

Camouflage protection for industrial plants has progressed to a scientific group effort, p. 72

# C O N T E N T S

Volume 111—No. 18 **STEEL** November 2, 1942

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## PRODUCTION

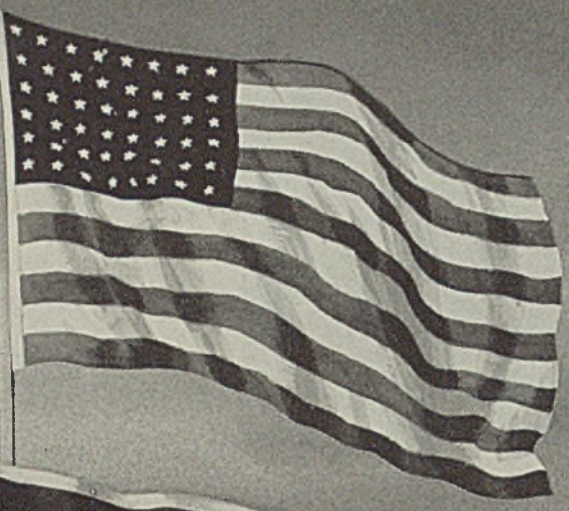
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*And now...*

Three flags wave over all Ex-Cell-O plants today . . . the Stars and Stripes, as always, the first U. S. Treasury "Bull's-Eye," and now—the coveted Army-Navy "E" . . . each a badge of honor, a medal for distinguished service to the Nation. \* \* \* Exceptional achievement in the production of war materials early earned Ex-Cell-O the "E" pennant (for instance, every plane made in the United States, no matter where its ultimate destination, has precision parts made on Ex-Cell-O machines). \* \* \* The "Bull's-Eye" flag signifies that Ex-Cell-O was the first firm in the United States where more than ninety per cent of the employees agreed to put ten per cent or more of their pay into War Bonds. \* \* \* Flying proudly alongside Old Glory, these two pennants proclaim the unified determination of Ex-Cell-O's many thousands of workers and the management . . . to promise solemnly to America's gallant fighting sons that, as it always has, so Ex-Cell-O always will, back them up with everything it's got!

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# HIGHLIGHTING

this issue of **STEEL**

**PROFITS** Manufacturers who have laid awake nights worrying about renegotiation of their war contracts under Public Law No. 528 have no real basis for such fears (p. 48). In the first place some of the bad features of the original law have been corrected by amendments. Secondly, the law is being administered by business men who desire to keep industry in good financial health. They favor fair profit margins and spur incentive by allowing larger profits as costs are reduced through efficiency. Incidentally, any manufacturer can go to one of the three Price Adjustment Boards and get immediate clearance and thus know how he stands with reference to profits.

Third quarter earnings reported by steel producers this year were down 41 per cent from the profits for the same period in 1941 (p. 38).

**PRODUCTION** Capacity of the new Kaiser steel plant at Fontana, Calif., has been expanded to 675,000 tons of ingots and the plate mill is to be supplemented by blooming, merchant bar and structural rolling mills.

Many orders for steel are being rerated, mostly downwards (p. 133). Steel is being diverted from certain types of war materiel in order to supply more for airplane and ship construction. Almost one of every five tons of steel now being produced is going into ships (p. 43).

Steel production last week again stood at 99 per cent of ingot capacity (p. 43). To show how these records are made possible, Bethlehem Steel Co. employes relined and enlarged one of the blast furnaces at Johnstown in 21 days (p. 42). The pace that is being maintained is reflected by the awards of the Army-Navy "E" and the Maritime Commission "M" pennants to many more plants (p. 63).

**TECHNICAL** Harper Goff explains the underlying thinking which must be employed in industrial camouflage—the architecture of concealment—to be most effective. A series of unusual illustrations shows the principles involved (p. 72).

Scott D. Baumer tells how to fabricate replacement parts by welding structural shapes and plates so as to get quickly back into service equipment needed to keep production going. He explains how many such jobs can be made to last longer than original equipment (p. 74).

Earl Glen gives details of the production of 30 and 50-caliber cartridge cases and includes recom-

mendations for improved die designs utilizing carbide dies (p. 78).

F. Hudson presents an analysis of the properties of sand-cast low-tin alloys and their applications, also a discussion on conservation of tin under wartime conditions (p. 80).

Corrugated boxes for shipping have many advantages but their characteristics must be understood to obtain best results. Therefore, suggestions for shipping economically in corrugated boxes are timely, especially since factors in effective package design are explained (p. 88).

The M. W. Kellogg Co. has developed ways of effectively reducing alloy steel needs of the petroleum industry (p. 92).

W. F. Plume presents details of the design and application of large heavy-duty speed reduction units as utilized for many important steel mill jobs (p. 98). He tells how to obtain the right unit and how to get the most from it in uninterrupted service.

**PRICES** Freight car parts have been placed under a price ceiling (p. 47). Toll agreements are regarded as contracts involving services that do not come under price ceilings.

**MANPOWER** The War Manpower Commission has certified that smelting, refining and rolling of metal are activities necessary to war production and has instructed that draft boards in taking men under the Selective Service Act should consider the length of time in training replacements. It has compiled a list of jobs requiring six months or more of preparation (p. 45). Reflecting the trend, Canada has outlawed absenteeism and floating labor (p. 66). . . Women have been found capable of holding most jobs in war plants, the tool engineers were told last week (p. 67).

**CONSERVATION** Donald M. Nelson urges industry throughout the country to dig deeply and turn in the greatest possible amount of scrap, since while the situation now is better there is the future to think about (p. 44). At the same time, it is a question as to whether the industrial scrap drive is timed right or whether it is organized efficiently (p. 55).

Direction of the War Production Board's Steel Recovery Program now has been concentrated at Pittsburgh (p. 58).

Thin-gage black plate of higher carbon content is being rolled experimentally for use in bottle caps (p. 56).



# **WARNING!**

The public and industry probably do not realize how close many steel mills came last month to closing down a portion of their productive capacity due to the lack of scrap.

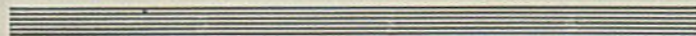
In fact, Inland actually was forced to shut down two furnaces for a time. A drastic curtailment of America's steel production, because of the lack of scrap, would be a national calamity.

Today, scrap is coming in somewhat faster than we are using it, but we despair that we will build up a backlog sufficiently large to provide for all the winter months, when very little scrap moves. We must build large scrap piles during these fall months to carry us through until April, or we are certain to have a serious breakdown in steel production.

Anything that possibly can be done to give everyone a better understanding of this critical situation will be of service to our country.

**INLAND STEEL CO.**

*Chicago*





### Criticism in Wartime

*No one can compare the state of the nation today with that of two months ago without realizing first that we have made considerable progress in buckling down to the realities of war and secondly that this improvement has been due largely to natural democratic processes.*

*Two months ago—just before Labor day—the nation was in a state of indecision in regard to many of its major problems. Congress was toying with tax legislation and it looked as if the bill could not be passed until late in November. The farm and labor blocs were opposing efforts to curb inflation. Leon Henderson's OPA was the only agency working effectively to restrain price increases. The synthetic rubber program was in a mess. The manpower problem was being mishandled. There was a general disposition to stall on every delicate issue until after the Nov. 3 elections.*

*Today the picture is quite different. The tax bill has been passed and signed. A strong organization has been created to deal with economic problems and an able administrator has been put at its head. The Baruch report pointed the way to progress in the rubber situation and the rubber chief has shown by his clash with the cotton senators that he means business. The manpower problem is being tackled more realistically. Congress is showing signs of achieving a sense of direction.*

*What caused this change in attitude in two short months?*

*The soundest explanation is that Washington discovered that the people want action. Congressmen went home to mend their political fences and encountered a critical public. Other Washington officials sensed the criticism of the people as it is reflected in the press. The change was wrought largely by the whiplash of constructive criticism.*

*This should be reassuring to industrialists and others who have deplored the slowness with which officialdom has tackled important war problems. It shows that the American right of free speech is a powerful influence in wartime.*

*E. L. Shaner*

Editor-in-Chief



# Third Quarter Steel Profits Down 41% from 1941 Rate

*Higher taxes, costs, retroactive wage increases cut deeply into producers' earnings, despite high operations. . . Companies adding women to clerical staffs to replace draftees*

THIRD quarter earnings of leading steel producers this year were 41 per cent lower than those reported by the same companies in the comparable 1941 period.

The reduction reflects sharply increased federal taxes, higher costs and, in most instances, retroactive wage advances ordered by the National War Labor Board.

The profits picture for the first nine months is similar to that for the September quarter; 14 leading companies reported earnings of only \$122,448,082 for three quarters this year, compared with

\$202,616,214 in the same period last year. For the third quarter, earnings of the 14 producers totaled \$39,184,640, against \$66,727,083 in the 1941 period.

Federal income and excess profits taxes advanced sharply. Twelve of the producers reporting this item have made provision for \$415,478,415 for the first nine months this year, compared with \$233,364,534 in the first three quarters last year.

Operations of the industry during the third quarter averaged 95.5 per cent of capacity, and for the nine months, 96.4 per cent of capacity.

by the War Labor Board and by a voluntary adjustment made to salaried employes in the lower brackets. These adjustments amounted to approximately \$14,600,000, of which about \$6,000,000 applies to the third quarter and the remainder to the period between Feb. 16 and June 30.

Provision for taxes for the third quarter total \$66,318,328, compared with \$60,321,120 in the third quarter, 1941. Tax provisions for the first nine months aggregated \$215,742,757.

A reserve of \$6,000,000 was established to provide for contingencies attaching to the present high rate of operations and other unusual conditions. Similar funds were set up in the first two quarters.

Finished steel shipments during the third quarter showed an increase of 3.4 per cent over the similar 1941 period. Shipments for the nine months were 4.1 per cent above the first three quarters of 1941.

Employment and payrolls statistics show all-time records for the quarter. Average number of employes was 340,129 and total payroll was \$189,305,722.

The corporation has lost about 10 per cent of its employes through the draft or voluntary enlistment, according to Chairman Irving S. Olds. Despite this operations are continuing above theoretical capacity.

Mr. Olds said the corporation is in a fairly comfortable position as regards scrap and opined it is in a comparatively better position than some of the smaller companies, because of its diversity of operations and also because it produces synthetic scrap. He indicated, however, that collection of a sufficient

## Wage Order Lowers U. S. Steel's Income

Despite operations of more than 100 per cent of capacity, United States Steel Corp. earnings for the third quarter were only \$12,628,836, equal to 72 cents a common share, compared with \$34,313,345, or \$3.21 a common share, in the September quarter of 1941.

Nine months' profit amounted to \$46,-

495,743, equal to \$3.16 a share, against \$95,688,091, or \$8.82 a share, in the first three quarters of 1941.

Directors declared the \$1.75 dividend on preferred stock, payable Nov. 20, and \$1 on common shares, payable Dec. 19.

Corporation's net income was lowered by wage and salary adjustments ordered

### STEEL PRODUCERS' EARNINGS STATEMENTS SUMMARIZED

	Third Quarter		Second Quarter	Nine Months		Federal Taxes Nine Months	
	1942	1941	1942	1942	1941	1942	1941
United States Steel Corp.	\$12,628,836	\$34,313,345	\$5,945,373	\$46,495,743	\$95,688,091	\$161,600,000	\$82,285,500
Republic Steel Corp.	2,581,100	4,378,379	3,355,158	10,653,221	17,997,095	54,200,000	29,975,000
Bethlehem Steel Corp.	7,444,870	7,910,569	6,070,913	19,656,471	23,998,054	84,370,000	46,030,000
Youngstown Sheet & Tube Co.	2,459,652	3,103,649	2,291,119	7,327,750	12,445,843	22,448,000	15,675,000
National Steel Corp.	2,838,884	3,200,453	2,750,445	8,265,166	12,922,272	19,250,000	14,349,575
Inland Steel Co.	2,642,409	3,675,724	2,782,391	8,113,890	11,247,342	19,567,000	17,109,904
American Rolling Mill Co.	2,740,998	2,523,968	1,602,688	6,075,321	8,215,761		
Wheeling Steel Corp.	839,659	1,878,355	795,558	2,835,307	6,567,551	6,701,000	4,112,182
Crucible Steel Co. of America	2,135,917	1,677,640	1,932,541	5,471,379	4,275,064	27,224,015	10,486,300
Sharon Steel Corp.	311,387	412,899	386,900	948,589	1,226,140	2,442,000†	1,940,000†
Allegheny Ludlum Steel Corp.	904,370	2,459,356	1,205,565	2,874,626	3,989,236	11,709,400	6,890,198
Continental Steel Corp.	218,251	294,592	234,410	621,999	932,149	811,000	834,875
Keystone Steel & Wire Co.†	191,576	352,414	665,536	1,221,195	1,401,415		
Rustless Iron & Steel Corp.	1,246,731	545,740	\$30,785*	1,887,425	1,710,201	5,156,000	3,676,000
Totals	\$39,184,640	\$66,727,083	\$29,987,812	\$122,448,082	\$202,616,214	\$415,478,415	\$233,364,534

#### PIG IRON CAPACITY ONLY

Interlake Iron Corp.	\$311,521	\$524,698	\$247,840	\$1,004,123	\$1,824,022		
Sloss Sheffield Steel & Iron Co.	333,312	270,850	\$266,229	877,282	1,134,314		
Woodward Iron Co.	287,400	112,605	\$ 66,553*	618,184	1,032,623		

†Fiscal year ends June 30.

‡Based on first quarter and six month statements.

\*Loss. †Federal and state.



supply for the winter months might be difficult.

The chairman said the corporation also is in a fairly comfortable position in its stocks of manganese ore, and added that government stocks probably could be drawn upon if necessary.

U. S. Steel is using an increasing number of women in clerical jobs and Mr. Olds estimated that between 30 and 40 per cent of this type of work now is being done by women. However, he said, the company is moving slowly in the employment of women for mill jobs. It has employed women for crane operations and in coremaking duties in foundries, but to date the percentage of women in mill jobs is small. Training programs, however, are underway in several plants.

Mr. Olds said the blast furnace which had been dismantled and moved from Joliet, Ill., to Ironton, Utah, would be blown in about Dec. 1. The corporation already has one stack in operation there. First of three new furnaces at Provo, Utah, will be ready for operation April 1. Two stacks at the Edgar Thomson plant are scheduled to go into blast by the middle of 1943.

The corporation has not yet been asked by the government to renegotiate any of its contracts, according to Mr. Olds. The Navy, however, has asked for certain basic information which later may lead to renegotiation.

The Steel corporation's board of directors at their meeting last week authorized the calling for redemption on Dec. 31, 1942, of all of the outstanding serial debentures which mature in 1944, 1945, 1946, 1947, 1948 and 1951. These debentures, aggregating \$30,000,000 in principal, will be redeemed at the prices stipulated with accrued interest to Dec. 31, 1942.

## Bethlehem Earns 1.8% on Billings

Bethlehem Steel Co.'s net profit for the quarter ended Sept. 30 totaled \$7,444,870, after all charges and provision for federal income and excess profits taxes. This compares with \$7,910,569 in the third quarter last year and with \$6,070,913 in the second quarter this year.

Indicated net profit for the first nine months, as compiled from the company's quarterly reports, was \$19,656,471, against \$23,998,054 in the comparable 1941 period.

Provision for federal income and excess profits taxes during the third quarter amounted to \$34,970,000, compared

with \$21,130,000 in the September quarter in 1941 and \$25,210,000 in the June quarter this year. For the first nine months this year, provisions for federal taxes aggregate \$84,370,000, compared with \$46,030,000 in the first nine months last year.

Bethlehem directors declared a dividend of \$1.50 on common stock, payable Dec. 1, and the regular quarterly dividend of \$1.75 on preferred, payable Jan. 2.

Current steel production, according to President E. G. Grace, is approximately 101 per cent of capacity. During the third quarter, operations averaged 97.4 per cent of capacity.

Mr. Grace said third quarter earnings amount to 1.8 per cent on billings, compared with 3 per cent in the third quarter of 1941, 3.59 per cent for all of 1941, and 8 per cent for 1940.

Discussing the wage and labor situation, Mr. Grace disclosed that weekly payrolls in the third quarter averaged \$53.07 a worker, an increase of 22.8 per cent over the third quarter of 1941. He pointed out that the increase in the cost of living during the same period was 9.5 per cent. Hourly wages in the quarter just ended averaged \$1.24.

Approximately \$8,000,000 was paid to workers in the steel division alone due to the retroactive wage increase ordered by the War Labor Board.

Mr. Grace said Bethlehem has been discussing renegotiation of contracts with the Navy for some time and was ready to act when the Navy thought it advisable.

No serious labor shortage has been encountered in the company's plants. The corporation is training some women for work in machine shops and shipbuilding yards, but the total actually working is only a small percentage of the total workers. About 18,000 men have left the company to enter the armed services.

Mr. Grace said the scrap drive this fall had at least in Bethlehem's territory relieved the situation considerably, and that the company is in better position than it was a year ago. Increasing of pig iron capacity, he added, also is helping the situation.

## National Steel Corp.

National Steel Corp. had net profit of \$2,838,884, after provision for taxes, in the quarter ended Sept. 30, compared with \$3,200,453 in the third quarter last year.

For nine months, income was \$8,265,166, compared with \$12,922,272 in the first nine months last year.

Provision for federal taxes in the third quarter totaled \$6,500,000, against \$3,200,453 in the third quarter last year.

Tax provisions for the first nine months this year total \$19,250,000, against \$14,349,575 in the first three quarters of 1941.

## Inland Steel Co.

Consolidated net profit of Inland Steel Co., Chicago, for the third quarter amounted to \$2,689,090, compared with \$2,782,391 in the June quarter, and with \$2,642,409 in the September quarter, 1941. Nine months' earnings totaled \$8,113,890, equal to \$4.97 a share.

Federal tax provisions for the third quarter totaled \$6,386,000, and for the nine months, \$19,567,000.

Profits have been adjusted to reflect the amount of back wages paid as result of the recent ruling of the War Labor Board.

## American Rolling Mill

September quarter net profit of American Rolling Mill Co. totaled \$2,740,998, equal to 78 cents per common share, compared with net of \$2,523,968, or 70 cents a share, in like 1941 period. In the June quarter this year the company reported net profit of \$1,602,688.

Nine months' profit aggregated \$6,075,321, equal to \$1.59 a share, against \$8,215,761, or \$2.34 a share, in comparable 1941 period.

Directors declared dividend of 20 cents on common to cover final quarter of 1942, and a year-end disbursement of 10 cents, both payable Dec. 16 to record Nov. 16.

## Wheeling Steel Corp.

Wheeling Steel Corp., Wheeling, W. Va., reports net earnings of \$839,659 for the third quarter, after allowance of \$705,000 for federal income taxes and \$650,000 for excess profits taxes.

Nine months' net was \$2,835,307, or \$2.59 a common share, against \$6,567,551, or \$9.10 a share in the first nine months of 1941.

Federal tax provisions for the first nine months aggregated \$6,701,000, against \$4,112,182 in the first three quarters of 1941.

Request for a retroactive increase in wages to February, 1942, has been filed with the War Labor Board, and, if granted, will reduce earnings before taxes by about \$850,000.

Action on common and preferred dividends was deferred until the next meeting of the board of directors.

## Allegheny Ludlum Steel Corp.

Net profit earned by Allegheny Ludlum Steel Corp., Braeklenridge, Pa., in September quarter totaled \$904,370, after charges and provision for \$3,654,-



000 for federal income and excess profits taxes, and an additional charge of \$716,000 for retroactive wage increases ordered by the National War Labor Board.

The net is equal, after preferred dividend requirements, to 68 cents a share on common stock. For nine months, earnings totaled \$2,874,626, equal to \$2.17 a common share. Taxes for the nine months amounted to \$11,709,400, compared with \$6,890,198 in the comparable 1941 period.

## Youngstown Sheet & Tube

Youngstown Sheet & Tube Co. earned \$7,327,350 in nine months ended Sept. 30 last, based on third quarter and first half reports. This compares with \$12,445,843 earned in the like period a year ago.

September quarter profit totaled \$2,459,652, equal to \$1.34 on common, compared with \$2,291,119, or \$1.24 a share in the preceding quarter and \$3,103,649, equal to \$1.73 a share, in corresponding 1941 quarter.

## Rustless Iron & Steel

Net profit reported by Rustless Iron & Steel Corp. for the nine months ended Sept. 30 totaled \$1,887,424, equal to \$1.96 a common share. This compares with \$1,710,200, or \$1.77 a share, earned in like 1941 period. Tax provisions in the two periods were \$5,156,000 and \$3,676,000, respectively.

Based on first half and nine months report, net profit for the September quarter this year was \$1,246,731, against a deficit of \$30,785 in the preceding quarter and profit of \$545,740 in September, 1941, period.

## M. A. Hanna Co.

September quarter net profit of M. A. Hanna Co. totaled \$1,080,307, equal to 90 cents a share on common stock, compared with \$1,006,168, or 83 cents a share, earned in like 1941 period.

Nine months net aggregates \$2,915,036, equal to \$2.39 a share, against \$2,578,712, or \$2.06 a share, in like 1941 period. Tax provisions doubled last year's allowance.

## Cleveland-Cliffs Iron Co.

Cleveland-Cliffs Iron Co., profit of \$3,273,721 in nine months ended Sept. 30, compared with net of \$3,621,730 in like 1941 period.

## Cliffs Corp.

Cliffs Corp., nine months net profit of \$628,821, equal to 78 cents a share on capital stocks, compared with \$694,-

884, or 86 cents a share, in like 1941 period.

## General Motors' Earnings Only Half of 1941 Rate

General Motors Corp. and subsidiaries report net income of \$83,635,622 for the first nine months of 1942, equal to \$1.76 a common share, compared

with \$161,249,107, or \$3.56 a common share, in the first three quarters of 1941.

Third quarter income was \$35,743,411, equivalent to 77 cents a share, against \$43,022,353, or 94 cents a share, a year ago.

Alfred P. Sloan Jr., chairman of the board, said the corporation's capacity for war materials this year is estimated at \$4,000,000,000 and will be increased considerably next year.

# "No Need To Approach Bankruptcy To Prove Your Patriotism"

NEW YORK

STIMULATION of production for war is the dominant policy and the first guide-post in renegotiation of contracts, according to Maurice K. Karker, chairman, War Department Price Adjustment Board, who addressed a press conference last week. While encouragement is given to lower costs and therefore lower prices, nothing is contemplated to interfere with ever-increasing output of war goods and materials for arming the nation.

In administering the law under which war contracts are being renegotiated, Mr. Karker declared the board has no intention of experimenting with the American system of free enterprise and profit; no contracting company should be required to approach bankruptcy to prove its patriotism.

Fair and flexible judgment will be applied in individual cases up for renegotiation rather than any fixed formula, the board being concerned less with how much profit a contracting company makes than what it should not make. The margin in cases already renegotiated ranges from four to 33 per cent before taxes, depending on individual circumstances.

If a company produces more than one item, losing on some, breaking even on others, with a profit on several, renegotiations are conducted on an overall basis to cover a fair aggregate profit. A total of 6000 contracts have been assigned for renegotiation, the larger contracts being reviewed first, leaving an estimated 25,000 to 30,000 to follow, although the war department apparently does not know definitely how many contracts it has placed. Ninety per cent of the contracts to be renegotiated are by the war department. Few contractors have applied for renegotiation, and these mainly the larger ones.

Policy of the board is to administer the law with a view of making conditions uniform for all sections and to renegotiate for the period ahead rather

than for the present or past. Encouragement of lower-cost large-volume producers is the aim. Mr. Karker pointed out some contracting companies have as many as 25,000 contracts for products. Citing one, the General Electric Co., he emphasized the difficulty in submitting cost data on every one of the many hundreds of items manufactured.

Opposition to the theory of higher costs because the government will pay anyway was expressed. Renegotiation of contracts is not new, Mr. Karker declared; it is done regularly in commercial business; only in that the procedure is applied to government is it new.

### When Costs Become Known

Any company should know costs, in his opinion, when 20 per cent of the contract has been delivered. Excessive profits are possible under price ceilings; the Maritime Commission is buying an item for \$20 a ton which has a price ceiling of \$60 per ton.

The law and its administration is directed toward saving American industry from criticism and retaliation primarily, said Mr. Karker; any alternate legislation would probably be more adverse toward private industry at this time. Contracts already renegotiated have been on a basis of mutual agreement.

In reading agreements, allowance for reserves for rehabilitation or other factors not allowed by the treasury department in tax deductions are not permitted as elements in figuring costs, although a reasonable cost for advertising is approved. All items recognized by the Treasury Department as tax deductions in income returns are automatically allowed as elements of cost. Cost-plus-fixed-fee contracts, growing out of emergencies earlier in the war, are being converted to fixed price contracts.

(For a comprehensive article on renegotiation see *Windows of Washington*, page 48.)



## \$26,000,000 Addition to Kaiser Steel Plant Approved by WPB

APPROVAL of a \$26,000,000 addition to the steel plant facilities being built at Fontana, Calif., by the Kaiser Co., Inc., was announced last week by WPB Chairman Donald M. Nelson.

The new facilities, expected to be completed in about 12 months, will add 225,000 tons of steel ingots, or 158,000 tons of finished products to the capacity of the plant. The facilities already under construction—scheduled for completion during the first quarter of 1943—will have a capacity of 450,000 tons of ingots, or 300,000 tons of steel plates.

"Mr. Kaiser and his associates have been doing a fine job in all their war production projects," Mr. Nelson said, "and I am certain that the enterprise they have demonstrated will again be reflected in the building of this new steel capacity."

The facilities to be added include two open-hearth furnaces with a charge capacity of 185 tons each; a 28-inch structural mill fed by a 36-inch breakdown mill; a merchant and bar mill; alloy fin-

ishing facilities; and slow cooling pits for ingots.

Ingots of standard sizes and shapes of approximately 5000 pounds to 12,000 pounds each will be produced. The announced expansion includes a further extension of ingot moldmaking capacity.

The addition of the two open hearths will permit the Kaiser Co. to make full use of all pig iron produced in the blast furnace now almost completed as a part of the original plans. The furnace will have a capacity of 1200 tons of pig iron a day.

