129.7	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

Output of military goods is expected to exceed 65 per cent of total production, or nearly three times the present volume.

With war in two oceans to be faced, this country's shipbuilding schedule is to be again expanded. Besides war craft a sharp upturn in merchant ship construction can be expected. A new wave of orders for fabricated structural steel for supplemental construction of army and navy plants will accompany an increase in private industrial plant expansions. Production schedules of all types of aircraft have been stepped-up, particularly in the heavy bomber classification. Additional large volume of machine tool orders are being super-imposed on already heavy backlogs.

Reflecting a decline in automobile production and revenue freight carloadings during the week ended Dec. 20, STEEL's index of activity in the iron, steel and metalworking industries declined 6.7 points to 126.5. During the past year the index attained a new peak of 138.8, or 6.2 points above the former record of 132.6 registered during the closing weeks of 1940.

With some automobile manufacturers already reaching their December quotas, motor car assemblies declined to 65,875 units during the week ended Dec. 20. In the preceding week automobile output totaled 95,990 units, while in the comparable 1940 period they were 121,350.

The national steel rate held steady at 97.5 per cent of capacity during the week ended Dec. 20. A year ago steelmaking operations were slightly below the current level at 95 per cent. Scarcity of steel scrap continues to hamper operations in some instances. Supply of scrap is one of the gravest factors the steel industry must face this coming year. However, the situation will be alleviated somewhat by new blast furnace facilities scheduled to be put in operation within the next few months.

Where Business Stands

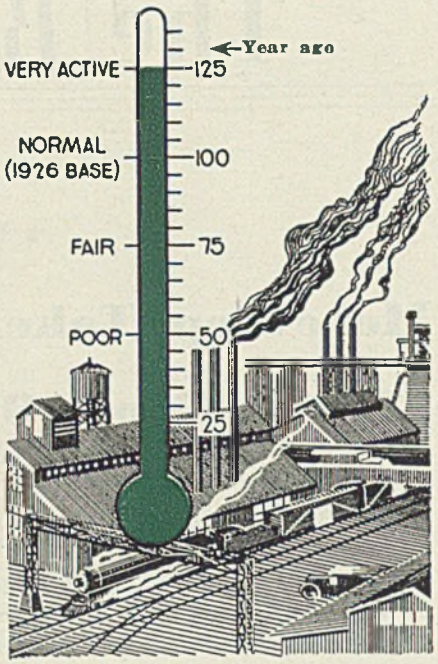
Monthly Averages, 1940 = 100

	Nov., 1941	Oct., 1941	Nov., 1940
Steel Ingot Output	126.8	127.6	117.7
Pig Iron Output	122.5	122.3	114.4
Building Construction	137.4	181.7	114
Auto Output	95.7*	100.3	130.7
Freight Movement	123.5	130.8	126.8

*Estimated.

Industrial Weather

TREND: *Sidewise*



The Barometer of Business

Industrial Indicators

	Nov., 1941	Oct., 1941	Nov., 1940
Pig iron output (daily average, tons)	156,906	156,775	146,589
Iron and steel scrap consumption (tons)	4,482,000	4,649,000	3,922,000
Gear Sales Index	241	261	173
Foundry equipment new order index	408.5	403.8	254.2
Finished steel shipments (Net tons)	1,624,186	1,851,279	1,425,352
Ingot output (average weekly; net tons)	1,624,706	1,634,917	1,507,950
Dodge bldg. awards in 37 states ($ Valuation)	$458,620,000	$606,349,000	$380,347,000
Automobile output	374,000	401,360	510,973
Coal output, tons	42,865,000	49,800,000	40,012,000
Business failures; number	842	809	1,024
Business failures; liabilities	$9,197,000	$7,333,000	$16,572,000
Cement production, bbls.†	16,688,000	16,115,000	13,935,000
Cotton consumption, bales	953,600	875,682	770,832
Car loadings (1,000 cars) weekly average	864	746	885

*Estimated.

Foreign Trade

	Sept., 1941	Aug., 1941	Sept., 1940
Exports	417,139	455,257	295,245
Imports	262,680	282,513	194,928
Gold exports	$5,000	$6,000	$13,000
Gold imports	$65,707,000	$36,979,000	$325,981,000

Financial Indicators

	Nov., 1941	Oct., 1941	Nov., 1940
30 Industrial Stocks‡	116.91	121.18	133.90
20 Rail stocks‡	27.92	28.54	29.36
15 Utilities‡	15.93	17.65	21.22
Bank clear'gs (000 omitted)†	$1,241,652	$1,092,324	$972,664
Commercial paper rate (N. Y., per cent)	½–⅝	½–⅝	½–⅝
*Com'l. loans (Billion $)	$11.1	$10.94	$8.85
Federal Reserve ratio (per cent)	91	91	90.6
Capital flotations:			
New Capital†	$132,066,000	$64,856,000	$110,687,000
Refunding†	$167,236,000	$208,544,000	$114,752,000
Federal Gross debt. (mil. of dol.)	$55,040	$53,584	$44,277
Railroad earnings†	$93,657,000	$104,070,000	$87,638,000
Stock sales, New York stock exchange	15,047,142	13,151,616	20,887,311

†October, September and October respectively.
*Leading member banks Federal Reserve System.
‡Dow-Jones Series.

Commodity Prices

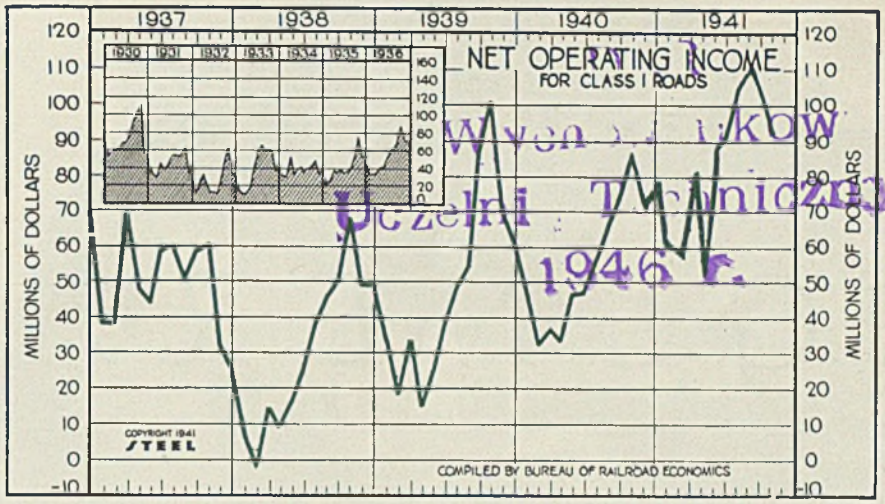
	Nov., 1941	Oct., 1941	Nov., 1940
STEEL's composite finished steel price average	$56.73	$56.73	$56.73
Babson monthly prices: (as of Nov. 1)			
Wheat, cash (bushel)	$1.105	$1.17	$0.85
Corn, cash (bushel)	$0.75	$0.815	$0.683

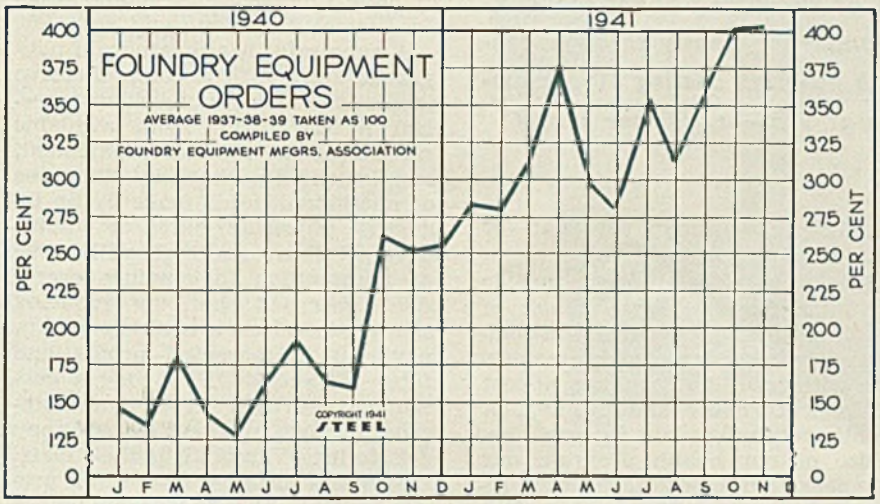
Class I Railroads
Net Operating Income

(Unit: $1,000,000)

	1941	1940	1939	1938
Jan.	$62.36	$45.57	$32.89	$7.14
Feb.	58.49	32.86	18.59	1.91*
Mar.	80.63	36.73	34.32	14.73
April	52.57	33.82	15.32	9.40
May	88.63	47.08	25.10	16.67
June	93.26	47.42	39.10	25.16
July	106.31	57.08	49.01	38.43
Aug.	110.02	66.01	54.59	45.42
Sept.	104.07	74.19	86.43	50.36
Oct.	93.66	86.99	101.62	68.57
Nov.	.....	71.10	70.35	49.67
Dec.	.....	78.79	60.95	49.37
Average	.....	$56.84	$49.02	$31.02

*Indicates deficit.





Foundry Equipment Orders

Monthly Average

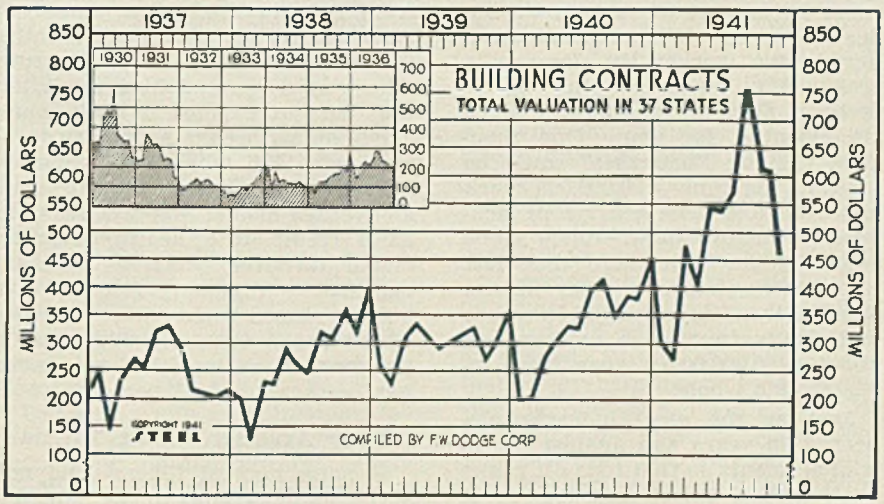
(1937-38-39 equals 100)

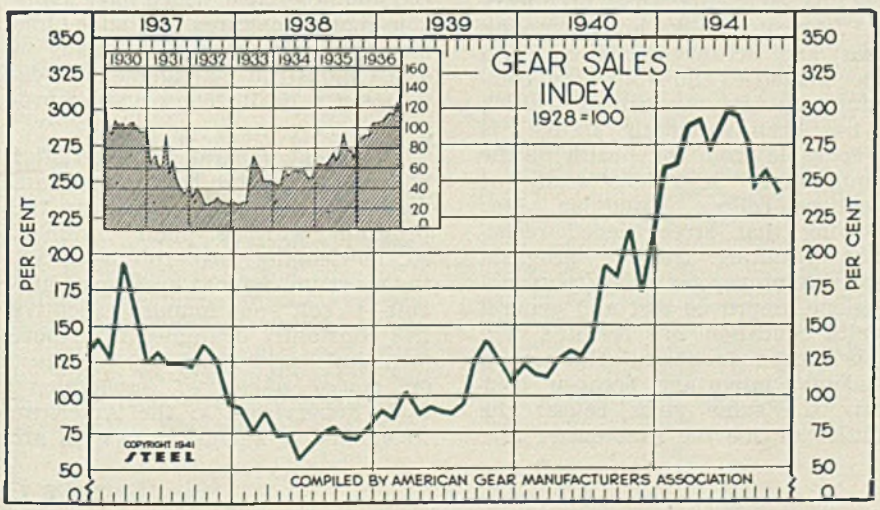
	1941	1940
Jan.	285.3	149.0
Feb.	281.1	135.7
March	315.2	183.2
April	377.2	145.2
May	298.7	129.1
June	281.1	164.9
July	358.1	194.4
Aug.	312.9	165.4
Sept.	363.8	161.2
Oct.	403.8	264.0
Nov.	408.5	254.2
Dec.	...	257.8

Construction Total Valuation In 37 States

(Unit: $1,000,000)

	1941	1940	1939	1938	1937
Jan.	$305.2	$196.2	$251.7	$192.2	$242.7
Feb.	270.4	200.6	220.2	118.9	188.3
Mar.	479.9	272.2	300.7	226.6	231.2
April	406.7	300.5	330.0	222.0	269.5
May	548.7	328.9	308.5	283.2	243.7
June	539.1	324.7	288.3	251.0	317.7
July	577.4	398.7	299.9	239.8	321.6
Aug.	760.3	414.9	312.3	313.1	281.2
Sept.	623.3	347.7	323.2	300.9	207.1
Oct.	606.3	383.1	261.8	357.7	202.1
Nov.	458.6	380.3	299.8	301.7	198.4
Dec.	.....	456.2	354.1	389.4	209.5
Ave.	.....	$333.7	$295.9	$266.4	$242.8





Gear Sales Index

(1928 = 100)

	1941	1940	1939	1938	1937
Jan.	259	123	91.0	93.0	144.0
Feb.	262	116	86.0	77.0	130.5
Mar.	288	114	104.0	91.0	195.0
April	292	128	88.0	74.0	164.0
May	273	133	93.0	70.0	125.5
June	299	129	90.0	58.0	134.0
July	298	141	89.0	67.0	124.0
Aug.	276	191	96.0	76.5	125.0
Sept.	243	183	126.0	80.5	123.0
Oct.	261	216	141.0	72.5	139.5
Nov.	241	173	126.0	72.0	127.5
Dec.	...	208	111.0	81.0	97.0
Ave.	...	155.0	103.0	76.0	135.5

War Declared on

GENERAL ILL

As is shown, it is entirely possible to do something about the 190,000,000 man-hours lost to industrial production yearly through general illness . . . And the average health program costing $8 per employe per year will yield a return of $12—or 150 per cent

■ GIVE the average citizen three guesses as to the major factors that may cripple war production and he'll retort quickly, "Strikes. . .bottlenecks. . .accidents." And he'll be wrong unanimously.

The answer, as alert production men know, is—general illness. Balking continued production is a regiment of common ailments, like colds, which keep up a constant guerilla warfare against society, and, because he is part of society, the industrial worker. When such illnesses disable the worker the damage is reckoned in terms not only of individual discomfort, but of materials essential for war. One thousand "Flying Fortresses" could be built in the time—190,000,000 work hours all told—lost because of sickness, estimates show. Colds alone cause 50 per cent more time lost in industry than any other illness, stealing three days and $15 in wages and drugs from each worker and about $450,000,000 a year from industry as a whole.

Just as the steel industry pioneered 30 years ago against industrial accidents so that today it ranks as the third safest industry, so it is now in the lead mapping an attack against general illness. A recent study by the Iron and Steel Institute shows that the medical department is a fairly well established institution in the steel industry. There is a growing appreciation that such departments, which at first were concerned primarily with accidents, can assist in job placement to gain the greatest efficiency from each employe, and in educating employes to the importance of health.

What does a health program cost? About $8 per employe a year, the United States Public Health Service estimates, but it will yield a return of $12 per workman per year—or 150 per cent.

Dividends to the employer include an intangible but large chunk of employe goodwill; reduction in compensation costs and of sick absenteeism with resulting decreases in cost of labor turnover and training. A small processing plant reports, "Because of our health program our compensation cases have been reduced from 31 to 10, our days lost from 2430 to 290." One employer reported it took him three months to train a man to use a wheelbarrow "the way I wanted him to. After that sort of expense I don't want to lose his services." A foundry operator, with 225 employes, estimates it costs a minimum of $200 to train an average molder and declares that as a result of a health program "labor turnover which is a major expense in a jobbing foundry has been reduced." In one industry which has a comprehensive health program, time lost due to illness has been reduced 44 per cent.

Many Agencies Willing To Aid

Because general illness—and not accidents indigenous to one industry—is the chief foe, steel producers and fabricators alike are borrowing ideas and actual assistance from other industries and from every community agency. "Industrial health", it has been succinctly stated, "is inseparable from the health of the community." A recent study at Stephens college, Columbia, Mo., showing that strengthened resistance, resulting from a program stressing proper sanitation, personal hygiene, improved diet and general health education, has resulted in a 50 per cent reduction of colds among students, important because basically the same virus causes the sniffles of Joe the sandblaster and of Jane the Coed. *The same measures which help Jane will help Joe.*

A successful health program may get its start with a comprehensive tabulation of causes of sick absenteeism in the plant, from available records of the medical department, supplemented perhaps by estimates of nutritional needs made by an industrial physician, nurse or outside agency. Such material will serve as ammunition to convince everyone concerned that, by reducing sick absenteeism, a health program pays off in increased profits and fatter paychecks. Following a government nutrition survey in a Southern mill town, workers learned they got too little vitamin C in their diets. Dispensers installed in the mill provided tomato juice to workers whose health and efficiency improved noticeably thereafter.

The program will utilize, to the fullest extent, every resource of the community. The local health department may be called on to care for an incipient tuberculous case or to clean up eating places patronized by workmen where saliva-borne diseases may be spread by poorly washed utensils. Local tuberculosis associations, and other health organizations, visiting nurse associations, local bureaus of industrial hygiene, nutrition councils, state medical societies, the nutrition committees of the National Research Council at Washington, the National Association of Manufacturers, the Red Cross, organizations, commercial and otherwise, which have available motion pictures and slide-films on health—all these stand ready to assist industrial management in developing a health conservation program.

Two other general characteristics of any successful health program may be noted. Key workers in the program will be plant foremen. Acknowledging that foremen "are the most important—and most difficult—to sell", one foundry executive has constantly drummed into these men that *"safety and hygiene must be placed ahead of production"*. Male supervisors in the American Telephone & Telegraph system are

By HARVEY M. HALL

NESS

being trained to recognize symptoms of physical disturbances so they can send men, when necessary, to medical departments.

Finally the health program will be continuing, not sporadic. The program itself can be treated under four general headings:

Examinations: According to modern conception, examinations amount to more than merely "sticking out your tongue." Their purpose is summed up by the committee on healthful working conditions of the National Association of Manufacturers: "Examinations should determine the individual's fitness for the job. . .and permit placement of applicant or employe on work which he can perform without harm to himself or to his fellow employes.

How this is done may be illustrated by the medical program now being undertaken by the National Youth Administration in New York city, to serve as a model throughout the country. Upwards of 20,000 youths, from 17 to 25 years of age, employed in machine shops, at forge and heat treating furnaces, welding machines, and so forth, have been examined in work centers. The purpose of the examinations, required of all entering NYA, is job placement, not rejection. In addition to taking a thorough history, urine analysis, routine Wasserman test, and hemoglobin tests, laboratory tests indicated by the examination are made. Chest X-rays are made of all with positive tuberculin tests. The examiner learns what the youth had to eat that morning and the previous day. The youth is then advised regarding his defects and referred to a private physician or clinic.

For more than 50 per cent of those examined, reports on voluntary follow-up care have come from such outside sources.

An example of a profitable transfer is furnished in the case of a valuable machine shop operator who began acting so queerly that it was feared he was going insane. Treated for years by his family physician for high blood pressure, a complete examination by the NYA medical department revealed he was a diabetic in such an extreme stage that he was near coma and, in fact, death. Given treatments and transferred from shop work to a supervisory position he is well and productive. Not only his life, but a valuable cog in the war machinery, had been saved.

Between-meal snacks reduce sick absenteeism markedly. Workers given five meals a day show better production records than those getting only three meals. That is the reason many plants encourage use of mobile food containers such as this one at Paterson, N. J., plant of Wright Aeronautical Corp.

A similar program has been in effect for three years at Eastman Kodak Co., Rochester, N. Y.

Periodic health examinations follow the pre-employment examination. Such checks are "especially beneficial on dusty jobs to determine whether the individual is being harmed," says Dr. W. A. Sawyer, medical director. Partial examinations are given to employes voluntarily visiting the medical department because of some ailment or symptom.

Nutrition: Numerous studies show that food influences considerably the productivity of workmen. In a factory manufacturing rubber footwear, workers given five meals a day had a better production record than those getting three meals. In another study, when clerical workers took two between-meal snacks of milk and bananas, sick absenteeism decreased markedly. The American Telephone & Telegraph Co. noticed a relationship between the total of wrong numbers given by operators and poor diet.

According to Dr. Howard W. Haggard of Yale university, the food used for supplemental feedings of workers should contain all known vitamins and minerals, be easily digested and provide a quick source of energy. Service should be such that no preparation of food on the spot is necessary. All danger of contamination must be eliminated. The food must not come in contact with workers' hands, and the service must be readily disposed of. A combination of milk and fruit, usually a banana, provides, Dr. Haggard reports, such nutrition requirements. Single-use paper cups and containers answer service needs, experience has shown.

Such service is used not only for mid-meal snacks but for lunches served from mobile units in factories. Coffee is carried in a stainless steel, insulated vacuum tank and dispensed on order in unwaxed paper cups. Meat pies, hot soup, chili, baked beans, spaghetti, macaroni are baked in a central kitchen —often by a food service supplying

(*Please turn to Page* 75)

HONING In Ordnance

. . . . What the Process Is, How It Works

By L. S. MARTZ
Micromatic Hone Corp.
Detroit

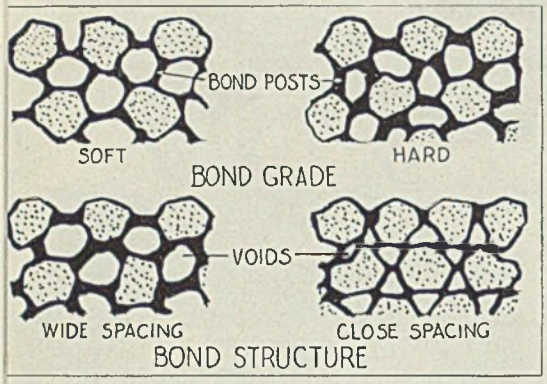


Fig. 1. (Above)—Showing characteristic structure of abrasive—grains connected by vitreous attachments called "bond posts". Amount of attachment determines whether stone is soft or hard, see two upper views. Extent of voids determines spacing and number of grains per square inch of surface

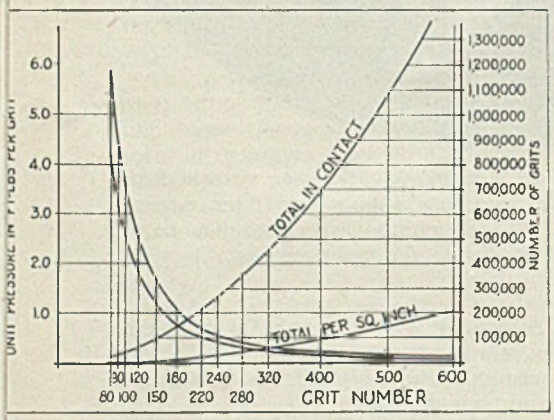


Fig. 2. (Above)—Diagram showing relation of unit pressure and number of grits, grit size in honing

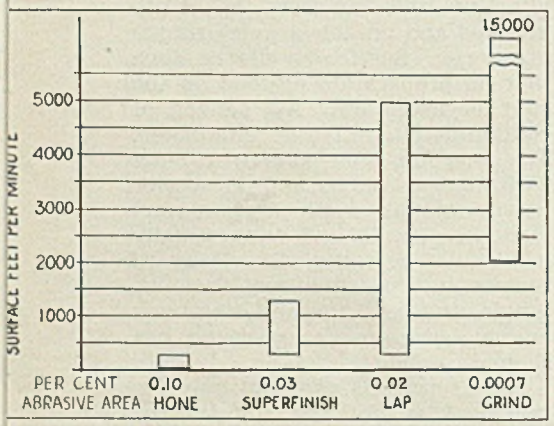


Fig. 3. (Above)—Comparison of abrading area contact and speed in various finishing methods

Fig. 4. (Right)—Various features of controls, compensation features, etc. in honing

Fig. 5. (Opposite page)—Path an abrasive particle travels in honing. Note it does not repeat

■ PERHAPS it can be assumed that Mr. Johnson has properly impressed the reader with the diversified usage of the honing process in industry—and particularly in ordnance production—in the description of ordnance honing applications carried in his article in STEEL, Dec. 22, 1941, p. 48. It might be in order now to develop briefly the underlying advantages offered by this process in generating final surfaces in finished parts.

Honing is used chiefly to generate final, finished surfaces in bores and on some cylindrical parts in high production. It also includes:

Correction of errors resulting from previous processing operations, and the generation of final geometric and dimensional accuracy within extremely low tolerance—ranging from fifty-millionths to not more than one-thousandth of an inch—for diametric roundness, diametric straightness, and axial straightness.

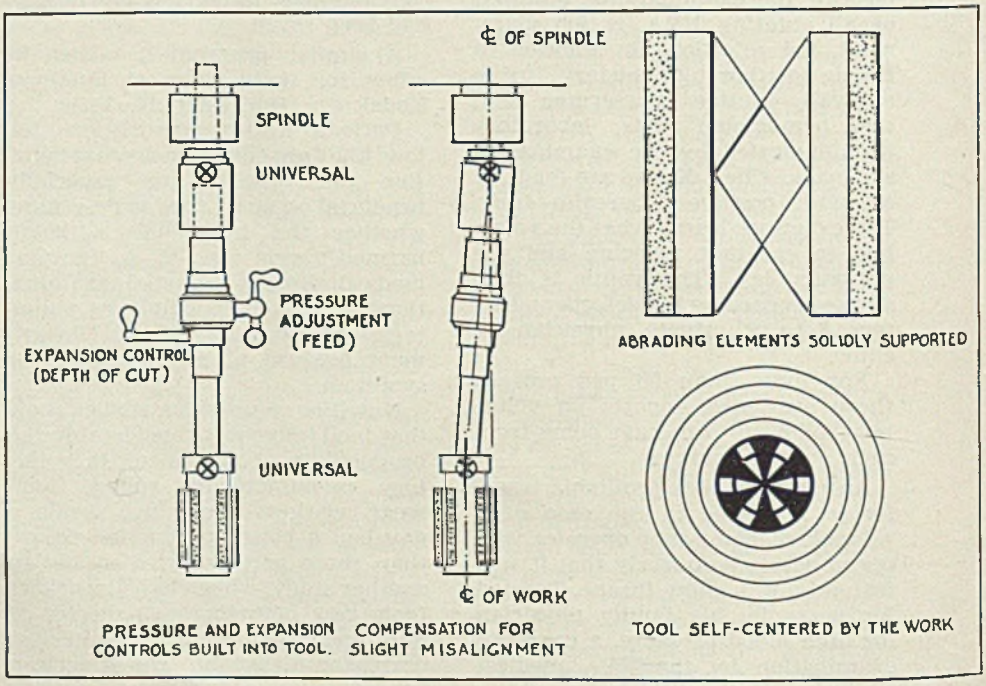
Generation of final dimensional size accuracy coincident with the above geometric accuracy, within conventional tolerance ranging from 0.0005 to 0.002-inch, as may be required.

Generation of any desired type of surface finish, and any desired degree of surface finish accuracy.

Control in one process of rapid and economical stock removal ranging from 0.0001 up to 0.05-inch on diameters, in bores ranging from ¼-inch diameter by ¼-inch long, up to 30-inch diameter by 75 feet long—and at rates varying upward to approximately 65 cubic inches per hour.

Surface Quality: Factual study of surface generation and surface quality originated only about ten years ago with the development of the Profilograph at the University of Michigan. This instrument employs the tracer-point principle and produces a photographic trace record of a surface profile, mechanically recorded to any convenient scale of horizontal and vertical magnification.

Measurement and analysis of thousands of profilograms of various types of surfaces produced by various kinds of cutting tools on various kinds of materials reveal the existence of the qualitative as well as the quantitative character of surface roughness. A definite relation-



Production

ship between the character of surface roughness and the method used in producing such roughness is also revealed.

When a piece of metal is processed by some type of treatment which fashions it into a desired form and size, it must be deformed —as by compression or tension— or stock must be removed from it —as by shearing.

The quality of the surface produced is directly proportional to the manner in which force is applied or the direction and rate of motion used in its application.

Final surface finish and surface quality are generated on a majority of all parts produced in the metalworking industry by some form of abrading process. These abrading processes use either loose or bonded abrasive under various applications of impact or impulse force and motions.

Every abrading method differs from every other form of shear-cutting method of metal processing because of inherent factors in the abrasive material and the manner in which it is used. Each abrading method differs from all other abrading methods in the manner of force application, the allowable number of simultaneous cutting contacts conventionally employed, the direction of abrasive travel over the work surface, the rate of abrasive and work travel, the amount and uniformity of pressure or force application, and, in some cases, the cutting fluids used.

Honing uses a large number of fixed or bonded abrasive cutting tips in simultaneous abrading contact— more, in fact, than are usually used in any other abrading method. For example: In a bore 3 inches in diameter by 8 inches long, size 150-grit stones would have a total area of 7.5 square inches, in which there would be an estimated 98,000-odd simultaneous shearing contacts. A corresponding internal grinding wheel application, using a 46-grit wheel, would have approximately 0.055 square inches of total contacting area with the work, with only about 48 simultaneous stock removing contacts at any one time.

Honing stones are made by bonding together in stick form a large number of carefully sized and shaped grains of manufactured silicon carbide or aluminum oxide. Characteristic of all bonded abrasive structures, as shown in Fig. 1, one or more vitreous attachments, called "bond posts," of fuzed quartz connect each grain to its neighbors. For harder bonds, a larger quantity of bonding material is used, causing the bond posts to be thicker and somewhat greater in number than in softer structures.

These abrasive grains are the hardest industrial materials manufactured, being rated next to the diamond in hardness. Being crystalline, they have definite cleavage planes and are therefore individually friable.

The cleavage planes of individual grits lie at every possible angle to each other in the bonded structure. The grits fracture most easily when the direction of force application is parallel with their cleavage planes. They are most resistant to fracture when force is applied at right angles to their cleavage planes.

The bond posts, being vitreous, are also friable. In like manner, they are most resistant to fracture when under compression than when under tension.

A bonded abrasive honing stone, according to its size, may contain from several hundred thousand to millions of individual grains. Each grain has not just one but several sharp points or edges in its boundary contour. All these exposed points or edges are potential cutting tips if properly actuated in motion.

No other type of machining method uses similar friable cutting tips, mounts its cutting tools in friable tool holder mountings, nor approximates this point-of-cutting-contact qualification.

