STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116, No. 25 June 18, 1945

NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

Trial Run at Republic's Sponge Iron Plant

Tooling Ways Afford Accurate Small-Scale Positioning

Evaluating Surface Finishes with a Beam of Light

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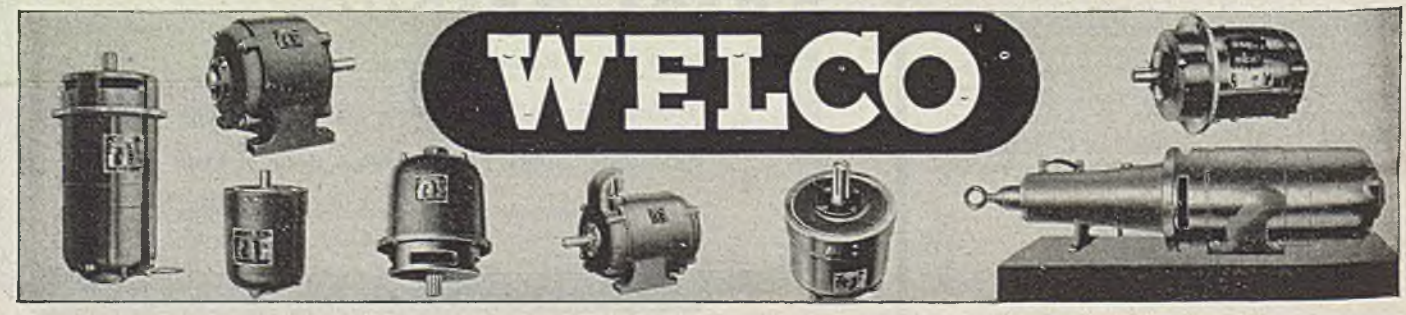

STEEL
June 18, 1945

A Valuable Report

The War Production Board has just issued an exhaustive report on the wartime expansion of the iron, steel and related industries. Prepared by W. A. Hauck of the Steel Division of WPB, the report is significant for two reasons: First, it is the official record of the achievement of government and industry in providing facilities to insure an adequate supply of ferrous materials for the "arsenal of democracy." Secondly, it provides the authoritative, basic data necessary for the formulation of a sound national policy for disposing of government-owned steel plant and equipment.

The report, which is digested in an article beginning on page 98 in this issue, shows that as a result of the expansion program, steel ingot capacity was increased by 15,323,522 tons annually and blast furnace capacity by 15,412,064 tons, and that important additional facilities were provided for mining, water transportation, casting, forging and other related operations.

The cost of this expansion exceeded $2.5 billion. Expenditures for the steel industry proper were $1,956,881,057, of which $1,030,918,853 was provided by industry and $925,962,204 by the government.

Outstanding in the program was the construction of six major steel plants, located at Geneva, Utah; Fontana, Calif.; Houston and Daingerfield, Texas; Homestead, Pa.; and Chicago. Because of security and other reasons four of these six major projects were allocated to the South and West. As a result, steel ingot capacity in the Eastern, Pittsburgh, Cleveland and Chicago districts has dropped from 93.2 to 90.5 per cent of the total and that of the Southern and Western districts has climbed from 6.8 to 9.5 per cent.

As industrialists read this report they will arrive at two noteworthy conclusions. One is that in spite of confusion, delay and disappointments, the job of providing steel facilities for war has been handled exceedingly well. They will agree heartily with the third annual report of the Truman committee that "in terms of war production, the expansion program has been entirely successful. No vital war program has failed or has been retarded very seriously for lack of steel. . . . Much credit for this achievement should go to the Steel Division of WPB for a fine job of administration. This accomplishment was rendered possible because of co-operation by the industry."

The other conclusion is that adjusting these wartime-expanded facilities to the need of our peacetime economy will be difficult and that for those charged with this task the Hauck report should serve as a welcome and indispensable aid.

LIFT ANTITRUST FOG? Washington observers believe that eventually the status of basing point systems under the antitrust laws may be clarified, partly as a result of the decisions handed down by the Supreme Court in April in cases involving two manufacturers of glucose.

These decisions are significant in two respects. First, they represent the highest court's first interpretation of the intent and applicability of the antitrust law in cases where the use of a basing point system is claimed to constitute unlawful price discrimination. Secondly, they are interpretations of the Clayton act as it was amended by the Robinson-Patman act. This act broadens the scope of the Clayton act and simplifies the task of the Federal Trade Commission in attacking basing point systems.

It is well to note that the Supreme Court's decisions in the glucose cases were unanimous—a point of some significance at a time when 5-to-4 decisions of the court have been rather frequent. Likewise these decisions appear to strengthen the hand of FTC considerably.

On the other hand, it would be a mistake to re-

(OVER)

gard the glucose decisions as forecasting the outcome of other pending basing point cases. The Supreme Court, in one of its April decisions, indicated its belief that not all basing point systems necessarily are illegal per se. —p. 82

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TIMING IMPORTANT: Two subsidiaries of United States Steel Corp. have announced plans for modernizing and improving production and finishing facilities in the Chicago, Pittsburgh and Birmingham districts involving an expenditure of about $27.5 million. Included in the program are provisions for increasing the output of cold-reduced tin plate.

This announcement is one of several noted during the past few weeks having to do with rehabilitation and expansion or the construction of new plant and equipment for postwar use. It is known that hundreds of producers and manufacturers have plans for similar work in readiness. Doubtless, the number of announcements of such plans will increase as the outlook for obtaining materials and manpower brightens.

Perhaps the timing of these announcements is more important than we realize. Will it not be reassuring to workers affected by cutbacks and to servicemen released by the armed forces to know that industry is planning substantial improvements for postwar demand? —p. 81

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JOB SITUATION SPOTTY: A survey by editors of this publication of the effect of cutbacks in war contracts upon the labor situation in leading industrial centers indicates that thus far few workers have been forced out of employment.

Where contract cancellations or reductions have caused layoffs, most of the released employes have found jobs in other departments or plants. The disposition of many displaced workers is to "shop around" before seeking new employment, to be in no great hurry to take a new job and to insist upon wage rates and working conditions comparable to those prevailing in their last "good" war job.

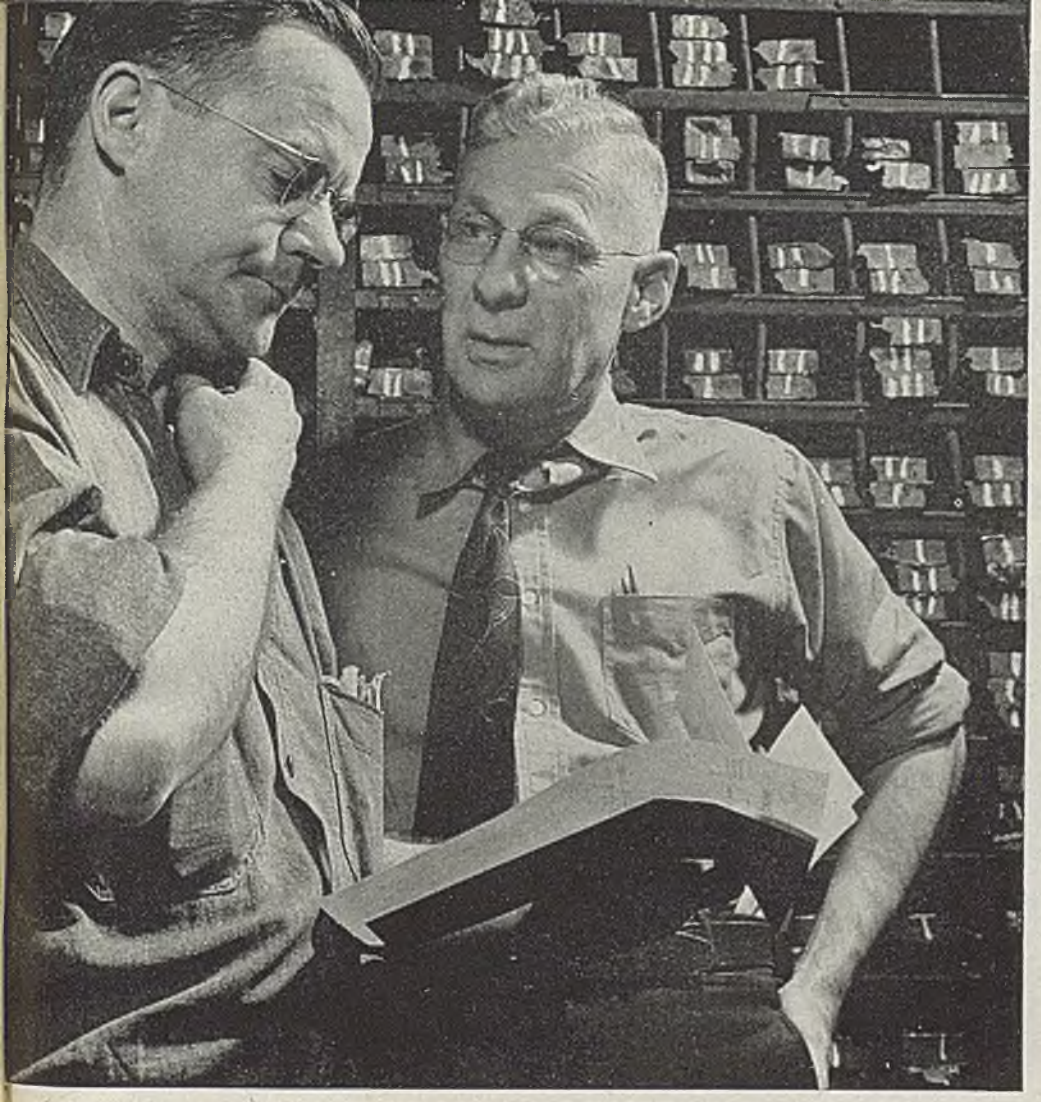
In spite of an appreciable easing in manpower, employers in many sections of the country still are crying for more men. In Los Angeles and San Francisco aircraft cutbacks have released many workers but the demand for men for ship repair exceeds the supply. Foundries and steel mills in the East and Midwest need more men.

The manpower situation still is spotty. —p. 73

SIGNS OF THE TIMES: Disposal of some wartime surpluses will be difficult. It is estimated that after V-J Day there will be 500,000 heavy aircraft engines in storage (p. 90) and that 5000 will be sufficient for all commercial airline needs for the following five or six years. . . . The first two hand-built 1946 passenger car models—Ford and Nash—differ from their prewar counterparts of 1942 (p. 87) principally in front-end styling. The current models, viewed from the front, have a more rugged appearance, with a decided accent on horizontal lines in grill and bumper. . . . An idea of the after-war job adjustment problem in the important Los Angeles area can be gained from the following (p. 78): Working force in Los Angeles county in 1940 totaled 1,031,000 persons; in December, 1943, at the peak of wartime employment it touched 1,487,000; and today it has receded to 1,398,000. . . . Significant in the American Iron & Steel Institute's report on steel shipments to consuming industries for the first quarter of 1945 (p. 76) is the sharp decline in the use of steel by shipyards. First-quarter consumption for merchant and naval ship construction was 1,267,386 tons, or 8 per cent of total shipments, which is in sharp contrast to the 3,220,901 tons or 20 per cent of total shipments received by the yards in the first quarter of 1944. . . . Output of aircraft in May totaled 6354, against a schedule calling for 6345. May was the third consecutive month (p. 90) in which production exceeded quota. . . . As of Jan. 1, 1940, there were 13 steel companies having steel ingot capacities exceeding a million tons annually. As of Jan. 1, 1945—as a result of wartime expansion—only two of the 13 (p. 101) had increased the percentage of their capacity in relation to the total capacity of the nation. These two are Republic Steel Corp. and Crucible Steel Co. of America. . . . Three bills now before the House Committee on Patents (p. 85) would require recording in the Patent Office all agreements pertaining to patents, provide for expiration of a patent not more than 20 years after date of application and provide for public registration of patents available for licensing. . . . War expenditures in the month following V-E Day (p. 178) were up a billion dollars from the previous month.

E. L. Shaner

EDITOR-IN-CHIEF



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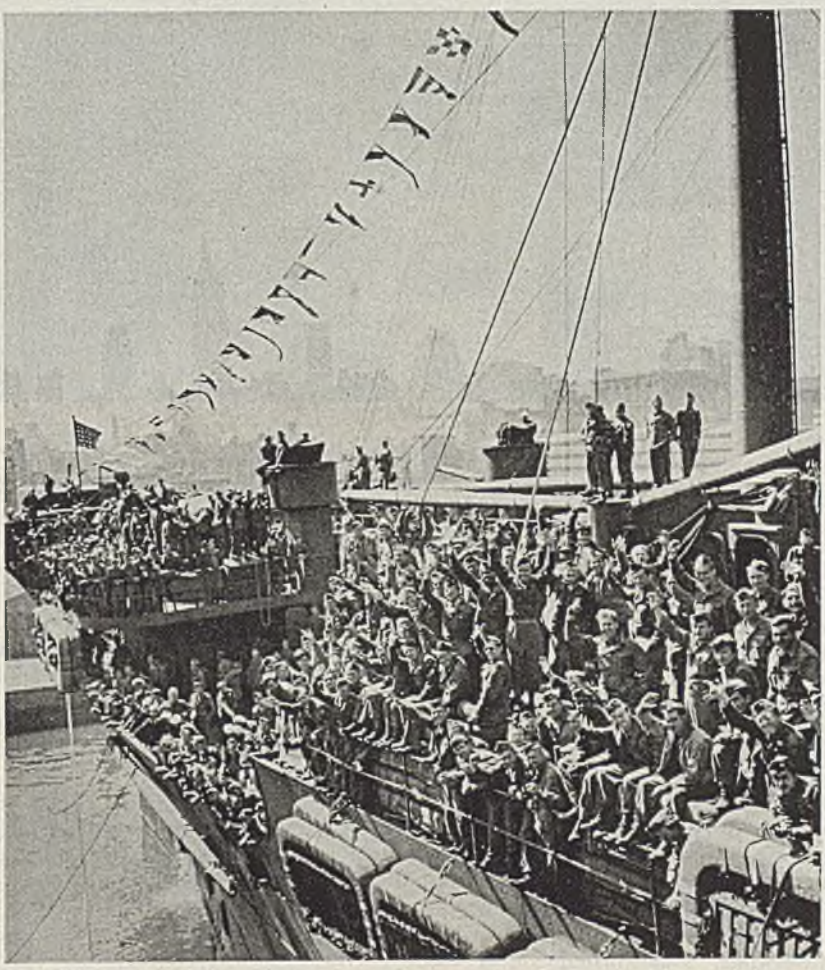
RYERSON STEEL

Cutbacks Disemploy Few Workers

Men released as war contracts are canceled or reduced quickly absorbed by other departments or other companies. Foundries and steel mills still looking for workers. Applications for unemployment compensation increase only slightly. Gradual rise in unemployment during second half anticipated



Many of these veterans, returning from the European war theater, soon will be added to the civilian labor force. NEA photo

CUTBACKS in war contracts to date have not resulted in any considerable unemployment and the labor supply in leading manufacturing districts continues fairly tight. Where workers have been displaced as result of contract cancellations or reductions they generally have been absorbed by other departments, or by other war plants or essential employers in the same area. In some cases workweeks have been reduced, thus spreading employment.

These facts were revealed in a survey of industrial centers last week by STEEL's editors.

Manpower officials and employers, however, expect that unemployment as a result of cutbacks will increase gradually after July 1 and that several millions may be out of jobs by the end of the year.

Large employment centers likely to be most seriously affected by reductions in the munitions program appear to be Detroit, Los Angeles and San Francisco. In the latter two centers, aircraft layoffs already have displaced some workers, although demands for workers in ship repair yards still are greater than the supply.

In Midwestern and Eastern centers, foundries and steel mills still are experiencing difficulty in manning plants.

Workers displaced by cutbacks generally are "selective" about accepting employment in other plants, and often spurn proferred jobs if pay rates, working conditions and job ratings are not at least on par with those of the jobs which they formerly held. Many, with their pockets lined with high war wages, are not anxious to find employment immediately.

Some increase in applications for unemployment compensation is noted, although this is not yet large.

Summaries of the situation in the various districts, as reported by STEEL's editors, follows:

CLEVELAND—Due to wide diversification of industry in this district, order cutbacks have had no appreciable effect on employment. Since V-E day, only 65 establishments have received cutback notices, reducing between 80 and 90 war contracts.

While these cutbacks have reduced the average number of hours worked per week, they have resulted in layoffs in 22 plants of only 1600 employes, of which 60 per cent are men. All workers were absorbed in other war or essential work.

Since many employers in this district are subcontractors, they generally are making items similar to their peacetime products. For that reason reconversion problems are relatively slight and they can shift quickly to civilian goods production whenever they receive cutbacks in military orders.

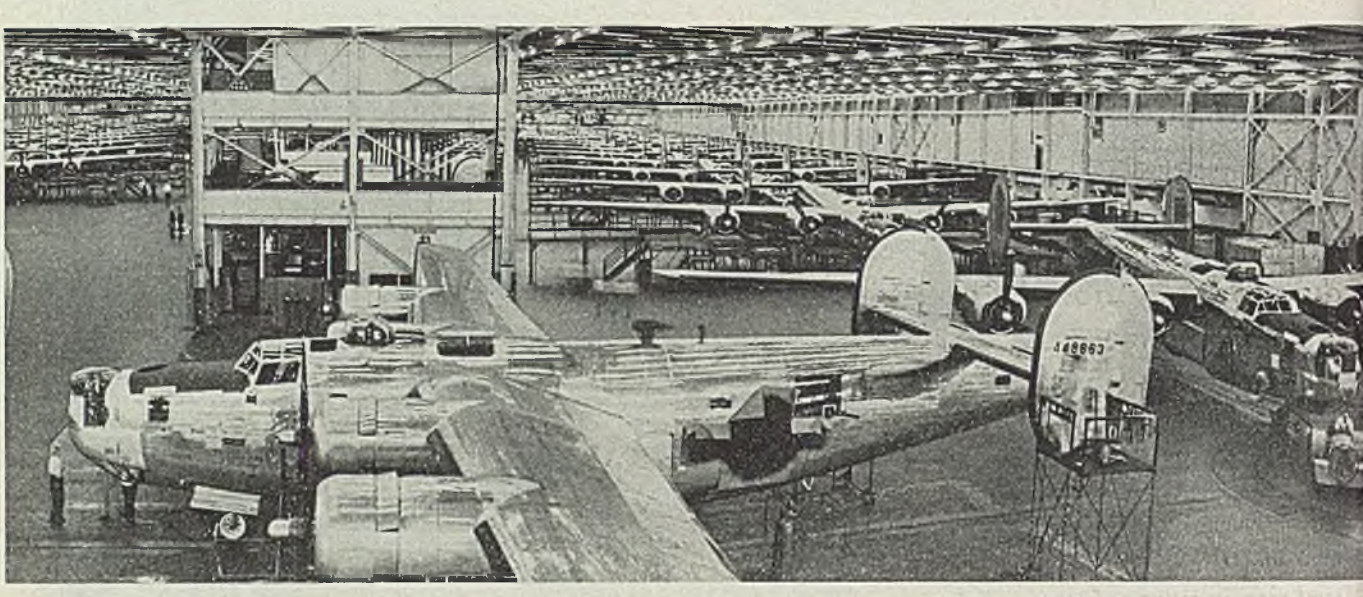
Cleveland is still classified by the War Manpower Commission in group 1 (areas of current acute labor shortage). The district WMC office has over 20,000 unfilled orders for labor of all types, one of the largest numbers recorded in recent years. Of this total, between 4000 and 5000 constitute top priority openings. Demand for workers is particularly strong in steel foundries and other establishments requiring skilled workers.

CHICAGO — Despite substantial and continuing cutbacks and cancellations of war contracts, this area remains in the No. 1 or critical manpower classification. Latest available information is that war and essential industry needs 58,000 additional workers.

Some 400 priority plants are seeking 15,000 men and 5000 women; aircraft plants alone have places for 2800 men and 1450 women. In addition, railroads are looking for more than 6000 workers to assist in handling mounting traffic as the war moves to the Pacific.

Principal cutbacks and cancellations have centered in heavy artillery ammunition, tanks, guns and mounts, ships, airplane engines, and landing mats.

Companies affected include Pullman-Standard Car Mfg. Co., Pressed Steel



Soon to be shut down is the mammoth Willow Run bomber plant operated by Ford. Shown here are the twin assembly lines, with the B-24s in the foreground being turned toward the gasoline and service areas. Its closing will release many thousands of workers, both at Willow Run and in suppliers' plants. NEA photo

Car Co., Chicago Bridge & Iron Co., Buick Aviation Division of General Motors Corp., and Studebaker Corp.

Several thousand workers laid off at these and other plants have in a large measure been absorbed in other plants but the manpower supply still shows a heavy deficit. A number of workers, principally women, have not sought reemployment. Others unable to find work matching their particular skills remain idle and some even collect unemployment insurance benefits.

Meanwhile, some manufacturers are in process of reconverting for resumption of civilian goods. Makers of electric washing machines and ironing machines are being given the green light and by virtue of priority assistance will be under production in a limited way shortly. Pullman-Standard Car Mfg. Co. has been authorized by WPB to undertake reconversion of its plant here for third quarter building of railway passenger cars. Farm implement makers are increasing output of agricultural machinery as their war contracts decline.

On the other hand, the outlook is not bright for manufacturers who cannot get priority assistance for materials needed for civilian goods. Unless steelmakers receive cancellations of tonnage far in excess of those now coming in, there is little prospect for civilian steel before fourth quarter or next year. Sheets, a product more universally used than any other in civilian items, will not be available for months to come, on the basis of present rolling schedules.

PITTSBURGH — Shell, gun and ship contracts in this area have been cut back substantially, but in many cases additional contracts have replaced the canceled tonnage, with the net result that no excess of labor has been developed.

Largest concentration of labor in the area directly traceable to the war has been at the two Ohio River shipyards, one operated by American Bridge Co., the other by Dravo Corp. These were producers of LST's, contracts on which have been completed. American Bridge yard is now producing some ARV and YF ships for the Navy, on a greatly reduced schedule, and the Dravo yards are turning out some river barges and doing repair work on other river craft. Total employment at the two yards during the peak period was about 25,000, while currently some 7000 workers are on the job.

This apparent fund of 18,000 workers has been reabsorbed with hardly a ripple noticeable on the worker pool here. According to current figures released by Pat Fagan, area director of the War Manpower Commission, some 6000 additional workers are now needed, about 75 per cent of whom are needed in the basic steel industry. Some are expected to come from cutbacks in shell programs which are just beginning to make themselves felt. At least a dozen companies here have been notified of reductions in their production schedules or outright cancellations, mostly on the heavier shell and gun programs.

Since there are no companies here operating entirely on such programs, the workers released by these cutbacks in most cases are shifted to other production jobs in the same plant. Most of the shell lines, for example, are operated by steel producing companies, which are sorely pressed for workers in the open hearth and blast furnace departments, as well as on almost all finishing equipment.

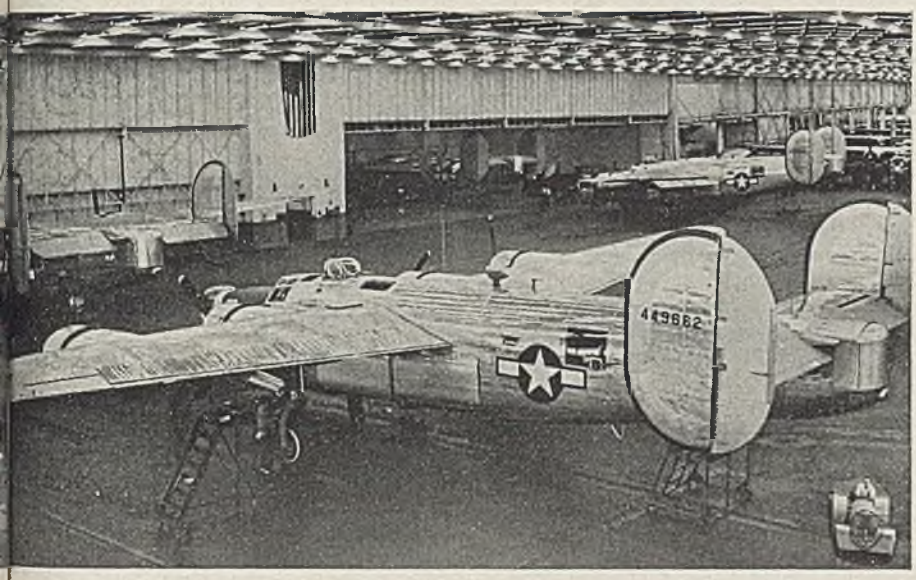
Cancellations in the Pittsburgh district since V-E Day have now passed the $200 million mark, but a large part of that figure represents future contracts which had been placed but were not under way at the time of cancellation.

PHILADELPHIA—Although cutbacks to date have had relatively little effect, the manpower situation in this area, comprising Philadelphia county and the four adjacent counties, is easing. Only recently the district has been taken out of labor group 1 and placed in group 2, and whereas a couple of months ago approximately 9000 workers were needed in the more essential industries, approximately 5000 are now required.

One large electrical manufacturer will lay off 3500 as a result of cancellations and cutbacks in war work, but will lay these employes off gradually over a period of several months. Frankford Arsenal is scheduled to lay off 800 within the next 30 days or so, although in this case many of the employes will be worked into other civil service jobs. There have been other recent adjustments, some of them interdepartmental changes, which have resulted in relatively few being thrown upon the labor market. As the total employment in the war industries is approximately 1,025,000, the effects of these readjustments are relatively small, but they do contribute to a less tense situation.

Demand for highly skilled workers still is urgent. More workers of various degrees of skill are needed at the local Navy yard, where only recently prisoners of war have been called upon for certain of the more ordinary tasks. Steel plant requirements are less pressing but this is offset by more urgent requirements from foundries.

NEW YORK—Manpower officials estimate 8000 jobs are open with companies having top priority rating. New York



Navy yard alone has openings for 4500. The general trend is expected to continue downward, however.

Foundry labor is still in pressing demand, with operators having difficulty in even maintaining existing forces. Manpower controls are scheduled here to continue for some time, notwithstanding the recent announcement in Washington that they might be lifted in some districts and that the New York metropolitan area is well down the list in point of critical rating, being in group 4.

In the New York city metropolitan area there has been an increase in the number of cutbacks on war contracts from 35 in March to 133 in May, although the number of companies reporting layoffs as a result remained about the same, 21 in March and 20 in May. Rather than resorting to layoffs, many employers are reducing working hours.

Nevertheless, as of May 25, there were 25,000 unemployment insurance claimants in the metropolitan area, an increase of 9000 over the first week in March, ascribed in part to seasonal layoffs in the needle trades.

DETROIT—Accurate appraisal of the effect of cutbacks and contract cancellations in the Detroit region is difficult. For one thing, the local office of the WPB has not even kept a cumulative record of total contract changes of this sort, but at STEEL's request made a compilation which showed a total of approximately $950 million in cutbacks and cancellations made in prime contracts in the region thus far. The figure is admittedly not too accurate, and revisions are coming in almost hourly, two of the latest being a cutback in the Cadillac M-24 tank program, and a cancellation of a Studebaker 2½-ton truck contract amounting to $100 million, effective July 31. The latter of course is not included in the Detroit region figures.

As to displaced workers, the best estimate obtainable from the WPB is that readjustments thus far have affected 80,000 employes, 65,000 in May alone.

On a percentage basis, the figure generally mentioned is 20 per cent, that is, 20 per cent of the contracts in force, by dollar volume, have been cut back or canceled. This is believed somewhat higher than in other regions, lending credence to reports further cutbacks expected after July 1 may not be as heavy in this area as in the past month.

Cumulative war contracts placed with prime contractors since Pearl Harbor in the Detroit region total in excess of $24 billion, but of course much of this already has been shipped, how much the WPB is not able to say. However, as of Jan. 1, most of the larger contractors had backlogs of war contracts sufficient for about 18 months of operations at the level current then.

Unemployment compensation claims being filed in Detroit number about 3700 weeky, with the total filed now in excess of 20,000.

LOS ANGELES—Although thousands have been laid off in this district's aircraft plants, 5000 workers still are needed in ship repair work and about 750 more in truck tire plants. Subcontractors in many lines, notably in pump manufacturing, are seeking skilled men. Many disemployed workers are refusing to take jobs in the shipyards or tire plants because of travel time required and because the work often is heavy.

Recent border checks indicate more people are leaving California than are entering. However, housing shortages continue acute, indicating the exodus has not been extensive.

BOSTON—Although numerous muni-

(*Please turn to Page* 197)

Present, Past and Pending

■ PRIORITIES GRANTED FOR RECONVERSION NEEDS

WASHINGTON—From April 1 through June 8, preference ratings were authorized on 553 applications for bottleneck items of equipment and construction for preliminary reconversion, WPB reported last week. Automotive industry alone filed 161 applications.

■ TENNESSEE COAL, IRON WORKERS END STRIKE

BIRMINGHAM, ALA.—Workers in the Ensley and Fairfield blast furnace departments, Tennessee Coal, Iron & Railroad Co., this city, reported back to work last Wednesday following a strike which resulted in an estimated loss of 100,000 tons of steel and 85,000 tons of iron.

■ SPOT AUTHORIZATION PLAN TO END JULY 1

WASHINGTON—WPB field offices will not assign preference ratings or make allotments of controlled materials under priorities regulation 25 beyond July 1.

■ UNRATED ALUMINUM PRODUCT ORDERS MAY BE FILLED

WASHINGTON—Controlled Materials Plan has been partially "open-ended" to permit aluminum producers to fill immediately unrated orders for aluminum products, except aluminum extrusions, on condition that such action does not interfere with the filing of authorized controlled material orders or orders they have been specifically directed to fill.

■ FREIGHT CAR INDUSTRIES GET HIGH MANPOWER RATING

WASHINGTON—WPB has placed the entire freight car, railroad brake shoe and chilled railroad car wheel manufacturing industries and certain malleable iron and steel foundries manufacturing components for locomotives and freight cars on the National Production Urgency List. Freight car shortage reached a high of 19,397 in mid-March and is now estimated at slightly more than 10,000.

■ BETHLEHEM AWARDS MESTA CONTRACT FOR COLD MILL

PITTSBURGH—Mesta Machine Co., this city, has received a several million dollar order for a 56-inch four-high tandem cold mill, part of $15 million expansion program for cold rolling sheets at the Sparrows Point, Md., plant of the Bethlehem Steel Co., Bethlehem, Pa. The new mill is expected to be in operation by the end of 1945.

Steel Consumption Picture Changing

War use still dominant but trend is downward. First quarter 1945 shipbuilding tonnage less than half that of year ago

CHANGING complexion of wartime steel consumption is reflected in the first quarter 1945 statistical report just issued by the American Iron & Steel Institute. While use of steel in direct-war and war-related lines continues to dominate the consumption picture, still the beginning of a trend to heavier use in normal avenues of demand and a slackening in some war requirements is indicated by the first quarter data.

The period, for instance, brought a sharp decline in shipments of finished steel products to the shipbuilding industry. This is significant in view of the fact shipbuilding has been the largest single outlet for steel since 1941.

Total shipments of 15,414,051 tons, first quarter of 1945, were below the total 16,319,000 tons shipped in first quarter of 1944. Comparative figures are given in the accompanying table.

During first quarter, merchant and naval ship construction received 1,267,386 tons of steel, only 8 per cent of the total of 15,414,051 tons shipped to all consuming industries during the period. In the corresponding months of 1944 shipyards took 3,220,901 tons of steel, nearly 20 per cent of the total tonnage of steel products delivered in that period.

Jobbers, dealers and distributors received 2,210,233 tons in the first quarter of 1945, an increase of about 361,500 tons from the 1,848,732 tons they obtained in the corresponding part of 1944.

The "Miscellaneous Industries and Export" classification received 3,673,434 tons against 3,032,040 tons in first quarter of 1944.

First quarter shipments to the construction, container, machinery and stamping industries showed increases over the first quarter of 1944. Shipments to railroads, the oil, gas and mining industries, agricultural implement makers and the automotive and aircraft industry were down slightly, as compared to first quarter of 1944.

Nonintegrated Producers Protest Price Policy

Representatives of nonintegrated steel producers appeared Thursday before the House Banking and Currency Committee protesting OPA prices allowed on steel products.

R. W. Wolcott, president, Lukens Steel Co., leading the presentation said, "The practice of adjusting price control on the basis of past situations is inadequate to insure them (nonintegrated producers) a fair return on operations, and will not suffice to maintain them in a sound position. We urge upon this committee the fact that a revision of policies is necessary now and that the task is one for the Congress."

Others who submitted briefs include: D. V. Sawhill, president, Mercer Tube & Mfg. Co.; John F. Budke, president, Parkersburg Iron & Steel Co.; Lauson Stone, president, Follansbee Steel Corp.; H. W. Boal, vice president and treasurer, Andrews Steel Co.; David Thomas, president, Phoenix Iron Co.; R. K. Clifford, vice president and general manager, Continental Steel Corp.

Sheet Scarcity To Hamper Enameled Ware Output Rise

Continuing difficulty of obtaining light-gage steel sheets will prevent appreciable increases in enameled ware production for some time despite recent revocation of the enameled ware order, L-30-b.

STEEL SHIPMENTS TO CONSUMING INDUSTRIES

(Net Tons)

	First Quarter 1945 Net Total	First Quarter 1944 Net Total	Fourth Quarter 1944 Net Total
1. Steel Converting and Processing Industries			
(a) Wire drawers and wire product mfrs.	156,295	163,238	154,198
(b) Bolt, nut, and rivet manufacturers	277,719	297,716	279,606
(c) Forging manufacturers			
(1) Automotive and Aircraft	150,293	166,120	138,145
(2) All other	402,699	427,447	376,142
(d) All other steel plants and foundries	500,480	386,876	363,054
Total	1,487,486	1,441,397	1,311,145
2. Jobbers, Dealers and Distributors			
(a) Oil and natural gas industry	162,211	114,437	173,544
(b) All other	2,048,022	1,734,295	2,038,867
Total	2,210,233	1,848,732	2,212,411
3. Construction Industry			
(a) Public (Municipal, State, National)	33,094	16,710	22,543
(b) Highways	52,522	35,342	54,989
(c) Railways	12,682	17,391	20,646
(d) Automotive and Aircraft	21,553	37,805	22,340
(e) Utilities	47,368	49,932	59,353
(f) Bldg. trim, accessories and builders' hdwe.	126,263	98,883	128,803
(g) All other	822,025	791,600	819,262
Total	1,115,507	1,047,663	1,027,936
4. Shipbuilding Industry	1,267,386	3,220,901	2,019,962
5. Pressing, Forming and Stamping Industry			
(a) Metal furniture and office equipment	40,901	30,100	54,383
(b) Hardware and household equipment	129,397	80,343	104,453
(c) Automotive	332,846	339,679	327,396
(d) All other	298,938	271,315	267,036
Total	802,082	721,437	753,268
6. Container Industry			
(a) Oil and natural gas industry	118,897	129,558	108,300
(b) All other	959,191	764,602	812,139
Total	1,078,088	894,160	920,439
7. Agricultural, Incl. Impl. & Equip. Mfrs.	243,068	279,561	278,989
8. Machinery and Tools			
(a) Machinery and tools, not incl. elect. equip.	418,716	412,905	410,428
(b) Electrical machinery and equipment	199,231	184,595	206,830
Total	617,947	597,500	617,258
9. Automotive and Aircraft Industry	502,368	582,054	488,075
10. Railroad Industry			
(a) All railroads	904,460	1,013,039	904,612
(b) Car and loco. builders and parts mfrs.	289,363	469,163	295,831
Total	1,193,823	1,482,202	1,200,443
11. Oil, Natural Gas and Mining Industry			
(a) Oil and natural gas, incl. pipe lines	288,954	338,263	288,715
(b) Mining, quarrying and lumbering	57,531	53,074	51,658
Total	346,485	391,337	340,373
12. Unclassified	876,144	.....	.....
13. Miscellaneous Industries and Export	3,673,434	3,032,040	3,401,061
14. Total (Items 1 to 13)	15,414,051	16,319,000	14,671,360

During 1944, the companies included above represented 99% of the total output of finished rolled steel products as reported to American Iron and Steel Institute.

Steel Output in May Under That Of Last Year

Average weekly production in month also slightly less than in April. Total for year to date is smaller

STEEL ingots and steel for castings produced in May totaled 7,477,387 net tons according to American Iron & Steel Institute. This is a decline of about 3 per cent from 7,702,576 tons made in May, 1944 but a gain of 185,461 tons over the 7,291,926 tons produced in April.

Average weekly production in May was 1,687,898 tons, compared with 1,699,750 tons per week in April and 1,738,730 tons per week in May, 1944. Percentage of capacity operated in May was 92.2, against 92.8 in April, and 97.1 in May, last year.

Breakdown of production into various grades and comparisons with prior months are shown in the accompanying tabulation. Figures for April have been revised and May totals are preliminary.

Production in the first five months of this year totaled 36,338,090 tons, a slight decline compared with 37,909,133 tons produced in the corresponding period of 1944.

Finished Steel Shipments Decline Shown for April

Shipments of finished steel in April totaled 5,769,786 net tons, compared with 6,179,452 tons in March, the American Iron and Steel Institute reports. Of this total 515,722 tons were shipped to other members of the industry for conversion into further finished products. In March such tonnage was 547,297 tons.

Hot-rolled sheet production was 1,123,358 tons in April, against 1,228,276 tons in March; hot-rolled bars, 1,099,110 tons in April, 1,147,530 tons in March; plates, 675,599 tons in April, 812,553 tons in March.

Steel Corp. Shipments in May at Lower Daily Rate

Shipments of finished steel by the United States Steel Corp. in May totaled 1,797,987 net tons, an increase of 75,142 tons over April shipments of 1,722,845 tons.

The increase was due entirely to the greater number of working days in May. On a daily average basis May dropped 2321 tons from April. For 27 working days in May shipments averaged 66,592 tons per day, against 68,913 tons per day for 25 working days in April.

For five months ended May 31 deliveries totaled 8,522,077 tons, compared with 8,895,085 tons in the comparable period in 1944.

(Inter-company shipments not included)

	Net Tons			
	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	.....	1,737,769	1,552,663	1,774,068
July	.....	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	.....	•97,214	•449,020
Total	.....	.....	20,147,616	20,615,137

•Decrease.

Military Demand for Brass Strip, Rod Drops Sharply

New deep military cutbacks in brass mill requirements will make a substantial amount of controlled materials available for civilian needs in third quarter, War Production Board officials report.

Coke Workers' Strike Slows Pittsburgh Output

Advent of warm weather last week caused a major strike and the loss of several thousand tons of iron and steel production in the Pittsburgh district. Trouble started in the by-product coke works of Carnegie-Illinois Steel Corp. at Clairton, Pa.

Coke workers have a clause in their contract providing for "spell crews" in hot weather. Because of the cool weather prevailing this spring such crews were not provided and last week's hot, humid weather brought out a demand for them. When the crews were not put on immediately, the men struck.

Suspension of coke and gas production forced the suspension of 36 open hearths and several bessemers. About two dozen blast furnaces were put on slow blast. Five rolling mills were shut down at Clairton, four at Homestead, four at Edgar Thomson, three at Duquesne, one at Irvin Works, and one at the McKeesport works of National Tube Co.

Maj. E. H. Gallup, Army Ordnance, and Charles R. Ward, federal conciliator, intervened in the dispute, but had made no apparent progress toward a settlement by late last week.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.		
Based on reports by companies which in 1944 made 97.9% of the open hearth, 100% of the bessemer and 86.7% of the electric ingot and steel for castings production										
1945										
Jan.	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1,626,687	4.43
Feb.	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.00
Mar.	6,927,377	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,947	4.43
1st qtr.	19,364,034	93.3	1,124.640	77.6	1,080,103	80.2	21,568,777	91.6	1,677,199	12.86
Apr.	6,541,097	94.4	372,952	77.2	377,877	81.4	7,291,926	92.8	1,699,750	4.29
May	6,682,597	93.4	402,081	80.6	392,709	84.7	7,477,387	92.2	1,687,898	4,43
1944										
Jan.	6,770,423	97.2	439,551	85.4	382,629	84.4	7,592,603	95.7	1,713,906	4.43
Feb.	6,410,914	98.5	409,781	85.2	373,314	88.1	7,194,009	97.0	1,737,683	4,14
Mar.	6,977,466	100.1	455,368	88.5	393,423	86.8	7,826,257	98.6	1,766,649	4.43
1st qtr.	20,158,803	98.6	1,304,700	86.4	1,149,366	86.4	22,612,869	97.1	1,739,451	13.00
Apr.	6,789,422	100.6	437,472	87.8	366,794	83.5	7,593,688	98.8	1,770,090	4.29
May	6,879,253	98.7	437,444	85.0	385,879	85.1	7,702,576	97.1	1,738,730	4.43
June	6,463,049	95.8	419,699	84.2	351,509	80.1	7,234,257	94.1	1,686,307	4.29
2nd qtr.	20,131,724	98.4	1,294,615	85.6	1,104,182	82.9	22,530,521	96.7	1,731,785	13.01
1st hlf.	40,290,527	98.5	2,599,315	86.0	2,253,548	84.7	45,143,390	96.9	1,735,617	26.01
July	6,743,812	96.6	415,543	80.9	339,032	74.6	7,498,387	94.3	1,696,468	4.42
Aug.	6,715,835	95.9	429,672	83.5	353,406	77.6	7,498,913	94.1	1,692,757	4.43
Sept.	6,501,944	96.1	398,058	80.1	335,109	76.2	7,235,111	94.0	1,690,446	4.28
3rd qtr.	19,961,591	96.2	1,243,273	81.5	1,027,547	76.2	22,232,411	94.1	1,693,253	13.13
9 mos.	60,252,118	97.7	3,842,588	84.5	3,281,095	81.8	67,375,801	96.0	1,721,405	39.14
Oct.	6,860,921	98.0	420,105	81.6	339,859	74.7	7,620,885	95.6	1,720,290	4.43
Nov.	6,572,454	97.0	403,908	81.0	302,357	68.6	7,278,719	94.3	1,696,671	4.29
Dec.	6,678,460	95.6	373,322	72.7	314,388	69.2	7,366,170	92.6	1,666,554	4.42
4th qtr.	20,111,835	96.9	1,197,335	78.4	956,604	70.8	22,265,774	94.2	1,694,503	13.14
2nd hlf.	40,073,426	96.5	2,440,608	80.0	1,984,151	73.5	44,498,185	94.2	1,693,878	26.27
Total	80,363,953	97.5	5,039,923	83.0	4,237,699	79.0	89,641,575	95.5	1,714,644	52.28

The percentages of capacity for 1944 are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 82,223,610 net tons, bessemer 6,074,000 net tons, electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,580,042 net tons open hearth, 116,182 net tons bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, bessemer 6,074,000 net tons, electric 5,372,150 net tons.

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 112,658 tons of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 tons; based on annual capacities as of Jan. 1, 1945 as follows: Open hearth 84,171,590 net tons, bessemer 5,874,000 tons, electric 5,455,890 tons.

Reconversion Problems Vie with War Production for Attention

Western industry going through one of most trying periods in area's history. Pacific war needs hold priority position but attempts are being made to at least partially shift to civilian economy

THE WEST is going through one of the most trying periods in its history. Still up to its neck in the war, the area at the same time is almost as deeply enmeshed in reconversion problems.

When the two phases are mixed as intricately as is the case now, a solution is more than a little difficult.

The Pacific war, of course, has a priority over all other considerations. Its effects are widespread and still influence nearly all phases of industrial activity.

The West Coast is the staging area and the embarkation point for a large number of the men and most of the material needed for the war against the Japanese. This means that nearly all transportation to the West Coast from all other parts of the country will, for months, be devoted almost exclusively to war-necessary shipments.

The West Coast also is the main continental base for keeping the Navy in operation as far as ship repairs are concerned. But repair work is being handicapped by a need for skilled workers. Other related activities, such as longshoring, vessel loading, and the like, also need men. New shipbuilding is declining but workers who are leaving the yards are either leaving the area, are retiring from work, or are unsuited for skilled jobs.

Canneries Face Manpower Shortage

California now is entering its fruit and vegetable packing season. The importance of producing and canning large amounts of foods this summer has been intensified by crop losses caused by bad weather in the East and Midwest and by the greater need for foods during the coming year to help feed liberated Europe. But both the farmers and canneries face a serious manpower shortage.

The War Production Board during recent weeks has released from restrictions a large number of civilian-type articles and equipment, but production or plans for reconversion to production of many of these things have been delayed by either a continued shortage of materials or scarcity of manpower.

In the midst of this half war-half peacetime period, attempts, meantime, are being made to shift to a full civilian economy, or at least to make a start toward the goal.

Much of the basic planning until now has revolved around the metals industries, both steel and light metals. During the war, western facilities for producing metals were built up to huge proportions—that is, huge compared with prewar capacity. Conversion of these wartime plants to peacetime production may well be the cornerstone of the future West Coast economy.

However, serious problems remain to be solved before a clear-cut picture emerges as the eventual outcome of these expanded producing facilities.

LABOR FORCE DOWN

Los Angeles county's total worker force has decreased by nearly 100,000 since the peak employment figure of 1,487,000 in December, 1943, according to the Department of Industrial Relations of the state.

The total is still 367,000 greater than that shown by the federal census of 1940 when 1,031,000 workers were enumerated. Of the 1,398,000 estimated jobs at present, those in manufacturing activities number about 540,000. Construction, transportation, communications, utilities and service trades contain the remainder of employes with the exception of 130,000 in government service.

An example is the light metals industry. Perhaps next in importance to disposal of the war-born steel plants is the question of what is to be done with the big aluminum plants built on the coast during the last few years.

California, Washington and Oregon now have 38 per cent of the nation's aluminum-producing capacity as a result of the wartime expansion. The biggest problem will be finding a market for this output. There simply aren't 38 per cent of potential consumers located within range of this capacity. Any discussion of an "integrated" postwar light metals industry on the west coast will hinge primarily on finding new and enlarged outlets for aluminum and magnesium.

Chiefly because of abundant and relatively cheap power, most of the wartime light metals plant expansion has been in the Pacific Northwest. The government built five plants in Washington and Oregon to produce aluminum, as well as an aluminum rolling mill and a magnesium plant. There are no extrusion plants in Washington and Oregon, and those in California and Arizona are far removed from the Pacific Northwest reduction plants.

Raw material supplies have been a wartime problem which promises to be an equally troublesome roadblock in the path to peacetime conversion. Alumina has been shipped from the Mississippi Valley to the Northwest to be made into aluminum ingots. The ingots were shipped east and rolled into sheets, which then were shipped to the West Coast again to be made into airplanes. Every move adds freight charges to the overall cost. It appears highly unlikely that peacetime users will pay for such costs.

Soon to be in operation is a new plant at Salem, Oreg., which will produce alumina from native Pacific Northwest clays. The plant is owned by the Defense Plant Corp. and will be operated by Columbia Metals Corp., an American Cyanamid subsidiary. There are extensive deposits of alumina-bearing clays in the region. However, this supply will only supplement, not replace, raw material from other sources. At best the new alumina plant can only point a possible way to economical utilization.

Large Market Necessary

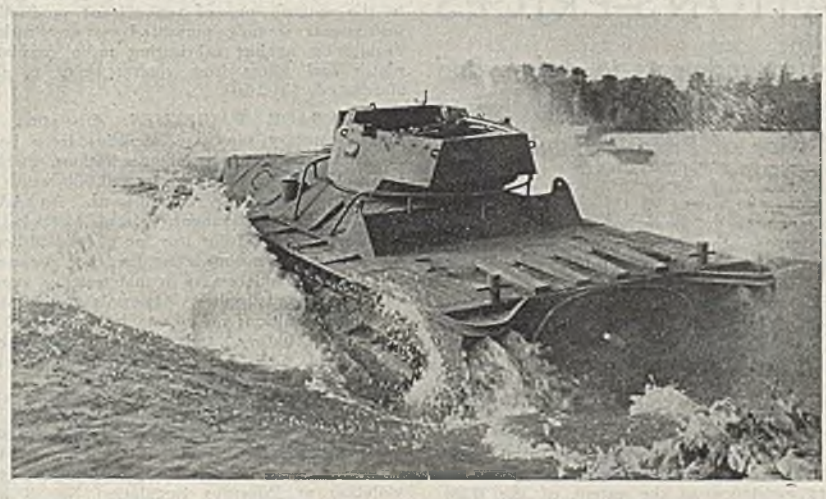
If the Western war-built aluminum capacity is to survive in peacetime, it will be necessary, first, to have a large enough market to support the industry, and, secondly, production must be integrated from raw material to final product, a process which is likely to be costly.

Markets also will hold a large part of the key to the western steel industry in postwar. Prospects for steel, however, are a little brighter than in the light metals industry. Already considerable progress has been made toward continuing steel operations into peacetime

Negotiations now are going on in Washington between Henry Kaiser and the Reconstruction Finance Corp. looking to refinancing of the Fontana plant. Within a few months plans for disposal of the Geneva steel mill probably will be evolved.

Meantime, both plants are feeling the reduction in wartime demand. The Geneva structural mill is closed and the plate mill will shut down in two or three months. Plate production at Fontana also is being curtailed. However, steps have been taken at Fontana toward at least a small conversion to peacetime products.

A few days ago the War Production Board approved a $1,495,700 loan, made privately, for remodeling of the 36-inch rolling mill which will enable the plant to roll steel sheets 3/8 inch or thinner. The project will take eight months to complete. The WPB also approved a $99,150 unit to salvage gas from the



"WATER BUFFALO NO. 10,000": Launched recently by Food Machinery Corp., Los Angeles, this 10,000th amphibious tank created an ocean-like wave on an inland lake. Christener of the tank was Mrs. E. L. Cochrane, wife of Vice Admiral Cochrane, chief of the U.S. Navy Bureau of Ships. It was the first launching of an amphibious tank

blast furnace. The gas will be used as fuel in the coking ovens.

These steps, however, are only a small part of the changes indicated necessary to convert Fontana fully for postwar. Mr. Kaiser has estimated additions and improvements to plant and equipment for such a purpose will cost $52 million. A sum at least as large and perhaps larger will be needed for reconversion of the Geneva mill.

Shipyard at Seattle Needs 2000 Additional Workers

SEATTLE

Work load at Plant A, Seattle, Todd Pacific Shipyards, cannot be completed this year and 2000 additional workers are needed immediately at this yard, according to Capt. H. N. Wallin, Navy, supervisor of shipbuilding in the Seattle area.

In the Puget Sound area, he added, 15,000 to 18,000 additional mechanics are needed to make repairs to Navy vessels and to replace the lost destroyers CALHOUN, LITTLE and JOHNSTON built at Seattle. Lack of manpower, Captain Wallin said, has resulted in diversion of some repair work from shipyards in this area.

Recent cutbacks in airplane production have not affected the Boeing plant which has been notified by the Army that in July its production schedule of B-29s will be stabilized at a rate 33 per cent above the May output. An additional work load has resulted from modification work. Company officials stress the need for additional manpower, the current program calling for more workers than are now on the payrolls. It is expected that airplane workers, released in California, will seek employment here.

At Portland, shipbuilding is approaching its war-swollen end. In anticipation 3000 workers are leaving their shipyard jobs monthly. No new contracts of major importance are being placed. Lee Stoll, Oregon manpower director, predicts that no more than 25,000 of the 90,000 employed in the yards, will find employment in the ship repair program by the end of 1945. Shipyard payrolls show a steady decline. Since December, Oregon Shipbuilding has dropped from 31,000 to 28,000, Swan Island from 22,500 to 11,500 and Vancouver from 36,200 to 28,000. Peak shipyard employment last year reached 125,000 workers.

Seattle Chamber of Commerce estimates that the number of postwar jobs in King county (Seattle) will be 251,200 and the potential working force at 257,000 to 287,200. This estimated postwar total compares with 192,200 jobs in 1940 and 300,000 currently. Of this number, 155,200 were employed here in 1940, the others being newcomers.

All phases of the development of the light metals industry in the eleven western states will be discussed at the Western States Council's conference at Seattle, June 21-22. U. S. Sen. James E. Murray (Dem., Mont.) is on the program as is also an unannounced representative of the Henry J. Kaiser enterprises.

9468 Liberators Built By Consolidated Vultee

As the 9468th and final Liberator B-24 bomber built by Consolidated Vultee Aircraft Corp. rolled off the assembly line at San Diego the company prepared to expand its experimental department operations on military projects and commercial transport types. Two other four-engine military planes, the Privateer PB4Y-2 and the RY-3 are still in production at the San Diego Division.

This final B-24 is the 6725th produced by the San Diego plant. The Ft. Worth, Tex., Division delivered 2743.

Completion of the last B-24 made a total of 36,289 military planes and equivalent spares manufactured by Convair during the war, representing 357 million pounds of aircraft. Fourteen types, ranging from the Stinson "Flying Jeep" to heavy bombers and flying boats have been built during this period.

During 1940, Convair built seven Liberators; in 1941, production reached 177, most of which were delivered to the British. After the U. S. entrance into the war, output accelerated rapidly, with 1132 heavy bombers completed in 1942. Production increased again in 1943 when 3468 B-24s were made. Peak deliveries were reached in 1944 with 4061.

So successful were these bombers in the various theaters of combat that the Army called upon the manufacturing facilities of three additional firms. More than 18,000 B-24s and an additional 1700 in equivalent spares were produced by the group, which included Consolidated Vultee, Ford, Douglas and North American.

Volume production methods resulted in a decrease in price during the war period from a peak of $269,000 to $114,500, a reduction of 58 per cent.

In voluntary price reductions and refunds, Convair has already returned to the government more than $460 million on B-24 contracts, making the Liberator the most reasonably priced heavy bomber produced in the U. S.

An adaptation of the Army Liberator was ordered by the Navy and designated PB4Y-1. Used mostly in the Pacific for long range search missions, the Navy versions proved so successful that a specially designed bomber based on the B-24 type was ordered and designated Privateer PB4Y-2.

Company Formed on Coast To Deal in Machine Tools

Harron, Rickard & McCone Co. of Northern California has purchased the assets and taken over the lease on the building of its predecessor, Harron, Rickard & McCone Co. at 2070 Bryant street, San Francisco. The latter company withdrew from active business several months ago. The new company will continue to serve as sales representatives for a large group of machine tool builders. Partners in the company are: Paul J. Schafer, general manager; S. S. Morton, assistant general manager; James O. Ellison, manager of service and engineering.

PRIORITIES–ALLOCATIONS–PRICES

Summaries of revocations of and amendments to orders and regulations; official interpretations and directives, issued by War Production Board and Office of Price Administration

REVOCATIONS

The following orders have been revoked by the War Production Board:

DOMESTIC ICE REFRIGERATORS: Order L-7-c which controlled production of domestic ice refrigerators. Schedule XI, also revoked, of the order listed production quotas assigned to manufacturers for the second quarter of 1945. (L-7-c)

CONVEYING MACHINERY: Order L-193 which covered distribution of and restricted the use of materials in production of conveying machinery and equipment for transmission of mechanical power. (L-193)

VANADIUM: Order M-23-a which required reports on sales of vanadium in excess of 500 pounds monthly. (M-23-a)

COBALT: Order M-39 which required reports on sales of cobalt in excess of 1000 pounds monthly. (M-39)

AMENDMENTS

The following orders and regulations have been amended by the War Production Board:

CONTROLLED MATERIALS: Instructions for a manufacturer's handling of military cancellations of class A civilian type end products are contained in direction 70 to CMP regulation 1. The direction provides for minimizing the rescheduling and reordering in the case of a manufacturer making a class A civilian type end product to fill both civilian and military orders, who had received from the military (to obtain production materials) a rating and an allotment identified by the symbols W, O, N, M or C, and gets a cutback of any military orders.

The manufacturer need not cancel any use he has made of the military rating or allotment, and can continue to place additional orders with his suppliers within the limits of the military allotment. Such orders placed subsequent to the military cancellation must be identified by the CMP symbol, that the manufacturer receive from the WPB industry division for his civilian production. Such orders that are placed with ratings must carry the ratings assigned to his civilian production. Where a manufacturer chooses to operate under direction 70, he may report by letter to the appropriate WPB industry division within 10 days from the date the military order was canceled, giving all related facts. Within 10 days of the date such letter is received by WPB, the industry division concerned will notify the manufacturer how to proceed.

However, in interpretation 31 to CMP regulation 1, WPB stressed it is necessary that ratings and authorized controlled material orders no longer needed for their original purpose be canceled promptly in order to open up suppliers' orders boards. WPB also said it is important that allotments be promptly returned to the source, which may be the customer or WPB industry division. The interpretation outlines what actions must be taken by manufacturers of class A and class B products upon receipt of cancellations and cutbacks, and by any other manufacturer who has received an authorized production schedule or who extends his customer's ratings, upon receipt of a cancellation or cutback.

New orders, when customers wish to make changes in previously placed controlled materials orders with producers, include the following: An increase in the total amount ordered, to the extent of the increase; an advancement or deferment of a delivery, when made by a customer; and instruction to a producer by a customer to reinstate a suspended order. In no case does a change in shipping destination constitute the placing of a new order. Interpretation 30 to CMP regulation No. 1 explains rules for the transfer of purchase orders, including rated purchase orders, when allotments are transferred under the regulation. (CMP No. 1)

DOMESTIC WASHING MACHINES: Manufacturers may resume production of domestic washing machines and they will be granted priorities assistance to the extent of the third-quarter program of 350,000 units. Production in excess of the program is permitted to the extent that materials are available without priorities assistance. Production of ironers and driers may be resumed also but no priorities assistance will be granted for the acquisition of materials. (L-6)

CONTAINER CLOSURES: A 10 per cent increase in the quota of zinc for manufacturing screw tops for home canning has been allotted for the period from April 1 through Sept. 30, 1945. A manufacturer of home canning closures may use during this period 70 per cent of the weight of zinc he used for similar purposes in the base period, Oct. 1, 1940, through Sept. 30, 1941, or 35 per cent per quarter.

Direction 2 to order L-103-b, pertaining to aluminum closures, has been revoked. This direction prohibited any person from using any aluminum received against his CMP allotments for the second quarter of 1945 for manufacturing any closures, except those used for packing products listed in schedule B of order L-103. (L-103-b)

HARDWARE: Restrictions have been removed on the manufacture of builders' finishing hardware, cabinet locks and padlocks, established by schedule I of the hardware simplification order. (L-236)

ELECTRONIC EQUIPMENT: Certain items that do not make use of electronic components and which are not produced generally on facilities now being used for the production of electronic equipment have been eliminated from the coverage of order L-265. Restrictions on the sale of electronic equipment that has been produced under WPB authorization for sale with motion picture equipment have been lifted.

No manufacturer may produce electronic equipment under PR 27 except to fill preferred orders, to fill authorized production schedules and programs as defined in CMP regulation 1, or to fill schedules or programs authorized on a spot basis. (L-265)

STEEL PRODUCTS: Direction 4 to order M-21-b-2, which established allocations of steel for the American Red Cross for disaster relief, has been revoked. Provisions of this direction have been incorporated in a new direction 4 to the steel order M-21. (M-21-b-2)

CANS: Deliveries to the Army and Navy have been exempted from the prohibition against the manufacture and use of tin plate and terne plate cans with ears or bails. The prohibition applies, as before, to all other manufacturing and use except cans to pack honey. (M-81)

QUARTZ CRYSTALS: Reference in the quartz crystals order M-146 that provided for application for certain production under PR No. 25 (the spot authorization plan) has been eliminated. Consumers in hardship cases are directed to appeal directly by letter to the Miscellaneous Minerals Division. Use of quartz in the manufacture of research or production instruments is now permitted on any rating. Prohibition against fabricating radio oscillator plates and filters from quartz scrap is also eliminated. (M-146)

SEWERAGE FACILITIES: Operators of public sanitary sewerage facilities have been authorized to construct plant additions, including buildings, involving up to $25,000 worth of materials, without WPB approval. An AA-3 rating and an allotment symbol MRO-P-141 has been provided for use for plant additions, but the AA-1 rating is retained for materials and equipment necessary in maintenance, repair and operating supplies. Materials to be used in minor additions are not to be considered as part of inventory, and deliveries and withdrawals of such materials are no longer restricted. (P-141)

REPORTING REQUIREMENTS: When an order or regulation is revoked, WPB may continue the reporting requirement upon written notice. Failure to file a required report is a violation of Priorities Regulation No. 8 and of any other order which requires it. (PR No. 8)

SPECIAL SALES: The following items have been deleted from list A (domestic special sales restrictions): Beryllium, marine diesel engines, integral, horsepower electric motors, paper mill machinery, refrigeration condensing units and compressors, up to and including 5 horsepower. Restrictions on certain critical materials, particularly electronic parts and equipment have been tightened. The following items have been deleted from list B (export special sales restrictions): Beryllium; beryllium chemicals; calcium metal; cast iron soil pipe; air conditioning equipment; cast iron bathtubs; jewel bearings; brass plumbing fixtures, fittings and trim; construction machinery; marine diesel engines; water heaters; extended surface heating equipment; fluorescent lighting fixtures, integral horsepower motors; paper mill machinery; refrigeration condensing units and compressors up to 5 horsepower, stokers and stoves (except electric). (PR No. 13)

FARM SUPPLIES: Farmers have been granted an AA-2 extendable preference rating for obtaining necessary farm production supplies. Other changes in the order, Priorities regulation No. 19, include: Revision of the list of items to which the AA-2 rating can be applied and addition of other essential items; change in the certificate used by farmers, eliminating necessity for approval of county farm rationing committee of purchases in excess of $50; and elimination of the "basketing" provision for permitting a dealer to apply all farmers' applications toward the purchase of any selection of items he might choose. (PR No. 19)

PRICE REGULATIONS

SOLID FUELS: Lake dock operators may add 20 cents per net ton to their maximum prices for bituminous coal to cover increases in mine ceiling prices authorized May 1, 1945. Those located on the United States shores of Lake Superior and the west bank of Lake Michigan at or north of Waukegan, Ill., are authorized to sell coal, purchased by accommodation, at the ceiling prices provided for the operator of the dock from which the sale is made. (No. 122)

BUFF AND POLISHING WHEELS: An increase of 9 per cent in manufacturers' maximum prices for buff and polishing wheels used by the metal industries for final finishing of tin plate and other metal surfaces has been authorized. (No. 136)

CONSUMERS GOODS: Manufacturers of aluminum cooking utensils who cannot price under existing regulations are required to use as ceilings the prices quoted in the last price lists they published before March 31, 1942.

Applications for the establishment of maximum prices for consumers durable goods under the fourth pricing method of MPR No. 188 must be filed with the district office of OPA, rather than with the national office. (No. 188)

U.S. Steel Plans Improvements To Cost $27 Million

Carnegie-Illinois and Tennessee Coal, Iron & Railroad to increase cold-reduced tin plate capacity in three districts

MODERNIZATION and improvement programs announced last week by two subsidiaries of the United States Steel Corp. will involve an expenditure of about $27.5 million, according to estimates in steel circles.

Included in the programs are plans for increasing the cold-reduced tin plate capacities of Carnegie-Illinois Steel Corp. in the Chicago and Pittsburgh districts and of Tennessee Coal, Iron & Railroad Co. in the Birmingham district.

The programs, announced by J. L. Perry, president of Carnegie-Illinois, and Robert Gregg, president of TCI, are designed to meet postwar requirements for efficient facilities and quality products. They are a continuation of the Corporation's improvement program carried on through the prewar depression years. Date of completion will depend on availability of materials and labor.

Mr. Perry disclosed that Carnegie-Illinois will embark upon a program to increase its capacity for cold-reduced tin plate products in the Pittsburgh and Chicago areas by a total of 233,000 tons annually. Carnegie-Illinois also will rebuild and enlarge one blast furnace at Gary, Ind., and two at South Chicago, Ill., and will replace ore and coke pockets at the South Chicago furnaces. After rebuilding, these blast furnaces will be the largest in the country.

Irvin Works To Be Improved

In the Pittsburgh district the cold-reduced tin plate capacity of Irvin Works will be increased by approximately 129,000 tons annually.

In the Chicago district the cold-reduced tin plate capacity will be increased approximately 104,000 tons annually by the installation of new equipment at the Gary sheet and tin mill.

This new tin plate improvement program is a continuation of the prewar trend towards improved facilities to meet the change in trade demands from the old style hot-reduced to the more modern cold-reduced products.

At Gary Works the No. 6 blast furnace will be rebuilt and enlarged from a daily rated capacity of 870 tons to 1508 tons. The rebuilding will include new stoves, additional gas washing capacity, and other auxiliaries for the larger furnace, as well as a belt conveyor coke handling system and other stockhouse iron and cinder handling equipment. The No. 6 blast furnace was built in 1910 and last completely relined in 1928. At the South Chicago plant, blast furnaces 7 and 9 will be completely rebuilt and enlarged, and ore and coke pockets at blast furnaces 5 to 10 will be replaced. The No. 7 furnace, built in 1910, has a rated capacity of 676 tons per day and was last completely relined in 1922. It has not been operating since July 3, 1944. The No. 9 furnace, built in 1909, has a rated capacity of 713 tons per day and was last completely relined in 1930. It is expected to continue in operation until Sept. 1, 1945. After rebuilding, each of these furnaces will have a daily rated capacity of 1508 tons.

The TCI project contemplates an increase in tin plate capacity in the Fairfield tin plate mill and installation of feeders and cleaners for 28 tin stacks. The increase in capacity will be approximately 52,000 tons annually.

Committee on Critical Materials, Products Formed

Joint Committee on Critical Materials and Products has been appointed by the War Production Board. The joint committee will consolidate the functions and responsibilities previously carried on separately by the WPB, Army, and Navy. The three agencies will be represented on the joint committee by Roger E. Williams of WPB, chairman; Lieut. Col. N. G. Kenny, Army Service Forces; and Donald L. Colwell, Navy.

Functions of the new committee will be: To identify those materials or products which are now, or expected to be in short supply, and which may bottleneck war and war-supporting programs of high urgency, and to determine the reasons for these shortages; to make recommendations to the appropriate vice chairman of WPB and to the claimant agencies for actions, methods or policies to reduce the shortages or improve the supply of critical materials and products; to publish at regular intervals a joint list of critical materials and products for the guidance of WPB and the claimant agencies.

OPA Committees Named To Study Product Extras

Iron and Steel Price Branch, Office of Price Administration, acting on consultation with the general Steel Products Advisory Committee as to the advisability of studying the extras for certain basic carbon steel products has established a number of product subcommittees to work on the matter.

The study contemplates making such adjustments and corrections as will provide a more equitable price structure according to Warren M. Huff, price executive for the Iron and Steel Price Branch.

TRANSITION TOPICS

CUTBACKS— Cancellations and reductions of war contracts to date are causing few unemployment problems. Most displaced workers are quickly absorbed in other war or essential work. Joblessness expected to increase during second half. See page 73.