The larger part of the total output will be in those products most suitable for shipbuilding, although the present expansion contemplates the possibility of some alloy steel manufacture.

Production of the mill now being built at Fontana will consist entirely of steel plates. When the added facilities are in operation, the Kaiser Co. will be producing, in addition, structural shapes and some amounts of other steel products.

The iron ore for the blast furnace is

being supplied from southern California desert deposits. Coal is being obtained from mines in Utah, while limestone is supplied from quarries only a few miles from the Fontana plant.

The expansion has been recommended by WPB to the Reconstruction Finance Corp. for financing.

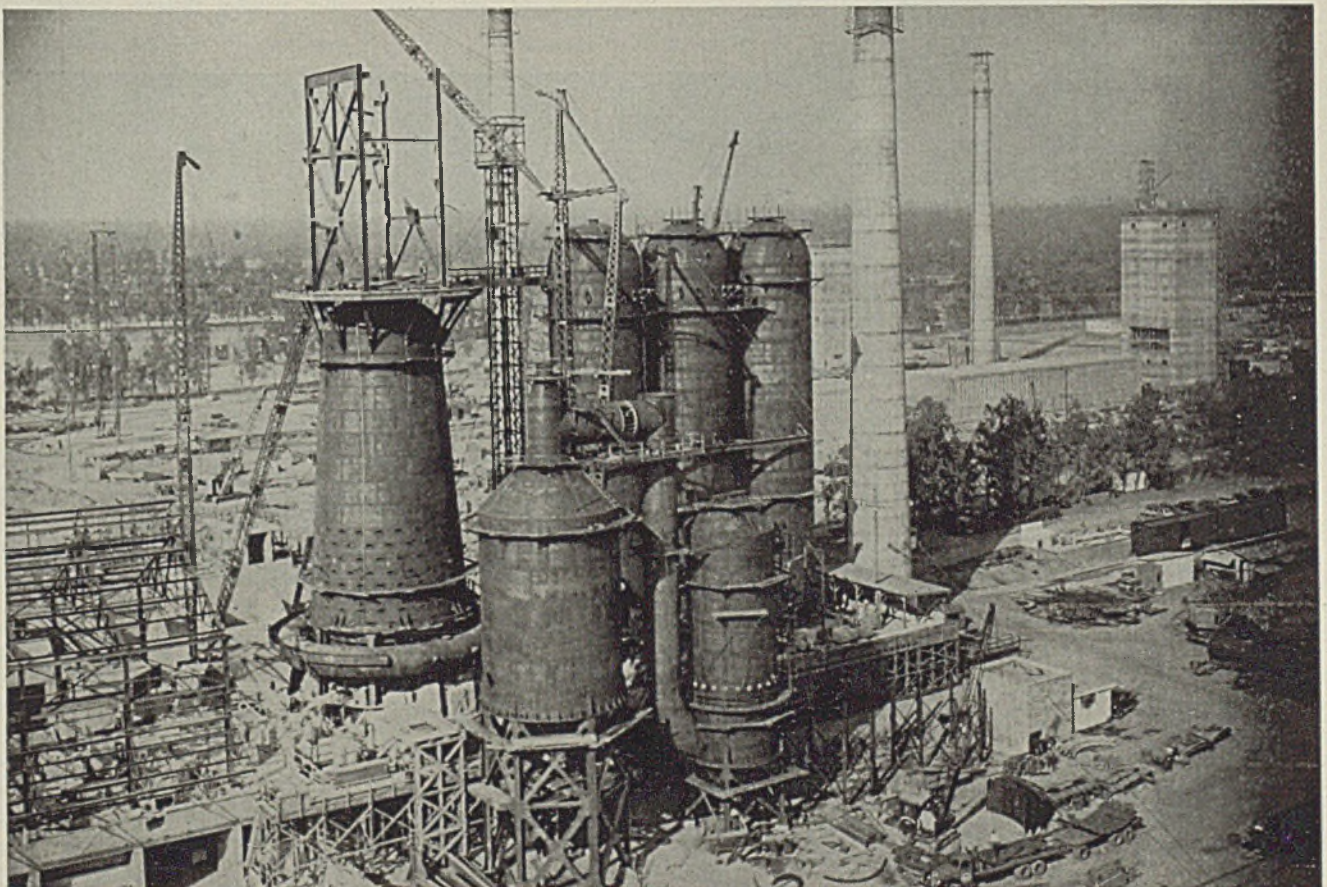
### New Walworth Co. Plant To Produce Cast Steel Valves

Erection of a midwestern plant for Walworth Co., specially designed for production of cast steel valves for the Navy, has been completed by Rust Engineering Co., Pittsburgh, Pa., it was announced recently.

In partial operation four months after construction began, the steel foundry's layout includes complete pattern, machine shop and finishing units. Ultramodern working conditions are provided, with maximum amount of light without heat being obtained through walls of heat and glare-reducing glass.

### Solvay To Build Lithium Plant in North Carolina

Solvay Process Co., Syracuse, N. Y., will build a concentration plant at Kings



Hot-blast stoves and furnace at the steel mill being constructed by H. J. Kaiser near Fontana, Calif. AP photo



# NEW FACILITIES

Mountain, N. C., to utilize a large deposit of spodumene, a lithium-aluminum silicate. Production is planned for early next year. The flotation process will be used.

In the Kings Mountain operation the material will be quarried.

In addition to spodumene concentrates the company will develop some by-products for shipment to its processing plants. This mineral is a chief source of lithium, compounds of which are being used increasingly in war production. Some mining has been done in the past and shipments have been made to New Jersey

for processing but quantities have been small.

## Quick Construction Job "Triumph of Co-operation"

Completed and in partial production just five months after site excavation was started, the new plant of Farrel-Birmingham Co. in northern New York represents another triumph of co-operation between industry, government agencies and building contractor in the interests of speeding the war effort, according to Nelson W. Pickering, com-

pany president. Virtually a duplicate of the company's original building and now operating in conjunction with it, the new structure contains 150,000 square feet.

## Ohio Steel Foundry Co. Allotted More Funds by RFC

Jesse Jones, secretary of commerce, has announced Defense Plant Corp. has authorized an increase in its contract with The Ohio Steel Foundry Co., Lima, O., to provide for additional equipment, in excess of \$1,000,000, making a total commitment of more than \$5,500,000.

## "VICTORY" FURNACE RELINED, ENLARGED IN 21 DAYS



*RELINING and enlarging of Bethlehem Steel Co.'s "G" furnace at Johnstown, Pa., recently was completed in 21 days. The men who rebuilt the stack rechristened it the "Victory" furnace*

Bethlehem Steel Co.'s Johnstown plant, which in the course of its long existence has shattered many records, last week completed relining and enlarging its 1200-ton capacity blast furnace in 21 days. Heretofore designated simply as Blast Furnace G, it was rechristened by general acclamation of the men who worked on the job as Victory Furnace.

Normally a job of this type and proportion would require 60 days by the industry's accepted standards. By completion in 21 days the furnace will produce about 35,000 tons of pig iron for war purposes, one month and 10 days ahead of schedule. This is enough pig iron to make 90 destroyers.

The plant had the advantage of experience gained at the company's Sparrows Point plant which recently completed the relining of a furnace of similar capacity in 27 days. This, however, did not include enlarging the furnace. Dimensions of Victory plant furnace's



hearth was increased from 21 to 25 feet, adding 300 tons to its daily capacity.

Before work was started the men and company executives converted blue prints and engineers' specifications into a master job schedule that indicated every operation to be done, who was to do it, and how soon it was to be completed. The "inside story" is that it was then scheduled for completion in 24 days. The men (see photo) decided they could

## Blaw-Knox Awarded Contract For Building Detinning Drums

Blaw-Knox Co., Pittsburgh, has been awarded a contract amounting to approximately \$1,000,000, by H. K. Ferguson Co., Pittsburgh, for design and fabrication of 14 new type detinning drums for use in salvaging tin from cans. This contract represents a part of that awarded recently to the Ferguson company by the Defense Plant Corp. for six detinning plants for salvaging cans.

The drums will be cylindrical in design, each with a diameter of 20 feet, and a length of 28 feet. Shredded tin cans will be fed into one end of the drum and, after passing through a chemical

swing it in 23 days. Signs were displayed indicating the rate of progress in relation to the originally agreed upon 23-day schedule. On Oct. 20 one of the signs read: "29 hours ahead of the 23 days schedule". The last bricklayer climbed out of the rebuilt hearth, and the drying-out fire was lighted by one of the workers at 9:04 a. m., Oct. 22, two days ahead of the schedule that the men who worked on the furnace set up.



solution which is kept in motion by rotation of the drum, will emerge at the other end completely detinned.

## Shipbuilding No. 1 Consumer of Steel

SHIPBUILDING, both naval and commercial, is consuming a far greater proportion of the nation's steel production in wartime than the automotive industry consumed in 1940, before this country entered the war, according to American Iron and Steel Institute, New York.

At present, almost one out of every five tons of finished steel produced in this country is going to the shipbuilding industry, which now ranks as the No. 1 consumer of steel.

In 1940, the automobile industry, for years the leading steel-consuming industry in the country, took about 16 per cent of the year's output. The shipbuilding industry that year consumed 2 per cent of the total.

In 1941, about 10 per cent of the steel went to the automotive industry, and about 4½ per cent to shipbuilding.

Currently only about 3 per cent of the steel produced is used to build automobiles, the production of which has long since ceased except for the building of trucks for war.

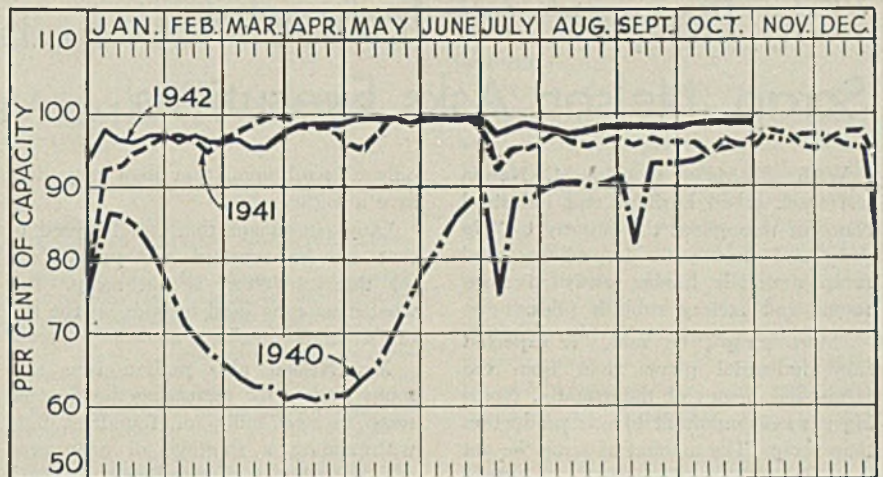
In transition from a peace to a wartime economy declines in the proportion of steel going to civilian industries have been more than offset by increases in shipments of steel for military purposes. Total shipments to all classes of consumers this year are substantially above 1941 levels, and far in excess of the tonnage of steel shipped in any year prior to 1941.

Public construction projects and highway construction, for example, which together took 2 per cent of all steel consumed in 1941, are taking only about 0.6 per cent of the total being shipped this year.

Manufacturers of metal furniture, office and household equipment, and hardware consumed almost 4 per cent of the total last year. Currently, however, only 0.7 per cent of the steel is required to meet military and essential industry demands for those steel-consuming items.

Steel for containers, chiefly "tin cans," represented a market for more than 7 per cent of the steel produced last year. Currently, however, only a little more than 4 per cent is going to container manufacturers.

Cooper-Bessemer Corp., Mount Vernon, O., in September surpassed its monthly production goal for the fourth consecutive month.



## STEEL . . . . . STEADY

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week continued at 99 per cent for the third week. Two districts made gains, four declined and six were unchanged. A year ago the rate was 95½ per cent; two years ago it was 96½ per cent, both computed on capacity as of those dates.

**Pittsburgh**—Rebounded 1½ points to 99 per cent as repaired furnaces resumed. Carnegie-Illinois Steel Corp. blew in its Ohio No. 4 blast furnace Oct. 23. Only one stack is idle in its Ohio district and all stacks in the Pittsburgh district are active.

**Wheeling**—Down 2½ points to 77 per cent.

**Chicago**—Declined ½-point to 103 per cent as open hearths were taken off for repair. Five plants held previous rates and one cut several points.

**Detroit**—Steady at 92 per cent.

**Cincinnati**—Open-hearth repairs caused production to drop 5 points to 92 per cent.

**St. Louis**—Removal of an open hearth for repairs reduced the operating rate 3 points to 94 per cent.

**Buffalo**—Held at 93 per cent with probability of a lower rate this week as furnace repairs impend.

**Cleveland**—All interests held production steady, with the rate at 98½ per cent.

**Youngstown, O.**—With 76 open hearths and three bessemer in operation the production rate rose 1 point to 96 per cent, highest since the first half of September. Pig iron output is largest in history, 26 blast furnaces active.

**Birmingham, Ala.**—Unchanged at 95 per cent, with 23 open hearths in production.

**Central eastern seaboard**—Scrap supply was adequate and steelmakers continued production at 96 per cent.

**New England**—Production is maintained steadily at 95 per cent for the third week.

### District Steel Rates

District	Percentage of Ingot Capacity Engaged in Leading Districts		Same week	
	Week ended Oct. 31	Change	1941	1940
Pittsburgh	99	+1.5	90	95
Chicago	103	-0.5	103.5	98
Eastern Pa.	96	None	92	94
Youngstown	96	+1	98	91
Wheeling	77	-2.5	95	98.5
Cleveland	98.5	None	97	90
Buffalo	93	None	81	95
Birmingham	95	None	95	100
New England	95	None	90	90
Cincinnati	92	-5	91.5	94
St. Louis	94	-3	83	85
Detroit	92	None	91	95
<b>Average</b>	<b>99</b>	<b>None</b>	<b>*95.5</b>	<b>*96.5</b>

\*Computed on basis of steelmaking capacity as of those dates.

## Republic's 10 Months Beat "Year's Output in Japan"

Republic Steel Corp.'s steel output in October up to 3 p. m. last Thursday exceeded its former total monthly record of more than 760,000 tons made last March. By the end of October this record was beaten by approximately 50,000 tons.

Company also reported that by 3 p. m. Thursday it had equalled this year the last reported annual steel production of the Japanese Empire of 7,200,000 tons.

Output established new records in many departments, well in excess of 100 per cent of capacity during the month.



## "Dig Deeper" for Industrial Scrap, Nelson Asks Executives

WPB Chairman Donald M. Nelson last week asked business and industrial concerns throughout the country to "dig deep and then even deeper" for vital scrap materials hidden away in store rooms and factory rubbish piles.

"More scrap", he said, "is expected from industrial plants than from the farms and homes of the country. Nothing is more important to war production than scrap. The amount of scrap we get depends in large measure on industrial scrap. It is essential to the successful solving of the winter supply problem.

"It is the job of every president, every purchasing agent, every salvage manager, every plant superintendent, every shop foreman and every workman to dig and then even deeper for dormant as well as production scrap. Every plant must undergo a thorough, old-fashioned house cleaning. Store-rooms and rubbish piles will reveal tons of old, worn-out equipment and stocks, broken-down machinery and discarded tools. All such scrap materials are wanted badly. Although plant executives may feel that every effort has been made to move scrap from their plant, they should search again and again to make certain that nothing is overlooked. Even if it is

only a small item, that item may help save a soldier's life.

"Any equipment that can be used or that can be repaired and put to use for the war effort is not scrap. But what cannot be used belongs on the nation's scrap pile."

Mr. Nelson also praised iron and scrap dealers for increasing the flow of scrap to steel mills and foundries, notwithstanding a shortage of manpower and curtailment of gasoline, tires, and other supplies. In a letter to E. C. Barringer, president and executive secretary of the Institute of Scrap Iron and Steel Inc., he said: "The patriotic spirit and co-operation of the junk dealer is highly commendable."

The institute last week estimated consumption of scrap in September as 4,556,000 gross tons, a slight decrease from the 4,645,000 tons of August, which is accounted for by the shorter month and the Labor Day holiday. In September, 1941, consumption was only 4,392,000 gross tons. For the first nine months of 1942, consumption is estimated as 41,644,000 gross tons, compared with 39,858,000 tons in the corresponding period of 1941 and 29,582,000 tons in the same period of 1940.

## Steel Salesmen Anxious To Find Material

VAST tonnages of dormant industrial scrap will be uncovered by the campaign now being conducted by steel warehouse salesmen, according to John J. Hill Jr., chairman of the drive. Reporting to directors of the American Steel Warehouse Association in Cleveland last week, Mr. Hill said that 250,000 industrial plants were being canvassed in the drive.

"Our steel warehouse salesmen are ideally equipped to go into the industrial plants because they have enough engineering training to spot unused piping, worn-out tubular boilers, obsolete tools and jigs and hundreds of other items of vital metal which is so urgently needed to fulfill the vast war material program.

"Our early reports indicate the unanimous interest and enthusiasm of 354 members of the American Steel Warehouse Association located in 97 cities coast to coast. They have assigned about 1000 full-time salesmen to ferret out the

dormant scrap in industrial places.

"Judging from the preliminary reports, they seem to be as anxious to get high tonnage of scrap as they used to be to get high tonnage orders for steel.

"We have set a goal of two million



J. J. Hill Jr.

tons. That sounds like a lot of scrap, but it is not more than we will need when the snow and ice of January and February are interfering with the processing of scrap in the junk yards."

In another drive 2000 steel company salesmen, most of them technically trained and all of them thoroughly familiar with industrial operations, will be engaged in a hunt for scrap iron and steel during the next few months, according to the American Iron and Steel Institute, New York.

They will spend virtually all of their working time helping their customers, the leading steel-consuming industries of the country, search out and dispose of the scrap, particularly obsolete or long-idle machinery, tools and equipment.

The "loan" of these salesmen to the scrap drive represents the second major contribution which steel companies have made to the salvage program within the past few months.

The first was the expenditure of \$1,500,000 toward financing the nationwide scrap advertising campaign of the past summer. Industries consuming other scrap materials contributed an additional \$300,000 towards that campaign.

All scrap recovered will move as usual to the various steel plants through the yards of scrap dealers. Approximately 22,000 industrial plants, those that buy iron and steel direct from the producer, will be visited at least once by the salesmen. Thousands of other manufacturers who buy their iron and steel from jobbers and warehouses, will be called upon for the same purposes by salesmen employed by the warehouses.

## Historic Steam Hammer's Base Contributed to Scrap Drive

A 25-ton base and anvil of the first steam hammer used in the United States, which was buried near the Museum of Science and Industry, Chicago, in 1938, when it proved too big to be placed on exhibit, will be dug up by Park District workmen and contributed to the salvage drive.

Built in England in the early 1850's, the big hammer helped construct the first iron warships during the Civil war. When the hammer was donated to the museum, it was found that the base would be out of sight and also would be too heavy for the floor, consequently it was discarded and used to fill a hole in the museum grounds.

Ships that have been wrecked off the coast of Portugal are now furnishing that country with much-needed scrap iron. The iron plating is removed after the ships are dynamited from their seabed.



## Draft Boards Asked To Consider Skills, Training of Metals Workers

WAR Manpower Commission has certified that smelting, refining and rolling of metals is an activity necessary to war production.

A list has been issued setting forth "the important occupations in the smelting, refining and rolling of metals activity which must be filled by persons capable of performing the duties involved, in order that the activity may maintain efficient production. This list is confined to those occupations which require six months or more of training and preparation."

In classifying registrants employed in these activities, draft boards have been instructed to consider the following:

"(a) The training, qualification, or skill required for the proper discharge of the duties involved in his occupation;

"(b) the training, qualification, or skill of the registrant to engage in his occupation; and

"(c) the availability of persons with his qualifications or skill, or who can be trained to his qualification, to replace the registrant and the time in which such replacement can be made."

The complete list follows:

Accountant, acid man, agitator tank man, assayer, assembler, die; assorter, nonferrous scrap.

Bag-house filterman, baking-furnace gang leader, bessemer-converter blower, blacksmith, (all around), blast furnace charger, blast furnace operator, boilermaker, maintenance; brick-kiln burner, bricklayer, refractory; bridge operator, leaching and electrolytic.

Cadmium plant operator, carbon marker, carpenter, cement finisher, chamberman, chemist, chief clerk, coal-pulverizer operator, condenser setter, converter operator, upright; conveyor man, copper compress operator, coremaker, cottrell operator, crane operator, crane rigger, cupola operator, cupola tender, cyanide solution man.

Derrick operator, dinkey operator, steam; draftsman, driller, machine.

Electric-cell man, electrician, engineer, industrial locomotive; engineer, professional and technical; evaporator, filter-press operator, fire chief, fireman, zinc furnace; fireman, zinc roaster; foreman, steel scrap yard; foreman, iron and steel mill; foreman, nonferrous metal mill; furnaceman, lead; furnaceman, residue.

Gas control operator, gas-producer man, grinder, tool.

Heat treater, heater, manganese; heater, sheet metal; hoisting engineer, hostler, railroad; hot-metal craneman, hydrator operator, hydrogen plant operator.

Ingot man, inspector and tester, outside production; inspector, casting; inspector, metal shaping and forging; instrument maker.

Jig runner.

Laboratory technician, ladle-crane man, ladle engineer, lathe operator, all around; lay-out man, boiler; lay-out man, casting; leacher, lead burner, lead loader operator, lead refinery; lead motorman, lineman.

Machinist, managers, employment, general, personnel, production, traffic; mechanics, automotive, blower, maintenance; melter, melter, assistant; mercury amalgamator, metal drawer, metallurgist, mill roller, millman, millwright,

mix-house man, mixer foreman, mold maker, molder.

Nickel plant operator.

Open-hearth bricklayer, open-hearth charger, ore grader.

Painter, parting plant operator, patternmaker, physicist, pipe fitter, pointing-machine operator, pot liner, pot lining foreman, pourer, metal; power generator operator, power house engineer, power shovel operator, precipitator, pug-mill operator, pulpit man, pump operator, purchasing agent, pyrometer man.

Retort kiln man, reverberatory-furnace operator, roll polisher, roller, anode rolling mill; roller, metal.

Safety engineer, scarfer, scotch hearth operator, lead refining; selenium plant operator, skip operator, slimes treatment plant operator, sorter, stamper, stationary engineer, straightening-press operator, structural steel worker, substation operator, supply man, surveyor.

Tableman, tester, sheet metal; tin plate dipper, tinhouse scruffman, tinner, tripper operator, tube bender, tube drawer, tube miller.

Vaner man.

Wealz kiln operator, welders acetylene, arc, butt, combination, all around; wire drawer.

Yard conductor, yard master.

Zinc chloride plant operator.

### Clarifies Restrictions on Employment of Aliens

Attorney General Francis Biddle has advised the Secretaries of War and Navy that manufacturers who mistakenly employ ineligible aliens on aeronautical or confidential war contracts are not liable to prosecution if employment was given in good faith.

The prohibition against the employment of aliens on certain types of aeronautical or confidential war production contracts has resulted, the attorney general pointed out, in the denial of jobs to thousands of native-born citizens because they could not produce birth certificates or other documentary proof of their citizenship. This not only has worked an injustice upon many qualified citizens but has seriously intensified the manpower shortage in a number of important plants.

The ruling removes any danger of prosecution of those employers who employ aliens on aeronautical or confidential war contracts if the employer has accepted in good faith as proof of an applicant's citizenship any of the following:

1. A certificate of naturalization; a certificate of citizenship; a birth certificate or other record of birth.

2. An honorable discharge from the United States armed forces (act of June 22, 1942, public law 620, 77th Congress).

3. A properly executed "Declaration of Citizenship" as prescribed in the War and Navy Department joint memorandum of August 22, 1942.

Aliens who falsely represent their cit-

izenship in order to gain such employment are, of course, liable to severe punishment.

Because of the inadequacy of vital statistics in many states, it is pointed out, some 40,000,000 persons in the United States are unable to obtain birth certificates. To a great extent, this inadequacy affects older persons who now are being called upon in great numbers for war production work. Instances have occurred of jobs being refused veterans of the World War whose ancestors for many generations have lived in this country, solely because they were unable to produce birth certificates.

### Detroit Area Tool, Die Workers' Wages Frozen

National War Labor Board has frozen maximum wages for tool and die workers in the Detroit area in an effort to stop "pirating" of workers. The order, affecting 35,000 employes, established \$1.75 an hour as the maximum hiring rate.

At the same time, James F. Byrnes, Director of Economic Stabilization, approved a WLB-proposed increase of \$1 a day for copper, lead and zinc miners in Idaho and Utah and increases of from 2.5 to 12.5 cents an hour for workers in seven other western states.

### Priority Ratings for Western Construction Jobs Revoked

Following up its policy of curtailing the flow of critical materials to construction projects, WPB has revoked priority ratings previously granted seven power and irrigation projects in the West.

Six of the projects are sponsored by the Bureau of Reclamation. The seventh involves construction equipment for a section of the Grand Coulee Dam. The units affected by the orders had potential generating capacity of 829,100 kilowatts, although rearrangements of available generating units reduces this figure to a net loss of 679,100 kilowatts.

Builders are prohibited from continuing construction or installation on the projects. Exceptions are made, however, for construction solely for the purpose of safety or health or to avoid undue damage to or deterioration of materials. In such cases the stop date is Nov. 15 unless specific authorization is given to continue beyond that date.

Projects affected include: Davis dam; Colorado Big Thompson project; Keswick dam; Anderson Ranch project; Shasta dam; Grand Coulee dam (equipment for the east power house and completion of a part of the west power house).



# Accident Prevention Hailed as Contribution to War Program

CHICAGO

INDUSTRIAL accident death rates are on the increase despite efforts to reduce them, and threaten to continue upward as more and more over-age, inexperienced, physically under-par workers are drawn into war work and as the supervisory load gets constantly heavier. These facts were revealed at the opening of the thirty-first National Safety Congress and Exposition, here, last week by Col. John Stilwell, president, of the National Safety Council.

President Stilwell, who is vice president, Consolidated Edison Co. of New York Inc., New York, warned that "further increases will inevitably occur, unless by terrific, concentrated effort we who know how accidents can be stopped can give even greater power to that knowledge.