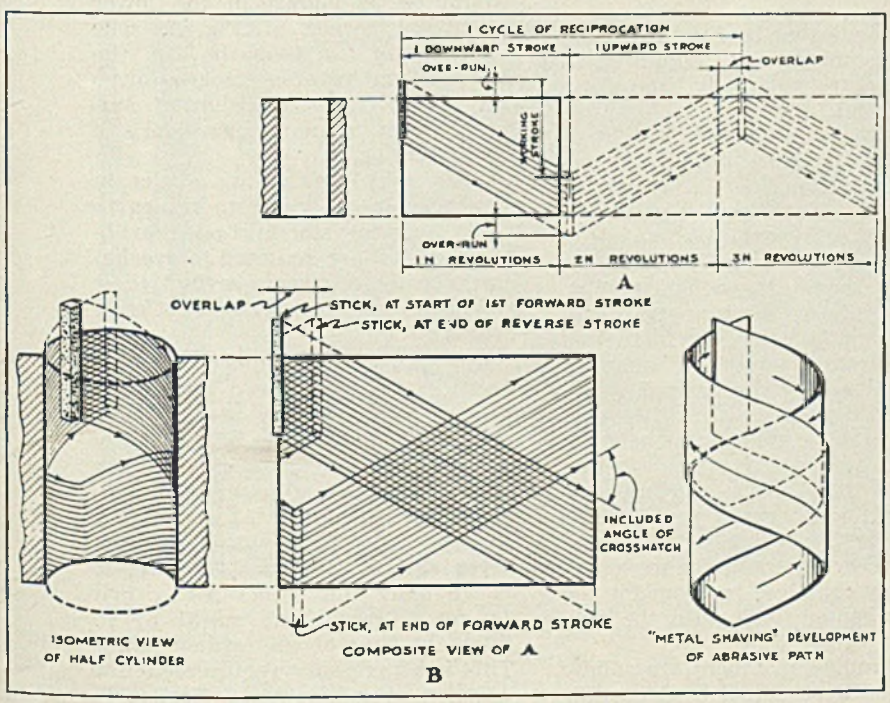
As in every other type of shearing application, *pressure* is required to secure and maintain a desired degree of penetration of the grits into the work; and *motion* is required to convert this pressure into a directional force to produce shearing stress.

Due to the inherent structural characteristics of the bonded cutting tips, there is a relatively low limit to the buildup of impulse force which can be applied. This limit depends on: The extent of variation of grit cleavage planes to the direction of force application, the stress resistance of the bond posts in which each grit is mounted and the time during which this buildup of force occurs.

It is possible to select and control these limits within extremely close values and thereby lower shearing stress to values which cannot be registered with present instruments. The total normal pressure conventionally used in honing results in unit pressures which range from approximately 55 to 75 pounds per square inch in rough honing and from 40 to 55 pounds per square inch in finish honing. These pressures, distributed over thousands of simultaneous cutting tip contacts, result in unit pressures per grit which range from 0.003 to 0.015-ounce in finish honing and from 0.019 to 0.324-ounce in rough honing.

Shearing stress influence is thereby localized over a large number of minute area contacts in the work surface; and high unit stress is reduced by distributing shearing force

From a paper presented at the National Defense Meeting of the American Society of Mechanical Engineers held in St. Louis Sept. 9-11, 1941.



application through a large number of cutting tips. This makes it possible to control the uniform removal of stock in any desired amount, at any desired rate, from surfaces of any degree of roughness.

The direction of motion used in hone abrading is extremely important as upon it depends uniform rate of grit and bond fracture, a uniform number of cutting tip contacts, and the ability to produce as great a variety of surface finish patterns as may be desired.

By the law of averages, there are probably as many bonded grains fully resistant as there are least resistant, all the others having resistances within this range. Therefore, if an area of bonded abrasive grains is actuated in shear over a surface, maximum cutting efficiency will be obtained only when the direction of abrasive travel is varied frequently and in a wide enough angle to permit periodic force application parallel with the cleavage planes of all the cutting grains. Frequent change of direction of motion permits the grains and bond posts to fracture in a self-dressing action and thereby maintain sharp cutting edges at all times.

A constant direction of abrasive travel offers a minimum opportunity for self-dressing of the abrasive. Worn or dulled grits are formed very quickly. As such, they are resistant to penetration and tend to ride up over the surface of the metal. This produces a rubbing or burnishing action and a burnished finish.

These considerations emphasize the importance of multi-directional motion of the abrasive over the work surface.

A most important consideration is the time required for penetration of the grits into the work surface—that is, whether under actuation by impact or impulse force. This largely determines the quality of the work produced. While superficially equivalent results in surface finish generation may be obtained over a wide speed range, they are not equivalent in surface quality.

Abrasive travel speed is directly related to the number of simultaneous cutting tip contacts and to the amount of work which must be done by each of these cutting tips. With few cutting tips at work, harder bonds and high speeds are required. Application of force is largely by *impact*. With a large number of simultaneous cutting contacts, softer bonds are used and speed can be reduced to where force application is by *impulse*.

As will be noted in Fig. 3, honing conventionally uses the lowest speed of any of the mechanical abrading methods, ranging upward from 10 and rarely exceeding 250 surface feet per minute.

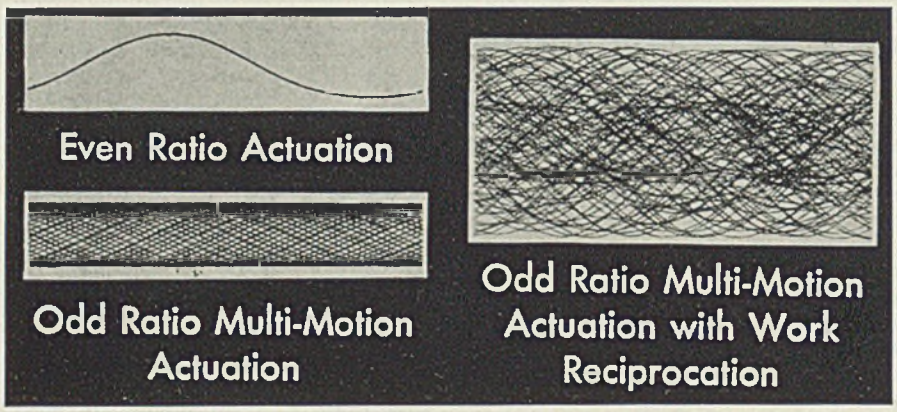


Fig. 6—This shows paths of an abrasive grain on the work surface itself, starting with the even ratio movement, supplemented by odd ratio multi-motion actuation, to which finally work reciprocation is added to produce the final spiral path desired. These illustrations show how the spiral path in Fig. 5 is actually obtained on the work

As is indicated in Fig. 4, honing accomplishment and honing tool actuation are relatively free from such critical factors of machine balance as the relative unit weight of assembled machine parts, the machine foundation, inertia factors, vibration and centrifugal forces.

The entire control of expansion pressure application is designed into the tool adjustment mechanism, Fig. 4. This assures positive transmission or modification of force and motion in relation to the quantity and quality of work desired.

Universal joints in the driver connection with the spindle and between the hone body and its adjusting head provide incidental compensation for minor misalignment of the spindle and work, eliminate high spindle bearing maintenance costs, and allow complete freedom for the hone to center itself with the neutral axis of the bore.

All abrading members are solidly supported by the tool construction, and the tool is supported concentrically in the bore by the work itself. This assures balanced shearing force application.

Because of these features, honing tools are not designed to generate concentricity nor parallelism of bore axes.

On the other hand, these features do make it possible for a bore which is undersize or which requires additional correctional processing to be rechucked and finished to specified tolerances. This is a uniquely important feature in the field of generative, mechanical processing.

Correction of out-of-roundness and generation of roundness are produced by the rotary motion of the hone and the freedom of the tool to center itself with the neutral axis of the bore.

Correction of taper and generation of diametric straightness are controlled by the reciprocation or longitudinal traverse of the tool combined with positive expansion and equalized pressure application throughout the length of the honing stones and the working stroke.

Correction of axial distortion and generation of axial straightness are accomplished by the use of sufficiently long stones to overcome any axial deformity in the bare.

The simplest form or multi-directional abrasive actuation used in conventional honing applications is shown in Fig. 5. It combines simple rotational movement with simultaneous reciprocating strokes or rapidly reversing traverse of the tool. This actuation generates a simple harmonic abrasive travel path. For simplicity, the ratio shown is slightly more than two revolutions to one reciprocation.

The path of the stone travel, if conceived as a thin metal shaving, would be as shown in the lower righthand corner of Fig. 5. The crossing of these paths on the forward and reverse strokes forms the symmetrical "crosshatch" surface finish pattern characteristic shown in Fig. 6.

Note that the honing sticks in Fig. 5 are not allowed to return to their original starting position in the bore but are actuated to overlap successively or creep beyond their previous positions at the end of each stroke.

The paths of a number of sticks positioned at spaced intervals around the periphery of the hone, will thus cross each other many times during operation. With a wide range of adjustment in establishing the angle of crosshatch in these actuations and with a uniform rate of abrasive fracture, it is virtually impossible for a grit to cut a continuous spiral or to follow in any of its former paths. This is a necessary requirement for uniform abrading effort, Fig. 6.

SCRAP PILES

. . . . offer a reserve source of nickel that has recovery possibilities estimated to reach a potential of over 1,000,000 pounds a month

■ RICH in so many elements of vital importance to American industry as it rushes to meet war needs, the alloy steels paradoxically offer an important source of supply of these elements—especially nickel, according to the International Nickel Co. Inc., 67 Wall street, New York.

The answer lies in the fact that from 20 to 40 per cent of the total tonnage delivered by mills to manufacturers is lost in machining and other processes of fabrication. Sometimes net losses may run to 70 per cent, and—in complicated operations—up to 80 per cent. Nickel content in the case of the automotive and similar type low alloy steels runs from slightly over 1 per cent to more than 5 per cent. In stainless steels the figure often may rise above 10 per cent.

The alloying elements in these materials are largely reclaimable, but in the past most of them have been lost—though the stainless steels, to an extent, have been an exception. They have been lost by a general practice of mixing the alloy steel scrap with carbon steel scrap and disposing of it as carbon steel. The extent of this practice is indicated by the fact that in the past year the residual nickel content in miscellaneous scrap as revealed by periodic examinations was approximately 0.05 per cent.

This residual nickel enters carbon steel through alloy steel mixed with ordinary carbon steel scrap charged into the furnaces with pig iron. An average of 50 per cent scrap is used in the usual furnace charge. In other words, this nickel enters by mistake or failure to segregate alloy from carbon steel scrap. It is too low in content to add appreciably to the qualities of the steel. It remains buried.

During the past year approximately 84,000,000 net tons of steel were produced. At average figure of 0.05 per cent residual nickel this tonnage would account for 84,000,000 pounds of nickel. This nickel might well have been salvaged had scrap segregation been systematically carried out over the years in which, through cumulative effect, this residual nickel was being built up.

Steel production is mounting rapidly. During the first 8 months of this year, for instance, more scrap was used than in any other year of the steel industry's history. Hence the concern of both government and industrial leaders for an intensified salvage campaign.

As indicated, segregation is the springboard for recovery of essential alloying elements. It means far more, of course, than segregation of alloy steel scrap from carbon steel scrap. No general specifications for such segregation according to percentage of nickel content have yet been completely outlined, though numerous divisions along these lines not only have suggested themselves, but also are being carried out.

Much Nickel Can Be Saved

While all scrap containing nickel is valuable and should be segregated so that the nickel content can be salvaged, it should be obvious that scrap containing 2½ per cent nickel or higher is far more valuable to the producing mills than scrap which, through dilution, runs 1½ per cent nickel or under. On the basis of present nickel steel consumption it is estimated that up to 1,000,000 pounds of nickel a month may be saved for producers and users of these nickel steels by careful scrap segregation.

It also has been found advisable to separate the various forms of scrap with small pieces, such as machine turnings, chips, flashings from forgings, and the like, being kept apart from heavier and larger pieces like bar-ends, punchings, rejects, and the like. An important reason for this is that the smaller pieces are not as compact as the heavier and must be baled, briquetted, or otherwise processed to save space and make transportation more economical.

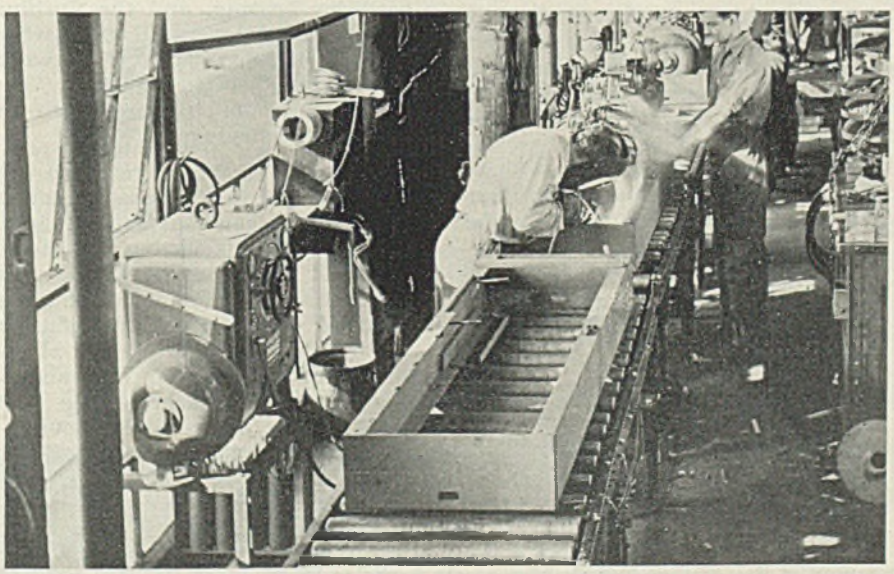
Many manufacturers, especially those operating smaller plants handling both ferrous and nonferrous materials, already have had experience in segregating steel from brass, bronze, and other nonferrous materials. The segregation now urged merely carries this control further.

The general method of handling is the obvious one of sorting the scrap at the machine, using suitably marked containers for the different types of scrap, and storing in separate bins—each bin holding material of one type or of several closely associated types. Thus, when the scrap is returned to the furnaces, the nickel represents a known and fixed content which can be reclaimed and thus decreases the amount of nickel needed to provide the desired analysis in the resulting alloy steel. One enterprising alloy steel producer recently salvaged over 40 per cent of his nickel requirements for the month from nickel steel scrap.

In many cases, obviously, salvage operations will require capital outlay for additional storage space,

(*Please turn to Page* 76)

Assembly-Line Welding Speeds Production



■ **Welding machines placed at strategic points along the assembly lines at Hobart Bros. Co., Troy, O., speed production and eliminate backward handling from assembly line to welding shop. Operator above is welding motor and generator mounting bars for a gasoline driven unit. Note welding machine at the left**

METAL CLEANING

And Ordnance Production

By DR. R. W. MITCHELL
Technical Director
Magnus Chemical Co.
Garwood, N. J.

. . . . especially as regards recommendations for shell bodies, shell cases, cartridge cases and other ordnance items

■ FIRST two sections of this series detailed the part played in the cleaning function by such characteristics as wetting, penetration, alkalinity, ability to retain alkalinity with continued use, and ease of rinsing. Now let's see how these are applied.

Cleaning Shell: Steel shell bodies after leaving the forge shop usually are first rough cleaned by sand or shot blasting. Then before going to the machine shop, they receive a further cleaning by one of two alternative methods. One is the use of modern alkaline cleaners, either in still tanks with or without mechanical agitation or in washing machines of suitable design. The other is the use of the emulsifiable solvent cleaner described in Section II, see STEEL, Dec. 15, 1941, p. 86. Section I appeared in STEEL, Dec. 8, 1941, p. 90.

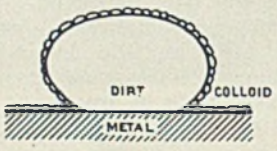
In mechanical washing machines, the alkaline cleaner used must not possess excessive foaming qualities, but in all other respects the same general type of cleaner applies both to tank and machine cleaning.

In selecting cleaners for this type of operation, it is essential that the compound is not based on caustic alkalies, not only to avoid tarnishing of the copper rotating band but also to prevent poor rinsing which would impair the adherence of the lacquer on the finished shell (particularly in the interior). Caustic alkalies are unpleasant and hazardous to handle, and in addition there still is the danger of forming unstable and highly sensitive alkaline salts with some explosive materials if unrinsed residues are left in a shell.

A modern alkaline cleaner for shell bodies will not show strong caustic action. It will wet and penetrate grease deposits quickly, emulsifying and dispersing all ingredients, besides loosening embedded particles from the metal surface.

It should clean satisfactorily in a 3-minute maximum period of soaking and rinse off thoroughly and completely with minimum contamination of rinse tanks due to slow drainage after the cleaning soak. There should be no tarnishing of copper bands and no film left on the shell surface.

Choice of handling methods of course depends on the setup of the shell production line. Adequate provision should be made for complete penetration of the cleaning fluid to all interior parts of the shell, due to the fact that it has but one opening. Similarly, provision must be made for good mechanical positioning for draining off of cleaning solution prior to rinsing. Rinsing itself should be with hot water to insure speedy drying off of shell for subsequent lacquering.



Part of the colloidal theory of metal cleaning action is that colloidal particles adsorb on the surface of a solid dirt particle as shown here. In turn, a solid particle of dirt may be loose or bonded (adsorbed) to the surface on which it lies. When it is more firmly bonded than soap would be, it is obvious that cleaning with a soap solution alone will be ineffective. The colloidal particles then must have some aid to clean the work. This and previous sections in this series cover the actions involved

An ideal cleaning solution will not give off any objectionable odors or fumes.

The emulsifying solvent cleaner offers many of the advantages of vapor degreasing, but eliminates much of the expense of the former method, besides being much more effective in removing adherent solid dirt from both the exterior and interior of the shell.

In practice, the process consists in the use of the emulsifying solvent cleaning solution in a dip tank, or in the spray zone of a mechanical washing machine. In the latter case, the setup must be such that the sprayed solution reaches every part of the interior of the shell.

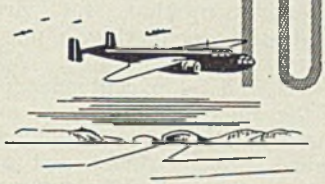
The solution does not require a long soak. In fact, a minute or two is all that is needed. The solution has very speedy penetrating power, reaching down to the metal surface and loosening the bonds of all deposits of grease, dirt and solid particles, even where they are embedded. The loosened material is then readily flushed off with a pressure spray of water.

After the dip in the solution and a short drain period during which the excess solution is drained back into the dip tank, the shell bodies are sprayed with water under pressure. The solution itself is used at room temperature without any need for heating, and the flushing spray is fully as effective when used at room temperature as when hot, insofar as rinsing goes. The only reason for heating is to insure speedy drying.

Pressure flushing removes all traces of dirt and grease, leaving a physically clean surface in ideal condition for lacquering. It should be noted that relatively little solid dirt comes off in the dip tank, being retained on the shell until flushed off by the pressure spray. Hence the cleaning solution has an exceptionally long service life with minimum sludging up. It should be further noted that the emulsifiable solvent cleaning solution is nonflammable, harmless to skin and hands and has a low evaporation loss, which makes it highly desirable from the safety angle. Overall cost is considerably less than that of the ordinarily used vapor degreasing solvents, which are, moreover, exceedingly scarce during this

To Help You get the most out of STAINLESS STEEL

TODAY... TOMORROW



If your plant is using Stainless Steel for defense work—your big problems are to push the work out faster—to avoid fabricating troubles—and to keep costs in line. Ever since the earliest days of Stainless Steel we have been successfully attacking these problems. When Carpenter developed the first bright finish, ductile Stainless Strip and gave industry Free Machining Stainless Bars, the way was paved for the precision jobs men are turning out today. By co-operating on a wide variety of wartime jobs, Carpenter is adding to the fund of experience and information that is available to all Stainless users. Ask us for easy-to-understand fabricating information that will help you speed up production and overcome trouble. A letter to us, or a phone call to our representative, will promptly bring you the information you need.

Out of the vast proving ground of national defense will emerge better Stainless Steels and an improved "know how"—born of much problem solving. Thousands of products, like yours, will have "discovered" Stainless Steel for improvements in appearance and performance. But don't wait until tomorrow comes. Start thinking about tomorrow and redesigning for the future *now* . . . and let us cooperate with you. There is no let-up in Carpenter research. We'd like to think ahead with you—give you the benefit of our experience and new developments as they come along. Then when the zero hour on the sales front arrives, you'll be ready to uncover your new product, and get the jump on competition.

To help make your fabricating problems easier, Carpenter offers this Stainless help. The handy Slide Selector Chart quickly suggests which Stainless analysis best meets your corrosion or heat resistance requirements. It provides answers to your questions about physical properties and fabricating conditions.

And to help you plan for tomorrow—this Design Booklet will show you practical ways to make the most out of the natural advantages of Stainless. It contains helpful hints on designing Stainless parts and products that are easier to fabricate at less cost.

A note on your business letterhead will bring you copies of either or both of these Carpenter helps. Or ask your nearby Carpenter representative for them. This offer good only in U.S.A.

THE CARPENTER STEEL COMPANY, READING, PA.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

period of the national emergency.

From the viewpoint of speed and economy, the emulsifiable solvent method of cleaning shell is perhaps the most desirable.

The cleaning of steel shell where the interior of the shell has been machined instead of being finished in the forge shop imposes a slightly more difficult cleaning job on the cleaner in that embedded metal particles present more of a problem. In such shell, vapor degreasing is very apt to be unsatisfactory, while the emulsifiable solvent method is completely adaptable.

Shell Cartridge Cases: Cleaning the blanks between draws and after annealing can become quite a complicated operation, involving acid pickling, rinsing and brushing. Use of the same kind of cleaner described above for steel shell cleaning in a solution of similar concentration provides for speedy removal of annealing salts and leaves a physically clean metal surface on which the drawing compound is more effective.

The final cleaning of brass cartridge cases is best entrusted to a modern alkaline cleaner of the same composition as the one recommended for steel shell. The speedy and effective cleaning action of this cleaner, plus its fine rinsing qualities, insures fast dependable results.

Staining due to excessive alkalinity or too long a contact with the solution must be avoided. Note, too, that poor rinsing qualities will tend to cause staining or tarnishing due to the effects of unrinsed residues on the metal.

Caustic alkaline cleaners are thus to be as much avoided in cartridge case cleaning as in shell cleaning. Pitted surfaces and poor adherence of lacquer due to caustic cleaners tend to increase seconds and reworking, even where out and out rejection is not involved.

Small Arms Cartridge Cases: since these cases are usually drawn with a dilute nonstaining soap, the cleaning operation is not usually difficult. The same cleaner suggested for shell cartridge cases will do an excellent job on these small arms cases for the same reasons of speedy cleaning action and fast thorough rinsing.

It should be noted that thorough cleaning and rinsing are most important in this operation because of the final trimming operation which follows cleaning. Traces of grease on the cases tend to cause slippage which will materially slow up the operation of the automatic machines used for trimming.

Other Ordnance Items: Any attempt to make detailed recommendations for the cleaning of the hundreds of other metal objects involved in the production of material for defense would involve far more space than is available in this article. On the other hand, detailed recommendations are not necessary in the great majority of cases.

Generally speaking, both the modern alkaline cleaner recommended for the shell and cartridge case cleaning operation and the emulsifiable solvent cleaner are applicable to most of the metal cleaning operations involved in the victory program.

The main point to remember is that when the metal will require a finishing operation such as plating or vitreous enameling where a physically clean surface is not sufficiently good to insure good results, the methods described above are not enough. The logical procedure is first to obtain a physically clean surface by one of these methods and then carry the cleaning one step further to get a chemically clean surface suitable for plating.

Remember that for ordinary painting or lacquering, a physically clean surface is ample. All dirt, grease and oil except that present in the microscopic cracks and fissures of the surface have been removed. But residual dirt and oil are still there, usually evidenced by a "water break" when the metal surface is wetted with water.

For fuze parts, searchlight mirror shell, many elements of tanks, trucks, artillery, and the whole range of ordnance and *materiel*, not to mention mess kits, side arms, and the other multitudinous metal items in the rearmament program, a chemically clean surface is desirable for final finishing operations. In general the most practical and economical cleaning procedure is the use of the emulsifiable solvent cleaner to provide a physically clean surface, followed by a final cleaning operation to insure complete cleaning and a chemically clean surface.

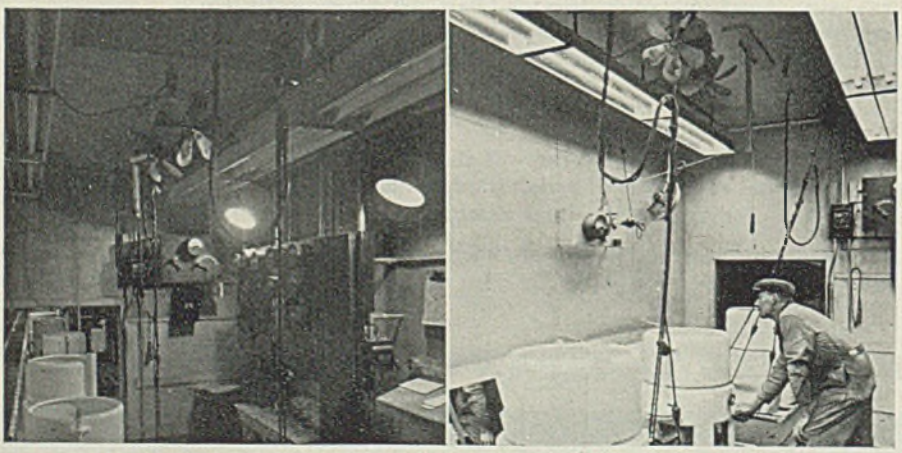
The cleaner used for this final operation depends on the technique to be followed. Where an electrocleaning tank is used, the cleaner should be of an alkaline type, capable of carrying a relatively high current so that the current density of the operation is at a level consistent with the modern practice. The cleaner should have exceptional wetting properties to insure speedier cleaning action in the tank and later to insure speedy and very complete rinsing to avoid troublesome scums and drag-over troubles in plating tanks.

In most plants where a chemically clean surface is sought, electrocleaning is used. Where tanks of mechanical washing machines are employed for this final cleaning operation, modifications of the balanced alkaline cleaners designed for electrocleaning operations will be found satisfactory. On mechanical washing machines, foaming characteristics must be checked, since excessive foaming must not be allowed on these machines. On tank cleaning, the superior wetting properties of certain modifications of alkaline electro-cleaning compounds can be utilized effectively, even though their foaming characteristics make them unsuitable for mechanical washers.

The cleaning problems of the

(*Please turn to Page* 76)

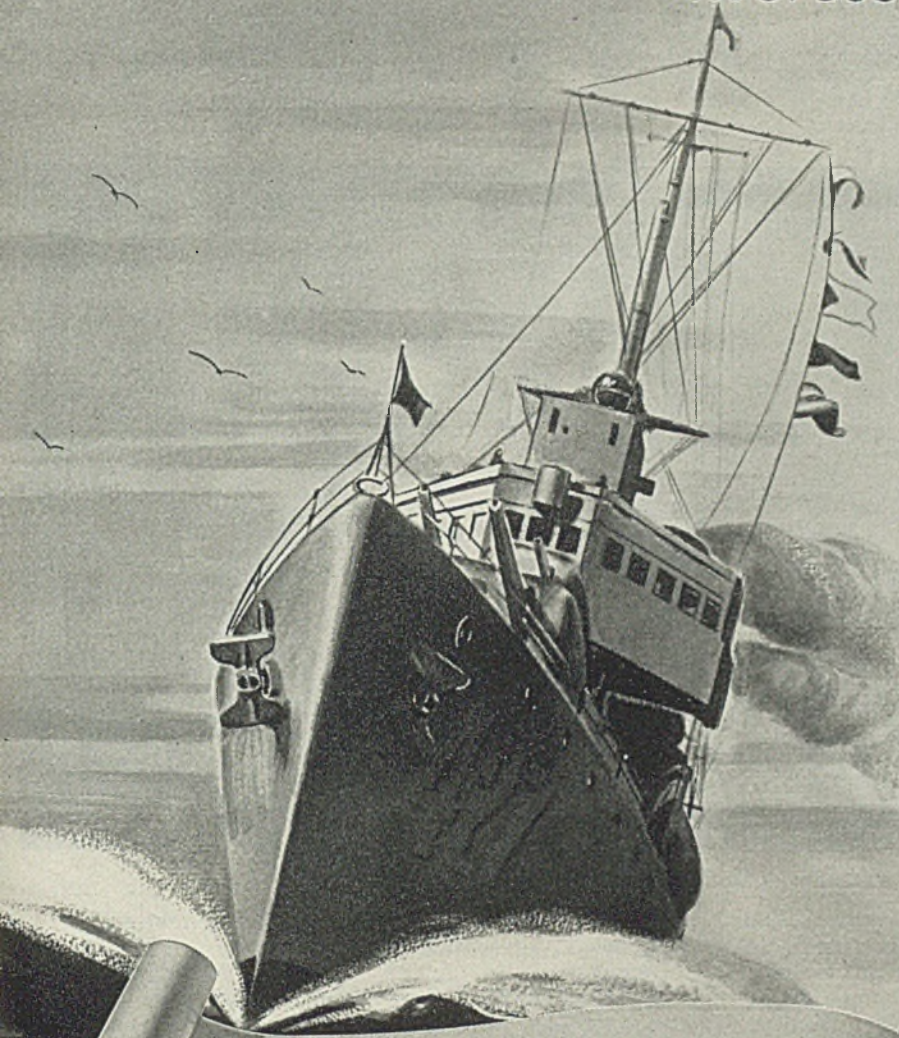
No "Blackout" Here



■ Illustrating the high efficiencies possessed by the new fluorescent lamps, these views show improvements made in illumination of important areas without increasing power costs. Illustration at left shows an inspection booth in the plant of Apex Electric & Mfg. Co., Cleveland, before it was relighted. View at right shows same booth equipped with six twin-lamp Westinghouse luminaires, each utilizing two 48-inch 40-watt fluorescent lamps. Each provides 100 foot-candles of glareless, cool illumination, eliminating shadows in any form on product being inspected

PROTECTION IN TRANSIT

...'Cross Ocean or 'Cross Town



YOUR Shipments NEED PROTECTION IN TRANSIT, too . . . and dirtproof, waterproof FIBREEN DOES THE JOB

Like convoys across the Seas—your shipments, whatever they are, wherever they go, face the hazards of transit . . . rain, dirt, exposure and rough handling.

Send your shipments out with the protection necessary to get them to the consignee as clean, as fresh and undamaged as they left your plant. Use FIBREEN—the material that is helping a host of manufacturers deliver their goods in perfect condition. They're using it as a rugged, wetproof, dirtproof wrap—as a tough, impervious liner for crates, boxes and cartons. They're finding it saves time and money—reduces losses and claims.

Perhaps FIBREEN can solve a packing problem for you. Tell us what you ship and how you now pack it. Shipping experts of The Sisalkraft Co. will offer recommendations and provide a quantity of FIBREEN for your own tests. No obligation.

FIBREEN is 6 ply: TWO layers of strong kraft, reenforced with TWO layers of crossed sisal fibers embedded in TWO layers of special asphalt — all combined under heat and pressure. FIBREEN is pliable and clean — will not scuff — stands an astonishing amount of abuse and exposure. It is used either as a wrapping or a lining material.

Soak it—twist it—try to tear it!

Only when you get a sample in your own hands can you realize that a *paper* can be so strong — so tough — and impervious to moisture. Write for sample.