STEEL CONSUMPTION—Changing complexion of distribution of steel products to consuming industries noted in first quarter. Shipbuilding takes only 8 per cent of total output, against 20 per cent a year ago. See page 76.

WEST COAST— Pacific states giving top priority to Japanese war while attempting to reconvert partially to civilian goods production. See page 78.

SURPLUS PROPERTY— Sales of surplus war property are proceeding at a rate of $10 million monthly. At the end of March, inventories of surplus property aggregated $1399 million. See page 85.

AUTOMOBILES— First postwar models indicate major changes in front-end styling. More previews of 1946 models expected to be released soon. See page 87.

AIRCRAFT— Scrapping of unusable and obsolete surpluses recommended by Aeronautical Chamber of Commerce. Stockpiles expected to exceed future military needs and foreseeable civilian demand. See page 90.

RECONVERTING STEEL— The steel industry faces no real reconversion problems in the transition from wartime to peacetime production, reports W. A. Hauck of WPB's Steel Division. Even the wide strip mills, converted to plate production, offer minor reconversion problems which can be solved readily in comparatively little time. See page 98.

Court Rulings in Glucose Cases May Help Clarify Basing Point Status

May serve as precedents in other cases involving legality of basing point pricing system under antitrust laws. Decisions represent Supreme Court's first interpretation of intent and applicability of laws where price discrimination is charged

EVENTUAL clarification of the status of the basing point system under the antitrust laws may result from the recent Supreme Court decisions affecting two glucose manufacturers (STEEL, April 30, p. 62).

The decisions, which outlawed the basing point system used by the corn products manufacturers, represent the high court's first interpretation of the intent and applicability of the antitrust laws in cases where the use of a basing point system is claimed to constitute unlawful price discrimination.

They represent an interpretation of the Clayton act as amended by the Robinson-Patman act. Also they add to the stature and prestige of the Federal Trade Commission as the agency responsible for the formulation of the federal policy in regard to pricing methods involving basing point systems.

These decisions may serve as precedents in future cases involving the basing point system in other industries. While the high tribunal's ruling does not pretend to be the final word on the subject and while careful reading of the decisions indicates the court's belief that other decisions will be needed before the subject is clarified, the rulings are being carefully studied in industries using basing point systems.

In one of the decisions, the court indicated its belief that not all basing point systems necessarily are illegal per se. The court went on to say that no attempt had been made in reviewing this particular case, to determine whether a multiple-basing point system is permissible under the Clayton act.

Other Basing Point Cases Pending

The glucose decisions, therefore, while reflecting the court's line of reasoning in these two cases, are not regarded as forecasting the outcome of a number of other important basing point cases now pending in the lower courts. These include the steel basing point case, before the Third Circuit Court of Appeals in Philadelphia, and the cement, steel conduit, malt, and milk and ice cream can cases before the Seventh Circuit Court of Appeals in Chicago.

In particular, the glucose case decisions provide no safe basis on which to attempt to predict the outcome of the steel basing point case, involving a multiple basing point system.

In one of the glucose cases, Corn Products Refining Co. and Corn Products Sales Co. vs. Federal Trade Commission, the Seventh Circuit Court of Appeals had sustained the Federal Trade Commission's cease and desist order. On petition by the Corn Products Refining Co. the Supreme Court agreed to review the decision ". . . . because the questions involved are of importance in the administration of the Clayton act in view of the widespread use of basing point systems. The principal questions for decision are whether, when shipments are made from Kansas City, petitioners' basing point system results in discrimination in price between different purchasers of glucose, within the meaning of section 2(a); and, if so, whether there is support in the evidence for the finding of the commission that these discriminations have the effect on competition defined by that section."

The stipulated evidence in the case showed that customers in 12 western and southwestern cities paid unearned or phantom freight ranging from 4 to 40 cents per 100 pounds of glucose, or amounts equivalent to 2 to 19 per cent of the Chicago price of $2.09 per 100 pounds.

Denies Various Contentions

The Supreme Court denied various contentions on which the petitioners hoped to get a reversal of the decision by the lower court. For instance, it denied the contention that there is no discrimination under their basing point system between buyers at the same points of delivery, and that the prohibition of section 2 (a) is directed only at price discriminations between buyers at the same delivery points.

The court denied that basing point systems, being well known prior to the enactment of the Robinson-Patman act, were considered by Congress to be legal. It found that the basing point systems in other cases cited (the maple flooring and cement cases) were unlike that used on glucose. In the maple flooring case, the court pointed out, "the single basing point was so close to most of the points of production as to result in but trivial freight variances; and the defendants in that case were willing to sell on a f. o. b. mill basis whenever the purchaser so requested."

Denying another contention, the court found that when the Robinson-Patman act was adopted in 1936, there was no settled construction of the Clayton act in the federal courts contrary to that urged in the current Corn Products case; nor was there any settled administrative construction to the contrary.

"In fact, in 1924," the decision reads, "in the only decision involving the problem, the Federal Trade Commission ordered the United States Steel Corp. and its subsidiaries to cease and desist from the sales of their rolled steel products on the 'Pittsburgh-plus' price system. The commission held that the use of a single basing point at Pittsburgh for steel plants over the country was a violation of section 2 of the Clayton act, as well as section 5 of the Federal Trade Commission act, as they then read. The respondents in that case sought no review of the commission's order and filed with the commission a formal statement of intended compliance with it."

The court also dismissed the petitioners' reliance on the failure of the commission to make further orders against basing point systems in the period from 1924 to the passage of the Robinson-Patman act in 1936.

"The commission," says the decision, "undertook no further proceedings because of difficulties of enforcement which it attributed to the exemption provisions of section 2 and to decision of the lower federal courts in Clayton act cases. Instead, it pressed for clarifying amendments to the act. The Robinson-Patman act was adopted in response to the commission's recommendation that defects in section 2 be remedied and its prohibition of price discrimination strengthened."

The court also saw no merit in the

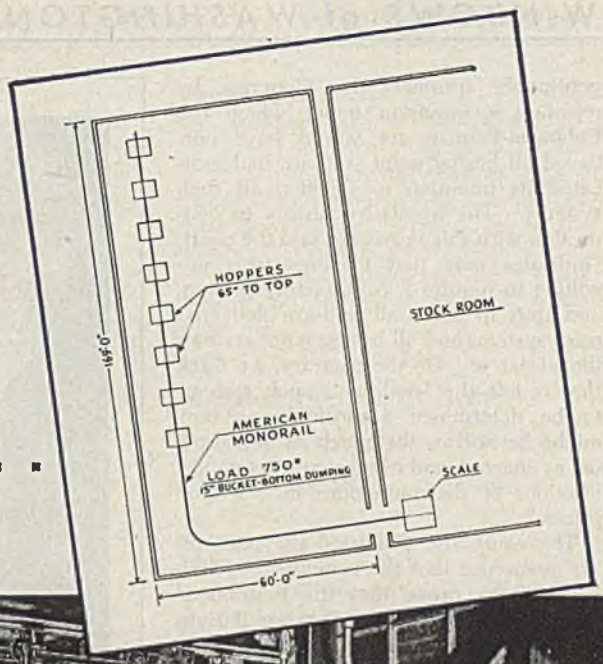
W. STUART SYMINGTON

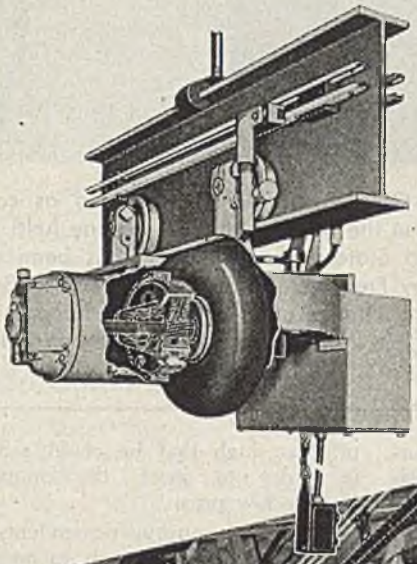
Recently nominated by President Truman as chairman of the Surplus Property Board, Mr. Symington is president of the Emerson Electric Mfg. Co., St. Louis. He is scheduled to succeed former Sen. Guy M. Gillette of Iowa, who has resigned effective July 15. NEA photo

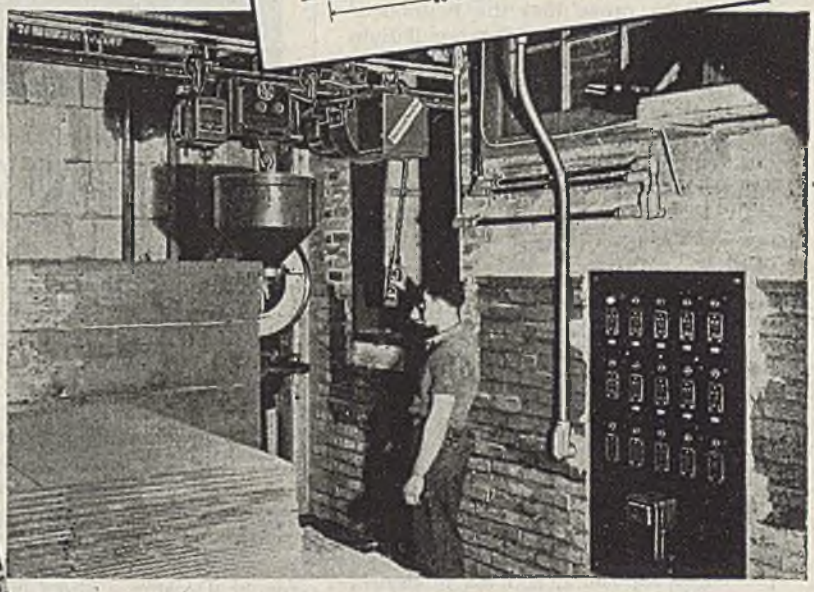
American Mono Tractor

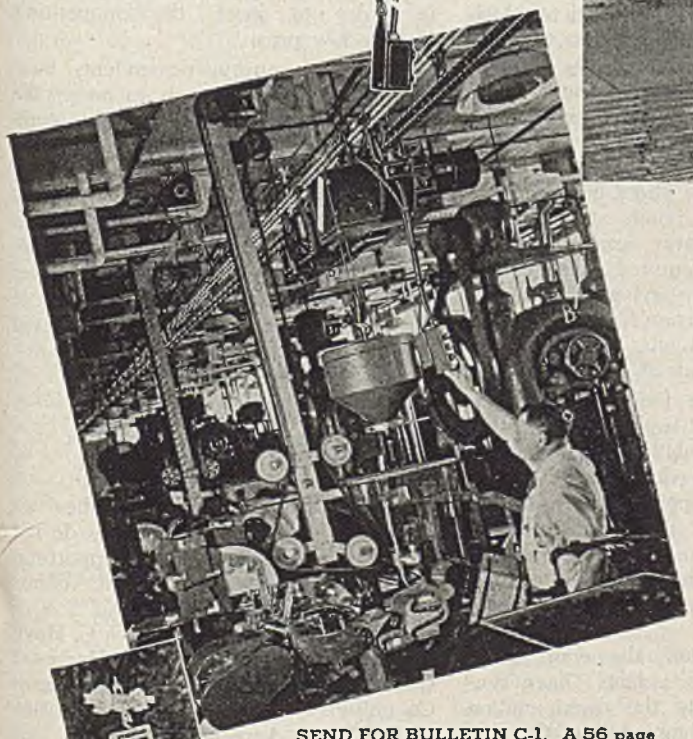
Automatically

Feeds 15 Stations . . . . .









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petitioners' argument that Congress, by rejecting a provision under which the Robinson-Patman act would have outlawed all basing point systems, had indicated its intention to sanction all such systems. The legislative history in connection with this provision, said the court, "indicates only that Congress was unwilling to require f. o. b. factory pricing, and thus to make all uniform delivered price systems and all basing point systems illegal per se. On the contrary, we think that it left the legality of such systems to be determined accordingly as they might be within the reach of section 2 (a), as enacted, and its more restricted prohibitions of discriminations in delivered prices."

The court also dismissed the petitioners' insistence that the commission's findings fail to prove that the petitioners' discriminations come under prohibitions of section 2 (a) of the Clayton act, amended, whose "effect. . . . may be substantially to lessen competition. . . in any line of commerce, or to injure, destroy, or prevent competition with any person who either grants or knowingly receives the benefit of such discrimination, or with customers of either of them."

"Section 2 (a), as amended," says the court, "does not require a finding that the discriminations in price have in fact had an adverse effect on competition. The statute is designed to reach such discriminations 'in their incipiency,' before the harm to competition is effected. It is enough that they 'may' have the prescribed effect."

The decision goes on to state that "the weight to be attributed to the facts proven or stipulated, and the inferences to be drawn from them, are for the commission to determine, not the courts. We cannot say that the commission's inference here is not supported by the stipulated facts, or that it does not support the commission's order."

Upholds Petition in Staley Case

In upholding the petition of the Federal Trade Commission against the A. E. Staley Mfg. Co. and the Staley Sales Corp., the court found these respondents to have a basing point delivered price system comparable to that of the Corn Products Refining Co. "Respondents sell their product, manufactured at Decatur, Ill., at delivered prices based on Chicago, Ill., the price in each case being the Chicago price plus freight from Chicago to point of delivery."

The principal question, said the court, is whether the respondents have justified their price system under section 2 (b) of the Clayton act, as amended.

"Respondents' Chicago price," the court found, "is only a delivered price at that place. It is also a basing point price upon which all other delivered prices, including the price at Decatur, are computed by adding to the base price, freight from Chicago to the point of delivery. The Decatur price, as well as the delivered price at all points at which the freight from Decatur is less than the freight from Chicago, includes an item of unearned or 'phantom' freight, ranging in amount in instances mentioned by the commission, from 1 cent per 100 pounds at St. Joseph, Mo., to 18 cents at Decatur. The Chicago price, as well as that at points at which the freight from Decatur exceeds freight from Chicago, required respondents to 'absorb' freight varying in instances cited by the commission from 4 cents per 100 pounds at St. Louis, Mo., to 15 1/2 cents per 100 pounds at Chicago.

"The commission found that this inclusion of unearned freight or absorption of freight in calculating the delivered prices operated to discriminate against purchasers at all points where freight rate from Decatur was less than that from Chicago and in favor of purchasers at points where the freight rate from Decatur was greater than that from Chicago."

The sole question, the court held, is whether the respondents "have succeeded in justifying the discrimination by an adequate showing that the discriminations were made in good faith to meet equally low prices of competitors. . . . The statutory test is whether respondents, by their basing point system, adopted a lower price. . . in good faith to meet an equally low price of a competitor.' This test presupposes that the person charged with violating the act would, by his normal, nondiscriminatory pricing methods, have reached a price so high that he could reduce it in order to meet the competitor's equally low price.

"On the contrary, respondents have used their pricing system to adopt the delivery prices of their Chicago competitors, by charging their own customers upon shipments from Decatur the Chicago base price plus their competitor's costs of delivery from Chicago. Even though respondents, at many delivery points, enjoyed freight advantages over their competitors, they did not avail of the opportunity to charge lower delivered prices."

VETERAN'S ADMINISTRATOR: Gen. Omar N. Bradley, who as commander of the 12th Army group in the battle against Germany held the biggest field command in United States military history, has been appointed veterans' administrator by President Truman. He succeeds Brig. Gen. Frank T. Hines who has had charge of the office for the past 23 years. General Bradley, center, is shown with President Truman, left, and Gen. George C. Marshall, chief of staff. NEA photo

Foreign Manufacturing Branches Are Defended

Foreign manufacturing branches established by American companies do not rob American workers of job opportunities but may in fact increase the volume of employment in this country.

Such was the testimony by G. C. Hoyt, vice president, International Harvester Co., before the House Ways and Means Committee during hearings on extension of the Trade Agreements act.

Speaking of his company's experience in foreign manufacturing, Mr. Hoyt said: "Our foreign manufacturing has preserved and created markets for our American-made products and has actually been a substantial factor in increasing the employment in our American plants. It has even helped to level off the peaks and valleys of employment in our American plants. There have been

periods of business depression when our export business suffered less than our domestic business and thus had a beneficial effect in maintaining employment in this country when it was most needed.

"Because it has increased our total foreign business, our foreign manufacturing has had other beneficial effects. First, it has widened the use of our farm equipment, which has improved the production of foreign farmers and thereby increased their income, enabling them to buy more imported products. Second, it has increased industrial activity in the countries concerned and thereby contributed to a higher standard of living and helped to make them customers for many other American-made products, including farm products. Third, it has been directly responsible for increased business for other American manufacturers from whom we buy supplies, parts or subassemblies. An International Harvester tractor with rubber tires represents not only the export sale of a tractor but the export sale of tires and of many other items not made but purchased by our company."

Supreme Court Rules Out Florida Union Licensing

United States Supreme Court last week ruled against a Florida statute requiring labor unions and their agents to register and be licensed with the state. In a 7 to 2 decision the court held the labor law invalid on the grounds that it conflicted with collective bargaining freedoms granted employes in the National Labor Relation act. However, the court refused to rule on the constitutionality of an Alabama law regulating unions since no dispute had arisen over the law's operation.

The ruling against the Flordia law was the second action this year by the Supreme Court nullifying state labor legislation. In January the court ruled Texas could not require labor organizers to obtain a state license before soliciting at labor meetings. The Texas law, the court held, violated the constitutional rights to speech and assembly.

Priorities Aid Tightened For Civilian Goods Output

No supplementary allocations of controlled materials will be granted by the War Production Board beyond levels already programmed for the third quarter of 1945, except in cases absolutely necessary to assure needed additional production of items of highest urgency to the civilian economy. This policy has been announced by WPB in a move to wean civilian industry away from dependence on government allocations now that cutbacks in war production are freeing increasing amounts of materials previously needed almost exclusively for the war and war-supporting efforts. This means production of civilian items above the levels already approved for the third quarter will have to be made without priorities assistance and with materials bought on the free market.

WPB and WMC Facilitate Food Processing Machinery

Preference rating of AA-2X has been assigned manufacturers of food processing machinery and equipment, putting industries in this category ahead of virtually all other industries not actually engaged in war and war-supporting production, War Production Board announced recently. They have also been assigned a production urgency rating of 5 and 6. Components are still in short supply, fractional horsepower motors and malleable steel castings being particularly difficult to obtain.

Sale of Government-owned Plant Equipment Facilitated

Regulation 18, prescribing Office of Contract forms 5 and 5-a has been issued by the OCS to speed removal or sale of government-owned plant equipment from privately owned plants. The new forms are for use by contractors in making offers to purchase government-owned plant equipment in their plants as well as requests to government agencies to remove such equipment from their plants.

Contractors with a facilities contract or lease made directly with an owning agency should present their offers to purchase and requests for removal to that agency. Contractors whose facilities contract is with a facilities contractor should present their offers or requests to that contractor.

Surplus Property Sales Total $40 Million Monthly

During the 10 months ended March 31, 1945, surplus property disposal agencies received declarations of surplus totaling $1575 million and sold property having a declared value of $265,181,000, or about 17 per cent of the total, for $164,431,000. By the end of March inventories of surplus on hand had increased to $1,399 million. Disposals are proceeding at the rate of $40 million per month. Total surpluses may approximate $100 billion, original cost to the government.

The Surplus Property Board has established a compliance staff, headed by Robert T. Amis, which has made arrangements for the prompt reporting of offenses to the proper federal criminal enforcement agencies. The staff will also ensure enforcement of the policies and provisions of the Surplus Property act as promulgated in SPB regulations.

Three Pending Patent Bills Are Expected To Get Favorable Vote

THE HOUSE Committee on Patents is expected to report favorably three bills on patents introduced by Rep. F. W. Boykin (Dem., Ala.).

The major proposal requires recording in the Patent Office of agreements pertaining to patents. A second bill provides for expiration of a patent not more than 20 years after the date of application but keeping the term of a patent at 17 years, and the third provides for public registration of patents available for licensing.

Commenting on the patent situation, R. J. Dearborn, chairman, Committee on Patents, National Association of Manufacturers, states that NAM recommends that legislation should be enacted which would contain the following:

1. Recording of all existing and future patent agreements to which one of the parties is a citizen of a foreign country. This should be done in the U.S. Patent Office.

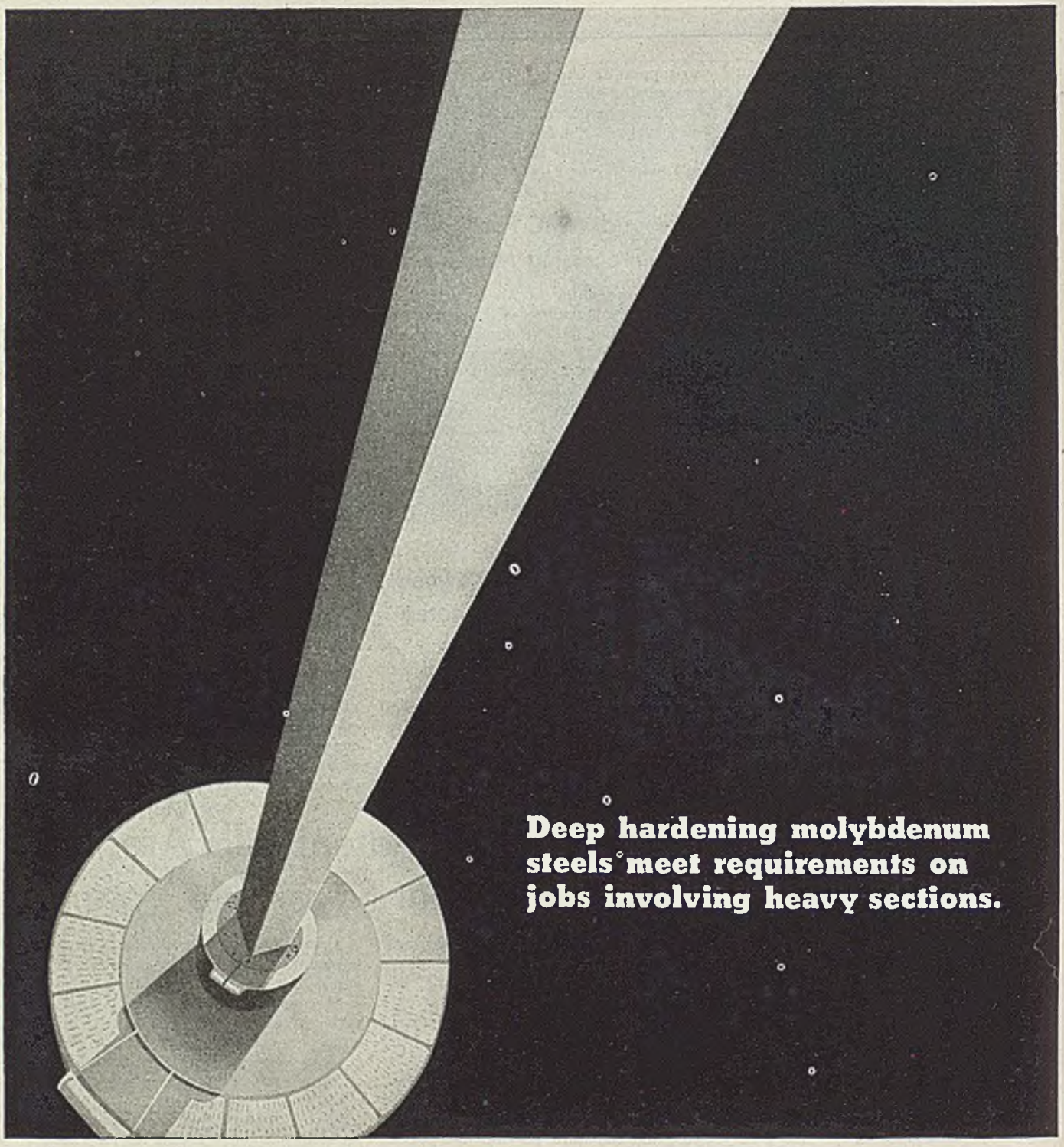
2. Filing domestic patent agreements in order to assure adherence to antitrust laws, and to remove the unjustified suspicion that manufacturers are entering into secret agreements contrary to public policy.

3. Permitting filing of abstracts containing essential facts in order to safeguard competitive information.

"There should be a clear distinction between agreements pertaining to patents and agreements in general," Mr. Dearborn said. "Should it be found desirable to require the recording of agreements other than those pertaining to patents, separate legislation should be enacted for that purpose. I want to emphasize that certain exclusive rights are inherent in patents. Agreements pertaining to patents may contain provisions which might be improper in other agreements."

The "20-year bill," long advocated by NAM, would correct an abuse which has been evident in some cases—that of excessively prolonging the period of argument in the Patent Office so that a patent is not issued until many years after the application has been filed. The bill would have the effect of retaining the present term of 17 years except in cases where more than 3 years were consumed in obtaining a patent.

"Undue postponement of the beginning and ending of the term of a patent is not in the public interest," Mr. Dearborn stated.



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

Principal changes in first 1946 model passenger cars are in front-end styling. Fenders, hoods and body panels are similar to 1942 models. Five Fisher Body plants being reconverted to automobile body production

CLOSE inspection of hand-built specimens of the first two 1946 passenger car models—Ford and Nash—confirms the fact principal changes are in the nature of facelifting treatments, with no indications of any major revisions in contours of fenders, hoods or body panels. That they can look so sharply different from the 1942 models is simply tribute to the ingenuity of designers and stylists who have created the new front ends.

Grille on the new superdeluxe model Ford lends a much stronger and more rugged appearance to the front end by the simple switch from two panels of closely spaced vertical bars, to a built-up grille comprising four horizontal bars, surmounted by a decorative headpiece. These bars are steel stampings chrome plated on their outer edges. Nose of the hood has been made to appear larger and more rounded by merely blacking out the center dividing strip and cutting off the belt molding at a point about 8 inches further back than on the old models.

Striking feature of the Nash 600 front end design is its close resemblance to the 1942 Cadillac styling—and this was not accidental either. The radiator grille itself comprises a series of seven closely spaced and parallel curved sections forming a sort of center projecting shelf at the level of the headlights. These might be either plated die castings or steel stampings; on the first hand-built model they were actually some brass strips formed to the proper contour. As on the Ford, the belt moldings have been moved back to accentuate the nose of the hood. A further Cadillac-inspired touch is a new nameplate shield or medallion attached to the hood just above the grille shelf.

Front Bumper Redesigned

A few changes have been made in the integration of the front bumper into the overall design. The bumper itself is nicely curved around the front end and sweeps back to the edge of the front fender wheel housing on both sides. Backing the bumper and just above it is a four-bar built-up chrome plated grille section carrying across the front end and swept back to the edges of the wheel housing, patterning the bumper treatment. A final touch is a three horizontal bar trim for each parking light, just inside the headlights.

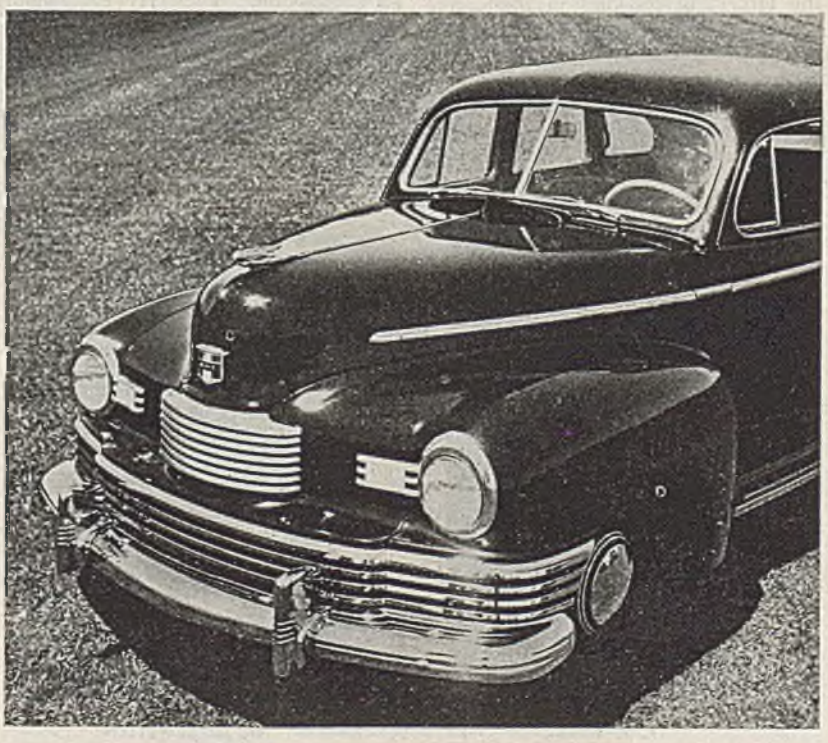
Overall effect of the design, not too different from 1942 styling, is compact and well integrated, perhaps a trifle too emphatic in horizontal lines, but still effective. The same treatment will be applied to the Nash Ambassador model which, with the lighter weight 600, will comprise the Nash line at the start. The 600 will continue the use of "unitized" body-chassis construction, permitting weight reduction claimed to give gasoline economy of 25-30 miles per gallon. Coil spring suspension is used on all four wheels.

More photographs of interim models should be coming out shortly, and it will be interesting to observe whether other manufacturers are confining their changes to front end restyling. Creditable reports here months ago indicated completely new hood and fender dies were being cut for some General Motors models. Sample models have been built, and pictures taken, but they are being held back for final determination of corporation policy.

Information supplied by Fisher Body Division reveals five Fisher plants are being reconverted to automobile body output, but for some reason these five do not include any facilities for Chevrolet body production. The plants now being equipped include Fisher No. 1 in Flint (for Buick), Fisher Lansing (for Cadillac and Olds), Fisher Pontiac (for Pontiac), Ternstedt Detroit (for body hardware), and Fisher Grand Rapids (miscellaneous stampings).

Explanation of the Chevrolet mystery is that Fisher's Cleveland No. 1 plant on Coit road, hitherto pretty well jammed up with production of nacelles for the B-29 bomber, now has been designated as the source for Chevrolet passenger car bodies. Shipping instructions on parts and materials have been issued, first consignments being scheduled July 2, followed up by similar shipments the first week in August and the second week in September. Originally it is understood plans were being considered to build Chevrolet bodies in the various car assembly plants, such as at Janesville, Wis., Norwood, O., St. Louis, etc. This was when it appeared Cleveland No. 1 would be tied up with bomber work. Later it was found some of the nacelle manufacturing could be transferred to Cleveland No. 2 plant at the airport, and to Memphis, Tenn., thus releasing No. 1 plant, in part at least, for passenger car bodies. Thus it appears Fisher Body will have six, not five, plants quickly converted to body output.

Delayed because five of its major war contracts were being shifted from a cost-and-fixed-fee to a fixed price basis,



NEW NASH: This is the new low-priced 1946 Nash "600" passenger car. First car to be built by the company since January, 1942, the new model is said to be lighter weight, roomier, more economical and will give 25 to 30 miles to the gallon of gasoline

Briggs Mfg. Co.'s annual report was issued last week and discloses a number of unpublished phases of operations there. Before the war Briggs peacetime production required about 23,000 employes and 5,000,000 square feet of floor space. During 1944, average employment was 36,565 and operations covered in excess of 5,690,000 square feet of space. In recent months, employment and floor space devoted to war work both have decreased about 20 per cent, permitting a start on tooling for production of Packard and Chrysler bodies.

Prior to the war Briggs operated a large body plant at Dagenham, England, which in 1939 was completely converted to military output. Many of the buildings there were heavily bombed during the blitz, but repairs were made and the properties are now being switched to peacetime production.

Last year Briggs delivered 25 per cent more airplane wings and other fuselage assemblies than in 1943, three times as many auxiliary gas tanks for fighter planes, 53 per cent more heavy bomber turrets (a contract now terminated), and 23 per cent more M-4 tank hulls. Last year also saw the start of ambulance body construction (for Dodge chassis), and already over 2500 have been delivered.

Briggs Cleveland foundry where brass castings are produced in baked plaster molds by the Capaco process, and which began production in April, 1944, is one of the largest of its kind in the country, and is regarded as having an important postwar future. It may tie in with the company's line of plumbing ware. Prior to the war, a Detroit plant produced pressed steel enameled bathtubs, lavatories and sinks, but was not equipped to manufacture china plumbing ware or plumbing fixtures. Purchase of the John Douglas Co. in Cincinnati, along with the Cleveland foundry, will fill in these voids.

Various contracts have been handled in the Briggs aircraft plant built on Conner avenue, including airframe parts for medium bombers, the B-17, Corsair fighters, P-61 Black Widow fighters, the TBY Sea Wolf torpedo bomber, A-26 attack bombers, and the B-29 Superfortress.

Late last year, Briggs began fabrication of the large armored hulls for the M-26 General Pershing heavy tank, on which, as well as on the M-4 medium hull, numerous body production methods have been found applicable to assembly and welding.

Seek Automatic Pricing Formula

Automobile parts manufacturers are going to the mat in Washington over prices, complaining of gross inequities resulting from OPA ceilings. They are seeking approval of an automatic pricing formula which would be flexible enough so that each parts maker could figure his own prices within reasonable bounds in the light of higher labor and materials costs, leaving the OPA to act solely as a policeman, with adequate penalties for violations.

The parts people insist 1941 price ceilings on automotive accounts currently will mean substantial losses, particularly in view of the restricted level of production. They say car manufacturers who are frozen to price ceilings can charge off their losses to advertising and promotion at the start, but the average parts supplier, while he may provide initial automotive requirements at a loss, cannot continue long to do so, especially if offsetting war contracts are cut back or terminated. The OPA's answer thus far has been that the provision of such proposed automatic pricing formula is outside the province of the agency's authority.

One of the many complainants on the price question is the membership of the Drop Forging Association. A single company in this group, located in Detroit, cites the case of 31 forging contracts taken on since last October, on which net loss under price ceilings has figured to 32 per cent. The forging men say even the Navy Department recognizes the impossibility of conforming to ceilings and allows a profit of 18 per cent on October, 1941, prices to permit realizing 10 per cent on current costs. In asking for price relief, these interests point out that taxes and renegotiation will take care of excess profits, if any, so why the concern over price ceilings.

Henry P. Nelson, WPB chief of automotive reconversion, said in Chicago last week the prospective civilian steel supply has so improved in the past 60 days that the amount of "free market" steel now in prospect is three times greater than on April 1. He added that, on the score of automobiles, after production of the scheduled 214,000 this year, all of which will go to essential users, the market will be open to all buyers, although informal rationing supervised by manufacturers and dealers probably will be in force. This could mean sales to those who have had their orders in first and who have made the largest down payment, which could hardly be considered equitable rationing. At any rate, dealers throughout the country report many customers anxious to place orders with substantial cash payments.

F. L. BURKE

W. G. LEWELLEN

FRANK R. PIERCE

These three men were elected vice presidents of General Motors Corp. at a recent organizational meeting of the board of directors. Mr. Burke formerly was assistant to the vice president in charge of the accessory group and is a veteran of 25 years with General Motors. Mr. Lewellen was assistant to the vice president in charge of the Eastern Aircraft Division and Dayton divisions and joined the corporation in 1919. Mr. Pierce, assigned to the personnel staff, formerly was associated with the Frigidaire Division and the Kelvinator Division of Nash-Kelvinator Corp.

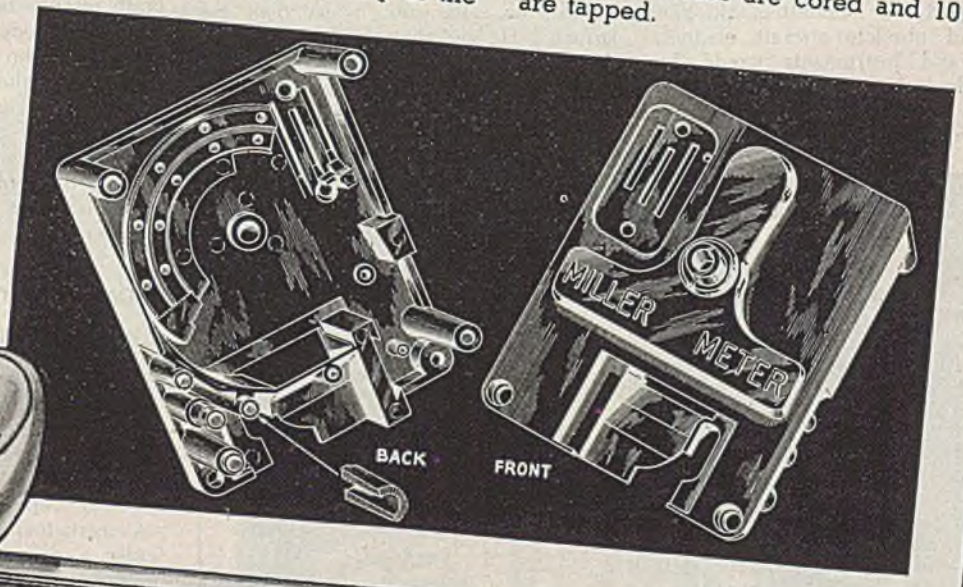
BOSSES

In die castings, tapped bosses form stronger fastenings than integral threaded studs and provide convenient mountings for mating parts.

Strength of bosses is greater because they are usually larger in diameter than studs and because external threads cause a notch effect under shock loads.

Boss holes in *zinc alloy die castings* usually can be cored to tapping size. Tap and chip clearance should be provided below the last thread in blind holes. A chamfer cored at the hole entrance facilitates tapping. Where bosses join the body of the casting, at least a small fillet is desirable.

This drawing of a zinc alloy die casting for the above parking meter illustrates the utility of bosses for attaching mating components. Most of the 17 bosses are cored and 10 are tapped.



DESIGNING FOR DIE CASTING

The above information on bosses was taken from our booklet DESIGNING FOR DIE CASTING. To insure that you will get the most for your die casting dollar, ask us—or your die casting source—for a copy of this booklet.

The New Jersey Zinc Company, 160 Front St., New York 7, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are specified with

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

WING TIPS

Scrapping of unusable and obsolete surplus aircraft equipment recommended to Surplus Property Board by Aeronautical Chamber of Commerce. Stockpiles expected to be far in excess of future military needs or foreseeable civilian demand

SCRAPPING of all "unusable, obsolete and surplus military aircraft equipment" is recommended in a report to the Surplus Property Board, Washington, by the Aeronautical Chamber of Commerce.

H. M. Horner, president, United Aircraft Corp., New York, and chairman of the chamber's committee on surplus disposal, pointed out in New York recently, in connection with the announcement of the report, that perhaps 500,000 heavy horsepower engines would be in storage after the war with Japan, and that 5000, or 1 per cent, would be sufficient to provide all commercial air line needs for the following five or six years.

In its report, the committee said that stockpiles of obsolete aircraft engines, propellers and instruments would be tremendously large and far in excess of future military needs or foreseeable civilian market demands. It recommended allocation of adequate quantities of current military aircraft equipment for a strategic reserve and for wide distribution of surpluses to educational institutions.

The report was limited to aircraft engines, propellers and aircraft components, Mr. Horner said, but recommendations on surplus aircraft plants would be submitted to the SPB in the near future.

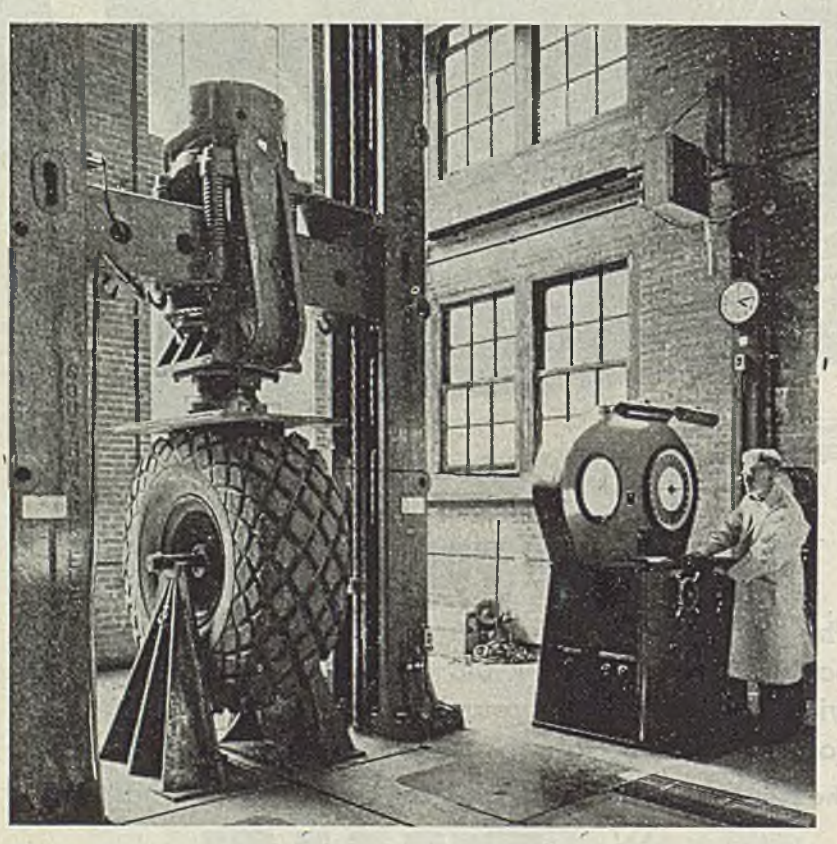
Mr. Horner believed that possible foreign trade would not solve the problem of surplus disposal. That market is limited, he said, and "won't dent the surface." He said that of 34,000 obsolete aircraft declared surplus by the government, only 9800 have found civilian buyers and that nearly all of those sold were of prewar civilian types.

Indicating the magnitude of the surplus problem, the chamber estimated in its report that 50,000 engines of high horsepower, valued at $500 million, are flowing through the "pipe line" from factory to battlefield at all times.

"Large aircraft engines require constant care and are very costly to handle, transport and store," the report revealed. "It would be a waste of the taxpayers money to set up great warehouses, bear the excessive cost of preservation, only to postpone a necessary decision that no market will exist."

Engines, Mr. Horner brought out, "cannot be stored on shelves and still be preserved in flyable condition unless they have been disassembled, which is a costly procedure."

The report recommended that not less than 25 per cent of the military aircraft reserve be replaced by new and improved models each year. It further advised that no engines of 800 or greater horsepower should be released except those which are new and unused, if available. At the same time it recommended that lower horsepower used engines be permitted to go into civilian channels after complete overhaul and replacement of critical parts.



TIRE TESTER: This machine just installed by the Goodyear Tire & Rubber Co., Akron, O., will be used to conduct deflection and other tests on large pneumatic earthmoving equipment and airplane tires. Designed specifically for tires upon which can be exerted pressure up to 600,000 pounds, the machine also can be employed for any type of tensile or compression work within its dimension and load capacity limits. Hydraulically operated, and supplied with three load ranges, the machine has a clear width of 6 feet between columns and will accommodate tires or other test specimens measuring up to 12 feet in length or height

Government Contracts for Construction at Air Fields

Contracts for a new experimental flight test hangar at Boeing Field, Seattle, and for reinforcement and reconstruction of runways and taxiways at Maxwell Field, Montgomery, Ala., have been awarded by the War Department.

Construction of the Boeing Field hangar under a contract of $1,147,491.51 has been started by Mowat-Sellen Co., Seattle, and is to be completed in March, 1946. The industrial type building is 725 x 180 feet. Work will be supervised by the Seattle district office of the Corps of Engineers.

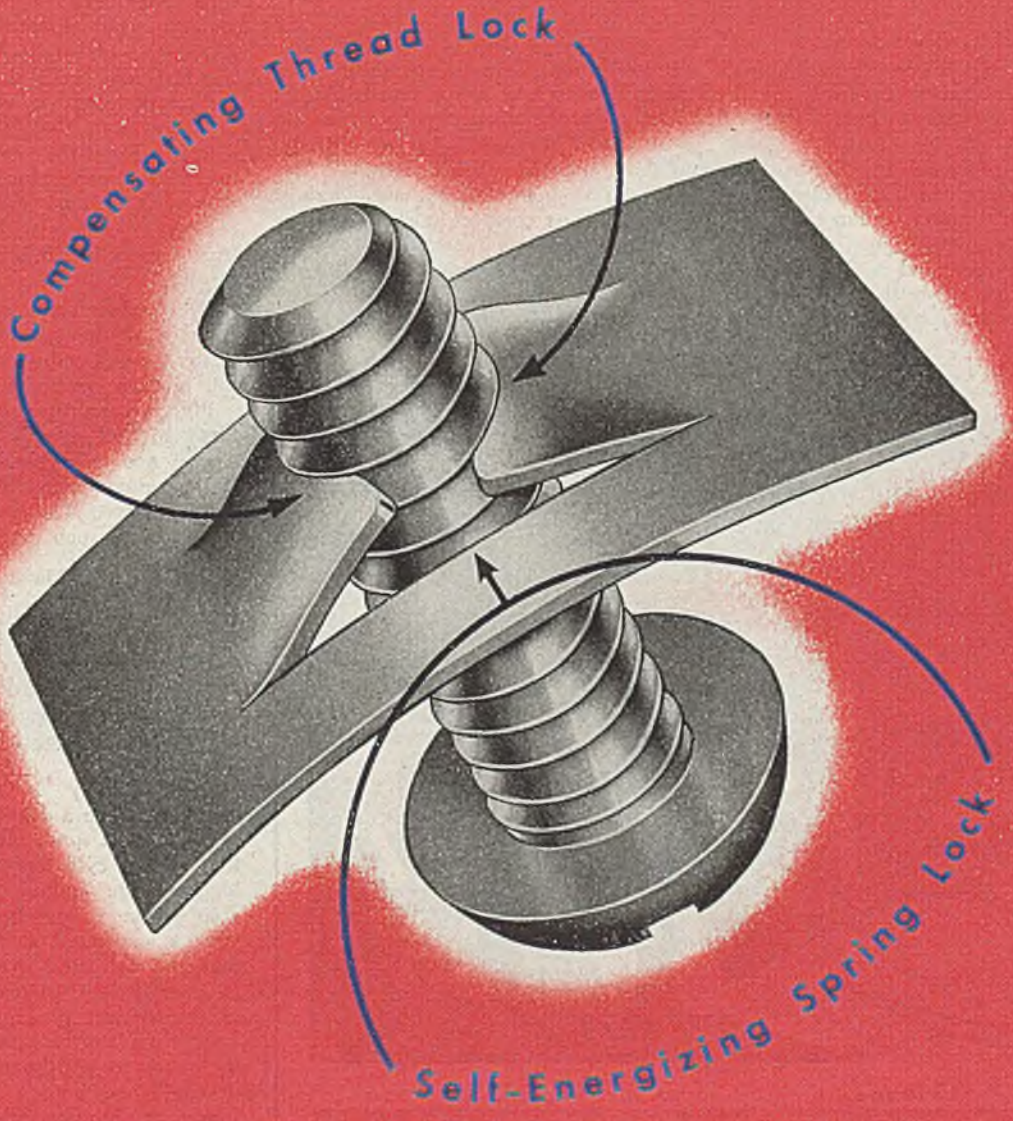
Work on Maxwell Field is to be done by Wright Contracting Co., Columbus, Ga., under a contract of $1,666,347.28. The Mobile, Ala., office of the Corps of Engineers will supervise the work.

Aircraft Production Tops Schedule for Third Month

Output of aircraft exceeded scheduled production in May for the third consecutive month with 6354 airplanes produced against a schedule calling for 6345. April production was 6412.

Airframe weight of airplanes accepted (excluding spares) amounted to 71,600,000 pounds, a reduction of 3 per cent from the April weight figure. A scheduled drop in the average rate of production per working day was noted, with 235 aircraft produced per day in May compared with 256 per day in April.

NOTHING LOCKS LIKE A SPEED NUT



SPEED NUTS are the only fastening devices that provide a COMPENSATING thread lock and a SELF-ENERGIZING spring lock. TWO distinct forces are exerted on the screw, as the SPEED NUT is tightened.

First, a compensating thread lock, the two arched prongs moving inward to engage and lock against the root of the screw thread. These free-acting prongs compensate for tolerance variations, and function perfectly on oversize or undersize screw or bolt threads.

Second, a self-energizing spring lock, created by the compression of the arch in both the prongs and base. The combined forces of the thread lock and spring lock definitely eliminate vibration loosening.

SPEED NUTS, proven in pre-war commercial industry and now boosting the production of airplanes, are ready to assist you in the assembly of post-war metal, vitreous enamel, plastic or wood products. Literature is available on over 3000 shapes and sizes, for standard or special assemblies.

TINNERMAN PRODUCTS INC.
2039 Fulton Road Cleveland 13, Ohio

Speed Nuts*
PATENTED
*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

New Ignition System for Aircraft Engines Improves Performance at High Altitudes

A SCIENTIFIC development to give further superiority to American fighting planes and to bombers in particular is revealed by AC Spark Plug Division of General Motors. It involves a low-tension, high-frequency ignition system for aircraft engines which facilitates starting in subzero weather, reduces aircraft engine maintenance time, minimizes effect of oil, carbon and lead fouling of spark plugs and solves the problem, so far as the ignition system is concerned, of raising the ceiling of extremely high altitude flying. The new system has been turned over to AAF technicians at Wright Field where it has operated perfectly for more than 750 hours at various altitudes on the engine of a B-17 Fortress.

Engineers point out the development marks the first complete aircraft ignition system including harness, magnetos and spark plugs ever designed and made by one manufacturer. Availability of a complete ignition system from one source is important and has long been desirable because it will make for better balanced engine performance.

The system was especially designed to improve ignition performance under adverse conditions. For example, it was found in cold climates that aircraft engines were especially hard to start after standing idle for a time. On removing the spark plugs it was observed that moisture from the firing chamber had condensed and the water had frozen between the spark plug electrodes. With the new ignition system, it was discovered in cold tests that sufficient electrical energy was built up to fire through the ice.

Oil, carbon and lead fouling, chief enemies of the spark plug, have practically been conquered through use of this ignition system, it is shown in tests.

Fighters escorting slower bombers are likely to foul spark plugs as they "loaf along" and may not have the desired speed when called upon to go into fighter action. The new system will be of benefit in such cases.

Builds All Major Components

In addition to designing the system, AC has built all its major components—the spark plug, a low tension magneto and distributor, "spark gap" tubes, and high voltage transformers small enough to be built into the barrels of the spark plugs.

Approximately 10,000 volts is required to force a spark to jump the gap of an aircraft spark plug which fires the fuel in the cylinders of an engine. In high voltage ignition systems considerable power is lost because the 10,000 volts is generated at the magneto, and must be delivered over wires, some as long as 10 feet, to reach the spark gap of the aircraft plug.

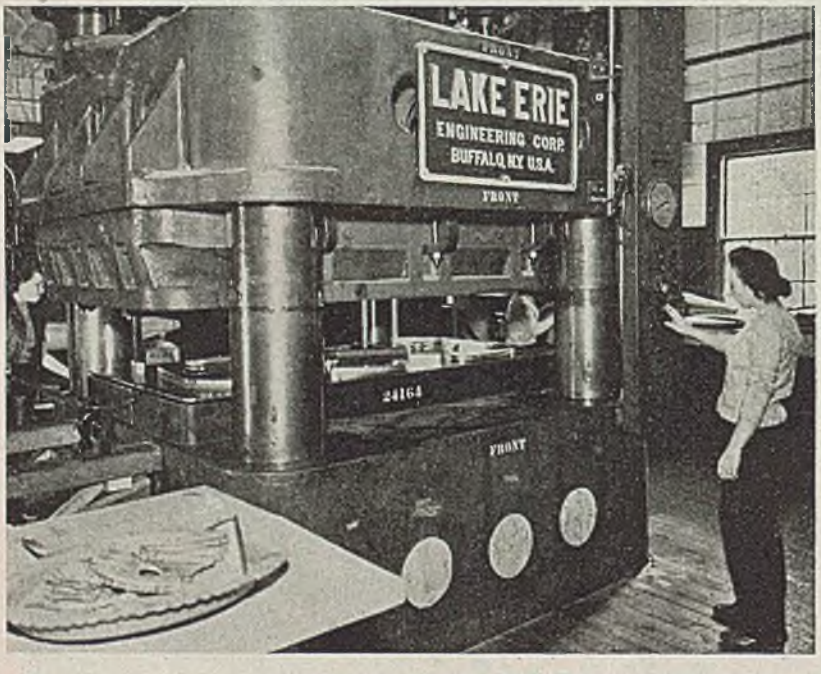
To eliminate this voltage drop between the magneto and spark plug, engineers designed and built a low tension, high frequency ignition system.

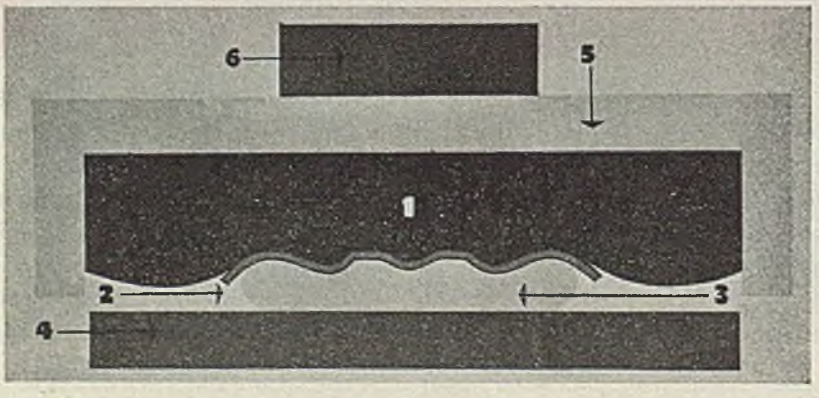
If we can take low voltage from the magneto, they reasoned, then it can be passed through the long cable wires to the spark plug with loss of little power. Once delivered at the spark plug, the power is then transformed to high voltage through the use of a tiny transformer built in the top end of the plug.

An important part of the system is the "spark gap" tube which embodies an alloy, which was an outgrowth of fundamental research initiated many years ago to determine the fundamentals of the common, but as yet little understood phenomenon in which a spark ignites a fuel air mixture.

The electrical energy generated by the magneto is stored in a condenser until the supply is great enough to jump the "spark gap" in the tube. When it does, it releases a steep wave of ignition power to the plug.

Here the energy is transformed to higher voltage, decreasing the flow of current, but increasing its force.





USES RUBBER FORMING PAD: A hydraulic press equipped with a new heat-resistant rubber forming pad developed by United States Rubber Co. turns out magnesium parts for aircraft. The rubber method of fabricating sheet metal is claimed to have saved many man-hours. Drawing shows how the rubber forming pad (1) is attached to the upper platen of the press (5). The hydraulic ram (6) comes down under heavy pressure, forcing the rubber against the sheet metal (2) and into the male die (3) which rests on the lower platen of the press (4)

EX-CELL-O's *facilities:*

*PRODUCTION ENGINEERING

The Ex-Cell-O organization, with skill, facilities and modern methods that have made a wartime record, can make an important contribution in the planning of quantity production of quality parts and unit assemblies for your postwar product.

HEAT TREAT

Induction Heating
Gas Carburize Furnaces
Box Carburize Furnaces
Pack Anneal Furnaces
Nitriding Furnaces
Laboratory for Heat Treat Control Including Micro Examination and Photography
Atmosphere Control Continuous Hardening Furnaces
Atmosphere Control Box Hardening Furnaces
Various Types of Air-Draw Batch Type Furnaces
Cyanide, Lead, and Neutral Salt Pot Furnaces
High Speed Steel Atmosphere Control
Vertical and Horizontal Hardening Furnaces
Continuous Air-Draw Furnaces
Sub-Zero Heat Treating Equipment

PRODUCTION MACHINES

Multiple Vertical Turret Lathes
Multiple Spindle Automatic Screw Machines
Single Spindle Automatic Screw Machines
Hand Screw Machines
Centerless Grinders
Single and Multiple Spindle Drilling Equipment
Plain O.D. Grinders
Plain I.D. Grinders
Milling Machines
Broaching Machines
Precision Thread Grinders
Precision Boring Machines
Lapping Machines
Special High Production Equipment

UNIT ASSEMBLIES

For many years Ex-Cell-O has supplied large and small manufacturers with parts and has also supplied many parts in unit assemblies after machining, heat treating and grinding.

INSPECTION

Ex-Cell-O has always maintained that quality in a product is not the result of accident; that quality is built into a product by rigid adherence to accepted quality standards . . . standards that are upheld at Ex-Cell-O by efficient inspection at every step of the machining process.

*A section of Ex-Cell-O Production Engineering Department is illustrated in this advertisement

We are Still Making Parts for WAR but EX-CELL-O is Ready for PEACE . . .

XLO
EX-CELL-O for PRECISION

The same long years of engineering experience . . . the modern and complete facilities . . . the manufacturing "know how" . . . that have given Ex-Cell-O an outstanding record in production for war can help you solve the problem of mass production of accurate parts and sub-assemblies for your peacetime products. Ex-Cell-O, with machining, heat-treating, grinding and sub-assembling facilities all under one management, offers you many practical advantages. Send your print or part to Ex-Cell-O in Detroit today, or get in touch with any member of Ex-Cell-O's field engineering staff located in thirty-two leading industrial centers in the United States and Canada.

Don't Gamble With Your Future Product . . . Plan to Use XLO Parts

EX-CELL-O CORPORATION • DETROIT 6

45—66

MEN of INDUSTRY

WILLIAM J. McMILLEN

William J. McMillen has been appointed manager of roll sales, Mackintosh-Hemphill Co., Pittsburgh. Mr. McMillen formerly was assistant manager of roll sales.

—o—

E. S. Elkus Jr. has been appointed assistant vice president in charge of finance, Joshua Hendy Iron Works, Sunnyvale, Calif. He succeeds **J. M. Mero**, resigned.

—o—

Charles L. Jones, assistant treasurer, Alan Wood Steel Co., Conshohocken, Pa., has been elected secretary, Philadelphia Control, Controllers Institute of America.

—o—

J. J. Grogan has been elected assistant treasurer, Allegheny Ludlum Steel Corp., Brackenridge, Pa., and **V. H. Mantz**, assistant secretary. Mr. Grogan succeeds the late **W. L. Dankmyer**.

—o—

Albert L. Kaye has been appointed metallurgical engineer, alloy steel products in the Pittsburgh district, Carnegie-Illinois Steel Corp., Pittsburgh. He succeeds **John Mitchell** recently appointed manager of the products section, Alloy Sales Division. **Maurice J. Day** succeeds Mr. Kaye as manager, alloy bureau, Carnegie-Illinois Metallurgical Division, Chicago.

—o—

Marvin S. Brown has been promoted to superintendent of engineering and maintenance, Joliet plant of the American Steel & Wire Co., Cleveland. He succeeds **John S. Banta**, a veteran of 42 years service who has been named to the newly created position of engineer-special. **Charles P. Pettigrew** has been made works engineer to fill the vacancy created by Mr. Brown's promotion.

—o—

Board of directors, Rigid-Tex Corp., Buffalo, announces election and appointment of the following officers: **Richard S. Smith**, president; **Hubert L. Perry**, vice president and treasurer; **William J. McArdle**, general sales manager; **John E. Emerson**, general manager; **R. Kemp Slaughter Jr.**, chief engineer, and **Eugene P. Thomas**, mill superintendent.

—o—

Fred M. High, formerly roll engineer for Hyde Park Foundry & Machine Co., Hyde Park, Pa., and Lewis Foundry & Machine Division, Blaw-Knox Co., Pittsburgh, has become associated with roll sales, Aetna-Standard Engineering Co., Youngstown, O.

—o—

George S. Garrard has been named chief engineer, Briggs Clarifier Co., Washington. Mr. Garrard formerly was assistant chief engineer in charge of all engineering branches, Jacobs Aircraft Engine Co., Pottstown, Pa. He also served as design analyst, Pratt & Whitney Aircraft Corp., East Hartford, Conn.

—o—

Graham Reid has been appointed acting procurement manager, Chance Vought Aircraft Division, United Aircraft Corp., Stratford, Conn.

—o—

Byrom Judson Smith, former production executive, Lycoming Division, Aviation Corp., Williamsport, Pa., and Marmon-Herrington Co. Inc., Indianapolis, has been appointed chief production engineer, Pitney-Bowes Postage Meter Co., Stamford, Conn.

—o—

W. F. Boyle has been named assistant to the vice president, Baldwin Locomotive Works and Pelton Water Wheel Co., a Baldwin subsidiary. Mr. Boyle will direct the companies' Pacific Coast district office at San Francisco.

—o—

W. H. Robinson Jr. has been named manager, General Electric Co.'s Lamp Department Advertising Division. His headquarters are at Nela Park, Cleveland. Mr. Robinson succeeds the late **H. Freeman Barnes**.

—o—

George C. Ford, works manager, Vultee Field Division, Consolidated Vultee Aircraft Corp., San Diego, Calif., has been placed in charge of the division, succeeding **Carl W. Coslow**, resigned. Mr. Ford will retain his title as works manager.

—o—

Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, has announced several appointments in its Sales Division as follows: **Marshal L. Noel**, previously industrial sales manager is now general sales manager of the Tractor Division; **William J. Faulkner**, formerly manager, Tractor Division, Washington office, becomes industrial sales manager; assistant industrial sales managers are **F. B. Harrison** and **E. G. Kullmann**. **H. A. Gratner** has been appointed agricultural sales manager; **Louis Adams** has been named harvester line sales manager with **S. H. Sorensen** as assistant harvester line sales manager; **Ernest Franks** is in charge of wheel tractor sales for industrial purposes in addition to his duties as manager of power unit sales. **Boyd S. Oberlink** has been appointed assistant to the vice president, Tractor Division.

—o—

John L. Salter has been appointed sales representative in charge of the Cleveland territory, Lamson & Sessions Co., Cleveland. Mr. Salter has been with the company for 13 years.

—o—

Armin G. Kessler has been appointed manager of sales, Midwestern district with headquarters in Akron, O., for the Farrel-Birmingham Co. Inc., Ansonia, Conn.

—o—

John W. Perry Jr., vice president, Grede Foundries Inc., Milwaukee, has been appointed to the Terms of Sale Committee, Gray Iron Founders' Society, Cleveland.

—o—

Clyde C. Bohner has been made vice president, Lawrance Aeronautical Corp., Linden, N. J. Mr. Bohner previously has held executive positions with Tungsol Lamp Works, Newark, N. J., and Western Cartridge Co., East Alton, Ill.

—o—

John M. Metes, formerly of W. R. Grace & Co., has become associated with Barium Steel Corp. as export manager of its subsidiary, Clyde Iron Works Inc., Duluth, Minn.

—o—

Daniel A. Herrick has been appointed manager of sales, d'Este Division, American Chain & Cable Co. Inc., with headquarters at Reading, Pa. This is a new division of the company.

—o—

Alvin Dice, vice president in charge of production, Albion Malleable Iron Co., Albion, Mich., retired June 1. Mr. Dice will continue as a member of the company's board of directors.

—o—

C. J. Smith, for the past three years director of Chrysler Corp. tank arsenal proving grounds, Centerline, Mich., has been appointed chief engineer, Monroe Auto Equipment Co., Monroe, Mich. From 1930 to 1942 Mr. Smith was in charge of the Packard Motor Car Co. proving grounds, Utica, Mich.

—o—

Theodore C. Fedders, former president, Fedders Mfg. Co. Inc., Buffalo, has resigned as a director of the company.

—o—

W. Earle Pashley, has been elected president, C. F. Pease Co., Chicago, to succeed **Thomas Lord** who has retired. Mr. Lord will remain as director and consultant.

—o—

Roy I. MacArthur, formerly assistant superintendent, has been appointed superintendent of General Motors Corp.'s Buick Motor Division forge plant, Flint,

Mich. Mr. MacArthur succeeds the late **Robert H. Darnton. Noel F. Young,** formerly assistant superintendent in charge of the die shop, becomes assistant superintendent of the plant; **Walter G. Malmquist** has been made assistant superintendent in charge of the die shop; **Henry J. Landis** becomes general foreman of the die shop and **Lauren V. Loveless** has been promoted to night general foreman.

—o—

Arthur H. Suckow of the Symington-Gould Corp., Rochester, N. Y., has been nominated for chairman of the Western New York chapter, American Foundrymen's Association, Chicago. Other candidates are: vice chairman, **Henry C. Winte;** secretary, **Leo A. Merryman;** treasurer, **Martin W. Pohlman.** Candidates for directorships are **John C. Goetz, Frank T. McQuillan** and **Avitus J. Heysel.**

—o—

F. Albert Moesel, assistant manager, Buffalo branch, W. A. Case & Son Mfg. Co., Buffalo, has been elected president of the Western New York chapter, American Society of Heating & Ventilating Engineers, New York.

—o—

Keith Williams, president, Pratt & Letchworth Co., Buffalo, has been elected vice president and a director of the Army Ordnance Association, Empire Post.

—o—

Dr. Earl W. Gluesenkamp and **Dr. James H. Lum** have been appointed assistant directors of research of Monsanto Chemical Co.'s Central Research Laboratories, Dayton, O

—o—

Lonnis Denison, formerly assistant general manager, Denison Engineering Co., Columbus, O., has been appointed vice president and assistant general manager. **Frank C. Norris,** formerly director of production, has been named vice president in charge of manufacturing and engineering. **E. L. Fouse** until his appointment as manager of expense control served as chief cost accountant.

—o—

J. G. Martin. credit manager, E. C. Atkins & Co., Indianapolis, has been elected president of the Indianapolis Association of Credit Men.

—o—

Thomas Henderson has been appointed assistant sales manager, Basca Mfg. Co. Inc., Indianapolis.

—o—

M. C. Wright, vice president, and **M. A. Dent,** secretary, Atlas Imperial Diesel Engine Co., Oakland, Calif., have been elected directors of the company.

—o—

Ilg Electric Ventilating Co., Chicago, has opened new branch offices in Grand Rapids, Mich., under direction of **J. W. Pulte,** and in Knoxville, Tenn., under direction of **Roy H. Mackay.** Mr. Pulte is a discharged veteran of World War II and prior to joining Ilg was field engineer for Detrex Corp., Detroit. Mr. Mackay for the past four years was associate engineer for the United States Bureau of Reclamation, Washington. The company has appointed **Marvin Gardner** as sales engineer, Dallas, Tex., and **George A. Innes** as sales engineer, Philadelphia. Mr. Gardner was previously head of the ventilating department, Ingalls Shipbuilding Corp., Pascagoula, Miss., while Mr. Innes was previously associated with the Barrett Division, Allied Chemical & Dye Corp., New York.

—o—

B. F. Ilsley, formerly assistant sales manager in charge of commercial operations at General Electric Co.'s cable plant, Oakland, Calif., has been appointed manager, Electric Wire and Cable Division, Central Stations Division. **W. J. Delahanty** of the company's San Francisco office replaces Mr. Ilsley.

—o—

C. L. Comegys recently was appointed manager, Research and Service Division, Addressograph-Multigraph Corp., Cleveland.

—o—

R. S. McLaughlin, formerly president, has been appointed chairman, General Motors of Canada Ltd., Oshawa, Ont. **William A. Wecker** becomes president and general manager.