"Accident prevention is a profession; we are its practitioners," he continued. "Ours is the responsibility, and we dare not think of failure. We face the bald fact that, unless we can prevent them, industrial accidents alone will this year disable 160,000 more workers than were hurt in 1941. Such losses are aid and comfort to the enemy which we cannot afford to give him. They are treason. They are sabotage.

"In this dynamic present, our past shall stand us in good stead, for the nation has laid at our door a job we dare not fail to do. We must cut our accident rates, our loss of productive manpower and womanpower, we must do it now. We must do it unmistakably, with such clean-cut results that we shall deserve beyond question the support and co-operation we are asking," Col. Stilwell declared.

## Accidents Weaken War Effort

"We have done well in the past, when an accident prevention program was the wise, sensible, decent, profitable course to take. Now that we realize our mortal danger as a nation, we know that safety is all of these things—and far more. Safety now is a grim necessity; safety is essential time; safety is production of the tools of war; safety is a part of victory and a part of the ultimate peace."

In conclusion, Col. Stilwell said: "Because safety conserves our manpower, it means much to our country in its present danger. Express our contribution in whatever way you will, it can mean only more weapons, more ships, and in the

end a shorter war and a surer victory. Productive man-hours saved mean casualties reduced among the men in uniform as well as among men in overalls. Never has the safety movement faced such a challenge and such an opportunity as it does today."

The number of man-days lost annually in the United States through accidents is sufficient to build 23,000 four-motored bombers and an army of 200,000 could have been supplied with this vanished time and energy, declared William A. Irvin, director and former president, United States Steel Corp., New York, in speaking on behalf of the National Safety Council's War Production Fund to Conserve Manpower.

## \$5,000,000 Fund Sought

"The annual cost of this prodigal waste of humanity has been estimated at four billions," he declared. "This amount would suffice to run our ten biggest cities for three years. It represents an assessment of \$88 for every family in the United States.

"Last year over 100,000 persons, about the population of South Bend, Ind., were killed by accident. About half of these were workers. In fact, someone got killed every 5 minutes around the clock, and someone was hurt or laid up premanently every 3½ seconds. Only four diseases were greater enemies of human life than are accidents.

"Accidents are killing off 100 Americans for every 36 Germans and every 21 Japs."

President Roosevelt issued a proclamation before Pearl Harbor which emphasized the alarming increase in accidental deaths and injuries, an increase so great as to be a menace to a nation shadowed by war, and specifically called on the National Safety Council to take the lead in reversing the trend.

It was estimated that \$5,000,000 would be needed by the council to carry out its new wartime assignment, and to raise this fund the War Production Fund to Conserve Manpower was organized. Mr. Irvin reported that efforts so far have brought in subscriptions of over \$1,000,000, one-fourth of which is at work in the field.

Reporting on the council's wartime program, Executive Vice President Ned H. Dearborn said that its facilities and energies are being devoted wholly to carrying out its assignment to aid the war production effort. Conversion of

the council from peacetime to a wartime basis of operation is now complete. In general, recent activities have been directed toward:

1. Pushing as intensively as possible existing services and activities in war industries and war production areas.

2. Developing contacts with, and gaining the initial interest of, major organizations, agencies and groups whose co-operation will be needed in carrying out the expanded wartime program.

3. Completing definite programs of expanded activities for war production industries and areas, and formulating definite plans of procedure for putting these programs into effect.

4. Strengthening the organizational facilities of the council for its wartime assignment through the addition of immediately needed personnel.

Mr. Dearborn stated that excellent co-operation is being obtained so far. Among various accomplishments are special safety programs designed especially to reduce accidents directly affecting the war effort put into operation at the request and with the assistance of the War and Navy Departments at a number of ordnance plants and shipyards.

The special problem of war industry is fatigue, declared Dr. Morris Fishbein, editor, *Journal of the American Medical Association*, Chicago, in addressing the council's Automotive and Machine Shop on "Saving Manpower for War Power". Fatigue, he said, is a problem to which medicine today is giving the most serious consideration.

## Fatigue Contributing Factor

"Ill health and fatigue are associated frequently with accidents. Accidents in the industries of the United States cause a loss of approximately 1,500,000,000 man-hours of production each year. Illness causes 15 to 20 times as many cases of absenteeism and about seven times as much loss of time from work as accidents. During a 12-hour day, women workers experienced 2.73 and men workers 1.14 times as many accidents as they did subsequently during a 10-hour day. Industrial accidents, according to investigation by the U. S. Public Health Service, are due to a complex of causes in which speed of production and fatigue are determining factors."

\* "More and more new people are coming into industry. Inexperienced and unskilled workers are more easily fatigued than experienced and skilled workers and are, therefore, more susceptible to accidents," Dr. Fishbein warned.

Substitutes for materials required by war has confronted industry with the

(Please turn to Page 145)



# PRIORITIES-ALLOCATIONS-PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, July 6, 1942

## M ORDERS

- M-9-c-4 (Amendment): **Copper**, effective Oct. 28. Permits use of not more than 25 pounds of copper for building repairs and then only if in possession of user on Oct. 27. Restricts delivery of copper building products to scrap dealers, brass mills, or government agencies, particularly Copper Recovery Corp.
- M-81 (Amendment): **Tin Plate, Terne Plate**, effective Oct. 20. Prohibits use in packing pyrethrum and rotenone base insecticides. Limits maximum standard coating on cans for apples and applesauce to 1.25 pounds per base box of tin plate.
- M-136 (Amendment): **Black Plate**, effective Oct. 26. Removes restrictions on use of chemically-treated black plate established in original order. Raises black plate quota for packing lye to 100 per cent of 1941 pack but restricts containers to 13 ounce cans. Adds to list of permitted uses for black plate containers: packing only in 45-pound cans, hardened edible oils, lard, rendered pork fat and edible tallow; restricts amount of black plate for this purpose for final two months of 1942 to 10 per cent of 1940 pack in containers 45 pounds and larger. Restricts sizes of slip-cover style cans and sizes for packing printing, duplicating and lithographing inks.

## P ORDERS

- P-19 (Amendment): **Construction**, effective Oct. 26. Provides that form PD-200B must be used for all applications for amendments to construction projects authorized by a P-19 preference rating order. This form should be used for requests for a higher rating and for items not previously authorized, or for increases in quantities previously authorized.
- P-115 (Amendment): **Canning Plant Maintenance and Expansion**, effective Oct. 27. Allows fruit and vegetable packers higher preference ratings for material and machinery for replacement, maintenance and repair. Order now also covers fish packers.

## L ORDERS

- L-18-c (Supplementary): **Vacuum Cleaners**, effective Oct. 26. Freezes stocks of all types of cleaners in hands of manufacturers, wholesalers and retail dealers until Jan. 1, 1943. Sales permitted only to Army, Navy, Lend-Lease and holders of export licenses issued by BEW. Manufacturers must file by 10th of each month reports showing shipment and delivery of all vacuum cleaners during preceding calendar month. Wholesalers and retail dealers must file copies of all purchase orders by 10th of each month. Restrictions cover demonstrators but not second-hand cleaners.
- L-30-c (Amendment): **Household Utensils**, effective Oct. 28. Provides that types of cast iron kitchenware be cut from about 200 different items to about 12. Restricts amount of iron which may be used in production of these articles.
- L-197 (Amendment): **Steel Shipping Drums**, effective Oct. 23. Prohibits sale or delivery of new drums on or after Sept. 14 pursuant to sale thereof; on or after Nov. 7 prohibits sale or delivery of new or used drums unless bottom plate is marked "X"; prohibits packaging products manufactured on or after Sept. 14 in new or used drums.
- L-206: **X-ray Equipment**, effective Oct. 20. Prohibits manufacture of any models or types other than those listed in Schedule A, attached to the order. Sales, transfer, or delivery is prohibited except to the Army, Navy, Maritime Commission and the War Shipping Administration, or to other persons establishing their need on PD-556 and receiving WPB authorization.
- L-211: **NE Steel Products**, effective Oct. 23.

Establishes specifications and restricts sizes and shapes of products. The first two schedules cover railroad and transit service wheels and tires and concrete reinforcement steel.

## PRICE REGULATIONS

- No. 12 (Amendment): **Brass Mill Scrap**, effective Oct. 29. Establishes maximum prices for tinned copper scrap at 9.62½¢ per pound for heavy scrap, sheet, tube, rod and rod ends, and 9.37½¢ for turnings. Extends definition of brass mill scrap to embrace unused sheet, rod, tube or other brass mill products sold to a brass mill for remelting.
- No. 2 (Amendment): **Aluminum Scrap**, effective Oct. 28. Excludes from operation of scrap ceilings transactions in aluminum scrap pursuant to written toll or conversion agreements approved by the WPB. Parties to such agreements must file reports with OPA, giving details of the transactions, within 10 days. Outstanding toll agreements must be reported by Nov. 20. Toll processors must report to OPA by 15th of each month detailing all toll transactions of the preceding month.
- No. 71 (Amendment): **Cadmium**, effective Oct. 26. Permits sellers to use adjustable pricing contracts.
- No. 246: **Farm Equipment**, effective Nov. 15. Establishes maximum prices for all except new items at those levels in effect March 31, 1942. Permits adjustments of prices of items which have been changed in design, specification, or equipment since that date.
- No. 248: **Manganese Ore**, effective Nov. 9. Provides ceiling for all domestic sales of manganese ore of every kind other than domestic battery or chemical ores, to any private buyer, as follows:  
 1. For metallurgical ores of base analysis of manganese 48 per cent, iron 6 per cent, silica plus alumina 11 per cent, and phosphorus not over 0.18 per cent on dry basis, 85 cents for Mobile and New Orleans, 90 cents for Norfolk, Baltimore, Philadelphia and New York, 96 cents for Fontana, Pueblo and Provo.  
 2. For battery and chemical, other than domestic; a. highest charged for March deliveries; b. if no deliveries, highest quoted list price; c. price approved by OPA if not determined under a. or b.

## Electronic Equipment Output Control Tightened by WPB

Further control over the production of electronic equipment has been established by Limitation Order L-183-a.

Producers have been ordered, after Jan. 1, to schedule, within any single priority rating, production and deliveries of electronic, communication, detection, and signaling equipment according to numerical designations assigned by the "Precedence List" of the Joint Communications Board of the Army and Navy.

The "Precedence List" designations, which set forth the relative urgency of deliveries of certain types and quantities of electronic equipment, operate only within any one priority rating category. They do not affect the scheduling of purchase orders having different priority ratings nor purchase orders not included in the "Precedence List." Producers of electronic equipment are directed to transmit to their suppliers or fabricators

of components or parts "Precedence List" designations with quantities and delivery schedules. The designations, however, do not affect raw materials.

Although the Order becomes effective Jan. 1, 1943, producers are requested to reschedule their deliveries before that date, where feasible, and where they can be rescheduled without disrupting production efficiency. It was emphasized, however, that rescheduling resulting from the provisions of L-183-a, must not cause a delay in the delivery of purchase orders of equal or higher priority ratings not bearing "Precedence List" designations.

## Freight Car Parts Prices Controlled by Regulation 136

Sales by car builders to railroads of partially or wholly fabricated car parts, usually produced and sold in such form for use in repairing and maintaining railroad freight and passenger cars, are not subject to the pricing provisions of Maximum Price Regulation No. 174, (freight car material sold by car builders), according to OPA.

Maximum prices for such parts are to be determined under Maximum Price Regulation No. 136, (machines and parts and machinery services).

To clear up any misunderstanding that might exist in the trade, however, Amendment No. 1 to Maximum Price Regulation No. 174 has been issued, clearly excluding such parts from that regulation's coverage. The amendment became effective Nov. 2.

## Toll Agreements Treated as Contracts in OPA Ruling

Transactions in aluminum scrap pursuant to written toll or conversion agreements approved by the WPB have been excluded from the operation of scrap ceilings by the OPA.

Parties to such agreements, however, must file reports with OPA, giving full details of the transactions within ten days after the agreements are entered into. Outstanding toll agreements must be reported by Nov. 20, 1942. Also, on or before the 15th day of each month, beginning Nov. 15, toll processors must file reports with OPA detailing all aluminum scrap toll transactions of the preceding month.

Under the action, toll agreements are treated as contracts to perform a service, instead of purchases and sales, and the fee which may be charged is limited to the difference between the maximum price for the scrap and the maximum price for the material into which it is converted.



# WINDOWS of WASHINGTON

*Friendly treatment accorded manufacturers renegotiating war contracts. Many worries unnecessary. Staff of attorneys and accountants not needed. Presentations receive courteous attention*

IN RECENT months many industrialists have worried themselves nearly sick over fears of what might happen to them and their businesses as a result of renegotiation of government contracts under Public Law No. 528.

Experience has proved these fears to be entirely unwarranted. It can be stated without reservation that the great majority who have had their contract prices adjusted are well satisfied with the treatment they received.

To understand a law and its implications it is necessary to examine, first, the law itself and, second, its administration.

Nobody in Washington regards Public Law No. 528 as a really good law, even now that the much criticized Section 403 has been sharply amended in the new federal tax law signed by President Roosevelt on Oct. 21. When 528 was under debate, prior to its enactment on April 28 of this year, one determination was shared by all members of Congress—there must be no profiteering in this war. Opinions varied widely; many Congressmen believed that a profit limit, say 6 per cent, should be stipulated. The armed forces protested, pointing out that the law should not only safeguard the country against unduly high profits, but that it also should be sufficiently flexible in order that all war contractors might be kept in good financial health and able to continue to provide war *materiel* in maximum volume.

## Up to Armed Services

Congress thereupon, in effect, said to the armed forces: "All right, you take the job". Hence it was that Section 403 was written in such a loose indefinite way.

In this case, as in many others, therefore, the spirit in which the law is administered is the all important thing. In the first place, anybody who has ever had experience with the Army and Navy knows that these agencies have a record for encouraging rather than discouraging industry and enterprise. Hence it was only to be expected that they would place responsibility for administering Public Law 528 in the hands of men qualified by experience and temperament to deal fairly with industry.

The chairmen of the Army, Navy and Maritime Commission Price Adjustment Boards are, respectively, Maurice K. Karker, K. H. Rockey and T. M. Woodward. Mr. Karker is chairman of the

Jewel Tea Co., Chicago. Mr. Rockey is president of Rio Blanco Copper Corp., New York, and a director of Philip Morris & Co. Mr. Woodward is an attorney, who has practiced in Philadelphia and Washington. He was appointed a member of the Maritime Commission in April, 1937, and is vice chairman of the commission.

It has been claimed by some critics that renegotiation depends on the judgment or whims of the particular board involved. Nothing could be further from the truth. The three boards continually are in close contact. They discuss mutual problems and set up unified policies. The result is that the contractor will receive just about the same treatment no matter which of the three boards he deals with.

One thing about the boards should be clearly understood. They do not function as trial bodies. When a manufacturer is to appear before one of these boards he will do well to go alone, or with one or two informed assistants, in the full knowledge that he will meet with friendly treatment. He should have with him his copy of the contract and he should have a balance sheet showing his financial position, costs, salaries, profits, so broken down as to permit quick and intelligent conclusions.

He distinctly should not, as many of them have done, appear before a board flanked by attorneys and accountants, prepared to argue defensively about interest, depreciation, amortizing loans, advertising expense and so on.

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## War Housing Construction Averages 3100 Units Weekly

Since Sept. 1, war housing construction started by private builders operating under FHA war housing insurance program has averaged approximately 3100 dwelling units per week.

In the eight weeks ended Oct. 24, construction of 25,100 dwelling units for war workers was started under FHA inspection.

Because of the urgent necessity for conserving critical war material, war housing is designed and located so as to consume minimum amounts of such material. Only those projects for which there is clearly an imperative need in the interest of the war effort are undertaken.

In essence, the theory which underlies the boards' practice may be summarized about as follows: "The objective in renegotiating contracts is to reset the contract price at a figure that would have been agreed on originally had both parties been able to forecast costs".

The boards review the operating profits of companies on an overall basis with respect to their government business and do not actually go into the individual contracts. The review, in effect, covers total results of all the contracts the company has with the government.

In such overall renegotiation all factors involved are considered. If a manufacturer invested his own capital in his plant facilities he gets more profit margin than if they were financed by the government. A contractor who requires six months to make a given item is treated on a different basis than one who produces other items on a mass production schedule. Due consideration is given to the contractor's capital structure, to his funded indebtedness. His gross income and his dividend record over a period of years are analyzed. Existing salaries are compared with those paid in previous years.

## Boards Are Fair

In general, it may be said that the boards are fair or more than fair in deciding what rate of profit the average contractor may retain. It is known that in one case, where special factors were involved, a board adjusted a price to permit a profit of 22 per cent, before taxes; it was the opinion that a profit margin of this size was necessary in order to maintain the particular contractor involved in an efficient condition to produce war *materiel*.

Too, the boards know that even in cases where they might err slightly on the side of liberality, the federal income tax always is there to prevent even any slight trend in the direction of profiteering.

Under renegotiation, profits, as related to sales, can vary materially. The boards feel that what is fair for one company would not always be fair with respect to another.

One manufacturer recently came away from a session with a board saying that the Price Adjustment Boards are "a Godsend" to industry.

"When we actually got going our costs proved to be much lower than we had calculated in the beginning. We were set to realize more than 100 per cent in profit on our contract price, and that worried us. Our contract came to around \$16,000,000. We have turned



over \$9,000,000 of this to the government. We still make a good but a reasonable profit. Now we know where we stand and we feel a lot happier."

Most manufacturers feel the same way after they have had their contracts examined and adjusted where that is decided on. Many, as is quite well known, voluntarily offered to adjust and did not wait to have their contracts assigned to Price Adjustment Boards.

However, there are certain men in industry who have not hesitated to benefit unduly as a result of huge profits on government contracts. One salary in one company, for example, was increased from around \$20,000 a year to just below \$600,000 on the theory that the compensation should be in ratio to the company's gross income. In another company a salary was increased from \$12,000 to \$260,000 without any real justification.

In such cases the boards feel that it is within the power of the board of directors of a company, subject to rulings by the Director of Economic Stabilization, to determine what salaries it will pay the officers. When the boards review salaries, therefore, they merely regard them as costs, so that if they seem to be excessive under a fair yard stick they would not be allowed in arriving at the proper margin of profit. It is then

left to the companies themselves to decide what disposition should be made of the profit.

Thus one of the objectives of the boards is to screen out a few "bad" boys who could blast all industry, good and bad alike, in the court of public opinion. The action of the boards is thus safeguarding industry's reputation. It is protecting industry from the postwar charges of World War I as to "merchants of death", "blood money", "war-mongers", "profiteers."

Manufacturers who have ascertained their costs and who therefore have a knowledge as to their profits have much to gain by asking for an examination of their contracts. By taking such action they are to get a quick adjustment if that proves warranted. This will put them in the comfortable position of knowing where they stand financially. Later on, under the law, their contracts will come up for review, but, if the original calculations have been approximately correct, any final changes should be slight.

A lot of charges have been advanced that Public Law No. 528 is "unconstitutional". Whether or not that is true evidently is of little concern to anybody in Washington. The question is regarded as being beside the point which is that the public demands protection

against profiteering. Too, the great majority of industrialists are interested in keeping their war profits record clean. Hence legislation was necessary. If the present law were repealed something else, possibly worse, might replace it. Hence, informed observers see no reason for any further immediate changes in the existing law as now amended. They point out that under the present law a real job is being done.

One of the objections to Section 403 that has been removed by an amendment was that contracts might remain subject to renegotiation until three years after the war. In part this objection is met by an amendment specifically authorizing final agreements discharging any liability under the statute. In other words, there is to be no "re-renegotiation"; settlements will be final and binding. Another amendment prohibits renegotiations after one year from the close of the fiscal year in which the contract or subcontract was completed or terminated. Another amendment authorizes a contractor to file financial and cost statements for a fiscal period and obtain final clearance under the statute unless the secretary of the armed force involved in the transaction begins renegotiation within one year thereafter.

The latter amendment takes care of cases where the contractor's profits prove to be considerably larger than he estimated in advance at the time he applied for clearance. It may be stated parenthetically here that the Price Adjustment Boards believe that no action that might cause a contractor to lose incentive should be taken. Suppose that a contractor made a greater amount of profit during a year than he had estimated at the beginning of the year; if he made the additional profit through finding improved and lower cost methods of manufacture he would be allowed to keep the additional profit as long as it is not too much out of line.

### Must Exceed \$100,000

Another frequent objection has arisen from doubt as to whether all of the war contracts of the manufacturer from the time of the law's enactment to the end of the war are subject to renegotiation, if the total amount of such contracts is over \$100,000. This objection has been met by an amendment which provides that the statute shall not be applicable if the aggregate sales under war contracts by the contractor or subcontractor do not exceed \$100,000 for a fiscal year.

Widespread misapprehensions that the law did not permit overall renegotiation of all war contracts of a contractor or subcontractor for a fiscal period but required that each contract must be renegotiated separately are eliminated by

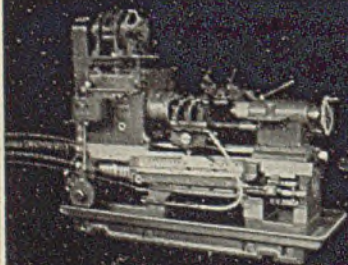
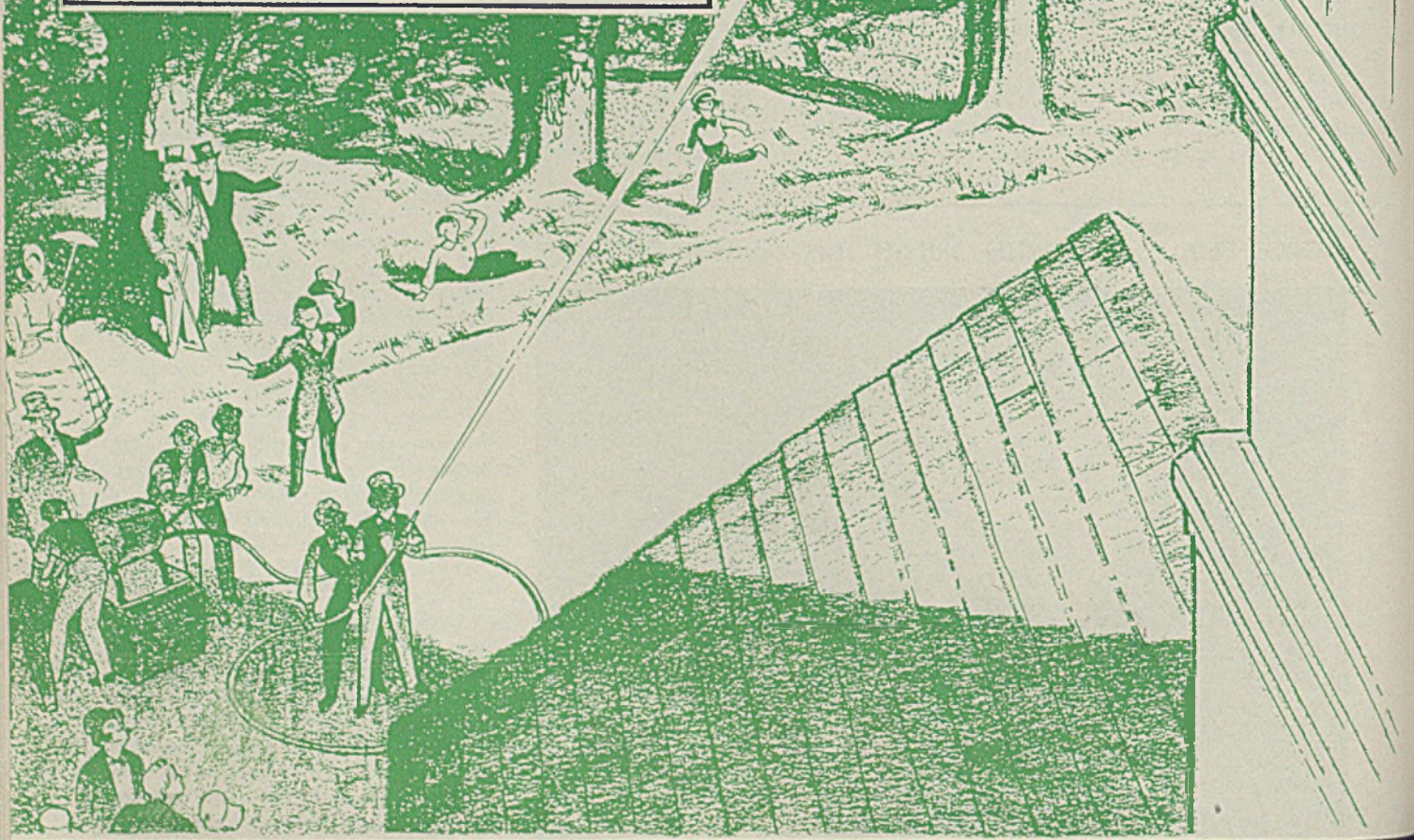
## MORGENTHAU TALKS WITH BRITISH INFORMATION MINISTER



HENRY MORGENTHAU JR., United States Secretary of the Treasury, visits with Brendan Bracken, British Minister of Information, at a London conference. Mr. Morgenthau is in London to confer with Sir Kingsley Wood, Chancellor of the Exchequer. NEA photo



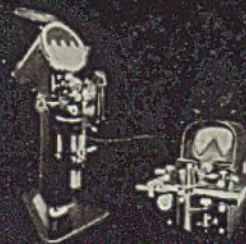
**A**SAHEL HUBBARD gave the order. Governor Clinton and other distinguished observers watched. Four men turned the cranks of the "Rotary Hydraulic Engine." Up over the top of the South Meeting House steeple it drove the water to prove, visibly and conclusively, the success of Hubbard's invention. Said the Vermont Journal of December 17, 1828, "It has propelled water to the height of 85 feet as ascertained by accurate measurement on the steeple. This engine has been examined by many experienced mechanics and other scientific gentlemen who, after witnessing its operation have universally given it preference over any other Hydraulic Engine which has come under their observation." The next year, starting with \$50,000 capital, Asahel Hubbard founded the National Hydraulic Company. Thus began a long chain of industries that comes down to Jones & Lamson Machine Company.