FIBREEN is a product of The Sisalkraft Co. —also manufacturers of Sisalkraft, Sisal-X, Sisal-Tape and Copper-Armored Sisalkraft.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

INDUCTION BRAZING

In Ordnance Work

. . . . means increased brazing speeds, precise control of area heated and temperatures reached, reduced production costs. Unskilled operators can produce perfect work

By W. E. BENNINGHOFF
Manager
Tocco Division
Ohio Crankshaft Co.
Cleveland

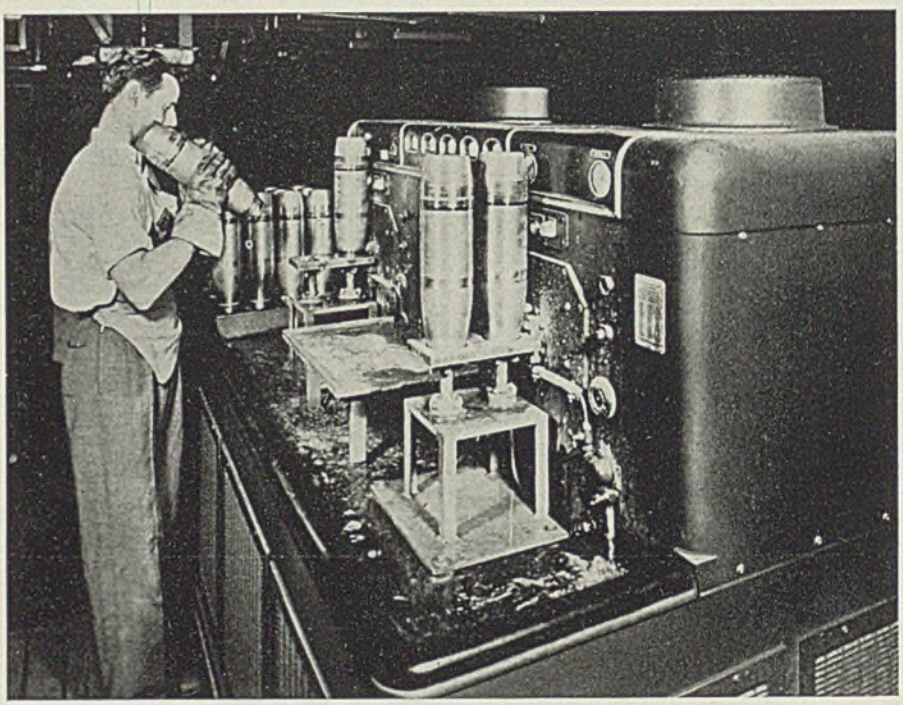


Fig. 1—Two working stations, each with provision for two shell bodies, mean that the induction heating equipment can operate at full capacity practically 100 per cent of the time. The work being done is the induction brazing of adapters to nose of 105-millimeter chemical shell bodies, using a 20-kilowatt Tocco induction heating unit to turn out a brazed joint every 20 seconds

■ PRESSURE of war production on American manufacturers has not been without its industrial blessings. Each new mechanical application or process, and many have been introduced, has been given the trial it needed to prove its practicability as an advanced method of accomplishing a given operation.

In that classification can be listed brazing, using electrical induction as the heating medium. It is today finding new applications in the hectic field of rearmament and proving itself exceptional in performance. Any analysis of metal that can be brazed can be heated inductively with the possibility of one exception—that of two extremely thin sections which by their shape do not lend themselves readily to induction heating. However, a heavy piece and a thin section can be brazed satisfactorily.

Strength of joints, inductively formed, is equal to the strongest unions. It cannot be said that one method of heating for brazing makes a joint appreciably stronger than another. However, tensile tests of an inductive braze of two tubes with silver solder showed failure of the tubes without failure in the brazed joint.

Where it is not possible to apply heat by usual methods to the inside of a joint or part, high-frequency electric currents can be used to penetrate the metal to provide uniform brazing temperature throughout.

Whenever a part is not suited to furnace brazing, induction heating often can be applied easily and with complete success because it is not necessary to heat the entire assembly, thus avoiding distortion. The reason, of course, lies in the rapidity and evenness with which brazing temperatures are obtained by induction heating. Tendency to scale is minimized by the extreme speed made by automatic controls which cut off the energy when the desired temperature is reached.

The principle of electric induction heating applied to brazing is the same as when applied to surface hardening, except for elimination of the quench and employment of a different heating cycle. Alternating current at a frequency near 9600 cycles is fed into the inductor which surrounds the joint to be brazed. When the piece is placed within the field of the inductor, a dissipation of energy in the joint creates heat in that section. This is the result of tremendous molecular friction in the outer surfaces of the metal. As the molecules attempt to align themselves with the polarity of the field which is changing thousands of times a second, they generate heat which quickly (a matter of a few seconds) causes the part to reach brazing temperature.

Brazing fixtures and water-cooled inductors are readily designed to fit almost any part. Establishing the correct heating cycle for a particular job is merely a matter of routine.

Equipment used for much induction brazing work of this type is a compact self-contained unit known as the Tocco Junior. Here 10,000 cycles of high-frequency current are produced by motor-generator sets having outputs up to 100 kilowatts. Other parts of the equipment include an inductor, suitable transformer and capacitors, automatic timing controls. Units can be installed quickly in a production line for only power and cooling water lines need be connected.

Examples of Brazing: Today in the field of ordnance and aircraft production, induction brazing is being used to great advantage. Its speed and perfection on repetitive work are helping step up schedules.

In two of the leading shell making plants of the country, induction units are brazing adapters on 75 and 105-millimeter chemical shell bodies. Back in 1918, adapters were screwed onto the shell using pipe threads. Then later welding was tried but not with complete success. Recently, induction brazing was applied and found to be quite satisfactory. Now a perfectly brazed shell is turned out every 20 seconds.

The brazing alloy, formed to fit

THE STORY OUR ADVERTISEMENTS DO NOT TELL

The advertisements of The New Jersey Zinc Company which are appearing currently in these pages explain the reasons why non-defense consumers have not been able to obtain all of the zinc they would like to have.

At the close of a critical business year, however, The New Jersey Zinc Company feels that it should tell a story which would not normally be a part of such a series of advertisements—a story of the cooperation given to this Company by its customers.

This cooperation, and the resulting exchange of vital information, made possible:

A better understanding of our mutual problems and difficulties;

The elimination of unreasonable demands and unfilled promises;

The fulfillment of contract obligations in spite of a tremendous expansion of business;

The shipment of a large list of zinc products where and when they were needed most—in defense and non-defense fields.

Consequently, thanks to our customers' cooperation and understanding, we feel that a difficult task has been accomplished.

The New Jersey Zinc Company looks forward to 1942 with confidence that this cooperation—which has proved of the greatest value under a heavy strain—will continue to operate to the mutual advantage of all concerned.

160 FRONT STREET

New Jersey Zinc

NEW YORK, N. Y.

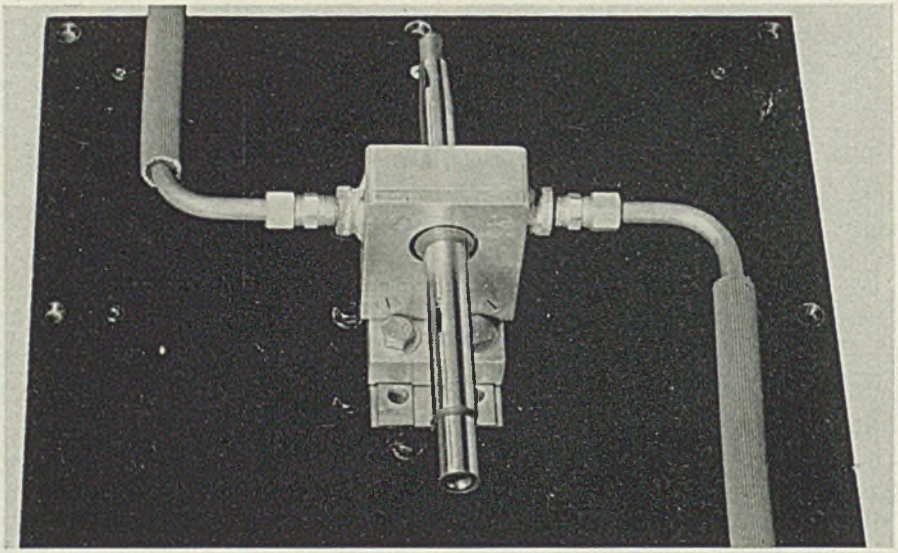


Fig. 2—Typical inductor block used for induction heating for brazing. It is made of copper and is cooled by water circulating through the connecting lines shown. Part to be brazed is in place in the inductor block

the shell, is placed over the nose. The adapter is screwed into place after the flux has been applied. Shell then is placed nose down in the double inductor of a 2-station 20-kilowatt unit. Two shell bodies are brazed simultaneously while the operator is setting up two more in the other station. The machine thus can operate at full power capacity practically 100 per cent of the time. This setup is shown in Fig. 1.

On a similar unit, burster tube assemblies are also brazed inductively at the rate of 300 tubes an hour. This is a delicate job that has always been difficult, for a special head and collar must be brazed to one end of a tube which carries the detonating charge. It takes 8 seconds to braze a burster tube assembly by induction heating.

Controlling the heated area accurately, a feature of induction brazing, is best demonstrated in these two operations. The heat on the chemical shell adapters must be restricted to a band ¼-inch wide on either side of the joint. On the burster tubes, it is confined so as not to go below the flange sleeve on to the tube.

In the aircraft industry, where little detail can be revealed at the moment, it can only be said that induction brazing done by unskilled labor is being used to real advantage on tubes, flanges, fuselage parts and engine accessories. A recent installation by a major plane maker indicates savings of tens of thousands of dollars over former brazing methods.

Formerly 40 particular aircraft engine assemblies were brazed by hand in an 8-hour day—5 per hour. Now, with induction brazing, this same part is being turned out at the rate of 20 *an hour*—a daily increase of 300 per cent. It is in an operation like this where the full economy of the induction method is seen. Not only is power consumption extremely reasonable per unit brazed, but labor costs can be reduced by putting skilled men on other more complicated tasks. Most important of all, production can be increased to relieve bottlenecks.

Additional induction heating applications now in operation include the brazing of bed ends by convicts working in the shop of one of our state penitentiaries; the brazing in 27 seconds of an oil filter assembly composed of a tube, case and cap; and the brazing of industrial brush assemblies in 15 seconds. Another application is the silver soldering of carbide tips to tool shanks in one minute and 56 seconds on a 40-kilowatt unit. This operation consumes only 1.5 kilowatts in a slow heating cycle which is none the less faster than previous methods.

Aluminum Brazing: Tests on the brazing of aluminum are being conducted and preliminary results indicate that because of the speed, accuracy and precise control of induction heating, satisfactory results are soon to be achieved. This development is expected to broaden greatly the scope of induction brazing in the aircraft industry.

Factors thus favoring induction brazing appear to include provision for increased brazing speeds; for localized control of the heat to the area to be brazed—heat can be held to within 0.25-inch limits; for precise duplication of results on all parts; for uniformly brazed joints; for reduction in unit cost of work done; for operation by unskilled labor once the heating cycle is established.

New Handbooks Available

Copies of "Modern Shell Production," revised, containing additional information on heating and heat treatment of ordnance, shell and bomb fuses, small arms ammunition and cartridge cases, are now available.

"Modern Shell Production" contains 160 pages and is fully illustrated. It is priced at $1.50 per copy.

Also available are copies of "Modern Gun Production." This handbook includes articles on principles of gun construction, gun carriages, recoil mechanisms, instruments for fire-control and rangefinders. It is priced at $1 per copy.

Orders should be addressed to Readers Service department, STEEL, Penton building, Cleveland.

New Production of Drill Fittings Extended To 1943

■ Effective date for new production of diamond core drill fittings, commercial standard CS17-42, has been extended to Jan. 1, 1943, according to the National Bureau of Standards, United States Department of Commerce, Washington. This action was taken upon the recommendation of the Diamond Core Drill Manufacturers Association.

Difficulty in securing raw materials because of the priority situation, which is likely to become worse if the trend toward allocation continues, and danger of slowing up manufacturing during this critical period in making a changeover in shop production were reasons advanced by the association for urging this move.

"Packaged Powder" Speeds Welding

■ "Packaged power" is now provided for the Unionmelt process by which steel plates as thick as 3 inches are welded automatically at a single pass. Supplied by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., the "package" consists of a transformer, its control and auxiliary apparatus—all consolidated into a single compact unit.

Feature of the unit is its semiportability. By means of a crane it can be shifted rapidly anywhere in the plant and set down ready to supply power for welds.

ARE YOU

USING THIS HISTORY-MAKING TURBINE OIL?

THERE'S no need to "put up" with a turbine oil that does only part of the lubrication job. Use the new Shell Turbo Oil—it's the *first* turbine oil to meet the 3 vital requirements of modern turbine lubrication . . .

RUST CONTROL

SUPERIOR OXIDATION STABILITY

MINIMUM FOAMING TENDENCY

Why not give the turbines in your plant the benefits of this new lubricant? You'll find a Shell man's recommendations entirely practical—and made without obligation.

THE PROOF!

The 4 steel test strips shown prove that Shell Turbo Oil can prevent rusting. All 4 strips were immersed for 48 hours at 167° F. in 4 well-known turbine oils, mixed with 10% of distilled water and continuously agitated at 1200 R.P.M. Top strip, immersed in Shell Turbo Oil under these severe test conditions, shows no rust. All other strips were badly rusted.

SHELL

SHELL TURBO OIL

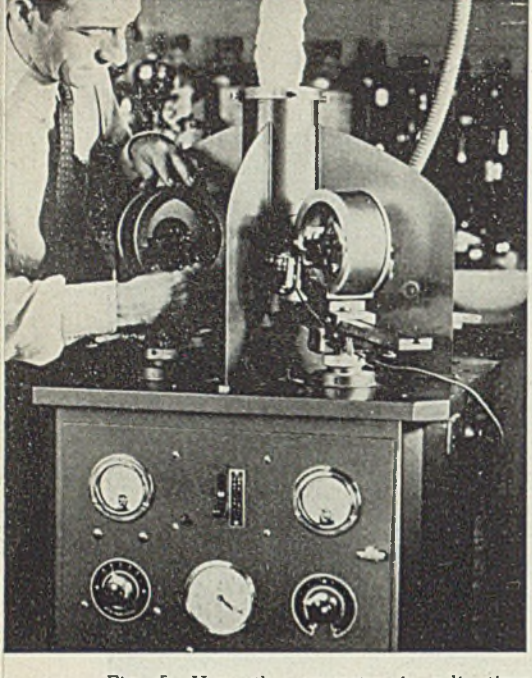


Fig. 5—Here the operator is adjusting the back reflection camera of the G-E XRD X-ray diffraction unit. Note how compact the equipment is

X-RAY DIFFRACTION

. . . . as a method of identifying metal alloys

By L. L. WYMAN
Research Laboratory
General Electric Co.
Schenectady, N. Y.

(Concluded from Last Week)

A VAST amount of work already accomplished in determining structures of numerous chemical and metallurgical materials has built up a marvelous bibliography to which one can refer for the positive identification of materials. This is particularly true in the field of chemistry, where Hanawalt (2) and his associates have devised a purely "mechanical" system that requires little knowledge of structures or X-ray methods to apply it with complete satisfaction.

Reference has already been made in the mirror analogy (see STEEL, Dec. 22, 1941, p. 70) to what is told by the intensity of the diffracted beam. In fact, it is possible to correlate the position of a line and the intensities of the lines with respect to each other (relative intensities) in an indexing system which catalogs the strongest lines according to position. Hanawalt included 1000 chemicals in publication cited (2). This method has now achieved such prominence that arrangements are nearly completed for the inauguration of a technical service to perpetuate and enlarge the references to all materials of known purity.

With such a reference available, or by referring the diffraction pattern of an unknown to that of a known material or synthetic sample, the identification can be positive. As an example, a severely oxidized piece of nickel-chromium alloy showed a dirty green appearance on the surface and on the entire fracture face; yet the material was of metallic appearance and was flecked with bright metallic-looking particles on the polished microsection. Furthermore, it was definitely magnetic. These factors would tend to indicate that chromium oxide and nickel metal were present although there was no guarantee that nickel oxide and chromium metal were not also present, thus creating a situation similar to that of the alkali halides previously described. Lacking a reference, diffraction patterns were made from samples of chemically pure Cr, Cr_2O_3, Ni, and NiO, and these were compared with the film obtained from the oxidized metal. The result showed that only Ni metal and Cr_2O_3 were present.

In another instance, a blackish corrosion product was observed on steel which had been immersed in warm oil. Suspecting sulphur, a qualitative chemical test was made, and it revealed some sulphur present. However, the X-ray diffraction pattern showed that the material was Fe_3O_4, which a quantitative chemical analysis corroborated by showing the sulphur content to be very small.

In establishing standards for the comparison of X-ray diffraction patterns, it is essential to have a pure material for a standard and to make precise measurements of line positions and intensities on the diffraction pattern. This is not too difficult where chemical compounds are concerned, but with the various solid-solution phases, intermetallic compounds, etc., that occur in alloy systems, it is usually necessary to obtain the desired data by obtaining the constituent as a residue by dissolving away the unwanted material chemically.

Fig. 6—Diffraction pattern of sample shown in Fig. 5

The study of hardening processes usually involves the precipitation of a segregate phase such as an intermetallic compound or a carbide. In order to obtain a thorough understanding of the nature of this hardening action, what causes it, and the relationship between composition and properties, it is essential that the precipitate be identified. The amounts of such phases are usually quite small, and an attempt to obtain diffraction patterns in the presence of the entire alloy may prove to be of no avail.

The usual procedure in such instances is to prepare a residue of this phase by dissolving away the bulk of the alloy, leaving the desired phase as a residue. For instance, the complex carbides in alloy tool steels can be reduced to a residue by dissolving away the matrix in diluted hydrochloric acid. The same is true of the several chromium carbides encountered in the carburization of heat-resistant alloys.

Diffraction patterns are then made on the residue, following which the residue is carefully analyzed chemically. The resultant data can be correlated and the lattice structure of the phase worked out, or the line data can be used as a comparison standard for future diffraction work.

There is at least a two-fold value in making a residue. Not only does it make the operation of obtaining a clear diffraction pattern much easier, but it also eliminates all the unwanted lines which would come from the matrix and thus eliminates any possibility of confusion or of complications arising from the chance overlapping of diffraction lines from the various constituents of the system.

When the segregate phase reaches

an appreciable amount, patterns can be obtained from the material without the necessity of going through the process of preparing a residue but by achieving an effective concentration by careful sampling, as described in the following instances:

An alloy of iron, nickel and chromium had become severely corroded in high-temperature service, apparently without provocation. Upon examination of the microsection there appeared to be at least two somewhat different layers of corrosion product overlaying the unattacked metal. These layers were readily differentiated because the outer one was entirely nonmetallic whereas the inner layer was flecked with metal particles. The outer layer was carefully filed off. Then the inner layer was filed off, and diffraction patterns made from each set of filings. The results showed that the nonmetallic outer layer consisted of sodium chromate and oxides of the other metals, whereas the inner layer consisted of metallic nickel together with the oxides of iron and chromium. The presence of considerable sodium was corroborated by spectrographic and chemical analysis, the sum total of data giving definite proof of how carelessly handled sodium compounds can cause the failure of alloys of this kind.

In the case of a nickel-molybdenum alloy which had been treated in burned illuminating gas for some time, it was noted that what had originally been a solid solution now consisted of a solid solution matrix with a segregate phase, Fig. 8, which might be a carbide. The diffraction pattern, Fig. 6, directly on the sample (no residue preparation) showed the face-centered nickel-molybdenum solid solution and the carbide Mo_2C to be present.

In studying alloy systems, the usual procedure is to make a series of alloys, varying from one pure metal to another, and obtain the patterns of each of the alloy compositions after completely stabilizing the alloy by thorough annealing, thus assuring a homogeneous material. If several different types of lattice are observed, it is then necessary to make intermediate compositions such that each lattice type can be obtained solely over a range of composition, thus identifying the composition limits of this single phase.

Whenever transformations are involved, the easiest method is to make diffraction patterns on alloy compositions which have been quenched from various temperatures. This is a satisfactory procedure, providing there is definite assurance that the material obtained at room temperature actually represents the high-temperature condition and that complications have not arisen because of any structural changes whatsoever having taken place during the quenching operation, the same holding true for low-temperature transformations.

In order to eliminate the possibility of error due to unknown changes having taken place during the interval required to get the sample to room temperature, special cameras have been devised which can hold the sample at elevated temperatures. This enables one to obtain the diffraction pattern at temperature without complications. If the camera is so designed as to enable the operator to take several different exposures while still maintaining the sample at temperature, the rate at which the precipitation is taking place can readily be studied.

Much work has been done the last few years on a type of phase formation in some alloy systems which is not of the usual type of intermetallic compound formation but is a considerably slower phenomenon in which the atoms in a solid solution rearrange themselves into an "ordered" state similar to an intermetallic compound and with quite unusual changes in properties. In some instances these are desirable changes, as in the new aluminum-nickel-iron magnet alloys. At other times, they are undesirable, such as the formation of the sigma phase in iron-chromium base alloys.

The classic example of this order-disorder transformation is in the copper-gold alloys. The diffraction patterns of the disordered and ordered states are shown in Fig. 7 (4). This change is accomplished by a long-time soaking at an intermediate temperature.

The tremendous potentialities in the field of practical application of X-ray diffraction to metallurgical problems may be readily understood from the variety of examples given above. Consequently, it is easy to see that equipment of this kind is essential to the up-to-date laboratory, for it is the one tool now generally available that can tell HOW a material is persent. Because of that, it facilitates a clear understanding of the mechanism involved in formation of the material. It must therefore be quite apparent that this purely "mechanical" procedure of identification by direct comparison requires but little skill in the use of X-ray diffraction. Thus, when the procedure is systematized according to the method of Hanawalt and his co-workers as they have applied it to chemical compounds, there results an easy and rapid method of identification.

The method of identification most generally used in metallurgical work is the so-called powder method, which has been well described in the literature (2, 3) because it is usually rather easy to obtain, heat treat, and prepare samples of metal powders or filings.

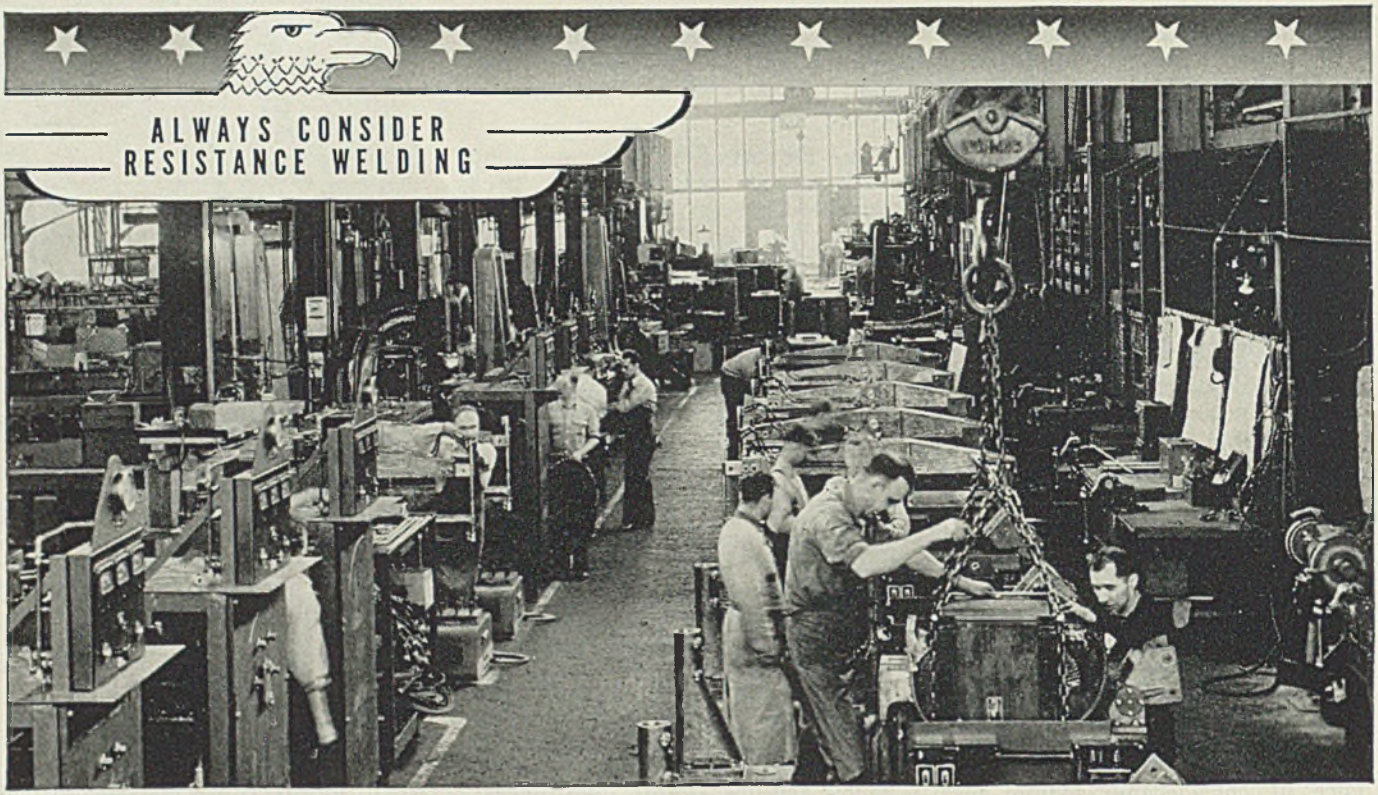
As there are certain precautions which must always be observed in order to prevent any unwanted changes or contamination, it is generally advisable to do all heat treating by enclosing the powdered sample in evacuated quartz tubes, removing the powder for suitable mounting in the X-ray camera. The sample mounting can be accomplished either by enclosing the powder (properly diluted with flour if atomically "heavy") in a glass capillary or by soaking a thin cotton thread in clear, thin lacquer and causing the powder to adhere to the outside of the thread.

Some instances will undoubtedly occur in which the sample cannot be sacrificed by filing into powder form for diffraction use, and there are two solutions to this. One is to use the back-reflection technique wherein the X-rays are reflected back from the face of the sample onto a film having an opening through which the primary X-ray beam goes from the tube to the sample.

Lacking such equipment, one may place the face of the sample at a very low glancing angle to the primary beam in a conventional pow-

Fig. 8—Microstructure (unetched) of 80 per cent nickel, 20 per cent molybdenum alloy at 250 diameters

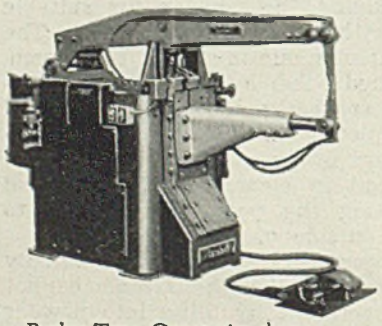
Fig. 7—This illustrates ordering of copper-gold alloy. Here **a** is the disordered alloy, **b** the ordered sample



RESEARCH DEVELOPMENTS IN RESISTANCE WELDING FOR A NEW ERA IN PRODUCTION

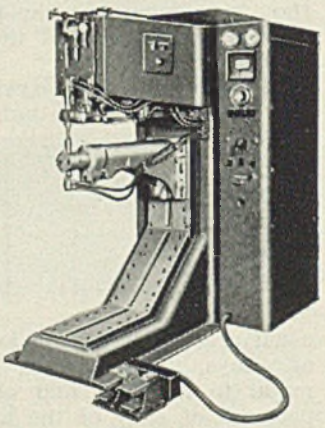
The present demand for greater efficiency and speed in the production of defense materials and machines, has engaged the engineering genius of our nation. Future production, obviously, will embrace improvements in design and manufacturing methods pre-induced by this emergency. Federal engineering accomplishments will eventually be utilized in the manufacture of products for the increased convenience and comfort of America.

FEDERAL IS ON THE MARCH



Rocker Type, Conventional or UNI-PULSE Spot Welder for welding Aluminum Alloys

The Federal Machine and Welder Company is today cooperating 100% with the government in supplying Resistance Welding Machines to vital defense industries. New metal fabricating problems are constantly being met and solved. The field and usage of Resistance Welding is being broadened with each passing day. Research and development never end. Federal is on the march. *Send for Technical Bulletin No. 527 pertaining to Uni-Pulse Aircraft Spot Welding. Bulletin on Shell-Turning Equipment also available.*



Rocker Press UNI-PULSE Spot Welder with Patented Low Inertia Head

THE Federal MACHINE AND WELDER COMPANY WARREN, OHIO

SALES OFFICES IN ALL PRINCIPAL CITIES

der camera, being certain that the beam covers only that portion of the sample which is pertinent to the analysis and that the overhang of the sample beyond the X-ray beam does not shade the diffracted beams from reaching the film. This technique was used on the nickel-molybdenum alloy shown in Figs. 4 and 8.

For general identification work, only a few types of cameras are necessary these being a full cylindrical (Debye) type of powder camera, a semicircular back-reflection camera of moderate size, a flat cassette for either transmission or back-reflection patterns, and a flat film segment camera where comparisons of lattice changes are to be made. There are, of course, many other types of X-ray diffraction cameras in use for special purposes, but those mentioned above will take care of the usual work.

In laboratories where a wide variety of materials may be encountered, it will be found necessary to have more than one type of radiation (wavelength of X-rays) available, and the usual molybdenum target X-ray tube can be supplemented with a tube having a copper target and possibly another having chromium, iron, or cobalt radiation.

As to the operation of the modern X-ray diffraction unit having sealed-off tubes, Fig. 5, there is little more to do than click on the switches and adjust the current and voltage. Thus, with modern equipment and with the great list of materials already studied available for reference in the literature, it is possible to make use of X-ray diffraction as a practical tool either for laboratory studies or for plant control without the necessity of resorting to the use of extensive equipment and personnel.

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Tool Retipping "Pays" On Short Run Work

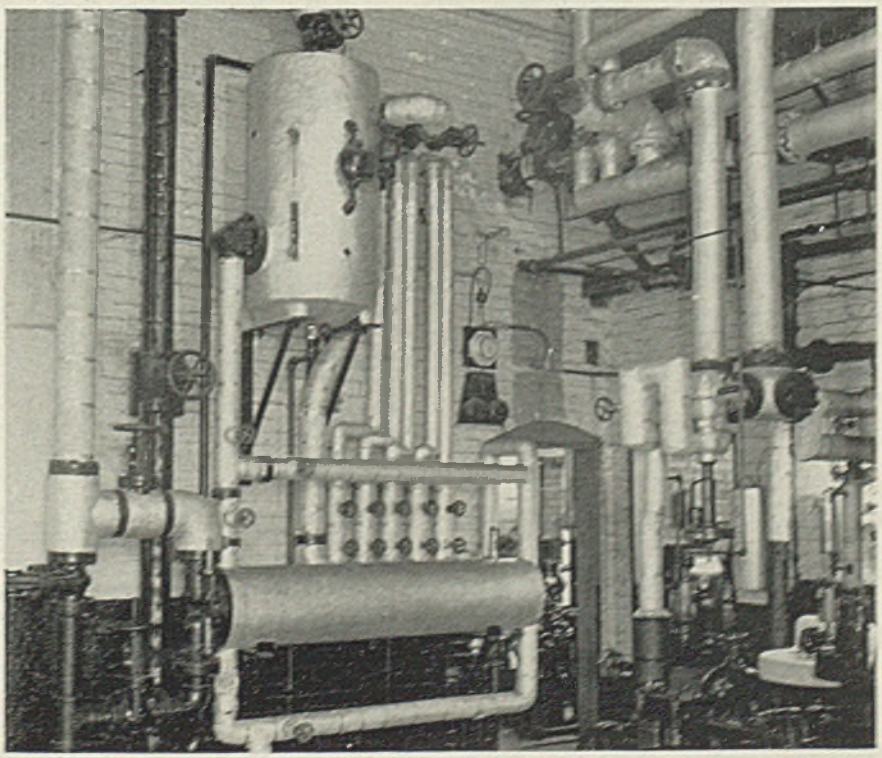
■ Although retipping of carbide tools has been recognized as valuable in mass production work, it also offers economies in short production runs as evidenced by savings up to nearly 40 per cent on recent jobs at the Saginaw, Mich. plant of Baker Perkins Inc.