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Arthur H. Dean has been elected a director, American Metal Co. Ltd., New York, to fill the vacancy caused by the death of **Harold Kingsmill.**

—o—

Joseph L. Oliver, general manager, Michael Yundt Co., Waukesha, Wis., has been elected to the board of directors.

—o—

J. Story Smith has resigned as vice president and secretary, Jacobs Aircraft Engine Co., Pottstown, Pa.

—o—

John T. Leslie, field engineer, Reynolds Metals Co. Inc., Richmond, Va., has been named Central Aluminum Division representative in Wisconsin and Minnesota.

—o—

Dr. Henry Butler Allen, secretary and director, Franklin Institute, Philadelphia, left recently for the European theater of operations on a special mission for the chief of ordnance, United States Army.

—o—

R. J. Lindquist has been elected treasurer of Curtiss-Wright Corp., Buffalo, in addition to his duties as vice president and controller. **Julia M. Scanlan,** former assistant secretary, has been elected secretary. Both succeed **E. S. Cramer** who has resigned as secretary and treasurer.

—o—

Howard D. Flicker has been appointed production manager, Long Island City plant, Salkover Metal Processing Co.,

JOHN W. CRAIG

Chicago. Former associations include: Beach-Russ Co., New York, Edo Aircraft Corp., College Point, N. Y., American Cystoscope Makers Inc., New York, and Hub Industries, Long Island City, N. Y.

—o—

John W. Craig has been appointed general works manager of the Richmond, Ind. plant, Crosley Corp., Cincinnati. Mr. Craig joined the Crosley organization in 1937 as assistant chief refrigeration engineer and later was promoted to chief refrigeration engineer.

—o—

E. O. Sowerwine, assistant to the president, Anaconda Copper Mining Co., New York, has been elected a vice president of the company. **C. E. Moran,** secretary of Chile Copper Co. and assistant secretary of Anaconda, has been elected secretary of the parent company while **James E. Woodard,** president of the Metals Bank & Trust Co. of Butte, Mont., has been elected treasurer of Anaconda.

—o—

E. C. Karmgard has become associated with the Personnel Laboratory, Chicago. Mr. Karmgard formerly was secretary, Cleaver-Brooks Co., Milwaukee.

—o—

LeRoy Hackl, Heil Co., Milwaukee, has been chosen president, Junior Traffic Club of Milwaukee.

—o—

E. K. Fry, assistant superintendent at the Columbus, O., plant, Curtiss-Wright Corp., has been elected chairman of the Columbus chapter, American Society for Metals.

—o—

Burton F. Miller has been named managing director, Highway Contractors' Division, American Road Builders' Association, Washington.

—o—

Westinghouse Electric Corp., Pittsburgh, has announced the appointment of **Norman C. Hurd** as manager, Cincinnati manufacturing and repair depart-

MERLE J. TREES

Who has been elected chairman of the board, Chicago Bridge & Iron Co., Chicago, as noted in STEEL, June 4, p. 96.

HENRY A. ROEMER JR.

Who was elected executive vice president, Detroit Seamless Steel Tube Co., Detroit, as noted in STEEL, May 28, p. 94

A. W. BROWN

Who has been elected a member of the board of directors, John A. Roebling's Sons Co., Trenton, N. J. as noted in STEEL, May 7, p. 95.

ment. **Douglas C. Lynch,** manager of the company's special projects department, has been granted a leave of absence to serve as technical adviser to President Sergio Osmena, Philippine Islands. **George M. Cribbs** has been appointed staff assistant, Office Methods Division.

—o—

R. W. Lytle, vice president in charge of special engineering, Formica Insulation Co., Cincinnati, has been appointed a member of the committee on Postwar Airplane Pulley Design and will represent all pulley manufacturers in the United States on this committee.

—o—

David M. Gans has been appointed technical director, Quaker Chemical Products Corp., Conshohocken, Pa.

—o—

Ralph B. Smith has been elected secretary, Menasco Mfg. Co., Burbank, Calif. Mr. Smith will retain his duties as industrial relations director.

—o—

Richard T. Purdy has been promoted to manager, Motor Truck Division, Automobile Manufacturers Association and the Military Vehicles Division, Automotive Council for War Production, Detroit.

William F. Sherman has been named manager of the Automotive Council for War Production, Contract Termination and Reconversion Division.

—o—

Harvey C. Fruehauf, president, Fruehauf Trailer Co., Detroit, has been elected a director, Automotive Council for War Production.

—o—

Edward M. Welty, formerly assistant general manager of sales, Industrial Fasteners Division, Oliver Iron & Steel Corp., Pittsburgh, has been appointed general manager of sales of that division succeeding **James G. Graham.** Mr. Welty joined the Oliver organization 34 years ago.

—o—

H. W. Overman has been placed in charge of industrial friction materials, Thermoid Co., Trenton, N. J.

—o—

F. F. Duggan has been appointed general sales manager of the North Chicago, Ill., Deepfreeze Division, Motor Products Corp., Detroit.

—o—

John J. Lance recently was appointed field representative in the Cleveland-Mansfield-Youngstown area of the Special Chemicals Division, Pennsylvania Salt Mfg. Co., Philadelphia. **Ethel Serfas Klingman,** formerly assistant manager of advertising, has been promoted to manager of advertising, succeeding **H. M. Ellsworth,** resigned.

—o—

William I. Beach, chief plastics engineer, North American Aviation Inc., Inglewood, Calif., has been presented with the John Wesley Hyatt award for distinguished contribution to the plastic industry.

—o—

Kenneth MacGrath, executive vice president, has been elected president, Air Associates Inc., Teterboro, N. J., effective Aug 1.. Mr. MacGrath succeeds **Harold I. Crow.**

—o—

John M. Grace, first vice president, Vaughan Novelty Mfg. Co. Inc., Chicago, has been elected president to succeed the late **Harry L. Vaughan,** founder of the company.

—o—

Charles E. Seman, New York, eastern representative, National Founders Association, Chicago, has been appointed a substitute industry member of the Second Regional War Labor Board (New York state and Northern New Jersey).

OBITUARIES . . .

Charles Hardy, 65, president, Charles Hardy Inc., New York, died June 8 in that city. Mr. Hardy was a pioneer in the powder metallurgy field.

—o—

Thomas M. Skove, 45, a director and general superintendent, Cleveland Twist Drill Co., Cleveland, was killed in Germany while on a special bombing survey assignment for the War Department.

—o—

Charles R. Whittier, 88 former president, Whittier Elevator Co. and more recently affiliated with Sanderson & Porter, New York, construction engineers, died recently at his home in that city.

—o—

P. M. Kettenhofen, 72, for the past 39 years purchasing agent, Malleable Iron Range Co., Beaver Dam, Wis., died recently in that city.

—o—

Harry R. Swartz, 79, former president, R. Hoe & Co., New York, died June 9, at his home in that city.

—o—

Even E. Ellertson, 86, chairman, Pioneer Engineering Works Inc., Minneapolis, died recently in St. Paul.

—o—

Prof. Chester W. Caldwell, 42 head of electrical engineering research and electronics. Purdue University, West Lafayette, Ind., died suddenly June 5 in that city.

—o—

I. Allen Barnett, 53, president, I. A. Barnett Co., Barberton, O., died June 7 in Ft. Lauderdale, Fla.

—o—

Harry S. Clay, 55, director of purchases, Oliver Corp., Chicago, died June 6 in that city.

—o—

William T. Brassil, 65, vice president and general manager, Adams & Westlake Co., Elkhart, Ind., died June 3 in Chicago.

Pullman Car Co. Plant Will Start On Reconversion

WPB authorizes limited preparations toward resumption of railway passenger car construction

PULLMAN-STANDARD Car Mfg. Co., Chicago, has received War Production Board authorization for limited reconversion of facilities of its Chicago plant to railway passenger car building after July 1. This was disclosed when WPB, in the first action of its kind at Chicago, approved a $187,783 reconversion preparation project at the plant.

The plan, approved in Washington with recommendation of the Chicago area production urgency committee and WPB facilities review committee, will allow the company to relocate its steel cabinet plant in new quarters, including paint spray equipment, conveyors, and other production facilities.

Pullman-Standard officials say the step is part of the reconversion program announced early in February. Actual resumption of passenger car building probably will be delayed beyond July 1 because of the wide diversity of parts and materials, including air conditioning equipment, upholstery, linoleum, electric wiring and motors, and plumbing, required before construction can start.

WINS SAFETY AWARD: Presentation of the National Safety Council distinguished service safety award to the Bolt & Nut Division, Republic Steel Corp., Cleveland, is shown above. Left to right: W. M. Kelley, assistant to vice president in charge of operations; C. P. McCabe, assistant works manager; H. C. Ellison, works manager; Ned H. Dearborn, president, National Safety Council; J. A. Voss, director of industrial relations, Republic Steel Corp.

New Firm To Deal in Scrap Metals Formed in Chicago

Max Schlossberg, for the past ten years vice president, M. S. Kaplan Co., Chicago, and Harold Brady, formerly a partner in the Brady Co., Rock Island, Ill., and associates, have established the Max Schlossberg Co., 33 North LaSalle street, Chicago, to deal in iron and steel, alloy and stainless scrap. Prior to his 13 years with the Kaplan company, Mr. Schlossberg was affiliated for six years with Price Iron & Steel Co., Chicago, and before that with the Highland Iron & Steel Division, American Chain & Cable Co., Terre Haute, Ind. He was president of the Chicago chapter, Institute of Scrap Iron & Steel Inc., in 1938-39, and has been a national director of the institute since that time.

Square D Co. To Expand Operations to Mexico

Formation of Square D de Mexico, S. A., to manufacture electrical distributing and control equipment for the Mexican market is being completetd, according to F. W. Magin, president, Square D Co., Detroit.

Square D de Mexico will be owned jointly by the U. S. company and Mexican capital. A plant equipped with the modern American machinery will be built in Mexico City as soon as arrangements can be completed.

In initial stages, operations will consist largely of manufacture of cabinets and assembly of parts shipped to Mexico from Square D plants in Detroit and Milwaukee. As the business progresses, complete parts will be manufactured at the Mexican plant.

Expansion of Square D activities to the south will give the company its second foreign plant. A Canadian subsidiary has been operating since 1924.

BRIEFS . . .

American Photocopy Equipment Co., Chicago, has announced expansion plans that will employ 200 to 500 ex-servicemen in the next two years.

—o—

R. G. LeTourneau Inc., Peoria, Ill., is to establish a British branch. Dennis M. Burgess, executive vice president, is now in England to consider sites for the branch plant within 150 miles of London. Maurice Foote, supervisor of Plant 1, Peoria, will go to England to supervise construction of the new plant.

—o—

LaPointe Machine Tool Co., Hudson, Mass., has been awarded a Liberty Mutual Insurance Co. accident prevention flag for a 56 per cent reduction in accidents in 1944. Lapointe's record was 54 per cent better than the average for the machine tool industry.

—o—

Bay City Shovels Inc., Bay City, Mich., has put into operation a new addition increasing factory and office facilities.

—o—

American Car & Foundry Co.'s. plant at Berwick, Pa., has received the National Security Award for extraordinary achievement in establishing and maintaining superior security and protection measures against air raids, fire, sabotage, and avoidable accidents.

—o—

Aeroil Products Co. is the new name adopted by the organization formerly known as Aeroil Burner Co. Headquarters are at West New York, N. J.

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Pennsylvania railroad reported to the Conservation and Salvage Division of the War Production Board that the company's scrap shipments continue at a high mark.

—o—

Committee for Industrial Salvage of Houston, Tex., has been commended by the War Production Board as a national pacemaker. That committee led the entire southwestern region of the nation in industrial salvage in the past three years.

—o—

Westinghouse Electric Corp.'s plant at East Springfield, Mass., is for the first time since May, 1942, producing electric fans for civilian use. Sale is restricted to hospitals, war plants, and other essential users.

War Production Board Reports on

Steel Expansion for

THE WAR Production Board today released complete details on the huge 2½ billion dollar war expansion program involving the steel industry and related industries. Prepared by the Steel Division's W. A. Hauck, the report undoubtedly comprises one of the most important documents relating to the steel industry ever released and it will assume greater importance in the months ahead when the government faces the difficult problem of disposing of the many facilities built with taxpayers' money.

Under the Surplus Property Act of 1944, Congress and the Surplus Property Board have a joint responsibility for framing policies for the disposition of certain surplus plants and facilities, among which iron and steel plants are included. As part of this procedure, joint hearings are scheduled to be held shortly on the disposal of surplus iron and steel plants by the War Contracts Subcommittee of the Senate Committee on Military Affairs and the Industrial Reorganization Subcommittee of the Senate Special Committee on Economic Policy and Planning. Senator Joseph C. O'Mahoney of Wyoming is chairman of both of these subcommittees.

Postwar Demand—Much of the data presented before the subcommittees will be lifted out of the Hauck report. Also, in preparation for the hearings, Senator O'Mahoney recently sent letters to steel companies, forge shops, casting producers, builders of heavy equipment, railroads, labor organizations and others, asking for suggestions and advice pertaining to the disposal problem. In reply to a question about probable postwar steel demand, Inland Steel Co. estimated the average for the 30-year period between 1945 and 1975 at 54,000,000 tons with maximum demand by 1975 of 63,000,000 tons. Initial postwar demand of 65,000,000 to 70,000,000 tons as estimated by Walter S. Tower of the American Iron and Steel Institute is regarded reasonable by Inland. U. S. Steel Corp. places postwar steel demand in good years at 65,000,000 to 70,000,000 tons but points out that capacity Jan. 1, 1940 was 81,000,000 tons and now is over 95,000,000 tons. Most companies anticipate postwar demand substantially in excess of prewar.

Practically all companies advised the Senator that disposition of the plants before they are declared surplus is desirable, but disagreed as to sale or lease. Inland takes the position that plants should be disposed of by sale only, in order to get the government completely out of business. American Rolling Mill Co. takes the same view. Copperweld Steel Co. advocates a 2-year lease on a tonnage basis which would permit the government to liquidate its entire capital investment and thus not necessarily add any burden to management. With respect to facilities installed primarily for the production of wartime products, Bethlehem Steel Co. suggests that the government's interests might best be served by preserving the ownership of the government for future emergencies rather than sell at a nominal price. United Engineering & Foundry Co. and Continental Foundry & Machine Co. oppose the sale of steel plants to companies not now engaged in the steel business.

Geneva a Pattern—Largest of the steel plants to be sold is the $196,000,000 Geneva, Utah project. United States Steel Corp., Colorado Fuel & Iron Corp. and Kaiser Co. Inc. already have notified the Defense Plant Corp. of a desire to negotiate for the plant and each of these companies is preparing surveys to determine the productive uses to which the plant may be devoted. A similar study also is being made by Arthur G. McKee & Co. for the Defense Plant Corp. In the opinion of Senator O'Mahoney, what is done at Geneva may well be the pattern for what will be done with other war plants built at government expense.

The Hauck report contains so much data on the factors leading up to the expansion of existing facilities and construction of new plants for wartime needs, that it is certain to prove extremely useful in disposing of surplus property as well as in providing an accurate record of one of the most hectic periods in the history of the steel industry. In addition to steelmaking facilities, the report includes ore, ore transportation, steel warehouses, coal and coke, refractories, ingot molds, scrap, steel, gray iron and malleable castings, forgings and ferroalloys.

New Capacity—No accumulative records were maintained to show the additional capacity provided by the steel expansion program but Mr. Hauck estimates the tonnage at 35,325,802 for the period from Jan. 1, 1941 through Dec. 31, 1944. Mr. Hauck arrives at this figure in the following manner: The American Iron and Steel Institute's Jan. 1, 1940 steel ingot capacity figure of 81,619,496 tons is reduced by 2,067,969 tons to allow for unused and dismantled open hearth furnaces plus over-

Report prepared by W. A. Hauck of Steel Division tells in detail how ore, transportation, ferroalloy, refractory, blast furnace, steelmaking, foundry, forging and other facilities were built up to supply huge requirements for war; steel industry faces no real conversion problem in transition from war to peace; data will be used in pending congressional hearings

War

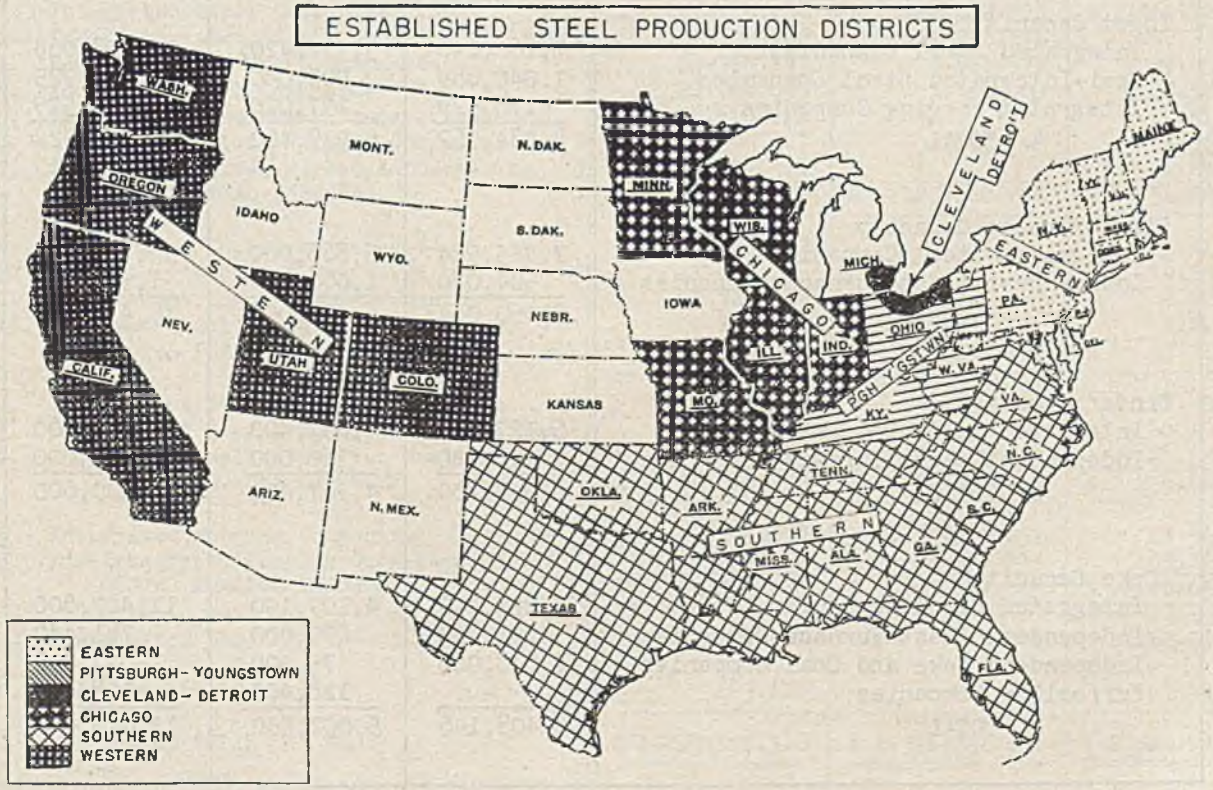
estimated ingot capacities, making the net operative capacity 79,551,527 tons. This capacity, operated at 98 per cent of capacity for the four years beginning with 1941, provided 311,841,986 tons of steel. However, as the result of additional new capacity added during the same four years, actual steel ingot production for the period was 347,167,788 tons. Subtracting 311,841,986 tons from this figure leaves 35,325,802 tons realized from the expansion program. Actual ingot production in 1944 was 89,552,961 tons, of which 11,592,465 tons is attributed to steel expansion in 1944. Currently, 12,758,603 tons annually are being realized from the entire program.

Accompanying tables indicate the extent of the expansion program on the basis of both capacity and costs. It will be observed that added steel ingot capacity of 15,323,522 tons was slightly more than matched by new blast furnace capacity of 15,412,064 tons. Thus, the steel industry had capacity as of Jan. 1, 1945 to produce 95,505,280 tons of steel ingots and 67,313,890 tons of pig iron. Coke capacity was supplemented by 13,410,646 tons and sinter capacity by 11,500,000 tons. Substantially more than half of all this capacity was financed by industry itself.

Industry Spends Most—The table on costs of the expansion program shows that the steel industry spent $1,956,881,057 on new facilities, of which less than half or $925,962,204 was government money. It may be explained, however, that a considerable amount of government money is represented in the "industry financed" column since certain facilities, such as the Kaiser plant in California and the Sheffield plant in Texas, were made possible by direct RFC loans.

During the period from Jan. 1, 1940 to June 30, 1944, the steel industry, including foundry companies, forge companies and companies in other closely related industries financed and installed in excess of 3000 separate projects. These projects varied in cost from a few thou-

This map, included in the Hauck report, indicates the principal steelmaking districts in the United States



sand dollars to several million each and were installed for maintaining, balancing, increasing and otherwise improving, wherever possible, steel supply, production and distribution. A large number of the projects included finishing and special purpose facilities for better rounding out and balancing supply and production and improving the quality of steel. In numerous instances, it was necessary to supplement government financed projects with those financed by industry for the servicing of government financed projects.

Necessity certificates providing for rapid amortization allowance were issued on most of the industry financed facilities. Some companies, however, made no application for necessity certificates, apparently preferring to follow normal depreciation procedure.

Most Plants Rented—Government financed projects include steel projects sponsored or financed by the Army, Air Corps, Navy, Maritime Commission, Defense Plant Corp. and other government agencies, as well as projects installed and initially financed by steel companies and subsequently reimbursed for over a 60-month period under emergency plant facilities contracts. Rentals are paid by companies for use of these facilities with the exception of the Geneva plant which is both government financed and government operated. The Geneva Steel Co., U. S. Steel Corp. subsidiary, operates the plant as agent for the government of the United States.

Government Participation—Space does not permit detailing the distribution of government and industry projects by individual companies but the following table summarizes these data by types of steel companies:

DISTRIBUTION OF PROJECTS

Type of Company	Total Number	Number with Projects	Company Financed	Government Financed
Integrated	19	19	18	14
Semi-integrated	48	41	41	15
Non-integrated	216	94	87	18

Government participation in the expansion of the steel industry is shown as follows:

GOVERNMENT PARTICIPATION

	Total Expansion	Government Participation	% Govt. Participation
Ingots (tons)	15,323,522	6,939,460	45.3
Pig Iron (tons)	15,412,064	6,952,000	45.1
Sintered Ore (tons)	11,500,600	4,987,400	43.4
Coke (tons)	13,410,646	5,002,500	37.3
Cost	$1,956,881,057	$925,962,204	47.3

Shifts in Industry—Mr. Hauck points out in his report that the relative position of the smaller steel companies has improved slightly as a result of the expansion program, the percentage now being 13.5 as compared with 12.3 before the war. A number of shifts in relative positions also are noted among the larger companies. In the table, the Geneva, Utah steel plant is listed separately

Summary of Steel Expansion—Capacity

Basic Capacity	Industry Financed Net Tons	Government Financed Net Tons	Total Net Tons
Ingot Capacity			
Integrated Steel Companies	7,160,648	5,737,420	12,898,068
Semi-Integrated Steel Companies	1,046,885	905,040	1,951,925
Integrated Forging Companies	176,529	297,000	473,529
TOTAL	8,384,062	6,939,460	15,323,522
Blast Furnace Capacity			
Integrated Steel Companies	7,955,984	5,886,000	13,841,984
Independent Blast Furnace Companies	504,080	1,066,000	1,570,080
TOTAL	8,460,064	6,952,000	15,412,064
Sinter Capacity			
Integrated Steel Companies	6,123,200	4,637,400	10,760,600
Independent Blast Furnace Companies	390,000	350,000	740,000
TOTAL	6,513,200	4,987,400	11,500,600
Coke Capacity			
Integrated Steel Companies	7,298,700	4,109,100	11,407,800
Independent Blast Furnace Companies	91,440	690,000	781,440
Independent Coke and Coal Companies	1,018,006	75,000	1,093,006
Ferroalloy Companies	-	128,400	128,400
TOTAL	8,408,146	5,002,500	13,410,646

as it is government owned. When DPC disposes of its various facilities, there may be a number of changes in the positions indicated.

SHIFTS IN INDUSTRY CAPACITY

Large Companies	Ingot Capacity —Jan. 1, 1940— Net Tons	%	Ingot Capacity —Jan. 1, 1945— Net Tons	%
(over 1,000,000 tons capacity)				
United States Steel Corp.	27,795,000	34.1	32,307,000	33.8
Bethlehem Steel Co.	11,468,800	14.1	12,900,000	13.5
Republic Steel Corp.	7,840,000	9.6	9,791,000	10.2
Jones & Laughlin Steel Corp.	4,920,384	6.0	5,024,400	5.3
Youngstown Sheet & Tube Co.	3,494,400	4.3	4,002,000	4.2
National Steel Corp.	3,808,000	4.7	3,900,000	4.1
Inland Steel Co.	3,091,200	3.8	3,400,000	3.6
American Rolling Mill Co.	3,030,182	3.7	3,268,000	3.4
Wheeling Steel Corp.	1,960,000	2.4	1,960,000	2.1
Crucible Steel Co. of America	933,408	1.1	1,507,680	1.6
Colorado Fuel & Iron Corp.	1,108,800	1.4	1,272,000	1.3
Pittsburgh Steel Co.	1,072,557	1.3	1,072,000	1.1
Ford Motor Co.	1,017,296	1.2	967,420	1.0
Total	71,540,027	87.7	81,371,500	85.2
Small Companies (Under 1,000,000 tons cap.)	10,079,469	12.3	12,850,380	13.5
Geneva Steel Plant	.....	....	1,283,400	1.3
Grand Total	81,619,496	100.0	95,505,280	100.0

The Hauck report contains two sets of figures which may prove useful in establishing fair selling prices for government-owned facilities. One set shows cost of constructing these facilities was above the levels ordinarily experienced by industry because of the strong pressure for early completion, necessitating much overtime for labor and such uneconomical methods as installing foundations in extremely cold weather. In addition, orders cancelling or deferring construction and their subsequent reinstatement contributed to increased costs. For instance, the structural mill at Geneva was cancelled and construction crews called off the job. Subsequently, it was decided to go ahead with the mill.

Government Costs Higher—The report places estimated completed cost per ton of government financed ingot capacity included in the program at $133.43 based upon 6,939,460 tons of capacity installed and total cost of $925,062,204. This compares with $122.96 per ton for industry financed capacity based upon 8,384,062 tons of capacity installed and total cost of $1,030,918,853. Average cost per ton for both government and industry financed capacity was $127.70 on the basis of an over-

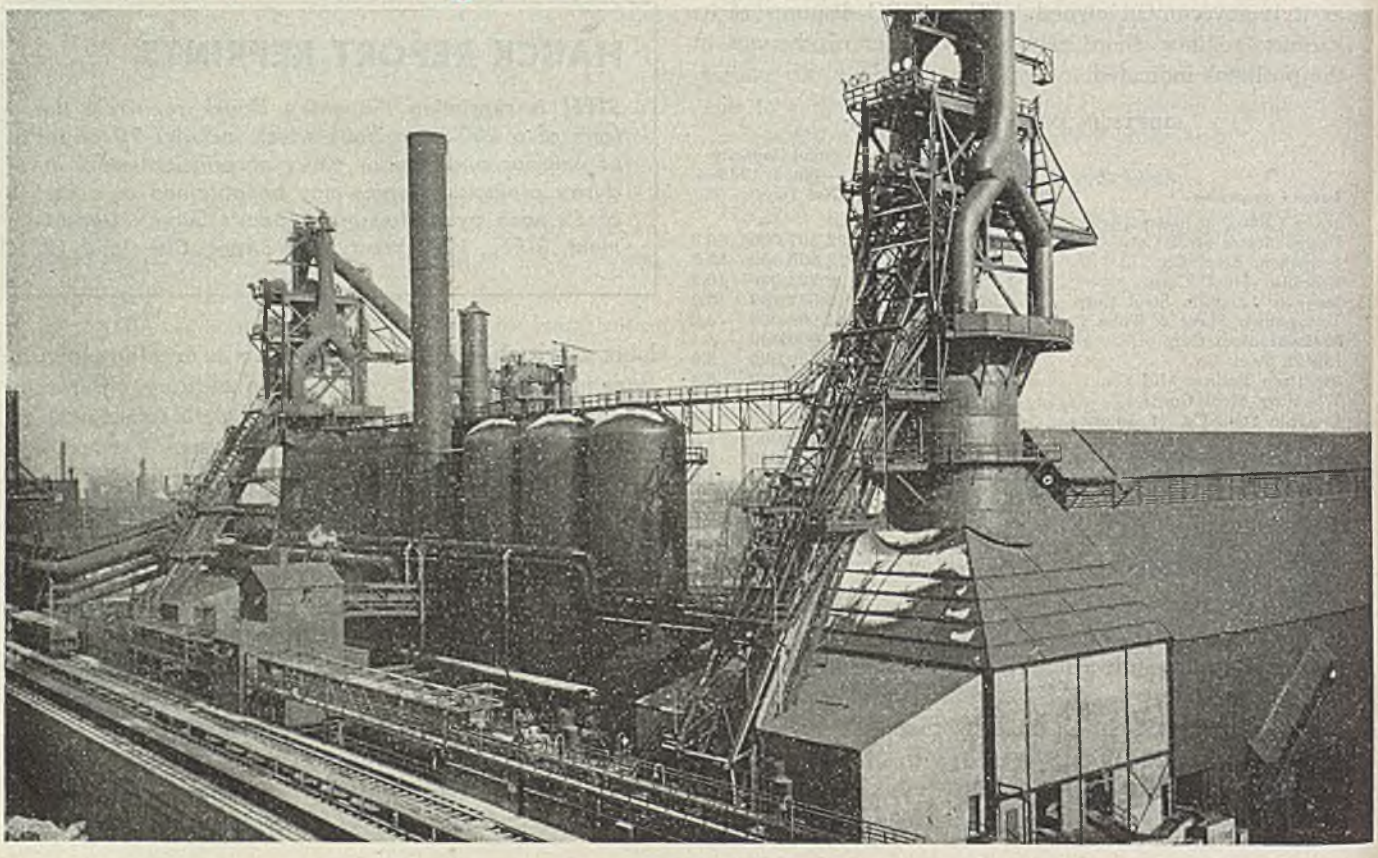
HAUCK REPORT REPRINTS

STEEL is reprinting the entire Hauck report in the form of a 200-page book which includes 70 pages of exterior and interior views of principal steel industry projects. Copies may be obtained at a cost of $2 each by addressing Reader's Service Department, STEEL, 1213 West Third Street, Cleveland 13.

Summary of Steel Expansion—Cost

Industry	Industry Financed	Government Financed	Total
1. Integrated Steel Companies	$ 876,694,256	$ 792,632,305	$ 1,669,326,561
2. Semi-Integrated Steel Companies	58,158,742	84,216,176	142,374,918
3. Non-Integrated Steel Companies	29,768,143	8,686,575	38,454,718
4. Independent Ore Companies	29,004,034	3,382,000	32,386,034
5. Independent Ore Water Transportation Co.	24,510,012	-	24,510,012
6. Independent Blast Furnace Companies	11,544,287	37,045,148	48,589,435
7. Independent Steel Warehouse Companies	1,239,379	-	1,239,379
TOTAL STEEL INDUSTRY	$ 1,030,918,853	$ 925,962,204	$ 1,956,881,057
8. Independent Coal-Coke Companies	12,011,282	1,405,579	13,416,861
9. Refractory and Flux Companies	11,961,206	2,395,521	14,356,727
10. Independent Ingot Mould Companies	2,329,034		2,329,034
11. Iron and Steel Scrap Companies	880,708	1,336,007	2,216,715
TOTAL STEEL AUXILIARY INDUSTRY	$ 27,182,230	$ 5,137,107	$ 32,319,337
12. Independent Steel Casting Companies	48,329,268	141,077,403	189,406,671
13. Independent Gray Iron Casting Companies	15,218,829	5,737,792	20,956,621
14. Independent Malleable Iron Casting Co.	12,544,173	13,641,264	26,185,437
TOTAL FOUNDRY INDUSTRY	$ 76,092,270	$ 160,456,459	$ 236,548,729
15. Integrated Forging Companies	20,199,073	67,165,251	87,364,324
16. Non-Integrated Forging Companies	28,692,552	74,594,433	103,286,985
TOTAL FORGING INDUSTRY	$ 48,891,625	$ 141,759,684	$ 190,651,309
17. Ferro Alloy Companies	89,822,461	78,215,646	168,038,107
18. Miscellaneous Companies	293,927	211,552	505,479
GRAND TOTAL	$ 1,273,201,366	$ 1,311,742,652	$ 2,584,944,018

Steel Expansion for War



These two 1250-ton Defense Plant Corp. blast furnaces at Inland Steel Co.'s Indiana Harbor, Ind. plant each have rated annual capacity of 427,000 net tons

all expenditure of $1,956,881,057 to provide 15,323,522 tons of capacity.

The accompanying table entitled "Schedule of Steel Supply Facilities" shows in Column A the categories of all steel supply facilities. Column B shows a breakdown of industry financed facilities into these categories according to applicable costs. In Column C is shown the breakdown of government financed facilities (marked "X") into these categories as installed by individual integrated companies, the semi-integrated and non-integrated companies and miscellaneous companies. Cost of government financing by these categories is not available and, accordingly, it is not possible to compare the cost of industry and government financed projects. However, it is possible to observe the types of government financed projects operated by individual companies.

Peacetime Rate 60 Per Cent—The second set of figures prepared by Mr. Hauck indicates that the steel industry cannot be expected to operate in peacetime at a long-term average of more than approximately 60 per cent of capacity. It is probably this fact that made the steel industry hesitant in the latter part of 1940 and the early part of 1941 about extending existing capacity substantially. Capacity had been increased by 35,370,350 tons during and since World War I and some time prior to Pearl Harbor it was not possible to estimate closely requirements for World War II. A summary of increases in capacity by 5-year periods follows:

PREWAR INCREASES IN STEEL CAPACITY

Five Year Periods	Net Increase in Capacity	Net Increase %
World War I (1915-19)	16,064,445 tons	34.7
Postwar (1920-24)	6,159,631 tons	9.9
Boom (1925-29)	4,512,184 tons	6.6
Depression (1930-34)	5,466,524 tons	7.5
Prewar (1935-39)	3,167,566 tons	4.0
Total	35,370,350 tons	

During the 5-year periods following World War I, the industry had a high percentage of its facilities that was not in use as shown by the following figures:

UNUSED STEEL CAPACITY

Five Year Periods	Operating Rate %	Unused Capacity (net tons) For period	Av. per year	%
Postwar (1920-24)	62.3	122,205,101	24,441,020	37.7
Boom (1925-29)	81.1	64,546,663	12,909,332	18.9
Depression (1930-34)	37.6	240,599,505	48,119,901	62.4
Prewar (1935-39)	58.7	163,907,847	32,781,569	41.3
Total		591,259,126		
Average Per Year	59.2		29,562,956	40.8

For purposes of comparison, it should be noted that unused capacity during the five World War I years (1915-19) averaged 9,990,567 tons or 18.3 per cent. Unused capacity for the five World War II years (1940-44) averaged 5,185,673 tons or 5.9 per cent. Based upon the peacetime rate of 59.2 per cent for the 20-year period noted above, it undoubtedly will be pointed out in the hearings involving disposal of surplus plants that private industry cannot be expected to project its long-term earn-

Schedule of Supply Facilities

Column A	Column B	Column C																
		Government Financed Expansion																
	Industry Financed Expansion	Categories Marked (x) Included According to Projects by Companies																
Categories of Steel Supply Facilities Included In Steel Expansion Program	Categories Included According to Applicable Costs	U. S. Steel	Bethlehem	Republic	Jones & Laughlin	Youngstown S. & T.	Inland	American Roll. Mill	Geneva	Colo. Fuel & Iron	Alan Wood	Crucible	Ford	Pittsburgh Steel	Semi-Integrated	Non-Integrated	Miscellaneous
Iron Mines	$ 96,962,092			x	x			x	x		x						x
Ore Treatment	17,692,340			x	x			x	x								x
Water Transportation Ore	58,027,935																
Raw Material Handling	11,342,452			x	x				x						x		x
Coal Mining	52,920,802			x				x	x								x
Coal Washing	12,929,835			x													
Coke	72,050,416	x		x			x	x	x	x							x
Flux & Refractories	6,278,093			x				x	x								x
Pig Iron and Ferro Manganese	111,595,169	x		x			x		x					x			x
Bessemer Furnace	2,963,626																
Open Hearth Furnaces & Facil.	62,197,455	x	x	x				x	x						x		
Electric Furnaces & Facil.	18,588,461	x		x		x		x				x			x		
Rolling Mills and Facil.	168,873,884	x		x				x	x			x	x		x		
Finishing	198,825,897	x		x	x	x		x	x			x	x	x	x	x	
Steel Casting	1,010,643	x						x							x		
Gray Iron Casting	463,266			x													
Drop Forging	2,357,292															x	
Heavy Forging	16,151,545		x	x						x		x			x		
Service	82,513,129	x		x				x	x	x		x			x	x	x
Miscellaneous	31,455,154	x		x	x	x	x	x	x			x			x	x	x
Warehouse	5,719,367																
Total	1,030,918,853																

ings on the basis of an average operating rate much higher than 60 per cent.

Geographical Shifts—Mr. Hauck observes in his report that the relative capacity of the steel industry has been shifted somewhat southward and westward and especially to the West Coast. The following table reveals a loss of 2.7 per cent for the combined Eastern, Pittsburgh, Cleveland and Chicago production districts, against a gain of 2.7 per cent for the Southern and Western districts. The four Midwestern and Eastern districts accounted for 93.2 per cent of the country's total ingot capacity as of Jan. 1, 1940 and received 74.3 per cent

of the new capacity added during the war. The Southern and Western districts accounted for only 6.8 per cent of the country's total capacity Jan. 1, 1940 but received 25.7 per cent of the expansion program.

GEOGRAPHICAL SHIFTS OF THE STEEL INDUSTRY EFFECTED BY THE STEEL EXPANSION PROGRAM

	—Jan. 1, 1940— Ingot Capacity	% of Total	—Jan. 1, 1945— Ingot Capacity	% of Total	Geographical Shifts—Decrease & Increase Total tons	%
Eastern	16,160,322	19.8	18,023,060	18.9	1,862,738	—0.9
Pittsburgh	34,458,309	42.2	39,885,290	41.8	5,426,981	—0.4
Cleveland	7,900,888	9.7	7,731,320	8.1	—169,568	—1.6
Chicago	17,553,701	21.5	20,743,920	21.7	3,190,219	0.2
Total	76,073,220	93.2	86,383,590	90.5	10,310,370	—2.7
Southern	3,360,225	4.1	4,209,220	4.4	848,995	0.3
Western	2,186,051	2.7	4,912,470	5.1	2,726,419	2.4
Total	5,546,276	6.8	9,121,690	9.5	3,575,414	2.7
Grand Total	81,619,496	100.0	95,505,280	100.0	13,885,784*	0.0

*Net increase after capacity dismantled and downward adjustments of capacity.

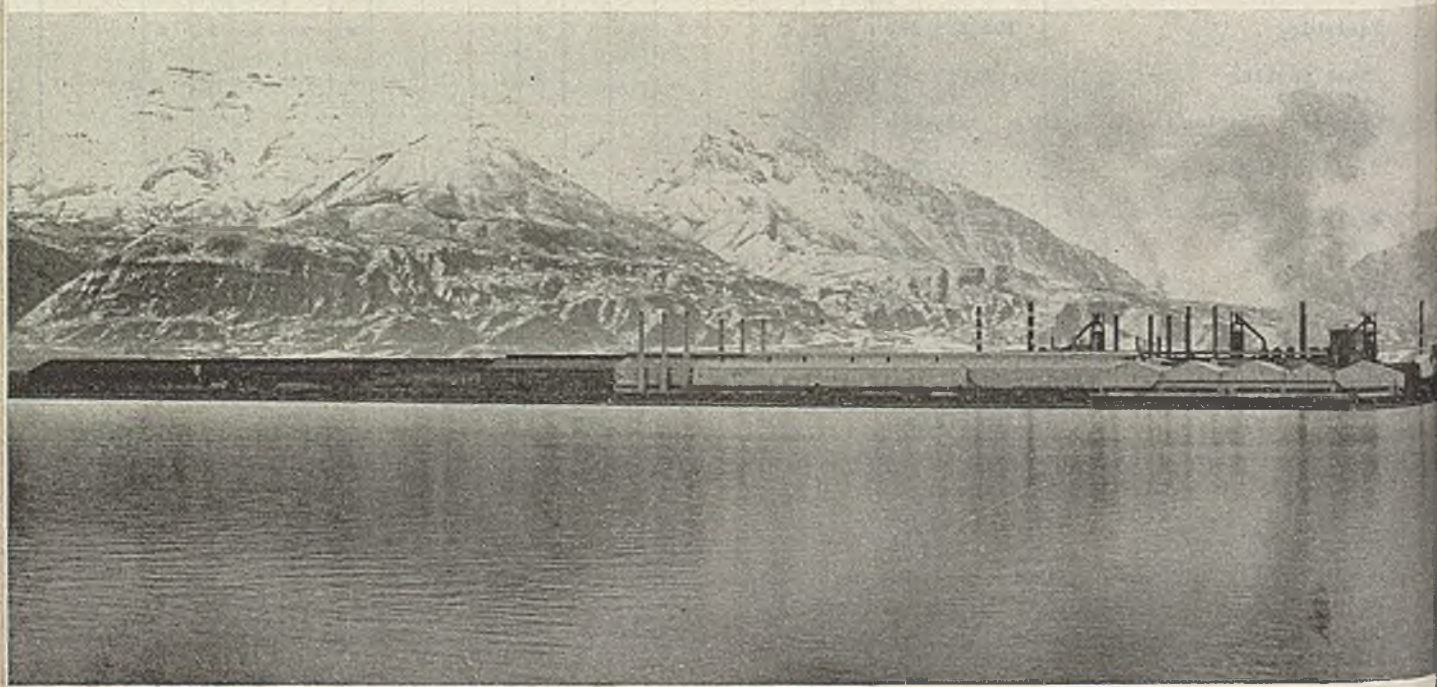
Planned for Invasion—Planning of the steel expansion program contemplated the possibility of invasion of the United States on the East Coast and the possible adverse effect of such invasion on the steel producing areas on the East Coast and westward through the Pittsburgh-Youngstown area, the Cleveland-Detroit area and even the Chicago area. In order to prepare against any such invasion, plans were made to establish independent sources of steel supply in the Far West with ingot capacity of as much as 5,000,000 tons. It also was desired to establish new plants close to West Coast shipyards and war plants.

Geneva Plant—As a result, four of the six new major plants were located in the South and West. Largest of these is the Geneva, Utah plant with three 1200-ton blast furnaces providing capacity of 1,150,000 tons of pig iron annually; nine 225-ton open hearth furnaces with capacity of 1,283,400 tons and 212 coke ovens with capacity of 971,100 tons. A 45-inch blooming and slabbing mill produces 1,058,800 tons annually; a 132-inch semi-continuous plate mill 700,000 tons; and a 32-26-inch structural mill 250,000 tons. Room was left for additional stands to the plate mill for the possible rolling of sheet and strip if future demand warrants. The structural mill was designed for production of lighter rolled sections, including I-beams, angles and channels, as well as light and medium billets for forging.

Kaiser—The Kaiser Co.'s plant at Fontana, Calif., includes the following facilities and capacities: 1200-ton blast furnace, 388,000 tons; 90 coke ovens, 340,000 tons; six 185-ton openhearths, 720,000 tons; one 20-ton electric furnace, 30,000 tons; 36-inch breakdown mill, 420,000 tons; 110-inch plate mill, 300,000 tons; 29-inch structural mill 210,000 tons; and 21, 18 and 14-inch merchant mills, 180,000 tons. The original program submitted by Henry J. Kaiser contemplated ingot capacity of 500,000 to 1,500,000 tons, plus electric furnaces in the Bonneville district of Oregon.

Houston—The new steel plant at Houston, Tex. is made up of facilities financed by the Sheffield Steel Corp., wholly-owned subsidiary of the American Rolling Mill Co. and others financed by the government. Sheffield owns three 100-ton open hearth furnaces, combination billet and structural mill, rod mill, wire mill, merchant bar mill and 112-inch plate mill. Scrambled with these are the following government financed facilities: two 100-ton open hearth furnaces; 35-inch blooming mill, five 20-foot circular soaking pits and a 110-inch heavy plate mill. The government also financed ore and coal mines

The huge Geneva, Utah, steel plant provides the government with its No. 1 problem when it confronts disposal of facilities built with taxpayers' money. U. S. Steel, Kaiser and Colorado Fuel & Iron have notified the Defense Plant Corp. of a desire to negotiate for the plant



in Oklahoma and Texas, plus 47 by-product coke ovens and one 700-ton blast furnace at Houston. The latter are separate and independent units. Early in the planning, it was proposed to operate the steel plant on Gulf territory scrap which previously had been exported.

Daingerfield—The government also financed a plant at Daingerfield, Texas, leased by the Lone Star Steel Co. The original plans contemplated a completely integrated mill, including five open hearth furnaces, along with plate, structural and pipe mills. The completed project includes ore mines, ore beneficiating plant, sintering plant, 78 coke ovens with annual capacity of 400,000 tons and a 1200-ton blast furnace with capacity of 438,000 tons. Plans for the steel plant were turned down in February, 1943. The ore beneficiation plant operated about six months, shipping 62 per cent ore to Sheffield at Houston and Koppers United at Granite City, Ill. The plant went back into production in April, 1945. The coke ovens were operated about four months, first producing high grade blast furnace coke and later an acceptable grade of foundry coke. The blast furnace has not been in production.

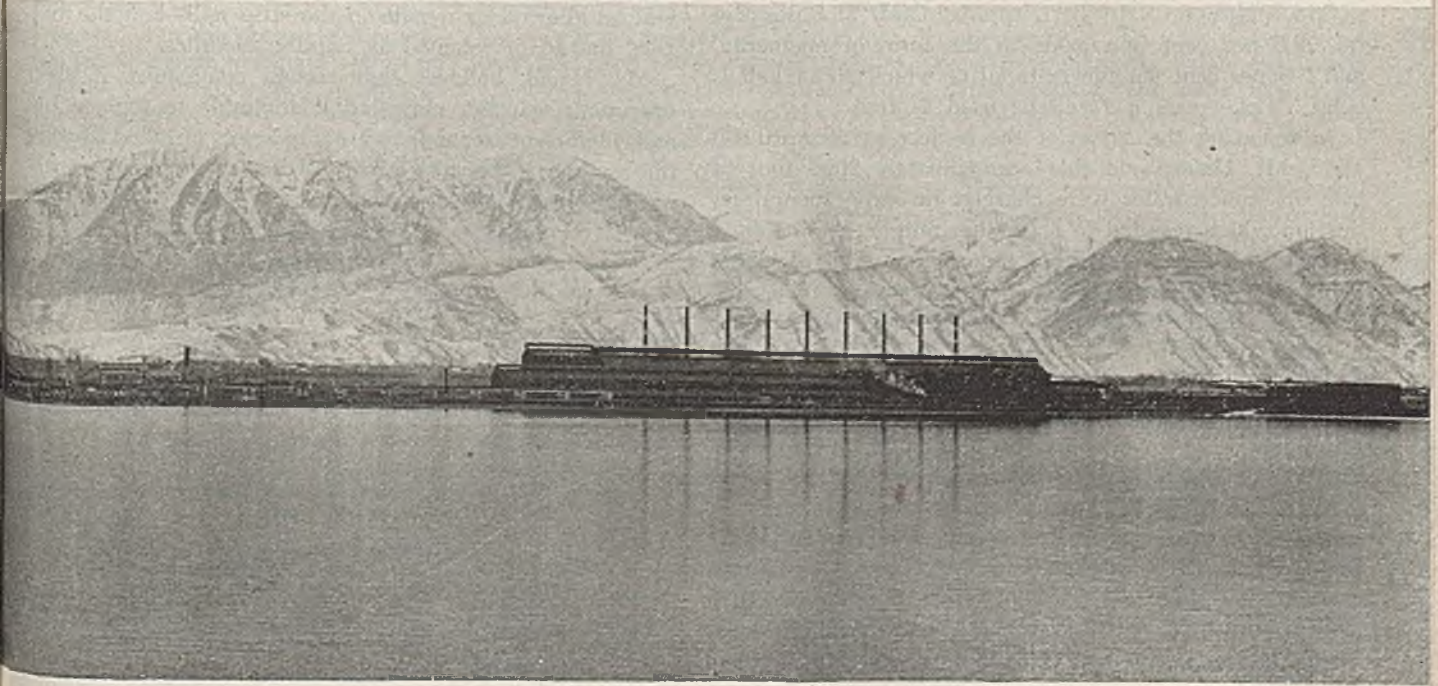
Homestead—The government-owned plants in the Homestead, Pa. area operated by the Carnegie-Illinois Steel Corp. include two 1250-ton blast furnaces at Braddock with annual capacity of 860,000 tons. At Homestead is a complete new open hearth plant with 11 225-ton openhearths having an annual capacity of 1,700,000 tons. A 45-inch slabbing mill is rated at 1,352,000 tons and a 160-inch plate mill at 600,000 tons. Equipment at Duquesne includes two 70-ton and one 35-ton electric furnaces with combined capacity of 165,000 tons and heat treating facilities.

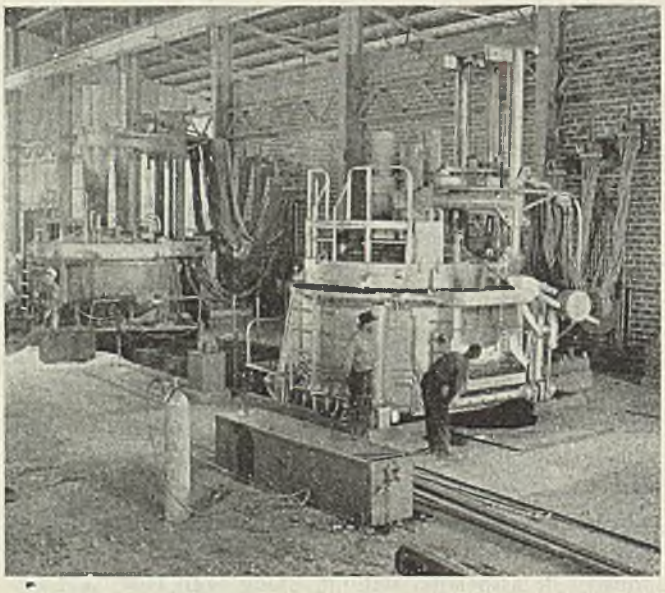
Republic—The sixth major government-owned plant cited by Mr. Hauck in his report is the $92,000,000 unit operated by Republic Steel Corp. at Chicago and designed to produce duplexed electric furnace steel. The following facilities and capacities are included: 75 coke ovens, 405,000 tons annually; sintering plant, 300,000 tons; 1275-ton blast furnace, 450,000 tons; four 200-ton tilting open hearth furnaces, 384,000 tons; nine 70-ton electric furnaces, 750,000 tons; 44-inch blooming mill, 960,000 tons and 36 and 32-inch bar mills, 480,000 tons. Six of the nine electric furnaces were deferred but are practically completed.

The Chicago plant was set up to roll heavy gun blooms as a substitute for forging these blooms on heavy presses. Production of rolled gun blooms now is an accomplished fact and the plant is producing three sizes, 18 by 18 inches, 24 by 24 inches and 26 by 26 inches. The bar mill is capable of rolling rounds up to 12 inches in diameter.

Ferroalloys—The report lists in detail the additional facilities added by several hundred companies in the steel industry or associated with it, along with costs and capacities. For example, under ferroalloys are listed the Nicaro Nickel Co. with mines in Cuba and a reduction plant in Wilmington, Del. for the production of 16,000 tons of metallic nickel annually; the Pittsburgh Metallurgical Co.'s 40,000-ton ferrosilicon plant at Charleston, S. C.; the Ohio Ferro Alloys Corp.'s 16,200-ton ferrosilicon plant at Wenatchee, Wash.; and the Union Carbide & Carbon Corp.'s 48,978-ton ferrosilicon and chromium plant at Ashtabula, O.

Sponge Iron—No sponge iron project was in commercial production at the outbreak of the war but in August, 1942 the Republic Steel Corp. submitted a proposal to the Steel Division of WPB covering an experimental iron ore reduction unit. The unit subsequently was approved and located at Warren, O. The process used is known as the Brassert-Cape low temperature gaseous reduction process and the plant is designed to operate con-





Electric furnace department, Oregon Electric Rolling Mill Co., Portland, Oreg.

tinuously 24 hours a day, seven days a week, in producing 100 net tons of briquettes per 24-hour day or 35,000 tons per year. In 1942, the shortage of suitable steel scrap for use in production of electric furnace steel became acute and Republic saw in the proposed sponge iron process, a reasonable opportunity to secure an alloy-free scrap for its electric furnaces at Canton, O.

Construction of the plant was started on Aug. 31, 1943 but has been materially delayed due to time consumed in concurrently working out details of design and preparation of revised drawings, in the ordering of proper equipment and in the delivery of equipment and materials. The plant will use high grade magnetite concentrates produced from low-grade magnetite ore mines in New York State owned by Republic. These magnetites analyze on a dry basis approximately 68.5 per cent (or 94.5 per cent iron oxide in the form of magnetite) and 5.5 per cent gangue material of which about half is silica. Coke oven gas will be used as fuel.

In reporting the status of the project as of April 17, 1945, Mr. Hauck said that approximately 2000 tons of iron ore concentrates were charged for experimental reduction which resulted in a product ranging from totally unreduced material to highly reduced material of which about 400 tons averaged 75 per cent or more metallic iron. (A detailed description of the plant will appear in STEEL June 25).

Alloy Steels—Demand for alloy steels in this war made it necessary to greatly augment electric furnace capacity. As of Jan. 1, 1940, capacity was 1,882,620 tons annually but by the beginning of the current year, it had been increased to 5,364,176 tons. Capacity now is more than sufficient to meet current requirements as evidenced by some of the figures submitted by Mr. Hauck. Operating capacity for 1943 was 4,745,677 tons and the industry operated at 96.7 per cent to turn out 4,589,070 tons. With 1944 capacity of 5,364,176 tons, the industry operated at 79 per cent to produce 4,237,699 tons. Operations have been rising somewhat this year, April, 1945 capacity of 449,061 tons being operated at 86.7 per cent to produce 389,336 tons.

Plates—In 1940, steel plate capacity was 6,000,000 tons and it was necessary to boost this total substantially to meet the huge needs for ship construction. New mills supplied some 3,000,000 tons of additional capacity and the balance was provided by converting wide strip mills. The latter made it possible to avoid construction of some 12 to 15 new plate mills. For the year ended September, 1944 plate shipments totaled 10,502,421 tons and for the 1943 and 1944 periods 13,100,229, and 13,557,280 tons, respectively.

Eleven strip mills over 54 inches in size and ranging up to 90 inches were converted to the production of heavy plate, including armor plate. These strip mills, before conversion, had an annual normal capacity of 1,320,000 tons of light plates. Most of the plate rolled was ⅝-inch or less in thickness although several mills could roll ¾-inch plate. Many of the smaller strip mills, under 54 inches, also were converted.

Between May, 1941 and July, 1942, plate production on strip mills was increased from 108,772 tons to 550,537 tons per month or more than five times production in 1941.

Reconversion—"In general, the steel industry does not face any real conversion problems with its steel producing facilities in the transition from wartime to peacetime production," said Mr. Hauck. "Virtually the same facilities can be utilized for both wartime and peacetime steel production."

Raw materials, blast furnaces, steelmaking plants and finishing mills, for the most part, offer no reconversion problem. Even the wide strip mills, converted to plate production offer minor reconversion problems which can be readily solved in comparatively little time, he said. Some strip mills will have to be restored to their original condition but, in other cases, some of the new facilities will be allowed to remain in the strip mills and the balance moved or retained as standby facilities.

Mr. Hauck believes that certain companies, if their operations warrant, may find it advisable to replace old and inefficient secondhand equipment, installed during the war period because it was all that was then promptly available, with modern equipment.

TOTAL STEEL INDUSTRY CAPACITY
Jan. 1, 1945—AISI Records
Annual Steel Capacity
(Ingots and Steel for Castings*)

	Net Tons
Open Hearth	84,171,590
Bessemer	5,874,000
Crucible	3,800
Electric	5,455,890
TOTAL	95,505,280

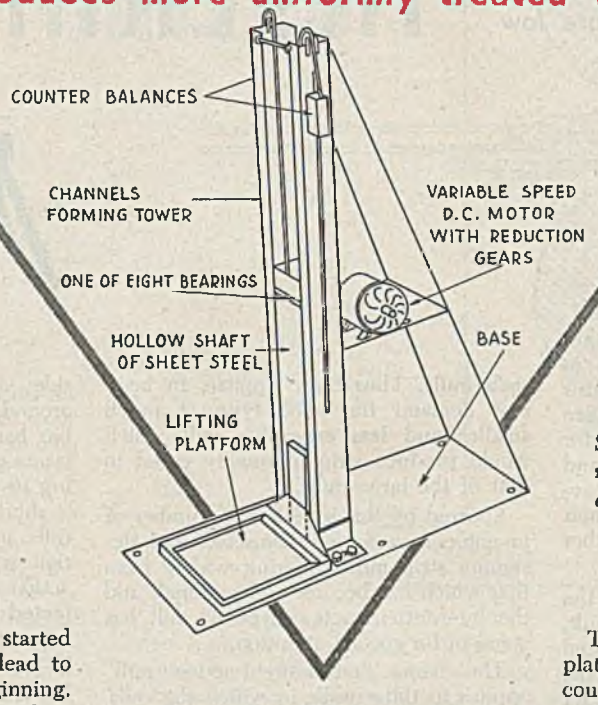
*Includes 558,210 tons capacity of steel for castings of foundries operated by companies producing steel ingots.

Annual Blast Furnace Capacity

	Net Tons
Pig Iron	66,256,810
Ferroalloys	992,600
Charcoal Pig Iron	64,480
TOTAL	67,313,890

Miniature Elevator

. . . affords precise movement through inductor block in induction hardening, ends loss of parts by arcing, produces more uniformly treated work



Schematic diagram shows arrangement of mechanically operated elevator which moves work through inductor blocks uniformly

By A. R. HOTCHKISS

AS is often the case, work started on one phase of a problem will lead to others little anticipated at the beginning. Such was the case when we started in checking physical aspects of parts treated by induction heating. The problem of excessive loss of parts by arcing as they were introduced into the induction block suggested that an elevator capable of moving 12 to 20 in. might solve the problem.

Such parts as flanges, with attached bearing surfaces where that surface had to be hardened up to fillet of the flange—work best done by progressive heating that necessitated movement of the part by hand after the current had been turned on—were causing the trouble.

So began the design fabrication and perfection of a miniature elevating device, sturdy enough to handle weights up to 50 lb or more through a distance of 18 in. at speeds as nearly evenly variable as possible, and capable of instant stop and reversal of movement at any place in the 18-in. throw.

Further the movement had to be smooth and free of lateral sway to such a degree that a clearance of ⅛-in. between the part and the heating fixture was maintained without enough variation to cause arcing. The whole unit had to be small enough to bolt to the lugs in the bottom of the work tray of the induction heater and of such open construction that the operator had free access to the platform of the lift for placing and removing parts being treated.

Not only was the foreman worried about loss of parts by arcing, but also the extreme care necessary slowed down production to the point where this was a bottleneck in the assembly line.

The elevator was designed for use with a 40-kw motor-generator unit but was adaptable to any other by changing the holes in the base to bolt the unit down to the bottom of the work tray. The base of the unit was ¼-in. sheet steel of such width and length as to give four or six anchors to lugs in the tray and insure immobility of the foundation.

The tower for the moving parts consisted of two 22-in. lengths of 4-in. channel held rigidly together with four bolts through ears welded on the sides of the channels at the ends and made adjustable to fit the space closely between them to the lifting shaft with its roller bearings. This tower was mounted upright on the base by two strips of 4-in. channel iron, welded to the channels and bolted to the base in slots for adjusting the lifting platform under the induction coil as desired.

The shaft in the tower was of hollow rectangular construction of sheet steel for lightness and strength. A steel bar was brazed midway on one of the broad sides at the lower end and extending 6 in. upward. This bar was of such width and thickness as to move freely with the shaft between the channels and to extend ⅛-in. beyond them so that the platform could be welded to it.

The platform consisted of an open frame made of 1½-in. rolled steel angle or L-section with the angle inward and up so as to form a closed support for the platform which held and centered the work for introduction into the induction block.

The considerable weight of the shaft, platform and part to be treated was counterbalanced by weights attached to vertical runners on the outside of either channel; and lifted by means of small steel cables attached to the base of the shaft and extending upward inside that part and over the upper end of each channel on fixed grooved pulleys. This enabled the power necessary for movement to be small.

The inner surfaces of the channels were reduced to a highly polished state on which eight roller bearings hold the moving shaft without lateral sway.

Limit switches mounted on the channels automatically control the extent of movement. In addition reversal and manual stopping at any point during movement is arranged for within easy reach of the operator. The motor is a direct current variable speed type with built-in reduction gears bringing the motor speed down to the range desired.

The open construction of the platform and nature of the controls make it possible to start the movement above or below the induction block and move the part at the speed desired just as far as necessary, stop it and reverse the direction to back the part up.

Quenching could be arranged below the block or the part removed from the block and immersed in a quench tank as desired.

An experienced operator first sets up the work to get exactly the right heat treatment cycle desired. Thereafter each part is heated at a maximum speed of production and minimum part loss due. No longer do fatigue and nervousness cause arcing loss as the hand method of moving the part into the block is entirely eliminated by this mechanical robot.

Operating principle differs from conventional mills in that roll motion and pressure are produced by action of reciprocating cam plates. Delivery speed of Krause mill ranges from 25 to 30 feet per minute. Lateral spreading and cracking of edges are low under heavy reduction

INTERMITTENT-for Rolling

By J. D. KELLER
Associated Engineers
Pittsburgh

AS A CONSEQUENCE of the rapid mechanical development in the age in which we live, methods or apparatus which only yesterday (so to speak) were radical, revolutionary and struggling for a foothold, today have crystallized and have become the conventional, the accepted and established forms; while their former status is now occupied by other emerging, widely different forms.

Such has been the course run by the modern continuous stripmills. As a result, and in the general and well-warranted admiration called forth by the phenomenal development of this type of mill, the fact seems to have been largely overlooked that it also has some drawbacks or disadvantages. Chief of these, of course, is the enormous capital expenditure required, which is only warranted from the economic standpoint if a sufficiently large market for the product exists to keep the mill in practically continuous operation. This has limited the use of these mills, with few if any exceptions, to the United States, and to the larger steel firms only; and has placed many of the smaller producers of steel strip and sheets in an unenviable competitive position. Other drawbacks of the continuous strip mills are: the lack of flexibility as regards rolling small orders; the expense of changing rolls, consisting not only of the cost of the large rolls themselves and of the precision finishing required for them, but also including the loss of production while the mill is shut down for roll changing; and the floor space or acreage required for such mills. Thus there appears to be a real demand for some type of much smaller and less expensive mill which would produce strip of quality equal to that of the large mills.

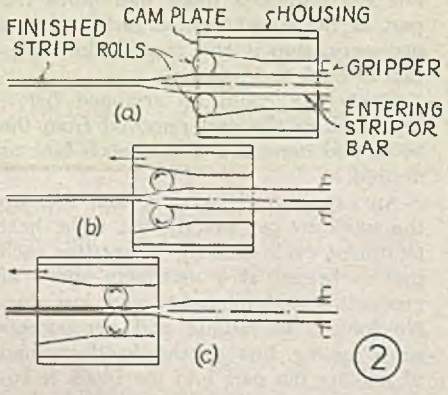
Spurred by this incentive, a number of inventors have busied themselves with designing strip mills differing widely from that which has become conventional; and the intermittent action type of mill has come in for special attention.

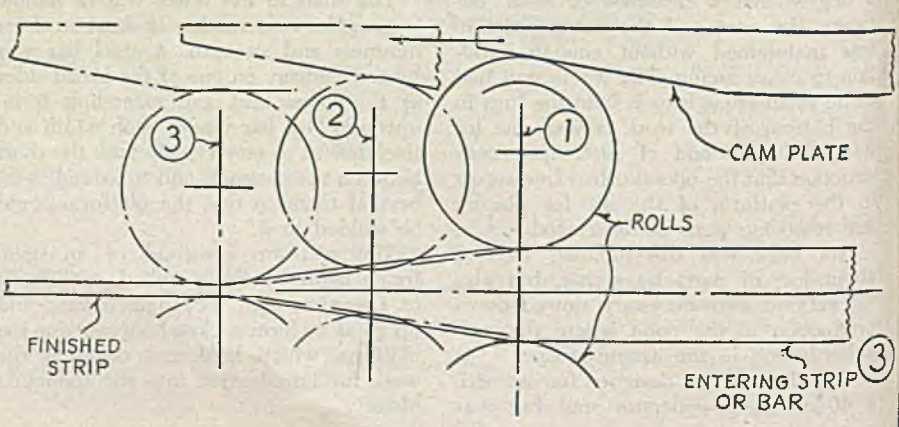
The name "intermittent-action mill" applies to those mills in which the rolls, instead of continuously engaging and uninterruptedly reducing the work-piece, are caused to act on the work-piece only for a time, then are moved out of contact while the position of the work-piece is shifted slightly with regard to the mill; then the rolls are returned to engagement again, and so on. The oldest form of intermittent-action mill is the "gap mill," illustrated diagrammatically in Fig. 1. The rolls, as shown, are not complete cylinders, but have a gap cut in their peripheries. As the rolls turn, at the time when the adjacent points of top and bottom roll are farthest apart, the operator pushes the work-piece through the gap between them, until it strikes the stop in back of the rolls. As the rolls turn further, the parts of larger radius contact the work-piece or bar and compress it or do work on it, at the same time thrusting it out toward the operator. The roll has a number of grooves in its periphery, side by side; and when the gap again comes around, the operator again pushes the bar back through it, but in the next adjacent groove, against the stop corresponding to this groove, which stop is located a short distance further back from the rolls, in order to take care of the elongation which has occurred. The reducing action may be regarded as forging effected by means of rolls instead of by a hammer.

The "pilger mill" for reducing seamless tubes, which excited so much interest about 15 years ago, is a form of gap mill with grooved rolls, in which the pierced tube-blank is pushed into the gap by the action of a hydraulic cylinder instead of manually. The mechanism also turns the blank through an angle at each feed stroke, so that the blank is worked on all sides.