FAY AUTOMATIC LATHES



AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



AUTOMATIC OPENING DIE HEADS



# OVER the TOP - in 1828

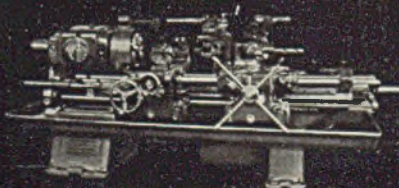
“OVER the top” might well have been the motto of the National Hydraulic Company. And this same motto might well do for the Jones & Lamson Machine Company today, but for an entirely different reason. Now we are going “over the top” on a 24-hour, 7-day week to meet the demand of the national emergency. The same willingness to work, the same disinclination to accept easy and conventional solutions as well as the same

eagerness and confidence that founded this industrial community over a century ago, are continuing unabated. Whether your problem is today’s production or one of adaptation to a post-war world . . . whether your company is large or small, your inquiry will receive the careful, detailed study of our engineers. Send us your inquiry today and ask for our illustrated catalogs.

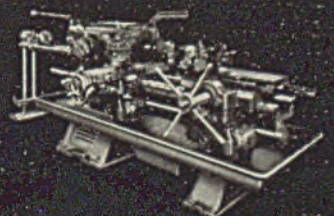
## JONES & LAMSON MACHINE COMPANY

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

*Springfield, Vermont*  
U. S. A.



SADDLE TYPE  
UNIVERSAL TURRET LATHE



RAM TYPE  
UNIVERSAL TURRET LATHE

PROFIT PRODUCING  
MACHINE TOOLS



an amendment providing that where a contractor or subcontractor holds two or more war contracts, renegotiation may be had with respect to some or all of such contracts as a group without separately renegotiating each individual contract.

This is in line with the previous policy of the boards in making overall studies of a contractor's financial position. It also is made clear that only war contracts are subject to renegotiation, and a contractor's non-war profits are segregated and not considered in renegotiating.

Concern frequently has been expressed that a contractor will be required to pay taxes on his profits and then be required at a later date to refund these profits as a result of renegotiation. Thus the contractor would pay twice, once in the form of taxes and the second time by a refund of excessive profits. While it seemed plain that the original law did not intend such double liability, an amendment clarifies this feature. It directs that, in determining the amount of excessive profits, the armed forces shall allow the contractor or subcontractor credit for the amount of federal income and excess profits taxes paid or payable with respect to such excessive profits.

One feature of the recommendations made before Congress by the armed forces when Public Law 528 was up for

revision bears out further what has been said above about the spirit in which the renegotiation law is administered. That was the opposition to any fixed profit limitation. They took the attitude that profits should be a reward for performance and that they should be judged in terms of relative performance and not on the basis of flat percentages. It is the announced policy of the armed forces that low-cost producers are to be rewarded with larger profits.

## Amendments to Act Summarized

Amendments to Section 403 of the act providing for renegotiation of contracts, as approved by the President last week, and discussed in the foregoing article, are officially summarized as follows:

(1) **RENEGOTIATION OF TREASURY CONTRACTS:** Contracts with the Treasury Department, which makes many of the lend-lease contracts and subcontracts thereunder, also are made subject to renegotiation.

(2) **FINAL AGREEMENTS:** When a contractor or subcontractor has renegotiated in good faith for a specified period and agreed to eliminate excessive profits for such period, he is entitled to assurance that the matter will not be reopened at a later date. The statute did not provide expressly for any final clear-

ance for liability for excessive profits. Amendments now specifically authorize such final agreements for a specified past or future period.

(3) **STATUTE OF LIMITATIONS:** Two provisions effect a statute of limitations on renegotiation. One prohibits renegotiation after one year from the close of the fiscal year in which the contract or subcontract was completed or terminated. The other authorizes a contractor to file financial and cost statements for a prior fiscal period and obtain clearance under the statute unless the Secretary begins renegotiation within one year thereafter.

(4) **OVERALL RENEGOTIATION:** Under the original law when a contractor or subcontractor held a number of war contracts or subcontracts, the boards had found it desirable to renegotiate with him to eliminate excessive profits on these contracts or subcontracts as a group, or on an overall basis instead of individually. Section 403 authorized renegotiation of contracts individually. In view of the board's practice of considering contracts as a group, the group renegotiation has been formalized as part of the statute. Excessive profits are determined by an overall study of a company's financial position and the profits, past and prospective, from its contracts are taken as a whole rather than by analyzing each individual contract on a unit cost basis. The statute does not confer any authority of renegotiation with respect to profits on contracts other than war contracts and all commercial or non-war profits are segregated and no renegotiation with respect thereto takes place. The statute provides that a renegotiation clause shall be inserted in every war contract of \$100,000 or more.

(5) **ELIMINATING EXCESSIVE PROFITS:** With respect to prospective profits it always was desirable to eliminate such profits by reductions in contract price or by revision in the contract terms instead of by recapture or refund. An amendment clarifies these provisions and permits any combination of these methods to be used.

Some subcontractors expressed concern that even though the price reduction is made as agreed, the subcontractor still might be liable for the excessive profit if for any reason the government failed to receive the benefit. While, the War, Navy and Maritime Commission Price Adjustment Board did not place such an interpretation on this part of the statute, the possibility was removed.

(6) **OFFSET:** The statute made no express provision for offsetting taxes paid by a contractor against any amount of excessive profits found to exist by renegotiation under the statute. In the

## NATIONAL SERVICE LEGISLATION "INEVITABLE"



PAUL V. McNUTT, chairman of the War Manpower Commission, appeared recently before the Senate Military Affairs Committee, and stated that national service legislation is inevitable, and "that the question of timing is in the hands of President Roosevelt." NEA photo



absence of such offset the contractor might have been forced to pay twice, once in the form of taxes and second, by refund of excessive profits. The statute is now amended, allowing credit for federal income and excess profits taxes paid or payable on the profits being refunded.

(7) **EXEMPTIONS FROM RENEGOTIATION:** The law provides for certain statutory exemptions as follows:

(a) The statute is amended permitting the secretaries of the War, Navy and Treasury Departments and the chairman of the Maritime Commission to exempt from renegotiation contracts or subcontracts at firm prices for specific periods if in their opinions the provisions of the contract or subcontract are otherwise adequate to prevent excessive profits.

(b) Also exempted from renegotiation are prime contracts and subcontracts made with other federal or local governmental agencies or a foreign government.

(c) The secretaries of War, Navy and Treasury and the Maritime Commission are authorized to exempt contracts from renegotiation when the profit can be determined with reasonable certainty when the original price is agreed upon, such as those for personal services, for the purchase of real estate or perishable goods or for commodities at a minimum price fixed by a regulatory body and contracts to be performed in a short period.

(d) Any contract or subcontract for the product of a mine, oil or gas well, or other mineral or natural deposit, or timber, which has not been processed, refined, or treated beyond the first form or state suitable for industrial use is exempted from the operation of the statute: and the secretaries are authorized by joint regulation, to define, interpret, and apply this exemption.

(e) Contractors and subcontractors whose aggregate sales for war purposes are less than \$100,000 in a fiscal year are exempted.

**OTHER CHANGES:** The following clarifying changes have been made in the statute:

(a) Excessive profits may be eliminated through a reduction in the contract price or otherwise as the secretaries of War, Navy and Treasury and the chairman of the Maritime Commission may direct.

(b) A contractor or subcontractor may be required to refund excessive profits only if they have actually been paid to him.

(c) The secretaries may fix a period or periods for renegotiation in the contract.

(d) A contractor is liable for reductions in the subcontract price only if he receives the benefit of the reduction.

(e) The secretaries of War, Navy and Treasury and the chairman of the Maritime Commission are required to recognize the properly applicable exclusions and deductions of the character allowed under Chapters 1 and 2 E of the internal revenue code.

## Government Publications Curtailed by the War

Up to July 1, 1941, the United States government was one of the world's leading publishing organizations. Government publications covered a vast variety of subject matter. You could get a pamphlet telling how to 'relieve your baby of colic. You could get cooking recipes and practical housekeeping information. If you had soil problems, insect problems, or if you required information about cattle breeding, or crop production, all you had to do was write to the proper government agency and a book on the subject could be had.

Starting in July of last year many of these publications have become war casualties. The trend was sharply accelerated when realistic Elmer Davis became head of the Office of War Information. Recently Mr. Davis announced that 239 government publications had been eliminated for the duration of the war, while an additional 284 had been curtailed both as to size and number of copies distributed.

At the same time Mr. Davis appointed an Inter-Agency Publications Committee which now is requesting the various agencies to justify continuance of publications not yet affected by the new order. This examination will bring elimination or curtailment of many others.

Mortality has been particularly heavy among Department of Agriculture publications. "Planning for Farm Plumbing", "How To Build a Sound Co-operative", "Poultry Husbandman", "Recreational News Letter", "Construction Hints", "Planting Quarterly" are among dozens of discontinued titles.

Among Department of Commerce discontinued publications are such titles

## Correction

It was stated erroneously under Windows of Washington in STEEL, Sept. 28, that 718 Jackson Place, Washington, was the headquarters of the Republican National Committee when Mark Hanna and Boies Penrose held sway. As a matter of fact, the Republican National Committee had its quarters in this building from 1934 until it recently moved to 1337 Connecticut avenue, Washington. Mark Hanna died in 1904 and Boies Penrose in 1921.

as "Jewelry Store Credit", "Installment Loans to Consumers", "New Automobile Financing".

"Children Born Out of Wedlock", "Causes of Stillbirth" are publications postponed indefinitely.

Each publication is studied carefully in order that all that serve a useful purpose in time of war may be continued—at least in modified form.

## Washington Hotel Operators Must Also Serve as Banks

When you go to the cashier's window in your Washington hotel to cash a check it may seem like a routine matter to you. To the hotels, however, the matter of cashing checks has become a major headache. Among the regular guests of the larger hotels are men who think nothing of presenting a check ranging from \$500 to \$1000 in face value.

Important corporations maintain regular quarters in Washington hotels and their representatives are likely without warning to present a check calling for all the way to \$5000 in cash. In addition, a large number of Washington business men, members of Congress and key government officials carry credit cards and instead of drawing money out of the banks during banking hours, stop in at a hotel and cash checks in the evening.

"This all adds up," states the manager of one of Washington's typical larger hotels. "We cash checks each day for an average total of about \$40,000. In addition, we need funds to operate all the various departments, including restaurants, barber shop, cigar counters, and so on. Our various banks altogether must add up to about \$70,000 which has to be in the house at all times in order to insure smooth operation. If we happen to fall much below this level things start to slow up and guests complain."

In addition to this matter of having enough money on hand, hotels here are beginning to suffer from a number of shortages. The worst is the shortage of help, and it is expected that self service, as in cafeterias, will become more general. Second is the difficulty of obtaining hotel supplies made of metal. Some hotels now are doling out sugar and restricting guests to one cup of coffee but the practice in this respect is not uniform.

## Lend-Lease Operations Reach All-Time High in September

Lend-lease goods transferred and services rendered in September reached a peak of \$643,000,000, according to E. R. Stettinius Jr., administrator. This compares with a previous peak of \$600,000,000 in July, and with \$565,000,000 in August.



# BRASS AT WAR



for the armies  
of the past



## for the United Nations NOW

**T**HROUGH the centuries, brass has moved up on the Active List of martial uses from the scale armor of the ancient days... to the brass cannon of the American Revolution... to the shells and cartridges of World Wars One and Two.

Now, brass is buckling into its greatest job... helping to build up the firepower of all United Nations fighting forces to an irresistible, ceaseless blast that will finally end in the long quiet of a victorious peace.

This is the fifth war in which Bristol Brass has helped to arm the Army and Navy of the United States. Today, brass from Bristol is roll-

ing out in ever-mounting quantities... rolled and drawn to closer limits of precision than ever before. So in plants all over the world, Bristol sheet, rod and wire are making it possible to reach and maintain higher levels of speed and quality in fabrication of war material... And Bristol will keep the brass rolling... *until the Axis stops rolling.*

## Bristol Brass

THE BRISTOL BRASS CORPORATION • BRISTOL, CONNECTICUT

*Makers of Brass Since 1850*

★ BUY WAR BONDS TO BUY BULLETS ★



# MIRRORS of MOTORDOM

*Whither 3½ billion dollars of war products? . . . Industry now producing 50 per cent ahead of peak peacetime rate. . . Machinery demand tapers. . . Criticize timing of scrap drives*

## DETROIT

IN TEN months of the current war-year, the automotive industry will have shipped close to 3½ billion dollars worth of war products, and daily output is proceeding at the astonishing rate of something under 20 million dollars worth, which is easily 50 per cent beyond the best production ever achieved in peacetime. This is no idle boasting; it is merely recitation of the hard facts, in terms of dollars instead of units because of censorship limitations. If the total figures on number of shells, tanks, trucks, guns, aircraft assemblies and all the rest of the military items could be presented here, the only logical question the reader could ask would be: Where has it all gone?

Certainly if the uncensored comments of Wendell Willkie are to be taken at their face value, this tremendous outpouring of weapons has not gone to the United Nations he visited in anywhere near the promised volume. The producers of all these weapons do not know what happens to them once the Army or the Navy or the air force takes delivery. Naturally they can see, as can anyone around here, thousands of trucks parked in storage lots and distribution depots awaiting transfer to theaters of action. They can see hundreds of combat airplanes awaiting dispatch at the military airport outside Detroit. They can see the tanks leaving by the daily trainload. Beyond that, they can offer no suggestion as to what happens to the \$100,000,000 worth of war goods turned out every week by the 850,000 men and women now at work in the automotive and allied industries.

### Choked with Weapons?

Difficulties of transoceanic transportation are acknowledged to be serious and since tanks and trucks must move by ship, the pipeline which feeds them to the battlefield is of restricted size. But airplanes, light guns and shells can all be moved by air transport, so there should be no serious bottleneck in these commodities when it is realized that manufacturers are now building close to 5000 planes a month, 60 per cent of them combat types. It may be said that pursuit planes and fighter craft, having limited range, cannot be flown to fighting fronts. Why not, then, knock them down and move them to the field in bombers and transport airplanes?

Admittedly there is a lot of war stuff packed into the British Isles, waiting the

day when, along with troops, it will move somewhere. But where? It will take ships again to transfer this equipment to the fight.

The suspicion has been voiced by more than one observer that this country is becoming choked up with the vast outpouring of weapons from industry because military leaders are not yet determined to get the equipment into action, because they are preferring to "hoard" the material until they can be dead sure just what to do with it. This defensive policy and delaying action would appear to be playing right into the hands of our enemies, who have boasted all along that American production would not arrive in battle in time to make any change in the result.

### Council Makes Good on Pledge

Nearly a year ago, the Automotive Council for War Production, now including over 400 manufacturers and suppliers, adopted this pledge:

*"The Nation will not lack for one gun, one tank, one engine, that the capacity and ingenuity of this industry's producers can add to the forces of our nation and its friends on all the fighting fronts."*

The council has made good—perhaps too good—on this pledge as far as production is concerned. But day-to-day developments on the fighting fronts seem to suggest that somewhere between the end of the assembly lines and the field crews paralysis has set in.

On behalf of military staffs it must be said that their global job came into being almost overnight. Their personnel had been depleted for years and now is going through all the inefficiencies of hasty organization and expansion. Industry has been trained for decades in planning and executing a masterful production job. Distribution and employment of new weapons on a worldwide scale are things for which this country's military leaders have been illy suited because of lack of numbers and experience. A heartening sign is to see industrial leaders with the ability to do exceptional organizing jobs entering the service to help solve the enormous supply problems now being faced. More of these able executives likely will be needed if the job is to be done. They will have to turn over the production reins to less experienced hands in their manufacturing organizations.

### Break in Machinery Demand

After about three years of the most in-

tensive pressure for new machine tools to equip new and converted war plants, machinery sales interests report a noticeable slackening in demand for such equipment. This has developed in just the past few weeks and was not unlooked for, since order books have been swamped for months, and present delivery schedules probably will keep machinery builders going full tilt throughout next year and into 1944.

The recent lull in new inquiries for machine equipment was a welcome respite to most suppliers who have been contending with the greatest demand ever experienced for production equipment. The machine tool industry has been virtually doubling its size and capacity for the past three years, and the time to catch a breath is long overdue. It appears likely now that equipment programs have been fairly well established for plants in the preliminary and early production stages. Skeleton production lines are being filled out and orders placed for the equipment necessary to bring them up to rated capacity.

The situation is not duplicated in respect to tools, cutters and related items which are expendable in production. Demand still far exceeds supply and there is no tapering in demand for this material. This is natural since production still is in the accelerating stage.

Large tool and die shops which have been active in new automobile model programs now find their equipment busy on far different work. Many of them have undertaken extensive subcontracts for machining of parts for tanks. Others have been active in furnishing jigs and fixtures for the Ford Willow Run bomber plant. The latter work should be tapering off soon, but the steady flow of design changes which all aircraft producers have had to contend with may keep tooling companies busy even after production has started.

### Timing of Scrap Drives Poor

Concerted drives to move dormant scrap in industrial plants are now in full swing. While the need for scrap metal is obvious to most manufacturers, they have two significant criticisms of the administration of the current drive. In the first place, the multiplicity of government and private agencies with a finger in the scrap campaign is both confusing and time-wasting. Purchasing agents, for example, find a virtual parade through their offices of steel salesmen, representatives from three or four government salvage agencies, ordnance officers and scrap dealers—all of them bent on making suggestions as to what shall be scrapped and why.

Second criticism concerns the timing



of the various scrap drives throughout the country. They can be divided roughly into three categories—the farm or country scrap, the domestic junk, and industrial scrap. As the campaign is now working, all three drives are being pressed simultaneously because of the alleged necessity for collecting the material and dispatching it to mills and foundries before winter. Obviously winter, no matter how severe, does not impede the movement of industrial scrap from plants to nearby mills; and should not hinder too seriously the collection of old metal from basements of homes in metropolitan communities. Farm and country scrap logically should be collected and moved to mills before the snow season.

By scheduling all scrap collection drives at the present time, yards of scrap dealers are clogged with metal, much of it requiring excessive time to classify and prepare. Labor is tight in these yards and the steady movement of collections is difficult. It is reasoned that if there had been concentration first on farm and country scrap, then on domes-

tic junk, and finally on industrial scrap, a more orderly flow of material would have been insured, and probably a greater collection in all would have resulted.

Industrial scrap is the finest type of material which can be obtained for steel-making purposes. Of fairly well established analysis and reasonably easy to prepare and ship, this scrap is regarded by some in industry as the last resource of "good" scrap in the country. They think it should be tapped only when all the rest of the material is out of the way. And this thinking is not at all selfish. Certainly industry would be more likely to dig down deep and scrap every possible ounce of iron and steel in its plants if it realized that by so doing the last available source of good scrap was "giving its all" in the fight against the Axis. Certainly a plant owner can be pardoned for hesitating to scrap an idle turret lathe that may have outlived its usefulness when he can see out of his office window piles of collected junk waiting classification and shipment to melters.

It is claimed that the mills must have a stockpile of 7,000,000 tons of scrap by

Jan. 1. What about after that? The normal flow of production scrap for open-hearth melting has been reduced far below its peacetime level. And nothing is coming back from the battlefronts to be thrown in melting furnaces. Scrap movement will have to be maintained throughout next year from sources outside usual production channels. Why not make the scrap drive a permanent affair, instead of trying to run it off in three months?

## General Motors Deliveries

September deliveries of war materials from General Motors plants increased over \$7,000,000 from the August level, to \$212,851,360, bringing total deliveries for the year to \$1,203,849,889, nearly three times the shipments made in all of 1941. Employment likewise continues to move up, for the week ending Oct. 11 totaling 262,549 in hourly-rated classifications, an increase of 12,199 over the week ending Sept. 13. Total employment in U. S. plants as of Oct. 11 was 328,584, plus 12,885 more men and women in five Canadian plants.

## MEETINGS . . . .

### Refrigeration Engineers To Stress War Service

Essential service of refrigeration in the war effort will be emphasized in the technical program of the thirty-eighth annual meeting of the American Society of Refrigerating Engineers at Hotel Commodore, New York, Dec. 1-2.

Charles R. Logan, Superior Valve & Fittings Co., Pittsburgh, has been nominated for president; A. B. Stickney, Armour & Co., Chicago, and John F. Stone, Johns-Manville, New York, for vice presidents, and John Bergdoll Jr, York Ice Machinery Co., York, Pa., for treasurer.

Nominations for the directorate are: Charles L. Leopold, consulting engineer, Philadelphia; Nels H. Rosberg, California Consumers Corp., Los Angeles; Lee C. Leslie, Johns-Manville, Philadelphia; A. B. Schellenberg, Alco Valve Co., St. Louis; J. Mack Tucker, University of Tennessee, Knoxville, Tenn.

**American Institute of Chemical Engineers**—Plant protection in wartime and protective smokes and camouflage for industrial plants will be discussed at the thirty-fifth annual meeting, Netherlands-Plaza hotel, Cincinnati, Nov. 16-18.

**Power and Mechanical Engineering Exposition**—The fifteenth annual exposition originally scheduled for Grand Central Palace, New York, Nov. 30-Dec.

5, has been transferred to Madison Square Garden.

**National Association of Manufacturers**—Donald M. Nelson, executive director, War Production Board, Washington, will be one of the speakers at the annual convention, Waldorf-Astoria, New York, Dec. 2-4. For the first time in 46 years the association has arranged a night program. Other prominent speakers include, W. M. Jeffers, rubber administrator; H. G. Batcheller, Iron and Steel Division of WPB; Paul McNutt, chairman War Manpower Commission; Leon Henderson, administrator, Office of Price Administration; Wilfred Dykes, president, Inland Steel Co., Chicago; and Dr. R. A. Millikan, chairman of executive committee, California Institute of Technology.

**Engineers' Society of Western Pennsylvania**—Third annual water conference will be held at the William Penn hotel, Pittsburgh, Nov. 9-10. Development of underwater paints and coatings will be reviewed by F. N. Speller, consulting metallurgist. Ten other papers covering inhibitors, water treatment, contamination and application of the Spriractor, Hydro-Treater and resinous Zeolite are included in the program.

Portugal's first tin plate plant is to be built at Oporto under a government concession to a French company, to be operated by a Portuguese subsidiary. Tin plate and galvanized sheets will be manufactured, with preference for Por-

tuguese materials and with a limit to the number of non-Portuguese workers.

### Rolling Thinner Black Plate for Bottle Caps

Difficulties besetting the bottling industry as a result of the steel shortage may be partially offset through use of extremely thin-gage black plate now being rolled experimentally by a midwestern mill for one of the country's leading dispensers of soft drinks.

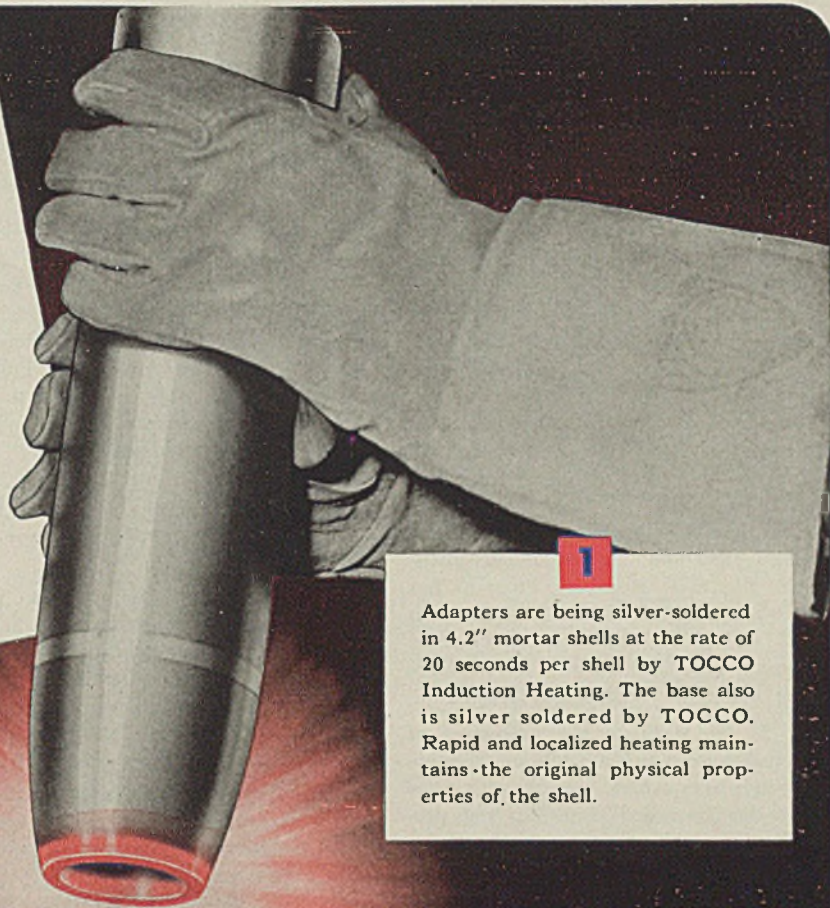
Bottlers are allocated steel sufficient for part of their requirements and now it is proposed to make this steel go farther by rolling it thinner. Bottle caps usually are stamped from 0.007-inch plate but it appears that 0.005-inch, or possibly 0.004-inch plate, is heavy enough to meet pressure requirements. Thin-gage plate rolled experimentally for one of the container companies a couple of years ago worked well.

The experimental plate is being rolled from strip with higher carbon content than normally used for tin plate or black plate and a heavier temper pass than usual therefore is required.

Bottlers figure that use of the thinner-gage caps twice in addition to the original application will just about solve their closure problem. While none of the thinner-gage plate has been used for containers, some authorities believe it might be used for some types.

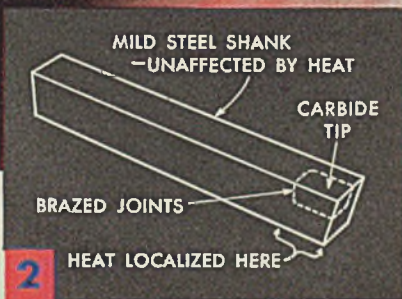


**BRAZED** by  
**TOCCO**  
 in **20**  
**SECONDS!**



**1**

Adapters are being silver-soldered in 4.2" mortar shells at the rate of 20 seconds per shell by TOCCO Induction Heating. The base also is silver soldered by TOCCO. Rapid and localized heating maintains the original physical properties of the shell.