Making equipment for baking establishments and other diversified products, its machine shop is equipped with lathes and boring mills for a wide range of work, requiring a great variety of cutting tools.

Even though total carbide tool bit consumption is small in this plant, compared with a large mass production outfit, it was found economical for the company to make and tip its own tools. When a tip of a tool becomes too short for further use, the shank is remilled and a new tip inserted. In a few cases the shank as well as the tip may be reshaped to make some new tool. Even a larger standard shank may be remade into a smaller one of special form. Thus a shank may be used in a half dozen different ways before it is finally discarded.

Standard shapes and sizes of shanks are used wherever possible. When tipped with Carboloy, the shanks are made from SAE 1040 or 1050 steel.

Saves by Recovering Heat



■ This Cochrane Corp. heat recovery system shown in the accompanying illustration, consisting of a flash tank, above, and a heat exchanger, below, utilizes the heat of "blow off" boiler water in preheating the incoming boiler feed. In plants generating 300,000 pounds of steam per hour, having a 20,000-pound boiler blow down, it can save as much as 8,524,400 Btu per hour

New Practice Reduces Varieties of Forged Axes

■ Revision of an existing simplified practice recommendation covering forged axes effective as of Dec. 1, 1941, further reduces the number of varieties produced and saves considerable essential metal for war uses, according to the Department of Commerce, Washington. It will limit available varieties of forged axes to about 200 compared with 845 in 1935, when the original recommendation was adopted, a cut of more than 75 per cent. Until the printed issue is available mimeographed copies of this practice (R158-41) may be obtained without charge.

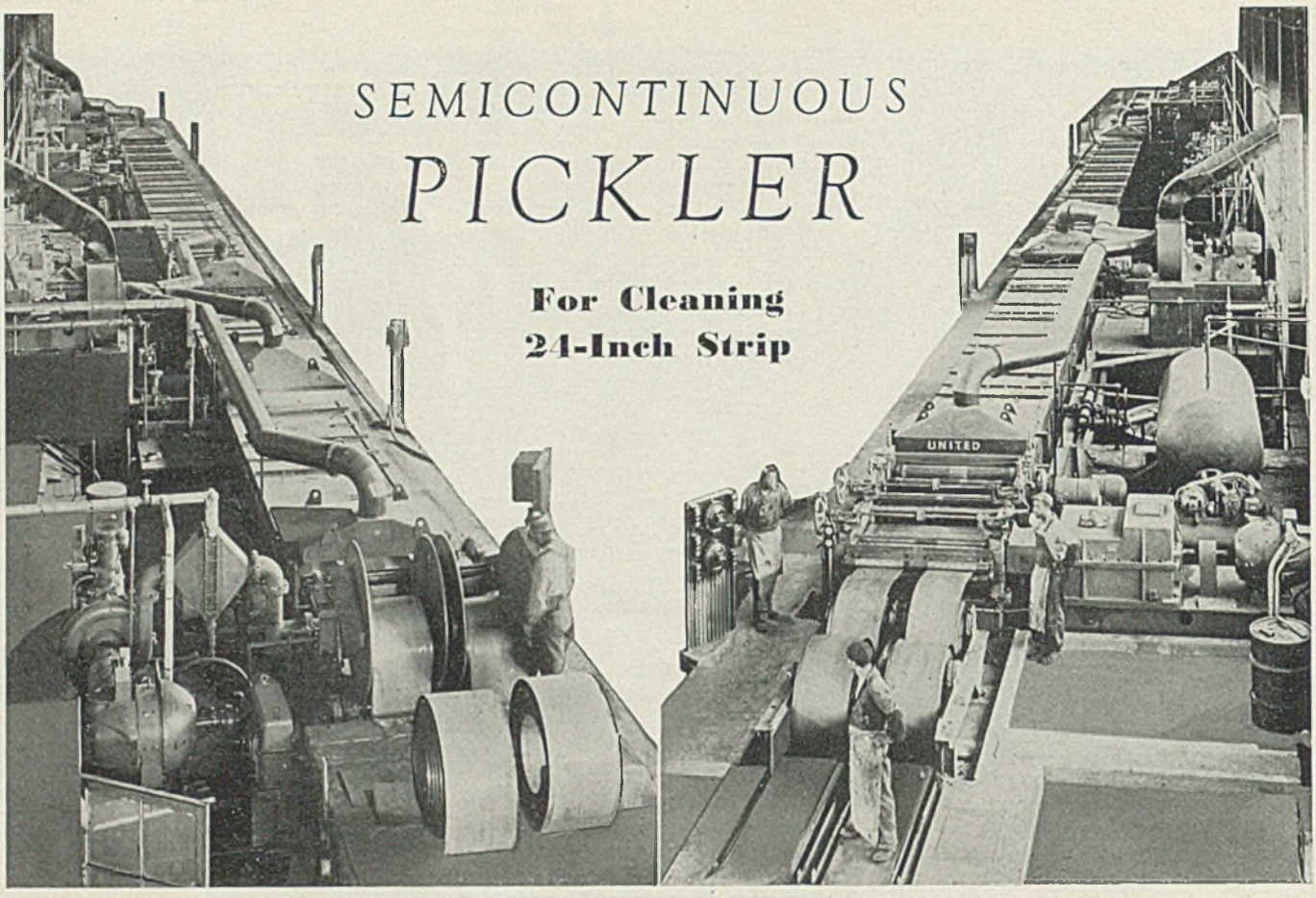
Add Classroom Lectures In Training Courses

■ The 2-year program for graduate engineers, who come to this company from engineering colleges throughout the nation, has been expanded to include classroom instruction 4 hours per week according to Lee H. Hill, vice president, Allis-Chalmers Mfg. Co., Milwaukee.

The lectures and instruction, he said, will be given by Allis-Chalmers executives, department managers, chief engineers, superintendents and supervisors and will run 26 weeks a year. The classroom work, to supplement actual experience in the shops and other departments, will be divided into four basic subjects: Psychology applied to business, basic sales methods, company organization and policy.

SEMICONTINUOUS PICKLER

For Cleaning 24-Inch Strip



Left, delivery end of semicontinuous unit designed to handle two wide coils simultaneously. Right, entry end of semicontinuous pickler showing coil boxes and roller leveler in foreground

Pusher type pickler, which handles two strands of wide strip continuously through separate compartments, is designed without welders, stitchers, looping pits and shears. Semicontinuous line operates with a crew equivalent to 15 per cent of that required for a comparable tonnage in tub picking. A line to handle 38-inch strip now is under construction

IN THE spring of 1941 the Detroit Steel Corp., Detroit, put into operation a new type of strip pickler. The installation was designed and built by United Engineering & Foundry Co., Pittsburgh, and was based on patents owned by the Stanley Works of American Tube & Stamping Co., Bridgeport, Conn., under which United has an exclusive license.

The machine is semicontinuous as distinguished from the continuous pickler, in that the coils are not tacked together but are pushed through each individual tank. This feature permits the elimination of welders or stitchers, looping pits and shears. This type of pickling has been known and used for a number of years in the New England section for narrow strip. It was known that a demand existed for a pickler to replace the conventional tub picklers used in plants where tonnage demands were moderate and where a better type of pickling would be beneficial, and it was decided to try to adapt the semicontinuous idea to meet this demand.

The Detroit line is designed to handle 10,000 to 15,000 tons a month, depending upon the number of shifts worked, and is arranged to handle two strands simultaneously, each having a maximum width of 24 inches, and a thickness ranging from 0.062 to 0.25 inch. Coils are brought to a simple type coil box at the entry end of the line and the end of the coil is fed to a roller leveler which removes the coil curvature and feeds the strip forward into the end of the first acid tank. Before entering the acid tank it passes through a pair of steel brushes rotating in the same direction as the strip travel, and intended to remove any broken particles of scale resulting from the action of the leveler.

There are two acid tanks, the first 45 feet and the second 90 feet long. The tanks are shallow and are divided into two longitudinal chambers by a series of hard burned tile, shaped in such a manner as to provide an oval shape to the bottom of the chambers. These tile are dropped loosely into the tanks proper, which are made of Haveg, a phenolic base plastic. Haveg was selected for the tanks because of the fact that it is impervious to the action of acid, and since it is protected from mechanical injury by the tile lining it was felt that it should give a long and trouble-free life. Another advantage is that the material itself is a good insulator and helps to retard the dissipation of heat. The acid itself is kept in constant circulation by means of a pump, one for each tank. These pumps deliver the acid to their respective tanks through a suitable opening located approximately in the center, and the amount of acid remaining in the tank is regulated by slots in the ends through which the strip passes. As the acid rises above the bottom of this slot the excess acid pours over into catch basins from which it is led back to a reservoir tank. Each of these reservoir tanks is equipped with steam coils which provide the required heat, without diluting the acid due to condensation of steam. The flow of the acid is sufficiently rapid to break up any hydrogen bubbles and to prevent the formation of protective films or coatings, and the rapid circulation insures that the entire surface of the strip is in intimate contact with fresh acid at all times. The bottom surface of the strip has its full area exposed to the acid due to the shape of the tile lining which permits the strip to ride on its extreme edges,

and the top surface of the strip is below the acid level.

The first pickle tank carries a high acid concentration and the second a somewhat lower, and since the second tank is twice the length of the first with the same cross section, the volume of the second is twice that of the first. One reason for this difference in tank capacities was an attempt to economize on the consumption of acid. The two storage tanks are interconnected and valving is arranged so that the contents of the 45-foot tank can be pumped into the 90-foot tank. When the acid in the second tank becomes saturated with iron salts it is pumped to a neutralizing tank preparatory to being dumped in the city sewers. There should be still a usable amount of acid in the first tank due to its higher concentration, and since the volume of the first tank is one-half that of the second, the contents of the first tank are introduced into the second tank and sufficient acid and water added to bring the volume and the acid content up to the required strength.

Upon leaving the exit end of the first acid tank the strip encounters a small rubber covered roll which rides on the surface and prevents excess acid from flowing along the strip. Immediately beyond this baffle roller it enters a pair of driven rubber covered pinch rolls which push it through the second tank. Upon leaving the second tank the same procedure is repeated and the strip is pushed through a short cold water tank. This tank is also arranged for circulation owing to the fact that it is necessary to use city water which is expensive. The rubber covered rolls feeding the strip between tanks act as efficient squeegee rolls and the amount of acid carryover is thereby reduced to a minimum. Small quantities of acid still adhere to the surface of the strip and the cold water tank is therefore arranged to permit wasting a sufficient volume of water to prevent the building up of harmful amounts of acid.

From the cold water tank the strip proceeds to a similar hot water unit, which again is circulated to conserve heat, and similar provisions are made for sufficient wastage to prevent red staining.

After leaving the hot water tank the strip passes through an air dryer and then direct to a 3-roll coiler from which the coils are ejected to a gravity type conveyor which leads the pickled coils directly into the cold mill bay.

The various pieces of equipment are driven by small direct-current motors, taking their power from a separate motor-generator set, and Ward-Leonard control is used to raise and lower the speed of the entire line. Individual rheostats are supplied for most of the equipment for individual adjustment, to correct for wear of rolls or for other reasons which might cause any piece of equipment to become out of step with the balance of the line.

After approximately six months of operation the results obtained have been extremely encouraging. It was realized when the line was put in that a number of changes and adjustments might be necessary to secure the best results. A number of these changes have been made and still others are in process of being made. It was found, for example, that the steel brushes after the leveler were extremely efficient when an occasional coil was encountered with a rusted surface, but that the maintenance costs of these brushes were hardly justified in removing broken scale from the surface.

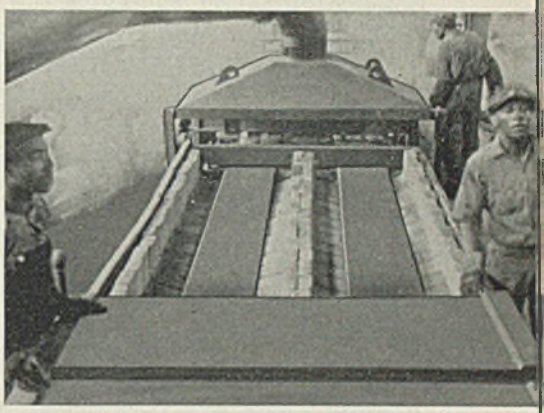
The tracking of the two strips through the longitudinal chambers was exceptionally good. This tracking was helped to some extent by adjustments to the leveler which permitted the front end to slightly turn up, but over the entire operating period, cobbles resulting from the front end of the strip catching in the tile have been negligible.

At Detroit the average speed of strip is about 85 feet per minute, but since the line has been designed to handle two strands this would be equivalent to 170 feet per minute for a single strand. The capacity of this type of pickler can be increased or decreased to suit customer's requirements by increasing or decreasing the length of acid tanks.

The line has not been in operation a sufficient length of time to permit the compilation of accurate operating costs, although some factors entering into these costs are definitely known. It is surprising to note that the acid consumption in pounds per ton of steel is about equivalent to the acid consumption required for tub picklers. It is customary to obtain a low acid consumption in tub pickling because of the fact that as the solution becomes saturated it is customary to leave the steel coils in the tank a greater length of time. In any type of continuous pickler it is desirable to maintain a fairly uniform speed and it becomes difficult to materially increase the time of immersion, which means that acid is dumped at a fairly high concentration, when compared with tubs.

Labor costs have been radically reduced. Many of the operations in tub pickling do not lend themselves readily to mechanical manipulation and in order to secure definite openings through the layers of hot rolled coils it is customary to manually shuffle them on tables, after passing through a set of bending rolls, and to insert spacer pins at intervals throughout the length of coil to prevent one or more laps touching each other, with the consequent production of black unpickled areas. A semicontinuous line can be operated comfortably with a crew equivalent to about 15 per cent of that required for a comparable tonnage in tub pickling and does not require a higher or more skilled type of labor.

A second line is now being installed by United at the Follansbee, W. Va. plant of the Follansbee Steel Corp. It differs somewhat from the Detroit installation in that it will be a single strand line handling strip up to a maximum width of 38 inches. For reasons of economy and otherwise, the tanks in this installation are being made of lead-lined steel. The only additional piece of equipment will be a side trimming shear located immediately before the roller leveler. The basic design, however, will closely follow the Detroit installation. This line is now being installed and should be in operation within the next few weeks.



Tank with covers partially removed to show the oval shaped trough in each longitudinal chamber

Allis-Chalmers Booklets Give Safety Tips

■ In commencing a "big safety push" recently, Allis-Chalmers Mfg. Co., Milwaukee, released some 14,000 copies of its new safety manual to employes in its huge plant. Distribution of the booklets represents a preliminary step in an intensified safety program.

Based on safety tips uncovered in a long-term survey of industrial accidents, the booklets were offered to employes as a safety guide.

Periodic safety messages will be displayed in 75 newly-erected, glass enclosed bulletin boards as the campaign continues. Single sample copies of the manual are available to safety directors and other interested executives in war industries who properly identify themselves as such.

Need for Substitutes Spotlights Developments in Germany

■ AMERICAN industrialists must increase their efforts now to find methods of conserving strategic raw materials and to develop substitutes wherever possible for the scarcer metals. Experiments have been under way for several months but this phase of research will be emphasized to an even greater extent during the duration of the war.

Due to the immense peacetime resources of the country, slight attention has been paid to substitute materials. The experience of Germany in finding substitutes for imported metals, as described in a recent issue of the *Metal Bulletin*, is enlightening. The article, entitled "Inside Europe Today", says that Germany has developed many uses for zinc which is available in the Reich in large quantities. Many of these applications are well known here and have received wide acceptance.

"Zinc alloys now play a great part in replacing brass in machinery, implements, utensils, ornamental parts and other metal ware," the article says.

Bearings: Zinc alloys are being used in Germany as bearing materials, thus saving considerable quantities of copper and tin. These alloys can stand up to exceptional stresses on occasion, while they behave perfectly, it is claimed, with steady loads and average turning speeds. Their behavior under running conditions is said to be similar to that of the better known bearing metals at certain speeds, while their wearing properties are equally good.

Experience with zinc alloys has, it is affirmed, already yielded favorable results in the electrochemical field. Large quantities of copper thus can be freed for other uses. For about a year past, electric light leads consisting of zinc alloy wire have been utilized; owing to the lower electrical conductivity of zinc, a larger section has to be used than with copper or aluminum.

Even in the case of metallic coatings (where nickel has predominated) now zinc and zinc alloys have been used widely. The latest development is the galvanic coating of zinc alloys with nickel, chromium, copper or brass.

Problems: The fact that zinc alloys have quite different properties from the metals and alloys they are replacing sometimes has clear advantages. But these alloys possess certain poor qualities which create special problems. One of these is a volumetric change which can prove serious. This problem, however, now seems to have been more or less solved. Also brittleness may occur at low temperatures and weakness at high ones. But these problems are not unsurmountable.

Use Sheet Zinc for Buttons

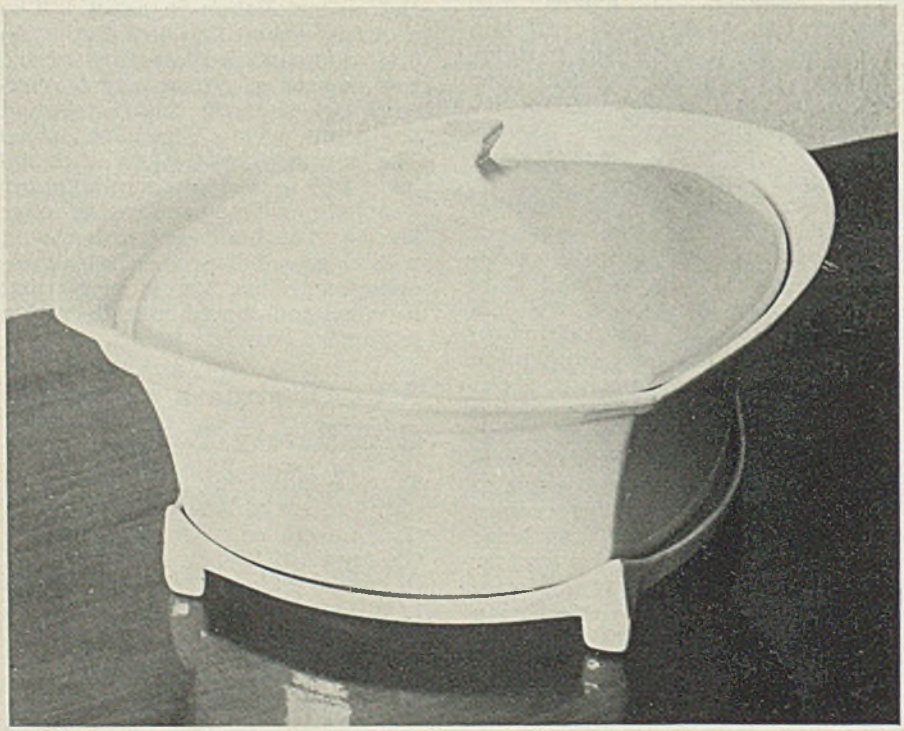
Germany is using small coins made of ordinary commercial spelter. Uniform buttons have been made of sheet zinc for some time, and are brazed, coppered, etched and lacquered so they can scarcely be distinguished from the previous ones of brass, copper or aluminum.

Utensils: Table furniture, such as bread baskets, bowls, serviette rings and serviette stands, drinking glass holders and table mats, are today made of zinc or zinc alloys. The surface is either silvered, chromium-plated, or polished and lacquered. Zinc table utensils must not, however, be used for keeping acid foodstuffs.

Other products which are being made of zinc or zinc alloys include smoking accessories, powder boxes, ornaments, hair-cutting machines and shaving apparatus, parts of weapons, packing and sealing materials. Industrial uses include bearings and gear-wheels; screws, nuts and rivets; water and gas fittings; carburetors, speedometers and ornamental parts; engine valves; brake and clutch linings (fine zinc alloy wire used); patent locks, parts or measuring instruments; clocks, photographic and cinema apparatus; lighting fitments, etc.

Steel Alloys: The war has curtailed Germany's supplies of many important alloying elements. This situation has been met in two ways: First, by wholly or partially substituting home-produced elements for foreign ones; second, by subsequent superficial treatment of the semi-finished or finished product to obtain qualities similar to those possessed by the more usual alloys. Both processes are continually being refined. Of especial interest is the increased substitution of nitrogen to replace nickel in high alloy special steel; and the Inkrom process which is a superficial treatment.

From Cast Aluminum to Enameled Cast Iron?



■ This casserole of porcelain enameled cast iron was produced in the laboratories of Ferro Enamel Corp., 4150 East Fifty-sixth street, Cleveland, to show makers of heavy aluminum houseware a possible answer to the problem of how to keep their sales forces intact. If this is to be done, they must have something to sell. Not being able to get aluminum, perhaps turning to cast iron with a porcelain enamel finish will do the trick, since the resulting product not only has color and excellent appearance, but can be made at comparable production costs, it is claimed. Although such products have been used widely in Europe and South America for many years, the sales possibilities in this country appear to have been completely ignored

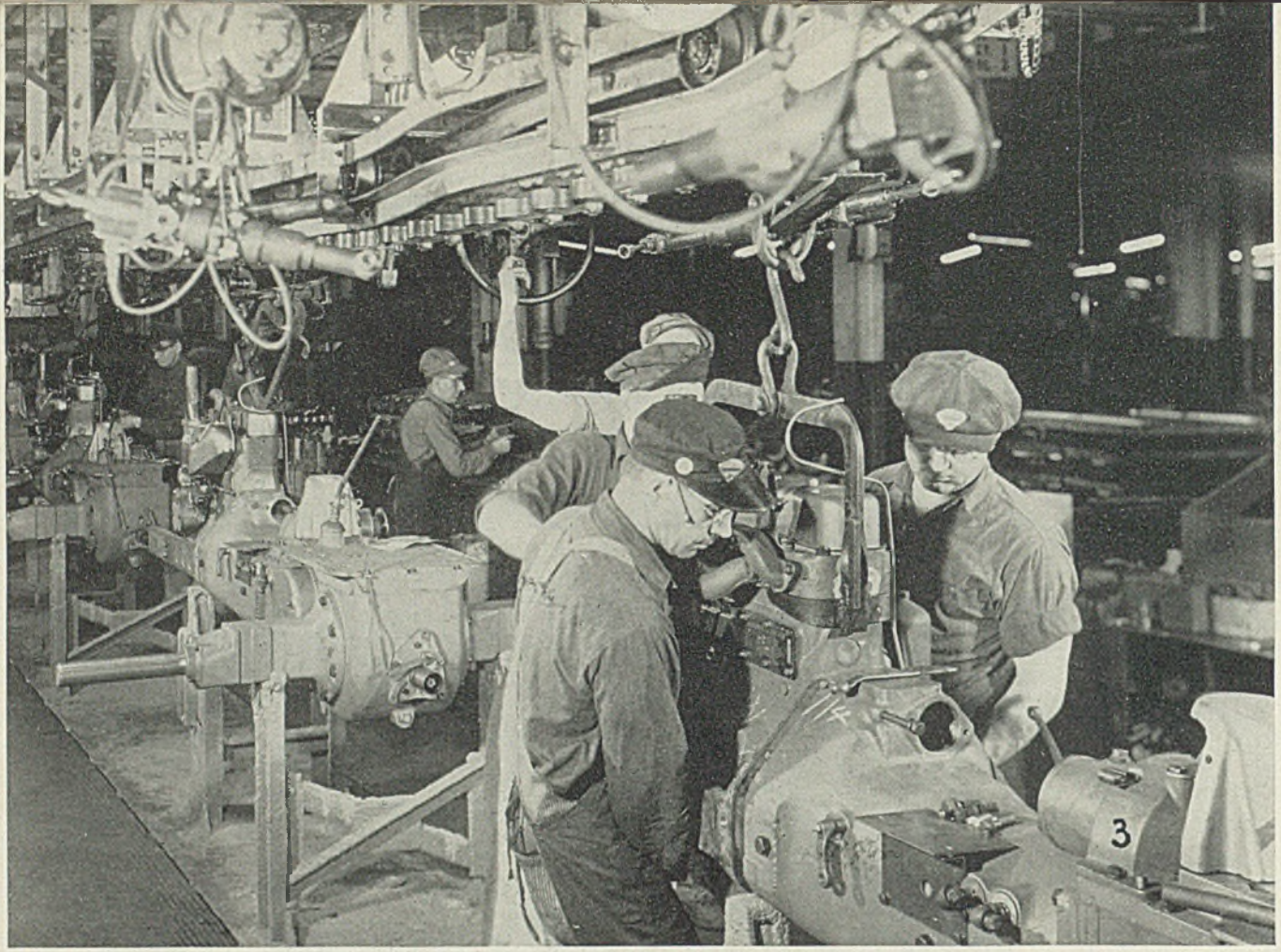


Fig. 3—The engine drops from the overhead conveyor and is bolted to the main frame

MECHANIZED HANDLING

Speeds Tractor Manufacture

. . . . limit switches are arranged to operate feeders connecting conveyor lines. Other auxiliaries adapted to facilitate operation of handling system

(Concluded From Last Week)

■ TRANSFERRING our attention to Fig. 3 we see the engine being slipped back into the chassis. The man with the upraised hand is retarding the speed of the motor conveyor to allow the chassis to overtake the engine. Notice that the trolley wheels suporting the engine have just started on a short level section which holds the engine at the proper height to connect it to the chassis. Just beyond this level section the conveyor dips slightly to allow the engine hook to be removed from the engine.

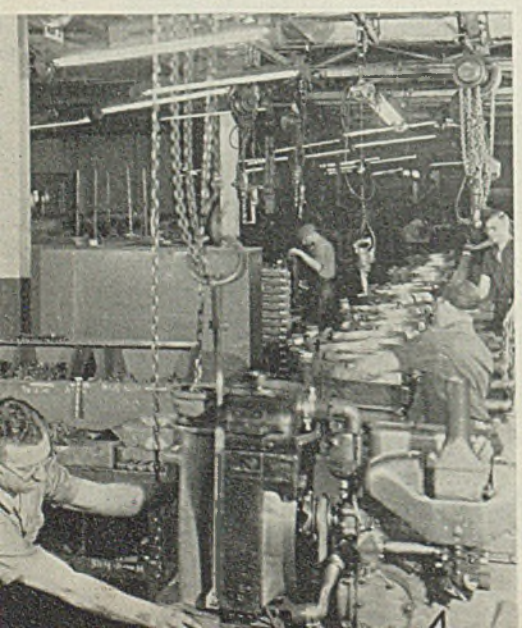


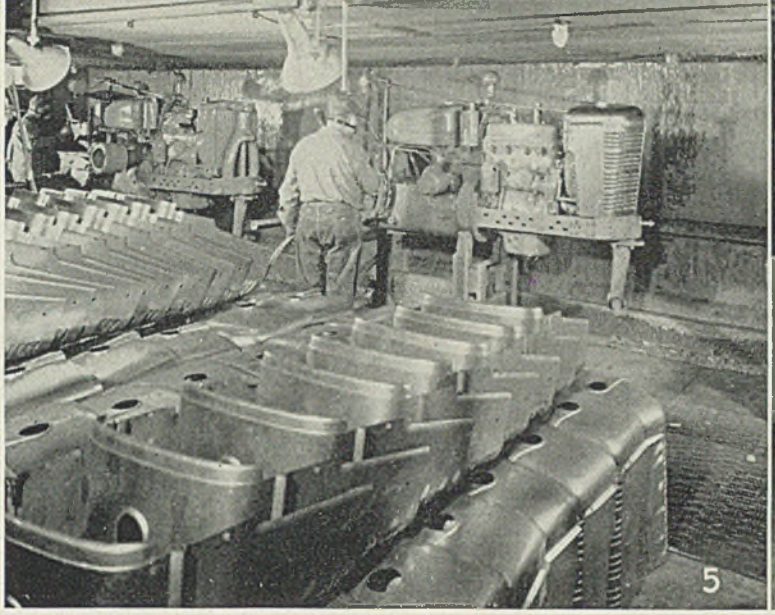
Fig. 4—Radiator and front end assembly are attached to the growing tractor. Subassembly work on these units is visible in the background

Fig. 4 shows the front bolster assembly with radiator attached being set between the channel side frames. This assembly is swung in place suspended from a curved rail much the same as the chassis is placed on the main line. The bolster assembly line may be seen in right background of the picture. It consists of two flat top chains sliding in channel guides. It is power driven and synchronized with the main assembly line by a limit switch at the end nearest the main line.

This limit switch allows the bolsters to advance until the first bolster actuates the switch and shuts off the motor. Then as soon as a bolster is needed and the first one removed from the conveyor, its removal starts the motor and the bolsters advance one space. Note that a very simple lifting fixture has been designed to lift the front assembly and hold it in a vertical position.

In Fig. 7 we see miscellaneous assemblies. The main fuel tank and the small tank for starting gasoline are in place. The generator, ammeter, heat indicator, lights, steering shaft, etc., are also attached. Overhead are three feed rails for electric nut runners. This arrangement eliminates interference between operators on opposite sides of the line. In the extreme background the tractors are entering the spray booth.

The tractors are seen in the paint spray booth in Fig. 5. Here the tractors are sprayed on the right side and immediately pass into another booth faced the other way where they receive paint on their left sides. The wall of the booth showing in the background is covered with a continuous sheet of water which catches paint sprayed



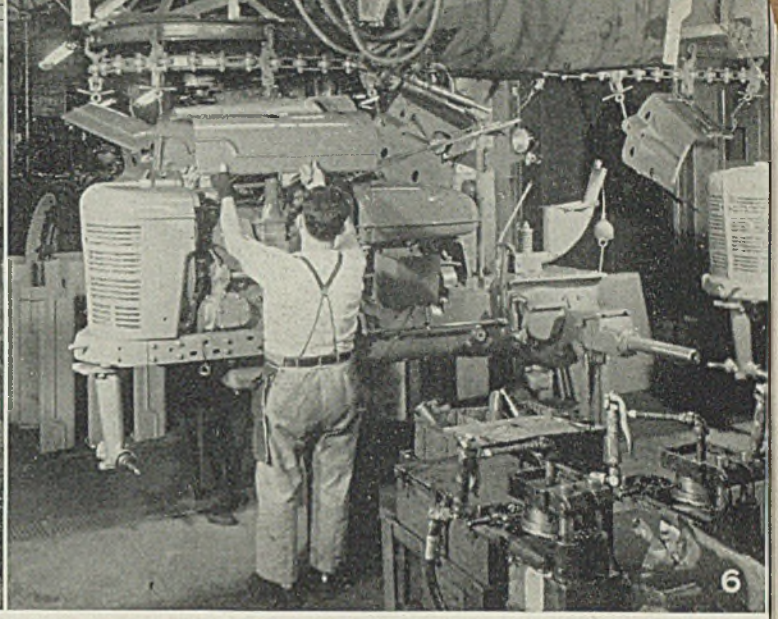


Fig. 5—Still moving on the same chain conveyor, the tractors are spray painted

Fig. 6—Emerging from the drying ovens after leaving the spray painting booth, the hood is placed on the tractor

past the tractor. An opening may be seen in this wall about the height of the channel side frames on the tractor. Air is drawn through this opening at quite a high velocity, and the water falls across and into it. Overspray tends to migrate toward this opening and is entrapped by the water. The water drains into a paint reclaiming system where the paint is removed from its surface.