An interesting mill of the intermittent-action type is the Krause mill, of which there are two installations now in operation for rolling strip[1]. The principle of action of the Krause mill is shown in Figs. 2 to 4. The rolls are reciprocated—forward stroke in contact with the work-piece or strip, return stroke out of contact—while the entering bar is advanced slowly into the mill at a uniform rate of travel. During the working stroke, the rolls are moved toward each other by the

[1] STEEL, Oct. 9, 1944, p. 248, 326. Also *Iron and Steel Engineer*, Aug. 1938, p. 16-29.





ACTING MILLS

Strip

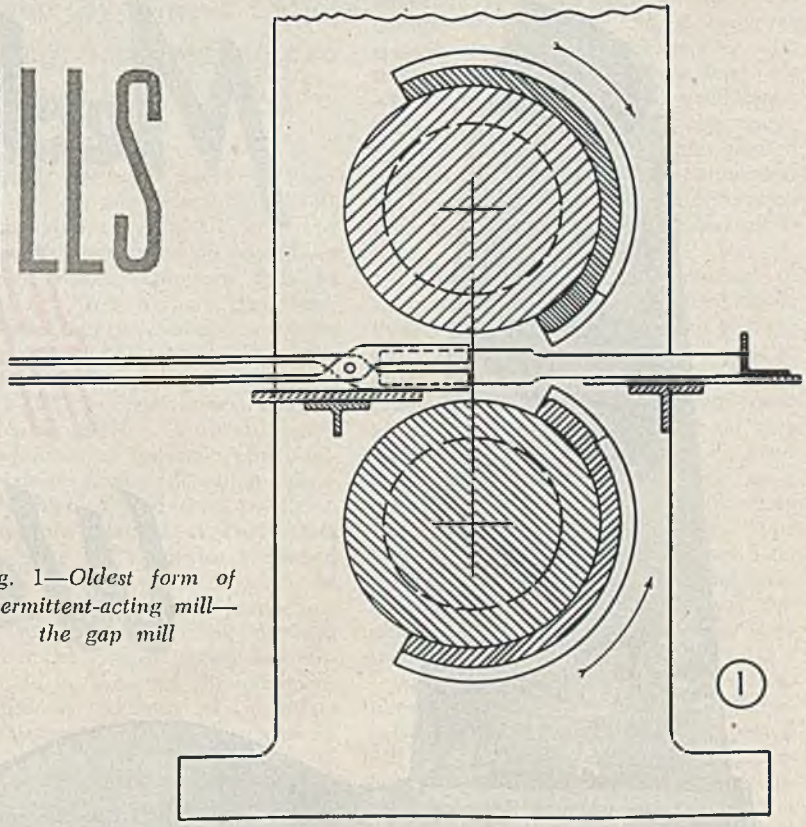


Fig. 1—Oldest form of intermittent-acting mill—the gap mill

action of the cam plates, and during the return stroke the rolls are allowed to move apart. The metal-displacing or reducing action occurs, not on a flat part of the bar but on a wedge-shaped part of it. That is to say, the rolls not only (1) turn, and (2) move longitudinally, but they (3) move steadily closer together during the working stroke as the tapering part of the bar passes between them. Referring to Fig. 2, at (a) the rolls are shown in position for the beginning of the working stroke; at (b), the rolls are half-way down the wedge-shaped working region of the bar; and at (c), the rolls have passed on to the parallel portion of the cam plates and are smoothing out the surface of the strip to the finish gage. The same thing is shown in a single view in Fig. 3, with successive positions of the rolls indicated at (1), (2), and (3); at the latter position, the rolls have just completed the reduction for that particular stroke and are passing on to the parallel parts of the cam plates.

Driving of the rolls is effected solely by the action on them of the cam plates, top and bottom, which are held in a stiff housing surrounding the work-piece and the rolls; no torque and no force is transmitted from the ends of the rolls to the work-piece. The housing, with the cam plates and other connected parts, slides in guides on the bedplate and is reciprocated by a crank mechanism (Fig. 4). The vertical forces are entirely contained within the housing, and cause no rubbing friction. Aside from the inertia forces and the small friction force due to the weight, the only force which the crank must exert is that corresponding to the horizontal component of the rolling force. This component produces a certain tension force in the entering bar or work-piece.

Ideally, the axes of the rolls would, if the entering bar stood still, travel horizontally exactly one-half the distance traveled by the housing and cam plates, and control of the motion of the rolls on the return or idling stroke would be a simple matter. But actually there are modifying factors; first, the bar does not of course stand still, but is fed forward slowly but steadily throughout not only the idling or return stroke but also the working stroke; second, because of the rolling deformation the entering part of the bar is displaced backward, slightly, *relative* to the rolls; finally, in order that during the return stroke the rolls may clear the thick part of the wedge portion of the bar which has been advanced slightly toward them, the roll carriage should be shifted slightly toward the exit side of the mill with reference to the cam plates. To take care of these various factors, an ingenious mechanism has been devised by the inventor, as shown in the diagrammatic view of the functional elements of the mill, Fig. 4.

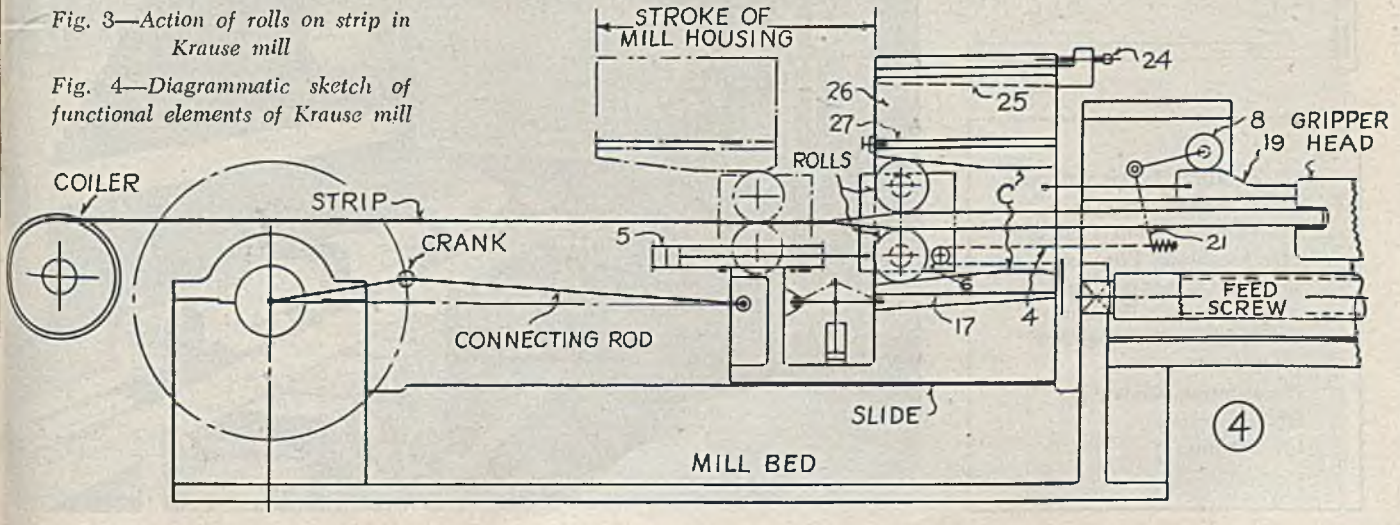
At each side of the mill is a chain 4, with one end fixed to the housing, making a half-turn around a sprocket 6 at-

(*Please turn to Page* 120)

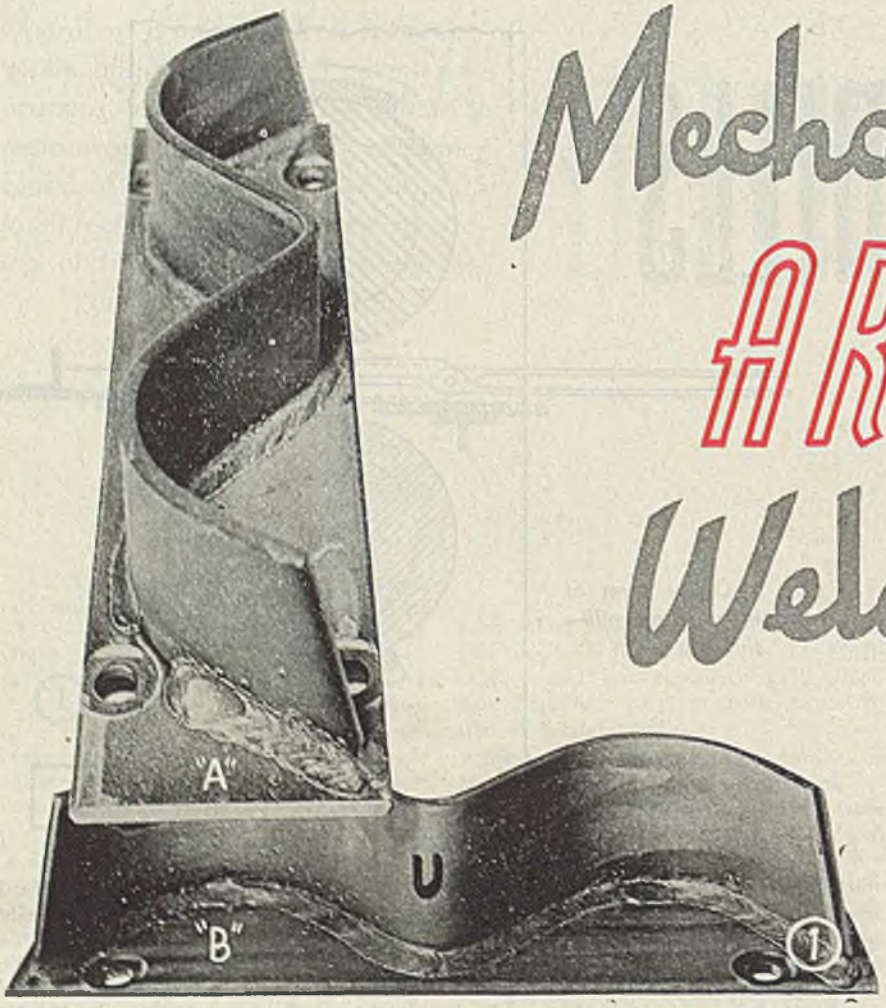
Fig. 2—Diagram depicting principle of operations of Krause mill

Fig. 3—Action of rolls on strip in Krause mill

Fig. 4—Diagrammatic sketch of functional elements of Krause mill



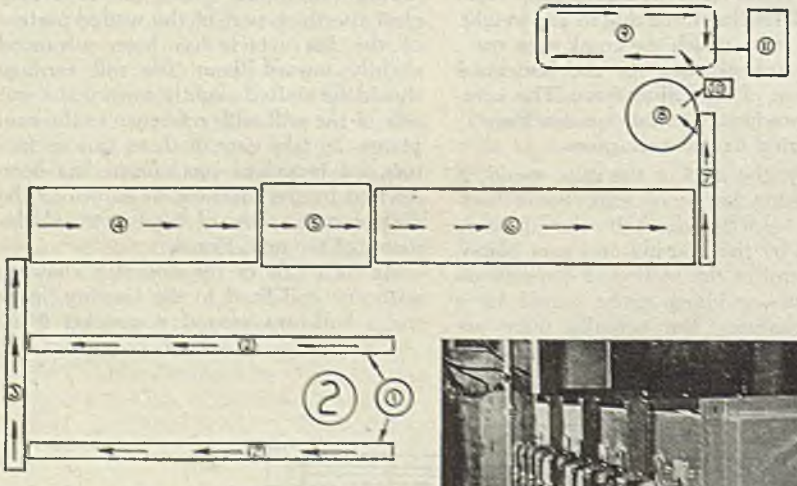
Mechanized ARC Welding



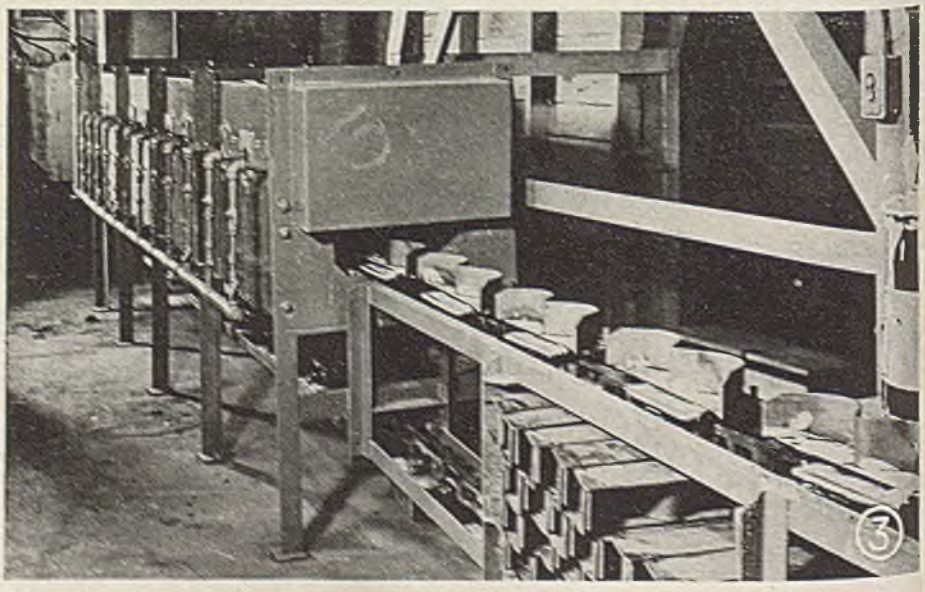
THE "Water Buffalo", officially designated as LVT (Landing Vehicle Tracked), is a dynamic and powerful amphibious tank that can crawl out of the sea and attack on land. It can swim ashore, through surf, over reefs, and surmount all types of obstacles in jungles, swamps and rivers. In addition, it can negotiate extremely rough terrain.

Versatility of the "Water Buffalo" in negotiating various types of terrain is due to the tracks which keep it moving through water, over land, and up mountains, achieved by designing them to be part paddle and part tread, called a "grouser". Dozens of these grousers are attached to two trucks, one on each side of the vehicle in the manner of a caterpillar tread.

The task assigned to United States Spring & Bumper Co., Los Angeles, was to manufacture a large volume of



(1) Rotating Tacking Fixture
(2) Welding Conveyor
(3) Transportation Conveyor
(4) Quenching Furnace
(5) Oil Quenching Tank
(6) Tempering Furnace
(7) Transporting Conveyor
(8) Shot Blast
(9) Painting Conveyor
(10) Inspection
(11) Packing



Conveyor line setup is employed by United States Spring & Bumper Co. in assembling, heat treating and finishing complex part for the Navy's LVT

these grousers at a high rate of production. The complicated shape, the material from which the grousers are made, the necessary means of welding the shape together, and other steps in the manufacturing operation were part of the production problems which confronted engineers at U. S. Spring. Accompanying photographs and drawings help to illustrate some of these problems.

Figs. 1A and 1B show the two ¼-in. plates welded together at 90°. The length of the base plate is 13½ in. and the width of the curved section is 2¾ in. There is approximately 36 in. of fillet weld completely around the curved plate, with only two small skips to allow bolts to fit into place. The weld specified is a 3/16-in. continuous bead using Type 6013 covered electrodes.

The grouser is heat treated after welding, descaled, and coated with a primary coat of zinc chromate. The base plate, after welding, heat treating, and shot blasting, must be flat to 1/32-in. Material used for this plate is NAX-9130, a heat treatable alloy.

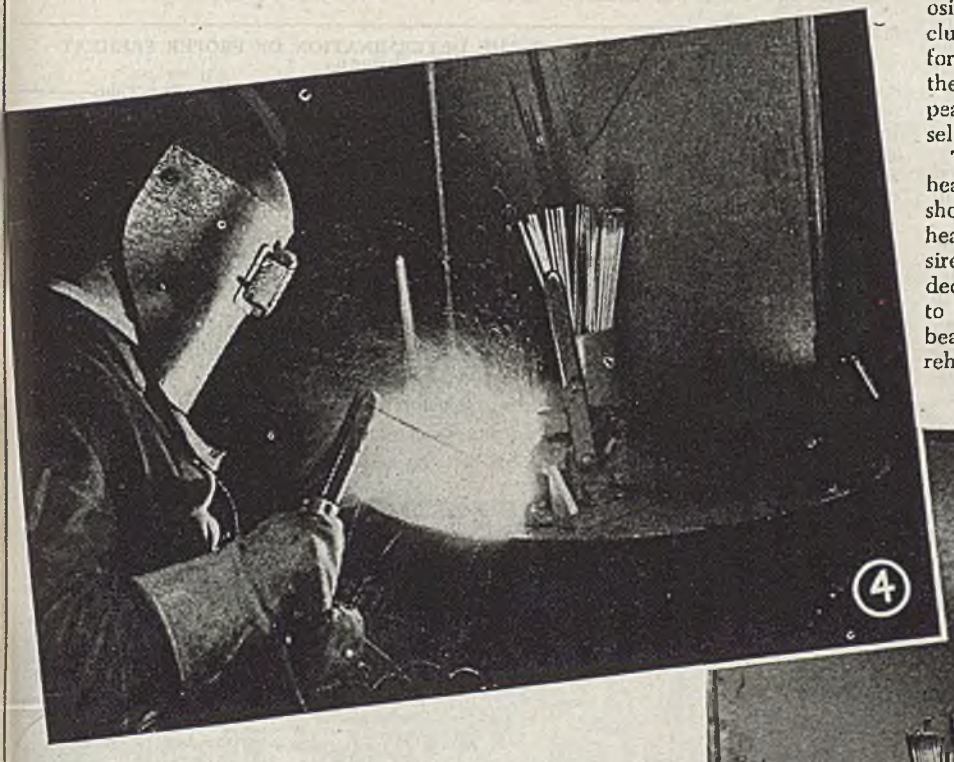
Some of the factors which have been taken into consideration can thus be readily seen. First, we have the welding of the complicated shape involving locked up stresses in the weld. Secondly, there is the metallurgical problem of arc welding a 0.30 per cent carbon alloy of self-hardening steel. A heat-treating factor and resulting warpage, plus additional warpage from a descaling operation, now enter as production problems.

Choosing the Method of Production: The next step was to devise a method whereby a quality product could be obtained through high speed production. A study of modern welding methods proved that the greatest speed and efficiency could be achieved through modern continuous methods of manufacture. Manpower shortage was also an important factor in deciding upon this method of operation. So, a conveyor system of welding, heat treating, descaling and painting was worked out which provided high speed production, decreased the necessary man-hours, brought to a minimum the time elapsed between the start of the operation and the final finished product, and resulted in a continual uniformity of the product.

Preliminary Tests: The method of manufacture having been decided upon, it was then necessary to make a thorough study of metallurgical factors in order to guarantee this uniformity of product. First, it was vitally important to select an electrode which would give crack-free sound weld deposits and would be acceptable for welding on a conveyor line. A test was therefore conducted using various 3/16-in. Type 6013 electrodes, as follows: Two 1-in. plates were placed together in the form of a Tee and a fillet weld was run along each side arc welding the two parts together.

After welding, the various assemblies were carefully cut apart at intervals of approximately ¾-in. and inspected for auto-cracks, fusion zone cracks, porosity, depth of penetration, and slag inclusions at the root of the weld, and the formation of crater cracks at the finish of the pass. Two electrodes, which appeared to give the desired results, were selected.

The next factor was the proper preheating temperature. Careful study showed that various tests for proper preheating temperature would give the desired results. The "single bead" test was decided upon. Strips of the material to be welded were secured and a single bead was laid on these strips which were reheated to 200, 300, 400, and 500° F.



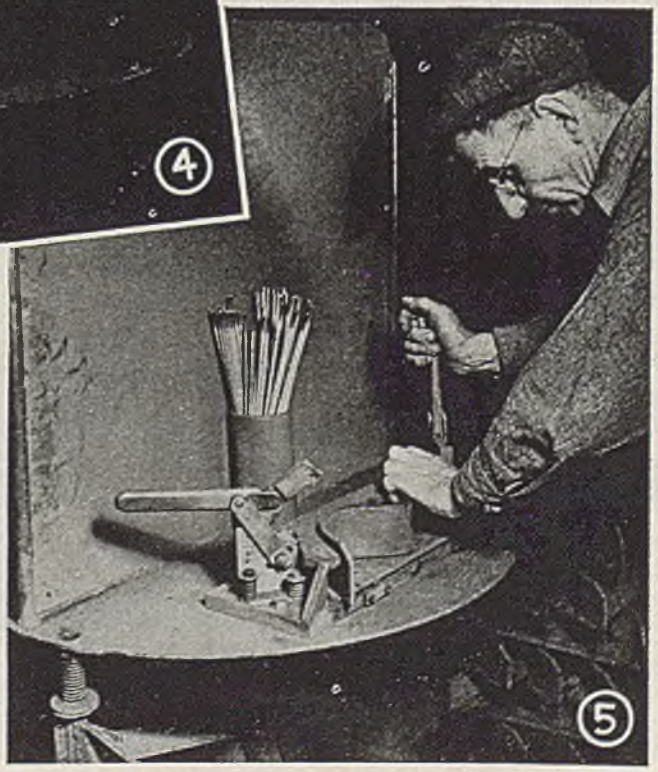


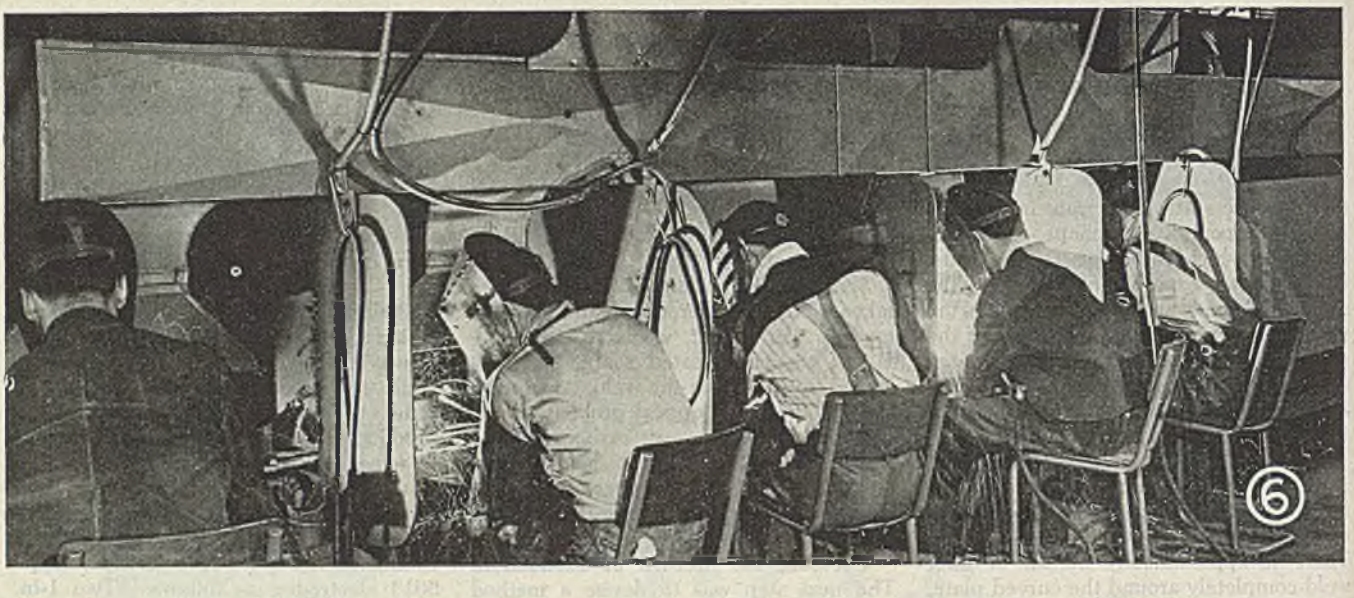
Fig. 1—Views of grouser tread for continuous tracks of amphibious tank LVT's

Fig. 2—Floor plan of grouser conveyor welding system at U. S. Spring & Bumper Co.

Fig. 3—Tacked grousers going into preheat furnace on continuous conveyor prior to finish welding

Fig. 4—Tacking the curved section of the grouser to the flat base plate

Fig. 5—Setup man assembling grousers on opposite side of table from operator shown in Fig. 4



The data were recorded for burn-off rate, electrode used per inch of weld, depth of weld penetration, cracks, porosity, maximum hardness in heat affected area, and the weld ductility.

The materials used in this test were Fleetweld 7, 3/16-in. electrode and NAX 9130X ¼-in. steel. The machine setting was 160 amp, 22 v. Accompanying table gives the results of this test. The conclusions drawn were that the 500° F preheat would be most satisfactory as it gave a low hardness of the metal being welded with an increased ductility. It also appeared that a slight saving in electrode would be encountered.

An extensive series of tests were made to compare the use of 3/16 and ¼-in. electrodes with the conclusion that the ¼-in. electrodes would increase production by 20 per cent though more weld metal would be deposited. One-quarter inch electrode would also save over 6000 man-hours in filling the original contract. However, the larger electrode produces a fillet larger than required hence was not used.

The Welding Operation: As this operation was going to be a continuous one, the engineering department designed the layout of the equipment which would be necessary, Fig. 2. Material is processed in the following manner: From the steel yard the steel is moved to a blanking press. There both the curved upper part and the base plate are blanked. Holes in the base plate are punched simultaneously with the blanking operation. From the blanking press, the base plates are taken in large quan-

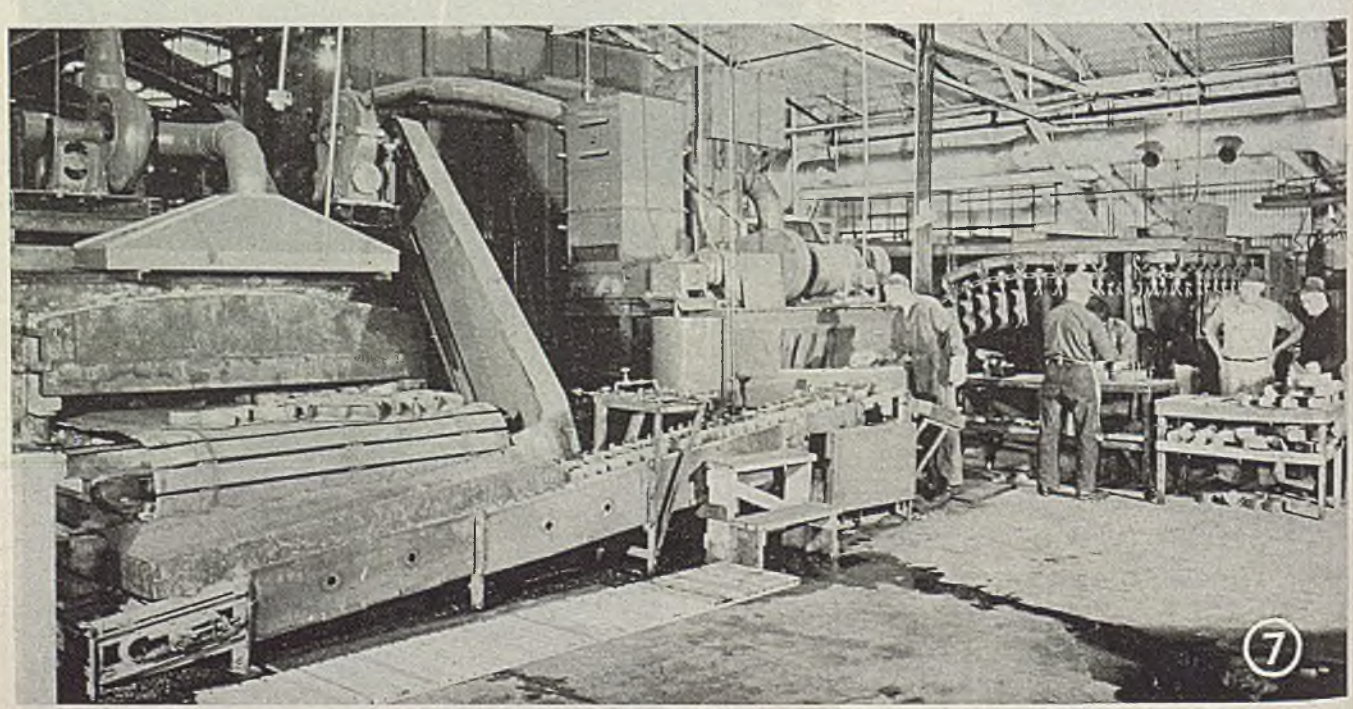
(*Please turn to Page* 154)

SINGLE WELD BEAD TEST FOR THE DETERMINATION OF PROPER PREHEAT FOR WELDING GROUSERS

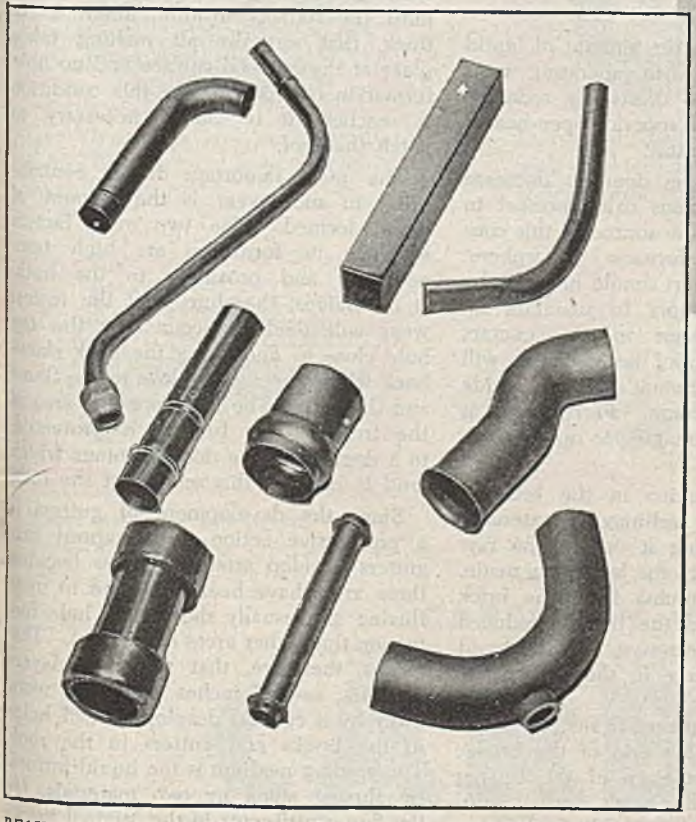
	Preheat Temperature, Deg. Fahr.			
	200	300	400	500
Burn-off Rate: Inches per minute	8	8½	8+	8—
Electrode used per inch of weld	1	1¼	¾	⅞
Depth of weld penetration mm.	1½	2	2	1¼
Cracks, porosity, etc.	None	None	None	None
Max. hardness in heat affected area: RC	44	35	37	34
Weld ductility: Degree bend on 1-in. pin	84	96	98	180

Fig. 6—At each welding station a small length of bead is deposited. "Stagger" welding is thus done on a continuous production basis along entire length of the 32-ft conveyor line, two of which feed the heat-treating furnace as shown in layout, Fig. 2

Fig. 7—Discharge end of tempering furnace, left, drops units on conveyor to shot blast unit adjoining. Cleaned grousers are hung on chain conveyor for paint dip and hot air dry in tunnel



The uses of REVERE WELDED STEEL TUBE are endless



REVERE Welded Steel Tube can be had either in straight lengths, or partly or completely pre-fabricated. Our tube-working equipment is highly specialized, and customers frequently find that it effects appreciable savings in costs.

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- A Air Conditioning Equipment
- Aircraft Parts
- Automotive Parts

- Ball Bearing Races
- Bearing Parts (tubular)
- B Beauty Shop Equipment
- Beds
- Bicycles
- Boilers
- Bus Body Frames

- C Condensers
- Conveyor Rolls

- D Display Stands
- Drying Machines

- Electrical Equipment
- E Elevator Parts
- Exhaust Tubes

- Ferrules
- Floor Scrubbing Machines
- F Food Processing
- Furniture

- Gravity Carrier
- G Systems
- Grease Guns

- Handles
- Hardware Items
- H Heat Exchangers
- Hydraulic Hoists

- I Irrigation Lines

- Ladders
- Lamps
- L Laundry Machinery
- Lawn Mower Parts
- Lubricating Systems

- Meter Parts
- M Motorcycles
- Mufflers

- N Nozzle Tubes

- Office Equipment
- O Oil Burner Parts
- Oiler Tubes

- Perforated Tubes
- Petroleum Equipment
- P Playground Equipment
- Pneumatic Conveyors
- Pressure Tubing

- Railings
- R Road Machinery

- Sewing Machines
- S Sports Equipment
- Spraying Equipment

- Torque Tubes
- T Transformers
- Tricycles

- V Vacuum Cleaner Parts

- W Washing Machines

- X X-Ray Equipment

QUALITY! Revere Electric Welded Steel Tubes are structurally stable, uniform in temper, and of correct analysis. Since they are formed by welding steel strip, walls are absolutely uniform. The finish is controlled and particularly suitable for plating, lacquering, painting, other coating processes. Surface is excellent for sliding parts. Available in sizes up to 4½" O.D. and in wall thicknesses to 3/16", somewhat heavier walls can be supplied in certain diameters. Our Technical Advisory Service is at your command. Write the Revere Executive Offices.

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Service Life of OPEN-HEARTH SILICA BRICK ROOFS

CAREFUL consideration of the physical conditions of open-hearth roofs and of individual bricks as well as the chemical changes which occur during service reveals that the wear of roof bricks takes place as the result of liquid flowing from considerable distance within the brick. This liquid causes small holes to form all through the hot end of the brick through which it flows. Further erosion enlarges these holes as the liquid flows out, until only projecting fingers remain of the hot end of the brick. This exposes the less refractory center of the brick to the furnace and the fingers are quickly melted away, leaving a gutter through the roof. In effect, this amounts to the removal of a layer of brick material 2 to 4 in. thick from the hot surface of the roof. The less refractory center portions of the brick are suddenly exposed to the furnace and the process repeats itself at an accelerated rate. This continues until the remaining bricks are so thin that all melting takes place so close to the hot surface that no further hole formation occurs.

This theory explains how alumina, alkalies and similar fluxes which attack silica can govern the service performance of silica brick. It further suggests that considerable improvements in the quality of silica brick may be attained by elimination of such fluxes from the brick.

This foregoing theory was presented by M. A. Fay, ceramic engineer, Bethlehem Steel Co., Sparrows Point, Md., at the Pittsburgh sectional conference of the Open-Hearth Committee, AIME, to show how alumina, alkalies, and similar fluxes which attack silica can govern the service performance of silica brick. He suggested that considerable improvements in the quality of silica brick may be attained by the elimination of such fluxes from the brick.

In this theory, the liquid present in the brick at operating temperatures is blamed for the erosion and ultimate failure of open-hearth roofs. This liquid varies in composition at different levels in the brick. At the hot face it is higher in iron oxide and lower in alumina and lime than at points deeped in the brick.

Principal constituents of the liquid are lime, alumina and fluxed silica from the brick and iron oxides and lime suspended in the furnace gases. Other constituents are alkalies, titania, magnesia, etc. For all practical purposes it can be considered to consist of lime, alumina, silica and iron oxides. The alkalies are well known to be effective fluxing agents. Inasmuch as they come from the same sources, clay or mica in the brick batch, they are also usually proportional to the alumina content.

The most effective fluxing agents are the alumina and the ferrous oxide. If these two constituents could be eliminated from the roof, the amount of liquid present at open-hearth operating temperatures would be drastically reduced. If this were done, a superior open-hearth roof brick would result.

Not much can be done to decrease the amount of ferrous oxide present in the brick because the source of this constituent is the furnace atmosphere. However, every effort should be made by the furnace operators to maintain an oxidizing atmosphere in the contact with the furnace roof because this will tend to keep the amount of ferrous oxide present at a minimum. Ferric oxide is not particularly damaging to open-hearth roofs.

Amount of alumina in the brick is capable of control and may be materially reduced by keeping it out of the raw material from which the bricks are made. Elimination of alumina from the brick during service and the liquid produced would be less corrosive. This would result in an increase in the service life of the brick.

When a roof is placed in service, liquid is formed in the hot end of the bricks. This liquid is made up of the fluxing constituents of the brick and is progressively enriched by additional fluxes from the dusts and vapors in the furnace atmosphere.

The liquid is pulled back into the brick by capillary attraction until the hot end of the brick is saturated with liquid. The amount of liquid presented increases continually because of fluxing of the still solid brick material and because of the pickup of additional fluxes from the furnace atmosphere. Eventually, after the saturated condition is reached, the liquid begins to run out from the brick. This causes further fluxing of the solid brick material along the path of flow of the liquid and brings about the formation of many small holes. Once these holes have formed, the liquid continues to flow out and enlarges the holes to the point where only projecting fingers of the original material remain at the hot end of the brick.

When this condition is reached, the less refractory center portion of the brick is exposed to the furnace and fast melting takes place in this region. The fingers themselves have comparatively large surface area exposed to the fluxes in the furnace atmosphere and pick up these fluxes faster. The result of these two reactions is a quick erosion of the fingers, leaving a definite gutter through the roof. Thus, a new brick surface becomes the working surface and the process begins to repeat itself.

Wear Occurs in Gutter

Once a gutter has formed, it is likely that wear will occur fastest in that area because the liquid present becomes more corrosive as it is enriched by the fluxing constituents of the brick portion which had not previously been penetrated. However, the mechanism of wear is unchanged. It will continue until the roof is so thin, about 3 in. thick, that virtually all melting takes place at the exposed surface and no hole formation occurs. Before this condition is reached, it is usually necessary to patch the roof.

The most important factor contributing to such wear is the amount of liquid formed. The two main factors affecting its formation are high temperatures and proximity to the bath. It is obvious, therefore, that the fastest wear will tend to occur over the tap hole close to and along the back skewback where the roof is close to the flame and the bath. The corresponding area at the front of the furnace is protected, to a degree, by the door openings which tend to cool off this section of the roof.

Since the development of gutters is a progressive action, it is natural that gutters develop around patches because these areas have been subjected to most fluxing and usually show more hole formation than other areas of the roof. This means, therefore, that successive layers of brick, several inches thick, are worn away by a cyclical development of holes in the bricks and gutters in the roof. The eroding medium is the liquid formed by fluxing silica by two materials, (1) the flux constituents in the original brick, and (2) the contamination of dust and vapors in the furnace atmosphere.

The two most effective liquid-forming

(*Please turn to Page* 158)

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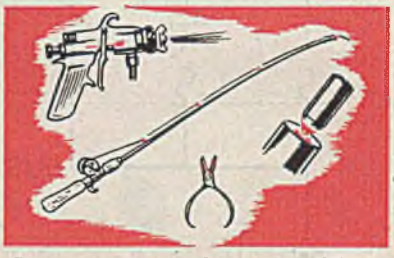

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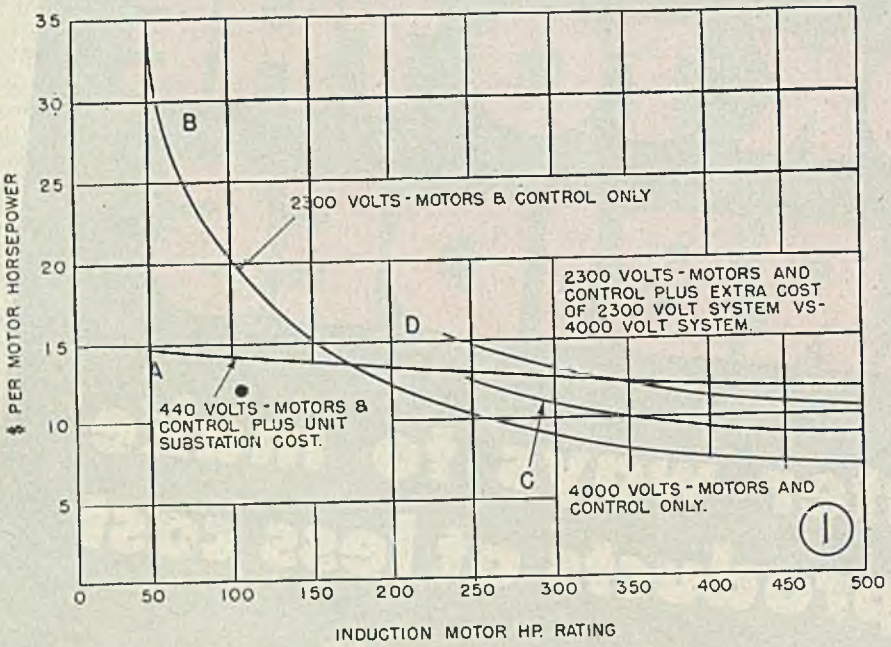
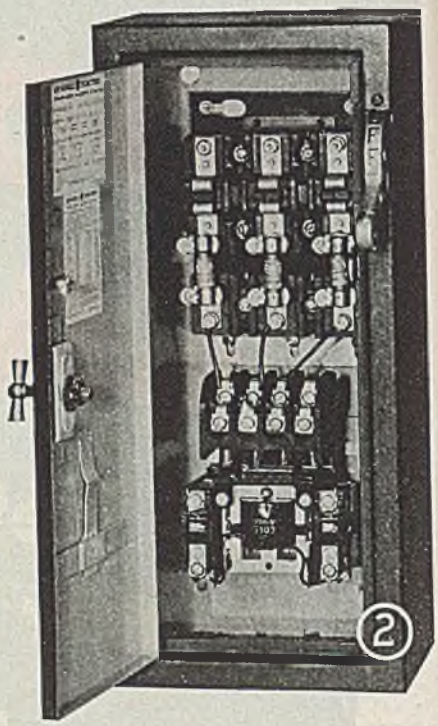
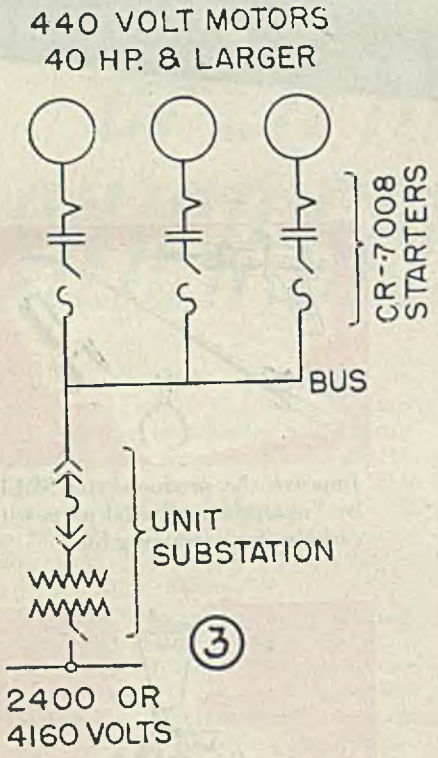






ECONOMICAL POWER DISTRIBUTION

For Medium-Size Industrial Plants

Installations formerly believed to deliver most economica power for motors, controls, and other apparatus by using 240 volts have increased efficiency with 4160 volts

By D. L. BEEMAN

Industrial Engineering Division
General Electric Co.
Schenectady, N. Y.

MANY operators will say that 2400 v is a more economical basic distribution voltage for a new, medium-size industrial plant than 4160 v for an apparently logical reason. A sizeable percentage of the total electric power in many industrial plants is consumed by motors ranging from 40 to 500 hp. As motors in that range can be connected directly to 2400 v circuits, it is commonly believed that the lowest-cost electrical system—including power generation, distribution, and motors and control—can be obtained by distributing purchased or generated power at 2400 v. A review of the factors which influence system cost indicates that such is not the case.

Advantages of 4160 V: Studies of specific systems show that, so far as overall electrical system costs are concerned, it is nearly always less expensive to use 4160 v primary or generation voltage rather than 2400 v, and to operate most motors of 200 hp and less on 460—or 575 v circuits. This conclusion is based on the data shown in Fig. 1. The derivation of these curves is explained in detail later in this article.

The 4160 v system offers many important advantages other than lower cost. Short-circuit current bottlenecks are not reached as readily as higher system short-circuit kilovolts. This would be rather involved and is beyond the scope of this article. The main consideration in many medium-size industrial plants is whether to use a 2400—or a 4160 v primary power system. The remainder of this discussion is limited to an economic comparison of these two voltages.

In some areas 4800 v is the standard primary voltage. The basic factors presented here are not substantially altered whether the voltage is 4160 or 4800 v. Since 4160 v is far more common than 4800 v, the former will be used as basis of comparison.

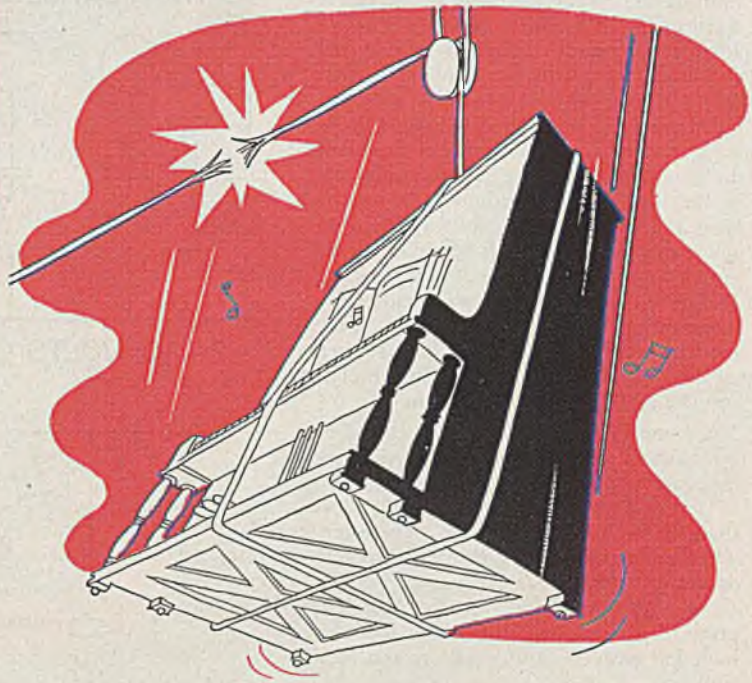
In studying the economics of this prob lem, certain basic equipment and syste elements were considered. These are di cussed in the following paragraphs, wit an inclusion to show the effect of oth types of motors and motor starters tha those listed herewith.

Motors and Motor Starters: Standa squirrel-cage induction motors are by f the most common. Therefore, to mak this study as representative as possibl these motors have been considered as basis of comparision. The curves in Fi 1 are plotted for 1800-rpm motors.

There has been a tendency to d regard totally short-circuit current inte rupting duty imposed on motor starte for short circuits which may occur on t load side of the motor starter. Adequa interrupting capacity is desirable in t

you wouldn't

lift a 500 pound load with a 100 pound capacity rope



It is just as foolish to put carbide cutting tools on an out-moded lathe. Carbide tools have increased horsepower requirements as much as 300 per cent.

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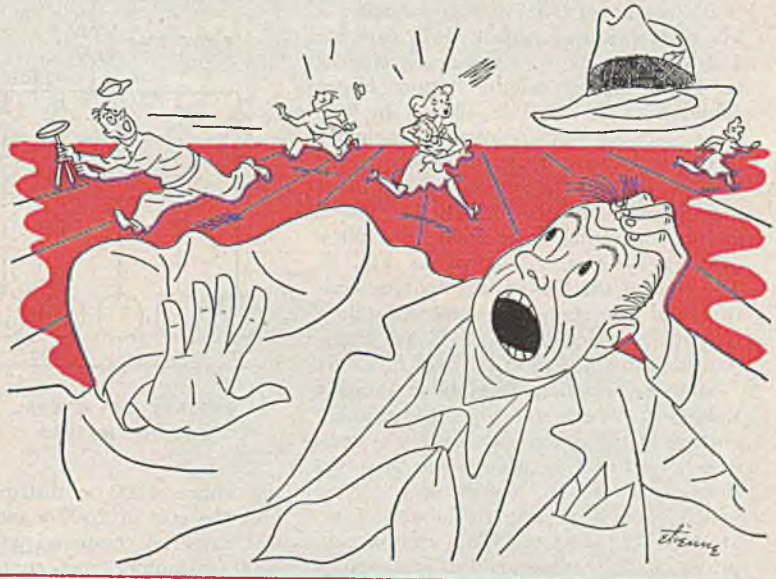
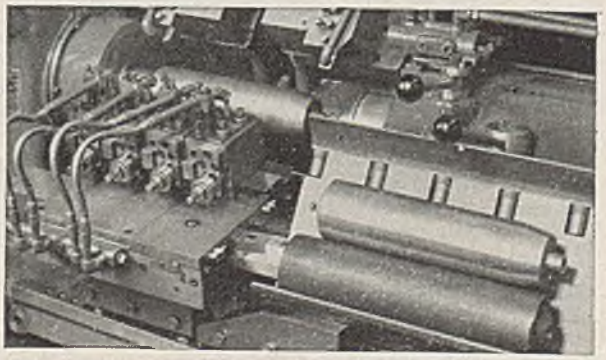


What HORSEPOWER Are You Using?

The 16" Fay Automatic Lathe that is rough turning this 105 millimeter shell has to transmit *from 75 to 100 horsepower* to do this job on a production basis and take full advantage of the fast cutting carbide tools.



Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools

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Fay Automatic Lathes

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

motor starters to safely and quickly open these short-circuit currents. When a fault occurs on the load side of the motor starter and the latter does not have adequate interrupting capacity, it may fail and endanger nearby personnel and property. It may also cause the feeder circuit breaker to be tripped out, thus dropping service over a large area of the plant and, as a consequence, substantially affecting production. From this it can be seen that it is equally as important to select motor starters with adequate short-circuit interrupting rating as it is to select feeder circuit breakers with adequate interrupting rating. Therefore, only modern combination motor starters, such as the one illustrated in Fig. 2, are considered in this basic comparison.

System Factors: To use 440 or 550 v motors in a plant in which the primary or generation voltage is higher than 600 v requires a transformation to less than 600 v for these motors. Therefore, when comparing 440 v motors to motors operating directly at primary voltage (i. e., 2400 or 4160 v), the installed price of a step-down substation must be included with the 440 v motors and control.

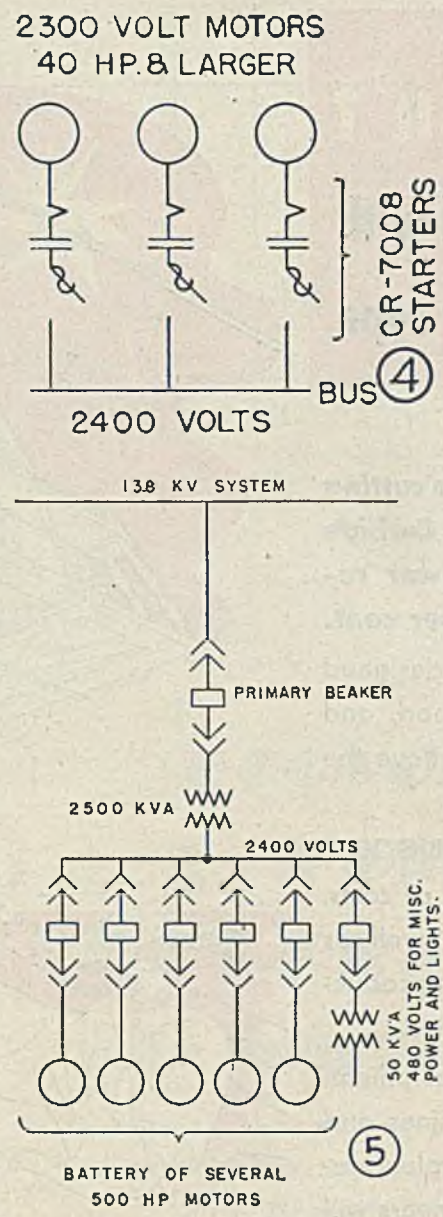
It is assumed that, due to diversity, 1 kva of transformer capacity will care for 1 2/3 hp of motors. As branch circuits to 440 v motors usually require larger cables than do 2300 or 4000 v motors, fifty cents per horsepower was included in Curve A to cover the cost of the larger 440 v cables. The one-line diagram of the circuit elements for 440 or 550 v motors, operating from 2400 or 4160 v primary systems, is shown in Fig. 3. The cost of the low-voltage motors, control, and the step-down unit substation is plotted as a function of motor horsepower rating in Curve A, Fig. 1.

Motors Operating Directly at Primary Voltage: When selecting the primary voltage of the power distribution system, it is necessary to consider more than just the prices of the motors and control which operate at primary voltage—i. e., at 2400 or 4160 v. The approximate prices of high-voltage motors and control only are plotted in Fig. 1 on Curve B and C.

The cost of the primary system must be considered as well as the cost of the motors and control if the lowest overall electrical system cost is to be obtained. In factoring the primary system cost, it is assumed that, if the power is distributed at 2400 v, 2300 v motors will be used; and, if the power is distributed at 4160 v, 4000 v motors will be used.

In industrial plants with a total demand of a few thousand kilovolt-amperes, the primary power system (i.e., the generating plant or main step-down substation from the utility system) and the primary switchgear and cable cost about $2 more per kilovolt-ampere for 2400 v primary voltage than for 4160-v primary voltage. This cost differential will increase to about $4 or $5 per kva for systems about 10,000 kva and larger.

Therefore, if a 2400 v system is arbitrarily chosen in place of a 4160 v system, the extra cost of the entire 2400 v over



the entire 4160 v distribution system, plus the cost of 2300 v motors and control, must be compared with the cost of 4000 v motors and control for those motors which operate at primary voltage.

This comparison can be made by referring to Curves C and D in Fig. 1. These curves show that the 2300 v motors and control, plus the extra cost of the 2400 v power system, are more expensive than 4000 v motors and control. For the general case, then, Curves C and D, and not Curves B and C, should be used when selecting the primary system voltage for plants where a sizeable portion of the total connected load consists of motors larger than about 200 hp.

The total extra cost of the entire 2400 v power system over a 4000 v power system has been included at $4 per horsepower of high-voltage motor, i. e., $4 per horsepower was added to Curve B to obtain Curve D. This figure ($4) is arrived at by assuming that complete 2400 v power systems cost $2 more per kva than 4160 v power sytems, and that an equal kva capacity of power system is required for serving motors operating at primary voltage and to serve all other load which is operated at 600 v or less. If the high voltage motors require only one-half the system capacity for supplying them, that means that the 2 kva of more costly 2400 v system capacity (at $2 per kva extra) are required per horsepower of high-voltage motor. That is the equivalent of $4 per horsepower of 2400 v motors.

System costs are usually given in dollars per kilowatt-ampere but are added in Fig. 1 as dollars per horsepower, on the basis that the kilovolt-ampere and horsepower ratings of high-voltage motors are about equal.

Motors Rated 200 HP or Less: By referring to the curves in Fig. 1, it can be seen that below about 175 hp, 440 v motors enable the least investment in electric equipment, regardless of the primary system voltage. Hence all motors rated about 200 hp or less should be operated on systems rated 600 v or less, regardless of the primary voltage.

A close examination of the detailed prices will show that at 200 hp the cost of 440 v motors and starters in step-down substations, Fig. 3, is about equal to the cost of 2300 v motors and starters, Fig. 4. This is the reason for placing the arbitrary division at 200 hp rather than at 175 hp, as pointed out by the curve. These curves represent approximate prices and do not follow detailed variations.

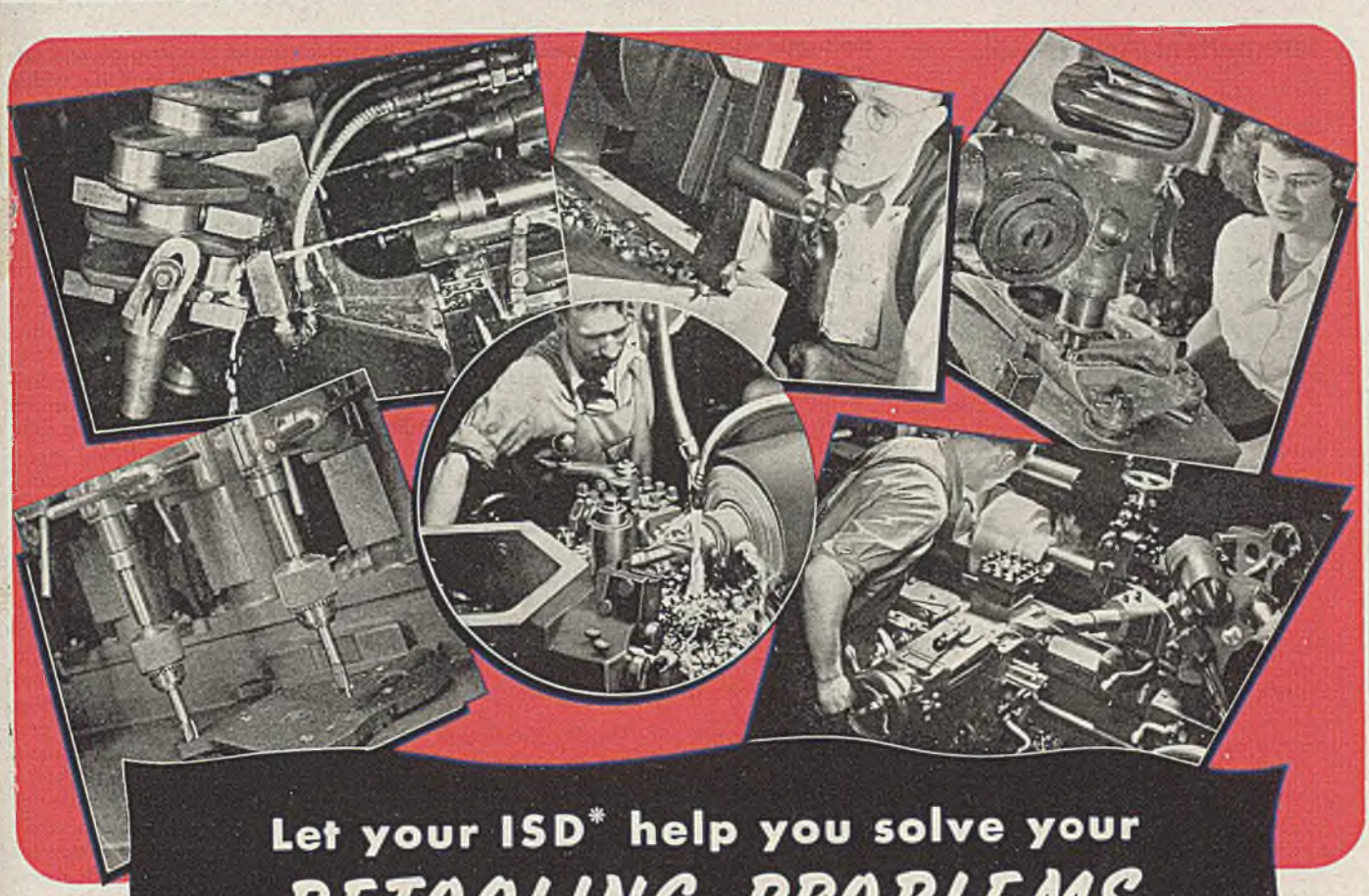
Hence there is no justification for ever arbitrarily selecting 2400 v as the primary voltage so far as any considerations of motors of 200 hp and below are concerned.

Overall Economy: Assuming that there will be a transformation from either 2400 or 4160 v to supply motors rated 200 hp or less, the choice betweeen these two primary voltages is based on primary system costs and the cost of motors and control for those motors rated above 200 hp. As pointed out previously, and as shown in Curves D and C, Fig. 1, the selection of a 4160 v system and 4000 v motors and control (for those motors rated 200 hp) enables a less expensive overall installation than the selection of a 2400 v system and 2300 v motors and control. In areas where the larger motors (i.e., those above 200 hp) constitute more than about 50 to 60 per cent of the total load, 2400 v may be less expensive providing the total load of the plant is not more than a few thousand kilovolt-amperes.

In general, an equally satisfactory, yet a lower cost power system can be obtained by selecting 4160 v as the primary voltage for general power distribution, rather than 2400 v.

Applications for 2400 V: In plants which are served at 2400 v directly from the utility system, then, of course, it would be more economical to use 2400 v directly and to place all motors rated 200 hp and above directly on the primary feeders. However, in these cases, nearly all motors rated 200 hp and less should be operated on a 460 or a 575 v system, stepping down from a 2400 v primary system. In some cases where

(*Please turn to Page* 160)



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Intermittent Acting Mills

(*Continued from Page* 109)

tached to the roll carriage, and having its other end attached to a spring on the lower end of a lever 21. These levers are mounted on a cross-shaft which has, off to one side, another lever with roller 8 engaging a cam-bar 19 connected to and reciprocating with the housing. As the housing moves toward the left on the working stroke (referring to Fig. 4), the cam 19 releases the tension on the chain, allowing the position of the rolls to be governed solely by the action on them of the cam plates and of the bar, when the latter is under rolling pressure. On the return stroke, as the housing approaches the right end of the stroke, wedge 17 has been pulled to the left, dropping the lower cam plate slightly and allowing cam 19, acting through the chains, to move the rolls back to their starting position for the work stroke (farthest-right position in Fig. 4).

Air cylinders 5 are mounted on an extension of the reciprocating housing; their piston rods, attached to the roll carriage, exert a pull which keeps the chains taut during movement of the carriage at times when no metal is between the rolls.

The function of wedge 17 is to facilitate the threading of the front end of the bar between the rolls when starting operation. The moving of this wedge to right or left (referring to Fig. 4) to raise or lower the under cam plate, is effected by a toggle mechanism actuated either by cams and rollers or by another air cylinder. However, when the final thickness of the strip is sufficient to give it stiffness against buckling, or (in the case of thin strip) after the front end has reached the coiler and is subjected to tension, the action of the toggle release can be dispensed with and operation continued with wedge 17 locked in place, holding the lower cam plate in its uppermost position.

If the cam plates were made with sloping surfaces throughout their entire length, a scallop would be produced in the surface of the strip at the end of each stroke of the mill, where the contour of the roll intersects the contour of the strip surface produced by the just-preceding pass. The parallel portions *C* of the cam plates allow the rolls to give the equivalent of a planishing or finishing pass over the reduced strip, smoothing out the peaks to the level of the hollows and producing uniform thickness of the strip. This is an advantage not available in some of the other types of intermittent-action mills. The slight reverse slope at the end of the parallel portion of the cams releases the pressure on the rolls at the end of the working stroke, to permit the wedge 17 to be moved while not subjected to roll pressure.

Adjusted with Mill in Motion

The screwdowns for adjusting the final thickness of the strip consist of screws 24 and wedges 25, one at each side of the housing. The housing cap 26 is moved vertically downward by the action of the wedges 25 or retracted upward by springs on top of the housing, carrying with it the upper cam plate. By means of jaw clutches operated by a flick of the operator's hand, a handwheel (not shown) can be made to actuate the screws 24 and wedges 25 on both sides simultaneously or either side alone and independent of the other, while the mill is in motion. This is an important feature, because in any mill having such an extremely large reduction in one pass (20 to 30 elongations), a slight difference in final thickness of the strip on one side from that on the other side of the width, can produce "camber," or slight curvature in the horizontal plane, causing the strip to tend to run off toward one side instead of running straight to the coiler. Tension exerted by the coiler tends to overcome this to a considerable extent, but the independent screwdown adjustment on the two sides is necessary also.

One of the problems in rolling strip in any mill is that of avoiding the formation either of buckles in the middle of the strip or of wrinkles at the edges. In the conventional type of strip mill, this requires suitable choice of the "crown" of the rolls, and adjustment of the same during operation by regulating the temperature along the length of the rolls. In the Krause mill, the effect of crowning the rolls is obtained by giving the upper cam plate a slight curvature in the plane of the roll axes. This is done by independently adjusting four wedges 27 located between the housing cap and the cam plate, at regular intervals across the width of the latter. The indicators on the screws actuating these wedges have fine graduations, permitting accurate adjustment of the amount of crown. In the present installations, the mill must be stopped in order to make this adjustment, but this requires only a short time, and needs to be done but once for a given material and given final thickness of strip.

One is so accustomed to dealing with the rolling action and the pressure distribution peculiar to the conventional mills, that a mental readjustment is required when considering the same factors in the Krause mill. Referring to Fig. 5, things will become clearer if the axes of the rolls are considered as being stationary as regards horizontal motion, and the strip is considered as being pulled to the right, while the rolls are forced together under pressure. Then it becomes evident that, so far as the pressure distribution and the slip of points of the strip surface with respect to the roll surface are concerned, the "outgoing" part of the strip is the part to the right, in this case the thicker part, while the "incoming" part of the strip (to the left of the rolls, in Fig. 5) is in this case the thinner part. The condition that the resultant of all forces over the entire contact length between roll and strip must pass through the point *A* of contact of the roll with the cam plate, determines the direction of this resultant and the line of projected contact area, and permits the Siebel diagram[2] of forces to be drawn and the neutral point to be determined. In all positions of the Krause rolls except those near the end of the pass where the strip is thinnest, the more accurate v. Karman diagram need not be used, as the Siebel construction is sufficiently accurate.