Another TOCCO-brazing application. Carbide tips are brazed to mild steel tool shanks by TOCCO Induction Heating as shown. Rapid heat, confined to brazed zone, produces tight, uniform brazes.

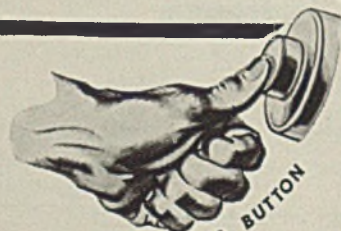


**3**

TOCCO Jr. machines are processing a wide variety of war materials such as burster tubes, shown above. TOCCO machines can be used for hardening, brazing, annealing or heating for forging or forming... war or peace-time products... by changing only the work fixture.

Full details in "The TOCCO Process" booklet. Free on request.

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 Cleveland, Ohio



JUST PUSH A BUTTON

**TOCCO**

World's Fastest, Most Accurate Heat-Treating Process

**HARDENING**  
**ANNEALING**  
**BRAZING**  
**HEATING** for  
 forming and forging



# Organized Recovery Program To Put Inventories to Work

WHILE considerable tonnages of steel lie idle in original "as rolled" mill form and in partially or wholly fabricated forms, some plants producing war materials have been forced to curtail production schedules. This has been caused by conservation and limitation orders and by changes in tactical warfare and other factors. In some cases, war production plants have been forced to close for lack of steel.

To free idle inventories and redistribute steel into war production channels, the Steel Recovery Program has been established by WPB. This program will set up records showing location, amount, type and quantity of idle ferrous materials. Primary objects are:

1. To facilitate the movement of inventories which are idle or excessive into plants which can use this steel in the "as rolled" form for war production work.

In carrying out this objective the Pittsburgh general offices of the Steel Recovery Program groups will serve holders and consumers of steel as a national clearing house for the redis-

tribution of iron and steel products. It is expected Priority Regulation No. 13 will be revised to speed up the flow of this material into war channels. In direct transactions between holders and buyers, the Steel Recovery Program groups will act only as liaison to help locate such buyers and sellers and put them in touch with one another.

2. To locate and redistribute non-assembled, partially or wholly fabricated products needed for war purposes.

Every effort will be made to redistribute and utilize these materials in their present forms; but, where use of products in their present forms is not practicable, these idle and excess inventories will be redistributed by government purchase for rerolling or remelting.

Where products are redistributed in their present forms by direct transactions between sellers and purchasers, the sellers will receive as nearly as is practicable the full prices originally paid. For products sold for stockpiling to be used in their "as is" form, or for rerolling, the government will pay going mar-

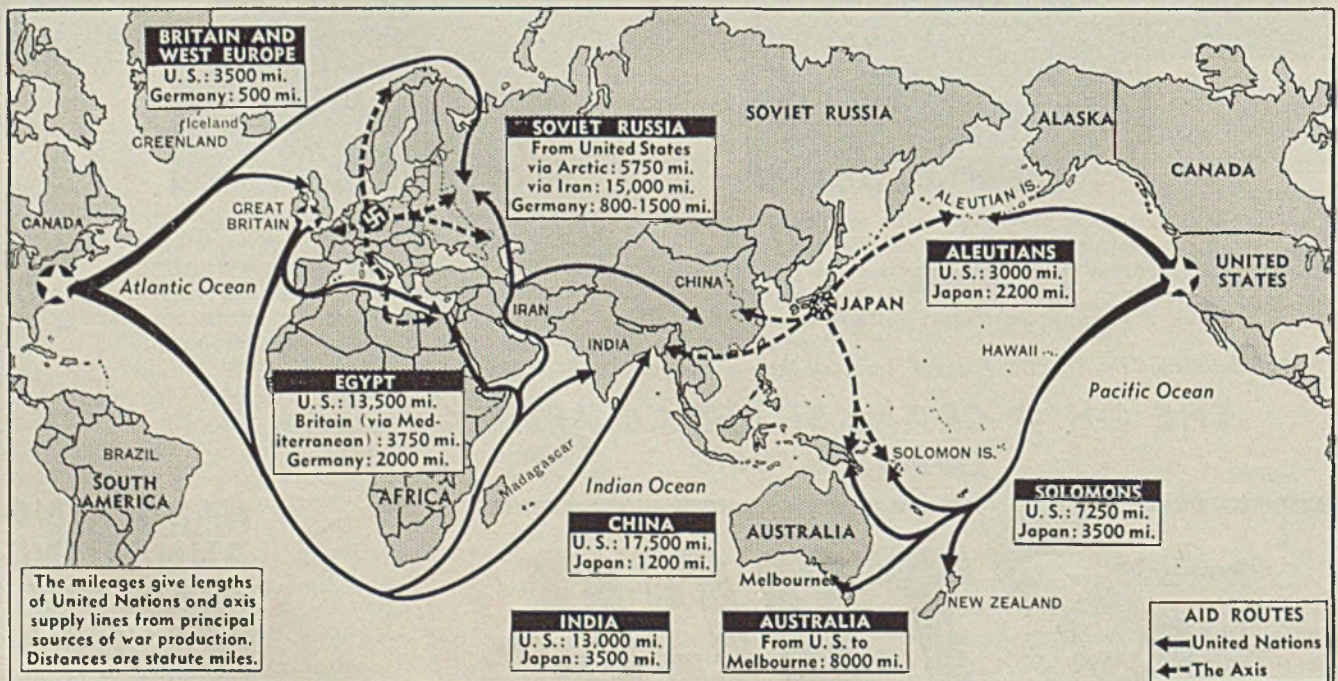
ket prices. If it proves impracticable or impossible to find private purchasers for idle and excessive products, or to stockpile or reroll such products, the government is prepared to buy or requisition them for remelting. In cases where the government buys or requisitions idle or excessive products for remelting, the prices paid will be substantially above scrap prices, but less than current market prices or values estimated by the holders. It should not be overlooked that the government is interested in purchasing only such items as may be urgently needed for the war effort and only after every attempt has been made by the holders and the War Production Board to dispose of the materials in their existing form.

The Steel Recovery Program groups in Pittsburgh will maintain the only national inventory of available steel items and will operate independently of Washington insofar as the actual administration of the program is concerned.

All the activity and practically all of the personnel of the Available Stocks Unit of the Iron and Steel Branch in Washington, has been transferred to Pittsburgh and absorbed by the Steel Recovery Section, Iron and Steel Branch, War Production Board in Pittsburgh.

Every effort is being exerted to speed up the work of the steel recovery organization so that tangible results will

## BATTLE OF SUPPLY LINES



THE AXIS holds the edge on time and distance when it comes to supplying its forces on the fighting fronts. While United Nations' planes and ships must travel hundreds and sometimes thousands of miles to aid one another in a battle area, Germany and Japan have relatively short runs from their centrally-located production areas. NEA photo



be evidenced soon. However, because the equipment and personnel required to carry out the responsibilities of such a gigantic national undertaking cannot be put together over night, some delay in putting all phases of the program in motion is to be expected.

Ample office space has been established at 5835 Baum boulevard, Pittsburgh, but only the nucleus of the organization personnel has been selected. Most of the needed equipment has been assembled, but delays under current conditions are unavoidable.

Certification of inventory forms are being mailed to more than 200,000 possible holders of steel.

Inventory forms will be mailed approximately Nov. 1 to stainless steel holders, but data probably will not be available before early December.

Because of the physical impossibility of analyzing, pricing and recording all types of steel at the same time, programs will be handled one at a time. Forms for reporting inventories of each type of steel will be mailed approximately a week to ten days apart, or just as rapidly as data can be recorded. It appears unlikely that the program can begin to reach the peak of performance until after Jan. 1.

The war effort also is in great need of inventories that are now in nonassembled, partially or wholly fabricated forms. Holders of large inventories in this category are urged to contact the War Production Board in Pittsburgh with the thought in mind that they may be able, by special purchase of these materials, to put them into the war production effort immediately.

Just as each program progresses, stock lists of available items will be mailed to persons requesting them in all branches of the armed services, War Production Board, steel warehouses and to others specifically requested by the services.

When a prospective purchaser is referred by the Pittsburgh office to a holder, the inventory card of that holder will be temporarily withdrawn from the files until sufficient time has elapsed for consummation of the transaction. Holders and purchasers will be required to report promptly about their transactions so that the inventory records will be accurate.

Three separate groups of individuals are involved in the administration of this program, each charged with full responsibility for certain parts of the work. The organization set-up and functions of each group may be described briefly, as follows:

1. MATERIALS REDISTRIBUTION BRANCH (which recently absorbed the former Inventory and Requisitioning Branch) has a Steel Recovery group in

## Variety and Shapes of Steel Products Limited by WPB Order

NATIONAL Emergency Specifications for steel products, designed to limit the manufacture of steel mill products to the minimum number of varieties which will satisfy current needs, have been established by WPB in Limitation Order L-211.

The order establishes the authority of the director general for operations to issue schedules for various steel products, which limit varieties and shapes as well as sets up specifications defining compositions, types, grades and qualities of steel and steel products.

The first two such schedules, issued concurrently with the order, cover concrete reinforcement steel, and railroad and transit service wheels and tires. Several other schedules are now being prepared.

The order, together with the related schedules, is expected to increase production by leading to the use of existing facilities in a more efficient way. At

Pittsburgh which is headed by Thornton E. Stokes as chief. This branch formulates the programs; sends forms to holders upon which it is mandatory that inventories be reported in detail; establishes the price the government will pay for materials that may be purchased or requisitioned under the authority of the Materials Redistribution Branch; keeps an up-to-date record of inventories nationally and makes them available to the Iron and Steel Branch Section for disposition.

2. THE IRON AND STEEL BRANCH has a Steel Recovery Section in Pittsburgh, headed by C. H. Bradley as chief, which has the sole and undivided responsibility for the disposition of materials. This section will attempt to move items from one holder to another in "as is" form wherever possible; decide whether material can or cannot be used promptly in war production in its present form and whether it should or should not be purchased from the holder and allocated to scrap for remelting into usable materials.

3. THE STEEL RECOVERY CORP., with George L. Stewart as president, is the fiscal agent. It is a private corporation, an agent of Metals Reserve Co., a federal corporation. The Steel Recovery Corp. will execute purchases and sales contracts and absorb the losses which are to be expected in a national operation of this magnitude.

the same time, it is expected that mill and consumer inventories will be decreased as a result of the reduction in compositions and forms needed for maintenance and replacement.

The schedule on a concrete reinforcement steel establishes a list of permissible sizes of steel reinforcing bars by adopting the Simplified Practice Recommendation R26-42 of the National Bureau of Standards as modified in accordance with recommendations of a technical advisory committee.

A list of permissible sizes of steel reinforcing spirals, as set forth in Simplified Practice Recommendation R53-32, is also established. All producing mills and consumer interests are familiar with and experienced in the use of the simplifications listed.

Restrictions on structural steel have resulted in a sharp rise in concrete construction, and a consequent greater demand for reinforcement bars and spirals.

The schedule on railroad and transit service wheels and tires provides for establishment of standard sizes, effective in 60 days. The standards were developed by an Advisory Committee on Wrought Steel Wheels, composed of representatives of producer and consumer interests as well as representatives of the military services.

The standards have been accepted and issued in specification form by the Association of American Railroads, the American Society for Testing Materials and the American Transit Engineering Association.

The schedule reduces the permissible number of sizes for railroad service alone from 500 to 50. A similar reduction is made in the number of permitted sizes for electric railway service. The standards, however, make provision for adequate replacements for all sizes in current domestic use. The period of 60 days until the schedule becomes effective is provided because of adjustments which must be made in modifying existing rolls and dies. No new equipment will be needed.

Office of Iron and Steel Control in Germany has been dissolved with the establishment of Reichvereignigung Eisen, a move from bureaucratic to industry control, according to unofficial reports to the American government. The move leads to conjectures regarding possible shortages of metal in Germany.



# MEN of INDUSTRY



T. G. Bergin



Anson B. Albee



A. E. Shelton



R. I. Schuppener

**T. G. BERGIN**, formerly associated with American Steel & Wire Co. at Worcester, Mass., in the open-hearth, rolling mill, wire mill and metallurgical departments, and the past four years at the New Haven plant as works metallurgist, is now in charge of the Wire Heat Treating Division of A. F. Holden Co., New Haven, Conn.

**Anson B. Albee** has joined the Holden company at its West Haven plant, and has been assigned to research and development of new products. He formerly was assistant metallurgist at Wetherell Bros. Co., Cambridge, Mass., and more recently was identified with Bridgeport Grinding Machine Co., West Haven, Conn., as purchasing agent and metallurgist.

**John B. Jenkins** has been appointed manager, Hydraulic Division, Twin Disc Clutch Co., Racine, Wis. The past eight years Mr. Jenkins has been in charge of the company's factory branches at St. Louis, Tulsa and Dallas.

**Elmer E. Stuart** has been named assistant treasurer, Thompson Products Inc., Cleveland. Mr. Stuart has been associated with Thompson Products 16 years.

**William H. Berssenbrugge**, former superintendent, Kenosha plant of Snap-On Tools Corp., Kenosha, Wis., has been appointed plant manager of the corporation's Mount Carmel, Ill., plant.

**F. N. Barnes** has been named vice president and general manager, W. A. Laidlaw Wire Co., Monaca, Pa. Mr. Barnes had previously been associated with Pittsburgh Steel Co. for 21 years. At the time of joining the Laidlaw organization, he was assistant district sales

manager of the Chicago office of Pittsburgh Steel.

**A. E. Shelton**, heretofore works manager, Stinson Division of Vultee Aircraft Inc., has been promoted to the newly created position of division manager. Mr. Shelton joined the Vultee organization at Wayne, Mich., last February. He formerly was president and general manager, Menasco Mfg. Co., Burbank, Calif., and before that purchasing agent, Lockheed Aircraft Corp., and purchasing agent of T.W.A. and Western Airlines.

**George E. Whitlock**, president, Mullins Mfg. Corp., Warren, O., and **A. E. Walker**, president, National Supply Co., Pittsburgh, have been elected to the board of directors, American Welding & Mfg. Co., Warren, O.

**Paul P. Hastings**, vice president in charge of traffic, Atchison, Topeka & Santa Fe railroad, Chicago, retired Oct. 31, concluding more than 51 years in the transportation industry.

**John Howe Hall** has given up his consulting metallurgical practice to become metallurgist with General Steel Castings Corp., Eddystone, Pa. Prior to establishing his own practice, Mr. Hall was technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

**H. J. Mandernach** has been appointed sales manager, replacement tube section of General Electric Co.'s Radio, Television and Electronics Department, at Bridgeport, Conn. Mr. Mandernach joined General Electric in 1936 and became district radio representative in the central west, with headquarters in Chi-

cago. He held that position until early this year when he was assigned to the G-E radio headquarters staff.

**Ralph I. Schuppener** has been elected vice president, Bennett Mfg. Co., Chicago. He has been located at Washington for several months in connection with government business on which the Bennett company has been operating practically 100 per cent for some time. Prior to joining the Bennett company in July, he was identified with Wheeling Corrugating Co., Wheeling, W. Va., as sales manager of the Steel Barrel and Pail Division, and general sales manager of the Building Products Division of Berger Mfg. Co., Canton, O.

**Felix A. Schagelin**, assistant to **W. Austin Commerdinger**, vice president in charge of production, Byrne, Mitchell & Co. Inc., New York, has also been appointed chief engineer, Industrial Electronic Corp., Brooklyn, N. Y., designer and builder of tools, jigs and fixtures, dies, gages and special machines.

**William T. Powell** has been elected a vice president, Emsco Derrick & Equipment Co., Los Angeles. He joined Emsco in 1937, in the fabricated plate division, and since June, 1941, has been manager of the War Materials Division.

**Merritt L. Smith**, advertising manager, Metal & Thermit Corp., New York, has been appointed assistant sales manager. He will continue to direct advertising activities. Associated with Metal & Thermit ten years, Mr. Smith was formerly a member of the staff of Rickard & Co., advertising agency.

**Charles D. Young**, formerly district manager of Metal & Thermit's Chicago office, has been transferred to New



York as sales manager of the Welding Division. He was associated with the corporation's Chicago branch since its inception in 1912, being made district manager in 1926.

—o—  
**Julius A. Clauss**, chief engineer, Great Lakes Steel Corp., Detroit, has been appointed assistant on production problems to Hiland G. Batcheller, chief of the WPB Iron and Steel Branch. Mr. Clauss is a specialist on problems relating to construction of steel plant facilities.

—o—  
**Guy Fiber**, 22422 Six Mile road, Detroit, and **L. E. Detrick**, 2519 West Winemac avenue, Chicago, have been employed by Timken-Detroit Axle Co. as field representatives to work with operators of motor vehicles. Mr. Fiber will cover Michigan, Ohio, West Virginia and parts of Pennsylvania, while Mr. Detrick will cover Illinois, Wisconsin, Minnesota and Indiana. **H. A. Mitchell** was recently transferred from the Chicago territory to the West Coast.

—o—  
**R. W. Hyde** and **R. J. Phipps** have been appointed assistant treasurers, Carnegie-Illinois Steel Corp., Pittsburgh. As credit managers for the central area and eastern area, respectively, they will continue in these capacities in addition to their new duties.

—o—  
**Frank J. Carter**, since 1938 general superintendent of Goodyear's Brazilian



Julius A. Clauss

plant at Sao Paulo, has been appointed personnel manager at Goodyear Aircraft Corp., Akron, O., succeeding **R. S. Pope**, recently made director of personnel for Goodyear Tire & Rubber Co. Mr. Carter will arrive in Akron within the next month.

—o—  
**E. P. Barry** has been appointed co-ordinator of plants, Chicago Pneumatic Tool Co., New York. Mr. Barry, formerly associated with Glenn L. Martin Co., Baltimore, will supervise machine equipment, tool designing and production methods for the company's plants located in Detroit, Cleveland, Franklin, Pa., and Garfield, N. J. He joined Glenn L. Martin in 1922, where he remained

until recently. At time of his resignation he was plant and equipment engineer.

—o—  
**Jerry M. Marks**, manufacturers' representative, handling stainless and alloy steels, has closed his warehouse in New York, to accept a position as technical analyst with the Steel Recovery Program, War Production Board, Pittsburgh.

—o—  
**William P. Tidwell** has resigned his post in the office of the chairman of the Crucible Steel Co. of America, New York, to accept a commission as major in the Army Specialist Corps, with headquarters in Washington in the Service of Supply. For 12 years previous to joining Crucible in 1938 he was associated with *Barron's Weekly* and the *Wall Street Journal* in New York, Boston, and Detroit.

—o—  
**Thomas H. Corpe** has been named sales manager, Elastic Stop Nut Corp., Union, N. J. Mr. Corpe was formerly assistant general sales manager, Lockheed Aircraft Corp., and at one time was in charge of sales promotion, advertising and market research for that company. Mr. Corpe has also been associated with General Motors Corp. as a technical engineer in charge of its proving ground, and in various sales and promotion positions.

OBITUARIES . . .

**Nelson Jarvis Darling**, 58, manager of General Electric's West Lynn and River Works, died Oct. 26, at his Beach Bluffs, Mass., home after an illness of a few months. The son of the late Henry W. Darling, for many years treasurer of General Electric, Mr. Darling joined the G-E test course as a student engineer after graduation from Cornell University in 1907. In November, 1918, he became assistant manager of the Erie, Pa., plant, and in 1922, manager of the River Works at Lynn, Mass. Later he was named manager of the West Lynn Works in addition to his duties at the River Works.

—o—  
**Arthur P. Taylor**, 68, president, Charles Taylor Sons Co., Cincinnati, died in that city, Oct. 15. He formerly headed the American Refractories Institute.

—o—  
**Daniel A. Keating**, 73, plant superintendent, Stanley Works, American Tube & Stamping Co., Bridgeport, Conn., died Oct. 20, in that city. He had been asso-

ciated with the plant 54 years, starting as an employe of Wilmot & Hobbs, predecessor to American Tube. Mr. Keating was the inventor of numerous automobile and household accessories, including sheet metal bearings for bicycles, first detachable rims for automobiles, also steel metal automobile bodies and other steel and metal innovations.

—o—  
**Aaron Elstein**, 51, office manager, Talk-A-Phone Mfg. Co., Chicago, died in that city, Oct. 20.

—o—  
**Oliver Perry McCracken**, 65, a veteran of 23 years with the American Steel & Wire Co., Cleveland, for whom he was employment supervisor at its American plant, died Oct. 20, in that city. He retired last March.

—o—  
**Michael W. Merriman**, president, Madison Foundry Co., Cleveland, died Oct. 20, in that city. He organized the company 45 years ago.

—o—  
**James H. McCollum**, 67, mechanical

engineer, Stewart-Warner Corp., Chicago, died in Evanston, Ill., Oct. 25.

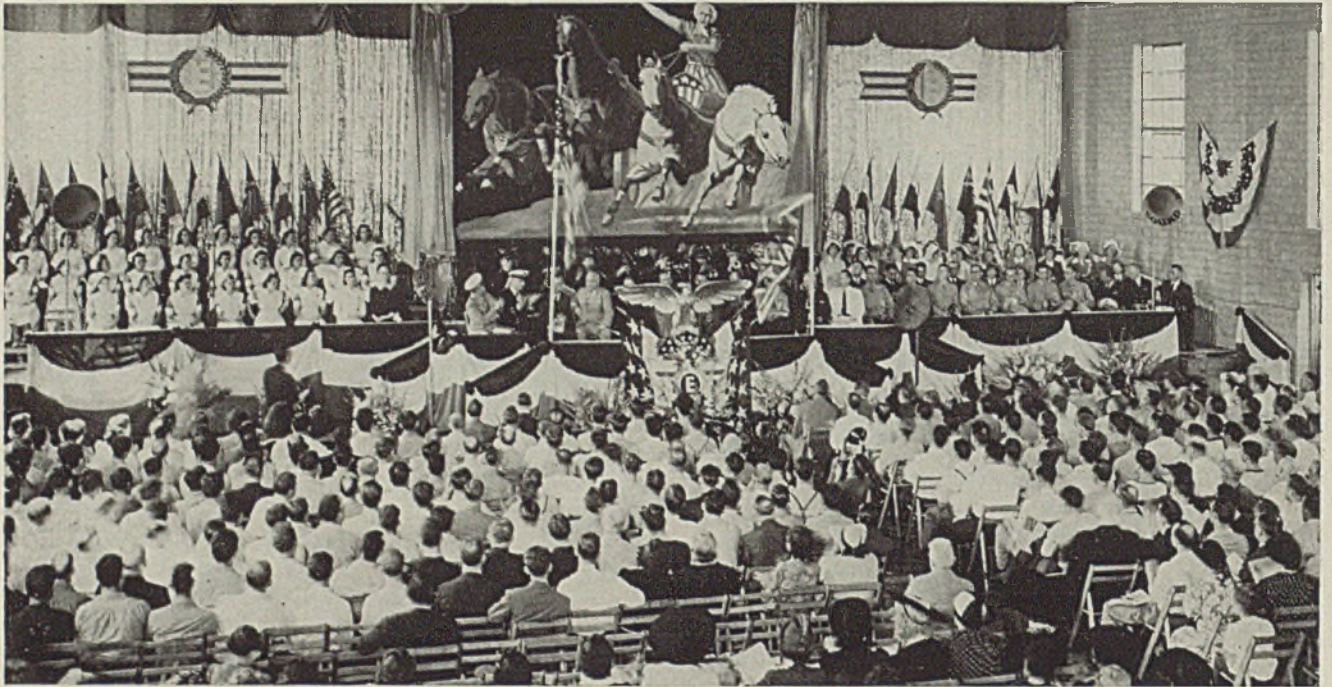
—o—  
**Henry D. Hibbard**, 86, consulting engineer in steel mill practice, died Oct. 17, in Plainfield, N. J. He was associated with the Linden Steel Co., Linden, N. J., from 1886 to 1889, which company later was absorbed by Jones & Laughlin Steel Corp. He then joined Hibbard-Rodman-Ely Safe Works, Plainfield, and its successor, Manganese Steel Safe Co. Mr. Hibbard was one of the oldest members of the American Institute of Mining Engineers and American Institute of Mechanical Engineers.

—o—  
**George N. Armsby**, 66, chairman of the board, Curtiss-Wright Corp., died Oct. 25, in New York.

—o—  
**John F. Jones**, 71, director of domestic sales, International Harvester Co., Chicago, from 1925 until his retirement in 1930, died in Fort Myers, Fla., Oct. 23. He had been associated with the company many years.



# ARMY-NAVY AWARDS



*Fosdick Machine Tool Co., Cincinnati, O., staged an impressive ceremony on the occasion of the award of the Army-Navy "E"*

*Sheffield Corp., Dayton, O., receives the award from Brig. Gen. Benedict Crowell for outstanding production of gages*

*Col. J. S. Seybold presents the "E" flag to M. C. McNeil, right, president of Osgood Co., Marion, O., manufacturers of excavating machinery, and to Charles W. O'Dowd, representing employes*



## Additional Plants Win "E" Pennants

Other companies which recently have received the joint award include:

- Atlas Press Co., Kalamazoo, Mich.
- Allegheny Ludlum Steel Corp., Brackenridge, Pa., and Watervliet, N. Y.
- American Welding Co., Carbondale, Pa.
- Brunner Mfg. Co., Utica, N. Y.
- Clarostat Mfg. Co., Brooklyn, N. Y.
- Divine Brothers Co., Utica, N. Y.
- Fairchild Aviation Corp., Jamaica, N. Y.
- Folmer Graflex Corp., Rochester, N. Y.
- General Cable Corp., Perth Amboy plant, Perth Amboy, N. J.
- General Cable Corp., Rome plant.