The middle operator of the three shown places the radiator grilles on the tractors after first spraying their inside surfaces. Notice, too, that the front wheel hub caps are suspended from the seat support post so they may be sprayed and sent through the drying oven. This eliminates having to spray the caps, dry them, transport them carefully to the station in the line where they are installed, and store them until they are needed. Also it avoids marring the finish.

From the spray booths, the tractors pass into the drying oven which is approximately 240 feet long and is maintained at the required temperature to produce a lasting finish. Fig. 6 shows the tractors emerging from the drying oven. An overhead conveyor chain runs to one side of the tractors through the drying oven and the hoods are carried through on this after first passing through an auxiliary spraying booth. This arrangement allows the hoods to be taken from the conveyor at the station where they are placed on the tractor and thereby reduces handling. In the right foreground is seen the pneumatic equipment used to pack the front wheel bearings with grease, and overhead may be seen the pneumatic hammer used to drive them in place.

The tractors are now nearing completion, and in Fig. 8 the rear wheels are being put in place. The rollers on the lifting fixture facilitate lining up the keyways. Front wheels are also put on the tractor at approximately this same place.

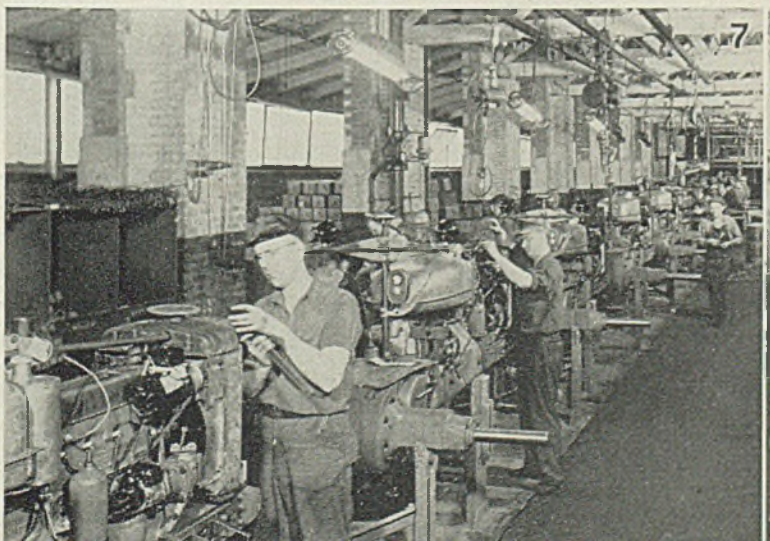
Fig. 9 shows the tractors receiving steering wheels and seats. Mention might be made at this time of a building addition that has aided production. The pilasters at the far side of the tractors mark the wall of the original building. A lean-to type of building has been added and has proved quite successful as it allows parts to be stored on both sides of the line. This has alleviated congestion resulting from bringing parts to the line on one side only.

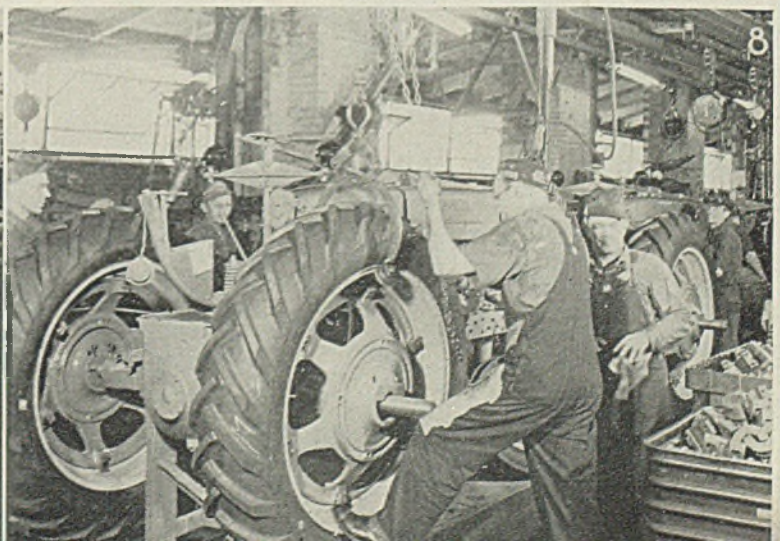
The second tractor from the front in Fig. 10 is at what might be termed the "service station." Close scrutiny reveals a number of hose connections leading to the tractor. The operator inserts these in the proper filler holes and pulls ropes releasing measured amounts of lubricant, fuel, or water. The two cylinders suspended from the truss supply the cooling systems with water. One is adjusted to fill the smaller tractors, and the other takes care of the larger size. The front tractor in the picture is equipped with a diesel engine as may be recognized by noting the fuel injection system.

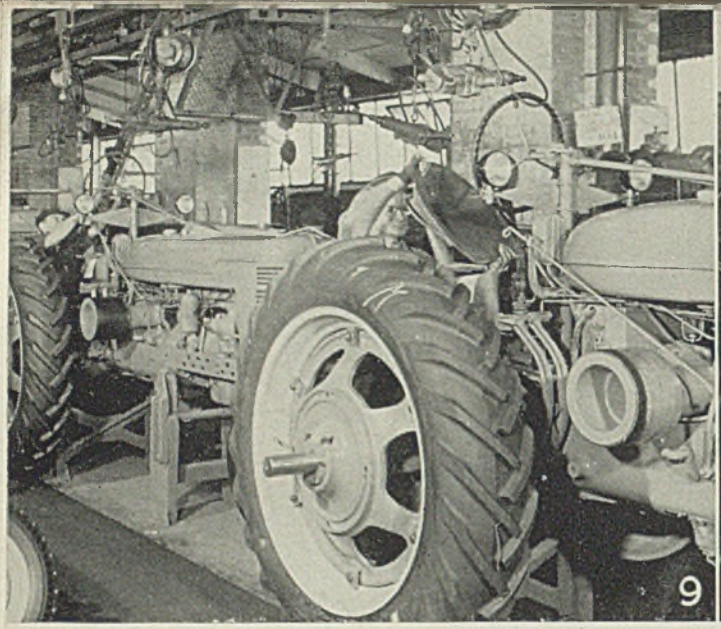
Fig. 11 shows the tractor being driven off the line. The raised floor plate just behind the front wheels is moved back and forth by a linkage attached to a crank driven by the shaft on the main line conveyor. It is shown at approximately its extreme outward position. When the rear tractor supports, which are seen lowering under the tractor, have dropped below the floor

Fig. 7—Here fuel tank, ignition system and lights are added

Fig. 8—Overhead hoists and special tongs aid in placing the huge rear wheels







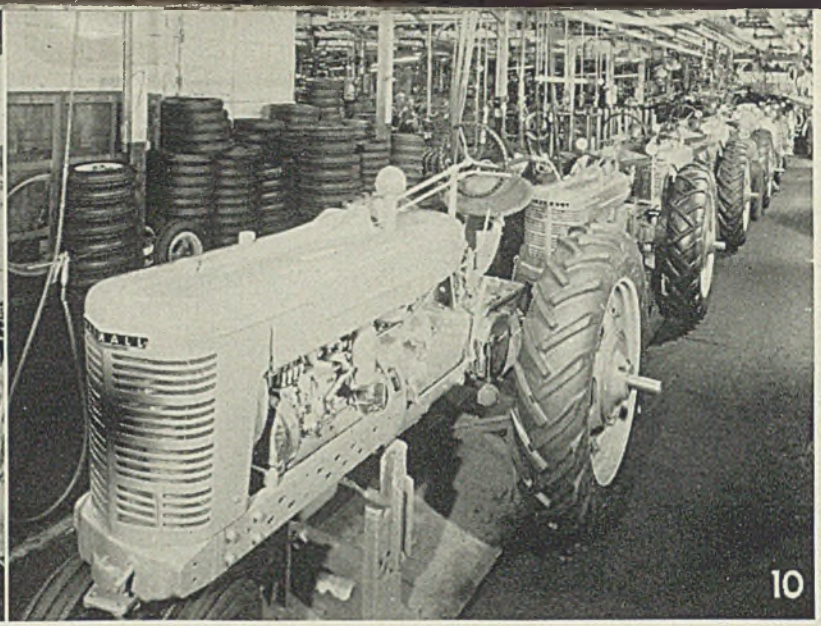


Fig. 9—Here are added steering wheels, seats along with other final fittings

Fig. 10—Near end of assembly line, oil and fuel tanks are filled by special measuring devices from overhead tanks shown here

level, the raised section will move back to cover the opening. When it moves back a certain distance, the front wheels of the second tractor in the picture will strike the short steeper slanted surface and the front of the tractor will be raised from the front supports.

The traveling floor section then starts its forward travel supporting the front of the tractor and also uncovering the opening for the support columns to pass through. The sections of floor plate on which the rear wheels of the first tractor are resting may be raised by air cylinders beneath them and are utilized in lifting the tractors with wide front wheels from the supports.

Fig. 12 shows the completed tractor being checked at full speed. The men who drive the tractors from the line are trained inspectors and listen for noises that would indicate adjustment of gears, etc. The rear wheels are resting on heavy cast iron rollers fixed to a common shaft. The inertia of the rollers is great enough to allow the tractor to be driven on them without the use of some locking mechanism. The chocks for the front wheels are raised and lowered by air cylinders, and the valve controlling them may be seen just to the right of the operator's head.

From the test rollers, the tractors are driven to the "touch up" conveyor which is a slat conveyor 150 feet long and 7 feet wide. Here the tractor is carried past men who put on the decal transfers showing the model of the tractor, places to drain water, etc. Also the places where the tractor rested on the main line supports were necessarily left unpainted so they are touched up. In short, on this conveyor the tractor receives all the final touches that really make the job complete. After the tractors are driven from this conveyor, they are lined up to await loading on flat cars.

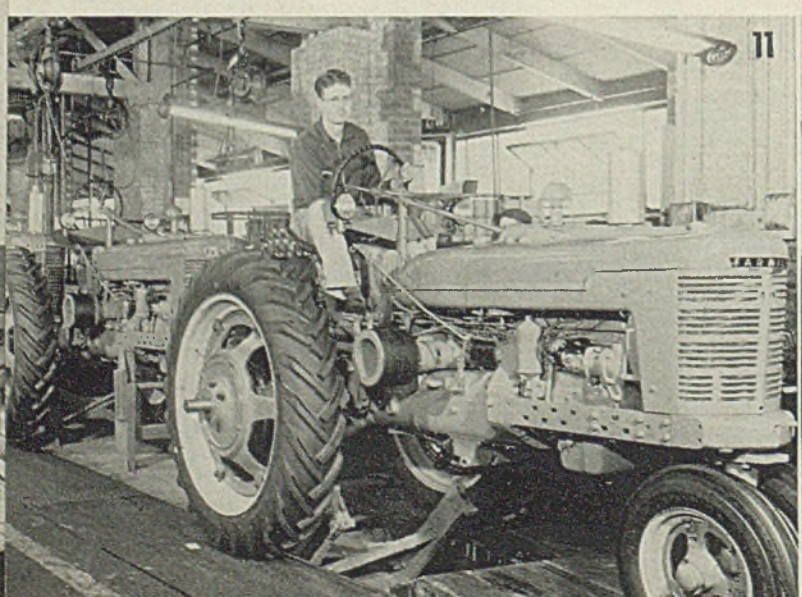
Industry Approves New Practice for Fittings

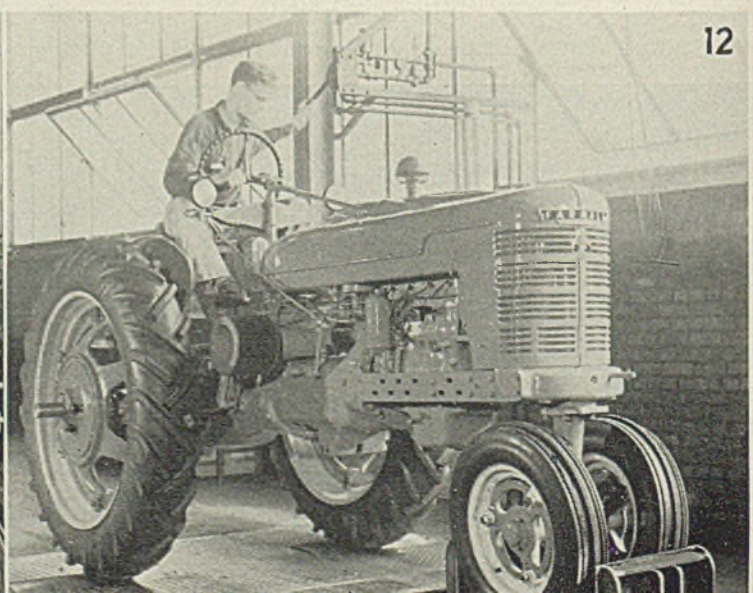
■ A new simplified practice recommendation for pipe fittings covering sizes of gray cast iron, malleable iron, and brass or bronze fittings recommended for production as regular stock items is reported approved for promulgation, by the Division of Simplified Practice, National Bureau of Standards, Washington. It will be identified as RI85-42, "Pipe Fittings," and will be effective for new production from Jan. 1, 1942.

The simplified schedule recommends the continued production for stock of but 1311 of the 4964 gray cast iron fittings heretofore offered; of 1169 of the 2331 malleable iron fittings, unions, and union fittings, and 487 of the 1271 brass or bronze screwed fittings, unions, and union fittings heretofore stocked. The retained items, it is estimated will satisfy 92 to 94 per cent of all consumer demand. Mimeographed copies are available.

Fig. 11—Dolly disappears under floor at end of conveyor line, allowing tractor to rest on floor. It is now driven off end of the assembly line

Fig. 12—Special setup utilized in making run-in tests of new tractors. Front wheels are clamped securely, back wheels resting on rollers





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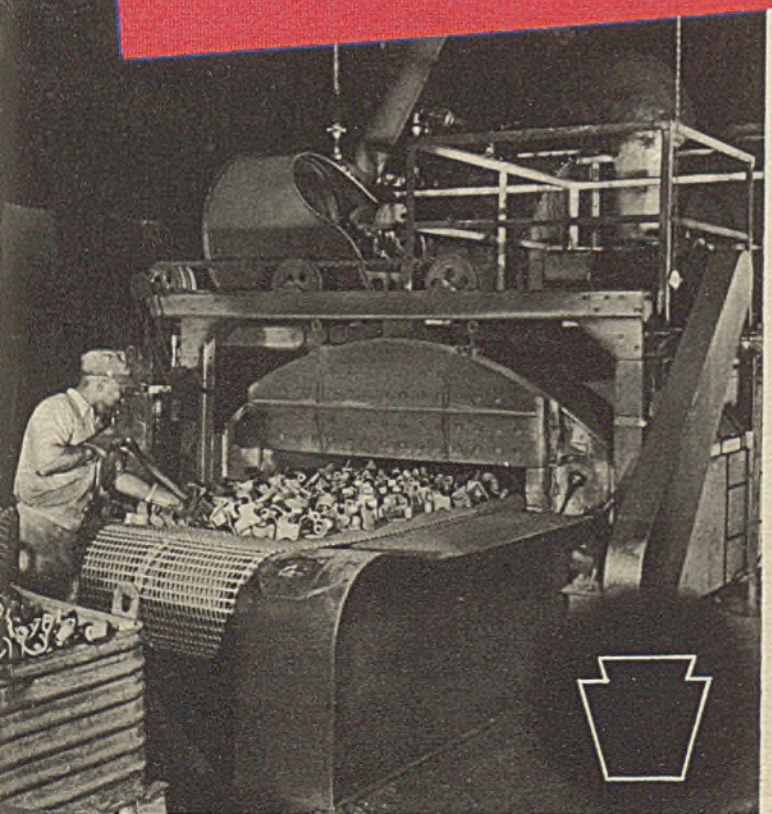

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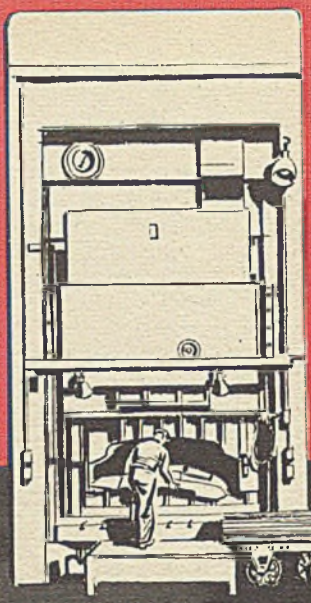

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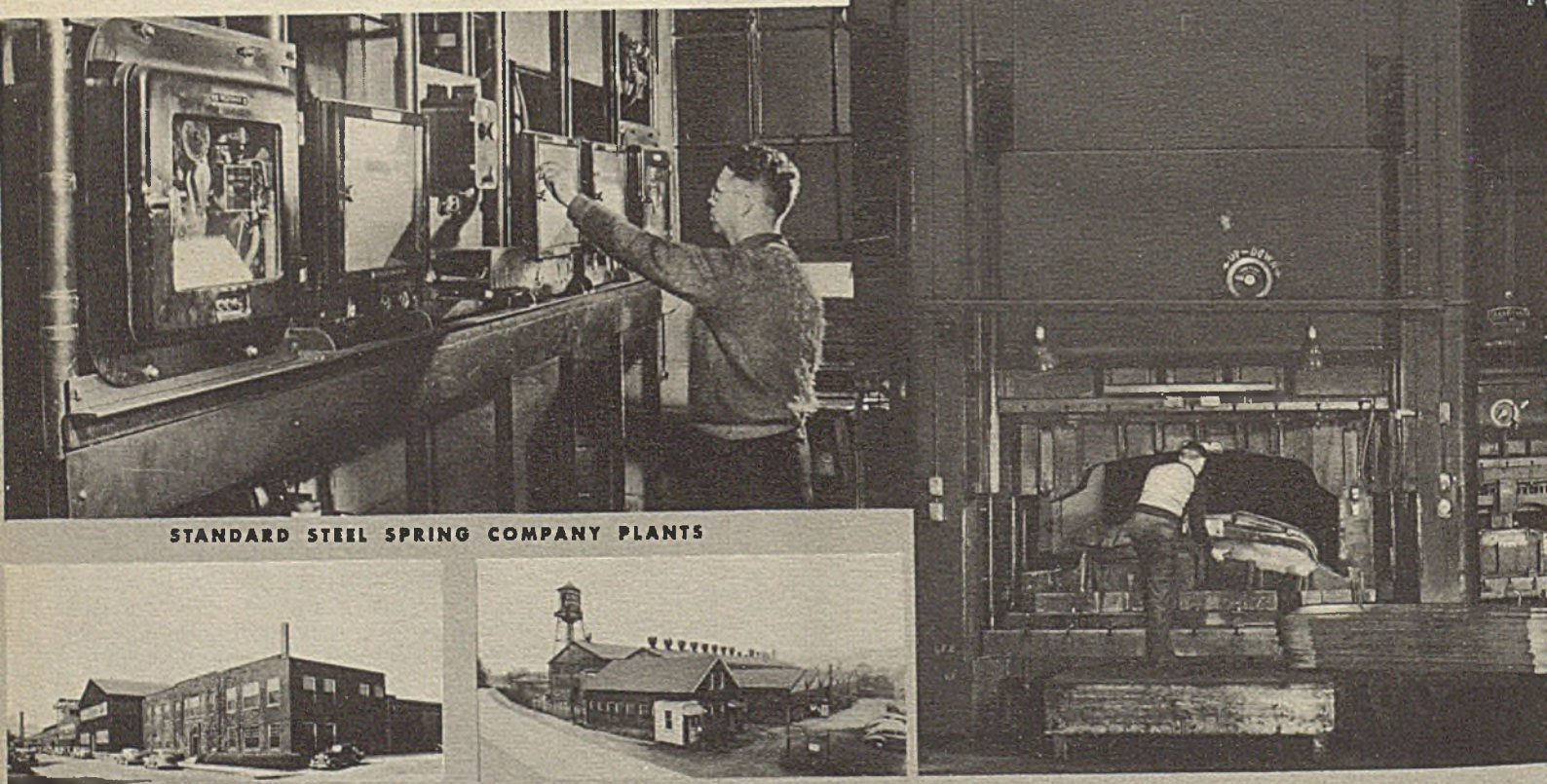

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Coraopolis Plant No. 1
Flat Leaf Springs for automobiles and trucks

Coraopolis Plant No. 2
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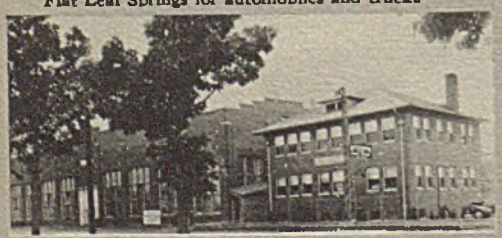

Gary Works
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Logansport, Ind.
Mechanical Precision Springs

STANDARD STEEL SPRING COMPANY

War on Illness

(*Continued from Page* 49)

several factories — in individual paper containers, covered with air-tight paper lids and carried in a hot insulated compartment on the rolling wagon. The food is eaten right from the containers, which are quickly disposed of after use. Many plant managements which insist on the use of paper for all food served in the plant point out the danger from accidents or sabotage of having bottles on the premises.

These wagons travel on schedule, arriving at the same place at the same time each day. One huge airplane factory, rather than build extensive cafeterias and invest in expensive dish washing machines and china, makes use of such canteen units, equipped with paper service, which visit eight outdoor eating places. Each of the 12,000 workers is not only assured a hearty, nutritious meal but is saved a 10-minute walk, and possible exposure to infection in an eating place. Time thus saved amounts all told to 250 work days a year! In another airplane factory where three cafeterias were found to be inadequate for 13,000 workers, 12 mobile units distribute food regularly.

Few industries as yet employ dieticians in cafeterias but such supervision is the hope of the committee on nutrition for defense workers, recently appointed by the National Research Council to make controlled nutrition studies in industries. Managements of numerous manufacturing plants in the country, already convinced of the potency of vitamins, are giving vitamins to workers. These vitamins, in concentrate form, are usually supplied in envelopes or dispensers and swallowed with water in individual paper cups. Vitamins are given both to heighten general resistance, and for specific purposes.

Workmen in plants where lead hazards are great—in one study 40 per cent showed distinct signs of lead poisoning—improved in health when given vitamin C. At the Mansfield, O., plant of the Westinghouse Co., color matchers were given lists of foods rich in vitamin A and were encouraged to eat liberally of these foods to improve their eyesight. Only those men who disliked such foods were given vitamin A concentrates.

A nutrition education program, easily developed with the assistance of a local nutrition council, the committee on nutrition for defense workers or the Bureau of Home Economics at Washington, may be all that is necessary to improve workers' nutrition. A study of 4000 workers showed that sufficient money for a nutritious diet was being spent but that, because of ignorance and poor selection, diets were grossly inadequate. Generally speaking, studies show workers' diets are too high in energy foods, too low in those which protect against infection.

Environment: Recent questioning of personnel executives, plant designers and union leaders elicited the frequent comment, "Dirty toilets cause more strikes than low wages." Old-timers consider washrooms and showers "frills," but, particularly in heavy industries, such "frills" are sound. They contribute to better health and greatly heighten the employe's sense of well-being. A relatively small woolen manufacturing plant has found it pays to employ full time, one matron, two janitors and a scrubbing machine operator to keep floors, windows, dressing rooms, in the old building scrubbed and cheerfully clean. Abundant hot water is provided in the showers. "Few men," observes the plant executive, "feel grouchy after a good shower."

"Common" Drinking Cups Out

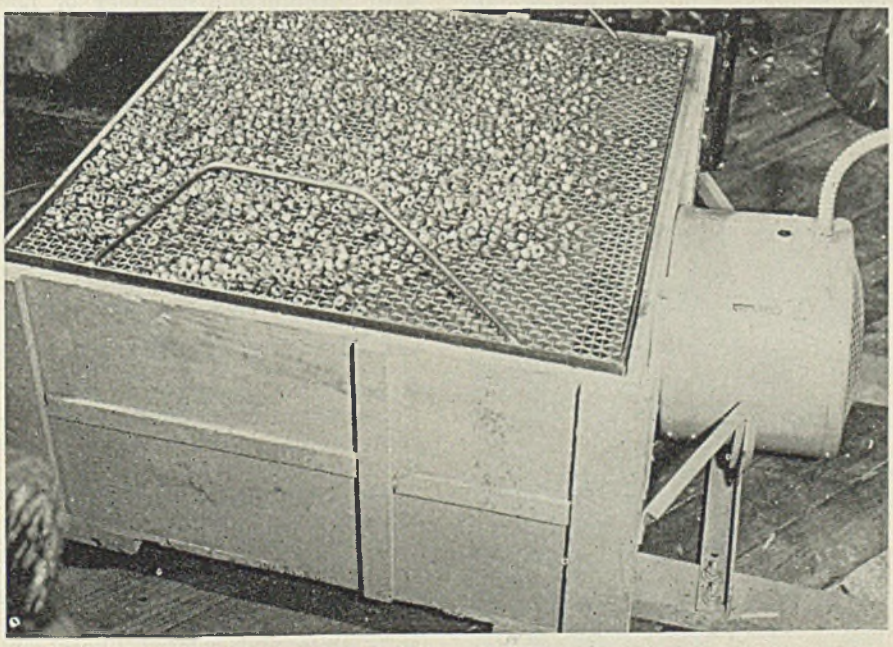
The common drinking glass, outlawed in all states, is nevertheless still found in some plants. The now famous Columbian construction project indicates the worth of abolishing it. Despite the snickerings of veteran workers for an oil company in South America, a crew of six hundred tough roustabouts and linemen sent to Colombia were ordered to use nothing but paper cups for drinking. At the end of six months those using paper cups had suffered very few colds and no other respiratory diseases that frequently felled men in another camp who used common drinking dippers.

Dispensers of paper cups should be provided with every drinking fountain, including the angle-jet type which up to now has been considered germ-proof. A recent study of such fountains by Lt.-Col. A. Parker Hitchens, of the University of Pennsylvania revealed that bacteria may be carried in splashing water to users.

Where cafeterias are provided, rooms should be light and cheerful, avoiding a "deadly barrackroom atmosphere." Dishes and glassware must be sanitized with heat or chemicals, according to most health regulations, if single service paper cups and utensils are not in use. The importance of the eating place, as a possible source of infection, was emphasized recently by Dr. F. V. Meriwether, liaison officer in Indianapolis for the First Corps area. Believing a record number of dysentery cases among war workers could be traced to unclean utensils in public eating places, he urged rigid inspections of all such establishments.

Ventilation and lighting contribute to workers' health and should be subject for study by sanitary engi-

Dries 50,000 Bearings per Day



Fifty-thousand flexible steel bearings per day made by Harris Products Co., Cleveland, are dried quickly and thoroughly by the above drying equipment. After a coating of petrolatum is washed from the bearings in a solution of strong soap, the bearings are placed on a screen tray which just fits the top of the box-like affair shown above. Air from a General Electric 5000-watt forced convection unit heater is then blown into one end of the enclosing box and passes up through the parts lying on the screen tray

neers. Parking lots, music and recreation facilities all do their bit. At Middletown, O., on the property of the American Rolling Mill Co., athletic fields, public parks and golf courses have been developed which build employe goodwill and better health.

Health Education: An organized, continuing course on health, the only one of its kind in the country, has been given for several years by various company members of the American Telephone & Telegraph Co. and may serve as a model for other industries. The course, which consists of six lectures, is for women since a large number of employes in the company are women. Revised in 1939 to appeal to women's desire for good appearance and personality, attendance at the course jumped 2000 per cent. In a textbook which is supplied to students, the chapter on nutrition begins significantly with "Beauty begins at the breakfast table."

Instructors Well Trained

Instructors are usually supervisors who have been thoroughly trained and supplied with teaching handbooks by an instructor from central headquarters. Classes are kept small, with only 10 to 20 students.

The fact that the course is voluntary and on the employes' time yet that nearly 200,000 women have taken the course attests to its success.

Such a program should be carried on in conjunction with distribution of posters, literature, showing of motion pictures and publication of articles on health in house organs. The medical examination should also be a most important means of education. Either physician or nurse should answer fully questions of patients, who are then in "a learning mood," authorities point out.

That a health program, intelligently and diligently promoted, actually works is certain—so certain, in the opinion of Dr. Sawyer, that he vows, "An industrial firm can determine its own sickness rate by its program of medical services."

This is an absorbing challenge!

Scrap Piles

(*Concluded from Page* 53)

bins, and equipment. But this may be offset by the premiums allowed for alloy steel scrap over carbon steel scrap. These premiums run from $5 a ton for scrap containing 1¼ per cent nickel up to $20 per ton for scrap containing 5 per cent nickel. In some of the larger plants where salvage programs have been underway for some time, it has been found that the increased value of the scrap has paid, within a surprisingly short time, for the cost of new facilities and equipment and as well as for the added operating costs.

Metal Cleaning

(*Concluded from Page* 56)

great majority of the plants processing metals and producing metal units for the victory program are not materially different from those faced by such plants in making their ordinary peacetime products. The major new elements are speed and volume, which are easy to meet when the modern cleaning compounds now available are carefully fitted to the specific job.

It should be remembered, however, that blanket recommendations are rarely possible in metal cleaning. Too many variable factors are involved. The general principles do not change, but the individual cleaner best adapted to the operation can only be selected after a detailed study of the individual conditions is made.

Hence the logical procedure in setting up a cleaning operation is to present the main features of your problem to a reputable producer of metal cleaning compounds and then to work out with him the type of cleaner best suited to your particular operations. The general recommendations covered above will apply to practically all metal cleaning problems, but comparatively minor modifications in composition can materially increase the speed of your cleaning work as well as reduce its costs and eliminate possibility of staining, tarnishing or other effects of poorly chosen cleaners.

"Engineered" Box

■ What engineering can do for the packing industry is clearly shown in the view below. Here brittle acid-resisting pipes, formerly a "shipping nightmare," are being packed in what is termed an "engineered" box. Pipes are carried in three intermediate cleats with circular pieces fitting snugly and entirely around each pipe. Two, three, four and eight pipes, depending upon the size, are accommodated with utmost protection. Designed by General Box Co., 500 North Dearborn street, Chicago, the box can be packed flat, two-thirds assembled.

54-Page Booklet Gives Advice on Patents

■ Designed primarily for engineers and executives who deal with inventions, a 54-page booklet entitled "Patent Background for Engineers" is announced by Allis-Chalmers Mfg. Co., Milwaukee.