The neutral or grip point is at *B* in Fig. 5. At this point there is no slip of

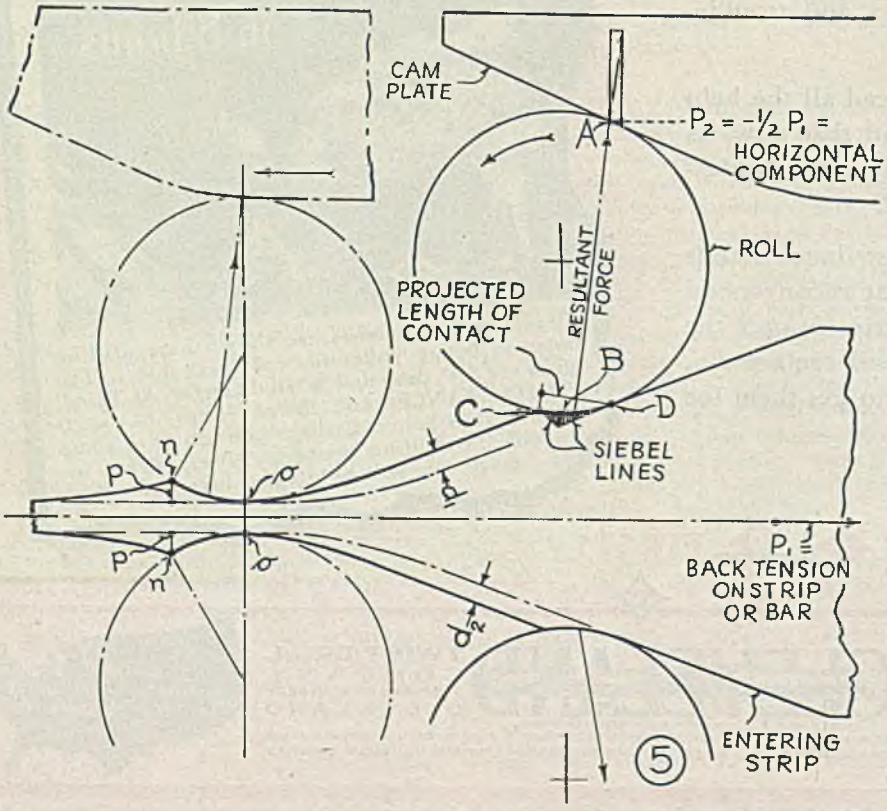
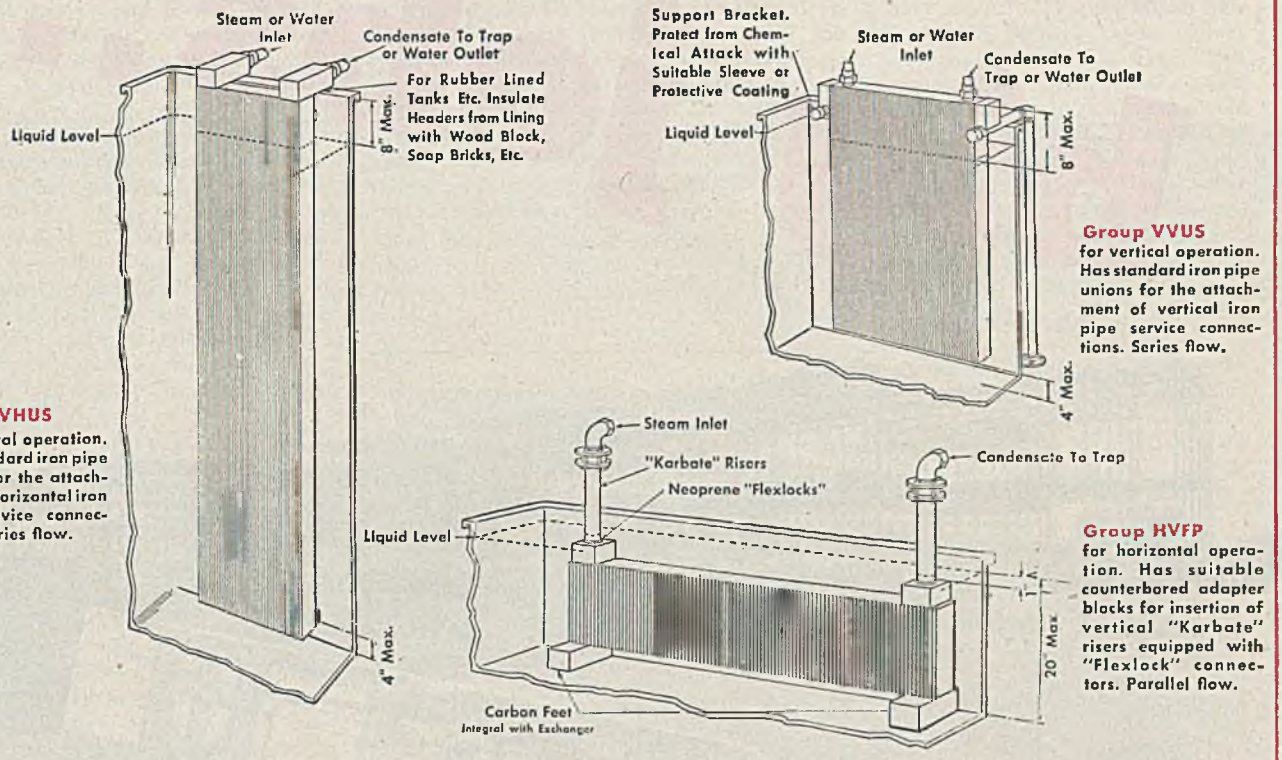


Fig. 5—Force relations, contact area and grip point in Krause mill

[2] Explained in "Roll Pass Design", Trinks, Vol. I, pp. 84, 86, 115.



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the metal on the rolls; to the right of *B* the metal slips toward the right relative to the roll surface, and to the left of *B* it slips toward the left. Since *B* is closer to the point of initial contact *C* than to the point of final contact *D* (which is just the reverse of the condition in the conventional mill), this is favorable to the desired "extrusion effect"; in other words, the metal finds it easier to flow toward the right (referring to Fig. 5) than to the left; and it does this under tension provided by the roll action. This seems to be, to a great extent, the explanation of the observed fact that lateral spreading in the Krause mill is astonishingly small[3], in spite of the extremely large reduction, and this is true even when narrow strips are rolled.

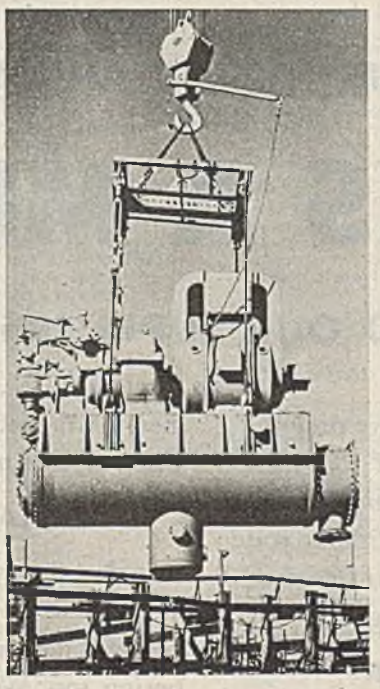
For light drafts (d_1, d_2 small, referring to Fig. 5), the axis of the roll would travel horizontally the same distance relative to the strip as the cam plates travel relative to the roll axes; and since the same is true as regards the relative vertical motions, it follows that the angle of the wedge-shaped part of the strip, or its slope from the horizontal, would be the same as the slope of the cam. Actually, because of the elongation of the wedge of the strip occurring as the rolling proceeds, the slope of the wedge is found to be slightly less than the slope of the cam plate.

Where Trouble Occurs

The only place in the working region of the strip at which trouble can occur is the thinnest section between the rolls when the final strip thickness is small and the feed too great relative to this thickness. In that case, the horizontal component of the compressive pressure, acting on the area corresponding to the projection *n-p* of the contact length on a vertical plane, produces a high tensile stress in the thinnest section *o-o* of the strip, and this combined with high compressive pressure of the rolls, may be sufficient to cause a combined action equivalent to pinching the strip through and tearing it across at this place. Strangely enough, tension exerted toward the left by the action of the coiler actually reduces the tendency to tear the strip, because it reduces the compressive pressure on arc *n-o*. Tearing is avoided by exact regulation of the feed, which must not only be correct in relation to the initial and final thicknesses of strip, but must be exactly the same, stroke after stroke.

In the present installations of the Krause mill, the rear end of the thick entering bar is held in a "gripper," and is fed toward the mill by a screw actuated by a variable-speed mechanism. However, since the speed is slow, it would easily be possible to have a welding device travel with the rear end of the bar and weld the latter to the front end of a following length of bar, so that it will be equivalent to an endless strip. Arrangements are being made to do this, in which case the screw feed can be replaced by a pinch-roll feeder or the like. This will permit continuous operation of the mill without stoppage for entering a new strip; will insure uniform front tension at all times, and will avoid leaving as scrap the rear end of the thick bar which at present cannot be fed into the rolls. (The scrap formed at present, however, consists largely of the tongue or rounded end of the bar, formed on it in the preceding hot rolling; and this would be scrap in any case).

The delivery speed of the strip in the present Krause installations is only 25 to 30 fpm. However, it is certain that this can be greatly increased. The upper limit of speed would doubtless depend either on the magnitude of the inertia forces of the reciprocating mass of metal (housing and attached parts), or on the impact forces of the rolls coming into contact with the strip. At present the speed is 62 rpm with a stroke of 32 in., and a maximum strip delivery of 5 in. per stroke. When it is considered that reciprocating blowing engines, for example, with heavier reciprocating masses and longer stroke (60 in.) have been run at 80 to 100 rpm without trouble from inertia forces, and blooming mill engines of 60 in. stroke at as high as 200 hpm, it seems probable that the speed of the Krause mill could be at least quadrupled, so far as concerns inertia forces. The speed limit as regards impact of the rolls on the strip is probably even higher, since the rolls and housing travel with sine-harmonic motion, and initial contact of the rolls with the strip in each cycle occurs just after the end of the return stroke or the beginning of the working stroke, when the velocity is only a small fraction of the average velocity. (In this, the Krause mill differs from rotating intermittent-action mills in which the contact occurs at full speed of the rolls).



PACKAGED POWER PLANT
Shown here being lowered into engine room of a military transport is a power unit built by Westinghouse which incorporates a 3500-horsepower turbine, generator and condenser in a single "package." Installation is complete, including lubricating oil system, pumps and piping, and only connections necessary are to steam, water and electric lines

Observations of Krause Mill

The author had the opportunity of observing the Krause mill in operation at the C. G. Hussey Co.'s plant, rolling clad copper strip about ½-in. thick and 12½ in. wide, to final thicknesses of 0.025-in. and 0.017-in. Following are the observations:

1. When the mill was correctly set for the 0.025-in. final thickness, the strip produced was excellent. When the adjustments were not right, the strip showed center buckles or edge wrinkles or camber, as would be expected. Reduction to 0.025-in. thickness (about 20 elongations) was effected without trouble, but when reducing to 0.017-in. (about 30 elongations) at times the strip tore across while between the rolls, until the equivalent crown of the rolls was adjusted to suit the new final thickness.

2. The appearance of the strip surface was excellent. Extremely small thickness variations at the end of each stroke, due to spring of the mill parts, were barely detectible visually, not detectible by micrometer.

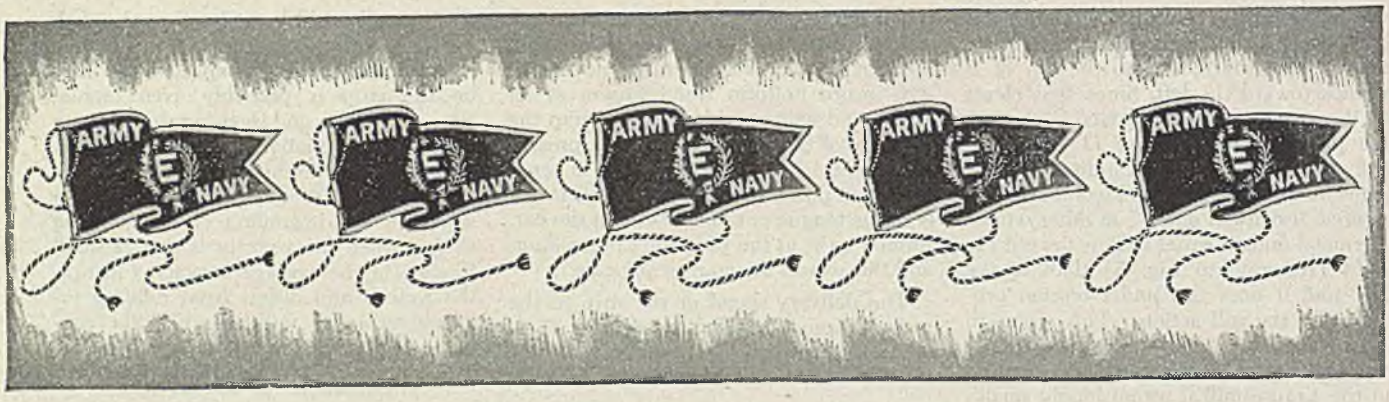
3. It was surprising, in view of the heavy reduction in one pass, to observe how little lateral spreading and how little cracking of the edges occurred, even in copper which is more subject than steel to edge cracking. Although the cladding metal originally projected considerably over the sides of the copper, and the edge parts therefore were elongated by tension only, no great amount of edge cracking occurred in it or in the copper.

It is stated that the strip produced by the Krause mill shows less of the undesirable uni-directional orientation of the grains after annealing than strip rolled in the conventional type of mill to the same number of elongations. In working nonferrous metals, elongations as high as 100 to 1 (reduction from ½ to 0.005-in.) are stated to have been effected, and there seems to be no reason why much greater elongations could not be effected without deforming the structure of the metal beyond the range in which it can be restored by proper annealing.

Tests of power consumption when reducing copper bars 26 in. wide by ½-in. thick to 0.022-in. final thickness, or 22.8 elongations, showed 76.5 kw-hr per ton, total, but since 47 per cent of this was friction power as indicated by the "idling" power measurements, the net power consumption for rolling was 44.4 kw-hr per ton.

Because of the slow speed of the Krause mill, it should be feasible when rolling metals which do not scale much, such as the metal, aluminum, to place

[3] Low power consumption of Krause mill is also explained by this roll action.



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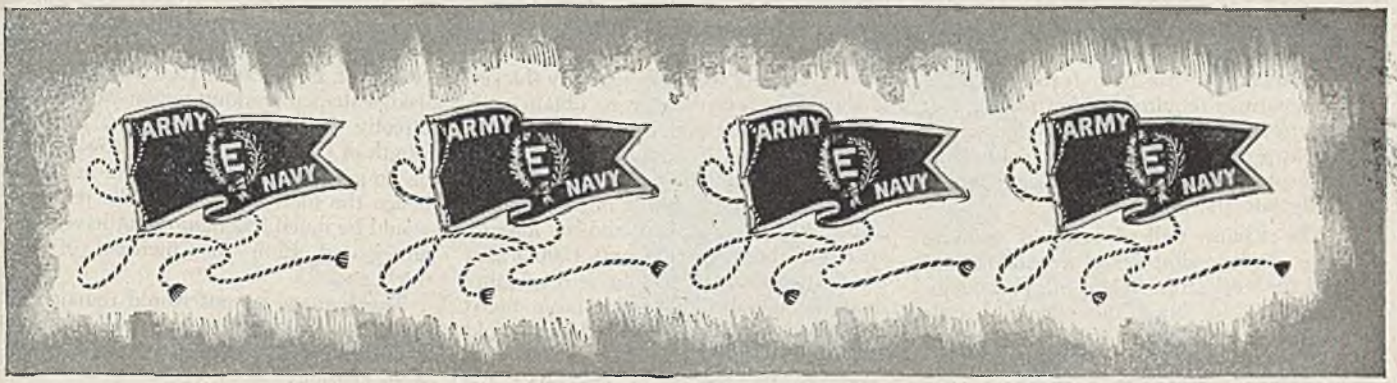

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burners on the entering side of the mill, playing on the entering strip and heating it, without the use of a furnace, to the temperatures required for hot rolling. For hot-rolling steel, in order to avoid scaling, the strip might be heated in a controlled-atmosphere furnace and thence pass directly into the mill.

The Krause mill also would seem to have good possibilities as a semifinishing mill for steel strip. While the present installations, for brass and copper, handle bars only ½-in. thick, there is no reason why much thicker bars or slabs could not be reduced. Elongations of 50 to 1 and even 100 to 1 have been effected in steel strip of ½-in. entering the thickness, and if the slab and consequently the strip leaving the mill were considerably thicker, it should be even easier to obtain such elongations. Starting with a slab 5 in. thick, this might be reduced in the single pass to strip 0.050-in. thick, ready for entrance into the finishing mill. The slabs could either be reduced cold, or initially heated to between 900 and 1000°F., at which temperature scaling is negligibly small, while the rolling forces are reduced almost one-half as compared with cold conditions.

The stroke of the mill when designed for 5-in. slabs would of course be made longer, but the required increase would by no means be proportional to the increase of thickness. The length of the wedge-shaped working region would vary directly as the slab thickness, but the length of the end parts of the stroke need be no greater than for the ½-in. material; hence the total length of stroke required would be much less than might have been anticipated from the increase of the thickness.

The tonnage output would remain the same, for a given final thickness of strip, regardless of the increase of the number of elongations.

(*Continued next week*)

Cutting and Machining

TURBINE BUCKETS

—with special attachments on standard milling machines

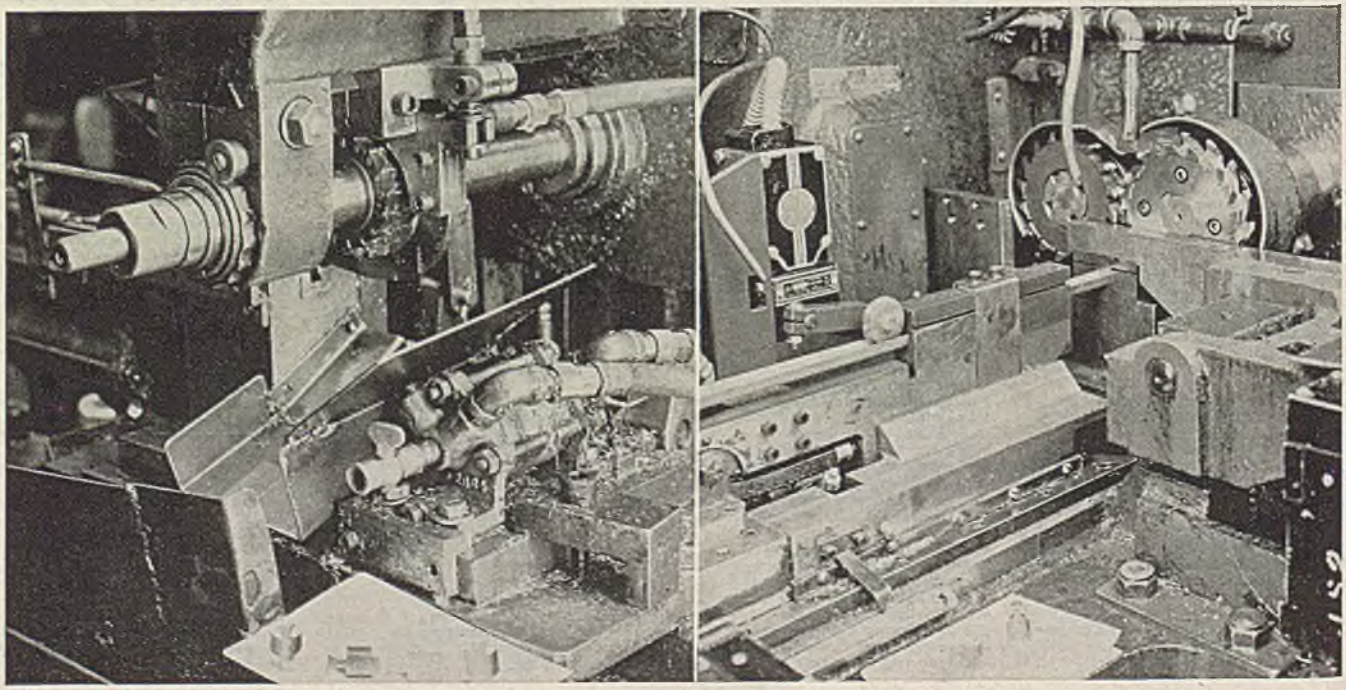
NECESSITY for designing and constructing a special machine tool to cut and machine turbine buckets from strip metal sections has been avoided by applying a special two-spindle-head and an automatic fixture to a standard rise and fall milling machine. This operation formerly was performed on a specially adapted closed-cycle milling machine having three-spindle heads and complicated controls.

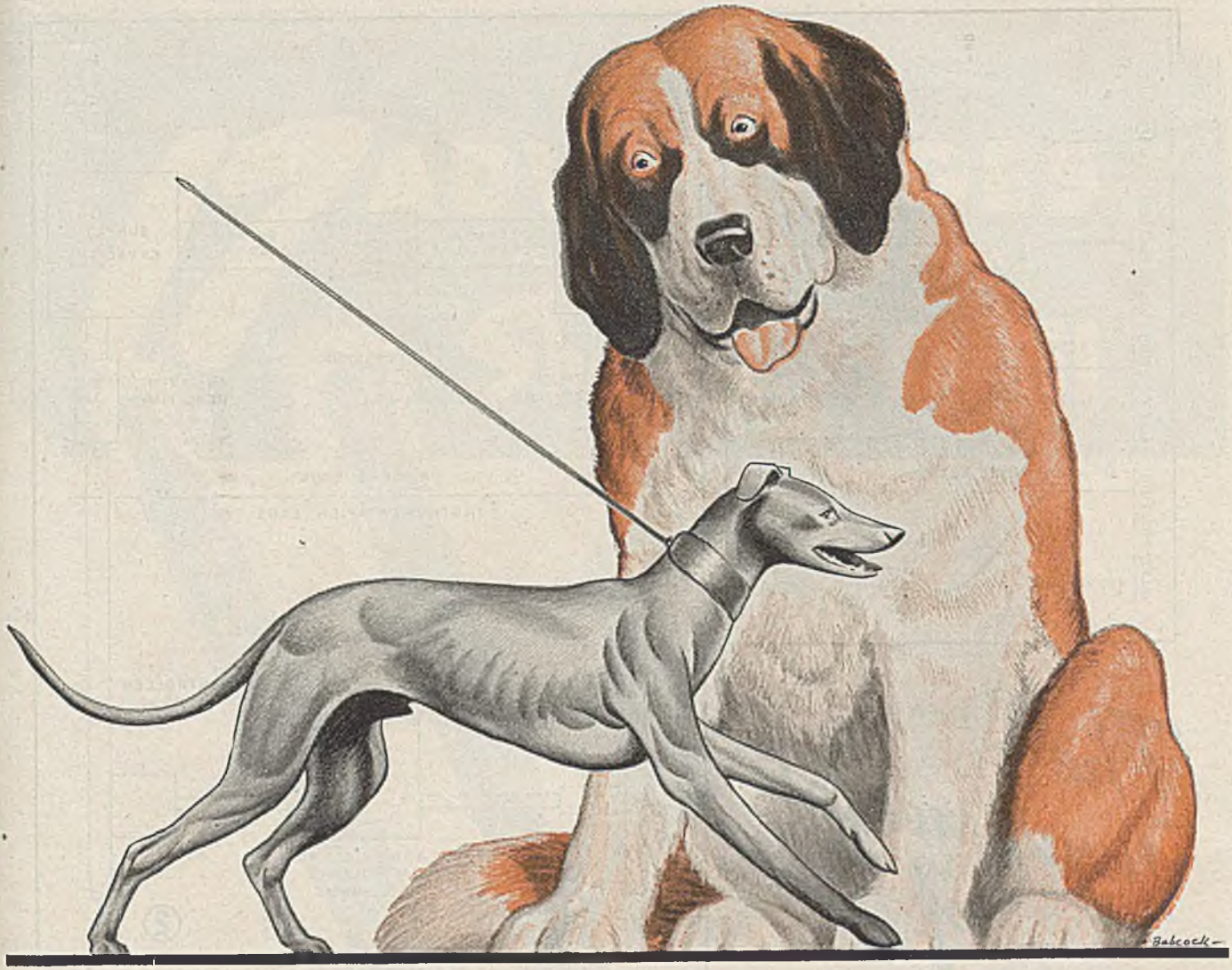
When production requirements were increased at General Electric Co's. Lynn River Works, a comprehensive study was made to determine whether a standard machine tool could be used for this operation. Finally, a rise and fall milling machine was utilized by dividing the operation into two parts. A two-spindle head machine is used to cut the stock and mill the dovetail, and a standard machine to mill the tenon.

Standard Cincinnati No. 2-24 rise and fall machines, with special two-spindle heads and special connections into the hydraulic systems of the machines, were obtained. A close-up view of this fixture at left below, shows work and arrangement of controls. The special connections are used for a fixture developed at the Lynn River Works and a solenoid trip used for automatically restarting the work cycle. This machine, working on a closed cycle, finish mills the dovetail on the bucket and cuts the strip stock.

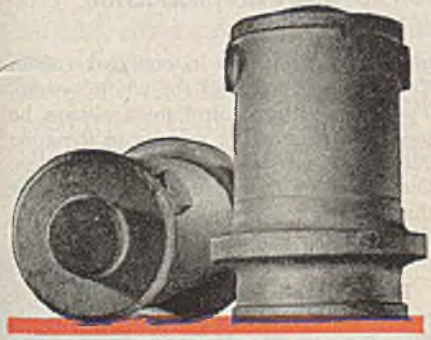
A standard Cincinnati No. 0-8 rise and fall milling machine, equipped with a special fixture with an automatic magazine feed, is used for the second operation. The special fixture, shown at right below, is equipped with adjustable stock for various lengths of buckets. It can be swiveled to mill the tenon at any angle to the axis of the buckets. A magazine feed with an electric vibrator also is provided to assist buckets in sliding down guideways.

By modifications and special attachments to these standard machines, equipment was obtained and put into operation in much less time than would have been required to acquire special machinery. The machines also may be easily altered for other jobs.





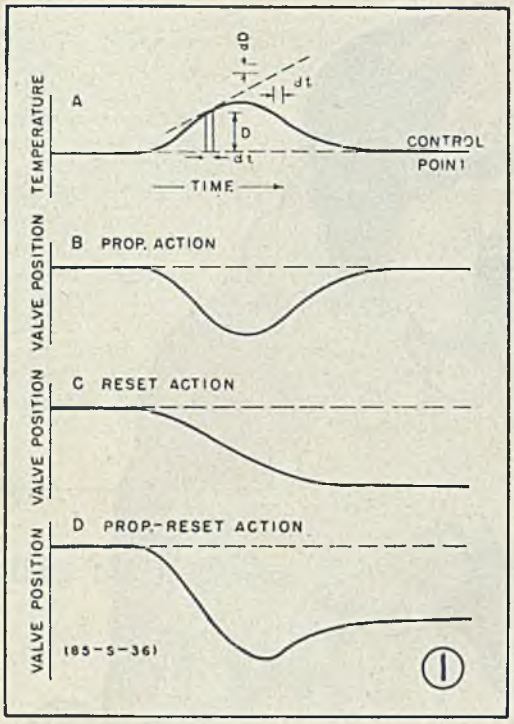
There's a vast difference in forgings, too!

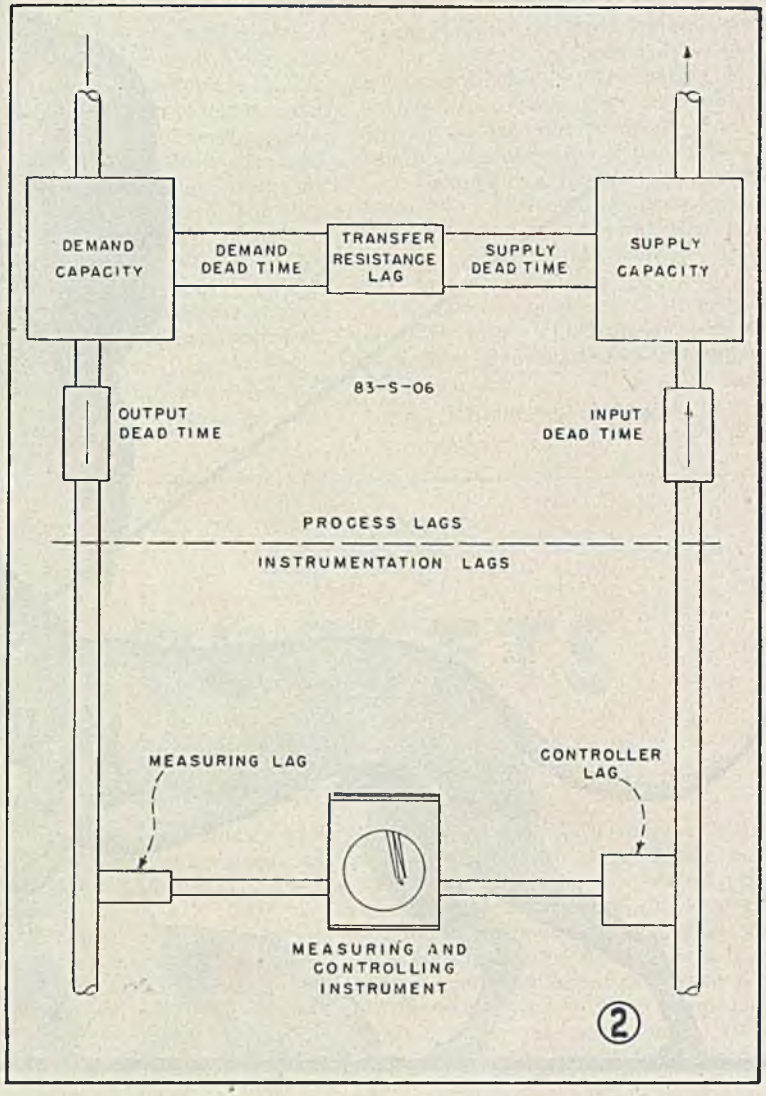


ONE of Tube Turns' tough wartime forging assignments involved a cylinder head and barrel unit for P.T. boat engines. The old forging weighed over 130 pounds. Tube Turns engineers produced this one in approximately normal forging tolerances above rough machined dimensions, weighing slightly over 80 pounds. Fifty pounds of critical metal were saved, and much expensive—and precious—machining time.

New forging production methods at Tube Turns make such savings available to all industry. If you are now at work on designs for the improvement of your present product, or for a wholly new product, you are invited to consult Tube Turns. Our engineering talent, our huge upset and mechanical press forging equipment and precision heat treating facilities have achieved remarkable results with steel and light metals. They are at your service. Write, without obligation, to Tube Turns (Inc.), Louisville 1, Ky.

TUBE TURNS *Forgings for Industry*





The Fundamentals of AUTOMATIC CONTROL

By regarding the automatic system for controlling pressure, flow, liquid level or temperature as a dynamic unit, it may be seen that measurement and process are one. Understanding may facilitate reconversion to postwar production

By DONALD P. ECKMAN

Engineering Department
Brown Instrument Co. Division of
Minneapolis-Honeywell Regulator Co.,
Philadelphia

AUTOMATIC control fundamentals, when understood and appreciated, may speed the conversion to postwar production.

Instruments, particularly controllers, have been important in meeting wartime demands for greater output, higher quality and increased operational efficiency. With an increase in both domestic and foreign commodity competition after the war, plus an even greater competitive wage situation due to world conditions, all three factors—quality, efficiency and speed—will be the basis for American industrial success. That success can be attained in great part through a realization now that automatic control and its fundamentals are important.

Proportional Control is a mode of control which positions the control valve in accordance with magnitude of the controlled variable. This control function is largely stabilizing and, if not too great, forces the controlled variable to line out at some point. It will not prevent permanent deviation from the control point upon a change in load.

Reset Response provides an additional increment of valve position in proportion to the deviation and the time of deviation of the controlled variable from the control point. This control function has very little stabilizing effect but, if not too great, tends to prevent deviation from the control point for changes in load.

From these definitions it is obvious that the control system and the process must be considered together as a dynamic unit, since a change in one part carries through so as to affect the whole system. Thus, automatic control must always be measured in terms of moving or dynamic conditions, not steady or static conditions. One proof of this is shown by the fact that a deviation must be detected before the controller can act. Therefore, a deviation, no matter how small, must occur.

In nearly all cases discussed here the controlled variable will be temperature. The discussion applies in general, however, to the control of pressure, flow, and liquid level when allowances are made for the greatly different process characteristics.

Action of Control Responses: Disregarding the process for the moment, we wish to study the pen and valve move-

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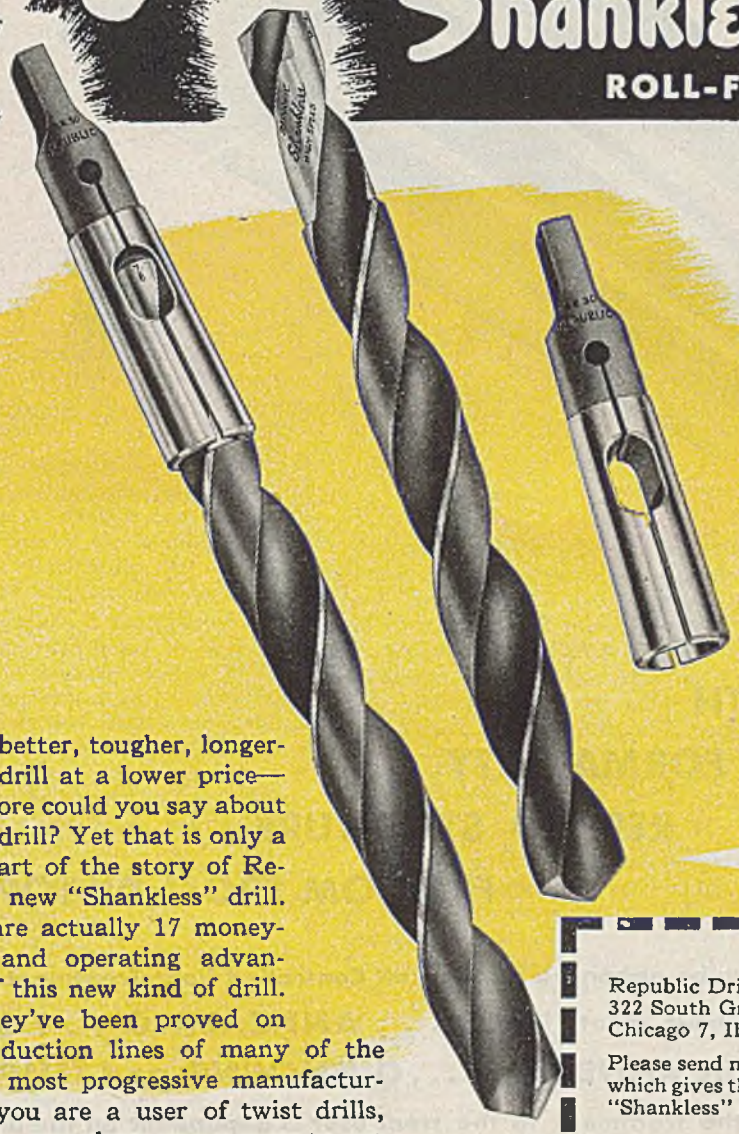

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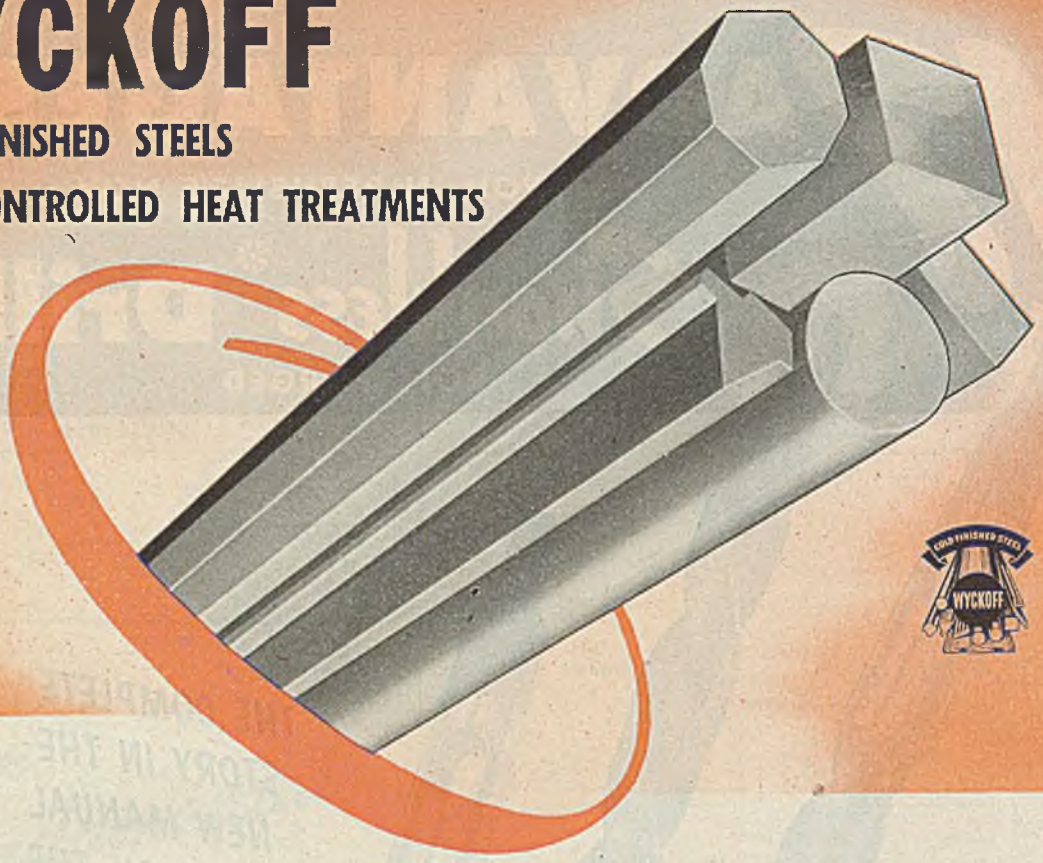

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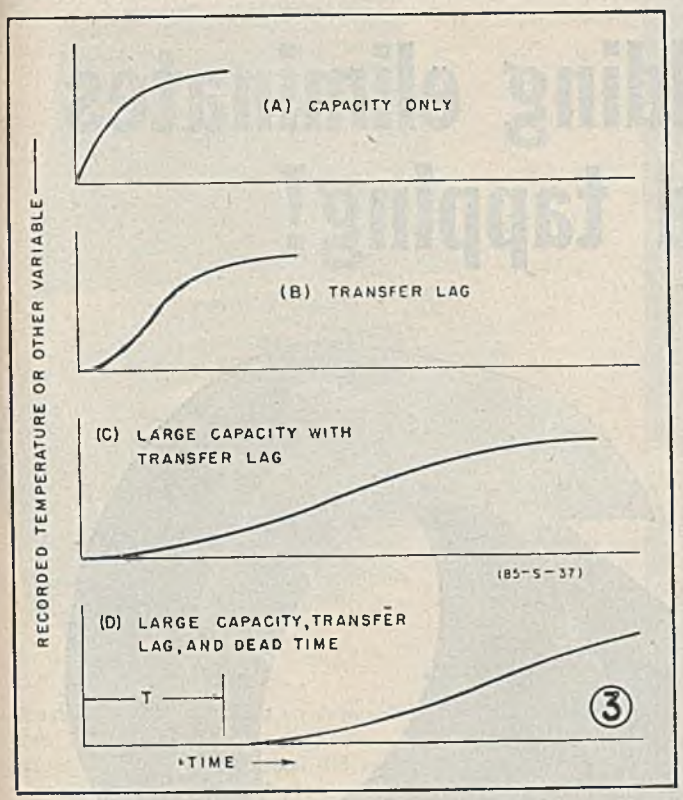
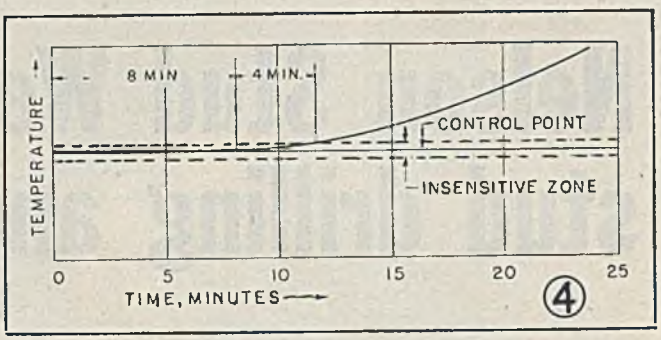
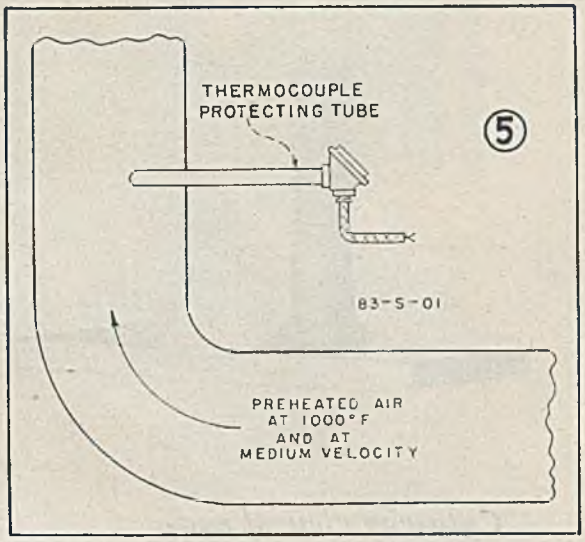






ments when proportional and reset responses are used in the control system. Fig. 1, curve A, shows a deviation which has been chosen as an example. The control valve is by-passed so that no control action results from its movement.

In the definition of proportional action, valve position was found to be proportional to the deviation. Curve B shows the valve movement that would result from this deviation when a proportional controller is used. Note that this curve is similar to the deviation curve. A proportional controller always has the characteristic that a certain pen position is accompanied by a certain valve position. Stated in other words, the rate of valve movement is always proportional to the rate of pen movement.

In actual practice this recovery action would result from a very temporary change in load, the load returning to exactly its previous value.

In the definition of *Reset Response*, the valve position was found to be proportional to deviation and time of deviation. Suppose that, at the time interval marked "dt" on the time axis of curve A, the deviation in temperature is D, as shown. The definition of reset shows that during time dt the valve will move an amount proportional to D x dt.

If we start at the beginning of the deviation and move the valve at each dt an amount proportional to D x dt, the valve will move as in curve C. What really has happened, is that curve C represents the area under the deviation curve and the reset has integrated or added the sum of the small D x dt areas. But since *Reset Response* is generally used in conjunction with a proportional controller, these two effects must be added together. Curves B and C are added and shown in curve D.

In actual practice, this recovery curve would occur on a permanent change in load, *Rest Response* having closed the valve an additional amount to maintain the temperature at the control point.

Process Characteristics Affecting Control: All processes are more or less complicated arrangements of a number of capacities, transfer lags, and dead times. The extent of these factors determines the complexity of the control problem.

Capacity produces a retardation, not a delay, by the ability of sections of the process to absorb energy without causing an immediate full rise in potential. Compare this with an electric capacitor which can absorb electrical current and thus delay the rise of voltage until it is charged. The ability of the brick walls in a furnace to absorb heat, the volume of liquid in a tank which affects the liquid level, and the amount of steam required to raise the pressure in a steam cooker, represent capacity.

Transfer Lag is a retardation, not a delay, caused by the potential drop between two separated capacities or over-distributed capacity in the process. This can be compared to an electrical resistor between two electrical capacitors. The temperature drop across a boiler tube or a heat-exchanger tube, the pressure drop across a valve connecting two tanks, or the temperature drop across an insulating wall represent resistance of the kind which causes transfer lag.

Dead Time is a pure time delay which arises from the necessity of transporting a mass of liquid, gas, or solid from one point to another. The distance between a heat exchanger outlet and the thermocouple, and distance between an oil burner and the material being heated, and the distance between a control valve and the fuel burner, all represent a small but sometimes appreciable dead time during which time no change can be effected.

Not only the process itself, but the measuring and control systems have capacity, transfer lag, and dead time. Fig. 2 shows a typical process with all the various sections which make up the system. All processes or controllers do not have this arrangement, some having fewer and some having more component parts.

Consider what actual characteristics enter into each of the blocks in a diagram; assume that the process is a fuel-fired waterheater and that we wish to know what each of the blocks in the diagram represents:

Input Dead Time is the time required for fuel oil to flow from control valve to burners.

Supply Capacity is the heat storage capacity of the firebox.

Supply Dead Time is the time required for hot gases or flame to travel from firebox to water tubes.

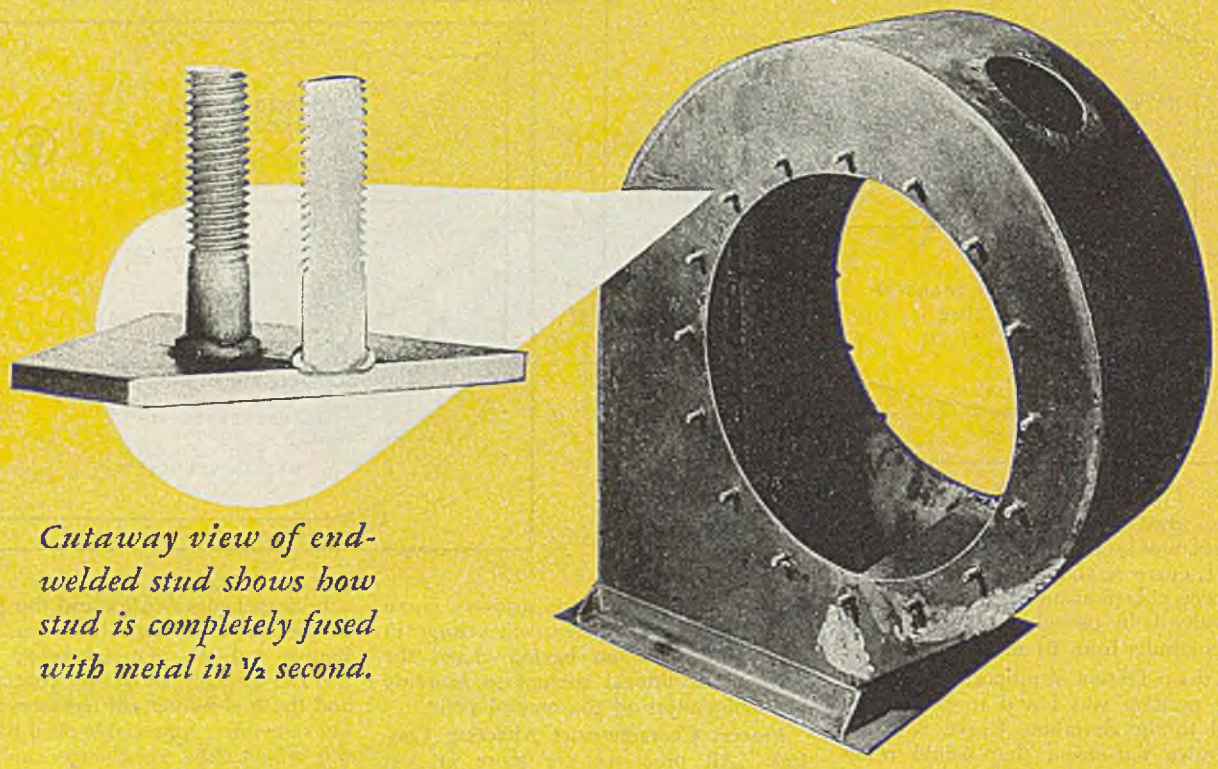
Transfer Resistance is the resistance to heat flow across the water tube from gases to water.

Demand Dead Time is the time required for water to flow from water tube to header.

Demand Capacity is the heat storage capacity of water in tubes and header.

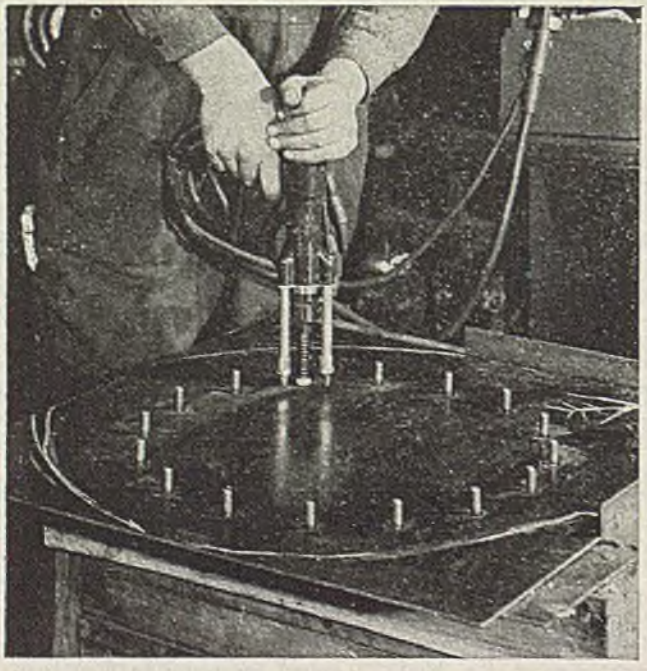
Output Dead Time is the time required for heated water to flow from the

Nelson Stud Welding eliminates stud drilling and tapping!



Cutaway view of end-welded stud shows how stud is completely fused with metal in ½ second.

Photographs by courtesy of Herbert H. Davis Co., Cicero, Ill.

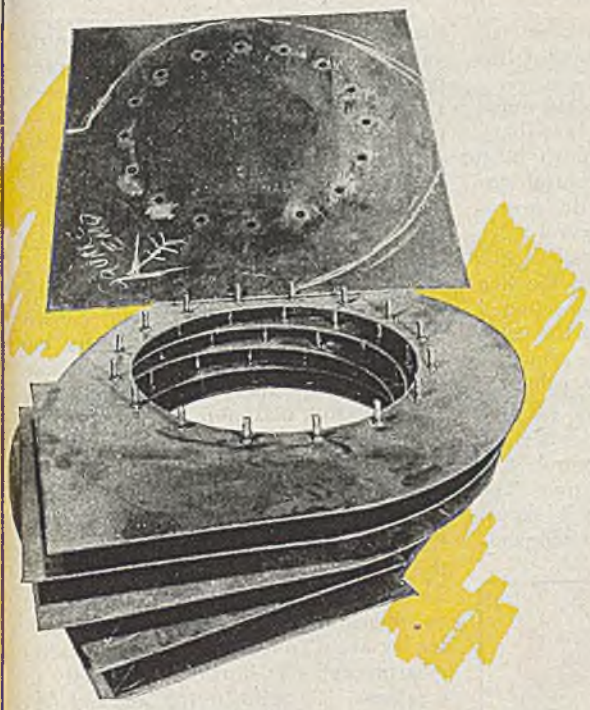


Welding studs through template produces accurate duplication of parts. Studs are welded through guiding template to work underneath. The operator loads a stud into the gun chuck, inserts it into the hole and pulls the trigger. Welds are *automatically* made in an instant.

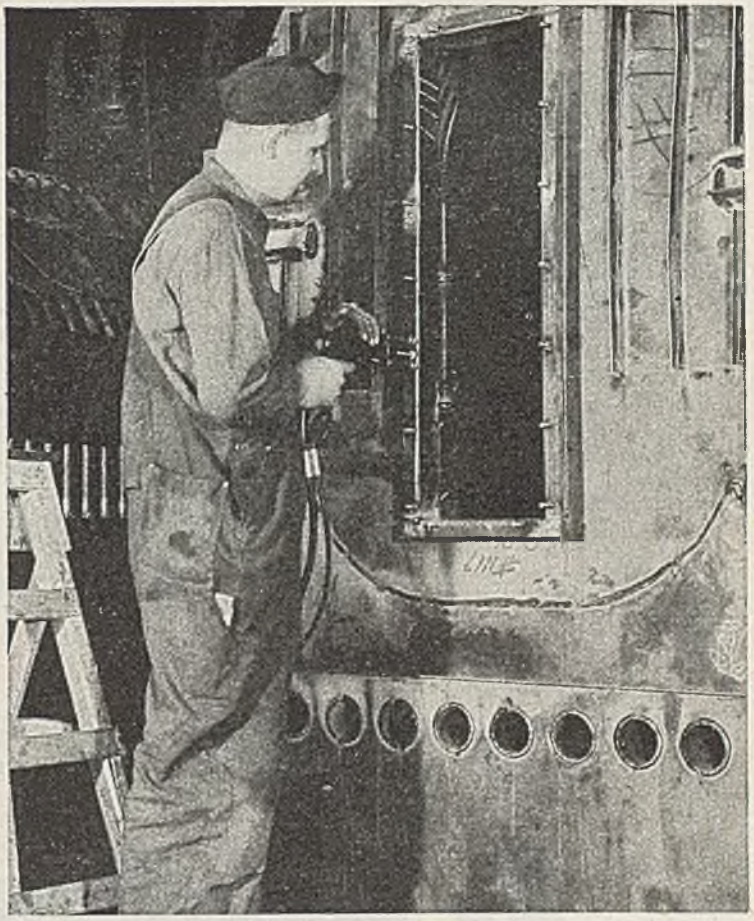
The Nelson Arc Stud Welder saves time and material because it secures studs without drilling and tapping holes. The manufacturing of air-conditioning equipment and industrial furnaces at the H. H. Davis Co. is a fine example of a typical industrial application.

The welds made with Nelson studs result in uniform work with *complete fusion* between stud and metal. Thousands are now being used by more than 650 industrial plants and shipyards. Operators can average 500 to 1000 stud welds in eight hours.

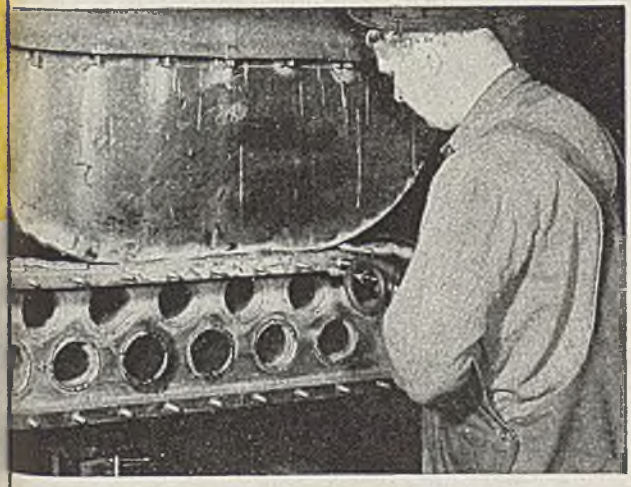
Nelson Stud Welders are fully automatic and are completely portable . . . they may be operated as a production unit or as a portable hand tool.



A template is used in welding studs to parts. Studs are welded through holes onto casing, insuring accuracy of spacing. Nelson Production Stud Welding Units, welders mounted on pneumatic cylinders and arbors, are also used where continuous production of parts is required.



Inspection plates of all kinds are welded in any position with the portable Nelson welder. Light in weight and easy to handle, it may be used efficiently in any location. Welds produced are as strong as any hand-welding method—have consistent weld fillets.



Welding inspection covers of all types is an ideal stud application. Studs are welded at desired centers to cover flange and cover secured with nuts. No holes in casing . . . close tolerances held.

Welding inspection door on industrial furnace through template. All arc timing is automatically controlled, producing consistent welds. Write today for catalog and complete details.

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Dept. T 440 Peralta Ave., San Leandro, Calif.

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tubes or header to the point where the thermocouple or the thermometer bulb is located.

Measuring Lag is represented by the heat capacity and resistance to heat flow in the thermocouple or thermometer bulb and its protecting well.

Controller Lag is represented by the lag of response of the control valve—in electric control by the speed of the motor valve operator, and in pneumatic control by the pressure storage capacity of the valve topwork.

Process Reactions: In order to illustrate the effect of capacity, transfer lag, and dead time, we may employ the reactions of the furnace or other process to changes in fuel flow. This method was previously used to illustrate controller action by moving the pen and observing the resultant valve action. To illustrate process characteristics we move the control valve and observe the action of furnace temperature.

The reaction curve is simply the curve of temperature, (or other variable), versus time that would be drawn by a recording instrument if the control system were disconnected from the instrument and a change made in control valve position. On pneumatic controllers this may be done by disconnecting the line leading to the valve, and connecting a separate air supply. By varying the valve pressure a known amount, the temperature would rise or drop to a new value.

Fig 3 shows the effect on the reaction curve of three characteristics which greatly influence automatic control: Capacity, transfer lag, and dead time. The effect of capacity in a process is shown by curve A. Capacity allows the temperature to change instantly when the control valve is moved but the temperature gradually approaches a final value—a typical logarithmic reaction. This type of process reaction is desirable since it provides instantaneous response of temperature but slows down the response sufficiently to provide stability. A reaction such as shown by curve A is an ideal which is rarely ever obtained. When a second capacity is associated with the process, a transfer lag is generally caused as shown by curve B. This transfer lag is illustrated by the slow initial response to valve movement which gradually builds up to a maximum rate of reaction. Note that this reaction is greatly different than when only a single capacity is involved as in curve A.

The effect of transfer lag may be caused by any additional retarded response in the process or in the control system. This is a very important consideration in automatic control. The effect of transfer lag arises from (1) a supply capacity in a process; (2) distributed capacity in a process; (3) a measuring lag; and (4) a controller lag.

Since transfer lag is nearly always detrimental to automatic control, all four conditions above must be avoided whenever possible.

By using greater process capacity the effect of transfer lag may sometimes be overcome. Curve C illustrates a much greater process capacity than curves B or A. Transfer lag is indicated by the slow initial rate of change of temperature.

Dead time is the cause of much difficulty in automatic control. When dead time exists, as shown in curve D, a control valve movement cannot be made effective until the dead-time period has passed. Therefore, any deviation which occurs during the dead time period cannot be avoided.

In automatic control, it is usually outside disturbances or load changes which cause the major difficulty, and not control of the variable itself. Then, also, the lags of the measuring and controlling systems of the controller form a very important part of an automatic control application, especially when process transfer lag and dead time are small.

Practical Aspects of Control: There are several factors entering into the control of various processes which produce relatively great improvements in the quality of control. They might be called fundamentals, but this is only to emphasize their importance.

Any reduction of the dead zone of the measuring system causes improvement in the quality of control, especially for processes having large capacity and transfer lag.

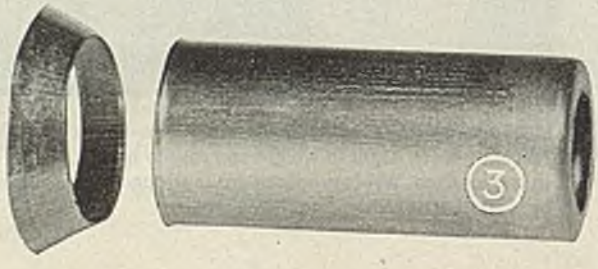
To show how this comes about, a reaction curve for a process having capacity, transfer lag, resistance, and dead time, has been redrawn to a larger scale and only the deviation from the control point is shown in Fig. 4.

This is the beginning of deviation from the control point and from the time that

(*Please turn to Page* 166)

DEEP DRAWING DIES

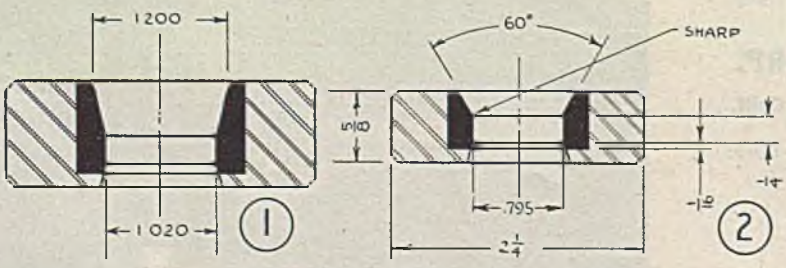
of cemented carbide have unusually long life, affording more profitable production of cases for radio tubes



DEEP drawing dies of cemented carbide currently are giving unusually good results in the production of cases for radio tubes. In one operation, where 100,000 pieces per die prove it a profitable performance, some of the carbide dies have turned out as many as 750,000 pieces, 400 per cent more than was calculated before these dies were installed.

Material being drawn is tin plated sheet steel, 0.011 to 0.012-in. thick. Disks, 2 9/16 in. in diameter now are blanked and cupped in two operations. The first cup is 1 5/32 in. OD and 1⅛ in. high. The first draw is in the carbide die illustrated in Fig. 1. The cup is then 1.020 in. OD and 1½ in. high. The second draw is through the die shown in Fig. 2. Its diameter is 0.795-in. and the draw angle is not blended but is cut 60 degrees included for pinch and trim. The cup then is finish drawn at size 0.795 x 1 11/16 in. high, with a 0.010-in. wall. The trimmed mouth of the cup is very clean and even, as shown in Fig. 3.

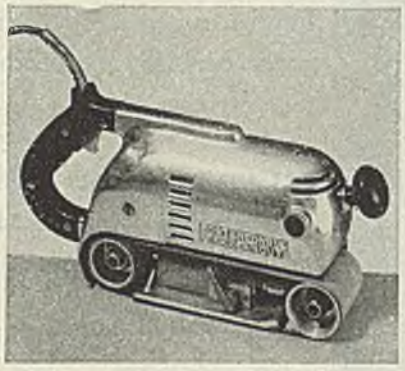
Some of the cemented carbide dies of the 1.020-in. diameter are the type which have produced up to 750,000 pieces. One of the 0.795-in. diameter dies to date has exceeded 100,000 draws and still is turning out excellent work. It also is interesting to note that the changeover to carbide dies was made within a single week, all machines being equipped in this time by the use of Carboloy stock dies, converted where necessary.



INDUSTRIAL EQUIPMENT

Portable Surfacer

A new portable, electric hand surfacer on which an endless abrasive belt operates over a flat or convex shoe, is announced by Porter-Cable Machine Co., Syracuse 8, N. Y. It may be used in any position, horizontally, vertically, overhead or on its side. It is used to sand a completed assembly, leveling joints or



grinding down welds and other sanding and grinding operations. The device can be used on metal, wood, plastic, stone and marble.

Tension on abrasive belt is maintained by a spring which, in this model, is retracted by lever actuating pinion in rack. Equipment includes cork resilient pad and steel cover attached to shoe or platen; motor; switch; 10 ft cord and plug; front and rear handles and six assorted abrasive belts.

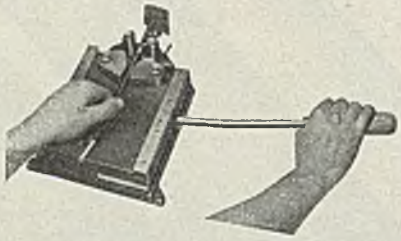
Flash Welder

Model F-25 flash welder, introduced by Thomson-Gibb Electric Welding Co., Lynn, Mass., is capable of exerting 10,000 lb clamping pressure with air operated clamps and 32,000 lb hydraulic push-up pressure. It will weld work up to 2¼ in. diameter or its equivalent area in squares or irregular shapes. A variation of this welder is the inclined platen unit, shown in the accompanying illustration, which operates the same as the horizontal platen but permits convenient placement and observation of work. Foot valves control the clamps. Large dial at right indicates speed of platen travel.

Cable and Wire Stripper

For stripping rubber insulation, asbestos, synthetic, plastic, glass, cambric and other insulations, a new wire stripper has been developed by Ideal Commutator Dresser Co., 5076 Park avenue, Sycamore, Ill. Any length of wire or cable, up to 5/8-in. in diameter, single or parallel conductor, can be stripped.

Parallel wire, heater cord, inner con-



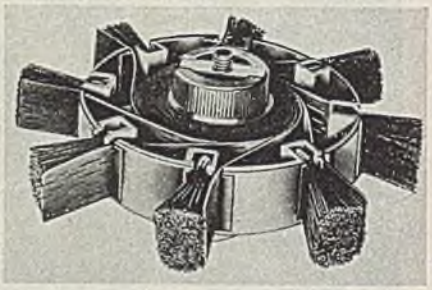
ductors and cord can be stripped with plain blades. Grooved blades are intended for rubber covered and weatherproof cable. To use the stripper, wire is laid in position between jaws and cutting blades, and the handle is pulled, causing gripping jaws to grasp wire and draw it through the oscillating blades.

Features include: Straight line pull and elimination of scraping and nicking of wire; jaws automatically centering and gripping any diameter of wire without manual adjustment; jaws instantly releasing wire at end of stripping stroke; blades opening automatically to receive wire when lever is pushed forward; interchangeable blades. Adjustable stop provides for length of stripping or it can be removed when extra long stripping is desired.

Sanding Wheel

Designated as Sand-O-Flex, a new brush backed sanding wheel is announced by Exactone Tool & Die Co., 4373 Melrose avenue, Hollywood 27, Calif. It sands, deburrs, finishes woods, metals, plastics, rubber products and many types of special materials. The device consists of a central magazine which houses the strip abrasive. Eight of these strips extend through the housing and are held against the work by tough bristles. The bristles cushion the abrasive, making it possible to get in and around corners, hollow and fluted surfaces and small openings.

The body and cover of the wheel are cast from Zamak. Overall diameter, including brushes, is approximately 8 in. Weight fully loaded is about 2 3/4 lb. Normal loading contains 20 ft of abrasive and reloading is done by unscrewing the serrated nut and removing the cover. A wide range of abrasives of various grits and grades are supplied for use with the sander. These cartridges and the quick-



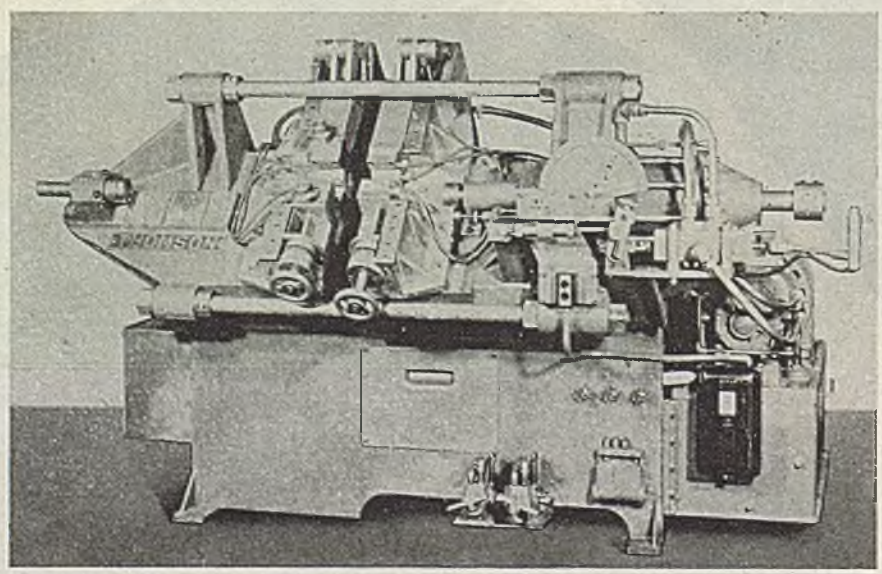
changing feature permit the tool to be used in all operations from rough stage to polished surface.

The device fits all standard 1/2 and ⅝-in. motor shafts, stationary or flexible, or can be supplied to fit almost any shaft size on request. A ¼-hp electric motor will handle all normal operations as will most portable electric tools. Motor speed of 1750 rpm is recommended, decreasing in proportion to the coarseness of the abrasive used and according to results desired.