Rome, N. Y.  
 F. L. Jacobs Co., Volute Spring Suspension plant, Dearborn, Mich.  
 Jacobson & Co. Inc., New York.  
 Jessop Steel Co., Washington, Pa.  
 C. M. Kemp Mfg. Co., Baltimore, Md.  
 Kennecott Wire & Cable Co., Phillipsdale, R. I.  
 Lake State Products Inc., Jackson, Mich.  
 Martin-Schwartz Inc., Mill Street plant, Salisbury, Md.  
 New Process Gear Co., Syracuse, N. Y.  
 Oneida Ltd., Oneida, N. Y.  
 Remington Arms Co. Inc., Ilion Works, Ilion, N. Y.  
 Ritter Co. Inc., Rochester, N. Y.  
 Ross Gear & Tool Co., Lafayette, Ind.  
 Savage Arms Corp., Stevens Arms Co., River plant, Chicopee Falls, Mass.  
 A. Schrader's Son, Division of Scovill Mfg. Co. Inc., Brooklyn, N. Y.  
 Scott Aviation Corp., Lancaster, N. Y.  
 Solar Aircraft Co., San Diego, Calif.  
 Solvay Process Co., Hopewell, Va.  
 Spicer Mfg. Corp., Toledo plant, Toledo, O.  
 Streeter, Hackney & Co., Johnstown, N. Y.  
 York-Hoover Corp., Body division, York, Pa.

## How War Department Sends Its "E" to a Company

When the War Department issues an "E" to a company the notification is not addressed simply to the company, as such, or to the president of the company, but to the entire personnel. Following is a typical letter:

To the Men and Women of  
 The \_\_\_\_\_ & Co.

This is to inform you that the Army and Navy are conferring upon you the Army-Navy Production Award for great accomplishment in the production of war equipment.

This award symbolizes your country's appreciation of the achievement of every man and woman in the \_\_\_\_\_ & Co. It consists of a flag to be flown above your plant, and a lapel pin which each of you may wear as a sign of distinguished service to your country.

I am confident that your outstanding record will bring victory nearer by inspiring others to similar high achievement.

Sincerely yours,  
 (Signed) Robert P. Patterson  
 Under Secretary of War

## Maritime Commission Awards "M" Flags to Nine Plants

Seven manufacturing plants and two shipyards have been designated by the board of awards of the Maritime Com-

mission to receive its "M" pennant, commission flag and labor merit badge, for outstanding production performances.

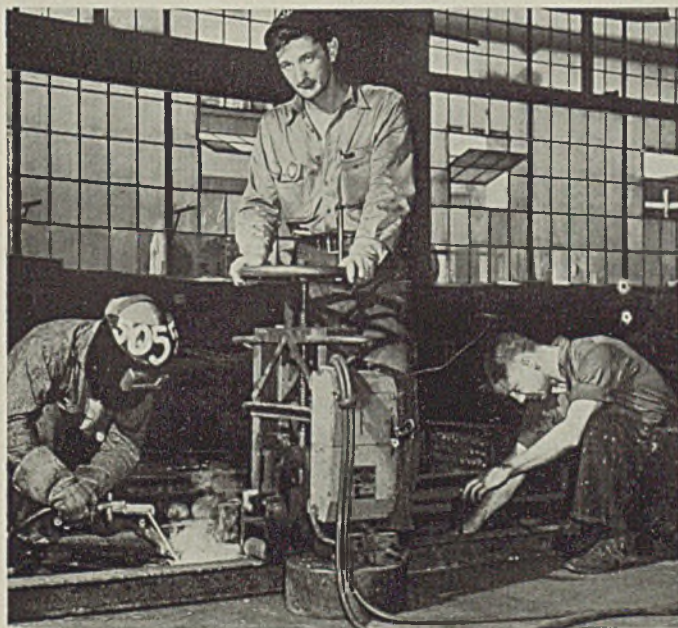
For the first time two Gulf yards, the Houston Shipbuilding Corp., Houston, Tex., and the Alabama Dry Dock & Shipbuilding Co., Mobile, Ala., both building Liberty ships, were awarded the commission's "M" pennant.

At the same time, the commission announced that the Oregon Shipbuilding Corp., Portland, Oreg., will receive its fifth award and the North Carolina Shipbuilding Co., Wilmington, N. C., and Richmond Shipyards No. 1 and No. 2, both at Richmond, Calif.; will receive their second awards for continued excellence in production of Liberty ships. Each award is indicated by the addition of a gold star to the "M" pennant.

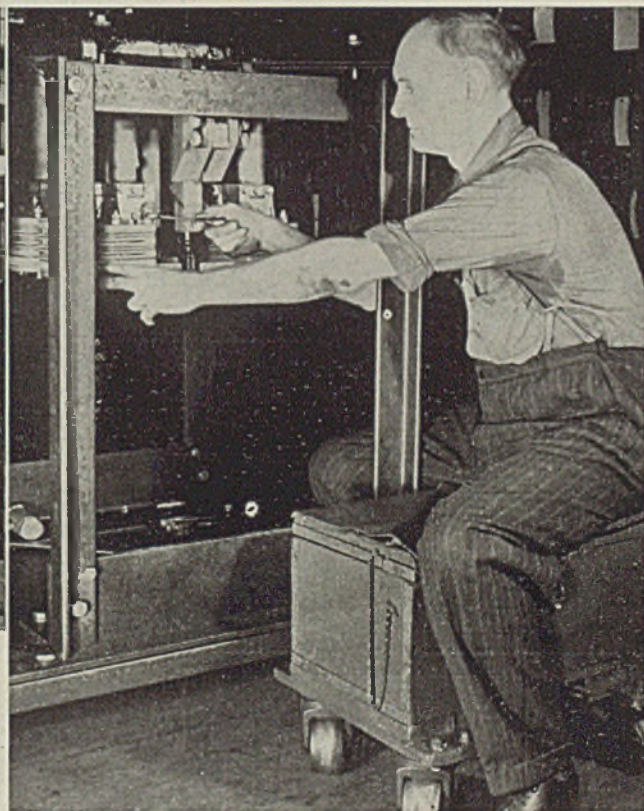
Others designated to receive the "M" pennant award are:

A. P. Green Fire Brick Co., Mexico, Mo.; Homestead Valve Mfg. Co. Inc., Coraopolis, Pa.; Linde Air Products Co. Inc., New York; Minneapolis-Moline Power Implement Co., Minneapolis; Russell & Erwin Mfg. Co., New Britain, Conn.; Security Engineering Co. Inc., Whittier, Calif.; Whitin Machine Works, Whitinsville, Mass.

## EMPLOYEES' INVENTIONS SPEED WAR MATERIEL PRODUCTION



WELDING of assembled structures has been speeded at Federal Shipbuilding & Dry Dock Co., Kearny, N. J., by using a new electro-magnetic device, above, for holding bulkhead stiffeners. Joseph Weiss, an employe who suggested the device, center above, has been presented an award for individual production merit. At right, tiresome stooping and kneeling is eliminated by a combination factory scooter and tool chest designed and built by L. H.



Doris, workman at Westinghouse Electric & Mfg. Co.'s East Pittsburgh works



## G. E. Workers in More Than 100 Units Exceed 10 Per Cent Goal

MORE than 96 per cent of General Electric Co. employes have pledged an average of 10.3 per cent of their earnings to the purchase of War bonds. This was accomplished through two campaigns covering the company's more than 120,000 employes.

General Electric's employes are scattered through over 100 units from coast to coast. About 110,000 are situated in some 30 factories, ranging in size from the Schenectady, N. Y., works with several thousand people, to the smallest factory with only two or three hundred employes. Sales offices are located in 86 cities, and associated with these offices are other units—warehouses and service shops.

In the first bond drive, most of the organization was handled from the company's home office in Schenectady; the second was handled largely on a local basis, with a great portion of the ideas and work originating and being carried out by local volunteer committees of employes.

### Three Purchasing Plans Offered

Thus General Electric's drives covered the whole range of conditions likely to be faced by any company, large or small.

When Defense Savings Bonds were first offered, the company immediately announced a plan to make it convenient for employes to obtain them. This plan was worked out by the company's treasury department and offered three ways in which the bonds could be purchased:

1. By payroll deductions, in installments. By filling out a form obtainable from paymasters, any employe could authorize the company to make regular deductions from his pay checks. These amounts would accumulate, and each time the total reached the required amount the company would purchase a bond and have it mailed to his home.

2. For cash. By applying to his paymaster, any employe could request the company to purchase bonds for him and have them mailed to his home.

3. By income accumulation. By filling out a form obtainable from the paymaster, employes could authorize the company to pay interest due him on his GE employes bonds and his profit-sharing payments in the form of War Bonds.

The large majority of employes took advantage of the first plan although many workers also used the second and third plans.

The company's treasury department

worked with each of the paymasters in setting up a uniform procedure for keeping records. After the authorization form filled out by the employe had been recorded by the local paymaster on the employe's payroll record, the form was sent to the company's treasury department at Schenectady, where a record is kept so that all bonds can be purchased by the treasury department as needed.

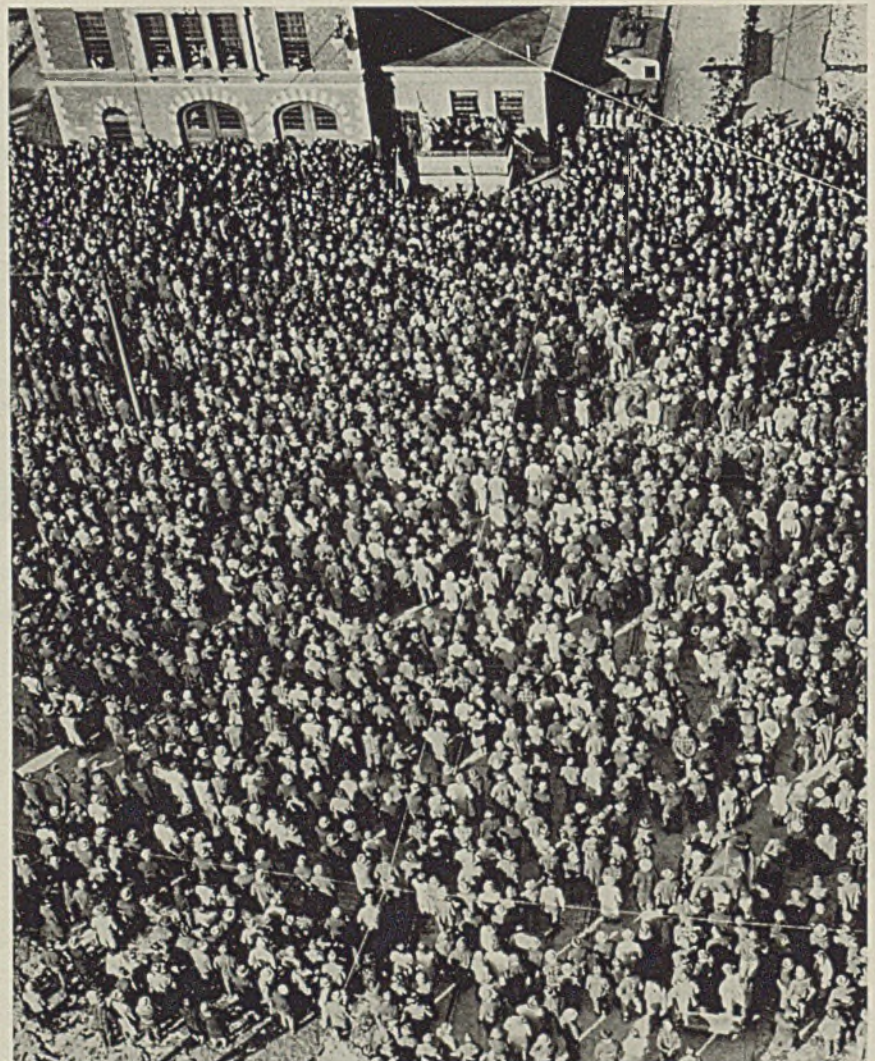
The job of informing the employes on the features of the bond plan and the provisions made by the company to facilitate such purchases was accomplished through a booklet distributed to all workers. Posters describing the plan were displayed on 1500 bulletin boards throughout the organization. The em-

ploye publications took up the job of education and of arousing of interest.

Since no one publication covers all GE employes, much of this material was prepared in Schenectady and syndicated to the editors of the nine employe newspapers. Week after week, hundreds of articles, editorials, cartoons and news items were used to tell the story in its simplest terms. At the same time the urgency of the war effort was emphasized in the company publications, and by motion pictures, dedication ceremonies, posters, flags and billboards.

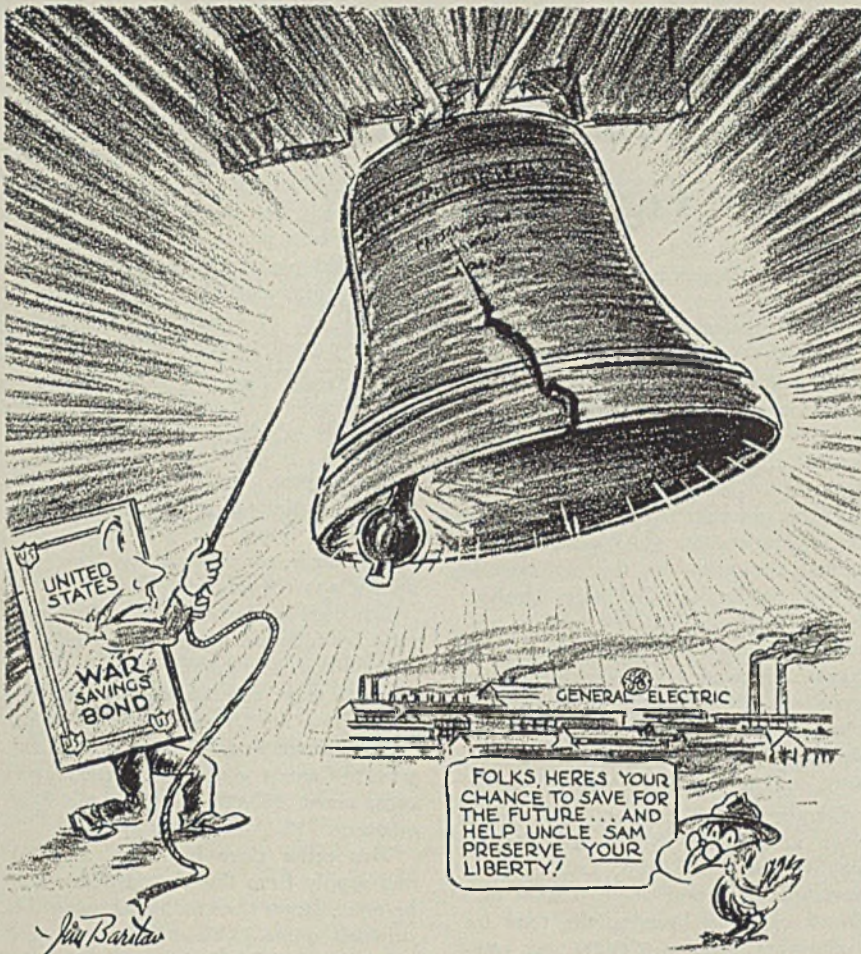
Early in the campaign it became obvious that most employes had made up their minds to purchase bonds, but for one reason or another had not gotten around to it. It was therefore decided to solicit each employe individually to make sure that he understood the bonds, the purchase plan, and the reasons for purchasing the bonds regularly.

To plan this personal solicitation, per-



Part of the crowd attending one of the many mass meetings staged by General Electric employes to promote enthusiasm for the War Bond purchase plan





This cartoon was one of many used in General Electric employe publications to acquaint workers with the importance of buying bonds

sonnel managers were called to a meeting in Schenectady. Features of the solicitation included:

1. The solicitors should be a voluntary organization of employes.
2. Each solicitor should be responsible for personally contacting about 20 employes, although the exact number would vary, depending on local conditions.

3. At each factory and office a drive chairman should be appointed by the local manager. He would select a captain in each department of the local organization; each captain would select a lieutenant in each section of his department; and within each section the lieutenants would select their own solicitors. Thus the solicitor organization

closely paralleled the physical organization of the company itself.

4. No quotas would be set, but if employes asked how much they should subscribe for, it was decided to recommend about 10 per cent of their income, in line with the expectations of the Treasury Department.

5. It was decided to stress the Series E Bonds. Only the Series E Bonds were offered for sale under the payroll savings plan. Series F and G Bonds were offered for cash sale.

6. The payroll savings plan would be emphasized, although if unsuccessful in getting an employe to use this plan, the cash and income accumulation plans would be offered by the solicitor.

Solicitors were carefully trained before the drive opened. This included the distribution of a booklet of instructions and other promotional material. Just before the drive opened the solicitors were called together to further explain the instructions and to arouse enthusiasm for the drive.

The result: 96.4 per cent of employes pledged 10.3 per cent of their earnings.

The plan was so successful that it was selected by the United States Treasury Department as a case history for bond drive promotion.

### War Bond for Each Worker As Army-Navy "E" Is Presented

A \$25 war bond was awarded Oct. 14 to each employe in the electrolytic division of the American Zinc Co.'s plant in Monsanto, Ill., after the Army-Navy "E" was presented to the plant.

Lieut. Col. Richard W. Coward, executive officer of the St. Louis Ordnance District, presented the flag.



Typical meeting held at General Electric to train and enthuse employe-solicitors just before the War Bond purchase campaign started



## Order Freezes Steel, Mine Labor; Absentees Must Work or Fight

TORONTO, ONT.

ABSENTEEISM and floating labor in war industries are outlawed by an order from the government freezing in their jobs until Feb. 15, 1941, all workers in primary steel mills, base metal mines and coal mines. The order provides that these workers cannot be "away without leave" unless they are prepared to face a National Selective Service officer who has authority to send them back to work or to take action that can force them into the armed services.

A worker may leave his job after giving seven days notice but he may not seek or accept a new job without a permit from Selective Service and no employer may interview or hire a man unless he holds a permit.

The order is estimated to affect about 75,000 workers. The new manpower plan was formulated by officials of the Department of Munitions and Supply, Wartime Prices and Trades Board, National Selective Service and Department of National War Services. The order is

subject to extension or alteration beyond Feb. 15.

Announcement has been made by the Canada-United States Materials Committee that discovery of new molybdenite sources in Canada, including a large deposit in northern Quebec, will aid production of alloy steel for war uses. Department of Munitions and Supply has given an order for 2,000,000 pounds to Dome Exploration Co., which is installing equipment on the molybdenite property in Preissac Township, Quebec. Although some 400 molybdenite deposits are known to exist in Canada the Preissac discovery is considered the most promising. It is only a short distance from workings carried on by Wartime Metals Corp., a government-owned company, in Lacorne Township.

Completion of its new open-hearth plant at Sydney, N. S., by Dominion Steel & Coal Corp. Ltd. early in November will add about 75,000 tons annual capacity, bringing the total for the Sydney works to 675,000 tons, com-

pared with 400,000 tons before the war.

The company is also building a new blast furnace, to be completed early in 1943, which will add about 1000 tons daily to pig iron capacity, bringing it to 750,000 tons per year. It is estimated the added pig iron tonnage will reduce scrap requirements about 30 per cent.

Steel Co. of Canada Ltd. is maintaining capacity production at its Hamilton, Ont., works, all open hearths being active. The new 110-inch plate mill placed in operation in April, 1941, is exceeding its rated capacity of 18,000 tons per year. On two occasions recently it attained production of 1000 tons in 24 hours on light plates. For more than a year this mill has been producing above capacity.

Increased production at Canadian steel mills has followed request of the minister of munitions and supply to make every effort to offset curtailment in steel shipments from the United States, following announcement from Washington that exports to Canada would be reduced 35 per cent, about 150,000 tons for the final quarter.

This order since has been modified and supply from the United States will be much larger than indicated under the original quota. The Canadian steel controller announces that under the revised program, with severe domestic control, war plants will be able to maintain production schedules. Even with increased steel imports it will be necessary to raise domestic output to the limit of plant capacity. To this end about 4000 workers will be transferred to steel mills. These workers and others of military age in the steel industry, will be given six months deferment from military service and will be frozen to their jobs indefinitely.

A new and more aggressive campaign for recovery of steel and iron scrap has been organized and will be in operation early in November. The program provides payment of \$7 per ton for small lots and \$8.50 per ton in lots of 25 tons or more. The program has been started in western Canada and C. G. Bateman, metals controller, states that more than 150,000 tons has been gathered there. It is estimated that 60 per cent of available scrap is located on farms and other places not usually available to collectors.

L. Levin, administrator of steel scrap in the Department of Munitions and Supply, warns that owners of unused mining equipment who can not be readily found by government authorities may find the equipment gone for scrap. Salvage agents make a close examination of mining properties and if the owner can not be found the government takes possession. It is sold to the government-

(Please turn to Page 129)

### MODERNIZED SURFACE STRUCTURES FOR IRON ORE MINE



MATHER mine of the Negaunee Mine Co., Negaunee, Mich., has been provided a model \$250,000 structure, designed and built by The Austin Co., to house surface facilities. A "change house," 60 x 280 feet, adjacent to the office building shown above, provides comforts for the miners. Head frame, in background, is 200 feet high above ground. Mine is owned jointly by Cleveland-Cliffs Iron Co. and Bethlehem Steel Corp.



## Women Capable of Handling Most Jobs in War Production Factories

AN ANALYSIS of operations in Canadian war plants show that 565 out of 623 could be performed by women. In England, Royal ordnance factories now are staffed 60 per cent by women operators, whereas in Germany a total of 15,000,000 are now employed in essential war work. In Canada, in contrast the ratio is now only 1 woman in 80, with a still lower percentage probably in the United States.

These facts were presented by Arnold Thompson, chief tool engineer, National Steel Car Corp. Ltd., Malton, Ont. before the War Production Conference of the American Society of Tool Engineers, Springfield, Mass., Oct. 16-17.

Best source of women workers, according to Mr. Thompson, are girls of 16 to 20 from high schools, with girls of 20 to 24 who have never had to work before as second choice. Women are better at routine work and are faster workers for such operations than men, many times being better than "skilled" men. Chief characteristic of women workers in war industry is that a woman wants one job while a man wants a dozen.

In discussing Mr. Thompson's paper, Otto Winter, president of the A.S.T.E., and vice president of Republic Drill & Tool Co., Chicago, pointed out that women work as well on night shifts as on day shifts. He cautioned against shifting women from night to day work, or vice versa, once they have adjusted their home life to the time table.

### Urges Training on the Job

T. O. Armstrong, international relations manager, Westinghouse Electric & Mfg. Co., Springfield, Mass., in discussing the training of new workers, cautioned that hiring programs are moving too fast to permit adequate pre-training of workers. Approximately 95 per cent of worker training must now be done "on the job." He recommended strongly the "Job Instructor Training" system developed by the Training within Industry Division of the U. S. Manpower Commission.

Mr. Armstrong advised against letting down on training once a plant nears capacity employment. He was of the opinion that in the future older men and women would have to be employed to replace the younger groups still to be called to services.

Indicating the extent of the revolution in U. S. industry brought about by the

requirements of war products, Col. H. B. Hambleton, Office of Chief of Ordnance, Washington, announced that experiments are being conducted to permit substitution of other materials for critical alloy steels in gages. One development along these lines is in the form of gages made of glass. Experimental development was not far enough along yet, according to the author, to permit drawing definite conclusions regarding the merits of this development.

Among the many suggestions offered in connection with new methods for conserving and salvaging tools were:

1. The tipping of worn out and undersize high-speed steel cutters with cemented tungsten carbide tips—using the tips to resize the cutter.
2. Recutting of milling cutters to a smaller size when worn out for the job for which they were purchased.
3. Welding, brazing and soldering of broken tools.
4. The use of longer lived higher-production cemented carbide tools wherever possible.
5. Adoption of carbide tool design, grinding, and maintenance practices for high-speed steel tools.

E. A. Clark, vice president, Budd Wheel Co., Detroit, and director of the Automotive Council for War Production, told about the job which the automotive industry did in meeting the war

production problem. When automobile production ceased, he said, something America had lived by for 40 years was gone.

Everybody had to stand by until the tool engineer had finished his job. The decoration the tool engineer received was to bury him under tons of blueprints of strange parts he had never heard of before. He was "honored" by management and labor who proceeded to hound him to get through and out of the way so that the factory could begin to produce. For 60 days a turmoil like Dunkirk ruled the plants. Machines useless for war work went to scrap, to vacant fields, to yesterday's competitors, or to some boat builder down in the Louisiana swamps.

Tools and parts were flying through the air by plane and crane. By July employment and dollar value of production had reached the highest total in the city's history—one sixth of the nation's entire war production.

A single company has undertaken as many as 150 different war projects. Major concerns asked Washington to give them the "hard" jobs and leave the easier ones for smaller plants with fewer tool engineers. A foreign design gun with 500 parts was converted to mass production involving the redesign of 150 pieces to enable them to be produced from stampings. It took 4900 dies, jigs,

### SLOGAN BANNER MOVES ACROSS SHOP



HIGH visibility for war production incentive posters is assured in Harnischfeger Corp. plant, Milwaukee. Placed on overhead materials handling equipment, manufactured and used by the company, they catch workers' eyes. Shown in a machine shop bay is a three-ton crane, latest all-welded type



make one wing for an airplane.

Chrysler balanced out its lines from the General Motors machine tool list. Ford made tools for Chevrolet. Parts builders helped life-time rivals fill the order they lost to the same plant a month before as production demand was doubled—then tripled.

Conversion to war work was solely a problem of tooling. By December, Detroit will have doubled its peace time output rate.

Primary credit for this goes to the tool engineer. Next year still more tools will be needed for a further increase in production. Tool men will be first in the reconversion for what shall come after the war and should give thought now to how to carry on.

It was the American tool engineers

who helped Australians to a knowledge of how to do things themselves. Some of them went to Russia to develop a race of mechanics out of peasant farmers so that they could plan for themselves, during our "waiting time" of getting ready.

The extent to which industry has been able already to develop substitutes of either a temporary or permanent nature for critical materials was brought out by J. B. Savits, Pneumatic Scale Corp. Ltd., North Quincy, Mass., who mentioned that his company had changed some 5000 items to avoid use of critical materials, and that hundreds of these were in the nature of "improvements" or permanent changes, involving the use of new processes and new equipment. Among developments were the use of

sheet steel instead of aluminum castings which actually saved a little weight, and also an enormous saving in production time.

The possibility of a new series of National Emergency steels to be substituted for the present types was indicated by L. S. Bergen, associate director of metallurgy, Crucible Steel Co. The new series (No. 9400, 9500, and 9600) are characterized by a lower content of nickel and chromium, etc., with a somewhat higher manganese and silicon content. Physical characteristics were not completely established but indications are that they are comparable with the current series of NE steels, except for a somewhat lower impact value. Some of the critical alloys are entirely eliminated in the 9600 series.