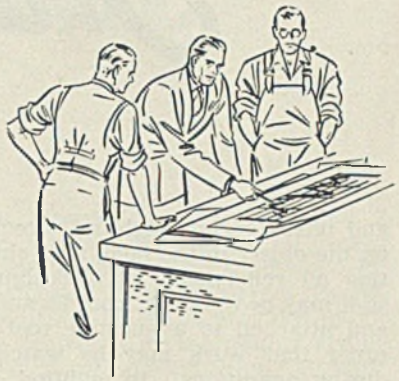
Written by patent attorneys and engineers for the lay mind, the articles embodied deliberately avoid such legal jargon as "the party of the first part" and "whereas" in describing the broad general principles of patent law.

Other articles included in the booklet cover such subjects as basic patent considerations, the importance of the drawing, specification and claims in evaluation of patents; patent fallacies, the protection of new inventions, the safeguarding of inventors' rights, importance of determining the original inventor, joint inventorship, whether or not to shroud an invention in secrecy, public or experimental uses of invention, the effect on product sales of an invention prior to patenting, the trend and development of American patent law, what compulsory patent licensing would mean, streamlining patent prosecution and trade marks.

G-E Reduces Prices Of Fluorescent Lamps

■ Substantial reduction in prices of General Electric Co. mazda fluorescent lamps, effective Jan. 1, has been announced by its lamp department, Nela Park, Cleveland. As examples of the lower prices of daylight and white types, 14-watt T-12 has been marked down from 90 to 80 cents; 15-watt T-8 from 75 to 60 cents. Reductions are also made in soft white and colored fluorescent lamps.

Since their introduction in 1938 General Electric mazda fluorescent lamps have been reduced about 60 per cent. The current change results from growing demand, allowing manufacturing economies.



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Various High or Low Carbon Shaped Wires such as: Shaft Casing Wires, I Beam Sections, Space Block Wires, Square, Keystone, Oval, Half Oval, Half Round, etc.

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Priority orders, of course, must receive preference. But we have endeavored to spread our output amongst customers in the fairest and most equitable way possible.

This "share-the-output" plan has worked. Although we have by no means been able to keep up with the requirements of our customers—we have succeeded in relieving the situation to the fullest possible extent.

We want you to know that we appreciate your problem—that we are doing our utmost to serve you under very difficult circumstances. Please feel free to call on us for any cooperation which you think we may be able to render.

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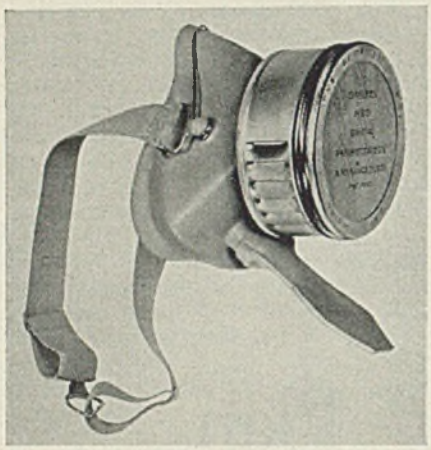
Industrial

Respirator

■ DeVilbiss Co., Toledo, O., announces a new MSD respirator, which affords maximum protection against the inhalation of pneumoconiosis-producing and nuisance dusts. Approved by United States Bureau of Mines, it is said to be more compact, lighter, easier to



breathe through, more comfortable to wear, and easier to clean and maintain than previous models. A cartridge measuring only 2 7/7 x 1½ inches and weighing but one ounce, actually provides more than 41 square inches of breathing and filtering area. Multivane construction allows every inch of this filter to be used efficiently. The filter is cleaned by blowing accumulated dust from vanes with an air-dusting gun or nozzle. The respirator is designed to fit closely the contour of practically any face.

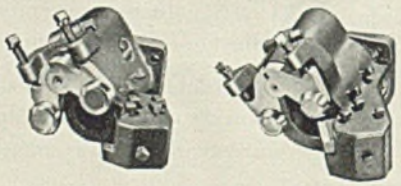
Illuminated Magnifier

■ George Scherr Co. Inc., 128 Lafayette street, New York, has placed on the market a new illuminated magnifier for use in war industries to detect quickly sources of delay and waste, such as blow holes in castings, machine tool beds, tools and dies, cracks in steel after hardening etc. Trade named Magni-

Ray. It only requires current from a standard 110-volt circuit. The tool has a wide magnification field and offers correct lighting directly on the object in the field, thus shutting off reflections. It is designed so it may be removed from its stand and attached to a machine tool in order that work may be watched during operations. In addition, its angle clamp permits it to be turned to any angle. Two types of tools are being offered—one with a 3-inch lens and another with a specially designed 2-inch wide achromatic lens with a magnification power of three plus.

Turret Lathe Tools

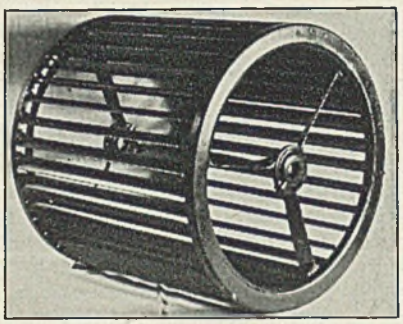
■ Gisholt Machine Co., 1217 East Washington avenue, Madison, Wis., is offering two new tools for turret lathes—an end-facing and forming tool for facing, forming, and chamfering the ends of shafts, studs, bolts, screws, etc., and a pointing tool which provides a quick means



of chamfering the ends of such work pieces for true starting on a single or multiple cutter turner. On each tool the rollers, mounted on needle bearings, are easily set for diameter, and support the work accurately and rigidly. Substitution of a roller support assembly equipped with straight rather than bevel rollers converts the pointing tool into an end facing and forming tool. Both tools may be used for light turning by substituting the proper cutter.

Blower Wheel

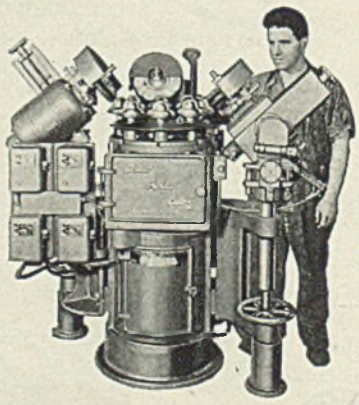
■ Morrison Products Inc., East 168 and Waterloo road, Cleveland, announces a new 14½-inch airstream blower wheel for use by manufacturers whose products employ blowers. Of 3-piece construction, it is assembled by spot welding. Its blade sections are made in one continuous strip, and channel-shaped end rings are said to insure a rigid light weight true running wheel. Curved inlets of the wheel reduce turbulence of incoming air. Weight of the unit is distributed near the



bearings by mounting the wheel at either end. This also is said to reduce tendency of shaft whip.

Automatic Polisher

■ Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., has developed a rotary automatic polishing machine capable of handling a wide variety of circular pieces. Aluminum pistons for aircraft engines, fuze bodies and engine valves, all are within the scope of this unit. The polisher consists of a circular aluminum table mounted over a heavy cast iron base. The table indexes automatically, rotating 6 to 8 chucks which pass under as many as four polishing wheels mounted on rigidly con-



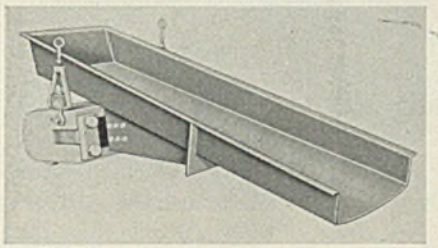
structed pedestals. Chucks are stationary during loading or unloading. Spindles carrying the chucks revolve with the table. Speed changes are easily made, both in spindle revolutions and number of table indexes

Equipment

per hour. Polishing wheels are independently driven, either by V-belts from motor or direct on motor spindle. Controls for all motors are mounted on a master control board found at the front of the machine. Buffing or polishing wheels may be adjusted to any angle desired to suit the work. Composition to the wheel is applied automatically by the Autodoper, an accessory attachment. Only one operator is required to operate the machine.

Vibratory Feeders

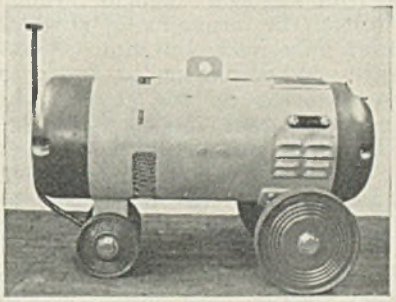
■ Syntron Co., 370 Lexington avenue, Homer City, Pa., announces the addition of two new models in its electromagnetic vibratory feeder conveyor line—one, the F-4, having a capacity of up to 100 tons per hour of material, and the F-5 which is capable of handling as much as



500 tons per hour. The former can handle feeder pans as wide as 36 inches and as long as 60 inches, while the latter can be equipped with troughs as wide as 48 inches and from 60 inches to 96 inches long. Both units are vibrated at high speed by a pulsating electromagnet. Finger-tip rheostat control permits a range of feeds from a rushing torrent down to a slow dribble. Both units handle material such as crushed rock.

Portable Welder

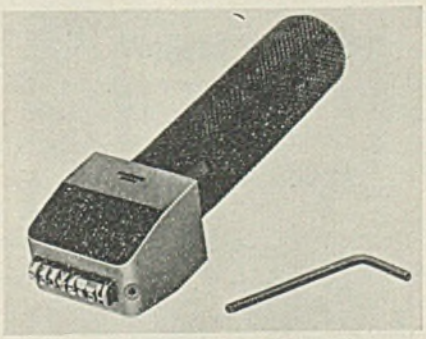
■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a new portable flexarc welder for all-purpose welding in industrial plants, shipbuilding and for general maintenance work. Its enclosure is made of a one-piece weatherproof steel frame mounted on a 4-wheel running gear. Ratings are 200, 300 or 400 amperes for 220, 440 and 550-volt alternating-current circuits; 2 and 3 phase, 25, 50, and 60 cycles. Current adjustment is obtained by a ball crank. Steady current regardless of arc length is provided by an arc control. Driving motors are of the squirrel cage induction type with low starting current, high efficiency



and high power factor. Push button-controlled magnetic De-ion starter for the motor provides low voltage protection by removing motor from line if the line voltage is too low.

Stamp Holder

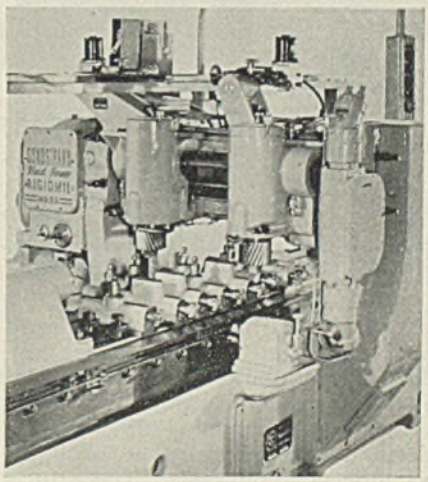
■ New Method Steel Stamps Inc., 145 Jos. Campau, Detroit, has placed on the market a new interchangeable hand stamp holder incorporating a new shock-proof feature. It has a special wedge lock washer which prevents the individ-



ual hand stamps from loosening after continued use of the holder. The former holds the stamps both sidewise and endwise against movement. Instead of using several set-screws at sides and ends, a single set-screw is used at the end to retain all the stamps in position. The stamps may be locked and unlocked quickly by using a wrench of hexagonal style. The body of the holder is large. The shank is knurled, with end hardened and tempered to prevent chipping or mushrooming. The holders are offered to accommodate any number of characters and all sizes of stamps. They also are available with shanks to fit presses.

Milling Machine

■ Sundstrand Machine Tool Co., 2571 Eleventh street, Rockford, Ill., has introduced a new machine for milling edges of propeller blades. Built around the fluid-screw Rigidmil, it has a number of interesting features. To mill both sides of the blade simultaneously, the machine is provided with two vertical type spindle heads mounted on a cross rail. Movement of each head along the cross rail is controlled by a screw driven by a fluid motor, which, in turn, is controlled by a hydraulic duplicator attachment. Attached to the machine table is a 2-sided cam on which the duplicator "fingers" ride. As the table feeds longitudinally, the cam, through the duplicator attachments, controls cross movement of the head to transfer the desired shape to the contour of the part. The heads are both driven from one



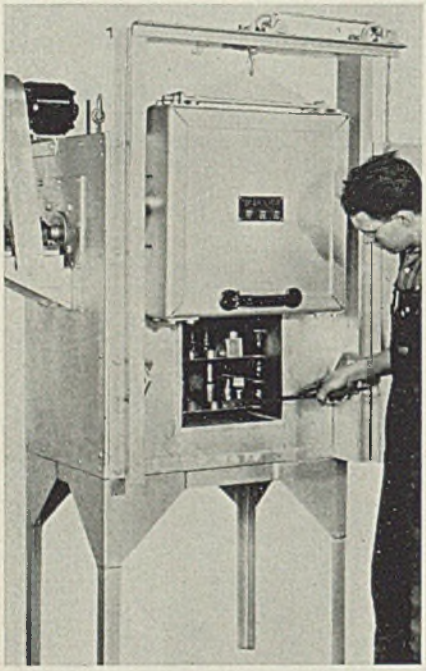
gear box and have pick-off gears for simultaneously changing the speed of both spindles.

The part is held on the machine table between a headstock and footstock member and is supported at intermittent points by jacks. Using spiral milling cutters, spindles are arranged to rotate so that the cutting thrust is down against the jacks. Movement of the control lever starts an automatic cycle in which the heads rapid traverse crosswise (in opposed direction) until the duplicator "fingers" contact the master templet after which cross movement is controlled by the duplicator attachment. As a safety feature the cycle is so arranged that the machine table cannot tra-

verse rapidly when heads are in cutting position. The machine has 90 inches of power feed in a feed range from ½ to 38 inches, per minute.

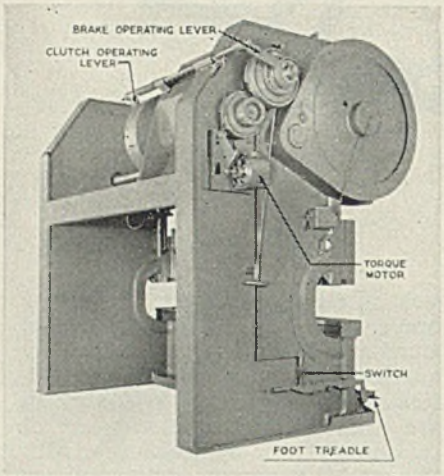
Heat Treating Furnace

■ Despatch Oven Co., 922 Ninth street, South East, Minneapolis, has introduced a heavy-duty CF type furnace for uniformly and accurately heat treating materials requiring temperatures from 300 to 800 degrees Fahr. It takes materials on removable shelves which are spaced on 3-inch vertical centers. Working chamber of the furnace measures 13 x 13 inches. It is equipped with an oversize high-volume, high-pressure fan, and special heat distributing and recirculating ducts so that horizontal air flow above and below each shelf is obtained. Uniformity is 5 degrees plus or minus Fahr., an air circulation is equivalent to about a six mile per hour gale. These furnaces are made in a variety of different sizes. They are available with either electric or gas heating system.



Clutch-Brake Mechanism

■ Steelweld Machinery Division, The Cleveland Crane & Engineering Co., Wickliffe, O., anounces a new electrically-operated clutch and brake mechanism for bending presses. It is said to reduce operator fatigue by eliminating the usual physical effort required to engage the clutch manually. Other features are fast snappy clutch and brake action with wear considerably reduced. The mechanism is set in operation by the foot treadle which actuates the switch and brings the torque motor into play. A shaft connecting the clutch and brake operating levers is worked by a connecting



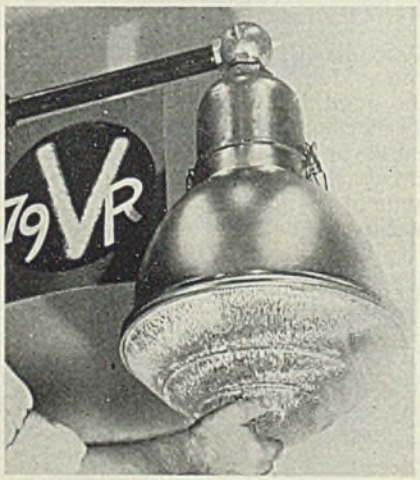
rod from the gear segment through a toggle. The torque motor is under power only when the clutch is engaged. When the power is cut, a heavy spring on the clutch-brake connection shaft applies the brake. A safety toggle makes operation of the mechanism practically foolproof. This mechanism is particularly desirable for the larger machines that are used for forming plate of ½ to 1 inch and greater in thickness. It can be installed on most presses now in service.

Microphotometer

■ Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, has introduced a rapid and convenient method for analyzing spectrographic plates or films in research and industrial laboratories. It is designed to accommodate plates or films as large as 4 x 10 inches. Because the plates or films are mechanically scanned by a motor-driven scanning unit, and the relative positions and densities of spectrum lines are recorded automatically by a Speedomax recorder, the microphotometer eliminates the "human equation" of visual methods, and does away with the delays and limitations of photographic processes. Quick determinations of elements present in small percentages are made possible by pen-and-ink records of standard and test spectrograms drawn at high speed on one chart. The scanning unit includes on a heavy cast base, an optical system, a plate stage, a drive mechanism for the plate stage, an alternating-current operated amplifier and all necessary controls grouped at a convenient location. In indicating and recording relative positions and densities of spectrum lines, the response of the recorder to density changes is so rapid that in less than 1.5 seconds the pen moves from one position and comes to rest at its new position, it is claimed.

War Industry Light

■ General Electric Co., Schenectady, N. Y., has introduced a 79 V R (vertilateral refractor) luminaire particularly effective in protective fence lighting systems. Its main features are a deep shading type reflector and a Vertilateral refractor designed to control the light both vertically and laterally, thereby doubling visibility.



Drill Press

■ Walker-Turner Co. Inc., Plainfield, N. J., has introduced a new improved 20-inch drill press which is being offered for power, hand or foot-feed applications. One of its features is the power feed unit —a built-in clutch which is part of the worm drive, assuring smooth action at all points of spindle travel. The unit is powered from the drill press spindle, four rates of feed speed being provided for each of the five spindle speeds. A chart indicates the rate of feed in thousandths of an inch per revolution of spindle. The machine is equipped with a No. 2 morse taper spindle nose and is available in single or 4-spindle models.

Industry Giving All To War Production

Workers sacrifice Christmas holiday to swell steel output. New scrap schedule may aid collection. Civilian buying off

MARKET IN TABLOID ★

Demand
Only war needs booked.

Prices
New schedule for scrap.

Production
Down 4 points to 93½ per cent.

■ EVERY effort is being made by the steel industry to meet its obligations for war, production being held at as high a point as practicable and distribution being guided by considerations of the country's best interests.

That the production rate dipped only 4 points for the Christmas holiday, in contrast to about 15 points in 1940 and 1939, indicates the willingness of the companies and their employes to co-operate fully, even at the sacrifice of sentiment attached to Christmas.

Cancellation of orders by consumers whose production has been curtailed continues and removes considerable tonnage from mill books. Pressure to buy by civilian consumers has all but disappeared, leaving the way clear for war production.

A further revision in ceiling prices on scrap has been issued by Office of Price Administration in an effort to bring out more material and correct some conditions brought about by the former schedules. The new plan segregates types and grades according to use and establishes maximum prices for each type of consumer. Geographical price differentials have been maintained. On all but cast iron scrap computation of shipping point price allows dealers to make use of "most favorable basing point" instead of nearest basing point. Cast iron scrap prices have been placed on a shipping point maximum, with three geographical groups covering the entire country. The cast scrap schedules are in the nature of an experiment and are expected to result in larger collections. Remote scrap provisions in former schedules are continued.

Consumption of iron ore in November was 6,501,027 gross tons, only slightly less than the record tonnage of October, 6,612,186 tons. Ore smelted in 11 months this year totaled 69,273,701 tons, compared with 56,253,276 tons in the comparable portion of 1940. Ore on hand at furnaces and Lake Erie docks Dec. 1 was 45,534,633 tons, compared with 41,711,704 tons at the same date last year. This reserve for winter was built up in spite of heavy consumption through the entire year. It is believed to be ample to keep maximum operations until the opening of navigation in 1942.

Automobile production dropped sharply last week, under influence of the holiday and OPM restrictions, 24,620 units being manufactured. This compared with 65,875 cars the preceding week and 82,545 in the comparable week last year. Output will be severely restricted in coming weeks as steel is diverted to other uses and orders from Washington limit the number manufacturers are allowed to assemble.

Christmas observance had much less effect on steel production than usual, the national rate declining only 4 points to 93½ per cent of capacity. In general ingot production continued through the week, although some interruption was allowed, the more willingly because of small stocks of scrap and necessity for repair to furnaces. Chicago mills increased output 1 point to 104 per cent, a new all-time high. One interest there made steel at more than 108 per cent of rated capacity. Buffalo increased output 2½ points to 82½ per cent and New England 1 point to 85 per cent. In all other districts there was curtailment. Pittsburgh lost 6 points to 90 per cent, Eastern Pennsylvania 4 points to 83 per cent, Youngstown 9 points to 83 per cent, Wheeling 1 point to 90, Cleveland 4 points to 90½, Birmingham 5 points to 90, Cincinnati 12½ points to 82½, St. Louis 15 points to 76 and Detroit 4 points to 86 per cent.

New price schedule on scrap had no effect on the composite price of steelmaking grades, which remains unchanged at $19.17, the level which has prevailed since ceilings were imposed in April. Finished steel composite continues at $56.73, semifinished steel at $36, steelmaking pig iron at $23.05.

Fabricated structural bookings in 11 months this year totaled 2,146,457 net tons, compared with 1,545,020 tons in the same period last year, with shipments of 2,064,547 tons in the 11 months, compared with 1,360,017 tons last year.

Placing of a ceiling on warehouse prices has met with general approval and is expected to bring an end to irregular practices on the part of some sellers not identified with the main units of the industry. In some cases where prices were in effect by some warehouses lower than the general level permission is being sought to raise them to that point.

Beehive furnace coke ceiling of $6 is expected to be maintained and some contracts for first quarter have been booked at that level.

COMPOSITE MARKET AVERAGES

	Dec. 27	Dec. 20	Dec. 13	One Month Ago Nov., 1941	Three Months Ago Sept., 1941	One Year Ago Dec., 1940	Five Years Ago Dec., 1936
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$54.66
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	35.45
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.32	19.48
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	21.40	17.05

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Mouth, Three Months and One Year Ago

Finished Material

	Dec. 27, 1941	Nov. 1941	Sept. 1941	Dec. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Dec. 27, 1941	Nov. 1941	Sept. 1941	Dec. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.95
Basic, Valley	23.50	23.50	23.50	23.10
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.84
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.29
No. 2 foundry, Chicago	24.00	24.00	24.00	23.75
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	25.715
Malleable, Valley	24.00	24.00	24.00	23.60
Malleable, Chicago	24.00	24.00	24.00	23.75
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.35
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$22.75
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	20.70
Rails for rolling, Chicago	22.25	22.25	22.25	25.00
No. 1 cast, Chicago	20.00	21.50	21.50	19.00

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base .. 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. ... 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. ... 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. ... 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. ... 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
403	21.50	24.50	29.50	21.25	27.00
410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
430F	19.50	22.50	29.50	18.75	24.50
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box $5.00
Granite City $5.10
Pacific ports, f.o.b. $5.75½

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.27½c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 2.10c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

Alloy		Alloy	
S.A.E.	Diff.	S.A.E.	Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20

4100 .15-25 Mo. 0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni. 1.20
5100 80-1.10 Cr. 0.45
5100 Spr. flats 0.15
6100 Bars 1.20
6100 Spr. flats 0.85
Carb., Van. 0.85
9200 Spr. flats 0.15
9200 Spr. rounds, squares 0.40
T 1300, Mn, mean 1.51-2.00 0.10
Do., carbon under 0.20 max. 0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, base, 35 lbs. and over.....28.00-30.00
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅞-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller ... 68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l .....$3.50 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.00
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Steel Blk.	Steel 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, Plain Ends

Steel

1 to 3, butt weld..... 68½
2, lap weld 63
2½ to 3, lap weld 66
3½ to 6, lap weld 65
7 and 8, lap weld 64
Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to ⅷ-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 *tons of one size, open hearth*

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.75
Do. (1000 lbs. or over) 13.00

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $29.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	$24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	$24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty pd., seab'd. $120.00; Carlots, del. Pittsburgh 125.33; Carlots, f.o.b. So. f'ces. 145.00. Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c; Packed 5.75c; Ton lots 6.00c; Less-ton lots 6.25c; Less 200-lb. lots 6.50c. Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25; Less-ton lots 2.30. (Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome) Carloads 13.00c; Ton lots 13.75c; Less-ton lots 14.00c; Less than 200-lb. lots 14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60; Do., 100-200 lb. lots 2.75; Do., under 100-lb. lots 3.00

Ferrophosphorus, 17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.

Contract	$58.50
Spot	62.25

23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.

Contract	75.00
Spot	80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50; Packed 80.50; Ton lots 84.50; Less-ton lots, per lb. 4.00c; Less 200-lb. lots 4.25c. Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

	1½%	2½%
Carbon		
Carloads (contract)	$128.00	$118.00
Ton Lots (contract)	140.50	130.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.60-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23; Less ton lots 1.25

20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35; Less-ton lots 1.40 (Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90 (Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts $1.10; Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50; Packed 107.50; Ton lots 108.00; Less ton lots 112.50. Spot $5 a ton higher

35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c; Do., ton lots 15.00c; Do., less-ton lots 16.00c. Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	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	3.42	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	3.50	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	5.68	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	3.85	3.85	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	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	....	6.80	10.80	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	5.60	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., 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	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.40	1	16	9
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

(Gross Tons)

OTHER THAN RAILROAD GRADES	*Pittsburgh	Johnstown, Pa. Sharon, Canton, O.	Steubenville	Youngstown	Warren	Weirton	Cleveland	Cincinnati	Middletown	Portsmouth	Ashland, Ky.	Buffalo	Claymont, Del.	Coatesville	Conshohocken, Pa.	Harrisburg	Phoenixville, Pa.
Open Hearth	20.00	20.00	20.00	20.00	20.00	20.00	19.50	19.50	19.50	19.50	19.50	19.25	18.75	18.75	18.75	18.75	18.75
Machine Shop Turnings	16.00	16.00	16.00	16.00	16.00	16.00	15.50	15.50	15.50	15.50	15.50	15.25	14.75	14.75	14.75	14.75	14.75
Blast Furnace	16.00	16.00	16.00	16.00	16.00	16.00	15.50	15.50	15.50	15.50	15.50	15.25	14.75	14.75	14.75	14.75	14.75
Elec. furnace and foundry																	
Low phos billet, bloom, forge crops	25.00	25.00	25.00	25.00	25.00	25.00	24.50	24.50	24.50	24.50	24.50	24.25	23.75	23.75	23.75	23.75	23.75
Low phos bar crops and smaller	22.50	22.50	22.50	22.50	22.50	22.50	22.00	22.00	22.00	22.00	22.00	21.75	21.25	21.25	21.25	21.25	21.25
Low phos punchings and plate scrap	22.50	22.50	22.50	22.50	22.50	22.50	22.00	22.00	22.00	22.00	22.00	21.75	21.25	21.25	21.25	21.25	21.25
Heavy cut structural, plate, 3 feet, under	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.25	19.75	19.75	19.75	19.75	19.75
Heavy cut structural, plate, 2 feet, under	21.50	21.50	21.50	21.50	21.50	21.50	21.00	21.00	21.00	21.00	21.00	20.75	20.25	20.25	20.25	20.25	20.25
Heavy cut structural, plate, 1 foot, under	22.00	22.00	22.00	22.00	22.00	22.00	21.50	21.50	21.50	21.50	21.50	21.25	20.75	20.75	20.75	20.75	20.75
Cut automotive steel scrap, 3 feet, under	20.00	20.00	20.00	20.00	20.00	20.00	19.50	19.50	19.50	19.50	19.50	19.25	18.75	18.75	18.75	18.75	18.75
Cut automotive steel scrap, 2 feet, under	20.00	20.00	20.50	20.50	20.50	20.50	20.00	20.00	20.00	20.00	20.00	19.75	19.25	19.25	19.25	19.25	19.25
Cut automotive steel scrap, 1 foot, under	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.20	19.75	19.75	19.75	19.75	19.75
Alloy free low phos, sulphur turnings	18.00	18.00	18.00	18.00	18.00	18.00	17.50	17.50	17.50	17.50	17.50	17.25	16.75	16.75	16.75	16.75	16.75
First cut heavy axle and forge turnings	19.50	19.50	19.50	19.50	19.50	19.50	19.00	19.00	19.00	19.00	19.00	18.75	18.25	18.25	18.25	18.25	18.25
Electric furnace bundles	21.00	21.00	21.00	21.00	21.00	21.00	20.50	20.50	20.50	20.50	20.50	20.25	19.75	19.75	19.75	19.75	19.75

	Sparrows Point, Md.	Chicago	Bethlehem	Kokomo	Duluth	Detroit	Toledo	St. Louis	Atlanta	Alabama City	Birmingham	Los Angeles	Pittsburg, Calif.	San Francisco	Minnequa, Colo.	Seattle	Portland
Open Hearth	18.75	18.75	18.25	18.25	18.00	17.85	.....	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	14.50	.....
Machine Shop Turnings	14.75	14.75	14.25	14.25	14.00	13.85	13.85	13.50	13.00	13.00	13.00	13.00	13.00	13.00	12.50	10.50	.....
Blast Furnace	14.75	14.75	14.25	14.25	14.00	13.85	13.85	13.50	13.00	13.00	13.00	13.00	13.00	13.00	12.50	10.50	.....
Elec. furnace and foundry																	
Low phos billet, bloom, forge crops	23.75	23.75	23.25	23.25	23.00	22.85	.....	22.50	22.00	22.00	22.00	22.00	22.00	22.00	21.50	19.50	.....
Low phos bar crops and smaller	21.25	21.25	20.75	20.75	20.50	20.35	.....	20.00	19.50	19.50	19.50	19.50	19.50	19.50	19.00	17.00	15.50
Low phos punchings and plate scrap	21.25	21.25	20.75	20.75	20.50	20.35	.....	20.00	19.50	19.50	19.50	19.50	19.50	19.50	19.00	17.00	15.50
Heavy cut structural, plate, 3 feet, under	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00
Heavy cut structural, plate, 2 feet, under	20.25	20.25	19.75	19.75	19.50	19.35	.....	19.00	18.50	18.50	18.50	18.50	18.50	18.50	18.00	16.00	14.50
Heavy cut structural, plate, 1 foot, under	20.75	20.75	20.25	20.25	20.00	19.85	.....	19.50	19.00	19.00	19.00	19.00	19.00	19.00	18.50	16.50	15.00
Cut automotive steel scrap, 3 feet, under	18.75	18.75	18.25	18.25	18.00	17.85	.....	17.50	17.00	17.00	17.00	17.00	17.00	17.00	16.50	14.50	13.00
Cut automotive steel scrap, 2 feet, under	19.25	19.25	18.75	18.75	18.50	18.35	.....	18.00	17.50	17.50	17.50	17.50	17.50	17.50	17.00	15.00	13.50
Cut automotive steel scrap, 1 foot, under	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00
Alloy free low phos, sulphur turnings	16.75	16.75	16.25	16.25	16.00	15.85	.....	15.50	15.00	15.00	15.00	15.00	15.00	15.00	14.50	12.50	11.00
First cut heavy axle and forge turnings	18.25	18.25	17.75	17.75	17.50	17.35	.....	17.00	16.50	16.50	16.50	16.50	16.50	16.50	16.00	14.00	12.50
Electric furnace bundles	19.75	19.75	19.25	19.25	19.00	18.85	.....	18.50	18.00	18.00	18.00	18.00	18.00	18.00	17.50	15.50	14.00

*Includes Brackenridge, Butler, Monessen, Midland, Pa.