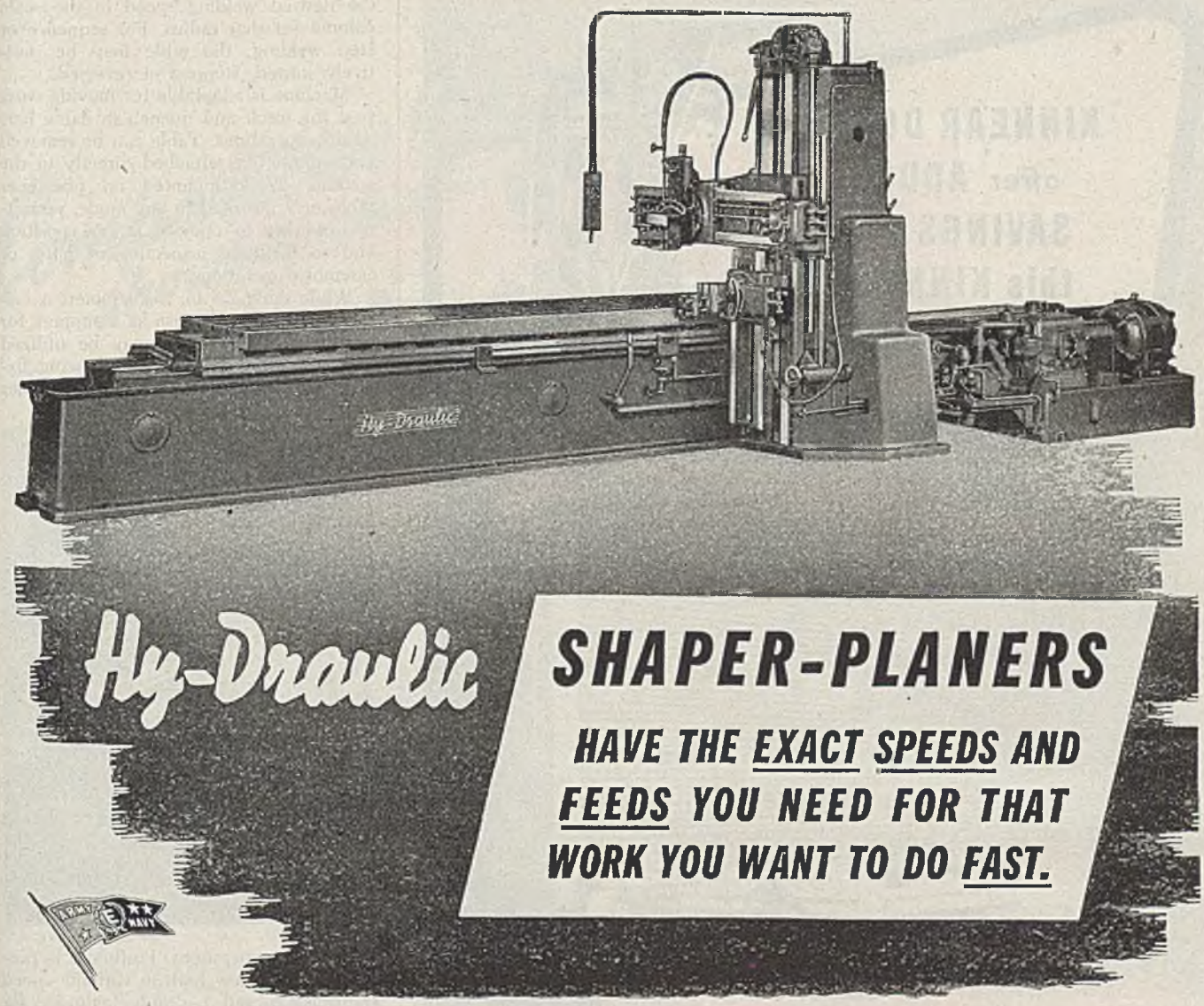
Welding Positioner

For rotating work up to 700 lb at speeds from zero to 2.4 rpm in either direction by hand wheel control, a new multi-purpose welding positioner is introduced by Standard Machinery Co., Providence, R. I. The unit will accommodate table speeds up to 180 ipm with a work radius of 1 ft. Linear speeds at all radii are set and indicated on scale located at side of frame.

To obtain a desired welding speed the operator notes approximate radius at which welding is to be done and moves control wheel until indicator is opposite



(All claims are those of the manufacturer of the equipment being described.)



Hy-Draulic SHAPER-PLANERS

HAVE THE EXACT SPEEDS AND FEEDS YOU NEED FOR THAT WORK YOU WANT TO DO FAST.

Cutting speeds and feeds are quickly and infinitely adjustable, within specified limits, in Rockford Hy-Draulic Shaper-Planers. There's every convenience for quick set-up and easy operation. Cutting pressure is uniform throughout each chip thus working cutting tools to maximum capacity. Table returns "on the double" after a smooth shockless reverse.

Maintenance is simple and easy in the Rockford Hy-Draulic Shaper-Planer. Tool cost is very low. Easy operation saves time, manpower and horsepower. Because the drive is *hydraulic*, the Shaper-Planer table cannot slide off the bed and cause damage, and it can stall under cut without harm to cutting tool or machine.

There's a wide field of planing in which the Hy-Draulic Shaper-Planer is unbeatable for getting out accurate work fast. Write today for details.

Ask for Bulletin 2903.

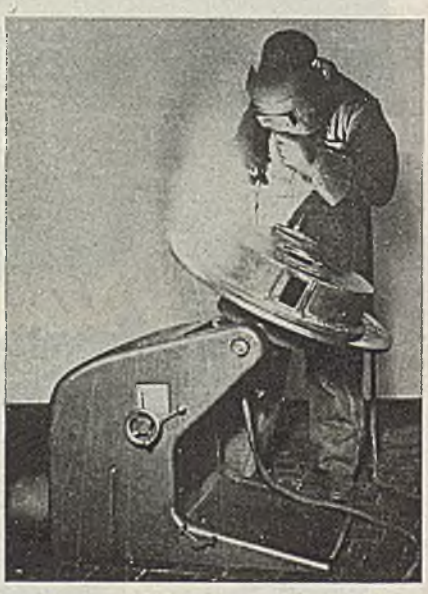
4501

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

the desired welding speed in the scale column for that radius. For sequence or step welding, the table may be positively started, stopped or reversed.

Machine is adaptable for moving work past the torch and quench in flame hardening operations. Table can be removed and various jigs attached directly to the spindle. Work mounted on positioner table may be tilted to any angle, permitting worker to operate at one position and so facilitate inspection of parts or assembly operations.

While table, 28 in. in diameter, is originally designed for use as a support for parts to be welded, it may be utilized also as a basis of power in moving fixtures and work across machine tool tables



in sequence operations. Positioner is provided with a new built-in variable speed transmission and hydraulic cylinder for definite power control with a single ½-hp, 110, 220 or 550 v electric motor. There are no belts or clutches. Instantaneous starting, stopping and reversing is provided by a foot operated switch controlling driving motor.

Table is tilted by a hydraulic cylinder and gear segments. Oil pressure is developed by utilizing gears that synchronize the disk drive rolls of transmission. When not required for tilting, oil from pump flows continuously at reduced pressure to lubricate and cool drive roll shaft antifriction bearings.

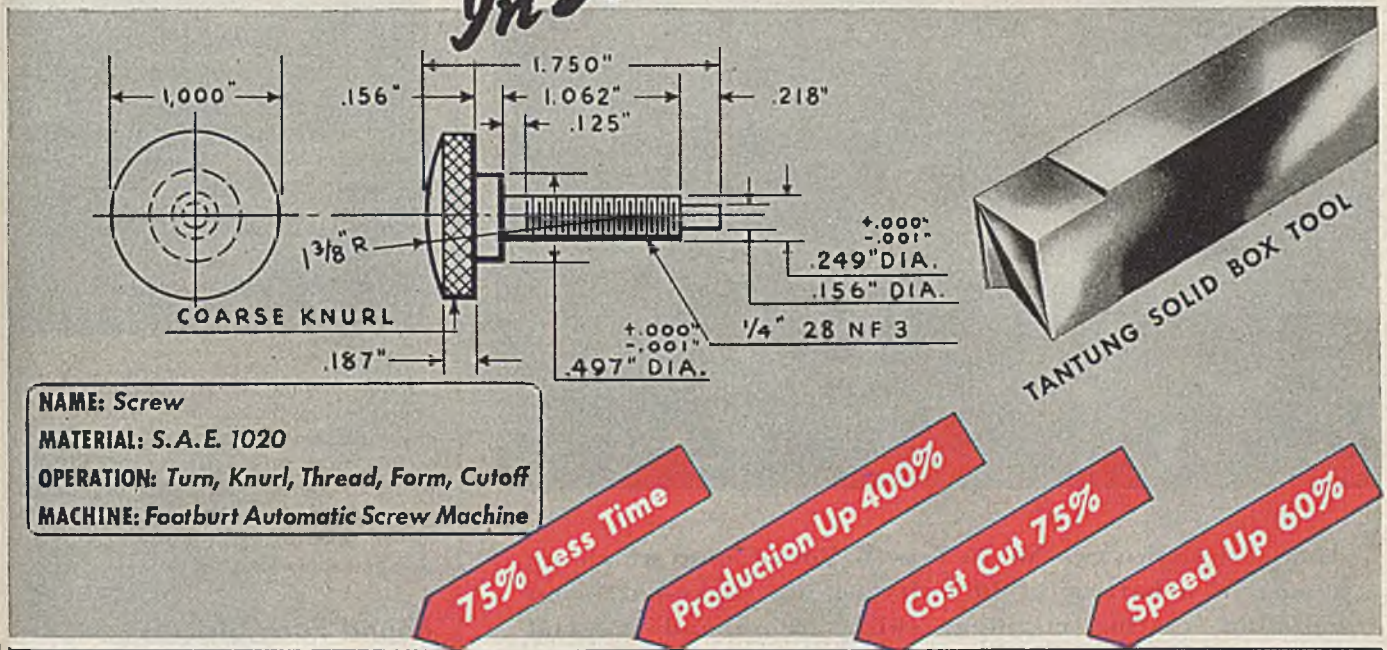
Cleaning Machine

Designed for jobbing foundry and other metalworking plants where cleaning has been handled by air blast rooms, cabinets and large tumbling mills, a new airless blast cleaning machine, Wheelabrator swing table, is announced by American Foundry Equipment Co., Mishawaka, Ind.

Four sizes of the machine are available, with sizes of the single work table being 24, 66, 72 and 86 in. in diameter. Operation of the four units is essentially the same, machines varying only in minor construction details and number of units utilized.

Work to be cleaned is placed on a

Comparative Performance showing advantages of TANTUNG THE MIRACLE METAL In Screw Machine Operation



TOOLING	ACTUAL TIME	PIECES PER HOUR	COST PER 100 PIECES	SPEED R.P.M.
HIGH-SPEED STEEL	4.30	13.9	$7.17	640
TANTUNG	.95	63.2	1.58	1060

THE ABOVE TEST was made in the plant of a large aircraft manufacturer, under ordinary shop conditions. Tantung tools have demonstrated superiority over high-speed steel tools in thousands of screw machine operations.

Tantung is especially efficient in machining materials which have a tendency to gall or tear, such as stainless steel, aluminum, bronzes, non-ferrous alloys, etc.

Tantung is a hard, tough, cast alloy containing Tantalum-Columbium Carbide. It is the high red hardness of Tantung, greater than any high-speed steel, that enables it to work so efficiently. Send for the free Tantung Catalog.

Ramet

VASCOLOY RAMET CORPORATION

CARBIDE TOOLS AND DIES AND TANTUNG CAST ALLOY TOOLS

4519

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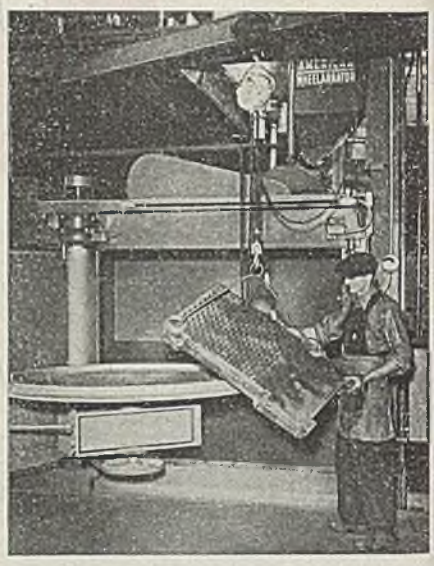
rubber covered work table which is mounted on the door of the blast cabinet. As the door is closed, work table swings into cabinet underneath an airless blast unit. While in this position, table is rotated at a predetermined speed. The blast unit whips a continuous stream of abrasive down on the rotating work to the full width of the table so that all surfaces are uniformly blasted to a bright, clean finish. After short exposure of parts, Wheelabrator unit is stopped, door opened and part is turned over for cleaning on underside.

After striking the work, abrasive falls



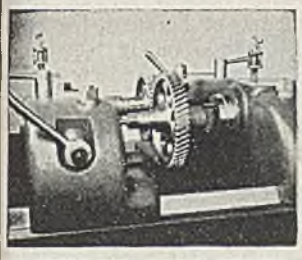
through perforations in table top into a hopper below the machine. A screw conveyor transfers abrasive to elevator boot section from which it is carried to an overhead abrasive separator. All broken down abrasive and useless fines are removed and usable abrasive falls into a storage hopper for reuse.

Round Face Stamps

Hand stamps with "round face" characters, designed for the low stress marking of lightweight alloy forgings and castings are offered by New Method Steel Stamp Inc., 147 Jos. Campau, Detroit 7. These hand stamps are particularly suitable for marking aluminum and magnesium alloy parts which will be subject to either tensile or torsional stresses in service. Both face and impression are rounded on these new stamps.

A complete line of standard figure and letter hand stamps with round face characters can be supplied. All characters are engineered and designed in accordance with the SAE aeronautical specifications which require impressions not deeper than 0.003-in. and fillets (radius of curve) of not less than 0.006-in. at all intersecting surfaces of an impression.

Shanks are provided either plain, or knurled for finger and thumb gripping. Every stamp is tempered by automatically controlled heat treating methods. The upper portion of each shank bears a characteristic "temper color" indicating that

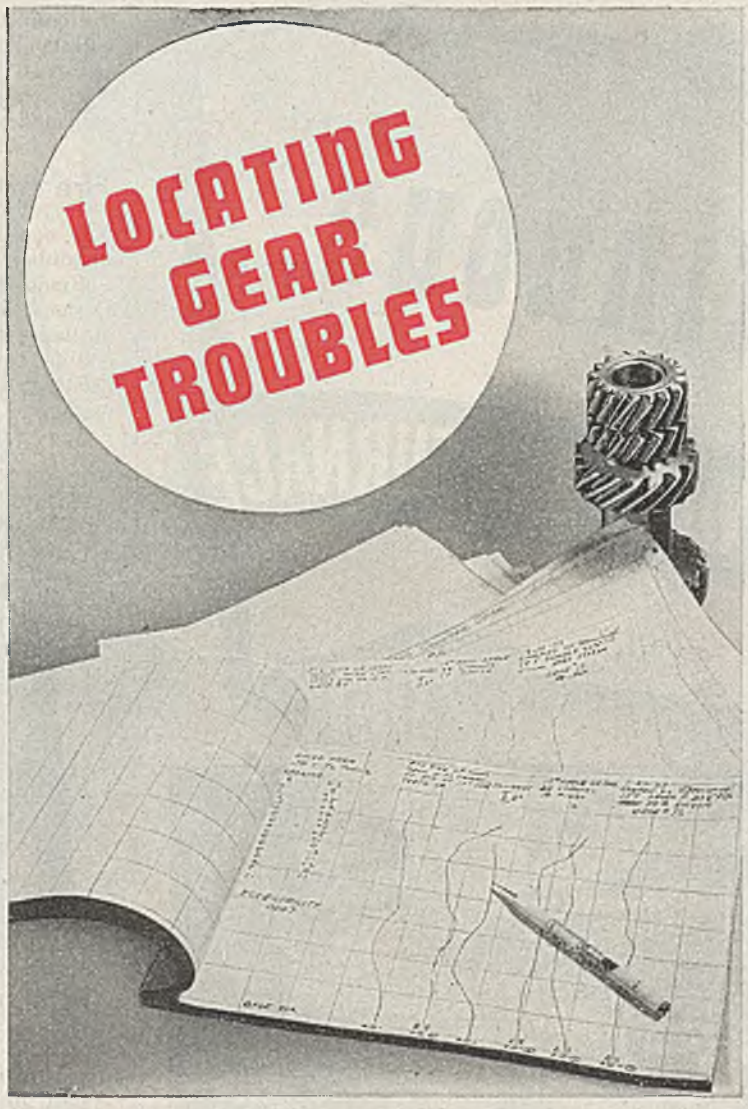


MICHIGAN GEAR SPEEDERS are available in two types for quick checking for quietness and bearing. Ask for information on Model 1127-B (for gears up to 9½") or 1129 (for gears up to 13").

MICHIGAN SINE-LINE INVOLUTE CHECKER provides rapid check of gears without necessity of additional base rolls, etc. Ask for information on Model 1124 (for gears up to 12" O. D.) or Model 1124-C (for gears up to 20").

MICHIGAN SINE-LINE LEAD CHECKERS will check left or right hand helical gear leads from zero to infinity without necessity of additional master rolls, discs or lead screws. Ask for information on Model 1205-18 (for gears up to 18") or 1205-24 (for gears up to 24").

MICHIGAN BASE PITCH AND SPACING CHECKER recently added to the Michigan SINE-LINE. Ask for information on Model #1130.



GOOD gears are not a matter of accident. They are the result of selecting the right kinds of steels, sticking to accurate production methods and equipment, proper heat-treating and adjusting for heat treat distortion.

To produce good gears *consistently*, good checking equipment is a "must". That is why Michigan SINE-LINE equipment includes machines to check and analyze not only gears but also gear cutting tools with laboratory precision *in the shop.*

Michigan Tool Company—Gear Production Headquarters—field engineers will be glad to help you on your gear problems and advise you as to the type of Michigan SINE-LINE equipment best suited to your specific needs.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. DETROIT 12, U.S.A.

SINE-LINE HOB CONTOUR CHECKERS permit quick checking of pressure angles of hobs on a simple fixture. Ask for information on Model #464.

MICHIGAN HOB-SHARPENING CHECKER incorporates complete facilities for checking correct resharpening of hobs, milling cutters and form cutters. Ask for information on Model #471.

MICHIGAN AUTOMATIC CHECKING RECORDER can be coupled to SINE-LINE involute, lead, or spacing checkers. Makes permanent chart records. Can be used for other purposes than gear checking, too. Ask for information on Model AY-1.

SINE-LINE LEAD AND LINE OF ACTION CHECKER for Hobs. Checks deviations from true lead to ten-thousandths of an inch. Line of action sine-bar also permits checking of active profile. Ask for data on Model #874.

the correct degree of hardness for best withstanding of mushrooming has been imparted. The tapered and rounded heads retard peening and dangerous chipping under blows.

Fire Extinguisher

A new fast acting portable fire extinguisher is announced by American-LaFrance-Foamite Corp., Elmira, N. Y. Designated as Alfite Speedex, it is made in three different sizes, models 15, 10 and 4. Numbers indicate the pound capacity of the gas. It uses carbon dioxide as the fire extinguishing agent.

The unit is enginereed to extinguish

small oil or electrical fires, with no loss of gas on anything but the fire itself. Operating valve lever is directly above the carrying handle. It can be instantly opened by pressure of the hand grip and closed by releasing hand pressure while operator is maneuvering his position. For continuous operation the D-yoke ring is slipped over the operating lever while it is depressed.

Printer-Developer

Designated as Model 41, a new printing and developing machine is announced by Charles Bruning Co. Inc., 4754 Montrose avenue, Chicago 41. This model combines individual printing and developing units in a cabinet with a steel frame of box girder construction.

The printer has a printing speed range up to 6 fpm, depending on transparency of original, printing either roll stock or cut sheets, with a printing width of 46 in. Light source is a 2000 w glass mercury vapor lamp within a 6 in. diameter cylinder. Uniform cylinder temperature within a few degrees is maintained.

Printing speed is controlled by a single knob. Suction through bands simplifies feeding of tracings and sensitized paper and tangential method of feeding assures safety to tracings and eliminates pinching or catching. Tracings and prints are removed without scraping. A front pedal located at floor level and at center of machine, instantly releases band tension so that misfeeding of roll stock can be quickly corrected. Anti-

CLAMP A QUICK STRANGLE-HOLD ON FIRE

● Choking incipient flammable liquid fires is a simple job — for the Kidde portable extinguisher. Ordinary water-type extinguishers can't control these tough Class B blazes—or the equally tough Class C fires that start in electrical equipment. But Kidde equipment kills them—*and kills them fast*—by smothering them with carbon dioxide gas.

This dry, inert, non-toxic gas swiftly ends blazes, with no contamination of fluids, no harm to valuable mixes or equipment, no after-fire mess to be cleaned up.

For fire safety, call in a Kidde representative—he'll be glad to discuss your fire protection problems. Check the accompanying list of typical industrial hazard areas. One may apply to you.

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PROCESS ROOMS
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TRANSFORMERS
DIP TANKS
AGITATORS
WASHING TRAYS
CONTROL PANELS

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Walter Kidde & Company, Inc. • 140 Cedar Street • New York 6, N. Y.

friction bearings are used throughout printing unit. Ball bearing motors require no lubrication and cylinder is accessible for cleaning.

In the developing unit, speed in excess of maximum printer speed assures an uninterrupted flow of prints. Prints are delivered at front of machine. A new type ironing roll results in flat, dry prints. Speed, contact and development controls

are removable for cleaning and all parts in contact with developer are of stainless steel or are nonmetallic.

Mounted on four casters, the unit can be moved to and operated in any desired location. No plumbing connections are necessary and there is no need for outside outlets for exhaust fumes, because there are none.

Electrode Holder

An electrode holder designed so that the front assembly may be detached by hand without shutting down the welding machine, is announced by Detroit

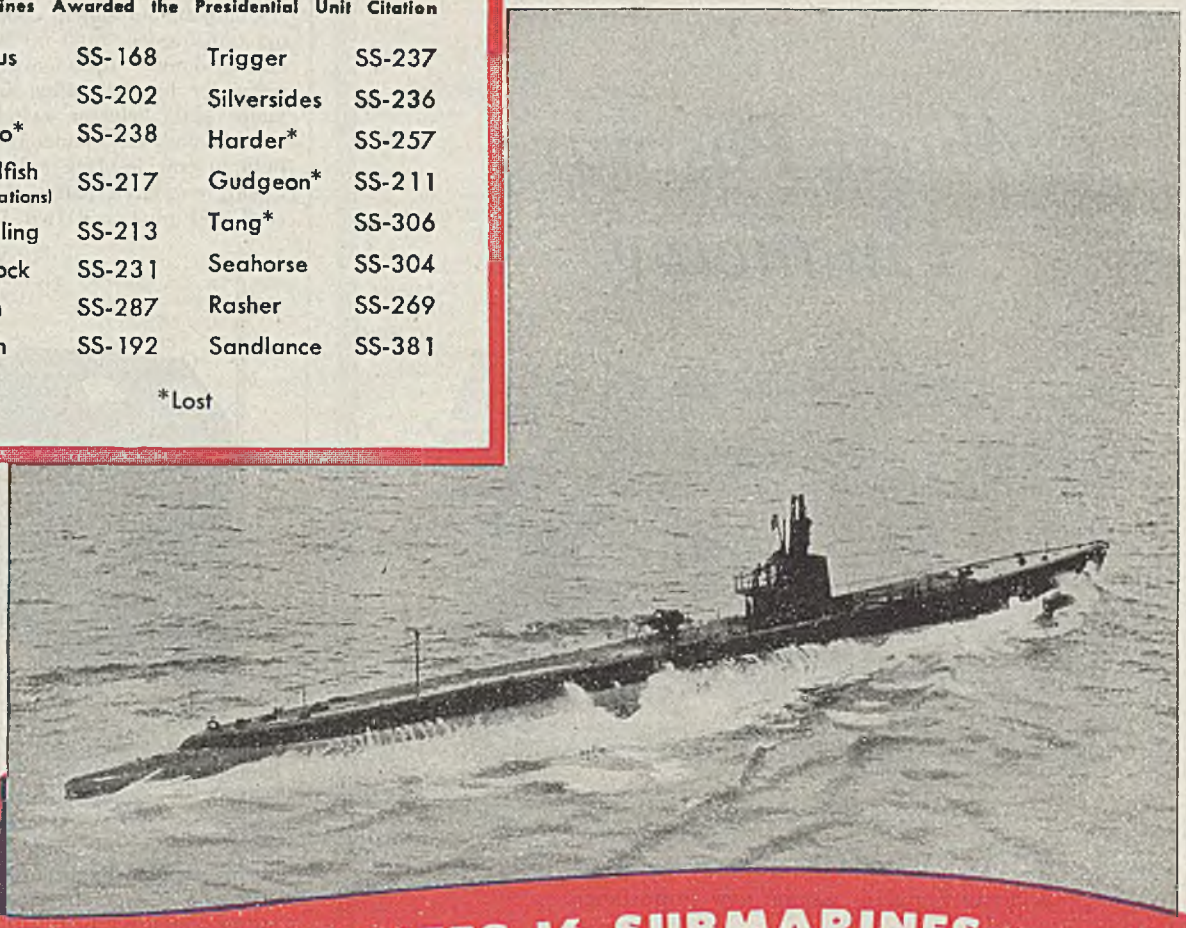
Electrode Holder Mfg. Co., 2026 Forest avenue, West, Detroit 8. The holder, designated as the marine model, is of the resilient jaw type, fully insulated.

Portable Test Set

A portable-alternating current test set, mounted on a three wheeled truck so it can be easily moved about and plugged into any convenient 115 or 230 v, 60-cycle outlet, and capable of supplying stepless test voltages from 0 to 15,000 v is announced by General Electric Co., Schenectady, N. Y. It is 36 in. high, 49 in. long and 30 in. wide and has a capacity of 5000 va. It can be used for highly accurate testing of generators or large motors of approximately 1500 hp, transformers up to several thousand kilovolt-amperes, short lengths of power

Submarines Awarded the Presidential Unit Citation			
Nautilus	SS-168	Trigger	SS-237
Trout*	SS-202	Silversides	SS-236
Wahoo*	SS-238	Harder*	SS-257
Guardfish (two citations)	SS-217	Gudgeon*	SS-211
Greenling	SS-213	Tang*	SS-306
Haddock	SS-231	Seahorse	SS-304
Bowfin	SS-287	Rasher	SS-269
Sailfish	SS-192	Sandlance	SS-381

*Lost



EXIDE SALUTES 16 SUBMARINES

Honored by the Presidential Unit Citation ★

AS this is written, sixteen U. S. submarines have won the highest honor which can be awarded to a unit of our armed forces. Their achievements stand out among the proudest in American naval history. And the complete story is still to be told.

Ranging incredible distances, often to within gunshot of enemy shores, they have helped to swell the total of submarine-destroyed Japanese vessels to more than 1000—seriously crippling vital supply lines, and preparing the way for the great naval victories that followed.

Their phenomenal successes are a result of superb skill and a brave fighting spirit. As we salute these heroic ships, we take great pride in the knowledge that all but one of them was powered by Exide Ironclad Batteries.

The same type of Exide Ironclad Batteries used to propel a 2000-ton submarine also furnishes motive power for the efficient, time-saving, electric industrial truck—the modern, economical method of materials handling. And wherever they serve, Exides are performing with dependability, long-life and ease of maintenance.

Write us for a FREE copy of the bulletin "Unit Loads," prepared by The Electric Industrial Truck Association. It tells how to cut handling costs up to 50% . . . covers latest developments in materials handling . . . and includes actual case histories.

ARMY E NAVY

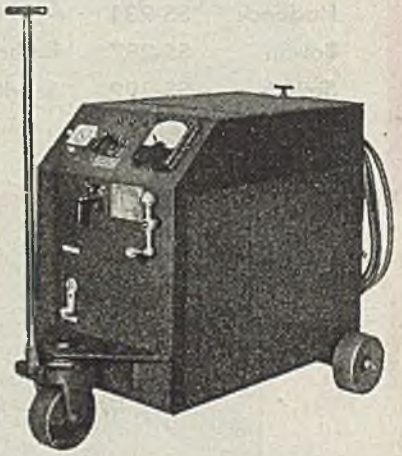
Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

cable, also insulators and other pole line hardware.

Complete equipment consists of a step-up transformer, built-in electric timing clock, double scale switchboard type voltmeter for full range accuracy, voltmeter scale selector switch, air circuit breaker with instantaneous overload trip, built in crackle-black enameled case enclosing energized parts. A 15 ft supply cord and plug and two 15 ft shielded



high-voltage leads with insulated test handles are also included.

With the exception of a safety foot-switch that shuts off the high voltage when released, all controls are mounted on an inclined control panel facilitating operation of the set from either a standing or seated position.

Air Control

An air control for shallow well pumps is announced by Manning, Maxwell & Moore, Inc., Bridgeport, Conn. The device features a rubber diaphragm as the one single moving part which combines valve head, gland seal and float hinge. The valve has stainless steel orifices and is completely sealed. It has no water cavities. Body is either cast brass or cast iron. Unit is compact, light weight, measuring 1 3/4 in. between wrench flats. Control is for applications up to 80 psi tank pressure.

Surge Washer

Designed to provide economical washing for smaller parts in baskets, using an emulsion cleaner (or alkali cleaner) and water rinse, a new 2-stage surge washer is announced by Phillips Mfg. Co., Touhy avenue, Chicago 45. In construction the unit comprises two compartments with a dividing, insulated wall between. One contains the cleaner, the other the water rinse. Mechanism is reciprocating in action, moving rack on which basket rests up and down through cleaner and rinse and accommodates two baskets at one time, one being swished through the cleaner, the other through the rinse.

This reciprocating cycle moves baskets vertically through solutions, from total immersion to total emersion, producing

HELPFUL LITERATURE

1. Shaft Couplings

Link-Belt Co.—8-page illustrated booklet No. 2045 covers complete line of flexible, rigid flanged face and compression shaft couplings as well as roller chain couplings. Data are also given on plastic and steel protective casings.

2. Pyrometers

Leeds & Northrup Co.—48-page illustrated catalog No. N-33B discusses Micromax and Speedomax Rayotube pyrometers which can be used to measure temperatures of molten cast iron, electric salt pots and blast furnace stove domes. Control panels, recorder charts, pens and inks are also described.

3. Columbium Alloy

Lebanon Steel Foundry—2-page illustrated data sheet on Lebanon Circle L 21 columbium stabilized alloy for corrosion-resistant weldments discusses applications and lists chemical analysis as well as average physical properties.

4. Treated Bar Steels

LaSalle Steel Co.—12-page illustrated bulletin No. 5 outlines important factors in the selection of furnace treated bar steels. Advantages obtainable through use of these materials are covered. Typical applications and engineering data are included.

5. Inert Gas Producer

C. M. Kemp Mfg. Co.—4-page illustrated bulletin No. 901.4 contains complete data on construction and operation of inert gas producer for industrial applications. Specifications are listed and advantages of inert gas over nitrogen in processing are explained.

6. Cutting Tools

Illinois Tool Works—16-page illustrated booklet entitled "How Illinois Tool Metallurgy Improves Cutting Tool Efficiency!" presents company's facilities in production of hobs, cutters, broaches, gears, saws and measuring machines.

7. Carbide Tool Tips

Hanly & Harman—4-page illustrated bulletin No. 11-A presents procedure in brazing of cemented carbide tips with silver brazing alloy. Heating methods commonly used are brazing torch, furnace, gas-air burners and induction brazing.

8. Locknuts

Security Locknut Corp.—4-page illustrated folder is descriptive of locknut which is equipped with alloy steel threaded retainer ring. This locknut is used in manufacture of locomotives, power shovels, tractors, pumps, compressors, forging hammers, punch presses, conveyors and materials handling equipment.

9. Heat Treating

E. F. Houghton & Co.—12-page illustrated research bulletin "Interrupted Quenching in Salt" discusses Martempering, Austempering and modifications of these heat treating procedures. Graphs and photomicrographs amplify text.

10. Clutch-Coupling

Hilliard Corp.—4-page illustrated bulletin entitled "The Hilliard Friction Clutch and Friction Cut-Off Coupling" shows design and construction of this control drive for all classes of machinery.

11. Cold Finished Steel

Jones & Laughlin Steel Corp.—29 x 45-inch "Cold Finished Steel Data Chart" is designed for wall hanging. Compositions of standard, National Emergency and special steels are listed. Also included are standard manufacturing tolerances, decimal equivalents, weights of bars per linear foot, hardness conversion tables, machinability ratings and spindle speeds at given surface speeds for various diameters.

12. Combustion Furnaces

Hevi Duty Electric Co.—4-page illustrated bulletin No. HD 735 describes temperature range, construction, control and operation, voltages and specifications of these electric organic combustion furnaces which have been designed to furnish combustion processes with exact and easily controlled heat.

13. Electronic Motor Drive

Electron Equipment Corp.—4-page illustrated bulletin 176 presents data on Varitronic electronic motor drive units. Typical circuits and advantages of use are covered. Comparison of wave form with conventional methods of motor control is charted.

14. Ball Bearing Cleaner

L & R Mfg. Co.—4-page illustrated bulletin is descriptive of precision ball bearing cleaning machine for bearings measuring up to 2 inches in outside diameter. Developed in cooperation with the Navy, its operation combines rotary principle and pressure-cleaning method to remove foreign matter from ball bearings.

15. Electric Unit Heaters

Electric Air Heater Co.—12-page illustrated bulletin 44-U describes Electromode electric unit heaters from 1.5 to 60 kilowatts for ceiling, wall or post suspension. Tables of dimensions, British thermal unit output and weights are included. Automatic control equipment is also covered.

16. Threading Heads

Landis Machine Co.—8-page illustrated bulletin No. D-67-3 contains complete data on Lanco pipe and nipple threading heads for hand-operated pipe and nipple threading machines. Features are described. Tools are available for up to 2-inch pipe diameters.

17. Universal Tool Grinder

K. O. Lee Co.—12-page illustrated bulletin lists users of Kuock-Out universal tool grinders geographically. Typical setups employed with this machine tool are shown.

18. Heat Treating

Lithium Co.—4-page illustrated bulletin "Lithcarb Selective Carbon Correction" describes method for replacing carbon in decarburized steel in neutral heat treating process.

19. Stainless Steels

Industrial Steels, Inc.—118-page illustrated handbook contains working instructions, engineering data and specifications of stainless steel materials and accessories. Stock list covering balls, bars, nuts and bolts, wire cloth, pipe fittings, forgings, welding rods, sheets, tubing, valves and wire is included.

20. Sheave Block Data

Downs Crane & Hoist Co.—2-page catalog sheet No. 44.00 illustrates and includes tables on sheave block data for standard hoisting service and double reeved for overhead traveling cranes.

21. Electric Welded Tubing

Formed Steel Tube Institute—32-page illustrated bulletin "Better Products with Electric Welded Tubing" describes process of fabricating tubing and gives specifications. Applications of welded tubing and advantages are covered.

22. Chemicals

Hercules Powder Co.—32-page illustrated booklet entitled "Hercules Products" contains list of approximately fifty industries in which chemicals and explosives are used. Postwar applications for chemicals in plastics, paints, textiles, film, adhesives and paper are given.

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23. Nickel Alloys

International Nickel Co.—16-page illustrated booklet entitled "Nickel Alloys in Railway Equipment" covers uses of nickel steels and other alloys of nickel in locomotives and cars for high speed, heavy duty railroad service. Various uses of Monel and pure nickel are also described.

24. Stainless Clad Steel

Ingersoll Steel & Disc Div., Borg-Warner Corp.—16-page illustrated booklet entitled "Manual of Welding and Fabricating Procedures for IngAclad" gives details of stainless clad steel which can be used in chemical, food, brewing and distilling, paint and varnish, and pulp and paper industries.

25. Alloy Steel Enamel

Inland Steel Co.—4-page illustrated booklet entitled "Inland Ti-Namel" deals with advantages of alloy enameling steel which can be used in manufacture of stoves, refrigerators, sinks, cabinets, heaters, bathtubs, panels and reflectors.

26. Research Laboratory

Ilg Electric Ventilating Co.—8-page illustrated brochure No. 101-15M presents workshop scenes of laboratory which makes available to engineers, scientists and laboratory technicians, instruments for measuring air, electricity, sound, light and vibration.

27. Crane

Hyster Co.—8-page illustrated booklet No. 658-B is descriptive of model KC Karry Krane, self-propelling general utility crane which handles machinery, crates, boxes, barrels, cases, cartons, bales and bags. Crane has capacity of 10,000 pounds and travels at speeds up to 10 miles per hour.

28. Hose Couplings

Hose Accessories Co.—44-page illustrated catalog No. 644 presents complete line of Le-Hi high and low pressure hose couplings which are available in brass, malleable iron or alloy steels. Proper selection of hose couplings for various applications is also covered.

29. High Speed & Carbon Tools

Lake Shore Tool Works—116-page illustrated catalog covers company's line of milling and gear cutters, hobs, broaches, carbide tipped and special tools. Sizes and dimensions are listed.

30. Floor Plate

Jones & Laughlin Steel Corp.—24-page illustrated booklet discusses Jal-Tread and Junior Jal-Tread floor plate which provides nonslip friction surface and can be used in shearing, bending, welding, punching and riveting operations.

31. Insulating Materials

Johns-Manville—Wall chart measuring 11½ x 18 inches covers temperature ranges of all insulating materials produced by this company. Temperatures from extremely low below zero to 2600 degrees above zero are shown in both Fahrenheit and Centigrade.

32. Hydraulic Devices

Lyon-Raymond Corp.—4-page illustrated bulletin No. 137 describes hydraulic elevating platforms, presses, roller-top tables, turntables, ram unloaders and upenders as well as hand- and foot-operated hydraulic pumps and portable test benches.

33. Automatic Lathe

Lodge & Shipley Machine Tool Co.—28-page illustrated booklet No. 601 presents details of No. 3A Duomatic lathe which can be used with multiple tools in turning and straight and angular facing operations. Sketches showing turning, facing, boring and grooving cycles; specifications and views of machine are included.

34. Flat Ground Stock

Simonds Worden White Co.—4-page illustrated bulletin and price list entitled "Air-Tru Flat Ground Stock" contains heat treating and application data on this nondeforming material which is adaptable for making accurate gages, fixtures, jigs, templates, tools and small parts. Small sample of Air-Tru stock is included.

35. Hammered Forgings

Johnston & Jennings Co.—26-page illustrated bulletin No. 421 deals with company's facilities to produce carbon and alloy steel forgings used in machine tool, gear manufacturing, turbine, road building machinery, and diesel and gas engine industries.

36. Anniversary Brochure

Cleveland Pneumatic Tool Co. & Subsidiaries—16-page illustrated brochure traces fifty-year history of this company and outlines in chronological order historical events and interesting sidelights during the course of company's growth.

37. Sealed Ball Bearings

Fafnir Bearing Co.—4-page illustrated bulletin on Plya-Seal ball bearings gives construction details and information on removable-seal bearings in standard widths. Dimensions and load ratings for two types are listed.

38. Refractory Materials

Illinois Clay Products Co.—4-page illustrated folder presents pictorially the manufacture of firebrick from clay deposits to finished product. These refractories are especially suited for steel mill and foundry use.

39. Vibration Control Unit

Korfund Co.—4-page illustrated catalog No. SL 500 covers rated load, weights, dimensions, details of construction and suggested uses of type LS universal Vibro-Isolator which is available in six sizes.

40. Rolling Doors

Kinnear Mfg. Co.—40-page illustrated catalog entitled "Kinnear Rolling Doors" covers line of rolling service, fire, overhead and bi-folding doors; window shutters; grilles and various special doors such as those used in kilns, furnaces and airplane hangars.

41. Spindle Machine

Kindt-Collins Co.—4-page illustrated bulletin No. B-3 describes Master spindle machine and fixtures which can be used for making segments, core prints, templates, circular core boxes and tapered and parallel ribs of wood and soft metals.

42. Hydraulic Cylinders

Hanna Engineering Works—32-page illustrated catalog No. 233 gives details of complete line of high pressure hydraulic cylinders for working pressures up to 1500 pounds. Adjustable cushions, clevises, mounting brackets, control valves and low pressure cylinders are also covered.

43. Air Strainer Water Trap

Inco Engineering Co.—4-page illustrated folder presents general specifications and advantages of Inco air strainer water trap which eliminates oil and water condensation in compressed air.

44. Hot Work Steels

Jessop Steel Co.—8-page illustrated bulletin No. 643 covers analyses and working data of hot work steels which can be used in manufacture of dies, mandrels, punches, shears and riveters.

45. Gear Pumps

Hydro-Power Systems, Inc.—16-page illustrated bulletin No. 440 is descriptive of models G and LG Hydro-Power gear pumps which serve as prime movers for hydraulically operated machinery. Construction, operating characteristics and styles of mountings are also covered.

46. Air Compressors

Ingersoll-Rand—24-page illustrated catalog No. 1011 presents construction features and characteristics of various types of air compressors for use in conjunction with reciprocating and rotary air tools and hoisting, lifting, pulling, testing and controlling units.

47. Metal Working Machines

T. H. Lewthwaite Machine Co.—80-page illustrated catalog No. 8 covers line of punching and cutting machines, benders, punches, dies, shear blades and special tools. Complete specifications and list prices are included.

STEEL
1213 West Third St., Cleveland 13, Ohio

6-18-45

1	11	21	31	41
2	12	22	32	42
3	13	23	33	43
4	14	24	34	44
5	15	25	35	45
6	16	26	36	46
7	17	27	37	47
8	18	28	38	48
9	19	29	39	49
10	20	30	40	50

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COMPANY _____

PRODUCTS MANUFACTURED _____

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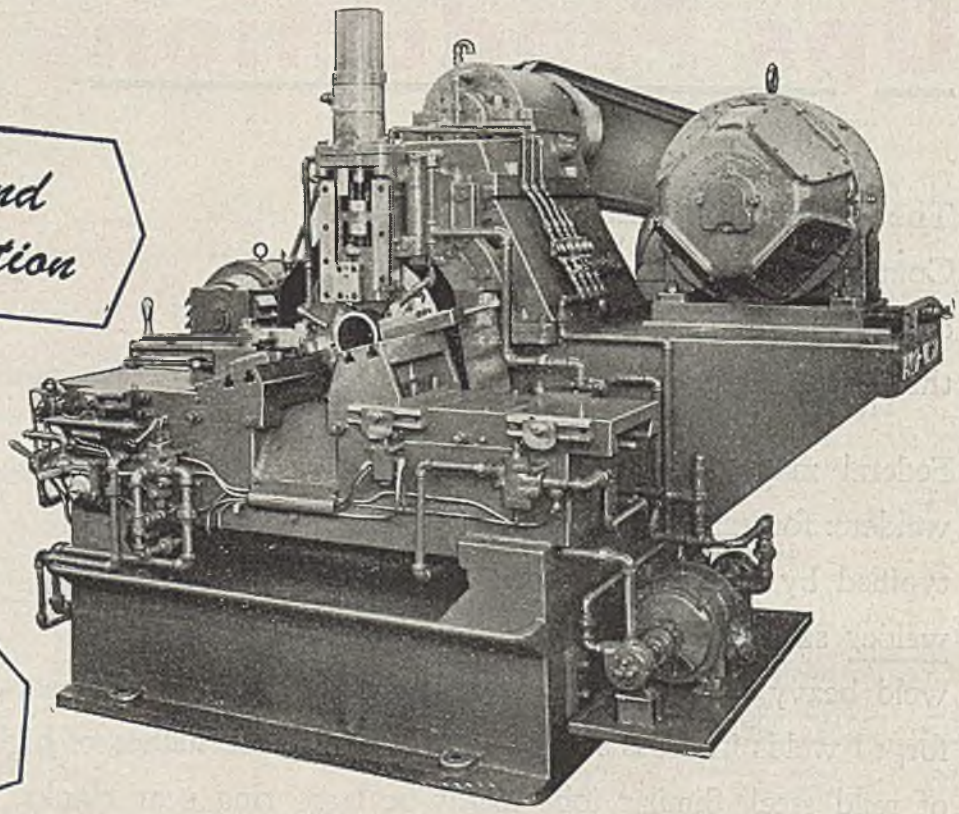
⇨ TAYLOR-WILSON ⇦
Cutting-Off Machines

Smoothness and speed of operation



Sturdiness and long wear

Amazing capacity for meeting stepped-up production schedules

Rugged, compact and efficient Taylor-Wilson Machines bring simplicity, speed and economy to the cutting off of pipe or tubing made of all grades of steel. They give close tolerance in cutting set lengths for roller bearing blanks, bomb blanks, coupling stock, etc.

Production is limited only by the ability of the cutting tools. Tool slides are hydraulically driven permitting unlimited feeds between maximum and minimum. Write for full information.

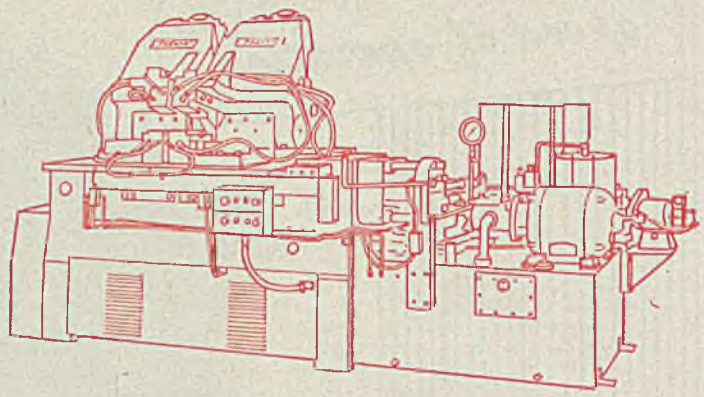
WE ALSO MANUFACTURE: Tube Testing Machines, Test Benches, Galvanizing Equipment for Pipe, Small Seamless Tube Mills, Straightening, Sizing, Burnishing Machines, Butt Weld Pipe Mills and Complete Line of Equipment for the finishing of pipe.

TAYLOR-WILSON MFG. CO.

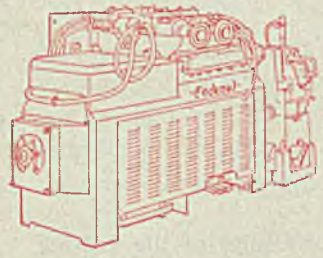
THOMSON AVE. McKEES ROCKS, PA.
(PITTSBURGH DISTRICT)

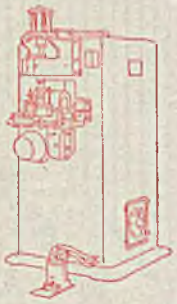
For Fabrication of Metal Resistance Welding Downs Ups Production . . .

The Federal Machine and Welder Company offers the metal working industry increased efficiency in production through resistance welding.



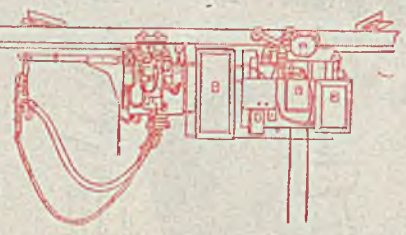
Federal makes all types of resistance welders: for example, heavy duty units typified by the 1000 KVA butt flash welder sketched at right, are made to weld heavy steel rings up to seven feet in diameter. These welders produce high quality forged welds in cross sections up to 18 square inches of high carbon steel, greater areas of mild steel. Similar jobs might be large ring gear blanks, rotating platform bearings, perhaps locomotive tires . . . Sash welders, such as sketched at left, speed production on steel sash of all kinds, are typical of the smaller butt and flash welders adaptable to everything from table knives (stainless welded to mild steel) and tools (high carbons to mild), to all kinds of metal tubing, rods and strips (including copper to aluminum in special instances), with either automatic or hand operation . . . Press type welders, amazingly versatile units for all kinds of projection welding, can be adapted by die changes to an infinite variety of fast assembly of metal parts. One suggested in the right hand corner of this page welds handles to pots and pans of enameling steel (adaptable for aluminum) and in actual production has cut costs to one-fifth that of previous method . . . And, speaking of versatility, one of the most useful tools in metal fabrication is the



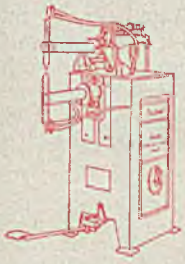


THE FEDERAL MACHINE AND

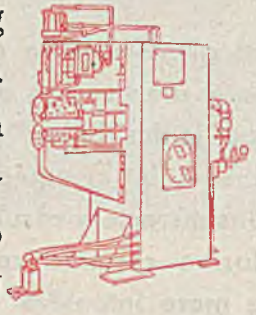
to Metal, Costs . . .



gun type resistance welder, an example of which is the overhead rail unit which can be rolled up and down an assembly line and allows operator a wide radius of travel about the work (see above) . . . Spot welders, from small utility rocker arm types (see left) to heavy duty units capable of welding sheets up to ⅜ inch each have wide use in the metal working industry . . . Roll spot and seam welders have equally broad application, produce a continuous or intermittent weld, automatically indexed . . . and many other cost saving types.



Federal wants to make available to you full information on applications of resistance welding to better and faster fabrication. We want to bring you up to date on resistance welding as a tool for modern production. Federal is ready to help if you will tell us WHAT YOU WANT TO KNOW ABOUT RESISTANCE WELDING.



Consult "the name of authority on resistance welding".

Federal

WELDER CO. 202 Dana Street WARREN, OHIO

VERSATILE MODERN PRODUCTION TOOLS

BARREL WELDERS

Of the millions of welded steel drums or barrels used to distribute gasoline and oil to our mechanized war in far corners of the earth, a vast majority are welded on Federal Barrel Welders. Not only has a major percentage of the industry for many years been equipped with Federals, but The Federal Machine and Welder Company designed and built several complete barrel manufacturing plants set up by the army at distant bases to augment the tremendously increased output of the home industry.

Seam welds (resistance welded) in such containers must be able to take terrific punishment. Immediately after welding, the barrel shells pass through a machine which forms two rolling rings in the side, by stretching the steel outwardly under great pressure. Then, too, the loaded barrels, weighing over four hundred pounds, often are dropped a distance that subjects them to thousands of pounds impact. The weld must hold.

NEW FOLDERS

Most recent informative bulletins on Federal Resistance Welders to come from the press are the new "Type R" bulletin describing a complete line of rocker arm utility spot welders . . . and "Type P" Bulletin with details of Federal's Press Welders, used for projection welding, mash welding, etc. Bulletins are available now on request.

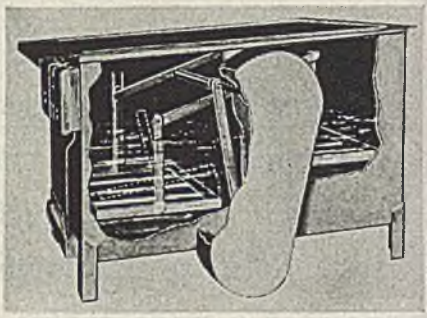
HOUSEWARE PRODUCTION

Anticipated expansion of houseware production points up the advantages of Federal resistance welding for the fast, low cost application of handles to enameling steel or aluminum pots and pans. Press type welders are used, with dies that permit rapid loading, give production of 500 to 800 handles per hour, depending upon type of handle applied. Cost with one manufacturer is one-fifth previous methods.

INTERESTING PLANT

Full details of a complete manufacturing plant for high production of large resistance welded tank turret rings (up to seven feet OD) are in a book just released by The Federal Machine and Welder Company. The company designed and built the entire plant, shipped to a foreign power. Point of interest is that similar rings, which can be made with same equipment, could be used for large ring gear blanks, rotating table bearings, possibly locomotive tires. Limited number available to executives, technical men, sufficiently interested to write to Federal giving name, official title and company name.

maximum of agitation for removal of chips, soil, etc. Either surge platform will accommodate basket loads of 50 lb, operated singly or together. Machine is 40 in. long by 21 in. wide and each tank holds 16½ gal of solvent or water and each surge platform takes baskets 14 in. square by 6 in. high. Reciprocating action is powered by a 1/3-hp motor. Machine is offered in four models: Unheated, with heated solvent tank, with

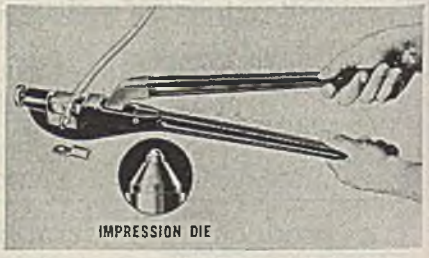


heated rinse tank and with both tanks heated. Heated tanks are provided with automatic thermostatic controls which keep temperature of solution to within plus or minus 5° F. Water rinse tank provides for overflow and can be fitted with flow control valve.

Surge washer is also provided with a hinged cover which locks into position as a draining board to drain solvent back into tank before baskets are placed into rinsing compartment.

Hand Tool

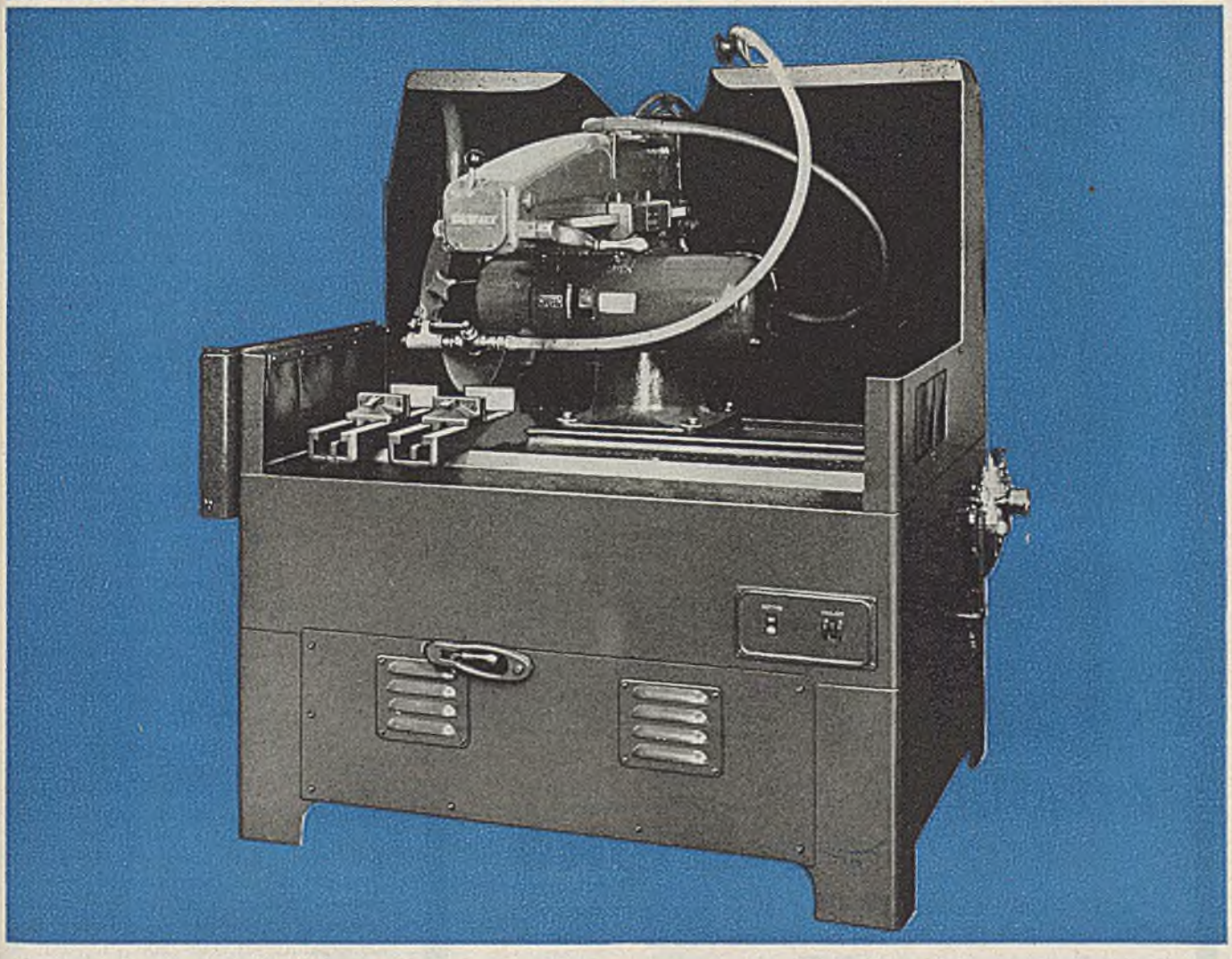
Known as Hytool MY28, a light weight universal hand tool for installing both copper and aluminum Hydent electrical connectors on large cables is introduced by Burndy Engineering Co.,



107 Bruckner boulevard, New York 54. It may be used on connectors for aircraft cable, sizes No. 8 to 4/0; U. S. Navy cable, sizes No. 23 to 250 Mcm; commercial cable, sizes No. 8 to 250 Mcm; flexible, extra flexible and welding cable, sizes No. 8 to 4/0.

Single, stepped impression die makes tool entirely self-contained. Adjustable holding die accommodates the entire range of connectors for which the tool is designed. Holding die adjustment is made by a large thumb screw and each setting is determined by a graduated scale on head of tool. When set for small sizes of connectors, the indent is formed by smaller diameter portion of die. When set for larger connectors, large portion of impression die is brought into play and stepped design provides for proper flow of metal in connector.

DE WALT offers cut-off power to spare!



The new DeWalt "Wet-Cut" Metal Cutting Machine:

- cuts wet with coolant or dry if desired
- cuts off wide stock and odd shapes
- also cuts metals on an angle

Power is the keynote of the new DeWalt "Wet-Cut" Heavy-Duty Metal Cutting Machine. Its 15 H. P. DeWalt-built motor, driving an 18" diameter abrasive wheel or steel saw blade, makes it possible to "walk" through the toughest kind of metal. It is this same power that keeps abrasive wheels operating at a constant speed, thus increasing wheel life and accuracy of cut. It is power like this that saves time and lowers cutting cost.

If you have a heavy-duty metal cutting job to do, investigate this DeWalt. Write for full information.

DEWALT PRODUCTS CORPORATION

226 Fountain Avenue Lancaster, Penna.

Mechanized Arc Welding

(*Continued from Page* 112)

tities to the start of the welding operation. The upper plate is moved to a hot forming press where it is curved and stamped with a designating symbol of the United States Spring & Bumper Co. Then these plates are also moved to the welding lines.

At the starting point of this line, a tack welder is placed between both welding conveyors. Opposite him sits a setup man who places the two parts into a tacking jig and then turns the tacking table 180° so that it is now in front of the tacker, who performs the tacking operation and removes it from the jig. While he is tacking the part, the setup man is assembling a new grouser on the opposite side of the table which is again rotated 180°, when the first piece has been tacked. The grousers are now ready to be placed on the welding conveyor (see Figs. 4 and 5).

A man is placed at the start of each welding conveyor to place the grousers on the line. At the same time he puts small plugs into two of the holes in the base plate where the weld metal comes in close proximity. This is necessary because bolts having a specific clearance are later placed through these holes to assemble the grousers on the track.

Each grouser is also painted on the base plate with a line wash to prevent the adhesion of the splatter from the weld. During this time the welding conveyors are in continual motion, as they will be in all the following operations which will be described. The parts now move into the preheat furnace or zone (Fig. 3).

The preheat furnace or zone is a rectangular box covering the conveyor for a distance of 12 ft and is approximately 36 x 36 in. in cross section. Along both walls of this preheat chamber small gas burners are inserted through holes. These are fed with low pressure natural gas. As the grousers come out of the preheat chamber, their temperature exceeds 500° F., but as they continue to move to the first welding position they lose heat and approach 500°F. At the first and at each of the following eight welding stations, a small pass of welding is laid. The welding is done along a conveyor for a distance of 32 ft (Fig. 6).

After passing a photoelectric counter, the now welded grouser falls on another conveyor at right angles and is carried to the loading end of the quenching furnace. This furnace is also of the conveyor type but moves a controlled distance in a set interval of time, stops, and then moves again. This insures a uniform temperature of the grouser before oil quenching.

A wire mesh belt conveyor now carries the grousers from the oil tank and drops them on the belt of a conveyor draw furnace where they are tempered to a tensile strength of 115,000-200,000

Important to Designers

"The Ring's The Thing"

It's Locked in the Material

It's easy to Replace

THE ROSÁN LOCKED-IN INSERT

ROSÁN Locked-in Inserts furnish permanent fastening points in all types of materials. The serrated Locking Ring (see A in illustration) prevents backing out or loosening under vibration or torsion. Installation is permanent, but the units may be removed by a simple shallow drilling operation *without disturbing the parent material.* No oversize replacements necessary, saves repair time and parts storage.

THE ROSÁN LOCKED-IN STUD

The Rosán Locked-in Stud operates on the same principle as the Insert described above. The serrated Locking Ring, identical in design for both types of units, is used to lock the Stud solidly in any material soft enough for the ring serrations to broach it.

Rosán Locked-in Studs and Inserts have been adapted to fastening and sealing problems of all types of industry.

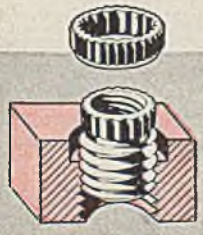
Write for free catalog. Manufacturers are invited to submit their fastening problems. No obligation.

A PRODUCT OF

BARDWELL & McALISTER, INC.

EXCLUSIVE LICENSEE

DEPT. 15-65, BOX 1310, HOLLYWOOD 28, CALIF.



(1) Material has been drilled and tapped. Insert, minus locking ring, has been partly screwed into place.

(2) Insert in place. Top flush with surface of material. Note the counter-bored channel for the locking ring.

(3) Insert locked in place. Inner serrations engaged with teeth of collar. Outer serrations broached permanently into material.

psi. The time in the draw furnace is about 60-80 min. At the discharge end of the furnace the grousers are picked up by another belt and moved about 12 ft to a rotary shot blast to descale and clean them for inspection for flatness which follows immediately.

After checking condition of the weld, the parts are hung on hooks and carried by belt into and out of a trough of zinc chromate primer. They continue moving in a circular manner and pass through a drying chamber which is heated by hot air taken from the tempering furnace. Packing boxes are placed at the end of the drying chamber and as the now completed grousers emerge they are placed in the boxes which are moved, when full, to the shipping platform.

Plastic Disks Used in Locating Spent Torpedoes

Plastic disks soluble in sea water have been developed by E. I. du Pont de Nemours & Co., Wilmington 98, Del., and Resistoflex Corp., Belleville, N. J., to prevent loss of naval torpedoes which sink during tests simulating firing conditions. Specifications demand that torpedoes float nose up in water so that they may be retrieved after test.

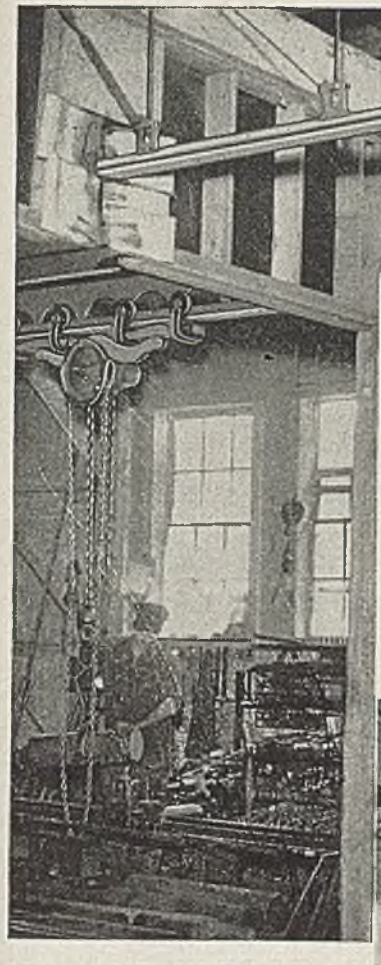
Navy designers suggested solution of the problem, except for a means of retaining float within the chamber during test run that would rise to the surface, should the torpedo sink. Methods of compounding polyvinyl alcohol resulted in substances ranging from absolute insolubility to complete solubility in water, and Resistoflex Corp. produced a disk which disintegrates in water within a specified time after firing.

Disks, formulated to withstand water pressures which develop as torpedo passes over test course, remain intact for a certain time. Should torpedo sink, the disk dissolves in a predetermined time interval, admitting water to the chamber. Water pressure forces the float through the disk. Float becomes a buoy marking location of torpedo, which then may be retrieved. Compounding polyvinyl alcohol plastic with a modifier requires great care so that chamber will remain watertight throughout the test. Two types of disks are made, one for cold water and the other for warm.

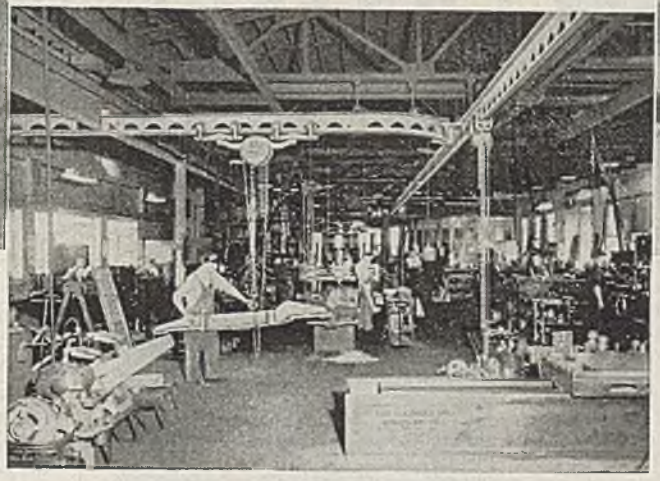
Synthetic Rubber Conveyor Belts Offer Long Life

A method of constructing small synthetic rubber conveyor belts for steel mill charging machines has been developed by Goodyear Tire & Rubber Co., Akron, O. They are said to last longer than previous types, thus require fewer shutdowns for belt replacements. Belts are built without splices, assuring wear at the same rate over entire belt surface. They measure 9 in. wide and about 117 in. long. In operation, charge belts traveling at high speed transfer dolomite to furnace interior by centrifugal force.

INEXPENSIVE EQUIPMENT *SPEEDS PRODUCTION* IN WOODWORKING MACHINERY PLANT



Above: The tramrail system connects between the two buildings and interlocks with the transfer bridge in the forge shop.



Left: Much time is saved because one man can pick up and deliver heavy parts with ease and safety. The equipment shown is hand propelled.

The Mereen Johnson Machine Co., Minneapolis, is well known in the lumber and woodworking industry for the fine sawing equipment, veneer splicers and jointers that they build.

Parts for these machines are handled many times before complete. Weighing up to two tons, it would be far too laborious and costly to transport them, or place them into or remove them from the various machine tools by hand methods.

Cleveland Tramrail equipment installed throughout the plant makes this work easier, faster and safer. Mereen Johnson are especially appreciative of the smooth, easy operation of the equipment. Very little maintenance is necessary. Even the cranes with electric hoists serving their foundry require minimum attention.

Silica Brick Roofs

(*Concluded from Page* 114)

constituents present are alumina from the brick and ferrous oxide from furnace atmosphere. The presence of the ferrous oxide cannot be directly controlled, but the amount of alumina can be appreciably reduced by the use of alumina-free materials in the brick manufacture.

The alumina in a brick in service becomes concentrated in certain zones until it has a damaging effect, no matter how small the amount of alumina present in the original brick. Considerable improvements of silica brick quality and service can be made by the elimination of alumina as a brick constituent.

Flush Surface Rivet Has Added Holding Strength

A flush surface rivet, developed by Hubert S. Dale, group engineer at Glenn L. Martin Co., Baltimore, is designed with a soft malleable head which flares out in shape of a truncated cone from the stem with a thickened edge portion extending above its top surface. When rivet is driven, edge is extruded as a flush extension of head. A feature of rivet is the thickened edge of head which provides additional metal to fill the depression in top of metal sheet, making a tight joint for rivet head and overlapped sheets and giving greater strength for holding surface of head. Added holding strength, made possible by increased surface area, aids in riveting thin, lightweight metal sheets, where failure frequently occurs by one sheet tearing away from rivet.