## 24-Inch Pipeline To Be Extended to Atlantic Coast

Extension of the 24-inch pipeline now under construction between Longview, Tex., and Norris City, Ill., to the Philadelphia-New York refining area was authorized last week by the War Production Board. The extension will require 220,000 tons of steel, which WPB will allocate for this purpose.

The 531-mile line to Norris City from Texas has been more than half completed, and is proceeding at a rate of more than 7 miles a day. The line to Illinois will be finished early in December and crude and heating oils are expected to start flowing by the first of the year.

Daily delivery capacity will be 300,000 barrels.

Contracts for the construction of terminals and pumping stations will be awarded soon by the Office of Petroleum Co-ordinator for War. Virtually all the materials have been ordered, but actual construction will have to await the acquisition of terminal and station sites.

Construction of power lines will be started soon.

Construction of the line offered some interesting engineering problems, due to the number of rivers that had to be crossed. Six crossings, the Red, Little Red, Little Missouri, Ouachita, White and St. Francis already have been completed, and crossing of the Arkansas and Mississippi are under way.

Seventy-two employees of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., were awarded service medals in the third quarter of 1942, Robert Gregg, president, announced last week,



Protective coating of tar-like substance is applied to 24-inch pipeline which will carry crude and heating oils from Texas to the East coast. An asbestos-paper covering will complete the coating. NEA photo



## Activity Index Moves Steadily Upward

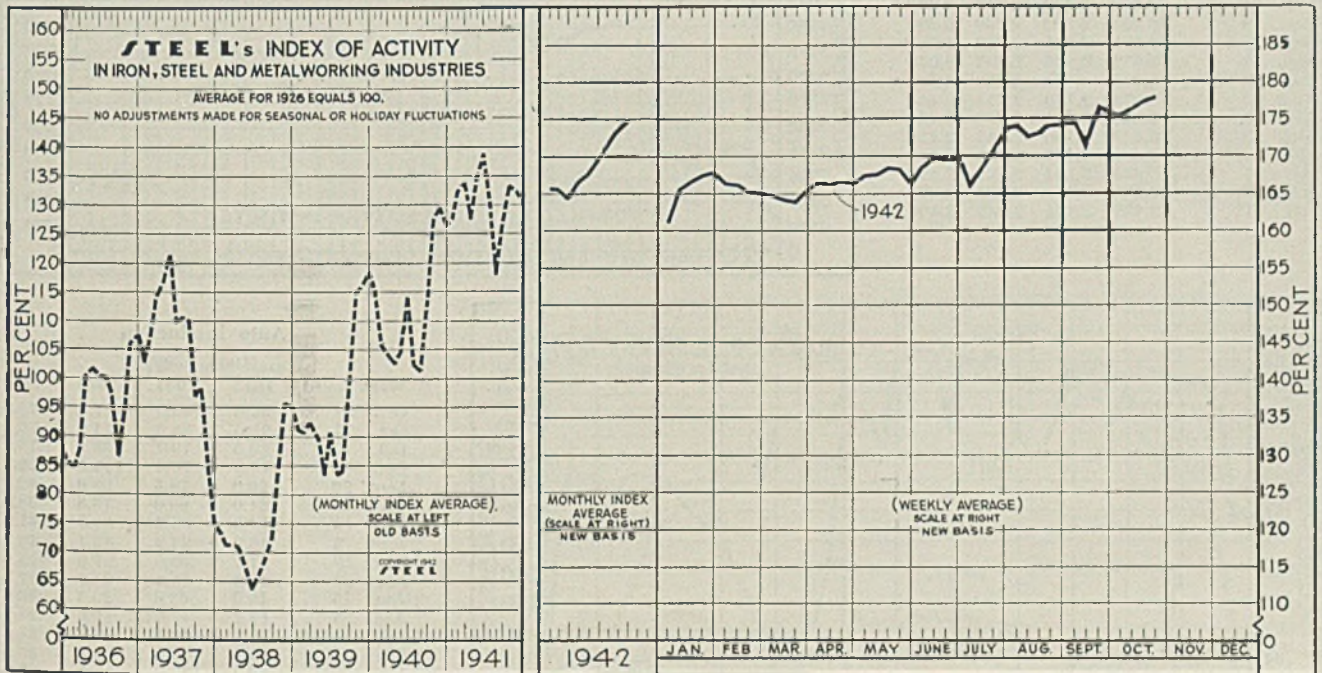
Consumer goods inventories held by manufacturers are normal or below in relation to sales, reflecting an unusually active demand and limitation of production in many lines. Inventories of department stores, particularly large independent retail stores, have increased at a much more rapid rate than their sales. However, retail store inventories are expected to decline steadily over the coming months. To an increasing extent we are living off the supply of goods previously produced.

Upturn in electric power production and revenue freight carloadings forced STEEL's index of activity in the iron, steel and metalworking industries up one point

to 177.9 during the week ended Oct. 24. This represents a new peak level recorded by the index, comparing with 176.0 in the corresponding week a month ago. The low point this year registered by the index was 163.9 in the period ended March 21.

The national steel rate held steady at 99 per cent of capacity during the week ended Oct. 24. Steel interests report volume of new orders is off from peak of recent months, but still exceeds output. Scrap supply situation continues to improve, with most steel producers now being able to build up stocks slightly. Industrial scrap is moving in better volume to steel mill yards. Full effect of the household scrap collection drives has not yet been felt, for sorting operations will take considerable time.

Electric power consumption again advanced during the latest period to reach 3,752,571,000 kilowatts. This compares favorably with the all time peak of 3,756,571,000 recorded in the period ended Sept. 16. Currently power output is 12.3 per cent above that recorded a year ago.

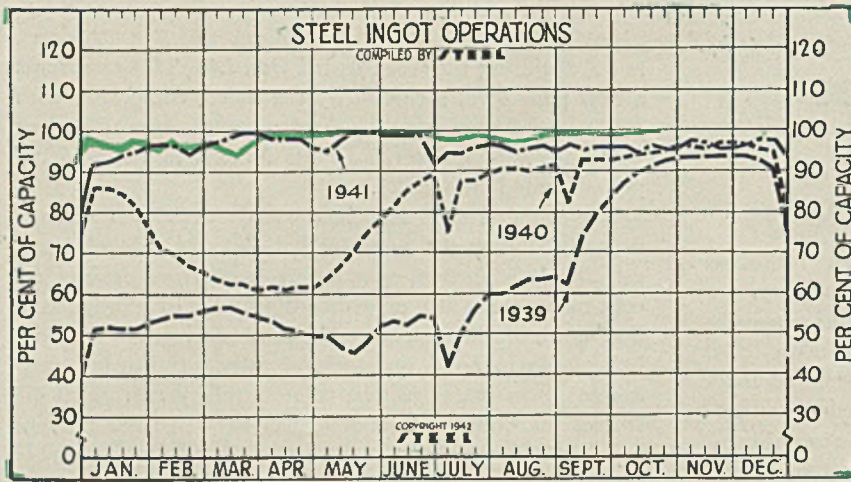


STEEL's index of activity gained 1 point to 177.9 in the week ending Oct. 24:

Week Ended	1942	1941	Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Aug. 22	174.0	118.5	Jan.	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.8	69.1
Aug. 29	174.5	118.2	Feb.	165.6	132.3	105.8	90.8	71.1	106.3	84.3	82.0	73.9	48.2	55.3	75.5
Sept. 5	174.8	111.8	March	184.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
Sept. 12	171.2	131.3	April	166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
Sept. 19	176.8	130.6	May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
Sept. 26	176.0	132.0	June	169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
Oct. 3	175.5	132.7	July	171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Oct. 10	176.5	132.3	Aug.	173.5	118.1	101.1	83.9	68.7	110.9	97.1	76.7	63.0	74.1	45.0	67.4
Oct. 17	176.9	133.4	Sept.	174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct. 24	177.9†	133.5	Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
			Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
			Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.9

Note: Weekly and monthly indexes for 1942 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production.



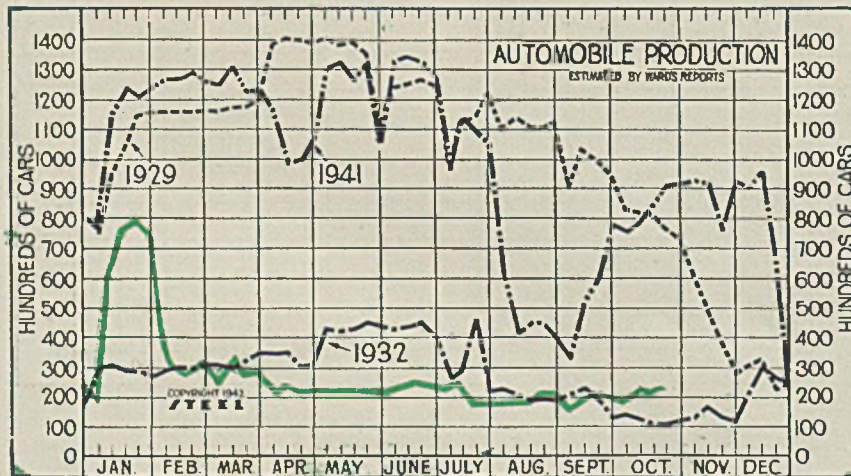
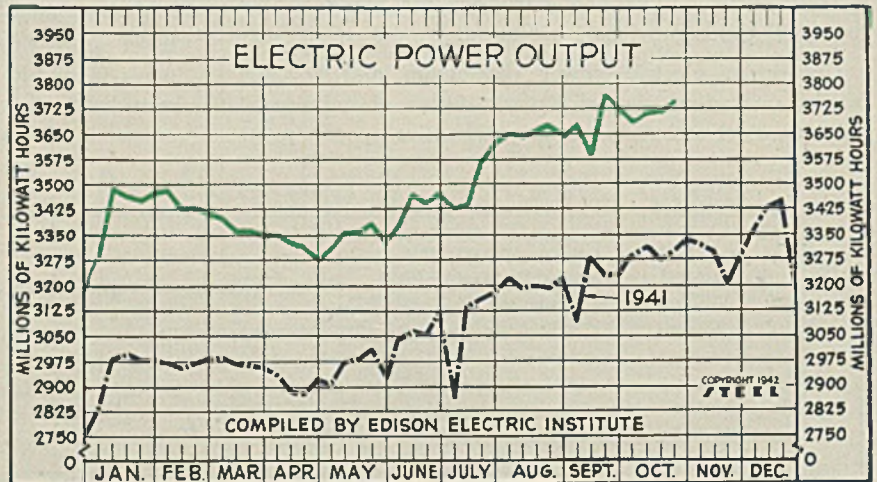


Steel Ingot Operations  
(Per Cent)

Week ended	1942	1941	1940	1939
Oct. 24	99.0	95.5	95.5	92.0
Oct. 17	99.0	96.5	95.0	91.0
Oct. 10	98.5	94.5	94.5	89.5
Oct. 3	98.0	96.0	93.5	87.5
Sept. 26	98.0	96.0	93.0	84.0
Sept. 19	98.0	96.0	93.0	79.5
Sept. 12	98.0	96.5	93.0	74.0
Sept. 5	98.0	95.5	82.0	63.0
Aug. 29	98.0	96.5	91.5	64.0
Aug. 22	97.5	96.0	90.5	63.5
Aug. 15	97.0	95.5	90.0	63.5
Aug. 8	97.5	96.5	90.5	62.0
Aug. 1	98.0	97.5	90.5	60.0
July 25	98.5	96.0	89.5	60.0
July 18	98.0	95.0	88.0	56.5
July 11	97.5	95.0	88.0	50.5
July 4	97.5	92.0	75.0	42.0

Electric Power Output  
(Million KWH)

Week ended	1942	1941	1940	1939
Oct. 24	3,753	3,299	2,867	2,622
Oct. 17	3,717	3,273	2,838	2,576
Oct. 10	3,702	3,315	2,817	2,583
Oct. 3	3,683	3,290	2,792	2,554
Sept. 26	3,720	3,233	2,816	2,559
Sept. 19	3,757	3,232	2,769	2,538
Sept. 12	3,571	3,281	2,773	2,532
Sept. 5	3,673	3,096	2,592	2,376
Aug. 29	3,640	3,224	2,736	2,442
Aug. 22	3,674	3,193	2,714	2,434
Aug. 15	3,655	3,201	2,746	2,454
Aug. 8	3,649	3,196	2,743	2,414
Aug. 1	3,649	3,226	2,762	2,400
July 25	3,626	3,184	2,761	2,427
July 18	3,565	3,163	2,681	2,378
July 11	3,429	3,141	2,652	2,403



Auto Production  
(1000 Units)

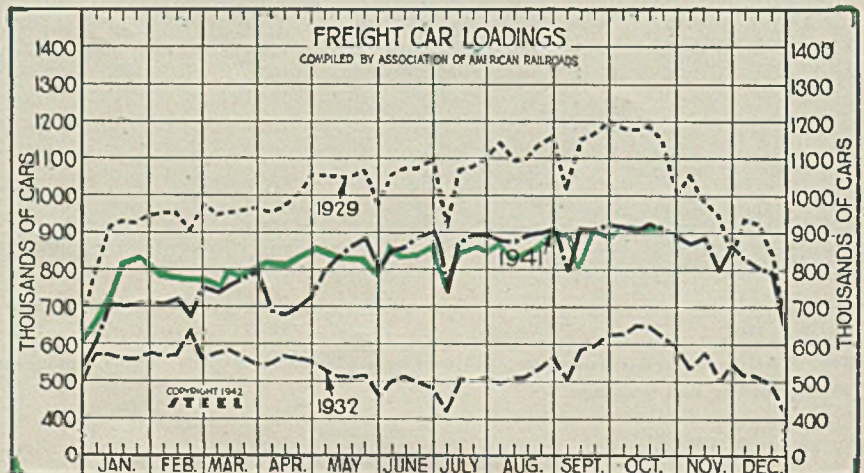
Week ended	1942	1941	1940	1939
Oct. 24	20.8	91.9	117.1	78.2
Oct. 17	20.2	85.6	114.7	70.1
Oct. 10	20.3	79.1	108.0	75.9
Oct. 3	19.9	76.8	105.2	76.1
Sept. 26	20.9	78.5	96.0	62.8
Sept. 19	21.0	60.6	78.8	54.0
Sept. 12	19.6	53.2	66.6	41.2
Sept. 5	16.9	32.9	39.7	26.9
Aug. 29	21.1	40.0	27.6	25.2
Aug. 22	20.2	45.5	23.7	17.5
Aug. 15	19.2	45.6	20.5	13.0
Aug. 8	19.2	41.8	12.8	24.9
Aug. 1	18.3	62.1	17.4	28.3
July 25	18.3	105.6	34.8	40.6
July 18	17.9	109.9	53.0	47.7

Figures since Feb. 21 last include Canadian trucks and automobiles and United States trucks.

Freight Car Loadings  
(1000 Cars)

Week ended	1942	1941	1940	1939
Oct. 24	910†	914	838	834
Oct. 17	901	923	814	861
Oct. 10	910	904	812	845
Oct. 3	908	918	806	835
Sept. 26	893	920	822	835
Sept. 19	903	908	813	815
Sept. 12	815	914	804	806
Sept. 5	888	798	695	667
Aug. 29	899	913	769	722
Aug. 22	869	900	761	689
Aug. 15	869	890	743	674
Aug. 8	850	879	727	665
Aug. 1	864	883	718	661
July 25	856	897	718	660

†Preliminary.

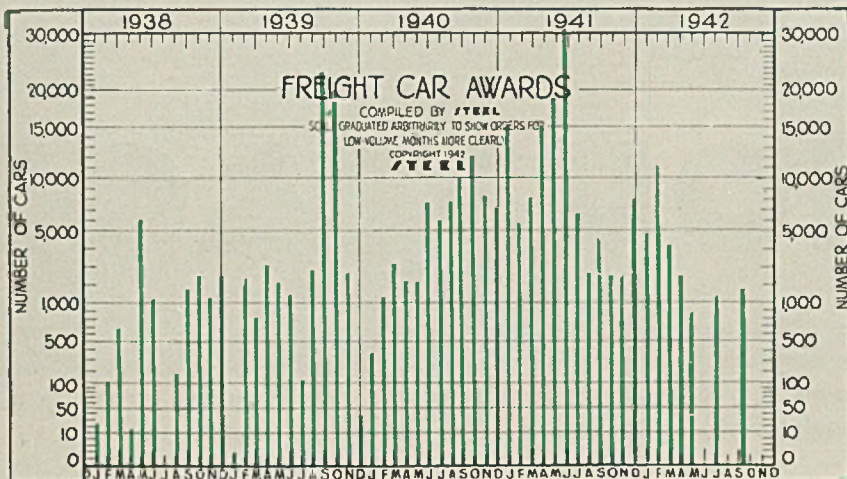
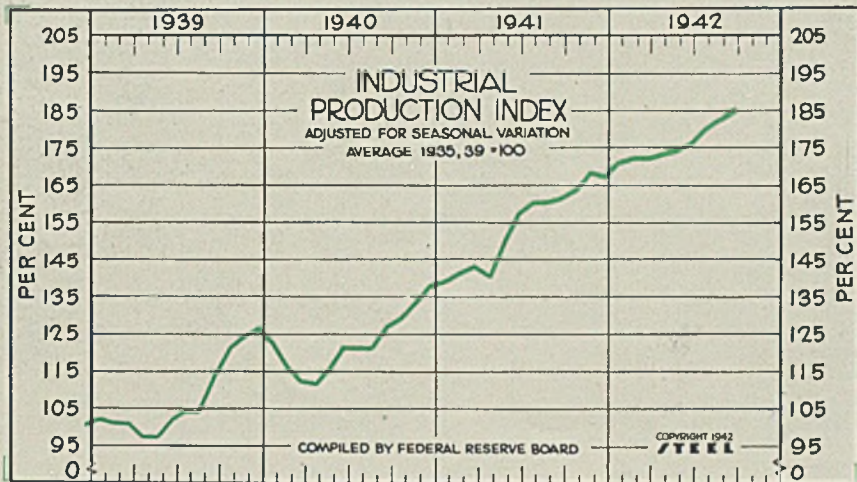




## Industrial Production Federal Reserve Board's Index

(1935-39 = 100)

	1942	1941	1940	1939	1938
Jan.	171	139	122	102	88
Feb.	172	141	116	101	84
March	172	143	112	101	84
April	173	140	111	97	82
May	174	150	115	97	80
June	176	157	121	102	81
July	180	160	121	104	86
Aug.	183	160	121	104	90
Sept.	185	161	127	113	90
Oct.	183	163	129	121	95
Nov.	185	168	133	124	100
Dec.	187	167	138	126	101
Year Ave.	154	122	108	84	



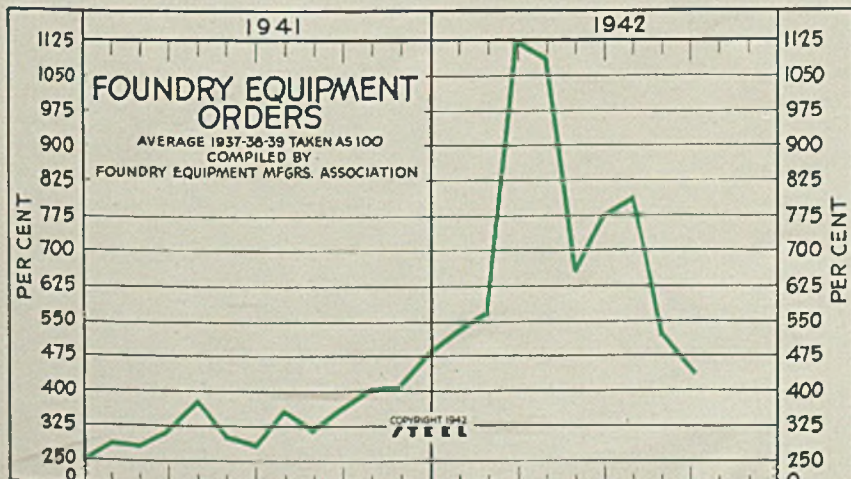
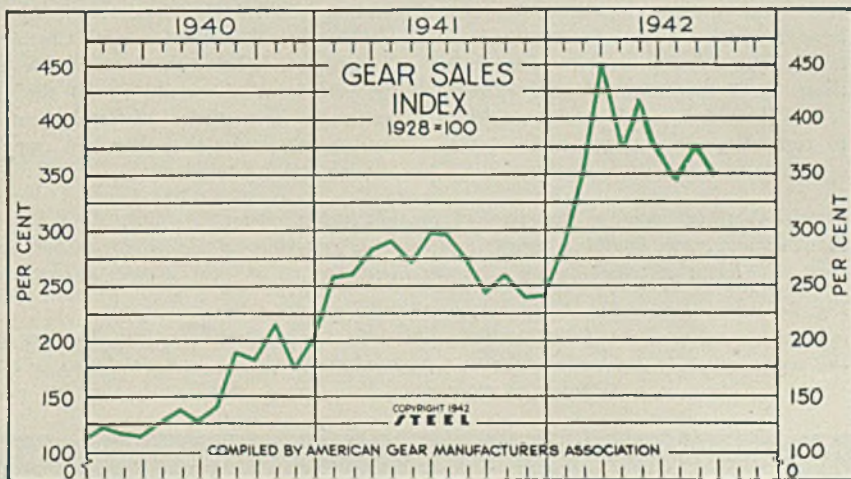
### Freight Car Awards

	1942	1941	1940	1939
Jan.	4,253	15,169	360	3
Feb.	11,725	5,508	1,147	2,259
March	4,080	8,074	3,104	800
April	2,125	14,645	2,077	3,095
May	822	18,630	2,010	2,051
June	0	32,749	7,475	1,324
July	1,025	6,459	5,846	110
Aug.	0	2,668	7,525	2,814
Sept.	1,863	4,470	9,735	23,000
9 mos.	25,893	108,362	39,270	35,456
Oct.	2,499	12,195	19,634	
Nov.	2,222	8,234	2,650	
Dec.	8,406	7,181	35	
Total	121,499	66,889	57,775	

## Gear Sales Index

(1928 = 100)

	1942	1941	1940	1939	1938
Jan.	288	259	123	91.0	93.0
Feb.	353	262	116	86.0	77.0
Mar.	455	288	114	104.0	91.0
April	378	292	128	88.0	74.0
May	421	273	133	93.0	70.0
June	373	299	129	90.0	58.0
July	344	298	141	89.0	67.0
Aug.	380	276	191	96.0	76.5
Sept.	351	243	183	126.0	80.5
Oct.	261	216	141.0	72.5	
Nov.	241	173	126.0	72.0	
Dec.	243	208	111.0	81.0	
Ave.	289.6	155.0	103.0	76.0	

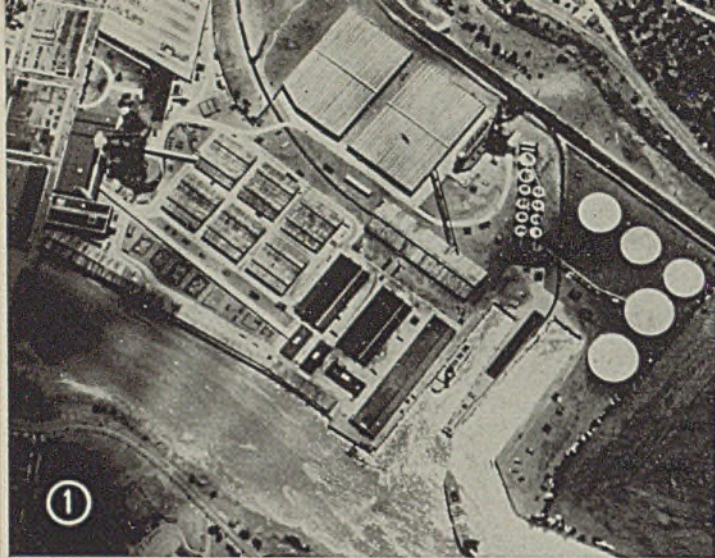


## Foundry Equipment Orders

Monthly Average  
(1937-38-39 equals 100)

	1942	1941	1940
Jan.	532.7	285.3	149.0
Feb.	567.9	281.1	135.7
March	1122.4	315.2	183.2
April	1089.3	377.2	145.2
May	653.6	298.7	129.1
June	774.0	281.1	164.9
July	800.8	358.1	194.4
Aug.	510.8	312.9	165.4
Sept.	446.4	363.8	161.2
Oct.	403.8	264.0	
Nov.	408.5	254.2	
Dec.	481.2	257.8	
Year	345.6	184.0	





## Protection of Industrial Plants Against Bomb Attacks by

By HARPER GOFF

# CAMOUFLAGE

TWO HOURS' flight from our west coast, dawn is breaking over the ocean's rim. On an aircraft carrier that flies the flag of the Rising Sun, the flight commander is giving final instructions as the ship maneuvers into the wind.

"On the west side of Greenhill, look for two Greek theatres in the center of a large recreation park. Bomb anywhere in the recreation park, but particularly those Greek theatres. To your places!"

And that's how much good it would do to camouflage one target with another

*Here a camouflage expert reveals underlying thinking that must be employed if camouflage efforts are to prove effective. As he points out, it is useless to camouflage one industrial target by a simulated scene that can be identified just as readily*

just as visible. Just one reconnaissance flight in search of the Greenhill Chemical Corp.—granted that the enemy knows its general location—would reveal the incongruous arrangement of Greek theatres and tennis courts that disguised respec-

tively the huge, vital storage tanks, and the more spread-out manufacturing plant, distillery, etc.