GRADES ORIGINATING FROM RAILROADS	*Pittsburgh	Youngstown	Cincinnati, Cleveland, Middletown, O. Ashland, Ky.	Los Angeles, San Francisco	Birmingham	Buffalo	Chicago	Detroit	Duluth	Kansas City, Mo.	Kokomo, Ind.	Philadelphia	Portsmouth, O.	Seattle, Wash.	Sparrows Pt., Md.	St. Louis	Wilmington, Del.
No. 1 Railroad Heavy Melting	21.00	21.00	20.50	18.00	18.00	20.25	19.75	18.85	19.00	17.00	19.25	19.75	20.50	15.50	19.75	18.50	19.75
Scrap Rails	22.00	22.00	21.50	19.00	19.00	21.25	20.75	19.85	20.00	18.00	20.25	20.75	21.50	16.50	20.75	19.50	20.75
Rails for Rerolling	23.50	23.50	23.00	20.50	20.50	22.75	22.25	21.35	21.50	19.50	21.75	22.25	23.00	18.00	22.25	21.00	22.25
Scrap Rails, 3 ft., under	24.00	24.00	23.50	21.00	21.00	23.25	22.75	21.85	22.00	20.00	22.25	22.75	23.50	18.50	22.75	21.50	22.75
Scrap Rails, 2 ft., under	24.25	24.25	23.75	21.25	21.25	23.50	23.00	22.10	22.25	20.25	22.50	23.00	23.75	18.75	23.00	21.75	23.00
Scrap Rails, 18-in., under	24.50	24.50	24.00	21.50	21.50	23.75	23.25	22.35	22.50	20.50	22.75	23.25	24.00	19.00	23.25	22.00	23.25

*Includes Wheeling, Steubenville, Sharon, Canton.

Maximum Price at Shipping Point. Where the shipment of the scrap to the consumer is wholly or partially by rail, or vessel, or combination of rail and vessel, the scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel for shipment to the consumer.

Where shipment of the scrap to the consumer is solely by motor vehicle, the scrap is at its shipping point when it has been loaded on such vehicle.

The shipping point price for grades 1 of cast iron scrap at the following shipping points in the United States shall be:

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	14.00	15.00	16.00
Heavy Breakable Cast	16.50	17.50	18.50
Charging Box Size Cast	17.25	18.25	19.25

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes all states not named in groups A and B.

Maximum Price Delivered to a Consumer. Scrap is at its point of delivery to a consumer when it has arrived for unloading at the plant of the consumer.

Maximum prices on sales of iron and steel scrap other than railroad scrap. On and after April 3, 1941, regardless of the terms of any contract of sale or purchase or other commitment theretofore entered into, no person shall sell, offer to sell, deliver, or transfer iron and steel scrap other than railroad scrap, to the consumer of such scrap or to his broker, at prices higher than the prices set forth in Appendices A, C, D and E, incorporated herein as §§1304.13, 1304.15, 1304.16 and 1304.17, and no consumer or his broker shall buy, offer to buy, or accept delivery of, iron and steel scrap other than railroad scrap at prices higher than the prices set forth in Appendices A, C, D and E, except as provided in §1304.6 and 1304.9 hereof.*

Maximum prices on sales of iron and steel railroad scrap. On and after April 3, 1941, regardless of the terms of any contract of sale or purchase, or other commitment theretofore entered into, no person shall sell, offer to sell, deliver or transfer iron and steel railroad scrap to the consumer of such scrap or to his broker, at prices higher than the prices set forth in Appendices B, D and E, incorporated herein as §§1304.14, 1304.16 and 1304.17, and no consumer or his broker shall buy, offer to buy, or accept delivery of iron and steel railroad scrap at prices higher than the prices established in Appendix B, except as provided in §1304.6 and 1304.9 hereof.*

Allocated Scrap. Where, prior to November 23, 1941, the Director of Priorities of the Office of Production Management issued an order allocating a specified tonnage of scrap, and any portion of such tonnage remains undelivered on December 23, 1942, such scrap shall continue to be governed by the provisions of Price Schedule No. 4 in effect at the time the order of allocation was issued.*

Sheets, Strip

Sheet & Strip Prices, Page 82

More contracts for government requirements, including sheets, are being awarded on a basis of delivery, prices and other factors being equal. Instances are also cropping up where fabricated and semifabricated work for which quotations naturally vary, are in the same category, the contract going to the shop best able to make delivery, although several others may quote lower prices. For small lots of more urgently needed material, district purchasing officers connected with government shops are being given more authority to negotiate purchases and frequently work partly finished and requiring a few pieces or sizes for completion is expedited.

Placing of a contract on a delivery basis and requiring 315,275 pounds of stainless steel sheets for the manufacture of food trays for the army at the Lewisburg, Pa., federal prison is a case in point. American Rolling Mill Co., Middletown, O., was awarded the contract, promising delivery of the first 20,000 pounds 15 days after the opening; 20,000 pounds three days later; 25,000 pounds two days later and 25,000 pounds alternate days thereafter until the contract is completed.

Sheet buying is practically at a standstill, producers being slow to book further tonnage until the plate allocation program indicates how much will be handed to wide sheet mills. Future needs of many consumers are uncertain, as in the case of automobile manufacturers and makers of household appliances. As a result warehouses are being given better tonnage of common sheets.

Galvanized sheets continue scarce and even rated orders are difficult to fill, with non-rated able to gain little attention.

Encroachment on sheet mill time by allocations of plates continues to limit sheet output and this would be greater if cooling and shearing facilities for plates were better. New equipment for this purpose will be completed soon.

In the East substantial sheet tonnages are being canceled, due to curtailment of automobile production. Cancellations on material in process are not being accepted but a considerable quantity is being taken off books. Despite this some makers have sufficient rush demands from other sources to take up the slack. Some mills have been allocated high rated sheet tonnage for ship work. Only a moderate tonnage has been accepted by most mills for January shipment and although books are being opened for February promises are largely tentative.

Fabricators in New England continue to take substantial prime defense contracts where equipment can be utilized with minor changes and set-ups for the production of new parts and materials: the Bristol Co., Waterbury, Conn., for example will fabricate a $391,300 order for torpedo parts, precision work, whereas the regular line of this company is recording, indicating and control equipment. Two of the largest industries in that area, textiles and shoes, normally consuming limited quantities of steel, are at capacity with ratio of defense heavy.

Plates

Plate Prices, Page 82

So heavy is pressure for plates for ship construction and defense allocations, considerable large tank inquiry without high ratings has been withdrawn. Deliveries of semifabricated plate work, heads, dished and flanged material are lengthening, due to difficulty in securing enough plates for these departments, while semifabricated tonnage is frequently held by delay in plates for the same job. Because of heavy buying of floor plates, both for ships and industrial uses, deliveries are off slightly, but are still materially better than for sheared plates. Warehouses are able to meet only a small part of the demand for small-lot orders, inquiry being active.

Additional fuel storage facilities at the naval depot at Melville, R. I., will include mostly reinforced concrete tanks in lieu of steel plates, designed primarily with a view of

avoiding further demands on plate mills, although one or two steel tanks will be required.

January plate allocations indicate shipyards will receive an increasing share of output with little available for consumers with lower priorities.

PLATE CONTRACTS PLACED

3400 tons, penstocks, Fort Peck dam, Montana; to Chicago Bridge & Iron Co., Chicago; bids to United States Engineer, Kansas City, Mo., Dec. 12.

PLATE CONTRACTS PENDING

175 tons, 500,000-gallon water tank and tower, Roswell Air Field, Roswell, N. Mex., bids Jan. 5 to United States engineer, Caddoa, Colo.

Unstated tonnage, 1564 feet, 30-inch i.d. steel pipe for Key Bridge, Washington; material to be of ½-inch plates, fusion welded, straight seam or spiral in 40-foot standard lengths; bids Jan. 2, U. S. Engineer Office, Washington, serial No. 977-42-114.

Bars

Bar Prices, Page 83

Most large users of carbon and alloy steel bars, having covered into second quarter against defense contracts, new buying is light. Consumers without war work or with low ratings are not placing additional tonnage with considerable still due them against old orders.

Forging shops in the East are making increasing priority demands on bar mills. Larger shops are overwhelmed with ship work and smaller shops have been able to obtain more war orders, for which steel is available. An instance is found in several eastern makers of small tools who had difficulty in obtaining steel. They have been given heavy orders for combat tank work. Makers of cold-drawn bars have not yet been placed on formal priority but hot mills are being pressed to furnish increasing quantities of high-priority tonnage.

Inquiry for substantial forward contracts by government shops and navy yards in New England is expected early in the year, the first, 750 tons for chains, Boston, closing Jan. 6. Others, calling for fixed definite monthly shipments during first half, are expected out shortly. While some additional buying of forging bars, notably alloys, is being done, most shops are covered through first quarter.

So as not to disrupt unduly production schedules on bars by making the transition too rapidly it is understood OPM will not place the cold-drawn bar industry on a full allocation basis until second quarter. Earlier it had been proposed to make the effective date Jan. 1. Meanwhile plans are being pushed to get the new shell program under way. It is planned that ordnance officers in various districts will be placed in charge of distribution of most contracts, with the likelihood of considerable work being placed within the next fortnight.

Pipe

Pipe Prices, Page 83

Merchant pipe is available in around eight weeks from some mills and while distributors as a rule are not getting full quotas, current consumer demand is being met better than on most steel products. Galvanized stocks are short, however, and only higher rated defense needs are being satisfactorily covered. Curtailment in private building the coming year is expected to be partially offset by defense housing and construction. Practically all volume being done in tubing is on rated orders. Cast pipe demand has slackened with indications pig iron allocations to pipe foundries will continue to be geared to more important tonnages taking some priority in the A-rating.

CAST PIPE PENDING

882 tons, 24-inch cast iron or concrete pipe, San Diego, Calif.; bids opened.

250 tons, 2 to 8-inch bell and spigot, for Bremerton, Wash.; bids to Clerk E. J. McCall, Dec. 24.

216 tons, 2 to 8-inch, Bremerton, Wash.; bids opened.

Unstated tonnage, water district at Cathlamet, Wash.; bids rejected.

Unstated, 5½ miles 2 to 8-inch, Glenwood water district, Eugene, Oreg.; bids to A. W. Vasler, clerk, Dec. 30.

Unstated, 35 miles various sizes, distribution for Defense Public Works project near Fort Lewis, Wash.; bids in to Seattle, alterations for transite.

Unstated tonnage, 35 miles 2 to 10-inch Defense Public Works, Seattle for line between Tacoma and Tillicum, Pierce county, Wash.

Unstated, distribution system expansion.

Fort Lewis, Wash.; Northwest Valley Construction Co., Seattle, contractors, low at $94,513.

STEEL PIPE PENDING

950 tons, copper-nickel condenser tubes, Navy, delivery at Boston and Mare Island navy yards; bids Jan. 6 to bureau of supplies and accounts, Washington, schedule 9829.

Unstated, 26,000 feet, 4 to 12-inch galvanized carbon steel pipe, Panama, schedule 5837; bids Jan. 2.

Wire

Wire Prices, Page 83

Wire mill shipments are shrinking in more instances, due to inability to secure full requirements of semifinished. While rod mills are turning out enough steel to fill higher-rated defense needs, regular trade tonnage is being curtailed and consumers producing nonessential goods are not attempting to much additional tonnage while considerable is still due them on mill books. Priority volume is increasing, but at the expense of nonessential lines.

Additional large orders for wire rope and cable are being placed, including one for $130,200 worth of cable to Collyer Insulated Wire Co., Pawtucket, R. I. Rope mill stranding equipment is being operated at capacity, rope wire being available, with most of the business highly rated defense, notably for marine use.

Rails, Cars

Track Material Prices, Page 83

Scattered buying, principally of locomotives, continued and the government has several inquiries out for rolling stock for the army and navy. The Canadian National is inquiring for some box cars it is unable to place in its own shops.

Buying of buses is active and manufacturers have heavy backlogs from which deliveries will be made for several months. No rail buying has appeared and much less than the usual year-end tonnage has been placed. Carriers are keeping down rail requirements by request of Washington, to give greater capacity for rolling of shell rounds.

Freight car builders have heavy order books to carry over into next year and deliveries are delayed by inability to obtain sufficient steel, priorities not furnishing as much as had been expected.

CAR ORDERS PLACED

Burlington Refrigerator Express Co., 300 forty-ton refrigerator cars, to own shops.

CAR ORDERS PENDING

Canadian National, 415 forty-ton box cars, bids asked.

United States Navy, 10 fifty-ton gondolas, bids Dec. 29.

United States War Department, 33 narrow gage and two standard gage coaches of miscellaneous types, bids asked; equipment will take an A-1C priority.

LOCOMOTIVES PLACED

Chicago & Alton, one 4000-horsepower diesel-electric locomotive, to Electro Motive Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Wabash, three diesel-electric locomotives, for which an expenditure of $240,000 has been authorized by the district court.

RAIL CONTRACTS PENDING

510 tons, Panama, schedule 5851, bids Jan. 7, Washington.

BUSES BOOKED

Twin Coach Co., Kent, O.; Eighteen 40-passenger for New York City Transit System, Brooklyn, N. Y.; ten 33-passenger for Bluebird Coach Lines, Chicago; six 27-passenger for Carolina Power & Light Co., Raleigh, N. C.; five 35-passenger for Akron Transportation Co., Akron, O.; four 31-passenger for Co-operative Bus Co., Wheeling W. Va.; four 28-passenger for Jamestown Motor Bus Transportation Co., Jamestown, N. Y.; four 31-passenger for Triple Cities Traction Co., Binghamton, N. Y.; three 28-passenger for Schuylkill Transportation Co., Mahanoy City, Pa.; three 31-passenger for Central Illinois Electric & Gas Co., Rockford, Ill.; three 25-passenger for Kansas Power & Light Co., Topeka, Kans.; two 33-passenger for Dayton Suburban Bus Lines, Dayton, O.; two 31-passenger for Menderson Bus Lines, Phoenix, Ariz.; four 33-passenger for Valley Motor Transit Co., East Liverpool, O.; two 31-passenger for Fort Worth Transit Co., Fort Worth, Tex.; two 31-passenger for Savannah Electric & Power Co., Savannah, Ga.; two 31-passenger for Peoples Transport Corp., Muskegon, Mich.; two 31-passenger for Motor Transit Co., Jacksonville, Fla.

Structural Shapes

Structural Shape Prices, Page 83

Shape fabricators feel an expansion in war demand, probably marking the start of a new wave of this type of activity. Commercial construction has practically vanished. Due to information on defense work being held back numerous projects in that class are not being reported when placed.

Some mills now are able to produce at a heavier rate than incoming orders, allowing some reduction in order backlogs.

Orders for fabricated structural steel booked in November totaled 181,103 net tons compared with 127,453 tons in October and 141,945 tons in November, 1940. Shipments during November, were 175,740 tons, compared with 214,175 tons in October and 146,992 tons in November, 1940. Orders booked in 11 months totaled 2,146,457 tons, compared with 1,545,020 tons in the comparable period last year. Shipments in 11 months were 2,064,547 tons, compared with 1,360,017 in the 1940 period.

Dependent on the character of construction, which has changed materially during the last year under the influence of the defense program, fabricated structural steel prices average from $100 to $110 per ton f.o.b. and with up to $40 per ton for erecting, prices are materially higher than those prevailing during the lean '30's. Mill work, industrial structures, hangars, warehouses and other construction predominating in recent months include lighter and more sections compared with heavier material entering into high buildings and bridges. Quotations on the latter type of work, however, are higher also, 6.37c per pound being quoted on carbon steel for a Hartford, Conn., bridge superstructure, 1063 tons, at the last Connecticut opening; this compares with 4.00c to 5.00c and even under on similar carbon structural steel work in the late 1930's.

SHAPE CONTRACTS PLACED

2000 tons or more, transmission towers, 99.5-mile Midway-Coulee line No. 2, for Bonneville Project, to American Bridge Co., low at $391,847.

1500 tons, additional building, Chapman Valve Mfg. Co., Indian Orchard, Mass., to Lehigh Structural Steel Co., Allentown, Pa.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

1400 tons, extension, building No. 311, Sea Coast Gun shop, Watertown, Mass., arsenal, to Lehigh Structural Steel Co., Allentown, Pa., fabricating and erecting, bids direct to Constructing Quartermaster, Harbor Defense, Boston, spec. 9042-E, bids Dec. 22.

1000 tons, including 700 tons doors and 300 tons sashes, Boeing seaplane plant, Seattle, to Truscon Steel Co., Youngstown, O.

890 tons, power house, Central Illinois Public Service Co., Meredosia, Ill., also 46 tons plates for smokestack, to Mississippi Valley Structural Steel Co., Decatur, Ill.; Sargent & Lundy, Chicago, engineers; bids Dec. 1.

530 tons, plant addition, Jenkins Bros., Bridgeport, Conn., to Bethlehem Steel Co., Bethlehem, Pa., direct; Fletcher-Thompson Co., Bridgeport, engineers.

500 tons or more, transmission towers Kelso-Longview 200 kv. line, for Bonneville Project, to American Bridge Co., low at $70,509.

475 tons, slab forms, piers J and K, navy yard, Brooklyn, to American Bridge Co., Pittsburgh.

450 tons, tank transmission shop building, Mack Truck Co., New Brunswick, N. J., to Morris-Wheeler Co., Philadelphia; Wilcox Construction Co. and Clemons Construction Co., New York, joint contractors.

400 tons, general defense projects in Puget Sound area, to Standard Steel Fabricating Co., Seattle.

350 tons, plant addition, Parish Pressed Steel Co., Reading, Pa., to Belmont Iron Works, Philadelphia.

315 tons, state highway bridge RC-41-56, Livingston county, New York, to American Bridge Co., through Ibero Engineering & Construction Co., North Tonawanda, N. Y.

210 tons, state bridge work, Monroe

SHAPE AWARDS COMPARED

	Tons
Week ended Dec. 27	10,918
Week ended Dec. 20	35,993
Week ended Dec. 13	5,233
This week, 1940	44,039
Weekly Average, 1941	27,213
Weekly average, 1940	28,414
Weekly average, Nov., 1941	20,935
Total to date, 1940	1,477,538
Total to date, 1941	1,415,110

Includes awards of 100 tons or more.

county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

190 tons, plant addition, SKF Industries, Philadelphia, through Turner Construction Co. to Roy A. Robinson, Philadelphia.

175 tons, boiler plant, Public Service Corp. of New Jersey, Jersey City, to Lehigh Structural Steel Co., Allentown, Pa.

175 tons, state highway RC-41-55, Montgomery county, New York, to American Bridge Co., through Pallette Construction Co., Amsterdam, N. Y.

150 tons, switching station, Public Service Corp., of New Jersey, Bayway, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

128 tons, state bridges, Iowa; 96 tons in Appanose county, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa; 32 tons, Wright county, to Des Moines Steel Co., Des Moines, Iowa.

100 tons or more, including plates, wind tunnel, Model Basin, Caderock, Md., to Pittsburgh-Des Moines Steel Co., Pittsburgh, $80,420.

SHAPE CONTRACTS PENDING

20,000 tons, tank parts plant, American Steel Foundries, East Chicago, Ind., Albert Kahn, Detroit, engineer; bids Jan. 2.

14,000 tons, armor plate plant for General Steel Castings Corp. at Granite City, Ill.

1400 tons, torpedo firing pier and building, Goulds Island, Naval station, Newport, R. I.; steel bids in.

1370 tons, bridges, various locations, for Atchison, Topeka & Santa Fe railroad; American Bridge Co., Pittsburgh, low on 1200 tons, Kansas City Structural Steel Co., Kansas City, Kans., low on 170 tons; bids Dec. 19.

1000 tons, assembly shop, Richmond Shipbuilding Corp., Richmond, Calif.; bids being taken.

750 tons, hangar and boiler house, Aberdeen Proving Ground, Md.; bids Jan. 7, United States engineer, Baltimore.

580 tons, bridge No. 4, War Department, road network, Arlington county, Virginia; also 440 tons reinforcing bars, bids Jan. 7, to district engineer, Federal Works Agency, Washington.

417 tons, state bridge over Pecatonica river, Freeport, Ill., Clinton Bridge Works, Clinton, Iowa, low, bids Dec. 19.

105 tons, overpass, route 42, Folsom, N. J.; Elsenberg Construction Co., Camden, N. J., low; also 56 tons reinforcing steel bars, bids Dec. 19, Trenton, preference rating A-4.

100 tons, state bridge work, Route 28, New Jersey; bids Dec. 29.

100 tons, I-beams, Navy purchasing office, New York, bids in; sch. 3527, Dec. 23.

Unstated, steel for 115-kv switchyard, Grand Coulee power plant; bids to Denver, Jan. 2; Spec. 1603-D.

Unstated, shapes for substations at Longview and Ampere, Wash., for Bonneville Project; bids in Dec. 20; Spec. 2,468.

Tin Plate

Tin Plate Prices, Page 82

Tin plate operations, reduced to 80 per cent last week, because of the holiday, may not rebound to the level of 92 per cent, that has prevailed. Many users of tin plate face immediate restrictions in their fields and supply of black sheets for tinning is reduced by use of sheet mills for plate production. Preference ratings for tin plate have not been deemed necessary but may be applied next year if definite shortages develop. Some ratings have been applied automatically for army, navy or lend-lease tonnage, but these have been handled without difficulty and have had little force.

Reinforcing Bars

Reinforcing Bar Prices, Page 83

Demand for reinforcing bars for private construction has all but disappeared, even for small lots. Trend toward redesigning of defense structures from structural steel to reinforced concrete has halted as structural deliveries in many cases are better than for reinforcing steel.

As low as 4.50c per pound has been quoted on deformed steel reinforcing bars in place for Connecticut bridges and highway work but the average is slightly higher, with rather a broad range, frequent bids being 5.00c, but as high as 7.00c. Most contractors quote 25.00c per square yard for mat reinforcement, Connecticut specifications, both bars and mesh being somewhat higher on the average compared with a year ago when material was less tight. Most of 875 tons of reinforcing for Connecticut has been awarded, mainly for projects rated from A-2 to A-4. Including a labora-

tory at Watertown, Mass., arsenal and additional requirements for a graving dock at Boston, both bid, close to 2000 tons are active, with prospects for additional defense tonnages.

REINFORCING STEEL AWARDS

1000 tons, aluminum reduction plant, Spokane, Wash., to Northwest Steel Rolling Mills, Seattle. (Previously reported at 700 tons.)

465 tons, Bureau of Reclamation, Invitation A-33,425-A-1, Coram, Calif., to Colorado Builders Supply Co., Denver, Colo.

300 tons, Puget Sound navy yard projects, to Northwest Steel Rolling Mills, Seattle.

280 tons, Bureau of Reclamation, Invitation A-33,457-A. Coram, Calif., to Columbia Steel Co., San Francisco.

200 tons, (merchant bars) for new Boeing and Isaacson plants, Seattle, to Northwest Steel Rolling Mills, Seattle.

180 tons, Bureau of Reclamation, Invitation 48,893-A. Friant, Calif., to Colorado Builders Supply Co., Denver, Colo.

125 tons, mesh, state highway, route 35, section 38-A, Middlesex county, New Jersey, to Igoe Bros., Newark, N. J., through Weldon Contracting Co., Westfield, N. J.

120 tons, state bridge, Kentucky City, Mich.; to Great Lakes Steel Corp., Ecorse, Mich., through Ceco Steel Products Corp., Detroit.

100 tons or more, maintenance and command building, Patterson Field, O., to Pollak Steel Co., Cincinnati; James I. Barnes Construction Co., Dayton, O., contractor.

CONCRETE BARS COMPARED

	Tons
Week ended Dec. 27	2,070
Week ended Dec. 20	14,754
Week ended Dec. 13	13,244
This week, 1940	1,174
Weekly average, 1941	13,718
Weekly average, 1940	9,661
Weekly average, Nov., 1941	11,379
Total to date, 1940	502,356
Total to date, 1941	173,380

Includes awards of 100 tons or more.

REINFORCING STEEL PENDING

3200 tons, Bureau of Reclamation, Denver; bids in Dec. 23, purchasing agent, inv. D-38,212-A.

500 tons, Panama, schedule 5818, Bethlehem Steel Co., low; bids Dec. 23.

350 tons, hospital, Springfield Memorial Hospital Association, Springfield, Ill.; bids Jan. 12.

310 tons, mesh, state highway project, route 28, sections 25B and 26A, North Branch relocation, Somerset county, New Jersey; Francis A. Canuso & Son, Philadelphia low, $511,636, bids Dec. 19, Trenton; preference rating A-4.

300 tons, wind tunnel and construction shed, naval experimental model basin, Carderock, Md. Lieb Construction Co., New York, contractor, $276,750, bids Dec. 3, spec. 10542, Bureau of Yards and Docks, Navy department, Washington.

200 tons, St. Lukes School of Nursing, Chicago; general contract to Bulley & Andrews, Chicago.

200 tons, building, Iowa Packing Co., Des Moines, Iowa; general contract to J. S. Sweitzer & Son, St. Paul; bids Dec. 12.

168 tons, superstructure, Park river interchange structure, Hartford, Conn., Alexander Jarvis, Manchester, Conn., contractor, $226,505.

Unstated, runways at Ellensburg, Wash. and Gooding, Idaho, airfields; bids to C. A. A., Seattle, Dec. 30 and Jan. 3, respectively; $569,000 available.

Pig Iron

Pig Iron Prices, Page 84

Most pig iron allocated for December was shipped during the first three weeks and was close to the total furnished in recent months. Curtailment in consumer goods production is at least matched by increased demand for war material. Heavier production of machine tools is calling for more castings, which is a large factor in several areas.

Numerous foundries will use idle holiday time to make needed repairs and consumption will be slightly curtailed by this factor, though it will not be great. This may cause some increase in inventory at the close of the year.

That pig iron allocation is becoming increasingly keyed to actual requirements for defense is indicated by allotments covering rated business with less regard to civilian needs where consumers have tonnage in both categories. For defense, iron is allocated fully, but more difficulty is experienced in covering civilian tonnage. Except for a few of the larger consumers, inventories do not average more than one month, and most of the former will be down to a point where new iron will be required some time late next quarter. Opinion holds consumers with ratings under A-10 will find difficulty in getting deliveries.

Metallurgical Coke

Coke Prices, Page 83

Coke sellers believe the $6 ceiling on beehive furnace coke will be maintained. Beehive foundry coke, which sells at a higher price, is not covered by the order. Considerable

tonnage has been contracted for first quarter at $6, which would make it difficult for a higher price to be applied to other tonnage. Some contracts at higher prices have been revised in compliance with OPA request. It seems probable higher coal prices after Jan. 1 already have been taken into account and will not be a reason for revising the ceiling upward.

Coke shipments are adequate, especially of foundry grades, as shipping schedules to furnace consumers are slightly slower.

Scrap

Scrap Prices, Page 86

Revision of the iron and steel scrap schedule to meet actual exigencies of war conditions has been made by OPA. Announced intention of the revision is to increase collection of all kinds of scrap and direct flow to consumers able to make best use. The schedule contains seven grades for open-hearth use, four grades for blast furnaces, eight grades for electric furnaces and foundries and six grades of cast iron scrap for gray iron foundries.

Dealers are allowed to compute maximum scrap prices, except for cast iron scrap, by using the "most favorable" basing point instead of the "nearest basing point in terms of transportation charges." Former geographical price differentials remain unchanged.

Electric furnace and foundry grades are priced at levels somewhat higher than open-hearth grades to allow for added cost of preparation but not high enough to divert open-hearth grades to electric furnace and foundry use. A specific restriction is imposed on open-hearth operators to prevent them from buying electric furnace and foundry grades.

All open-hearth grades except machine shop turnings are based on a maximum of $20 per gross ton at Pittsburgh. Turnings are based on $16 per gross ton at Pittsburgh. Blast furnace grades are based at $16, Pittsburgh.

Cast iron scrap is segregated, with provision for maximum prices on a regional shipping point basis. There are three groups, the first including Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico; the second includes North and South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas, and Florida; the third group includes all other states.

Consumers of cast iron scrap may pay the shipping point price plus the established charge for transportation. Previous amendments relating to remote scrap are retained. Grades inferior to the established grades must bear the same differentials as existed between Sept. 1, 1940, and Jan. 1, 1941.

The position of brokers is clarified, with definite rules for collection of a commission. This section states that no such commission may be charged unless, (a) the broker guarantees the quality and delivery of an agreed tonnage of scrap; (b) the scrap is purchased by the consumer at a price not higher than the applicable ceiling; (c) the broker sells the scrap at the same price at which he purchased it; (d) the broker does not split the commission with anyone. No commission shall be payable to a person for scrap which he prepares. A person who has not acted as a broker prior to April 3, 1941 (this date formerly was June 18, 1941) shall in no case be allowed a brokerage commission.

With the exception of heavy breakable cast the published prices are the maximum for prepared

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

For each 1% tungsten contained

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

scrap. For unprepared scrap, except heavy breakable cast, the maximum is $2.50 lower for corresponding grades. Where scrap is to undergo preparation prior to arrival at point of delivery it is not at shipping point until preparation is completed.

A Detroit dealer, finding that weight of former accumulations had forced some scrap into the ground, has been "mining" his yard and has reclaimed a fairly large quantity of usable scrap. In Milwaukee and suburbs more than 13,300 gross tons of steel rails have been removed from abandoned street car tracks and sold as scrap. About 4500 tons of rails are imbedded in streets but removal would mean repaving, which is uneconomical.

Allocations to Granite City Steel Co. and Sheffield Steel Corp. have had no effect on supply as dealers asked to furnish the tonnage have no scrap and also have contracts unfilled for these consumers.

Court Decision Favors Ohio Scrap Dealers

Ohio supreme court has reversed the Ohio board of tax appeals in a test case brought by the Middletown Iron & Steel Co. and others to obtain manufacturers' classification for the iron and steel scrap industry.

The ruling permits scrap companies to list their machinery, equipment and inventory at 50 per cent of its valuation instead of 75 per cent, for personal property tax.

Warehouse

Warehouse Prices, Page 85

In general placing of ceiling prices on warehouse sales has met with satisfaction, as it tends to eliminate numerous abuses in sales by smaller dealers and by brokers not connected with the warehouse industry.

Some questions are raised by the fact that not all distributors were on the same basis April 16, some quoting lower prices than the larger dealers. Whether these interests can use the same ceilings as the majority or must adhere to their own prices of that date has not been made clear.

Prices are being revised on invoices for material sold before the ceiling was established. Some question is being raised in regard to the lower ceilings on carload lots.