Rivets can be manufactured in various sizes and dimensions to fit particular types of sheets to be riveted together. Most experimental work was done with aluminum alloys, but any malleable metal may be used.

Fast Chemical Process Cleans Air Filters

A new process for chemically cleaning air filters, including air conditioning, engine, marine and aircraft, has been developed by Turco Products Inc., 6135 South Central, Los Angeles 1. Process eliminates necessity for using distillate and other materials which leave offensive odors and are fire hazards. It also reduces time required for the complete operation.

Filter is removed and immersed for 6 min in a tank of cold Turco Aktiv, 4 oz to a gallon of water. It then is removed from the tank and is given a cold water hosing to flush away dirt and grease. It is dried in a stream of compressed air and dipped into manufacturer's specified oil. According to time studies, entire process takes less than 18 min. Manufacturer claims there is no attack on galvanized iron and that the clean filter is odorless. Required equipment is simple and skilled labor is unnecessary.

Continued

Grinding Questions Answered

By Allen Steele, Manager, Dayton Grinding Wheel Division
SIMONDS WORDEN WHITE COMPANY

This series of questions and answers is presented as a practical aid in the solution of many of the more common grinding problems. Readers are invited to send in their own grinding questions, without obligation of any sort. All questions will be answered by mail or in this column. No identities will be revealed if published.

10 Q. *"How often should the oil filters of a grinding machine be drained to keep it working right?"*

A. Most machine manufacturers recommend that the oil filters be drained or the filtering element be cleaned every two or three weeks. Otherwise, they cease to act as filters.

11 Q. *"When truing a wheel with a diamond do you do it any differently for a high finish than you do for fast stock removal?"*

A. Yes, if a high finish is required on the work, move the diamond across the face as slowly as possible. On the other hand, if fast stock removal is the objective, you can work the diamond across the face at a higher rate of speed.

12 Q. *"Will you please give me a check list of the most common causes of chatter marks in throughfeed centerless grinding?"*

A. The presence of chatter marks on the work in throughfeed centerless grinding can usually be traced to one or more of the following causes: (1) Using a grinding wheel of too fine grain; (2) using a grinding wheel that is too hard; (3) using a work support blade at too steep an angle; (4) grinding too high above the centerline of the wheels; mount of grinding wheel fitting too loosely on spindle; (5) grinding wheel out of balance; (6) improper spindle adjustment of either the grinding or regulating wheel; (7) attempting too heavy stock removal; (8) improperly clamped blade; (9) excessive play in any part of the machine or equipment; (10) dressing the wheel with a flat diamond.

13 Q. *"What is considered a good rate of production in the grinding of automotive gear teeth by the formed wheel method?"*

A. From information we have been able to gather, it appears that the average rate for the formed wheel grinding of automotive and similar gear teeth lies somewhere between 40 and 45 seconds for each tooth. The factors which can affect this average rate one way or the other are the number of teeth to be ground, the size of the teeth, amount of stock to be removed and, of course, the skill and aptitude of the machine operator.

14 Q. *"We have recently taken on a contract to grind electric motor shafts. We are planning to use an 18 x 2 x 5 wheel. Have tried several wheels of different grain and grade, but to date have not met with much success. What do you recommend in a Dayton wheel?"*

A. We have met with quite some success in supplying wheels for the grinding of electric motor shafts. Drawing on this experience, we recommend our 5A-60-N-13-V-20 (old marking 560 N-3-V).

15 Q. *"We have just started on a new centerless job. When the work leaves the machine after being ground the front end of it has a slight taper. How do you correct this?"*

A. A taper on the front end of the work as it leaves the machine is caused by work guides on the entrance side of the machine being deflected towards the regulating wheel. Vice versa, a taper on the rear end of the work is caused by the work guides on the exit side of the machine being deflected towards the regulating wheels.

16 Q. *"We have just received a shipment of thread grinding wheels from a new supplier and notice that a few of the wheels have a slightly ground out spot in the heavy part on one side. Would you consider this wheel as being defective?"*

A. Every thread grinding wheel manufacturer frequently finds it necessary to grind a small amount from the heavy part on one side of a wheel in order to correctly balance it. Such wheels are not defective as they do not affect results in any way.

17 Q. *"To settle an argument, what is the ideal diameter of a wheel used for straight internal grinding?"*

A. When the wheel is new it should have a diameter equal to ¾ of the diameter of the hole being ground. A smaller wheel would slow down production too much, whereas a wheel very much larger would not easily go into the hole.

Power Distribution

(*Continued from Page* 118)

there are existing 2400 v systems in industrial plants, it is often more economical to extend these at 2400 v rather than change to 4160 v. However, it may be more desirable to extend it at some higher voltage, like 13.8 kv, rather than to extend the system at 2400 v. This has proven to be the case in many recently made studies of plants which are to be expanded and modernized. A discussion of this is beyond the scope of this article.

Twenty-four hundred volts are particularly applicable to concentrated loads which supply motors rated 200 hp and above, and where the primary voltage is above 5 kv. In these cases, it is preferable to step down from the higher voltage to 2400 v rather than 4160 v if the capacity per 2400 v bus is limited to a few thousand kilovolt-amperes, and nearly all of this load is utilized at this bus directly by motors rated above 200 hp.

A typical application where 2400 v would be most economical is a pumping station, Fig. 5, in which the control may be of the fused contactor type or of the vertical-lift power circuit breaker type where the vertical-lift feature is desirable and where the frequency of starting is not too great. If this preference is followed, it will be necessary to make a transformation for these large motors. The cost of the transformation is substantially the same whether it is made to 2400 v or to 4160 v. Hence the power system cost is not a significant factor, since all of the load is concentrated in one place. The 2300 v motors and their starters are less expensive than 4000 v motors and their starters. This can be seen by comparing Curves B, C, Fig. 1.

Motors and Control: Where 2300 v motor starters of 50,000 kva interrupting rating can be used, some reduction can be obtained in the overall cost of the 2400 v installation compared with the lower voltage installation for motors below 200 hp. This merely reduces the crossing points of Curves A and B, Fig. 1, to about 150 hp. Most variables, such as special induction motors, or special starters, will tend to make Curve B cross Curve A at a higher horsepower rating than shown in Fig. 1. Although Fig. 1 is plotted using 1800 rpm motors as a base, other motor speeds over the 600-3600 rpm range have little effect on the general relationship of those curves.

Synchronous Motors: There is less price differential between low voltage (600 v or less) and 2300 v synchronous motors and control than there is between induction motors and control for these voltages. This differential will tend to make Curve B cross Curve A at about 150 hp instead of 175 hp, as shown for induction motors, Fig. 1.

Motors Operating at 600 V and Below: In many industrial plants, the great majority of the motors is rated less than 200 hp and hence is operated from a 460 or 575 v distribution system. In these plants there may be one or two

motors which are considerably larger than 200 hp. It often is more economical, depending upon the size of the motor, to operate these larger motors directly from the 460 or 575 v system than it is to provide a special transformer to step down to 2400 or 4160 v where the primary voltage is above 5 kv.

In general, it is most economical to operate all motors rated 200 hp and less on systems rated 600 v or less, regardless of the primary voltage. Where a choice of primary voltage can be made, it is in most cases more economical to select 4160 v rather than 2400 v, even where the percentage of motors above 200 hp is as high as 50 to 60 per cent of the total plant load.

Constant X-Ray Current Provided by Regulator

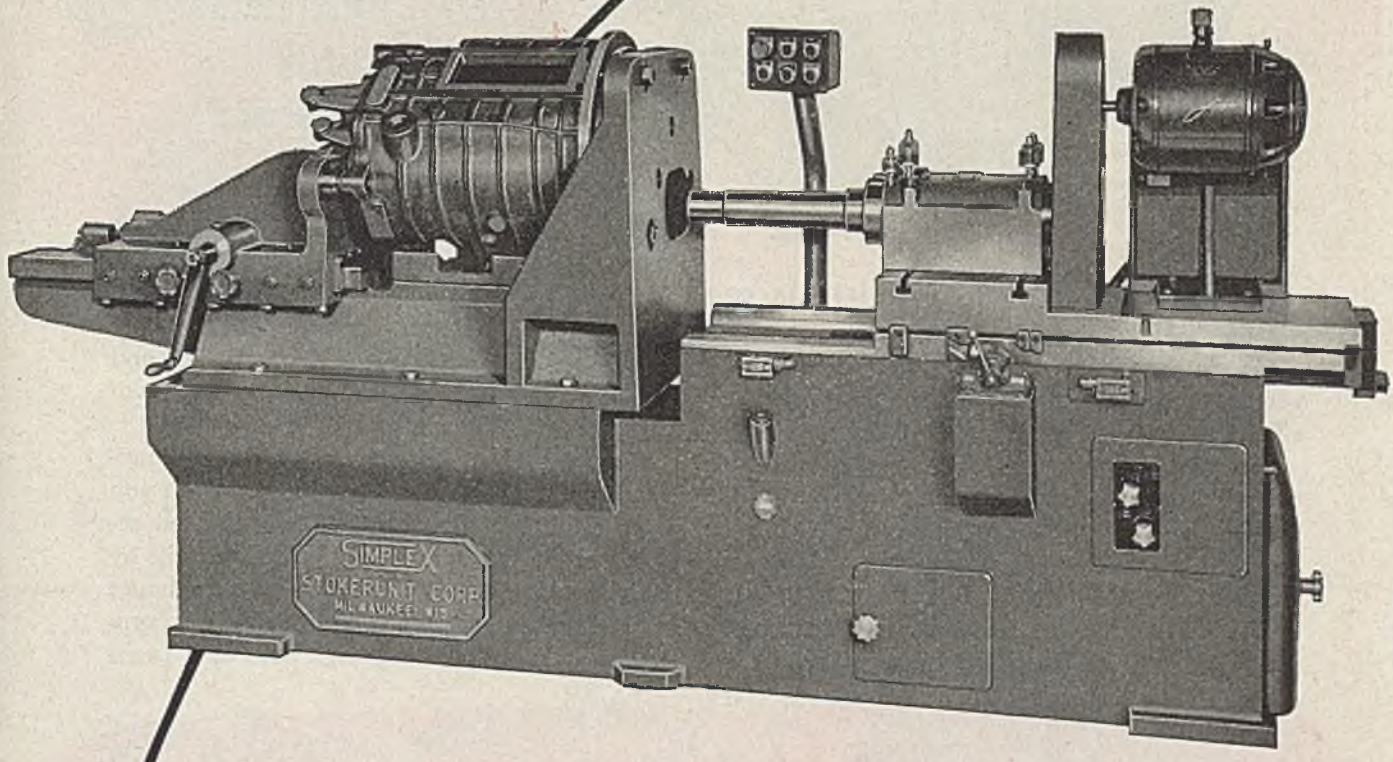
A new electronic-type regulator, the X-Actron Stabilizer, has been developed by Westinghouse Electric Corp., Pittsburgh, Pa. It insures constant current in X-ray tubes where a small change in power supply voltage makes a large difference in current delivered, i.e., in the amount of "light" available for the picture. It is small and compact and consists of vacuum tubes in a special circuit of inductances and capacitors. This device is in the high-voltage circuit of the X-ray tube, making it sensitive directly to changes in the quantity desired constant. The regulator holds the current constant by operating on the X-ray tube filament through a stepless saturable reactor. The regulator is said to be able to hold tube current within 2 per cent plus or minus over. It makes possible precalibrated current dials and reduces the work of the operator to making the current selection and pressing a button. The regulator insures that the tube delivers current ordered regardless of any fluctuation in supply-line voltage or whether the set has been operating and is hot; whether it is starting cold, and regardless of the amount of anode-cathode voltage.

Roughness Standards Aid to Surface Uniformity

Roughness standards have been developed as part of a checking kit by Surface Checking Gage Co., Hollywood 28, Calif., to meet trend toward uniformity in surface control. Kit contains a 65-page educational text bound to a gage consisting of 20 replicas of machined surfaces, prepared by turning, grinding, milling, honing, lapping and polishing, varying in roughness from 500 to 5 mu in. Replicas are molded into a 5 x 7-in. plastic plate through use of precise die inserts. Surf-Chek method of designation is said to eliminate guess interpretation, to convey engineer's instructions to machinist, and to make possible rapid and efficient roughness comparisons without the use of other special instruments.

SIMPLEX

Designers frequently come up with designs which serve their purposes admirably, but present machining difficulties. A typical example is this large gear case which had several bearing bores located deep in the closed end of the case, making accurate finish very difficult.



SIMPLEX 2U Single-end Precision Boring Machine with extended work table, provided support for the bulky fixture. A special 2-spindle boring head with extended outboard bearings provided means for boring the holes in their precise location to fine accuracy and finish. The operation was simplified to a point where it was no more difficult than other boring operations in the case.

Precision Boring Machines

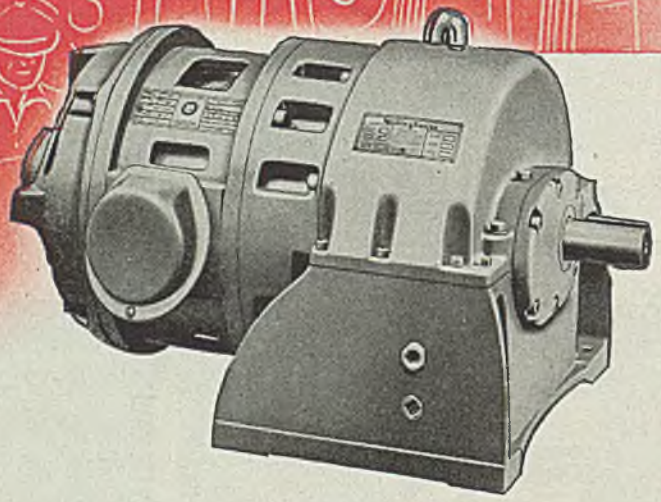
STOKERUNIT CORPORATION

SIMPLEX Precision Boring and Planer Type Milling Machines

4532 West Mitchell Street, Milwaukee 14, Wisconsin

Modernize with "Packaged Drive"

Westinghouse GEARMOTORS and Speed Reducers



Save Space
Save Installation Time
Reduce Maintenance
Increase Safety
Improve Appearance

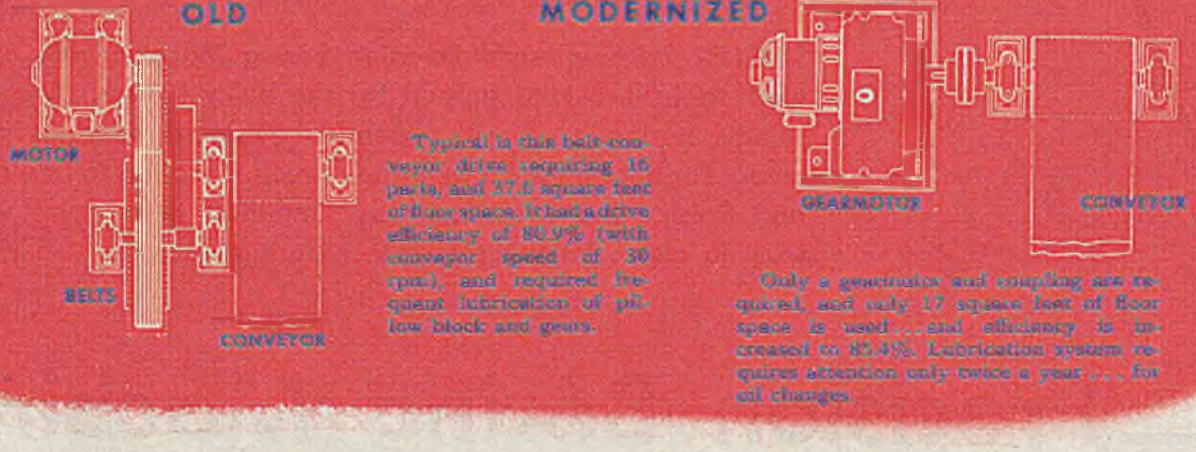
Gearmotors come complete in one "package"...ready for operation

Check up on your motor drives. Reconversion problems put a premium on their efficiency and economy.

Since the widespread use of gearmotors almost twenty years ago, performance records have proved them to be the most economical answer to drives which need speed reduction...and four out of every five drives do need speed reduction.

The efficiency of gearmotors stems from two major savings: (1) reduced power losses...no belts, ropes, and pulleys, etc.; (2) longer life and reduced outage time...maintenances seldom more than oil changes.

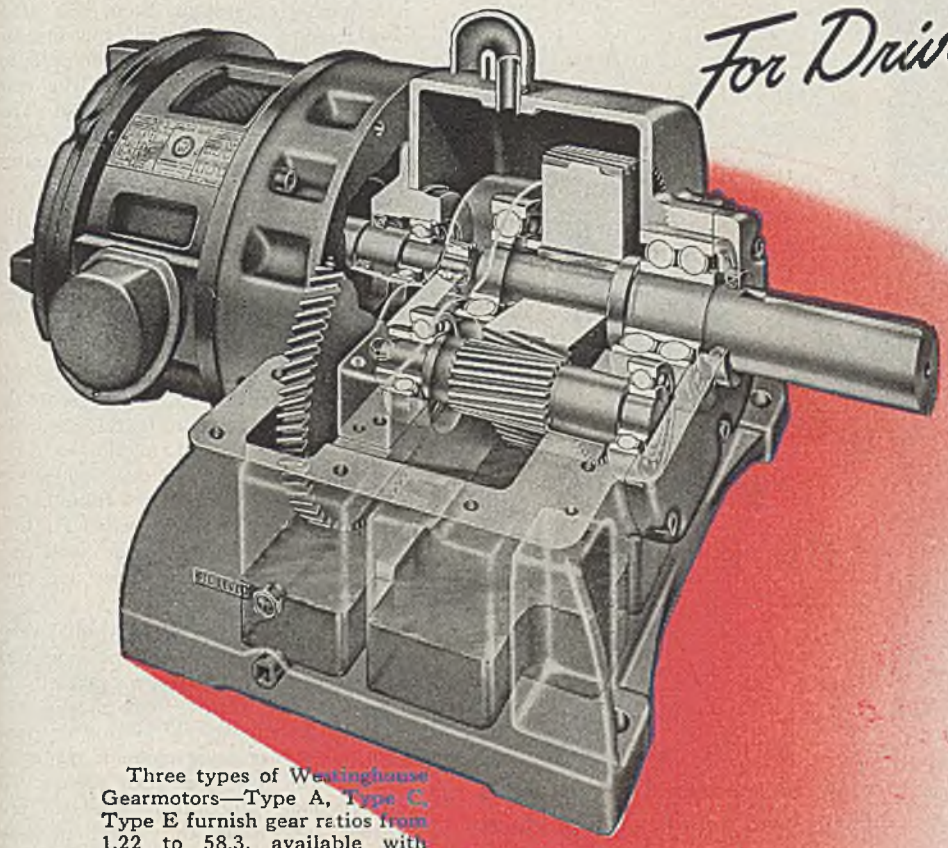
It's important, too, that your drives are engineered from one responsible source. When you come to Westinghouse you get undivided responsibility... the motor and gears are built by one manufacturer. Call your Westinghouse office, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-07231



Westinghouse

There is a Westinghouse speed reduction unit for most application needs

For Drives of 1 to 75 hp



Three types of Westinghouse Gearmotors—Type A, Type C, Type E furnish gear ratios from 1.22 to 58.3, available with single-phase, polyphase and direct-current motors.

HERE ARE 9 GOOD REASONS WHY YOU SHOULD INSTALL WESTINGHOUSE GEARMOTORS:

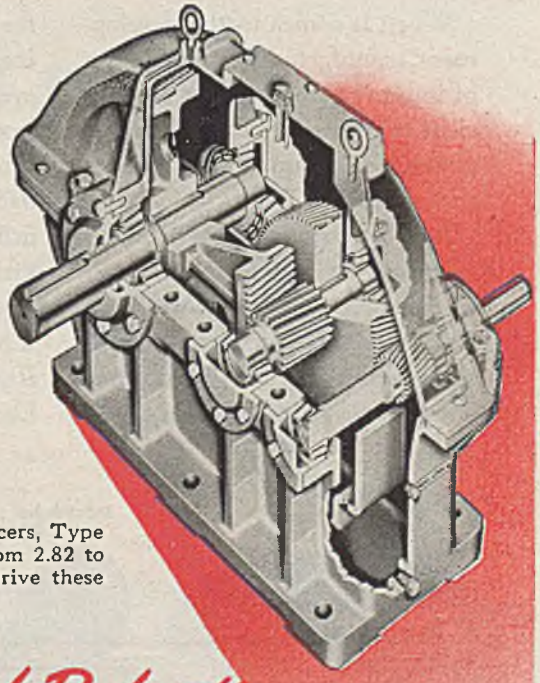
1. FEWER PARTS TO WEAR.
2. BPT "TOUGH-HARD" GEARS AND PINIONS.
3. USE ALL WESTINGHOUSE MOTOR TYPES.
4. HIGH EFFICIENCY.
5. POSITIVE LUBRICATION.
6. EASY ACCESSIBILITY.
7. IMPROVED FOUNDATION STABILITY.
8. MOTOR AND GEARS BUILT BY ONE MANUFACTURER.
9. DESIGNED AND APPLIED TO A.G.M.A. STANDARDS.

For Drives up to 1000 hp

Here are seven good reasons why you should install

Westinghouse Speed Reducers

- Antifriction bearings
- Simple, positive lubrication
- Heat-treated helical gearing
- Liberally proportioned gear cases assure alignment of rotating parts
- Low power loss for high efficiency
- Rugged case—split construction for easy accessibility
- Hob cutting assures high precision gears



Two major types of Westinghouse Speed Reducers, Type SH and Type DH, offer speed reduction ratios from 2.82 to 70.5. Westinghouse also furnishes the motor to drive these units—for a complete installation.

4 out of 5 drives need Speed Reduction

Automatic Control

(*Continued from Page* 134)

the deviation started at 8 minutes, until the deviation is several per cent of the controller scale, the control system should begin to function. However, in most measuring systems there is a small zone through which recording is insensitive, that is, the variable (temperaure, in this case) has changed but the controller fails to detect this change. This dead zone has variously been called "dead spot," "tapping error," and "neutral zone."

Dead zone is usually attributed to the measuring system but may also exist in the control system. Pneumatic controllers are sufficiently sensitive so that as soon as the pen or pointer begins to move, the control system begins to function.

In Fig. 4, the dotted lines above and below the control point represent the width of the dead zone. In this case, the control system does not function until the temperature exceeds the dead zone, and it is necessary to wait for 4 minutes before corrective action is made. These 4 minutes are in addition to the dead time already existing in the process and control system.

Since it has been indicated that dead time is the cause of one of the most serious difficulties in control, a dead time in the controller further complicates the problem. An improperly located or poorly installed measuring element results in poor control as well as poor accuracy of measurement. Much has been said and written concerning the effect of poor thermocouple or thermometer-bulb installations on the accuracy of temperature measurement. Its effect on automatic control, however, is not so immediately obvious.

Suppose, for example, that a thermocouple installation as shown in Fig. 5 were encountered. A large loss of heat will occur along the protecting well and heat will be lost to the atmosphere because of the long length of protecting well outside the pipe. This loss decreases the heat available at the thermocouple tip and the temperature reaction at the controller is slow.

A protecting well installed in a horizontal position will allow dirt to settle on the tube if the velocity of the gas will not scour the surface. This increases the thermal capacity because the additional mass must react to temperature changes. The resistance to heat flow from the air to the protecting well is fairly high because the thermocouple tip is located near the outside of the pipe where the velocity is even less than in the center. This increases the measuring lag so that the temperature response then becomes even slower.

The location of the thermocouple downstream from a bend in the pipe causes unnecessary fluctuations of temperature at the thermocouple because of the swirling effect of the gases going around the bend. Usually a thermocouple and protecting well has enough mass to

with ALCOA impact extrusions

One wallop of the impact extrusion press, and see what you have—a "shell" four inches tall—that part with ears attached—or the giant cylinder. Here's high speed, low cost production at its best.

Millions like the little fellow have been produced by Alcoa for such uses as radio condenser cans and blood transfusion set containers. But war's demands for more output with less labor early recognized the potentials of the process. Alcoa answered with parts like these.

Only aluminum gives you so much to start with—parts so quickly brought to finished form. Only aluminum offers you the combination of lightness, resistance to corrosion, workability and fine appearance. Alcoa has the know-how to help you use aluminum and the impact extrusion process to best advantage. ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN ALUMINUM

smooth out those fluctuations, but comparable difficulties are often encountered in a flowmeter or pressure control installation.

These general principles apply to the installation of almost any primary measuring element. Very careful consideration should be given to the losses and to the mass of the detecting element because they very greatly increase the lag of measurement. Make sure that the control valve is properly installed and is of a type best suited to the job.

In addition to the choice of lift-flow characteristic for a control valve, it is most imperative that it be smoothly operating, that is, have smooth increases in flow for increases in lift or rotation.

On pneumatic control valves this involves maintaining adequate lubrication of the stem and repacking at frequent intervals when necessary. The average pneumatic control valve, when properly maintained, will operate very satisfactorily, but friction at the valve stem which causes sticking can reduce very seriously the number of positions available at the valve. For this reason, there should be no hesitation in using a valve positioner, even if the sticking is only moderate. A valve positioner should always be used when the proportional band is set to wide values.

Electric motor-operated valves should not be operated with the shaft vertical because thrust causes excessive wear. It is most important that the motor oiling instructions be carefully followed. The resistor and operating contact, as well as the limit switches, for electric control systems should be inspected frequently because dirty or corroded contacts can appreciably reduce the number of steps available.

The ambient temperature at an electrically operated valve should never exceed that specified for that type of electrical equipment. The valve and motor should be installed with the recommended linkage arrangement so that the partial characterization obtained by such means is the most favorable, especially in the case of fuel-air ratio valves. The influence of outside variables often produces such large upsets that a single controller will fail to maintain process balance. Outside variables should be corrected at the source.

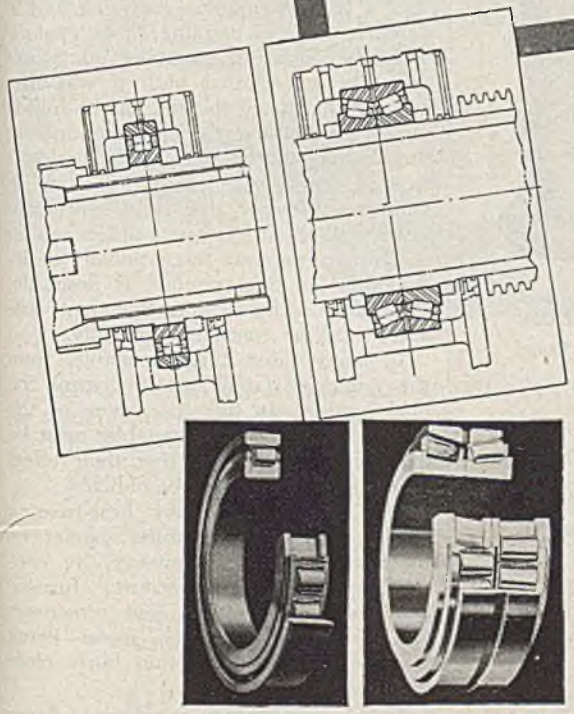
An upset in the supply of the process must carry through the process and finally reach the controller before any correction can be made. The time elapsing between the upset and a complete correction is often very long and serious deviation of temperature may result.

If a controller is applied so as to measure a variable associated with the upset and its effect corrected before it can reach the process, the job of the main controller is greatly reduced and better control will result.

The case in point is the control of temperature of a gas-fired furnace. Pressure changes of a very rapid nature often exist in fuel gas lines. When using a controller directly operating a valve, these pressure changes cause a change in flow of the

TORRINGTON BEARINGS HELP BOMB SPINNERS ACHIEVE NEW SPEEDS

Drawing from photograph of bomb spinning machine manufactured by W. S. Bowling.



X-section shows a single row straight radial roller bearing, and a 2-row tapered roller bearing designed and built by Torrington's Bantam Bearings Division to speed operation of bomb spinning machines. Our engineers specialize in designing and building to unusual requirements.

At the start of the war, Torrington was asked to design and build bearings that would enable the spindles of bomb spinning machines to operate at speeds up to then thought impossible. Soon, spindles equipped with large tapered and cylindrical Torrington Roller Bearings were turning at unheard-of speeds up to 1500 revolutions per minute, with equivalent pitch line speeds of 8000 feet per minute.

On the typical Torrington Bearing equipped spindle, the heavy alternate radial and thrust loads on the fixed end of the spindle are carried by a rugged, compact double row tapered roller bearing. A single row straight radial roller bearing supports the floating end of the spindle, allowing lineal expansion to take place without cramping. Special design features at the picket corners of the bearing cage take care of the rapid alternation between radial and thrust load. A specially designed automatic lubrication system handles the excessive heat generated by the unusual operating conditions.

Designing and building bearings to meet unusual anti-friction requirements is the year-round job of Torrington's Bantam Bearings Division. Our help and cooperation are at your disposal, for projects present or postwar.

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fuel which, in turn, upsets the control of temperature. The controller then has a difficult time trying to hold the temperature within limits.

Suppose a flow controller is installed in the gas line and the temperature controller is used to adjust the control point of the flow controller. This arrangement is commonly called metered control. Now, if a pressure change in the gas line occurs, the flow controller detects the change in flow and makes a correction immediately without allowing the change to upset the temperature. The temperature controller has a much simpler job to perform and the quality of control is improved.

When possible, therefore, upsets of this nature should be corrected at the source by adding a controller at the proper point. It need not be a recording controller. Sometimes a pressure-balanced valve or a nonindicating controller will serve the purpose. The results will be far better than by adding all sorts of gadgets to the master controller because the master controller cannot detect the upsets until they already have affected the process.

Many times the upsets are in the form of changes in composition of the material being processed or changes in the heating value of a fuel which cannot be readily controlled. It is then even more necessary to correct these upsets at the source.

An example of uncontrolled upsets is found in the following application. Pressure in a steel furnace was controlled with a furnace pressure controller and a damper. In the morning, wide cycling of furnace pressure was observed. Much difficulty was caused until it was discovered that when the sun hit the building in the morning, the operators opened the shutters in the side of the building to cool the furnace room. The varying wind conditions created varying pressure loss conditions and frequent upsets caused the furnace pressure to continually cycle.

Control of final product is desirable. When impossible, more independent variables must be controlled carefully.

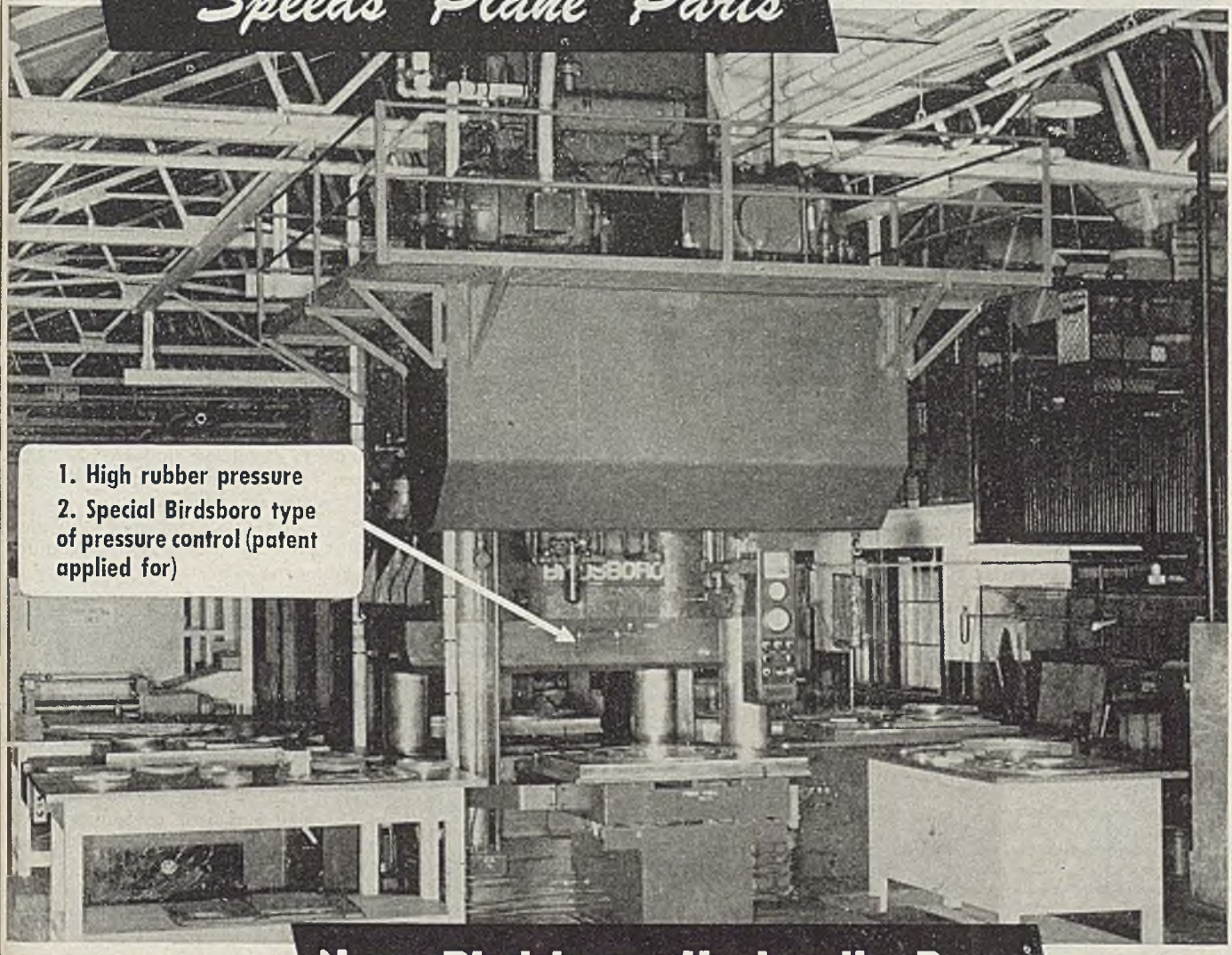
In many cases it is impossible, from the practical standpoint, to control the final product. In this case, more of the independent or outside variables must be carefully controlled so that their effect on the final product can be nullified.

For example, in many heat-treating furnaces metal temperatures cannot be directly controlled. However, by controlling furnace temperature, furnace pressure, fuel pressure, and sometimes furnace atmosphere, the metal being treated can be held within fairly close limits.

In processes having extremely large capacity and large dead time, hours sometimes will elapse before a change can be detected. There is a limit to the lag through which any controller can maintain effective control.

Summarizing this discussion, there are many more problems in automatic control than just the controller itself. In any control problem the quality of control can be improved more by carefully analyzing the measurement and the

4-Way Shuttle Table *Speeds Plane Parts*



New Birdsboro Hydraulic Press

BUY WAR BONDS

ENGINEERING RESEARCH COMPANY selects a BIRDSBORO 2500 ton hydraulic press for their precision rubber pad forming work. The new features of this press together with expert tool design enable them to produce parts accurately to gauge requiring no hand work with but a few exceptions.

Four convenient shuttle tables arranged for automatic loading and fully synchronized with the pressing operation can be moved in any sequence desired by the operators by pushing respective control buttons. As a result, the press *is always operating* with one of the four shuttle tables. This patented hydraulic press design is typical of the inventive skills of Birdsboro engineers in designing and building presses to meet specific requirements. Whenever you have a press problem, consult Birdsboro.

BIRDSBORO STEEL FOUNDRY & MACHINE CO. • BIRDSBORO, PA.

BIRDSBORO

HYDRAULIC PRESSES

process than by needlessly complicating the control system.

The points discussed here are worth a brief repetition: (1) Keep measuring lag to a minimum; (2) keep controller lag to a minimum; (3) use sensitive measuring and control systems; (4) connect outside variables at source; (5) control from final product; (6) properly maintain control system.

Bearing Production Aided by Air Conditioning

Air conditioning equipment with a capacity of 24,000,000 cooling units or 2000 tons of refrigeration, installed by York Corp., is being used by SKF Industries, Philadelphia, to protect high precision accuracy in vital bearing plants. It safeguards the production of tons of bearings a day ranging in size from diameter of a dime to 6 ft. A total of 550,000 cu ft of cool, filtered air a minute is circulated through plants by means of a chilled water system and electrostatic air cleaners.

Plants have 2 in. of roof insulation and steam coils to balance temperatures in winter. Electrostatic air cleaners in critical assembly and inspection operations filter out nearly 100 per cent of all smoke, haze and dust particles, making possible an atmosphere equivalent in purity to that found only at extremely high altitudes. Eleven separate Freon "11" centrifugal water cooling systems are used to air condition a total area of 379,200 sq ft. System includes a fan, washer, heating coils, air cleaning apparatus and automatic controls supplied by three 500-ton compressors and one 400-ton compressor.

Air conditioning performs four jobs, all intended to improve production and reduce number of spoiled parts. They are: 1. Helping to prevent stain-producing humidity from attacking finely finished bearing parts or assembled bearings during handling, in assembly and final inspection; 2. helping to maintain accurate dimensional controls not affected by varying outdoor climate conditions; 3. keeping factory atmosphere free from lint and dust, dirt, vapor, and grinding grit which normally collect on oiled surface of bearing races, balls and rollers; and 4. preventing excessive summer temperature from increasing workers' fatigue and lowering efficiency.

Aluminum Ladders

A line of industrial ladders of all-aluminum tubural rail and channel rail construction is announced by Duo-Safety Ladder Corp., 809 Ninth street, Oshkosh, Wis. Aluminum construction, in this application, offers advantages of light weight plus strength and safety. Folding ladders, marine boarding, scaffolding, light, telephone and other utility ladders, plus a heavy aluminum platform step ladder, are to be presented in detail in literature available at an early date.

engineered to a degree of excellence that assures unusual speed and economy

● Increased production is always possible in grinding departments when proper wheels are used. Sterling's "Wheels of Industry" combine the correct bond, grain, structure, size and shape for the solution of all your grinding problems—with speed and economy.

STERLING BONDS *Promote Efficiency*

You obtain all the grinding possible from wheels containing Sterling bonds. . . . Engineered to produce the utmost cutting action from every abrasive grain. . . . .

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THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Single Motion Attaches Universal Mounting Clip

A universal capacitor mounting clip, which can be attached to chassis instantaneously with one hand motion and without assembly tools, has been developed by Prestole Division, Detroit Harvester Co., 4500 Detroit, Toledo, O. No nuts or bolts are used to attach clip to chassis. Pointed retaining tongues bite into chassis firmly and prevent loosening from vibration. Clip is designed to give maximum engagement between capacitor and clip.

It is necessary to provide only for a simple embossure in the chassis—blue print of embossure is provided by the company. Clips may be riveted to chassis wherever an embossure is not provided. Clips are designed to fit chassis thicknesses from 0.032 to 0.062-in. Thus, all clips will fit one standard chassis embossure. Company states that clips also may be used for mounting tubes or wires in other applications. Clip sizes available range from ⅝ to 1⅜ in.

Stainless Shot Blast Cleans Steel Castings

A shot blast method for cleaning stainless steel castings, forgings and other products, developed by Cooper Alloy Foundry Co., Hillside, N. J., employs stainless shot instead of the usual steel shot which deposit a corrodible film of iron on the casting or other product being blasted. This action affects one of the most valuable properties of stainless steel, its resistance to corrosion and oxidation. Use of stainless shot avoids deposit of corrodible metal and permits the product to be cleaned down to bright, rust-free metal. Cleaning by this method is accomplished in the conventional manner using standard shot-blasting equipment. The process has been the subject of experiment and improvement since it was patented in 1937.

New Slidefilm on Solder

"Soldering," a 92-picture "discussional" type slidefilm, has been released for circulation by The Jam Handy Organization, 2900 East Grand boulevard, Detroit. This film has been widely used in wartime aviation training programs, and its purpose is to aid the foreman or other instructor in teaching students and apprentices the proper techniques of various types of soldering and the purposes. This film is divided into sequences, each sequence furnishing visual material for a single lesson as follows: (1) Definition of solder; (2) uses; (3) soldering methods, fluxes; (4) types; (5) application; (6) heat sources; (7) the bit; (8) steps in soldering; (9) soldering cables, terminals, taps, splices; (10) soldering sheet metal; (11) safety precautions.

Puzzled

ABOUT SPECIAL RINGS & BANDS

● It puzzles us to see a magician take five or six loose rings, touch them together — and presto! they're looped together. How does he do it? We don't know... but we do know that if you're puzzled about special rings and bands of rolled and welded steel, we can solve your problem very easily . . . We have more than 30 years' experience and the finest equipment for making special rolled and welded rings and bands in volume. So, if you're thinking about special rings and bands for postwar production, get in touch with us now.

The Cleveland WELDING CO.

WEST 117th ST. at BEREA RD. • CLEVELAND 7, OHIO

New Literature

METAL CLEANING

By Kelite Products Inc., Los Angeles 1.

(Illustrated folder)

Describes scientific processes for cleaning stainless steel and Monel metal, low and high carbon steel and Chromoly, and brass, copper and nickel before brazing action is powered by a 1/3-hp motor. structions for removing flux after brazing and a pH chart.

—o—

DEEP FILLET WELDING

By Metal and Thermit Corp., New York 5.

(Bulletin with illustrations and diagrams.)

Entitled "Deep Fillet Welding With Murex Type FHP Electrodes," bulletin explains deep fillet welding technique through use of heavy mineral coated electrodes at high amperages.

—o—

MACHINING OF AMPCO METAL

By Ampco Metal Inc., Milwaukee 4.

(A 12-page bulletin, No. 66, illustrated, with diagrams and tables.)

Discusses various phases of machining, tool design and inspection, and gives a table of recommended lathe feeds and speeds.

—o—

SHAFT COUPLINGS

By Link-Belt Co., 307 North Michigan avenue, Chicago.

(An 8-page, illustrated booklet.)

Gives sizes, dimensions, and lists prices for couplings of flexible, rigid flanged face and compression types, emphasizing type RC roller chain coupling. Includes information on three types of protective casing: R type steel casing, P type plastic casing, and S type stationary-mounted casing.

—o—

CAST IRON FIN TYPE RADIATION

By D. J. Murray Mfg. Co., Wausau, Wis.

(A 6-page folder, illustrated, with charts.)

Describes design and construction of cast iron fin type radiation unit. Contains installation views of cast iron Grid unit heaters, dimensional drawings, capacity tables, and supply and return connection drawings. Also explains carry-over of heat due to construction material.

—o—

ENGINEERING DATA

By Colonial Supply Co., 217 Water street, Pittsburgh 22.

(An 800-page catalog.)

Describes more than 20,000 items for use in industrial, contracting and mining operations.

A different Johnny is marching home

For one thing, he won't parade up Main Street the way you always expected. He doesn't much care for the ticker tape and bunting. By day coach or sleeper, Johnny is coming home with the experiences of battle vivid in his memory.

He may be back for the job he left when the call to colors came. You know you'll be proud and happy to have him with you.

But it's a *different* Johnny. Not quite the happy-go-careless guy you knew before. He's older for one thing. More thoughtful. You may even find him brusque or restless now and then.

Why?

When a man's been through the hell and pandemonium of battle . . . or the terrible boredom of lonely, inactive outposts, it's hard to readjust to a paradise of peace and plenty. It will take Johnny time to settle in a civilian groove, and the call's on you for friendly tact and patience.

Pull with Johnny. Give him time to come through at home, as he came through on the fighting front. Play ball with Johnny. He made a swell soldier. And he's going to make a swell civilian.

MACWHYTE COMPANY, 2912 Fourteenth Avenue, Kenosha, Wisconsin . . . manufacturers of "Hi-Fatigue" Aircraft Cable, "Safe-Lock" Cable Terminals, Aircraft Tie-Rods, Braided Wire Rope Slings, and Wire Rope for all requirements.

THE BUSINESS TREND

Business Indexes Reflect Pressure of War Orders

MAJOR industrial indicators continue high, and with exception of steel ingot production, show little change from V-E Day six weeks ago. Some of the steadying influence results from reconversion of certain facilities on a partial basis to civilian goods production, but most of it comes from continued war domination of business activity.

At V-E Day, steel ingot operations were at 95 per cent of capacity. In later weeks operations have tended downward, principally because of manpower shortage, and in the fourth week after V-E Day was 90 per cent, although it likely would have registered 92 per cent had it not been for a strike in the Birmingham, Ala., district.

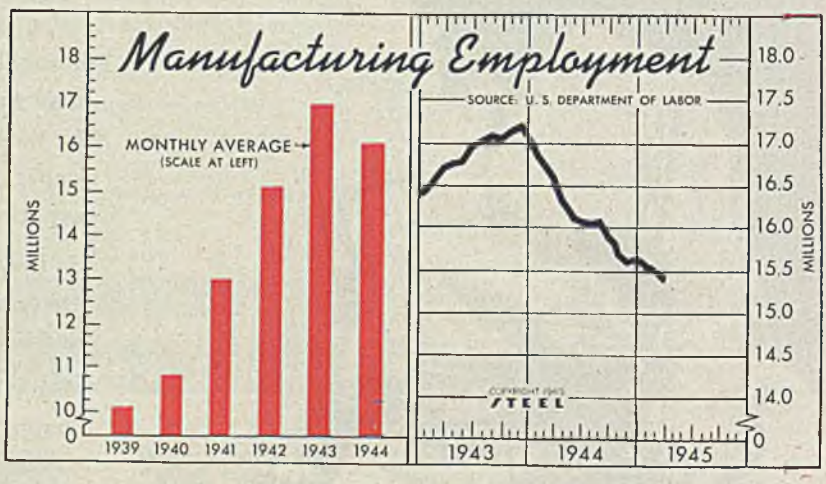
STEEL EMPLOYMENT—Latest complete monthly figures on steel industry employment and payrolls show that both declined in April. Number of employes on payrolls that month averaged 567,200, compared with 570,100 in March and 573,400 in April, 1944. Total payrolls for April were $146,954,800, representing a decline from $154,976,700 paid out in the longer month of March, but were substantially above the April, 1944, payrolls of $138,860,400.

Manufacturing employment and payrolls in the latest week were reported lower in some areas, but most released workers were reabsorbed.

With some relaxation since V-E Day of wartime restrictions on construction, the national construction volume in the latest week was 34 per cent greater than the previous four-week moving average, and 1 per cent higher than the corresponding 1944 week. Upward trend in electric power output on a seasonally adjusted basis halted in V-E week.

WAR EXPENDITURES — Cessation of hostilities in Europe has not brought about a decline in war expenditures, for as the United States began shifting its might from the European to the Pacific theater, disbursements for war in the month following V-E Day were a billion dollars greater than those of the month immediately prior to V-E Day and in the latest week they were still increasing.

COMMODITY PRICES—Among newest inflationary effects of the war are increases in the Bureau of Labor Statistics index of commodity prices, and prices of industrial raw materials, and manufactured products. All three have continued to rise since V-E Day. The all-commodity price index is now at a new peak for this war, and its latest increase is attributed to higher ceiling prices for steel mill products, increases in prices of bituminous coal, and advancing markets for a wide range of agricultural commodities.



Factory Employment (000 omitted)

	1945	1944	1943
January	15,555	16,825	16,423
February	15,525	16,735	16,599
March	15,401	16,559	16,747
April	.....	16,309	16,774
May	.....	16,122	16,753
June	.....	16,093	16,908
July	.....	16,013	17,059
August	.....	16,023	17,182
September	.....	15,843	17,136
October	.....	15,692	17,194
November	.....	15,607	17,238
December	.....	15,632	17,080
Monthly Average	.....	16,121	16,924

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	90.0	91.5	95.0	98.0
Electric Power Distributed (million kilowatt hours)	4,327	4,204	4,302	4,265
Bituminous Coal Production (daily av.—1000 tons)	1,865	1,969	1,803	1,942
Petroleum Production (daily av.—1000 bbls.)	4,853	4,859	4,860	4,522
Construction Volume (ENR—unit $1,000,000)	$43.0	$21.4	$38.9	$42.9
Automobile and Truck Output (Ward's—number units)	19,580	18,100	17,585	18,930

*Dates on request.

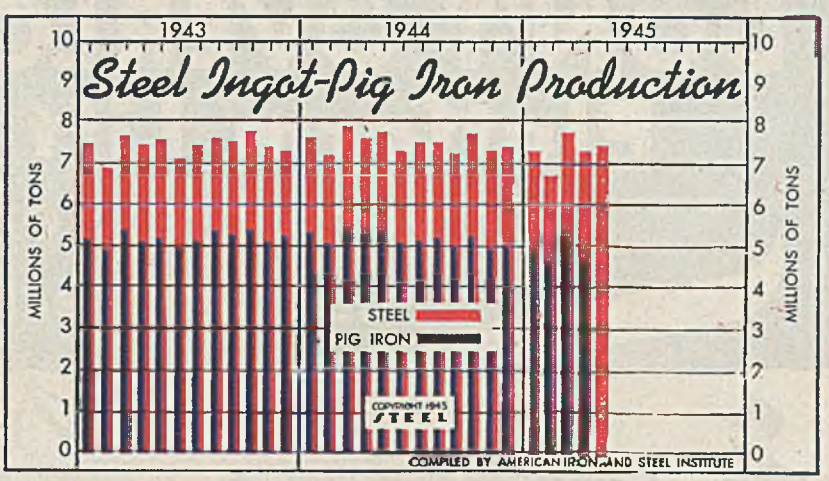
TRADE				
Freight Carloadings (unit—1000 cars)	832†	838	839	874
Business Failures (Dun & Bradstreet, number)	12	13	16	22
Money in Circulation (in millions of dollars)‡	$26,513	$26,500	$26,312	$22,255
Department Store Sales (change from like week a year ago)‡	+9%	+1%	+10%	+11%

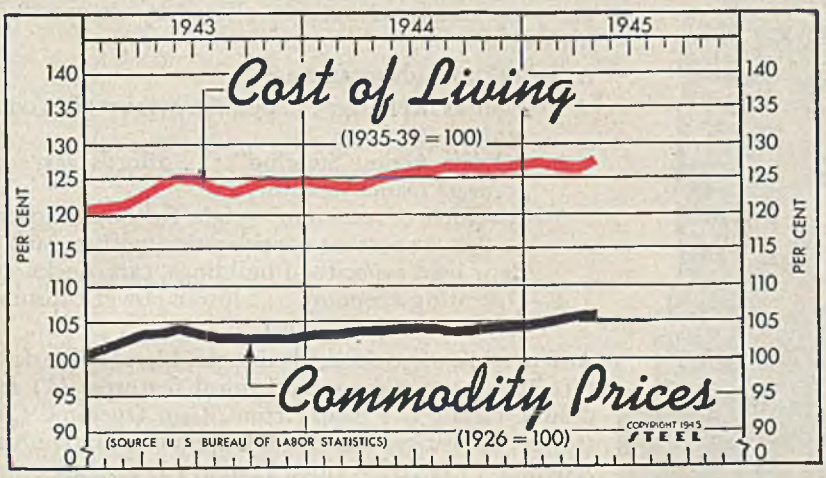
†Preliminary. ‡Federal Reserve Board.

Iron, Steel Production

(Net tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	1944
Jan.	7,206	7,593	7,425	4,945	5,276
Feb.	6,655	7,194	6,825	4,563	5,083
Mar.	7,708	7,826	7,675	5,228	5,434
Apr.	7,292	7,594	7,374	4,786	5,243
May	7,477	7,703	7,550	....	5,343
June	....	7,234	7,039	....	5,057
July	....	7,498	7,408	....	5,157
Aug.	....	7,499	7,586	....	5,210
Sept.	....	7,235	7,514	....	4,988
Oct.	....	7,621	7,814	....	5,200
Nov.	....	7,279	7,374	....	4,904
Dec.	....	7,366	7,266	....	4,999
Total	....	89,642	88,873	....	61,894





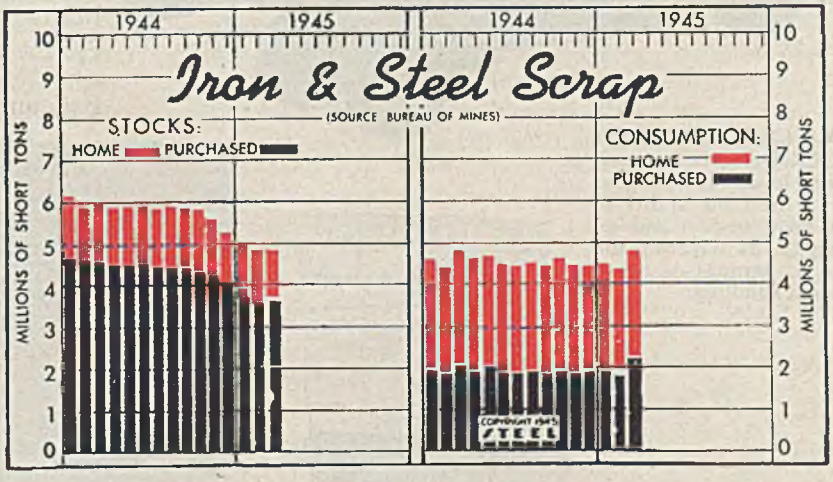
Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1945	1944	1943	1945	1944	1943
Jan.	104.9	103.3	101.9	127.1	124.2	120.6
Feb.	105.2	103.6	102.5	126.9	123.8	120.9
Mar.	105.3	103.8	103.4	126.8	123.8	122.8
Apr.	105.7	103.9	103.7	127.1	124.6	124.1
May	....	104.0	104.1	....	125.1	125.1
June	....	104.3	103.8	....	125.4	124.8
July	....	104.1	103.2	....	126.1	123.8
Aug.	....	103.9	103.1	....	126.4	123.2
Sept.	....	104.0	103.1	....	126.5	123.9
Oct.	....	104.1	103.0	....	126.5	124.4
Nov.	....	104.4	102.9	....	126.6	124.1
Dec.	....	104.7	103.2	....	127.0	124.4
Ave.	....	104.0	103.2	....	125.5	123.5

Iron and Steel Scrap
Bureau of Mines

(Gross Tons—000 omitted)

	Consumers' Stocks			Total Consumption		
	1945	1944	1943	1945	1944	1943
Jan.	5,023	6,214	6,877	4,507	4,616	4,492
Feb.	4,901	6,134	6,871	4,209	4,414	4,178
Mar.	4,873	6,027	6,850	4,889	4,827	4,787
Apr.	....	5,932	6,918	....	4,629	4,642
May	....	5,966	6,905	....	4,683	4,723
June	....	5,991	6,916	....	4,460	4,493
July	....	5,909	6,860	....	4,423	4,670
Aug.	....	5,975	6,778	....	4,533	4,686
Sept.	....	5,953	6,613	....	4,471	4,657
Oct.	....	5,832	6,456	....	4,684	4,830
Nov.	....	5,624	6,391	....	4,527	4,581
Dec.	....	5,335	6,448	....	4,487	4,449
Mo. Ave.	....	5,908	6,740	....	4,563	4,599



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,582	$8,503	$10,591	$9,021
Federal Gross Debt (billions)	$241.5	$239.2	$236.6	$188.5
Bond Volume, NYSE (millions)	$44.1	$47.4	$69.9	$55.8
Stocks Sales, NYSE (thousands)	8,234	6,795	8,159	5,943
Loans and Investments (billions)†	$57.5	$57.5	$57.2	$49.9
United States Gov't Obligations Held (millions)†	$42,842	$42,897	$42,844	$37,029

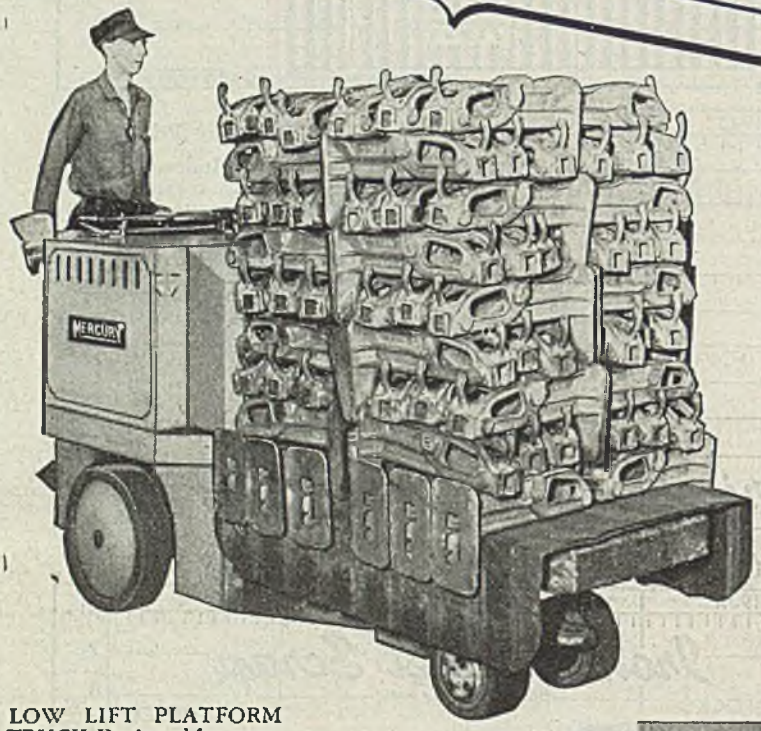
†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$57.55	$56.73
All Commodities†	106.1	105.9	105.7	103.9
Industrial Raw Materials†	118.9	118.5	117.8	113.8
Manufactured Products†	102.1	102.1	102.0	101.1

†Bureau of Labor's Index, 1926 = 100.

DON'T OVERLOOK the Platform Lift Truck . . . for versatile . . . efficient . . . low cost materials handling



In selecting industrial trucks for your materials handling it will pay you to carefully investigate the many operating advantages offered by the platform lift truck.

A few of these advantages are:

1—Four Wheel Steer . . . permits narrow aisle operation.

2—"Quick Action Steering". . . affords easy and accurate maneuverability.

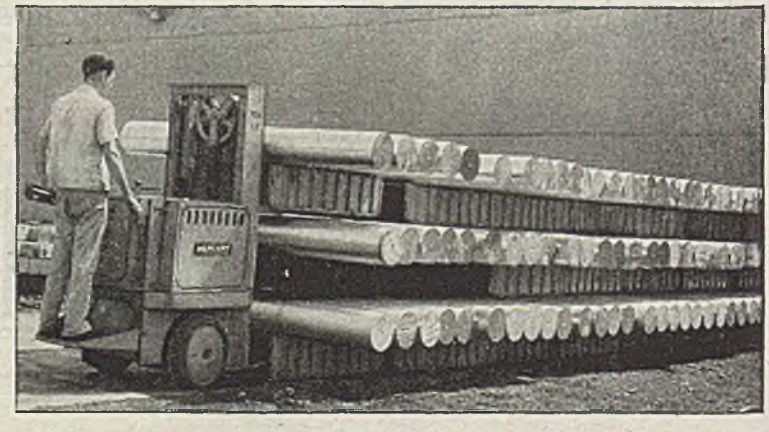
3—A vehicle of minimum weight for given capacity . . . an important consideration with regard to floor load capacity of buildings, cars, docks, etc.

4—Operating economy . . . lower power consumption and minimum wear.

And in addition to these advantages, Mercury Platform Lift Trucks offer these mechanical features: (1) Hydraulic Hoist; (2) Snap-Action, Cam Operated Controller; (3) Single Unit Double Reduction Drive Axle Assembly; (4) All Welded Frame; (5) Exclusive Ball Bearing Mounted Trail Axle Assembly.

For the complete story on Mercury Platform Trucks, ask a Mercury Field Engineer to call, or write for Bulletin 7-11.

LOW LIFT PLATFORM TRUCK. Designed for transporting loads only. Contains within itself the ability to pick up, transport and set down loads without the need of manual or other external handling.



HIGH LIFT TRUCK. Has the self loading principal but in addition, will stack loads to moderate heights. Permits greater utilization of storage area, and the elevating of loads for convenient handling in process.

Telescopic Platform Truck. (Available only on special appeal to WPB.) Designed for stacking loads to ceiling heights, permitting full utilization of available storage area.

ELECTRIC INDUSTRIAL TRUCKS

MERCURY

THE MERCURY MANUFACTURING COMPANY

4140 SOUTH HALSTED STREET CHICAGO 9, ILLINOIS

TRACTORS • TRAILERS • LIFT TRUCKS

Unrated Steel Needs Press Heavily on Mill Capacity

No delivery promises possible as CMP tonnage fills books . . . Third quarter civilian outlook gives little encouragement

VOLUME of unrated steel orders is expanding rapidly and in some districts important makers of a diversity of steel products find fully 50 per cent of incoming business is of this character, with sheets involving by far the larger portion, in spite of the fact they are the most difficult of the major products to schedule.

Generally speaking no definite delivery promises can be made on this unvalidated tonnage because of priority of rated orders. Apparently the rush is influenced by desire of consumers to get the best possible position when mills can place such orders on schedule. Some trade leaders foresee considerable confusion as a result, as by the time the tonnage can be handled there may be changes in programs and needs of various consumers.

On the other hand, it appears that many consumers, including the largest, have their civilian programs definitely laid out, pending availability of materials and manpower, with little probability of alteration.

Washington is making every effort to free as much tonnage as war and essential requirements will permit, to meet the increasing civilian demand, to sustain production and employment as much as possible during transition. To this end and also to accelerate new priority needs War Production Board officials are pressing various consumers who have had cutbacks and cancellations in their war contracts and have been slow to revise their steel orders, to move more swiftly.

Lag in passing these curtailments along to mills has been ascribed principally to desire to maintain positions with mills in the hope that further changes in instructions and regulations will make it profitable. This has proved so in the instance of the recent Direction 70, Controlled Material Plan Regulation 1, permitting consumers of Class A civilian-type products, on receipt of military cutbacks, to ask WPB permission to meet civilian requirements for products of like nature to the full limit of the military allotments, with such additional tonnage as may be ordered in rounding out these allotments carrying CMP ratings. This ruling fits into the overall effort to expedite civilian production where it can be done reasonably.

Delay in modifying steel requirements following curtailment in war contracts, has not been due solely to consumers' policies, as in various instances in recent weeks they have been instructed by ordnance and other government procurement officials not to cancel but to keep orders on mill schedules for shipment to other plants, thus avoiding loss of position.

Due mainly to strikes at Pittsburgh and Cincinnati the estimated national rate of steel operations last week declined 2 points to 88 per cent of capacity. Pittsburgh lost 5 points to 85 per cent of capacity, Wheeling 9 points to 86½ per cent, eastern Pennsylvania 1 point to 91, Cincinnati 29 points to 60 and New England 4 points to 86. Youngstown gained 6 points to 91 and Cleveland 2 points to 93. Rates were unchanged in the other districts, as follows: St. Louis 75, Chicago 95, Buffalo 90½, Birmingham 26, Detroit 83.

Strengthening is noted in the steel and iron scrap price position and apparent weakness has disappeared to a great extent on steelmaking grades, while borings and turnings actually have advanced on smaller production and good demand. Consumers offering prices below ceilings have been unable to obtain tonnage and have returned to paying approximately ceiling in some cases.

Production of ingots and steel for castings in May totaled 7,477,387 net tons, about 3 per cent less than in May, 1944, but 185,461 tons above output for April. Average weekly output in May was 1,687,898 tons.

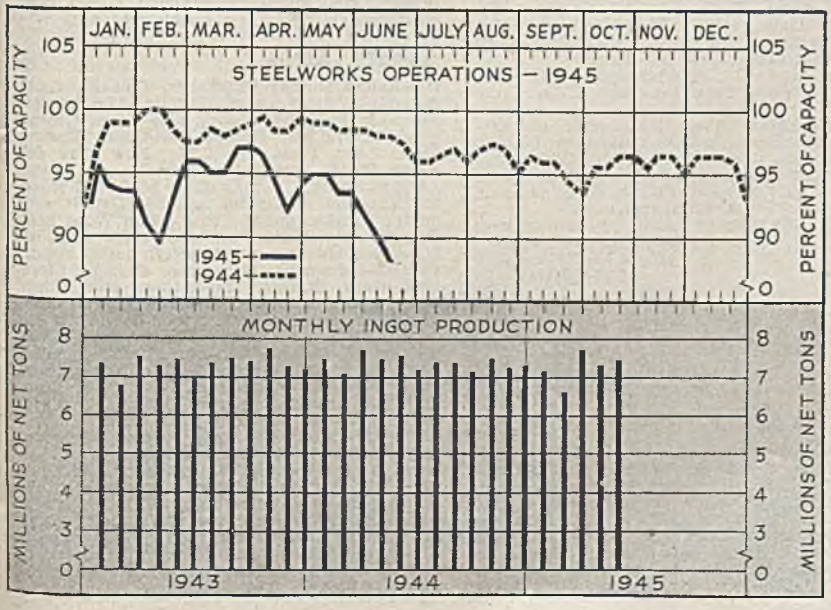
Average composite prices of steel and iron products are unchanged, finished steel at $58.27, semifinished steel $37.80, steelmaking pig iron $24.05 and steelmaking scrap $19.00.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended June 16	Change	Same Week 1944	Same Week 1943
Pittsburgh	85	—5	91.5	97.5
Chicago	95	None	100	97
Eastern Pa.	91	—1	94	94
Youngstown	91	+6	96	97
Wheeling	86.5	—9	96	90
Cleveland	93	+2	92	94.5
Buffalo	90.5	None	92.5	90.5
Birmingham	26	None	95	100
New England	86	—4	85	95
Cincinnati	60	—29	89	93
St. Louis	75	None	79.5	95
Detroit	83	None	83	87
Estimated national rate	88	—2	°98	°98.5

°Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	June 16	June 9	June 2	One Month Ago May, 1945	Three Months Ago Mar., 1945	One Year Ago June, 1944	Five Years Ago June, 1940
Finished Steel	$58.27	$58.27	$58.27	$57.73	$57.55	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	36.45	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.55	23.05	22.05
Steelmaking Scrap	19.00	19.00	19.00	19.13	19.17	19.17	19.15

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, 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. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

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

Finished Material	June 16, 1945	May, 1945	Mar., 1945	June, 1944
Steel bars, Pittsburgh	2.25c	2.17c	2.15c	2.15c
Steel bars, Chicago	2.25	2.17	2.15	2.15
Steel bars, Philadelphia	2.57	2.49	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	2.25	2.22	2.20	2.10
Plates, Philadelphia	2.30	2.26	2.25	2.15
Plates, Chicago	2.25	2.22	2.20	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.65	3.65	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.65	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.64	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.82	2.80	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$34.50	$34.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	34.50	34.00	34.00
Rerolling billets, Pittsburgh	36.00	34.50	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.05	2.00	2.00

Pig Iron	June 16, 1945	May, 1945	Mar., 1945	June, 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Phila.	26.34	26.34	26.34	25.34
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.56	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.50	$7.00	$7.00	$7.00
Connellsville, foundry ovens	8.25	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill, Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles).

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2.15. Do., over ⅜—41/64-in., incl., $2.30; Galveston, base. 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division, Borg-Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del 3.87c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrica	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

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; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity O. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) 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; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports .....$3.40 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	..	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

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
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
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

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
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	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

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

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

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅝ and ⅝ x 6-in. and shorter... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 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.

Nuts

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

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.....$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.88

*Operators of hand-drawn ovens using trucked coal may charge $8.00, effective May 26, 1945.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls., to jobbers	8.00c

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

Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[21]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.085[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[12]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[12]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[12]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[13]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[6]	5.583[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.783[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds: [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) 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, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

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.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
	(Extras for alloy content)	Chemical Composition Limits, Per Cent								
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. ‡For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base).....$30.50

6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.00% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania	52.65
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

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

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.) war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn., where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.022 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ⅛ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80 highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern contract basis, carloads in bulk or package, per lb. of alloy 14.00c gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si, Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 5c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 150 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.25
No. 2 Heavy Melt. Steel	18.25
No. 2 Bundles	15.75-16.25
No. 3 Bundles	13.75-14.25
Mixed Borings, Turnings	9.50
Machine Shop Turnings	9.50
No. 2 Busheling	12.50
Billet, Forge Crops	20.75-21.25
Bar Crops, Plate Scrap	20.75-21.25
Cast Steel	20.75-21.25
Punchings	20.75-21.25
Elec. Furnace Bundles	18.75
Heavy Turnings	17.00

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$14.33-15.33
No. 2 Heavy Melt. Steel	14.33-15.33
No. 2 Hyd. Bundles	12.83-15.33
No. 3 Hyd. Bundles	10.83
Chemical Borings	14.33
Machine Turnings	6.50
Mixed Borings, Turnings	6.50
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.00-11.50
Short Shovel Turnings	14.00-14.50
Mixed Borings, Turnings	12.00-12.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.00-13.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	13.06-14.06
No. 1 Busheling	13.06-14.06
Machine Shop Turnings	5.50
Mixed Borings, Turnings	5.50
Short Shovel Turnings	7.50- 8.50
Chemical Borings	13.06
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel, Turnings	16.00
Mach. Shop Turnings	14.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	15.00-15.50
Cast Iron Borings	14.00-14.50
Machine Shop Turnings	11.50-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-11.50

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	16.25-18.50
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	10.50-11.50
Mix. Borings, Sht. Turn.	12.00-12.50
Short Shovel Turnings	13.00-13.50
Cast Iron Borings	12.00-12.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00
(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)	

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	11.00
Short Shovel Turnings	13.00
Mixed Borings, Turn.	11.00
Cast Iron Borings	12.00
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	7.00- 7.50
Short Shovel Turnings	10.50-11.00
Cast Iron Borings	9.50-10.00
Low Phos Plate	19.32-19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	6.50- 7.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.99
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum; 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $158 to $163 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¼c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 181

Sheet mill backlogs again are expanding, though not to the level of early weeks this year. Unrated tonnage is coming to mills in greater quantities than would balance the decline in rated orders. The latter have slowed to the extent that delivery dates are quoted now for the same period as several weeks ago. Stainless sheets are easiest grade and can be promised for September. Galvanized are sold well into next year, with electrical sheets sold into January.

Philadelphia — Although backlogs of rated tonnage are declining in hot and cold-rolled sheets, shown by the fact that deliveries are being quoted for about the same dates as specified some time ago, unrated orders are increasing rapidly, to the extent that overall potential backlogs of most producers again are expanding, although not reaching the high level touched early in the year. Rated backlogs of galvanized sheets are as extended as ever, with some producers sold well into next year, ascribed in part to recent restrictions on mill production quotas because of shortage of zinc, and there is substantial booking of unrated orders for delivery as-if-and-when. Electrical sheet tonnage is heavier on both the validated and unvalidated basis, with most producers quoting January and beyond. In light silicon grades some sellers are booked virtually through first half.

Stainless steel sheet schedules are somewhat tighter than a fortnight ago, because of lifting of some restrictions on use of this material. However, stainless is freely available in September on rated orders and it may develop that some unrated tonnage can be handled before the end of third quarter.

Narrow hot-rolled strip is easier, with one large independent producer quoting September and October on widths under 12 inches, compared with February only a week ago. On the other hand, another large seller is booked solidly to July on sizes 4¼ to 9 inches, to January on 9 to 12 inches in heavier gages and to April on 9 to 12 inches in lighter gages.

Some pressure is being exerted here for civilian autobody tonnage for third quarter and beyond. How much can be obtained for nearby delivery through possible opening up of some free capacity or through Direction 70 applying to cutbacks and cancellations on Class A civilian type products, remains to be seen. It is thought possible at least some tonnage will be available.

Cincinnati — Sheet mills are receiving more cancellations, but these are not in major tonnages and gaps in schedules rapidly fill with other CMP requirements. The situation reflects shifting in military programs rather than an easing in sheet supplies or reconversion developments. Undoubtedly mill books contain tonnages for contracts that have been curtailed or eliminated, but district interests avoid estimates of the volume involved. Backlogs are extended, even without inclusion of if-and-when reconversion orders for civilian goods.

St. Louis — Recent cutbacks in steel sheets have been negligible except for a 1000-ton monthly reduction in orders for Navy quonset huts, calling for galvanized sheets. Labor shortage and turnover continue a problem, one mill reporting a 100 per cent annual turnover rate. Deliveries of cold-rolled sheets remain at February and later, hot-rolled and alloys in January and later and tin mill products October and later. Civilian orders for probable delivery after Jan. 1 continue to be received at moderate pace.

Pittsburgh — It is reported that backlogs of unrated tonnages which are not yet accepted as firm orders or any delivery promises given practically balance tonnage of validated orders on books. If true, this would mean a solid sheet booking for virtually a year ahead, inasmuch as third and fourth quarters of this year are filled with validated tonnage. There have been some cancellations of future programs but this is always the case and producers do not regard them with much interest. Cancellations have merely resulted in a shifting of prospective tonnage in fourth quarter and there has been no change recently in third quarter schedules. A substantial volume of excess sheets is available, not from producers but from government agencies and from plants which have had contract cancellations and are then possessors of surplus tonnage. For the most part this tonnage is being used on civilian goods programs which will start in third quarter.

New York — While unrated orders continue to flow into sheet offices here, sellers hold forth little promise of early scheduling. Future cutbacks may alter this situation, but on the basis of the present outlook it may be at least four or five months before such orders can be

handled, some sellers declare. The nearby situation is particularly tight, with producers likely entering third quarter with a carryover of rated work of about 600,000 tons.

Rated orders, however, are declining and this is being reflected in some shrinkage of mill backlogs, especially in hot sheets. In general hot-rolled pickled sheets may be had around December and January. Shipments on straight hot rolled sheets are less extended, with one large producer, and this is somewhat the exception, quoting September. Cold rolled sheets are being generally quoted for shipment next year, January and February in most cases.

Galvanized sheet schedules are more extended than ever, due in part to restricted mill quotas announced recently. These restrictions were said to be due to increasing stringency in zinc.

Chicago — Sheet situation is so tight that it is difficult to see how much output can go into civilian goods production before late in the year or early next year. Washing machines and ironers are to be granted priority assistance, but automobiles are not, thus outlook for the latter is definitely gloomy. Sheetmakers are booking considerable unrated business, but decline to make delivery promises or attempt to schedule. Only possibility of relief appears to be in substantial war cancellations, which until last week were virtually lacking. The expected cutback in landing mat has reached mill level, one sheet producer having received a cancellation and another advised one is on the way. Neither is large and running over several months do little more than reduce rolling overload.

Steel Bars . . .

Bar Prices, Page 181

While backlogs of bar mills are decreasing, there is not as much effect from cutbacks as had been expected. Small bars are available in third quarter, but larger sizes, especially in quality grades, are promised for fourth quarter and even into next year. Hot alloy bars may be obtained within a few weeks, this grade showing most recession.

Philadelphia — Carbon bar backlogs are shrinking slowly, with cutbacks in shell programs still not in volume expected and with some new shell work being placed, cushioning the decline. Plain carbon bars in small sizes can be had late in third quarter and medium and large sizes fall well into fourth quarter and in some instances into January. Deliveries of hot-top quality bars generally are much more extended than plain carbon, with one large producer quoting April on 2¼-inch rounds and larger. Cold-drawn bar schedules are easier, due more to tapering demand than to war cutbacks. It is reliably estimated that less than 1500 tons have been involved in cutbacks since the end of the war in Europe, a relatively negligible quantity, especially when it is considered there are 20 or more cold drawers.

On larger sizes some producers quote January but in general most cold-drawn bar requirements now can be picked up in November and December. This is true notwithstanding the rocket program is still making heavy demands and there is constantly increasing need for equipment repairs, also despite the fact that while there have been cutbacks in some types of combat tanks, others are still needed.

Good demand continues for bessemer cold-drawn bars, requirements about equaling those for open hearth, ascribed in part to better delivery position of bessemer. Hot alloy bar schedules are easing most rapidly. Both electric and open-hearth grades are offered for late July and August in some cases and the opinion of some producers recently that unrated tonnage would be available in third quarter appears increasingly sound.

St. Louis — Pressure for bar delivery is declining, although cancellations have virtually stopped. Some new orders for bomb and rocket components have been received, which will fill capacity to the end of the year. Civilian orders for indefinite shipment are increasing, notably from manufacturers of toys and beds. Buyers under Z-3 ratings are relatively few. Labor supply is short, aggravated by heavy absenteeism.

Pittsburgh — Merchant bar mills report full capacity bookings through third quarter, and in many cases through fourth quarter, but undoubtedly there is a lag between cancellations of contracts by the military and relaying from prime and subcontractors to steel suppliers. A fair volume of bar tonnage now on books is probably in this class and some of it may be delivered before cancellations are received. Most producers are confident that plenty of

bar tonnage will be available during fourth quarter on unrated orders. However, there is no evidence now to back up this contention. Cold-finished bar deliveries are being promised for fourth quarter, and in some cases as early as third quarter.

New York — Bar cancellations are still relatively few. However, new orders are tapering and deliveries are somewhat easier. Sellers hold out little hope, though, of being able to handle much unrated tonnage in third quarter. As the situation now stands they are booked fairly tightly into fourth quarter, on everything but small carbon bars and alloy bars. In the case of hot-top quality bar producers are generally sold well into next year.

Tubular Goods . . .

Tubular Goods Prices, Page 182

Boston — Considering slack demand for new construction and dwindling ship requirements, demand for steel pipe holds well. In part this is due to continued active buying by builders of sprinkler fire protection requirement. Cutbacks in ammunition programs, involving mortar and other shells fabricated from tubing have been minor. For bearing rings, demand for alloy tubing holds steady, but with less pressure. Alloy tubing for aircraft, while easier, has not declined sharply in this area as yet, or to the point expected. Electric welded pipe and tubing still can be had for October delivery, as was the case a month ago, butt-weld in September, with some exceptions, and boiler tubes in September.

Seattle—Bids are pending for three watermain jobs in Seattle, involving 400 tons of various sizes of cast iron pipe. Dealers report a large potential demand but cities and districts find it difficult to finance proposed improvements. Pipe deliveries are slow and uncertain. Tracyton, Wash., has voted a $65,000 bond issue to finance a water system. Bids are in at Vancouver, Wash., for 12,500 feet of six to ten-inch cast iron pipe and fittings. Fred Jensen, Box 135, Kelso, Wash., will receive bids June 22 for 21,000 feet of two to eight-inch cast pipe and construction of the 75,000-gallon reservoir for the Home Owners' Association.

Steel Plates . . .

Plate Prices, Page 182

Whether some unrated steel plates will be available in third quarter is a question, some producers believing they will have some to offer, while others find bookings for that period are increasing at a rate likely to engage their entire capacity. Possibility of removal of plates from CMP control is rumored.

New York — Plate sellers declare they will unquestionably have free tonnage available in third quarter, but doubt now if much of it can be handled until late in that period. They point out that they are already booked into August, with the possible exception of some universal plates, and that while new inquiry is on the decline enough rated work should come out over the next three or four weeks to absorb most capacity for that month. Meanwhile, interestingly, there has been little demand for unrated tonnage, this being in sharp contrast with the volume of unrated orders for sheets, which are particularly tight.

Tank fabricators report a little improvement in municipal work, although no large programs are reported. Such business is needed, as most tank fabricators are running out of government subcontract work.

Chicago — Although plate schedules are comfortable it now appears that volume for third quarter will be heavier than previously anticipated. This is in spite of the fact that shipbuilding continues to decline. The greater strength comes chiefly from expanded needs for bomb steel, and important construction projects.

Pittsburgh — It is reported that demand for plates having been substantially reduced and the volume of orders now on the books insufficient to maintain mill operations at full level, a new order has been issued which will permit elimination of plates from CMP. This would in effect permit the use of any steel for production of plates which is not required for the production of other CMP products. It would in effect change the requirements for placement of orders for steel plates in that allotments would no longer be necessary. This is not expected to create much change in the overall picture in plates inasmuch as there is relatively small demand which does not carry an allotment number and little if any new tonnage would be developed as the result of elimination of such requirements.

Boston — With rated tonnage falling short of filling August schedules and

pressure easing, indications are that some mills will be able to meet orders for some unrated tonnage in third quarter. Such inquiry, however, is light. Total volume will vary among producers but could include more sheared tonnage than was predicted recently. Activity is light, reflecting the decline in shipbuilding. An exception is approximately 10,000 tons, mainly plates, for three ships for the United Fruit Co. Railroads are placing little plate tonnage, some for October delivery, but requirements for the car building shops at Worcester, Mass., to be placed at Chicago, are substantially heavier. Miscellaneous specifications by industrial fabricators, builders of heavy equipment, are maintained, with orders in to the extent of allotments, but slackening in ship construction leaves a gap far from filled. Warehouses are also easing demand for plates and buying of floor plates with delivery in late July and August also reflects the trend in that commodity. Maine shipyards have built more than 1100 vessels of all types, Maritime Commission and Naval, since Pearl Harbor.

Philadelphia — Except for some universal plate tonnage more plate producers are booked solidly into August. Unrated tonnage undoubtedly will help out third quarter operations, although it appears most of it will not be placed on schedules earlier than September.

Tin Plate . . .

Tin Plate Prices, Page 182

Pittsburgh — Since canmakers have received an increase of 25,000 tons in third-quarter tin plate allotment and since military demands for tin plate packaging in the Pacific campaign are certain to increase, there is a good probability that output in last half will be substantially ahead of the same period last year and third quarter this year will undoubtedly produce more tin plate than second quarter, if only the stated 25,000 tons. Manpower shortages in cold mills continue to plague all the mill products, as they have other sheet mill items.

Chicago — Tin plate shipments once more are being affected adversely by shortage of box cars. Demand for cars for handling western grain is so acute that some railroads are trying to ease the strain by shipping grain in gondolas fitted with steel covers. Shortage is expected to continue through several months. A local distributor of coated and lithographed tin plate is so short on labor that it is asking customers to simplify designs and leave off one or more colors. Time thus saved will make better deliveries possible.

Structural Shapes . . .

Structural Shape Prices, Page 182

Demand for structurals is improving and new shell steel contracts have appeared, extending deliveries further than for some time. Several automobile plants are under inquiry, with Washington permission understood to be forthcoming. There also is considerable inquiry for export tonnage to various parts of the world.

Philadelphia — New orders for shell steel have tightened schedules of some shape mills, with indications now that there may not be as much free shape tonnage in third quarter as originally expected. All leading shape producers now are booked solidly into September on rated tonnage. Structural orders are relatively light, although inquiry is mounting, with permission by Washington on various projects abroad, including oil refinery work in the Far East and sugar mills and bridges in Latin America, in addition to projected rehabilitation work in Europe.

Chicago — Structural fabricators in the midwest are faced with the largest volume of new inquiry in some weeks. Most of this involves new construction of automobile plants, this industry now getting plans under way for reconversion. It is understood that PB has given permission for this pre-reconversion construction to get under way, and presumably priority assistance is to be forthcoming. Standard shapes, which recently showed signs of weakening in mill deliveries, have resumed some of their former tightness.

Boston — Led by 3500 tons for a hospital at Hartford, Conn., inquiry for structural steel is somewhat heavier. An interesting development in the structural fabricating field in this area is entry of a shipbuilder, Electric Boat Co., Groton, Conn., this shop having recently booked a hangar in Vermont. Plain shape schedules are easing, although mills generally are in August on most sizes. Less demand on structural mills in connection with the shell steel program, and other factors, however, may mean a limited volume of unrated shape tonnage may be available in third quarter in some sizes. In this easing, of course, is also slower demand for shapes in shipbuilding.

Seattle — General contracts were awarded here this week for two projects

involving 2235 tons of shapes. Army engineers placed a steel industrial-type experimental hangar at Boeing field with Mowat-Sellen Co., joint bids of two local contractors, at $1,147,491. This requires 1500 tons of shapes, reported placed with American Bridge Co. The second contract went to Lease & Leighland, Seattle, at $620,750, involving a steel and concrete aviation storehouse and other facilities at Sand Point, requiring 735 tons of shapes, which are still pending.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 182

Chicago — Reinforcing steel shows little activity at the moment. New inquiry is almost negligible and awards of over 100 tons are totally lacking. Small jobs requiring only a few tons each are fairly numerous. Production directives are higher than for some months, but bar interests are critical of OPA's failure to provide price relief in the recent authorization for higher prices on a number of steel products. However, this does not explain the lack of business.

Pittsburgh — Volume of unplaced tonnage, which has been unusually high in the past few weeks, has now dropped to about normal but backlogs have risen equally. While reports are current that some producers have taken unvalidated tonnage and given definite delivery promises, most producers are still in the position that their full capacity is taken up by properly validated orders and no gaps in schedule appear before fourth quarter. In addition, a currently reported change in government regulations takes reinforcing bars off the CMP base, which means that for fully integrated producers such bar orders must wait until all other steel tonnage is satisfied before getting on schedule. Under present conditions, this order, if carried out, would mean a virtual suspension of tonnage going into reinforcing bars until the jam in merchant bars and small shapes can be unraveled. Prices reported on recent jobs are all at full ceiling.

Rails, Cars . . .

Track Material Prices, Page 182

New York — Domestic freight car awards in May involved 1526 cars, of which 300 were placed with railroad company shops. Largest orders were 500 box cars for the Spokane, Portland & Seattle and 500 auto box cars for the Union Pacific, recently announced. The May total brings the figure for the first five months up to 14,096, compared with 27,241 in the corresponding period last year. Further comparisons follow:

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	.	1,150	50	0
July	.	795	4,190	1,025
Aug.	.	3,900	8,747	0
Sept.	.	400	6,820	1,863
Oct.	.	2,425	5,258	0
Nov.	.	1,065	870	0
Dec.	.	16,245	2,919	135
Total	.	53,221	41,355	26,028

Freight cars on order as of June 1 amounted to 35,497, of which 25,476 were with private builders and 10,021 with railroad company shops. The number of cars on order is expected to increase sharply in the near future as a result of a large number of export cars on inquiry, principally for France and India.

Pig Iron . . .

Pig Iron Prices, Page 184

While the pig iron situation is somewhat tight melters are receiving their requirements and the situation is fairly well balanced. Buying for third quarter is at about the rate prevailing for second, with an occasional increase asked. Producers are shipping their entire output and no tonnage is being accumulated.

Philadelphia — There is reasonably good balance in pig iron between supply and demand. Some foundries are pressing hard for tonnage but in general they are receiving all they can melt with available manpower. There is substantial export demand but little tonnage is available for this purpose.

St. Louis — Pressure for pig iron continues, with some shifting of orders. Production is unchanged and labor shortage continues. The few cancellations received have been offset by new business.

Cincinnati — Buying of third quarter pig iron is following the pattern of first and second quarters. Foundries depend on usual sources of supply and ask for nearly the same tonnages. In fact, some furnaces accept orders only from old customers, advising they have no surplus iron. The melt likewise remains virtually unchanged, shortage of man-

power still acting as a bottleneck to expansion aims.

Buffalo — There is little indication of easing in the tight pig iron market during third quarter. Consumers are covering on at least an equal basis with second quarter and merchant producers believe it will be a problem to fill all needs. A leading producer is charging an increased quantity of basic iron, which it has been selling.

Pittsburgh — Tightness continues with every effort being made to increase availability of iron. Carnegie-Illinois Steel Corp. blew in two more blast furnaces June 8, No. 1 at Duquesne works, Duquesne, Pa., and No 2 at Ohio works, Youngstown, O. The Duquesne furnace has been ready to go since April, but because of manpower shortage it has not been possible to start operations until the present time.

Chicago — Pig iron demand and supply remain closely balanced in this district. Some cancellations and cutbacks of war castings have tended to ease the situation somewhat. Foundries so affected have plenty of replacement contracts, but require time to get set up for runs. Need for truck castings will ease with the Army just having announced cancellation as of July 31 of its contract with Studebaker Corp., South Bend, Ind., for production of 2½-ton cargo trucks, 44,000 of which with spare parts had been scheduled between Aug. 1 this year and July 1, 1946. Inland Steel Co. has returned to blast its No. 3 Indiana Harbor blast furnace, which went down for repairs two months ago.

Scrap . . .

Scrap Prices, Page 185

Demand for steel and iron scrap is holding up well, steelmaking grades in the main continuing at ceiling and borings and turnings showing strength as production declines with cancellation of contracts for material in which they have been a byproduct. Buying in general is light but pressure for delivery has not declined. A waiting attitude is evident among both dealers and consumers.

Philadelphia — Scrap prices in this district are unchanged but the general tone is stronger. This applies even to borings and turnings, which are not being produced in the volume of several weeks ago. New buying of melting steel is relatively light but there is increasing pressure for tonnage against existing orders. Requirements for cast grades continue well in excess of supply.

Cincinnati — Iron and steel scrap prices are holding at ceilings, except on borings and turnings, although supplies of nearly all grades are easier. Some dealers offer material for which there is no immediate outlet during the present recess in consumer volume buying in the district. The market seems unsettled and most interests take a cautious attitude. Foundries and steelmakers are operating at high levels.

St. Louis — Scrap shipments here are off 40 per cent from last week, brokers taking only a portion of offerings, the remainder going to the stronger Chicago market. Mills have reserves for six weeks or more. Remote scrap is not being bought except for limited quantities from Oklahoma and Texas. No change is expected until WPB restrictions on civilian manufacture are lifted July 1. Car wheels became plentiful last week but the market for premium grades remains fairly tight. Prices are at ceilings, except for machine turnings, quoted at $6.50 to $7, with no sales.

Los Angeles — Scarcity of industrial scrap is moving prices toward ceilings. While reported sales are still $1 to $2 below maximum the spread averages higher than formerly. Dealers say mills are turning to collectors as industrial scrap from shipyards is scarce. Mill stocks still are at or above a 45-day supply. Shipments of No. 1 heavy melting steel to midwest mills have ceased. Collections are larger as the labor situation improves.

Cleveland — Strength continues in the steel and iron scrap market, with all grades moving freely and ceiling prices are held on open-hearth scrap. Cast supplies continue scarce with demand strong. Strength gains in borings supply becomes smaller. Shipments against contracts are accepted freely and further buying by large consumers is expected shortlyy.

Chicago — Primary grades of scrap continue in good demand and hold ceiling prices and turning grades hold their recent gains. Buying is in balance with melting requirements, since inventories are only moderate. Short shoveling turnings are enjoying stronger tone and have moved up 50 cents to $13 to $13.50. Wide variety of prices are heard for loose machine shop turnings in the range of $10.50 to $11.50. Although numerous brokers buy baled machine shop turnings freely at $16.25 and sales are made

at $16.75, some interests claim small tonnages command as high as $18.50.

Buffalo — Increased interest is shown in the scrap market following breaking of the deadlock on prices. A leading melter bought approximately 18,000 tons, paying ceiling prices on 13,000 tons of No. 1 and No. 2 bundles, with commissions, transportation tax and springboard provision eliminated. On the remaining 5000 tons of turnings prices were marked down an additional $1, placing machine turnings at $11 and short shoveling turnings at $13. Shipments on the contract are limited to 30 days.

Pittsburgh — Return of Bethlehem Steel Co. to the scrap market in New England, after having been out of the market for several weeks, has cut down flow of scrap from that point into the Pittsburgh district and has effectively strengthened the market here, although the action has been mere psychological in view of the fact that no cut prices have been reported on sales here. The added flow of scrap from the East, however, has forced some buyers out of the market and a continued situation of this sort would undoubtedly have led to weakening.

New York — Brokers' buying prices are unchanged, with the market undertone generally strong. The principal eastern consumer is again placing tonnage here for its Lackawanna plant, with the delivered price reported at $19.25 with no allowance for commissions or transportation tax. This interest is also said to be paying $18.75, Sparrows Point, Md., on the same basis. This is a genarlly strengthening factor. On the other hand, there has been little new buying here by Pittsburgh consumers, though shipments still are moving against old contracts.

Warehouse . . .

Warehouse Prices, Page 183

Chicago — Warehouses report business at about the same level as recent months, but volume is held down by shortness of inventories. A few cancellations have eased pressure somewhat but other business is in hand to be substituted. Controls are being devised to go into effect after July 1 when CMP is open ended. These are necessary because distributors will be obliged to watch unrated orders carefully and keep them in balance with receipts of unrated steel from mills. Otherwise, it may be impossible to replace stocks under the new system which WPB has imposed.

St. Louis — Steel from warehouse is in strong demand, although pressure is less than for the past few months. Stocks are low, with little prospect of improvement. Cutbacks in mill orders are not expected to reach warehouses before fourth or first quarters. Civilian orders with Z-3 ratings are in increased volume but no delivery dates are being promised. Such orders are mainly for farm, rural machine shop and truck and body use.

Steel in Europe . . .

London — (*By Radio*) — Labor shortage in steel mills and fabricating shops in Great Britain restricts activities in most departments. Heavy demand is received for galvanized sheets. Collieries are seeking larger quotas for structural sections, bars and arches.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, storehouses, Torrance, Calif., for U. S. Navy, to Bethlehem Steel Co., Bethlehem, Pa.

2200 tons, Navy warehouses, Scotia, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through W. L. Crow Construction Co., 101 Park avenue, New York.

1500 tons, industrial-type experimental hangar, Boeing Field, Seattle, to Mowat-Sellen Co., Seattle; steel contract reported placed with American Bridge Co.

1000 tons, Dairymen's League, dairy products plant, to unstated fabricator, through Cauldwell-Wingate Co., 101 Park avenue, New York.

200 tons, factory building, American Phenolic Corp., Chicago, to A. F. Anderson Iron Works, Chicago; Campbell-Lowrie-Lautermilch Corp., Chicago, contractor.

500 tons, state bridge, Springfield-Agawam, Mass., to American Bridge Co., Pittsburgh, through Daniel O'Connell Co., Boston, contractor.

500 tons, state bridge, West Springfield, Mass., to American Bridge Co., Pittsburgh.

STRUCTURAL STEEL PENDING

7000 tons, assembly division, Wilmington, Del., for Buick, Oldsmobile and Pontiac divisions, General Motors Corp.; bids June 1.

6500 tons, assembly building and office, Janesville, Wis., for Chevrolet Division, General Motors Corp.; bids June 14.

5600 tons, including 5000 tons in assembly plant and 600 tons in press shop, Flint, Mich., for Chevrolet Motor Division, General Motors Corp.; bids June 14.

5000 tons, assembly plant, Robertson, Mo., for Ford Motor Co.; bids June 20.

3900 tons, plant, Columbus, O., for Temstedt Mfg. Division, General Motors Corp.; bids June 4.

3500 tons, hospital, Hartford, Conn.

900 tons, two machine shops, Bingham Canyon and Arthur, Utah, for Utah Copper Co.

735 tons, aviation storehouse at naval air station, Sand Point, Seattle, to Lease & Leighland, Seattle; shapes award pending.

800 tons, plant construction for Consolidated Edison Co., Astoria, L. I.; bids asked.

600 tons, plant extension for Rockford Gas & Electric Co., Rockford, Ill., Stone & Webster Corp., Boston, engineer.

354 tons, bridges, Gentry, Franklin and Saline counties, Missouri, for state highway commission; bids June 15.

270 tons, three Pennsylvania state bridges, Lancaster county; Cayugo Construction Corp., 30 Vesey street, New York, low on general contract.

250 tons, plant extension, New Departure Mfg. Division of General Motors Corp., at Bristol, Conn., general contract to Edwin Moss & Son, Bridgeport, Conn.

250 tons, plant extension, Memphis, Tenn., for Ford Motor Co.

200 tons, factory building, South Bend, Ind., for Roach-Appleton Mfg. Co.; bids June 11.

150 tons, bridge floor replacement, Augusta, Me.

140 tons, Pennsylvania railroad shop, Renovo, Pa.; Ritter Bros., Harrisburg, Pa., general contractors.

100 tons, plant addition for Link-Belt Co., Hunting Park avenue, Philadelphia.

REINFORCING BARS . . .

REINFORCING BARS PLACED

4000 tons, bridge and approaches, Louisville & Nashville railroad, Henderson, Ky., to Truscon Steel Co., Youngstown, O.

300 tons, two storehouse buildings, Naval air supply depot, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa., through John McShain, contractor.

200 tons, high school, Dundalk, Md., to Beth-

lehem Steel Co., Bethlehem, Pa., through John McShain, contractor.

REINFORCING BARS PENDING

800 tons, Hartford hospital, Hartford, Conn.; bids June 30.

735 tons, including 100 tons bars and 635 tons welded wire mesh, for Illinois state highway commission; 235 tons mesh in Sec. 7X-2, federal aid route 5, Livingston and Grundy counties; 210 tons mesh, Sec. 11X-1, federal aid route 5, Livingston county; 190 tons, Secs. 13-R and 14-R, SBI route 18, Kendall county; bids June 15.

500 tons, Newark, N. J. housing authority; general contract to Rubin Construction Co., 11 West Forty-second street, New York.

100 tons, bridge and culverts, Louisville & Nashville railroad, Harlan county, Ky.

100 tons, Fleetwood plant, Fisher Body, Detroit.

43 to 200 tons, store, factory and boiler house, St. Joseph, Mich., for Nineteen Hundred Corp.; bids June 13.

PIPE . . .

CAST IRON PIPE PENDING

400 tons, various sizes, three local improvements, Seattle; general contracts pending.

Unstated, 12,500 ft. 6, 8, and 10 inch cast iron; bids in at Vancouver, Wash.

RAILS, CARS . . .

RAILROAD CARS PLACED

Brazil, 1350 forty-ton box cars, to Pressed Steel Car Co., Pittsburgh.

Carnegie-Illinois Steel Corp., 10 mill cars, to American Car & Foundry Co., New York.

Cudahy Packing Co., 150 refrigerator cars, to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Illinois Central, 1800 cars, including 500 box, 300 auto, 500 flat and 500 low-side gondolas.

LOCOMOTIVES PLACED

Boston & Maine, ten 4000-horsepower diesel-electric locomotives with the Electro-Motive Division of General Motors Corp., La Grange, Ill., with two for the Maine Central.

Denver & Rio Grande Western, three 5400-horsepower diesel-electric freight engines to Electro-Motive Division of General Motors Corp., La Grange, Ill.; this railroad is also reported to have purchased eleven steam locomotives from the Norfolk & Western.

Southern, fourteen 1000-horsepower diesel-electric switch engines and six 5400-horsepower diesel-electric freight engines, to Electro-Motive Division of the General Motors Corp., La Grange, Ill.

Union Pacific, 26 diesel-electric switch engines, 15 going to Electro-Motive Division of General Motors Corp., La Grange, Ill.; 10 to American Locomotive Co., New York; and one to Fairbanks, Morse & Co., Chicago; in addition to the switch engines, the Union Pacific has ordered three 2000-horsepower diesel-electric units and one 4000-horsepower diesel-electric engine from Electro-Motive Division of General Motors Corp., and has ordered jointly with the Chicago & North Western, one 6000-horsepower and one 4000-horsepower diesel-electric locomotive with the same builder, and with the North Western and the Southern Pacific, one 6000-horsepower diesel-electric locomotive, with Electro-Motive.

United Nations Relief and Rehabilitation Administration, 180 locomotives, 90 going to Baldwin Locomotive Works, Philadelphia, 50 to Lima Locomotive Works, Lima, O., and 40 to American Locomotive Co., New York; a portion are for delivery in fourth quarter this year, with the remainder for delivery in first quarter next year; these are in addition to 100 placed with United Kingdom builders and are scheduled for delivery to Greece, Yugoslavia, Poland, Czechoslovakia and Albania.

Cutbacks of War Contracts Disemploy Few Workers

(*Continued from Page 75*)

tions plants have taken cutbacks in war contracts, the effect on steel mill backlogs is limited and applies mostly to bars, carbon and alloy. Production of major finished steel products in New England, namely wire and narrow strip, has not eased and openings in mill schedules caused by canceled orders are few.

Small arms manufacturers are taking downward contract revision and Army aircraft builders and subcontractors have received some cutbacks.

BUFFALO—Sixty-six plants engaged in high priority war work here are lagging on production because of insufficient manpower, according to Joseph D. Canty, WMC area director.

In addition, the WMC reports a shortage of approximately 3300 male workers is indicated by Aug. 1. Problems, however, are confronting the area because workers laid off in aircraft plants and lighter industries are not suited for work in the heavy industry plants needing additional labor. As a result, the local WMC has moved to place the area in a No. 2 labor group to permit the placement of additional prime contracts which would provide jobs for discharged workers who cannot be employed in heavy jobs. A surplus of women workers exists at present and the WMC expects the number by Aug. 1 will "far exceed demand."

NEWARK, N. J.—A definite downward trend in employment demand is noted in the Newark, N. J., area. Cutbacks to date have not been numerous or especially important; nevertheless, various manufacturers engaged in war work see the end in sight, or at least see curtailments and are disposed to let employes go who wish to make a change rather than try to hold them or obtain others to take their place. Certain important exceptions include foundry operators. Here, if anything, the stringency is even more pronounced than ever, especially with warm weather approaching. Shipyard employment is virtually static. Advertisements by shipyards for labor have virtually disappeared, it is said.

Indicative of the downward trend is the current need for approximately 6000 workers in the top priority industries, as compared with around 10,000 six weeks or so ago. The Newark area continues in the group 1 critical classification, although it is possible that within a few weeks it will be moved down to the group 2 classification. The Morristown N. J., area, which includes the Picatinny Arsenal, has recently been moved from the No. 1 to the No. 2 group.

BIRMINGHAM — Cutbacks and cancellations in this district have been slight so far and mostly have affected contracts for 155-millimeter shells. WMC reports about 1000 employes in 12 plants have been affected and that all but 450 of these have been absorbed by changing of shifts, shortening the work-week, and transfers to other de-

partments. WMC says jobs for the 450 are available if the displaced workers are willing to accept what is offered them. Coal and iron ore mines still are short 2000 and 1500 workers, respectively.

YOUNGSTOWN—This district has had some cutbacks in war orders but the effect so far on employment has been comparatively light and Youngstown still has an acute shortage of male labor.

Youngstown's postwar prospects are fairly bright, chiefly because it hasn't had a large war expansion. Also these should be good prospects for steel orders.

Cutbacks here so far have been so light that they affected only comparatively small numbers of workers, and in many cases these were absorbed in other departments of same plants. General Fireproofing Co., large aluminum and steel furniture manufacturer, had a large share of its aircraft subassembly work cut off and laid off about 1,600 persons. It made subassemblies for Bell P-63s, most of which went to Soviet Russia. It expects to begin making aluminum furniture soon, again absorbing part of the force. Carnegie-Illinois Steel Corp.'s Farrell Ordnance plant, making tank armor plate, resumed work last Monday with between 500 and 600 workers of its original force of 1600.

CINCINNATI—This district has not had any major production cutbacks since V-E Day, or in the weeks immediately preceding. The largest war plant in the district, on airplane engines, had been shifted to B-29 power plants and hence was little affected by recent curtailments in the production of planes.

Principal cancellations have been in making of shells, but considerable reconversion has been done and the labor market continues tight.

ST. LOUIS—War production in this district so far is virtually untouched by contract cutbacks, which to date have amounted to probably less than 3 per cent. Cancellations have been almost entirely limited to backlog orders which in the majority of cases have been offset or even exceeded by new ones. Best indication is in the labor supply, which four weeks ago showed a deficit of 14,000, and now is calculated at 11,000. Only three curtailments, promising major layoffs, have occurred.

Principal one was the announced closing of the Curtiss-Wright airplane plant and release of 12,000 workers. This brought such a public protest it is apparent the city has not yet been made aware of the inevitability of heavy cutbacks. This protest prompted the Army Air Forces to announce they would keep the government-owned plant in operation.

Meanwhile cancellations in landing craft, airplane gun turrets, shipbuilding components and some munitions released about 4000 workers, who promptly were rehired by other plants.

CONSTRUCTION AND ENTERPRISE

MICHIGAN

ALMA, MICH.—Leonard Refineries Inc. has let contract to the Lummus Co., 420 Lexington avenue, New York, for a catalytic cracking unit to cost about $700,000. Construction is planned to start within 60 days.

AU GRES, MICH.—Au Gres Tool & Mfg. Co. has been incorporated with $50,000 capital to manufacture tools, dies, jigs, fixtures and parts, by Lisle E. Southward, 4366 West Pasadena avenue, Flint, Mich.

DEARBORN, MICH.—Dearborn Spring & Mfg. Co. has let contract to S. Harold Edlund, 7915 Wisconsin street, for a manufacturing building in Dearborn.

DETROIT—Rockford Industrial Engineering Inc., 3020 East Grand boulevard, has been incorporated with 1000 shares no par value to manufacture machines and tools, by C. W. Whittlesey Jr., 205 Nebraska street, Pontiac, Mich.

DETROIT—Middleville Engineering & Mfg. Co., 1120 Free Press building, has been incorporated with $50,000 capital to conduct a general engineering and manufacturing business, by Kenneth Murray, 1120 Free Press building.

DETROIT—Tyler Tool & Engineering Co., 426 East Jefferson avenue, has been incorporated with $25,000 capital to manufacture tools, dies, jigs, fixtures, by Mamie Schiff, 4024 Tyler street.

STANDISH, MICH.—Arenac Mfg. Co. has been incorporated with 50,000 shares no par value to manufacture screw machine products, dies and jigs, by L. Ray Phipps, 306 Paterson building, Flint, Mich.

OHIO

CLEVELAND—H. & P. Die & Stamping Co., 13945 Triskett Road, will build a one-story plant addition costing $10,000.

CLEVELAND—S. & Z. Machine Tool & Die Co., 3310 West Eighty-sixth street, will build a one-story 50 x 120-foot plant at Berea and Triskett roads, to cost about $23,400.

CLEVELAND—Steel Improvement & Forge Co., 970 East Sixty-fourth street, will build a one story 50 x 200-foot warehouse at 6416 Metta avenue, to cost about $53,000.

CLEVELAND—Ohio Machinery Co., Harold Grave, Manager, 6606 Schaaf road, will build one-story warehouse and service building 120 x 160 feet, to cost about $125,000.

CLEVELAND—Anthony Tool & Die Co. Inc. has been incorporated by Alfred C. Jones, 12715 Miles avenue, and associates, with $5000 capital and 100 shares no par value, to manufacture tools, dies and machinery.

MANSFIELD, O.—Ideal Electric & Mfg. Co., 330 East First street, manufacturer of motors, generators, etc., will install dust collector and electric crane, at cost of $107,810.

NILES, O.—Republic Steel Corp., Cleveland, has received WPB authorization for additional steel production facilities at Niles, to cost about $335,000.

WARREN, O.—Copperweld Steel Co. has received WPB authorization for construction of 23-kv feeder and protective facilities and installation of equipment, at cost of $58,092.

PENNSYLVANIA

DRAVOSBURG, PA.—Carnegie-Illinois Steel Corp., Pittsburgh, has received WPB authorization for construction of building and installation of complete galvanizing unit, am-

monia dissociators, gas compressor, unit heaters, etc., to cost about $1,500,000.

SHARON, PA.—E. S. Frantz Machine Co., Franklin street and Vine avenue, will build an addition 70 x 115 feet to increase production, at estimated cost of $8000.

ILLINOIS

ROCKFORD, ILL.—Rockford Machine Tool Co. has let contract to Security Building Co. for a one-story plant addition.

SYCAMORE, ILL.—Ideal Commutator Dresser Co., commutator and motor maintenance equipment, has let contract to B. J. Nelson for a part one and two-story plant addition.

INDIANA

HUNTINGTON, IND.—Caswell-Runyan Co. is building an addition to its No. 2 plant for production of electronic equipment for the armed forces. G. Hamilton Beasley is president.

INDIANAPOLIS—McQuay-Norris Mfg. Co., 1737 Massachusetts avenue, is engaged in a $350,000 expansion program, which will add 18,000 square feet of floor space, principally to provide more bearings for the Navy. Defense Plant Corp. is financing the enlargement.

OKLAHOMA

OKLAHOMA CITY, OKLA.—M-C-M Machine Works has bought Green Head Bit & Supply Co. and will build addition and install equipment to handle heavy oilfield machinery.

WISCONSIN

EAU CLAIRE, WIS.—Martin Motors Co., division of National Pressure Cooker Co., plans addition to plant on Galloway street.

GREEN BAY, WIS.—Green Bay Drop Forge Co. has let contract to Selmer Co. for one-story plant additions 40 x 82 and 18 x 65 feet.

JANESVILLE, WIS.—Schlueter Boiler Works is having plans prepared for an addition to its boiler manufacturing plant.

MADISON, WIS.—Madison Brass Works Inc. plans alterations and improvements to its foundry at 214 Waubesa street.

MARINETTE, WIS.—Badger Mfg. Co., recently organized, is negotiating lease of building from city as factory for manufacture of pistons, carbon removal tools and other automotive equipment. Earl J. Martin, president of Martin Auto Parts Co. Inc., 2036 North Dominick avenue, Chicago, is president.

MILWAUKEE—Eclipse Moulded Products Co., 5150 North Thirty-second street, has let contracts for one-story plant additions 60 x 123 and 15 x 40 feet.

MILWAUKEE—Metal Coatings Inc. has been incorporated to process metals by Clarence Graham, 6913 Cedar street, Eugene W. Hess and Peter Jach.

MILWAUKEE—Zierden Machine & Mfg. Co., 2620 South Fifth street, tool manufacturer, plans new plant and office building.

MILWAUKEE—Ampco Metal Inc., 1745 South Thirty-eighth street, manufacturer of castings, bushings, valves, etc., has let contract to Peters Construction Co for a one-story plant addition 65 x 85 feet.

MILWAUKEE—Nash-Kelvinator Corp., 3880 North Richards steet, has let contract to Permanent Construction Co. for a five-story addition 40 x 146 feet, one-story addition 63 x 148 feet and two-story addition 25 x 130 feet.

MENASHA, WIS.—Menasha Woodenware Co. has let contract to Fluor Bros. Construction Co., Oshkosh, Wis., for one-story plant additions 32 x 367 and 120 x 132 feet.

MILWAUKEE—Advance Tool & Die Casting Co., 3760 North Holton street, plans one-story addition to machine shop, 30 x 120 feet.

MILWAUKEE—Koehring Co., 3026 West Con-

cordia street, manufacturer of power shovels and other construction machinery, has bought site for welding and structural shop.

MILWAUKEE—Fortress Machine & Mfg. Co. has been incorporated to manufacture tools and appliances, by A. E. Anuta, 2920 South Fifty-third street, and Wendell Spring.

MILWAUKEE—Milcor Steel Co. will let contract soon for a one-story plant addition. Lawrence E. Peterson, 312 East Wisconsin avenue, is engineer.

OSHKOSH, WIS.—Bell Machine Co., manufacturer of woodworking machinery, has let contract to C. R. Meyer & Sons Co. for a one-story plant 102 x 202 feet and second-story addition to present plant, 46 x 118 feet.

RHINELANDER, WIS.—Atlas Plywood Corp. plans a new veneer plant. Oppenhamer & Obel, Green Bay, Wis., are architects.

SHEBOYGAN, WIS.—Polar Ware Co., manufacturer of enameled ware products, plans plant addition. E. A. Stubenrauch is architect.

WAUSAU, WIS.—Marathon Electric Mfg. Co., manufacturer of motors, grinders lathes, etc., is building a one-story foundry addition 60 x 100 feet.

WAUSAU, WIS.—Marathon Battery Co. has let contract to J. P. Doheny for one-story plant additions 70 x 100 and 40 x 120 feet. George Foster Jr. is architect.

WAUSAU, WIS.—Minnesota Mining & Mfg. Co., St. Paul, manufacturer of abrasives, has let contract to William Murphy & Son, St. Paul, for addition to roofing granules plant, to cost about $500,000, including expansion of rock crushing facilities, capacity of kilns and dust collecting equipment.

MINNESOTA

CROOKSTON, MINN.—Otter Tail Power Co., Fergus Falls, Minn., plans extensions to power plant to cost about $750,000.

MINNEAPOLIS—Archer-Daniels-Midland Co., manufacturer of linseed oil, etc., has plans for additions and improvements to various plants, to cost about $5 million.

MINNEAPOLIS—G. H. Tennant Co., manufacturer of floor maintenance machines, has let contract to C. O. Field Co. for a one-story plant addition 100 x 100 feet.

MINNEAPOLIS—Hughes-Hartogs Corp., 2938 Pillsbury avenue, has been incorporated to manufacture garden tractors and other machinery, by B. H. Hughes-Hartogs and associates.

MINNEAPOLIS—Metalloy Corp., K. M. Leute, president, 1320 Rand Tower, has let contract to Kermit Bonander for a one-story plant addition 50 x 100 feet in St. Louis Park.

MOORHEAD, MINN.—City plans improvements to municipal light plant, including new turbine, boiler and auxiliary equipment.

ST. PAUL—Minnesota Mining & Mfg. Co., 791 Forest avenue, manufacturer of abrasives, has postwar expansion program to cost about $7 million, including new cellulose tape manufacturing plant costing $2 million with conveyors and assembly line. Toltz, King & Day Inc., Pioneer building, are architects and engineers.

KANSAS

KANSAS CITY, KANS.—Propulsion Engine Corp. has let contract to Bennett Construction Co. for a one and two-story plant 100 x 160 feet.

SOUTH DAKOTA

BELLE FOURCHE, S. DAK.—Schundler Bentonite Co. Inc., subsidiary of F. E. Schundler & Co. Inc., Joliet, Ill., plans expansion of bentonite mill and installation of additional equipment to increase capacity.

NEBRASKA

COLUMBUS, NEBR.—Leo Sokol has let contract to Walter Roth for a one-story plant 40 x 120 feet, for manufacture of irrigation pumps and manure loaders.

LINCOLN, NEBR.—Cushman Motor Works, 900 North Twenty-first street, manufacturer of engines, lawnmowers, etc., is having plans made for a foundry building.

OMAHA—Steril Mfg. Co., manufacturer of undertaking and cemetery supplies, plans large plant addition.

OMAHA—Paxton-Mitchell Co., manufacturer of metallic packing and machinery, has let contract to A. Borchman Sons Co. for a plant addition.

IOWA

ALBIA, IOWA—Universal Heating & Equipment Co., Des Moines, Iowa, has bought site for plant for manufacture of electrical brooders and other farm equipment. Allen Brown is president.

CEDAR RAPIDS, IOWA—Rapid Gas Corp. plans aluminum foundry at 2204 A street SW, 40 x 120 feet.

CEDAR RAPIDS, IOWA—Iowa Mfg. Co., manufacturer of sand, gravel and rock crushing and screening equipment, etc., has let contract to Max Mildenstein for a one-story plant addition.

CLINTON, IOWA—E. I. du Pont de Nemours & Co. plans major expansion of its cellophane plant at Camanche, a Clinton suburb, requiring about a year to complete.

MONTANA

BILLINGS, MONT.—Beall Pipe & Tank Corp., manufacturer of welded pipe and tanks, plans plant 100 x 200 feet at Fifteenth street and Fifth avenue. J. G. Link & Co., Electric building, are architects.

ARIZONA

PHOENIX, ARIZ.—Air Research Mfg. Co., Los Angeles, has let contract to Buttress & McClellan, 1013 East Eighth street, Los Angles, for a plant addition to cost $50,000.

CALIFORNIA

ANAHEIM, CALIF.—Essex Wire Corp., North Platt street, has let contract to Nicholas South, 419 North East street, for a plant addition covering 12,000 square feet, to cost about $30,000.

LOS ANGELES—M. D. Becker Co. has been formed by Myron D. Becker, 4155 Gundry avenue, Long Beach, Calif, and has established a steel and steel products business at 727 West Seventh street.

LOS ANGELES—California Cornice, Steel & Supply Corp. has building permit for a steel storage building at 1601 Naud street, to cost about $4500.

LOS ANGELES—Equipment Engineering Co., 3191 Casitas avenue, has building permit for machine shop addition 40 x 50 feet, to cost about $5000.

LOS ANGELES—Safeway Steel Scaffolds has building permit for storage building at 5875 West Jefferson boulevard 65 x 146 feet, to cost about $16,000.

LOS ANGELES—Food Machinery Corp., 6040 North Figueroa street, has building permit for an office building 60 x 120 feet, to cost about $17,600.

LOS ANGELES—Air Research Mfg. Co., Mines Field, Los Angeles, is building three plant additions, 40 x 380, 20 x 60 and 20 x 130 feet, the latter two-story, all steel frame, to cost about $150,000. J. H. MacDonald, 1013 East Eighth street, is architect. Buttress & McClellan, same address, are contractors.

VERNON, CALIF.—U. S. Spring & Bumper Co., 4915 Alcoa avenue, will build 80-foot craneway 297 feet long, to cost about $25,000. Area 40 x 100 feet will be roofed.

VERNON, CALIF.—Percival Steel Co., 4600 Santa Fe avenue, will build a warehouse addition 105 x 210 feet, steel frame construction, to cost $35,000.

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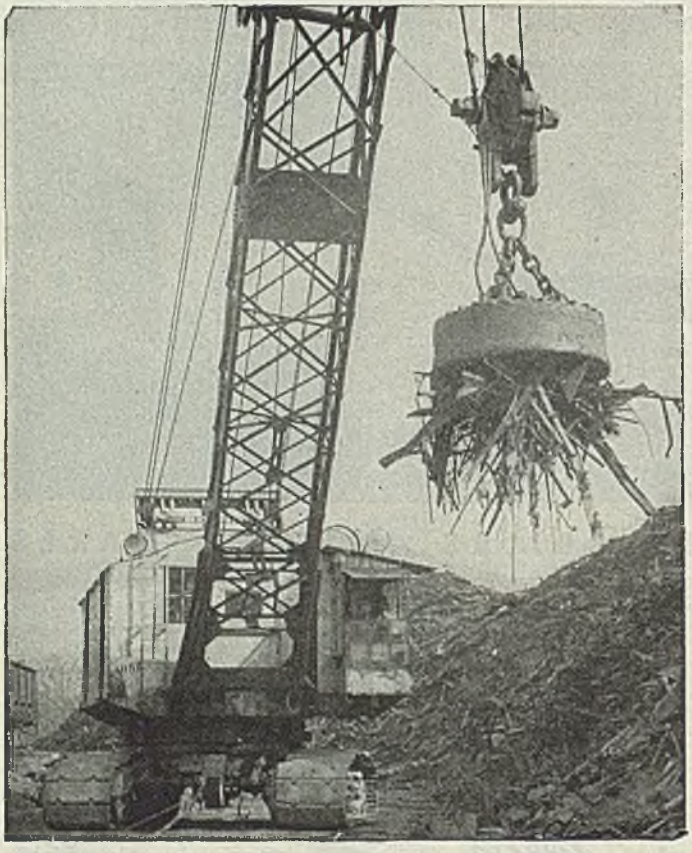

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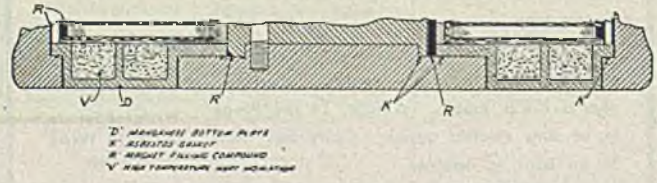

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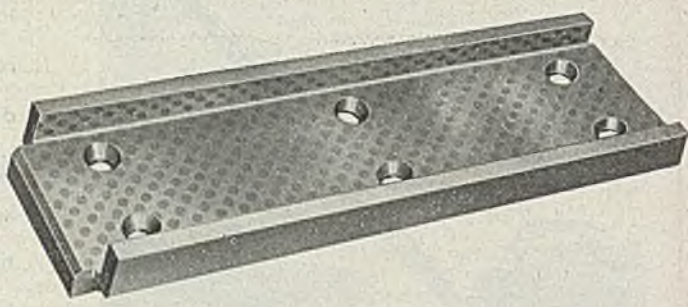

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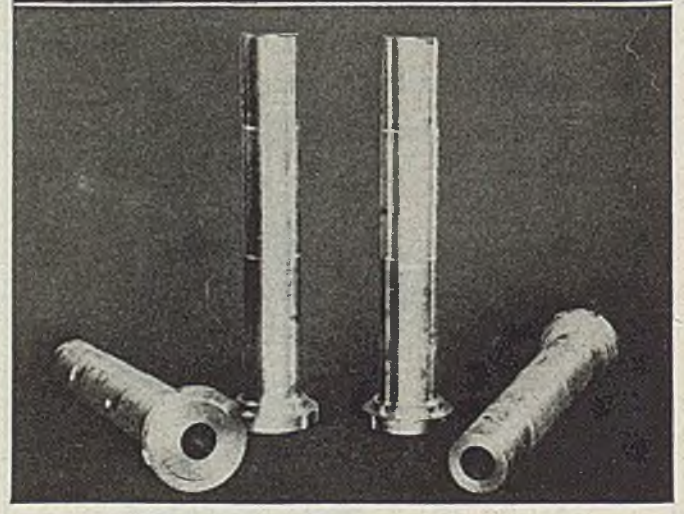

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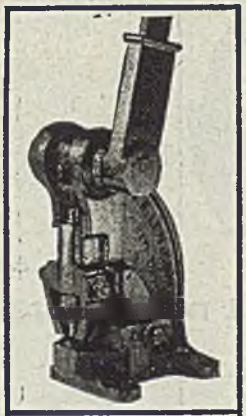

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5/16" x 3/16"	1/2" x 3/16"	1/2" x 7/32"	5/16" x 1/4"	21/64"	7/32"
1/4" x 3/16"	1/2" x 5/32"	1/2" x 3/16"	5/16" x 9/64"	5/16"	3/16"
	13/32" x 9/32"	1/2" x 5/32"	9/32" x 7/32"	9/32"	5/32"
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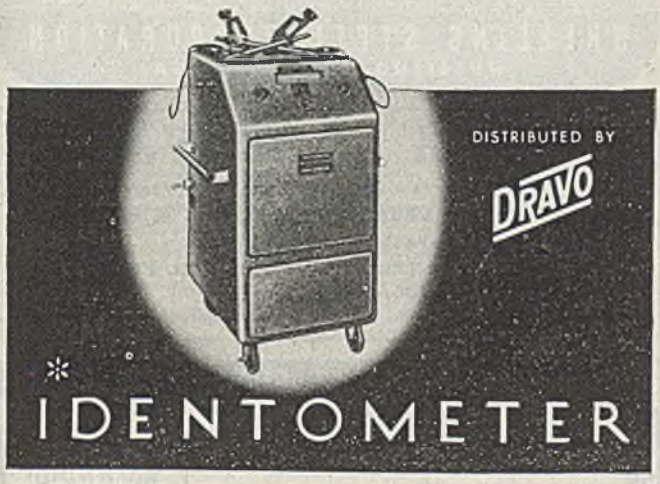

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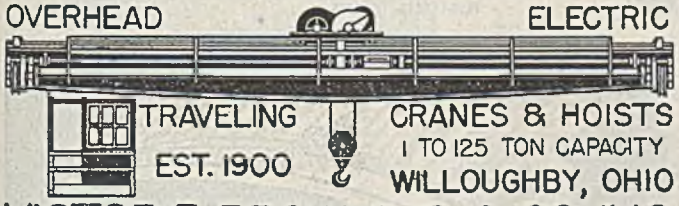

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Maximum Static Torque 150,000 in lbs.

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of New York
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200 TONS OF 5" IRON TUBES
12 or 14 gauge sidewall

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One new 2-ton P&H 4-motor monorail-type bucket hoist, complete with B-K 606-1 bucket. Built for 220 volts, 3 phase, 60 cycle operation and with 50 foot lift. Available for immediate delivery, without priority. Price is reasonable. Address Box 953, STEEL, Penton Bldg., Cleveland 13, O.

RAILWAY EQUIPMENT AND ACCESSORIES

We can furnish rails, spikes, bolts, angle bars, locomotives, cranes and other railway material.

Write, wire or phone for prices

SONKEN-GALAMBA CORP.
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WANTED
ROD DRAWING EQUIPMENT

Suitable for drawing #5 low carbon steel rods down to 13 gauge. Send full specifications and prices when replying.

Address Box 956,
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good used or rebuilt equipment or materials—Place an advertisement in this section. Write STEEL, Penton Bldg., Cleveland, Ohio

Help Wanted

WANTED
Shop Superintendent

For old, established Los Angeles manufacturing plant handling plate and welding fabrication—code work. State qualifications fully.

Address Box 938
STEEL, Penton Bldg., Cleveland 13, O.

INDUSTRIAL FURNACE SALES ENGINEER

Exclusive territory arrangement on straight commission basis for Sales Engineer familiar with industrial heat treating processes. Chicago territory now available. Old, well established company. Address Box 954, STEEL, Penton Bldg., Cleveland 13, O.

WANTED—CARBIDE TECHNICIAN. WELL-known eastern company with established sales outlet has excellent opportunity for Chief Technician to develop carbide line, especially for wear resistant applications. Fundamental processing equipment installed. Company also interested in cast tool developments, precision and centrifugal castings, with particular reference to special heat resisting applications, such as gas turbines. State age, education, experience, salary desired and draft status. Address Box 903, STEEL, Penton Bldg., Cleveland 13, O.

SUPERINTENDENT

Well established heavy industry making equipment for cutting and forming sheet metal has opening. Give details of education, personal qualifications and work history in letter of application which will be held in confidence. Employment in accordance with existing W.M.C. regulations. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

DRAFTSMEN WANTED — EXPERIENCE IN heavy machine tool work desirable, aircraft experience acceptable. Outstanding post-war picture for right men. Location, upstate New York. W.M.C. rules observed. Give full particulars in letter addressed to Box 923, STEEL, Penton Bldg., Cleveland 13, O.

DESIGNER, DRAFTSMAN & ESTIMATOR Wanted. Must have full knowledge of A.S.M.E. construction on all types of pressure vessels and other complicated steel plate construction of refining equipment, etc. Plant located in Texas. Statement of Availability required. Address Box 828, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: MAN WITH GENERAL OFFICE or field sales experience by large reputable manufacturer of seamless and electric welded tubing, alloy and carbon steels. Please apply giving full information, experience, etc., to Box 754, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

WANTED
Production Research Metallurgist

to work with aluminum and magnesium alloys by large plant with essential classification in middle western city; college graduate with minimum of 5 years experience in smelting or foundry work. Long established company with good postwar outlook. Address replies to Box 950, STEEL, Penton Bldg., Cleveland 13, O.

Wanted
ELECTRIC FURNACE OPERATORS

In Los Angeles steel foundry. Good opportunity for dependable man. Postwar work assured. Write giving full details including when available. Address Box 881, STEEL, Penton Bldg., Cleveland 13, O.

TUBE MILL SUPERINTENDENT

A comparatively young man capable of being superintendent of a cold drawn seamless steel tube mill. Submit detailed information regarding education, qualifications and past experience. Address Box 955, STEEL, Penton Bldg., Cleveland 13, O.

ELECTRICAL ENGINEER—A WESTERN NEW York manufacturer of heavy machine tools desires the services of an electrical engineer or experienced draftsman willing to break in on electrical designing. The work will consist of designing control panels, switchboards and electrical systems of large machine tools. This opening is permanent to the right man and offers excellent post-war prospects with well established, nationally recognized machine tool manufacturer. Apply by letter, stating age, experience, education and other pertinent data. W.M.C. rules apply. Address Box 922, STEEL, Penton Bldg., Cleveland 13, O.

WANTED PATTERN FOREMAN

Malleable Foundry in Texas has an excellent opening for a man capable of taking charge of wood and metal pattern shop employing twelve to fifteen pattern makers and apprentices, make own layouts and estimate pattern costs. Applicant should state age, family status, salary expected, past and present employers. Address Box 910, STEEL, Penton Bldg., Cleveland 13, O.

WORKS MANAGER

Well established heavy industry making equipment for cutting and forming sheet metal has opening. Give details of education, personal qualifications and work history in letter of application which will be held in confidence. Employment in accordance with existing W.M.C. regulations. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

STRUCTURAL STEEL DETAILER, ENGINEER, ESTIMATOR, BY OLD ESTABLISHED STEEL FABRICATOR. THESE POSITIONS ARE PERMANENT. IDEAL WORKING AND LIVING CONDITIONS. STATE AGE, EDUCATION, EXPERIENCE, SALARY DESIRED, ETC. ADDRESS BOX 960, STEEL, PENTON BLDG., CLEVELAND 13, O.

Help Wanted

WANTED
Layout Loftsmen and Checkers

With three to five years experience on sheet metal loft layout. Must have educational background to qualify for position with established New England company. Good postwar possibilities. Write giving qualifications, draft status, age and salary requirements.

General Aircraft Equipment, Inc.
22 Elizabeth St. South Norwalk, Conn.

Opportunities

EXPORTS

English manufacturers of High Grade Tool Steels, Alloy and Stainless Steels, desire collaborate with American manufacturers of products (using these steels as a base) interested in having same manufactured in England for their Exports to Sterling Countries.

Executive resident in Canada available for interview.

Address Box 948
STEEL, Penton Bldg., Cleveland 13, O.

Employment Service

SALARIED POSITIONS—This advertising service of 35 years' recognized standing negotiates for high salaried supervisory, technical, and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Send for details R. W. BIXBY, Inc., 110 Delward Bldg., Buffalo 2, N. Y.

CLASSIFIED RATES

All classifications other than "Positions Wanted," set solid, minimum 50 words, 5.00, each additional word .10; all capitals, minimum 50 words 6.50, each additional word .13; all capitals leaded, minimum 50 words 7.50, each additional word .15. "Positions Wanted," set solid, minimum 25 words 1.25, each additional word .05 all capitals, minimum 25 words 1.75, each additional word .07; all capitals, leaded, minimum 25 words 2.50, each additional word .10. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements

Replies forwarded without charge.

Displayed classified rates on request.

Address your copy and instructions to STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED

Positions Wanted

FACTORY MANAGER OR SUPT. DESIRES TO contact a steel fabrication manufacturer able to employ, and put in charge a middle aged executive. Well seasoned and experienced in all phases of kindred operations. Able to assume full responsibility of your labor relations, production control, shop management, standards, processing, cost, contractual commitments and the execution of any new production programs. Years of experience in forming, welding, cutting, finishing, machining of light and heavy steel. Age 35. Now employed. Address Box 958, STEEL, Penton Bldg., Cleveland 13, O.

SALES REPRESENTATIVE DESIRES CONnection with a small company with an expanding sales program. Experienced man, 35 years of age, now employed as district sales manager by recognized steel manufacturer. Address Box 945, STEEL, Penton Bldg., Cleveland 13, O.

ACCOUNTANT, MACHINIST - TOOLMAKER with 27 years broad business and practical experience, seeks a position with a progressive company as Administrative Assistant. Address Box 918, STEEL, Penton Bldg., Cleveland 13, O.

EXPAND

YOUR REPRESENTATION . . .

An advertisement here puts you in touch with trained, efficient, reliable men looking for new lines. Write STEEL, Penton Bldg., Cleveland, O.

Accounts Wanted

ACCOUNTS WANTED

Representative widely acquainted in the industrial field of New York, New Jersey, New England, Delaware, Maryland, Pennsylvania, and other states, invites expression of interest from Manufacturers of Fabricated Stainless, Alloy Steel and Carbon Steel Process equipment and accessories for the Chemical, Petroleum, Plastics, Food-Products, Pulp and Paper, and Steel Heat-Treating Industries who desire experienced and intelligent representation in the Eastern States by one who has been manager of sales of such equipment for the past twenty years. Address Box 957, STEEL, Penton Bldg., Cleveland 13, O.

ESTABLISHED STEEL JOBBER LOCATED IN DETROIT WANTS A GOOD BAR MILL ACCOUNT. TWELVE YEARS SUCCESSFUL BACKGROUND AND BEST OF CONNECTIONS. COMMISSION ONLY.

Address Box 952
STEEL, Penton Bldg., Cleveland 13, O.

ATTENTION

STEEL WAREHOUSES

Steel broker, located in Ohio, with well established clientele, desires connection with high-grade Mid-West warehouse on brokerage basis. Financially responsible organization distributing secondary and prime sheets on nation-wide scale. Address Box 937, STEEL, Penton Bldg., Cleveland 13, O.

Representatives Wanted

WANTED

Ambitious Representatives

Exceptional opportunity to sell nationally advertised AAA products approved and used by Government Agencies and large and small manufacturers for fabrication of metals, salvage, and reclamation. Good territories still open. Immediate commission earnings from $150.00 to $400.00 and up weekly. Qualifications: Technical or welding background indispensable. Essential position. If you are a hard worker and have ability, our Regional Manager will show you fine results of other representatives. Send outline of past technical and sales activities.

Write to
BENT LAUNE, Regional Manager
Room 1113
40 Worth St., New York 13, N. Y.

REPRESENTATIVE WANTED

A new but proven manufacturer of bolts, nuts, screws and special headed and threaded parts located in the Chicago area invites inquiries from manufacturers' agents located in the following areas: Grand Rapids, Milwaukee, Cleveland, and Pittsburgh. Should have contacts with large users and should be selling production items. Give some details in first letter.

Address Box 919
STEEL, 520 N. Michigan Ave., Chicago 11.

SCREW MACHINE CAPACITY AVAILABLE

from ¼" to 4¼", also hand screw capacity. Forward samples and blueprints.

Bridgewater Screw Products Co.
Bridgewater, Mass.

KING FOUNDRIES, INC., NORTH WALES, Pa. Gray Iron and Semi Steel Castings, also alloyed with Nickel, Chrome, and Molybdenum, Wood, Iron, Brass, and Aluminum Pattern work.

EXCESS CAPACITY AVAILABLE

Large and heavy machine work. The Hilyard Co., Norristown, Pa.

Send your inquiries for
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designers and builders of wire and ribbon stock forming machines.
We also solicit your bids for cam milling

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Send us your samples or prints for quotations. Prompt and efficient service.

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Metal Specialties comprised of STAMPINGS, FORMING, WELDING, SPINNING, MACHINING. All Metal or Combined with Non-Metal Materials

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ADVERTISING INDEX

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