By striking a quarterly average against 1940 volume, most jobbers will have a slightly higher first quarter quota on wire nails, at least on paper, which mills are likely to have difficulty in fully meeting. Fifty-cent margin in handling nails allowed both jobbers and dealers is meeting with some objection. Warehouses expect limited allocations of plates under the warehouse schedule against the A-9 rating for nondefense business, with consumers practically eliminated unless the latter have an A-10 or better.

Pacific Coast

Seattle—Large scale construction of feeder power lines is planned by Paul J. Raver, Bonneville Power Administration, under a $30,000,000 appropriation which will include ten or twelve 100,000-volt lines and a tie-in with the California-Oregon Power Co. As part of the same program Denver has awarded Newport News Shipbuilding & Dry Dock Co., Newport News, Va., the contract at $1,900,000 to furnish turbines and governors for Units L-7, 8 and 9, Grand Coulee powerhouse. Consolidated Builders Inc. has been given an order for construction of the $4,000,000 powerhouse addition. When finished the plant will produce 1,944,000 kw from 18 main generators. Tacoma has opened bids for $1,800,000 of electrical machinery. Pelton Water Wheel Co., San Francisco, submitted the only bid, $1,228,700, for one 55,000-horsepower turbine for LaGrande, and two 34,500-horsepower turbines for the Alder powerhouse. For a 40,000-horsepower generator for LaGrande, Allis-Chalmers Mfg. Co., Milwaukee, is apparently low at $277,850, and $23,100 for erection. For two 25,000-kilowatt generators for Alder, General Electric is low at $289,055 and $27,775 for factory assembly, or $383,300 and $37,575 for field assembly.

Willamette Iron & Steel Co., Portland, Oreg., has an additional contract for 21 steam engines for Liberty ships, making a total of 71 units, approximately $8,000,000, to be constructed by this plant.

Rolling mills are working on heavy backlogs of concrete and merchant bars. Inquiries were in the market this week for 5000 tons for projects in the Hawaiian Islands. Northwest Steel Rolling Mills, Seattle, is furnishing 1000 tons for the aluminum plant at Spokane, 300 tons for local navy projects and 200 tons of merchant bars for the new Boeing and Isaacson plants, Seattle. Bids are in at Olympia for the Spokane street viaduct, Seattle, involving 1500 tons of concrete bars.

Jobbing houses report no improvement in the situation, plates and sheets being almost entirely lacking and replacements uncertain and slow. Demand continues unabated and dealers are unable to care for the business offering, even from defense sources. Appeals to OPM have thus far failed to relieve conditions.

Washington state officials have completed a survey of potential scrap supplies in the state and report 30,318 tons available of which 18,175 tons consist of rails and other equipment of the dismantled Seattle street car system for which negotiations are under way. Current prices are not attracting shipments from the interior and while local mills have sufficient stocks for the present, a readjustment of regulations is said to be imperative to meet demands under the expanded war program. It is estimated that the two Seattle rolling mills will consume about 145,-

000 tons in 1941 but their requirements will undoubtedly exceed this figure next year.

San Francisco—National defense projects continue to take most tonnage produced by rolling mills on the Pacific Coast and little is available to private interests.

The reinforcing bar market was the most active one and 5211 tons were placed, bringing the aggregate to date to 171,288 tons as compared with 172,162 tons for the corresponding period in 1940.

The largest cast iron pipe award went to American Cast Iron Pipe Co., 826 tons of 16-inch pipe for a cantonment at Fort Lewis, Wash. Pending business calls for more than 500 tons.

Demand for plates continues exceptionally strong although no new awards of size were reported. A fair sized tonnage is involved in nine submarine chasers recently awarded to Albina Engine & Machine Works, Portland, Oreg., and Commercial Iron Works of the same city. The Washington Boat Works and Shain Manufacturing Co., Seattle, each took two 52-foot coast guard cutters, requiring a fair tonnage of both plates and shapes. So far this year 579,757 tons have been placed, compared with only 199,441 tons for the corresponding period in 1940.

Structural lettings were confined to lots of less than 100 tons. Bids are now being taken on 1000 tons for an assembly shop at Richmond, Calif., for the Richmond Shipbuilding Corp. To date 595,635 tons have been placed, compared with only 373,137 tons a year ago.

Canada

Toronto, Ont.—Providing steel for Canada's war effort has become a serious problem for primary producers and the government. Canadian mills have reached their maximum production with present equipment, but will be about 2,000,000 tons behind in meeting all requirements in the coming year. One of the more serious problems is supply of raw materials for steel mills and electric furnace operators. To maintain the present rate of steel production in the Dominion approximately 2,000,000 tons of scrap will be necessary during 1942, a quantity far in excess of any previous total for the country. To provide this scrap special appeals are being made by the government and a direct call has been made on persons with obsolete cars to turn these in for scrap. In normal times about 100,000 old cars are scrapped annually. F. B. Kilbourn, Canadian Steel Controller, stated that with regard to scrap "substantial salvage has been effected, but a great deal more has to be done if requirements are to be met.

New and heavier demands are being made for plate, and it is estimated that in the coming year ship plate requirements will be almost double those of the current year. The government has outlined a merchant shipbuilding program involving about $200,000,000, while for war ship construction the outlay will be only slightly under this figure. Even with the addition of the Sydney, N. S., plate mill within the next six weeks, Canada's output of plate will be well under requirements. Armor plate demand is increasing. No plate is available for ordinary consumers, all output being directed to government and war undertakings.

Mills continue to sell wire, nails and similar products to civilian consumers, but most orders are in small quantity. So far these materials have not come under direct government control, although production has been curtailed, owing to shortage of steel.

Business continues to expand in merchant pig iron markets, but all directly associated with war enterprise. Production of foundry and malleable iron has been stepped up and sales of these grades have gained about 20 per cent in the past couple of weeks. Basic iron sales also are more pronounced than formerly.

Demand for iron and steel scrap is soaring while offerings decline. Mills and electric furnace operators are taking everything offered and to date have been successful in meeting all requirements, although future possibilities in this direction are doubtful. Cast scrap and stove plate are scarce and offerings are declining rapidly. Dealers report general shortage of iron grades.

Steel in Europe

Foreign Steel Prices, Page 85

London—(*By Cable*)—No major change has taken place in the steel and iron situation in Great Britain. Substantial war contracts have been booked into first quarter. The slight interruption for Christmas will be used for plant maintenance and repair work. The tin plate market is active, but sheets and galvanized sheets continue irregular.

Iron Ore

Iron Ore Prices, Page 85

November consumption of Lake Superior iron ore totaled 6,501,027 gross tons, slightly less than the high record of 6,612,186 tons used in October. In November, 1940, consumption was 5,973,007 tons. Cumulative consumption to Dec. 1 this year was 69,273,701 tons, compared with 56,253,276 tons in the comparable period last year.

Ore on hand at furnaces and on Lake Erie docks Dec. 1 totaled 45,534,633 tons, compared with 43,945,751 tons a month previously and 41,711,704 tons a year ago.

Furnaces in blast numbered 177,

Nonferrous Metal Prices

Dec.	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-26	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.12½-10.25
Cleveland	10.25-10.50
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.37½-9.75

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00
Chicago	6.00-6.25
St. Louis	6.25

Lead

New York	5.25-5.50
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	5.00-5.25
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	14.50

of which 170 were in the United States and seven in Canada. Idle furnaces numbered ten in the United States and one in Canada. Total available stacks were 188, of which 180 were in the United States. A month ago 169 were in blast and ten were idle in the United States, with ten in blast and one idle in Canada. A year ago 160 were in blast and 22 idle in the United States, six in blast and one idle in Canada, a total of 189 available.

Equipment

Boston — Industrial-Brownhoist, Bay City, Mich., has been awarded a $386,450 contract for 25-ton cranes at the Portsmouth, N. H., navy yard, three units. Inquiry and prospective requirements for crane equipment continue heavy, the latter including cranes for the graving dock now being constructed at Boston. The Bay City, Mich. builder has also been awarded dry dock cranes at Philadelphia, and Bayonne, N. J., at $430,600. In the power equipment field, General Electric Co., Schenectady, has the contract for two mobile power plants, to be mounted on railroad cars, $2,500,000, awarded by the Bureau of Yards and Docks, Navy Department. Watervliet, N. Y., arsenal is inquiring for a double girder and two overhead electric bridge cranes.

Seattle—The market is entirely dominated by requirements, many private projects being postponed as necessary machinery cannot be obtained within reasonable time. Electrical equipment is in strong demand with road and earth moving machinery also leading. Denver has called important bids Jan. 28 for main and auxiliary control equipment, loading and frequency, station service distributing equipment and 6900-volt switch gear for units L4 to L9 inclusive, Coulee power plant, Spec. 1022. National Acme Co., Cleveland, is low at $4950 for furnishing oil purifiers for Coulee. Pierce county, Washington, has purchased three road graders and has called bids Dec. 29 for three diesel motor graders. U. S. engineer, Seattle, will soon call bids for a considerable quantity of chain link fence for air fields in this area, bids for similar material to United States engineer, Portland, Dec. 29. Cowlitz county, Washington, has purchased a power shovel from Clyde Equipment Co., Portland, Oreg.

Nonferrous Metals

New York—Problem of securing adequate supplies of metals and of allocating these supplies for consumption in war industries was being studied last week by officials of the producing companies as well as by those of the government. Activities of the latter were on an international scope as they met with the British Minister of Supply Beaverbrook and Canadian supply officials to work out plans to balance combined allied supplies with requirements.

Copper—OPM is expected to have about 130,000 tons of metal for January allocation, including some copper still held by dealers who are liquidating their holdings at prices above 12.000c on permission granted by OPA. Leon Henderson, OPA administrator, reiterated the policy of his office to the effect that "12.00c is an adequate price for by far the bulk of the copper being produced in the United States," that "copper output is increasing substantially at 12.00c, and that "OPA

will approve prices above 12.000c for additional copper that cannot be produced profitably at this price." Consumption during November by fabricators in this country declined to 117,024 tons, the smallest since December, 1940, due to scarcity of metal. Fabricators were short 330,969 tons at the end of November compared with 363,988 tons at the end of October.

Lead—Refined stocks increased 2936 tons during November to a total of 13,671 tons as production rose to 48,930 tons while shipments increased to only 45,980 tons. Supplies of ore are inadequate to support a higher rate of production and they cannot be increased, according to some mining interests, at present ore prices. Marginal mines must be allowed a higher price, it is claimed, if their output is to increase.

Zinc—OPM has extended to March 31, 1942, general preference order M-11 controlling distribution of zinc. Mine output to 64,135 tons of recoverable zinc during October, an increase of 2.88 per cent, but estimates for November indicate a decrease of about 3 per cent to 62,100 tons.

Tin—Trading in the open market ceased following an order by OPM freezing all stocks of tin in this country and assuming control by the government of all deliveries and supplies. MRC is expected to be the sole importer although no ships at present are being loaded in the Far East. Drastic curtailment in consumption in civilian industries is expected to be ordered soon. Restrictions on production of bronze, solder and miscellaneous products will be more severe than on tin plate.

DIED:

■ **A. T. Hunt,** 63, superintendent of plant engineering, Hawthorne works, Western Electric Co., Chicago, at his home in LaGrange, Ill., Dec. 18.

♦

Charles W. Stiver, 70, founder, Saginaw Shipbuilding Co., Saginaw, Mich., Dec. 17, in that city.

♦

James C. C. Holding, 69, at one time associated with American Bridge Co., Carnegie Steel Co., and Midvale Steel Co., at his home in Forest Hills, Long Island, Dec. 7. Recently he had been identified with the New York office of Robert W. Hunt & Co.

♦

Norman W. Cassell, 57, vice president and secretary, Harrisburg Steel Corp., Harrisburg, Pa., Dec. 22, in Baltimore.

♦

William J. Reardon, 71, president, National Alloys Co., Detroit, Dec. 24, in that city. At one time he was associated with Westinghouse Electric & Mfg. Co., Rome Mfg. Co., and Aluminum Co. of America.

♦

Vernon J. Voye, manager, Sheet Metal Department, Brown-Wales Co., Boston, Dec. 20, in that city.

♦

Soren J. Sorensen, 75, co-founder and president, Cincinnati Gear Co., Cincinnati, in that city, Dec. 16. He was also vice president, United Aircraft Products, Dayton, O.

Activities of Steel Users and Makers

■ STANDARD Reamer & Tool Co. has moved its offices and factory from Elmwood avenue at Hendrick, Detroit, to larger quarters at 2351 Hilton road, Ferndale, Mich.

♦

Link-Belt Co., Eastern Stoker Division, will move its sales office from Philadelphia to the Graybar building, 420 Lexington avenue, New York, effective Jan. 5. K. C. Ellsworth is in charge.

♦

Sparks Machine Tool Corp. has moved to new quarters at 32-34 Main street, Norwalk, Conn.

♦

C. B. Fall Co., 915 Olive street, St. Louis, has been appointed representative for Ajax Electric Co. Inc., Philadelphia, in Kansas, Missouri, Arkansas and southern Illinois.

♦

Uddeholm Co. of America Inc., New York, has opened its own warehouse at 23-13 Thirty-seventh avenue, Long Island City, for distribution of tool steels, effective Jan. 1. Frank Lunden will be in charge as superintendent. Heretofore the company has used the warehouse facilities of Ackerlind Steel Co.

♦

Dresser Mfg. Co. and Bovaird & Seyfang Mfg. Co., Bradford, Pa., have been merged. The latter company manufactures engines, tanks and oil well pumps, while the Dresser company makes shell parts.

Convention Calendar

Jan. 12-16—Society of Automotive Engineers Inc. Annual meeting and engineering display, Book-Cadillac hotel, Detroit. John A. C. Warner, 29 W. 39th street, New York, is secretary and general manager.

Jan. 26—American Institute of Electrical Engineers. Engineers Society building, New York. H. H. Henline, 33 W. 39th street, New York, is secretary.

Jan. 26-28—National Warm Air Heating and Air Conditioning Association. Annual convention, Benjamin Franklin hotel, Philadelphia. William Boeddener, 145 Public square, Cleveland.

Jan. 26-29—American Society of Heating and Ventilating Engineers. Annual meeting, Bellevue-Stratford hotel, Philadelphia. A. V. Hutchinson, 51 Madison avenue, New York, is secretary.

Jan. 26-30—National Canners' Association. Annual meeting, Stevens hotel, Chicago. F. E. Gorrell, 1739 H street, Washington, is secretary.

Industry, Labor Conference Pledges Strike Moratorium

WASHINGTON

■ A THREE-POINT plan to assure labor peace for the duration of the war was agreed upon last week by representatives of industry and labor organizations, conferring at request of the President.

Conferees agreed: (1) No strikes or lockouts would be ordered during the war; all disputes would be settled by peaceful means; the President should establish a war labor board.

The statement issued by the representatives of management said they "accepted the President's direction for a peaceful settlement of disputes and the establishment of a war labor board" but it strongly urged that the board "should not accept for arbitration or consideration the issue of the closed shop, requiring that a person become or remain a member of a labor organization if he is to get or hold a job.

"We recommend," the statement added, "that for the duration of the war, employers shall not attempt to change the terms, in present contracts, which provide for the closed shop. Where a closed shop contract does not now exist, it may under the law be arrived at by voluntary negotiation. We indorse without reservation the right of labor to organize and bargain collectively.

"But it would be a serious mistake to abandon the principle that the right to work should not be infringed by government through requirement of membership in any organization, whether union or otherwise.

"The closed shop is the most highly controversial and emotional question in industrial relations today. To accept it as an issue for government arbitration would intensify agitation, increase labor disputes, and divert the energy of both labor and management from the vital job of production."

Special Commercial Steels Find War Use

■ Many special steels developed for peacetime requirements are being used in large tonnages in manufacturing war implements, according to the American Iron and Steel Institute.

Among commercial steels serving war needs is alloy A6150, with 1 per cent chromium and 0.1 per cent vanadium, found in virtually every home workshop in the form of some handtool. It is also the steel from which the cocking lever of a machine gun is made. Plain carbon steel, C1075, containing about 0.8 per cent carbon, has long been used for manufacturing automobile bumpers. Qualities which render it desirable for that purpose also make C1075 useful in the locking mechanism of machine guns.

Armor-piercing bullets may be made from several different types of steel. One, commercially used to make steel cylinders for bottling and transporting gases, is A4130 and contains about 1 per cent chromium and a small amount of molybdenum. When made in electric furnaces, this steel can be used to make barrels for certain antiaircraft guns.

SAE Committee Adopts 42 Aircraft Standards

■ Aeronautics Division, Society of Automotive Engineers' Standards Committee, recently approved 42 new aircraft engine standards, according to John A. C. Warner, secretary and general manager.

Started immediately after a request for development of standards in the aircraft industry by the Office of Production Management last February, the task was assigned to four subdivisions serving as steering committees, and 34 subcommittees. More than 130 aeronautical engineers have served on the committees, said Mr. Warner.

The industry-wide standardization program also has resulted in publication of an universal manual of aircraft engine drafting room practice. "Up to now, each engine and engine accessory manufacturer has had his own manual," Mr. Warner explained. Because of technical differences, the society was asked to develop a standard manual which would make universal the language of design and manufacturing engineers. The manual is available at $1.50 from the Society of Automotive Engineers Inc., 29 West Thirty-ninth street, New York.

Meanwhile, importance of the role that can be played in war production by the American Standards Association, New York, was emphasized at the organization's annual luncheon meeting in New York recently. "Standardization is going forward in this country at a rate never reached before," said R. E. Zimmerman, president. J. Lessing Rosenwald, head of the new Bureau of Industrial Conservation, OPM, and R. P. Anderson, chairman, Standards Council of the AMA, also spoke of the vital need for adequate and accepted standards.

West Coast Civilians in Gas Mask Drill

■ Gas mask drills have become an essential and serious business in coastal areas more open to attack by enemy aircraft. San Francisco civilians here are receiving instruction from an Army Chemical Warfare Service officer in methods to be used in guarding against surprise enemy gas barrages. NEA photo

Construction and Enterprise

Ohio

CANTON, O.—Flowers Welding & Machinery Co., 707 Second street, has begun program of remodeling.

CANTON, O.—Canton Malleable Iron Co., 2808 Thirteenth street, is starting erection of factory and office building.

CLEVELAND—Lempco Products Co., Dunham road, Maple Heights, O., will expand production space with addition to factory building.

CLEVELAND—Cleveland Electric Metals Co., 2391 West Thirty-eighth street, is rehabilitating its foundry which was recently damaged by fire. John W. Brown is president.

CLEVELAND — Harris-Seybold-Potter Co., 4510 East Seventy-first street, has plans by W. H. Smith, 2400 Lee road, for factory additions. Cost $40,000. (Noted Dec. 22).

CLEVELAND—Acrods Co., R. Rogers, production manager, 4437 East Forty-ninth street, has awarded contract for one and two-story 109 x 293-foot factory addition to A. M. Higley Co., 2036 East Twenty-second street. Cost $200,000.

CLEVELAND—Apex Electric Mfg. Co., E. L. Frantz, president, 1070 East 152nd street, has let contract for one-story 30 x 140-foot steel factory addition to Bolton-Pratt Co., 1276 West Third street. Cost $40,000. (Noted Dec. 15).

CLEVELAND—Felck Mfg. Co., 10225 Meech avenue, has awarded contract to A. MacDougall Co., 5410 Stone avenue, for one-story 34 x 125-foot steel factory addition, costing about $40,000. H. J. Hassler, 700 Prospect avenue, engineer.

CLEVELAND—New gun sight plant will be built at East 185th street and New York Central railroad for Defense Plant Corp. General Electric Realty Corp., J. V. Anthony, Schenectady, N. Y., will be lessee of 157,000 square foot factory and 15,000 square foot office building, for which plans have been prepared by Giffels & Vallet Inc., Detroit.

CLEVELAND—Cleveland Worm & Gear Co., H. Dingle, president, 3243 East Eightieth street, plans one-story 40 x 80-foot and two-story 40 x 60-foot steel factory and office additions. Cost estimated at $40,000. George S. Rider Co., Terminal Tower, engineer. (Noted Dec. 22).

ELYRIA, O.—Hahn Mfg. Co. has filed incorporation papers for a charter to permit manufacture, design and sale of tools, dies and fixtures. Milton F. Hahn, 207 Standford avenue, is principal and agent for new corporation.

MANSFIELD, O.—Ideal Electric Co. will build an addition to its factory at 330 East First street as soon as priority rating is received from Washington.

MASSILLON, O.—Tyson Roller Bearing Co. has plans by F. K. Draz and A. Scholl, 13124 Shaker Square, Cleveland, for one and two-story factory, costing about $50,000.

Connecticut

BRIDGEPORT, CONN.—Peerless Aluminum Castings Co., 55 Andover street, will soon let contract for one-story 65 x 144-foot steel foundry addition, to cost $40,000. P. Petrofsky, 95 Main street, engineer. (Noted Nov. 17).

GREENWICH, CONN. — Electrolux Corp., Forest avenue, will soon let contract for two-story 101 x 166-foot steel factory. Cost $75,000.

HAMDEN, CONN.—Acme Wire Co., 1255 Dixwell avenue, has let contract for power plant to Mott-Mohr Construction Co. Inc., 440 Elm street, New Haven, Conn. Estimated cost $60,000.

New Jersey

CAMDEN, N. J.—New York Shipbuilding Corp., Broadway, has awarded contract for shop to Leonard Schaefer & Co., 1310 Spruce street, Philadelphia. Estimated cost $432,000. S. Jelinek, Spruce street, Philadelphia, architect.

KEARNY, N. J.—Acme Tool & Machine Co., 576 Davis avenue, has let contract for one-story 100 x 100-foot machine shop addition to Damon & Douglas Co., 605 Broad street, Newark, N. J. Cost $50,000. (Noted Dec. 15).

MAHWAH, N. J.—American Brake Shoe & Foundry Co. has let contract for one-story 50 x 125-foot steel foundry addition, altering storage building, one-story charging shed addition to J. H. Steel & Sons Inc., 48 North Second street, Paterson, N. J.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 91 and Reinforcing Bars Pending on page 92 in this issue.

Pennsylvania

HARRISBURG, PA.—Cloverdale Spring Co., 1620 North Seventh street, will build bottling plant and has let contract to Ritter Bros., 1511 North Cameron street. Cost $58,000.

MOUNT JOY, PA.—American Expansion Bolt Co., York, Pa., will improve and alter recently acquired plant here, and will spend approximately $40,000.

PHILADELPHIA—Fischer Machine Co., Eleventh and Vine streets, plans plant addition. Cost $100,000.

UNION CITY, PA.—Borough council will construct additional units at disposal plant.

WILLIAMSPORT, PA.—Aviation Mfg. Corp. will build aircraft engine testing unit here, including control room, and has let contract to Charles H. Roller, 413 Stevens street. Estimated cost $75,000.

Michigan

MUSKEGON, MICH. — Continental Motors Corp., 12801 East Jefferson avenue, Detroit, plans installation of motors and controls, transformers and accessories, conveyors, electric hoists and other equipment in plant here for production of aircraft engines for the government. Cost reported over $1,500,000. Financing will be provided by Defense Plant Corp.

Illinois

CHICAGO—Central Pattern & Foundry Co., 3737 South Sacramento avenue, has plans completed by Kocher & Larsen, 506 West Sixty-third street, for one and two-story 100 x 125-foot factory. Cost $50,000.

CHICAGO—H. Kramer & Co., 1359 West Twenty-first street, has started construction of a $350,000 addition to its plant, including a two-story structure, 65 x 135 feet, to contain dust and smoke-collecting equipment to turn out zinc oxide powder; a 120 x 135-foot office, research laboratory and chemical laboratory, and a one-story warehouse 150 x 225 feet.

CHICAGO—United Drill & Tool Corp., 411 West Ontario street, plans installation of motors and controls, switchgear, transformers and accessories, electric hoists, conveyors and other equipment in plant for production of ordnance products for government. Estimated cost $1,942,000. Defense Plant Corp. will finance.

Alabama

FORT PAYNE, ALA.—Sand Mountain Electric Membership Corp. has received REA allotment of $132,000 for rural lines.

Colorado

DOVE CREEK, COLO.—REA has allotted $215,000 to Empire Electric Association, Cecil E. Stokes, superintendent, to finance construction of 201 miles of transmission lines.

FORT MORGAN, COLO.—REA has allotted $228,000 to Morgan County Rural Electric Association, William L. Parker, superintendent, to finance construction of 154 miles of rural transmission lines.

California

BERKELEY, CALIF.—American Forge Co., 750 Potter street, will make additions to plant costing over $100,000.

LOS ANGELES—Western Pipe & Steel Co., 5717 South Santa Fe avenue, will install heavy-duty motors and controls, conveyors, electric cranes and hoists and other equipment in shipbuilding plant. Entire project to cost about $3,500,000. Work scheduled to begin soon.

SANTA ANA, CALIF.—Western Ordnance Co., C. Hoiles, 218 North Sycamore street, plans erection of munitions plant near here.

SUNNYVALE, CALIF.—Joshua Hendy Iron Works plans steam-turbine plant expansion. Cost over $500,000.

REDWOOD CITY, CALIF.—National Motor Bearing Co., 1100 Seventy-eighth avenue, Oakland, Calif., will build plant at cost of about $200,000. W. H. Ellison, Pacific building, San Francisco, engineer.

Oregon

EUGENE, OREG.—A. W. Vasler, engineer, Glenwood water district, will open bids Dec. 30 for 5½ miles of 2 to 8-inch water mains and construction of pump house and other facilities.

PORTLAND, OREG.—United States Engineer has called bids Jan. 2 for construction of motor repair shop, oil storage and other facilities at Portland air base, also for storage facilities at Pendleton base, including warehouse, heating plant, chain link fence, 2200 feet of three-inch cast iron and a quantity of 1½-inch steel pipe and fittings; Jan. 13 for several types of pumps and deep well turbines.

Washington

GRAND COULEE, WASH.—Bureau of Reclamation, Denver, will take bids until Jan. 5 for furnishing and installing three 108,000-kva, 13,800-volt, three phase, 60 cycle, vertical shaft, a.c. electric generators for Grand Coulee power plant. Specification 1018.

RITZVILLE, WASH.—REA has allocated $170,000 to Big Bend Electric Cooperative Inc. for rural transmission lines.

SEATTLE—R. M. Bunten Co. plans one-story addition to machine shop at 3431 Eleventh avenue Southwest.

SEATTLE—Puget Timber Co. will build boiler house at plant, 7400 Eighth avenue South.

TACOMA, WASH.—City council has authorized $4,000,000 utility bond issue to finance the second Nisqually power project.

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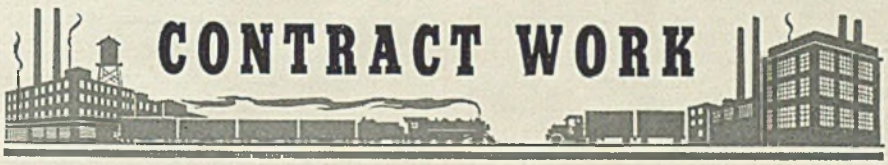

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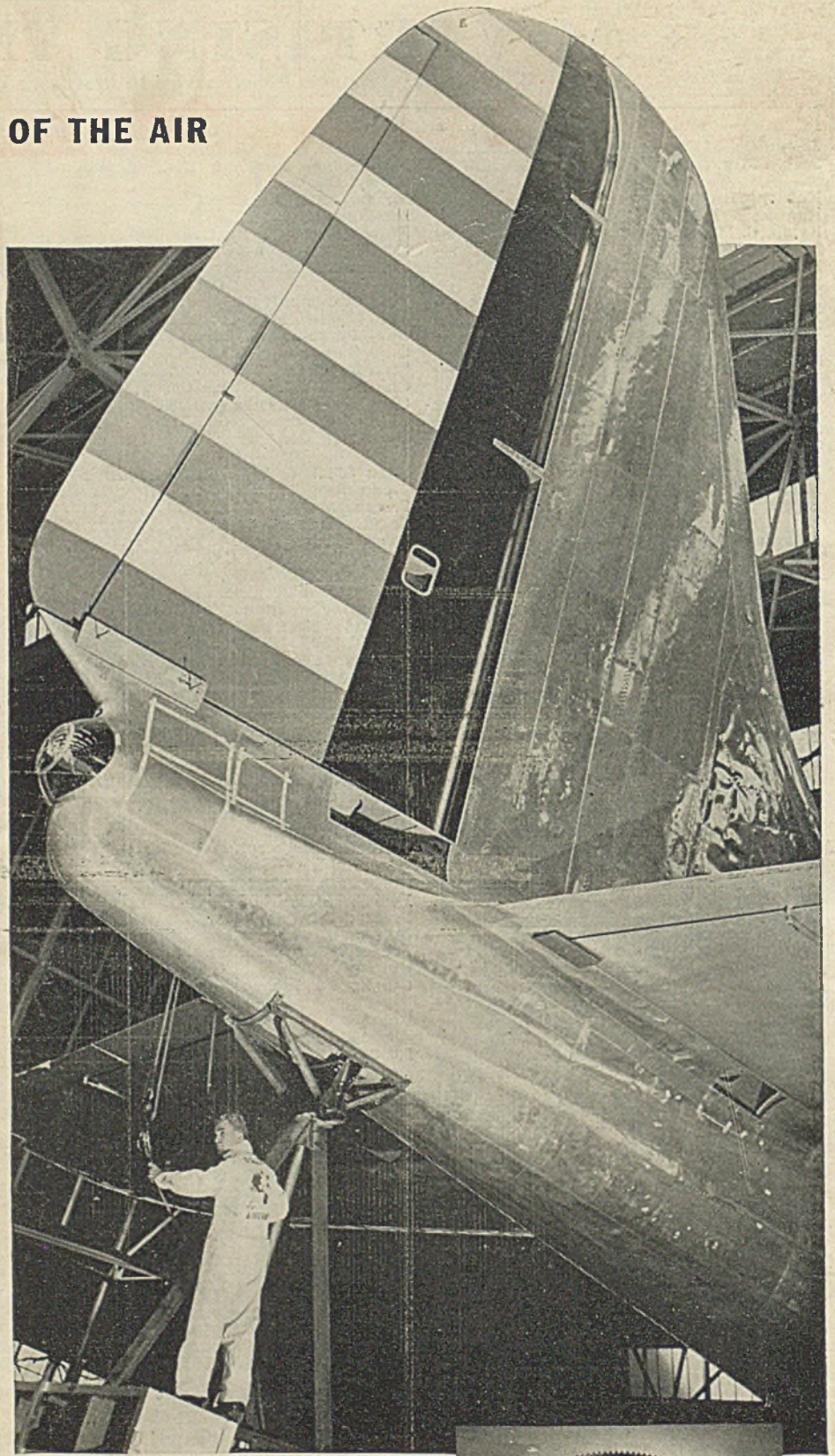

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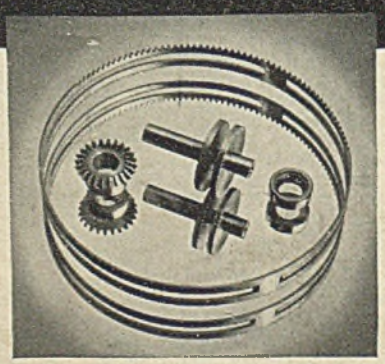

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