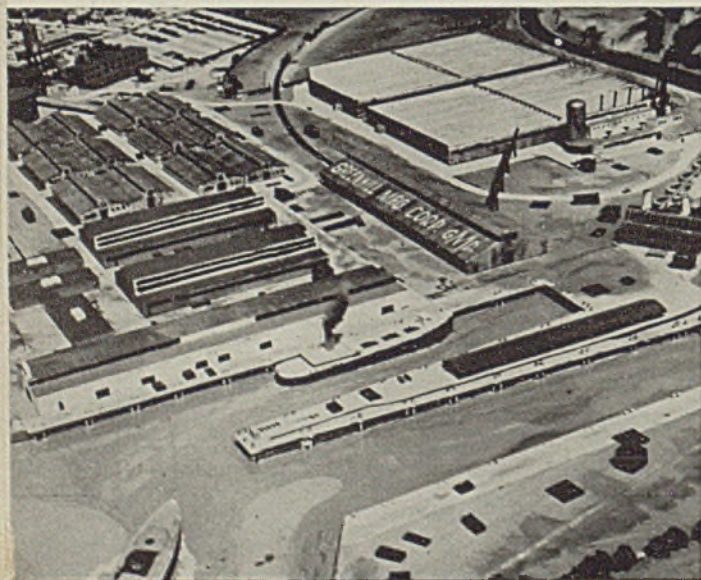
I have used an exaggerated example, perhaps, but it is indicative of some of the rationale that must lie behind every

*Fig. 1—Vertical view of hypothetical manufacturing center, showing numerous bombing targets. Altitude is considerably less than customary for enemy bombing*

*Fig. 2—Same view as Fig. 1 but here low visibility paint (disruptive camouflage) has been applied. This sufficiently alters the scene so as to confuse bombardier from altitude of 20,000 feet or more*

*Fig. 3—What happens to a busy scene like this, on a hypothetical American inland waterway, when a camoufler decides to blot it out? At the same time, its functional efficiency must be retained*

*Fig. 4—Here is the answer. Paint, nets, fabrics, foliage are combined to eliminate shapes and forms. Ships can be towed in and out, loading can go on without interruption*





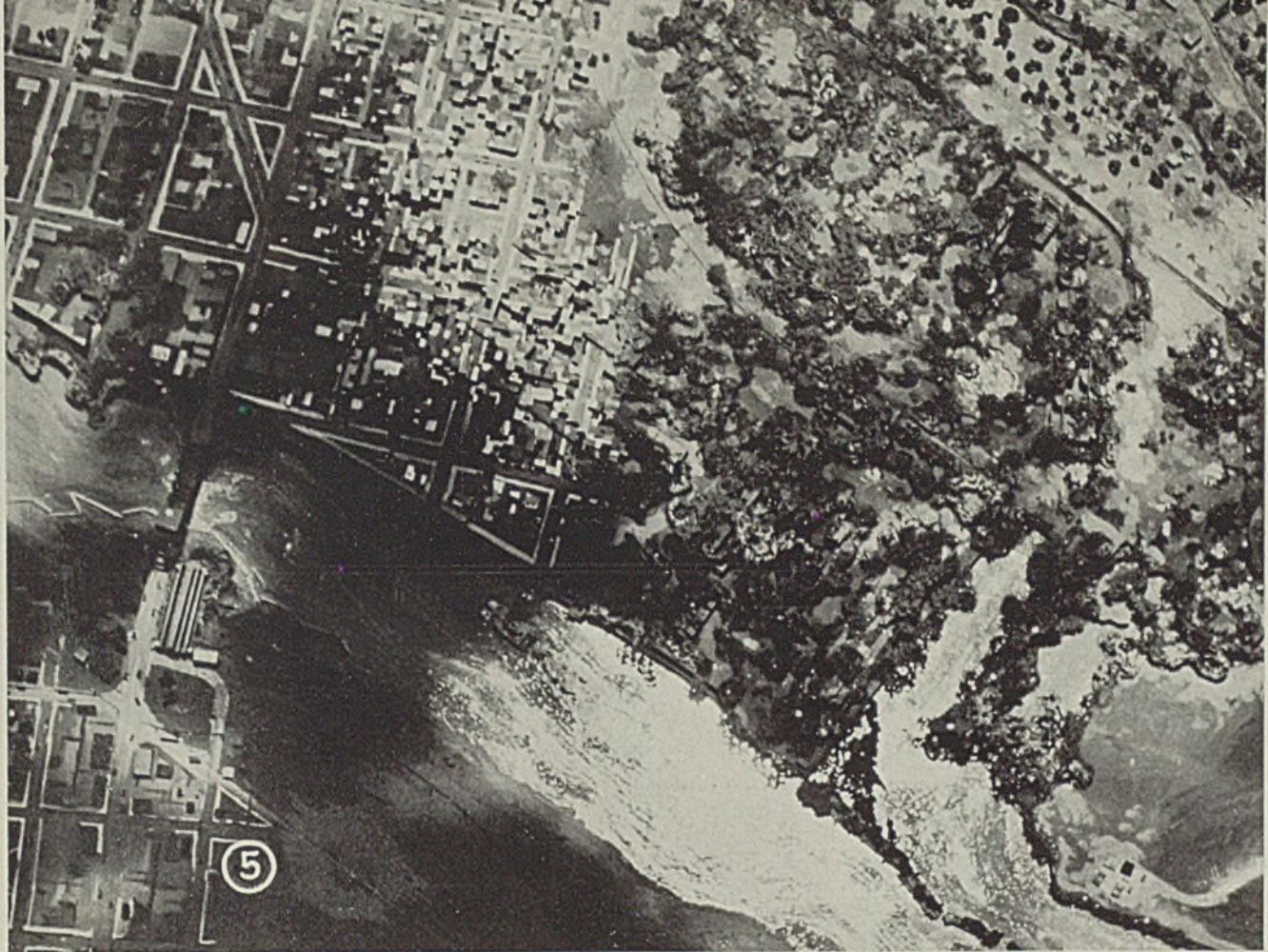


Fig. 5—Same scene as Fig. 1 except camouflage has been applied by use of nets and fabrics, plywood shapes, camouflage paint, train sheds, floats on river. This is exactly the same scene as in Figs. 3 and 4 but viewed vertically instead of from a low angle

Fig. 6—Long shadows are one of the more treacherous problems of the camouflleur. Paint may disguise form of a target

single camouflage job which has been, or now is, quietly under way in America.

To call camouflage a science may be correct. But it is more than science—it is an art, with a definite technique. It may properly be called *the architecture of concealment*. It is decidedly a tailor made job—custom-built to the last detail.

During the eight months since Pearl Harbor, a small handful of artists and engineers have been spending their days and most of their nights devising effective means of concealing west coast defense plants from the eyes of the enemy.

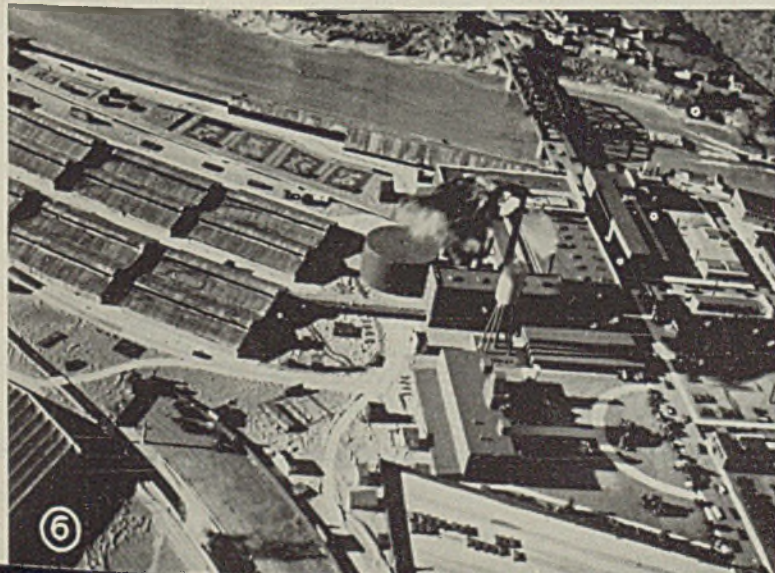
As a member of this group, I have seen professional interest in camouflage grow from the state of scattered individual

but early morning or late afternoon shadows give it away to reconnaissance photographer. That is, unless . . .

Fig. 7—. . . Unless the camouflleur breaks them up with plywood shapes, as here. Notice even smokestacks are rendered almost invisible by fastening cleverly painted plywood shapes halfway up. Photos and models furnished by Premier Oil & Lead Works of California

effort by a single designer here and there, to a group effort; thence, to a series of organized camouflage units. It was a rapid transition—but no more rapid than the gathering hunger for knowledge displayed by industry at large toward this architecture of concealment.

The information which these camou-  
(Please turn to Page 111)





# FABRICATING Replacement Parts

... by welding structural shapes and plates

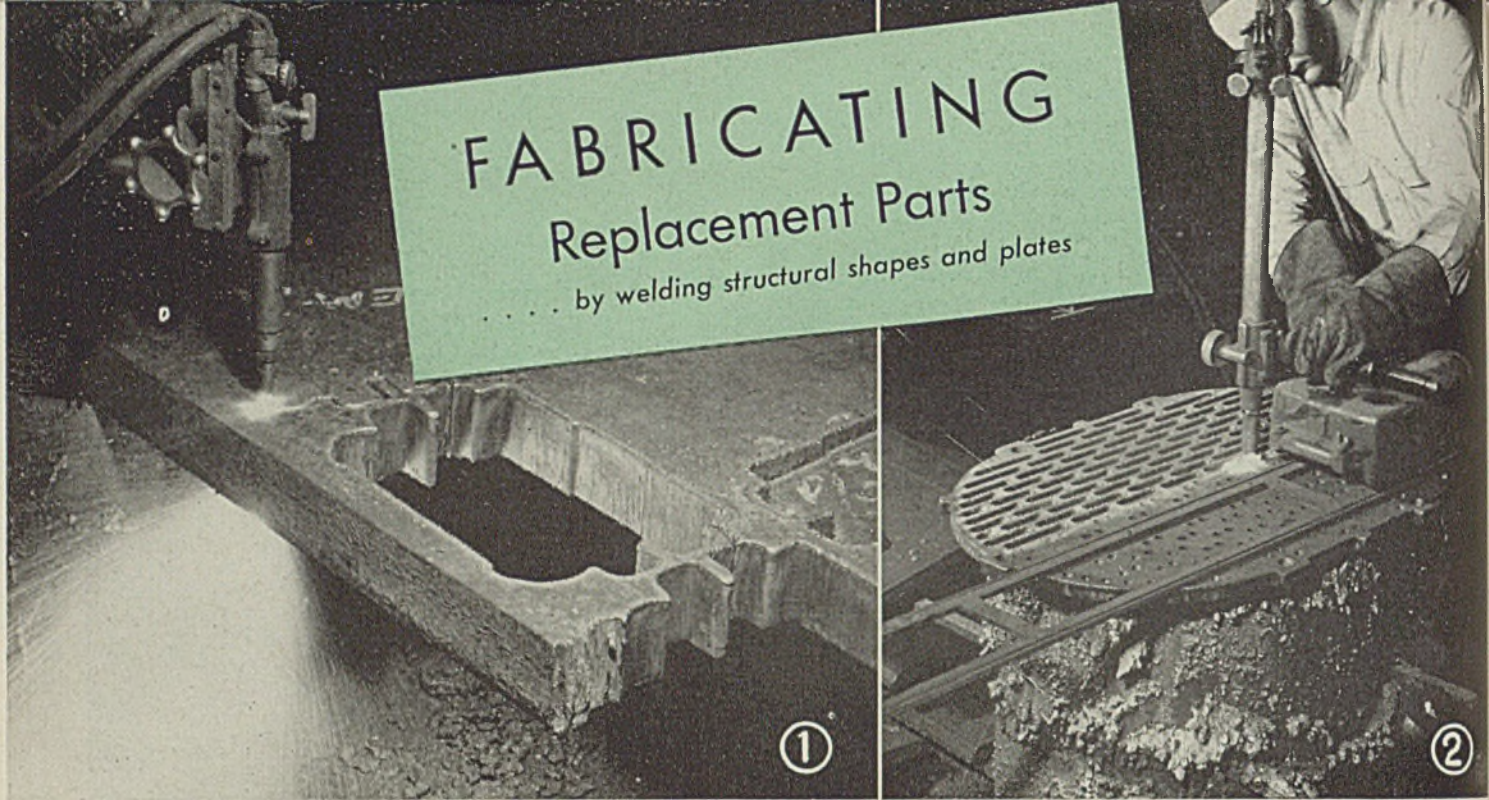


Fig. 1—When a part needs frequent replacement, such as these die blocks, it becomes practical to make a templet and cut a number at one time on a shape cutting machine such as the small Camograph used here

Fig. 2—Another part that periodically needs replacement is this strainer plate. Here a flame cut plate is being slotted using a special tip which cuts both sides of the slot simultaneously

PRECEDING articles in this series (see *STEEL*, July 27, 1942, p. 56 and *STEEL*, Sept. 14, 1942, p. 170) have recommended methods for prolonging the life of steel mill equipment, and for reclaiming worn or broken parts which might otherwise have to be scrapped, all for the purpose of "getting the most out of the least" and keeping the mills running with a minimum of shutdowns. Such restorations are not always possible or feasible, however, and the occasion ultimately arises when worn-out, burned-out or broken parts of mill equipment must be replaced. This is often a problem in itself, particularly in the case of large castings which may be obtainable only after interminable delay.

Likewise certain special rolled shapes have been eliminated from production schedules and a readily made alternative must be made available. In these days of forced production schedules and allocation orders, it is absolutely essential that means be available for making replacement parts with a minimum of delay, particularly when the continued operation of essential equipment depends on it. The need for such a part cannot always be forecast, and unexpected failures demand sudden action on the part of the maintenance organization.

Indispensable to such maintenance operations is the method of welded fabrication, utilizing standard plate thick-

nesses and rolled shapes if obtainable. The advantages inherent in welded fabrication are numerous, but even if we were granted only its speed and flexibility it would still be a boon to all steel mills.

## Consider Design First

In fabricating replacement parts the first problem to receive consideration is the design of the part. When designing for welded fabrication, it is generally desirable to think in terms of a functional unit which will meet the service requirements of the structure, rather than to attempt to duplicate the design which it replaces. The great strength of rolled steel permits light sections to be used. In elaborate structures, intelligent designing will eliminate the need for many finish-machining operations when using rolled steel. There are, however, considerations of time and economy which will affect the design of the piece. An experienced designer of welded parts for quantity production will incorporate a number of cost-cutting features—such as judicious use of the cutting torch, power shear, bending brake and hydraulic press—to reduce the amount of welding required. Bending will save the need for many a weld, even if but a

single replacement part is to be fabricated. In most cases the maintenance department must fabricate parts one at a time. Design of the part should facilitate its construction by being as simple as possible.

Having established the purely functional design as the most practical from the standpoint of both service performance and ease of fabrication, the question still remains, what is the best approach to this problem. Generally speaking, it is to use simple sections of steel, positioned to bear the load and broken down into the fewest and simplest sections which can readily be cut or bent from stock plate and rolled shapes. Admittedly, this is quite indefinite. A certain amount of judgment—or should we say experience—is required. But a study of the successful welded designs shown here will be found helpful and suggestive.

To facilitate the cutting of the component parts, the drafting or layout department should provide individual paper templets of each part for use by the cutting operators—except where large, simple sections can be more readily laid out directly on the metal. Most machine cutting required in such work can be done with the portable Radiograph, making it unnecessary to take the larger shape-cutting machines off production work except where involved shapes must be cut.

An example of a massive structure in



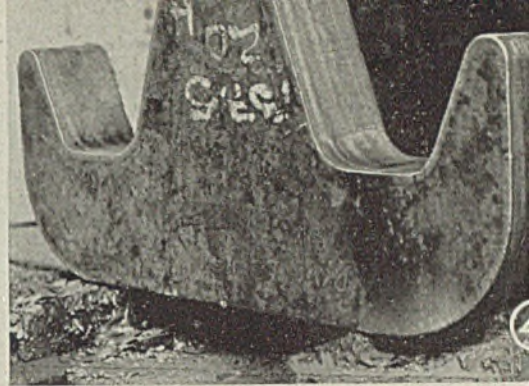
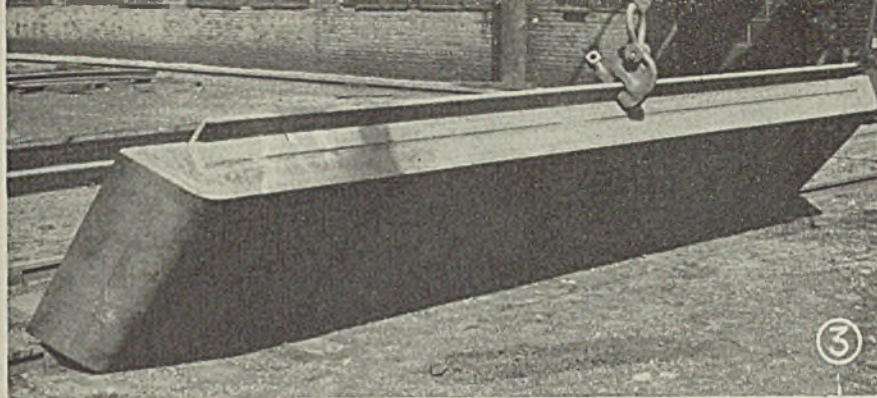


Fig. 3—Construction time for this 18-foot lead pan was short, for it consists of sections of standard plate thicknesses and rolled angles, flame cut and arc welded. Skip welding is important in such structures as this

Fig. 4—Speed is often important in making replacements. This double crane hook was flame cut in only 14 minutes, using an Airco Radiograph, from a forged steel billet 6¾ inches thick

Fig. 5—The functional design of this welded buck stay differs somewhat from that of the burned-away cast stay which it replaces. Note skip-welding technique employed to reduce distortion



Fig. 6—Opposite leg of buck stay shown in Fig. 5. Fillet welds are employed here. The offset leg resting on the plate is made up of three sections welded together

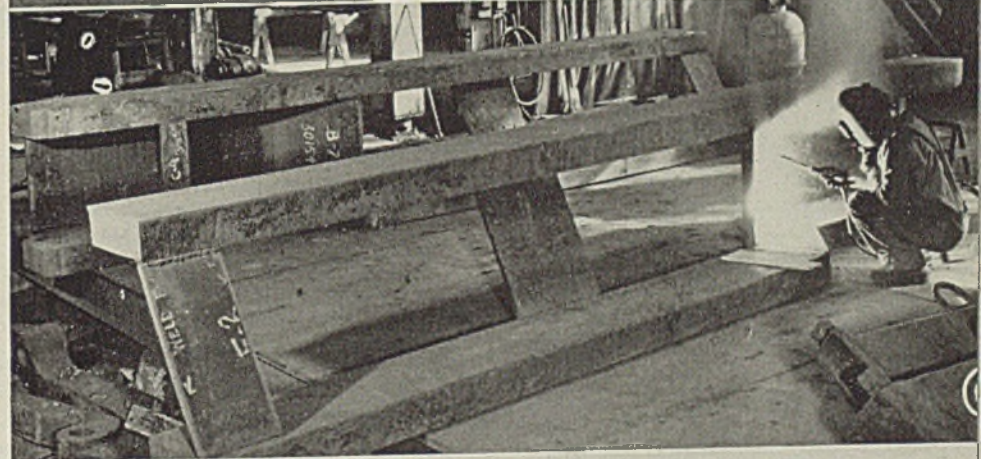
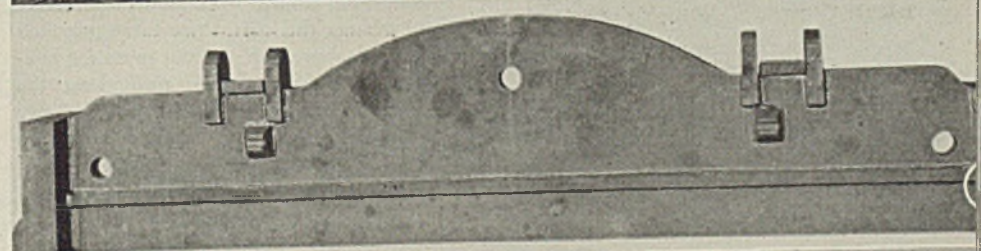


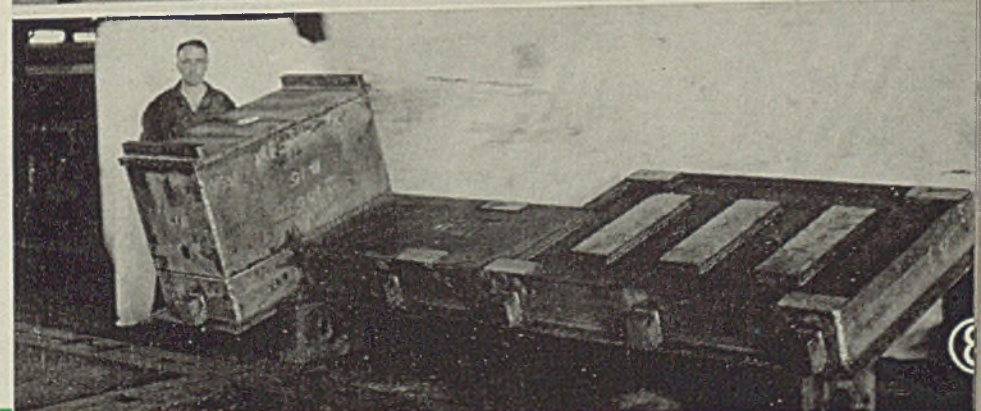
Fig. 7—This ram for a 28,000-pound press brake was fabricated from rolled plate, flame cut and arc welded

Fig. 8—Designed for strength and a minimum of machining, this base for a hydraulic press was fabricated entirely by welding. Outer frame is made from rolled structural sections



which virtually all cutting was done with the Radiograph is a welded end truck for an overhead crane, made at an Eastern steel mill. A small amount of shape cutting with the Oxygraph was required for the shaft openings, and rectangular lightening holes were cut with a hand torch and guide bar. It is sometimes desirable to postpone the cutting of such lightening holes until after the part has been welded into place, to avoid the distortion which the localized heat of cutting may set up in the plate.

In welding structures of this size it is essential that care be taken to minimize distortion. This is generally accomplished by skip-welding or step-back welding, since it is unlikely that welding jigs or fixtures will be available for use in fabricating replacement parts. The sequence of welding should be carefully planned in advance to distribute the heat in such a way that stresses will tend to counterbalance each other over





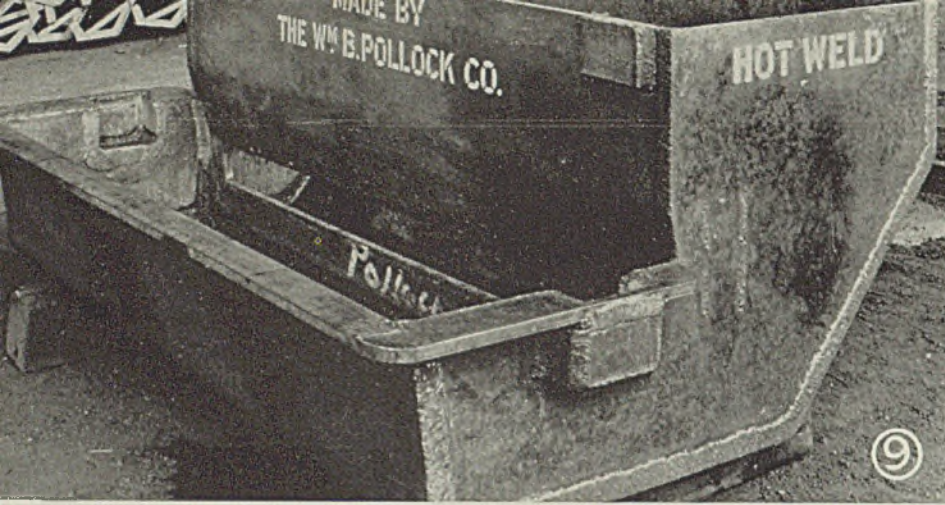


Fig. 9—A tin pot for steel plate, fabricated from 1-inch plate

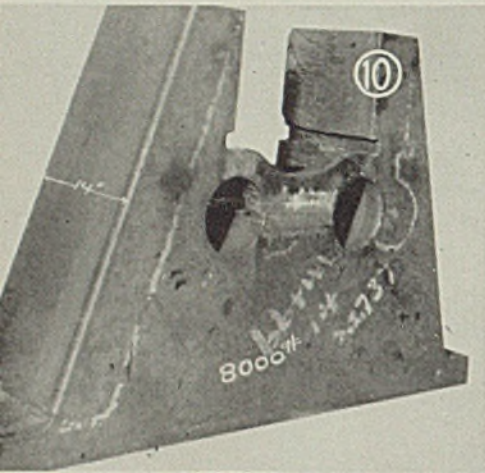


Fig. 10—A bending roll housing, flame cut from 14-inch thick ingot slab using a portable Radiagraph

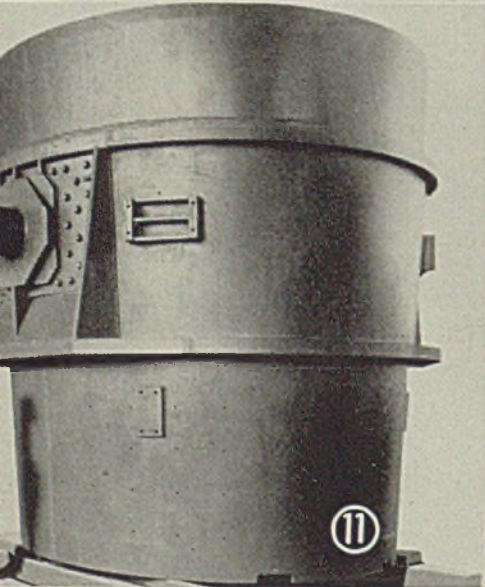


Fig. 11—This 130-ton ladle, fabricated entirely from rolled steel, is lighter than other constructions as well as stronger. This reduces crane cost and maintenance. Parts for this giant ladle were flame cut with a portable Radiagraph

Fig. 12—Due to the simplicity of design of this welded ladle stand, it is about 30 per cent lighter than the design it replaces

the entire structure. It is always desirable, of course, that locked-up stresses in large structures subject to heavy service be relieved by normalizing after welding. If the piece is too large to be accommodated in any available furnace, locked-up stresses may be almost eliminated by peening each welding bead as the work progresses.

Illustrative of the simplicity with which it can be built is the blast furnace buck stay shown in Figs. 5 and 6. Note that fillet welds were used extensively in making this part, since these provided adequate strength without need for beveling to obtain fusion throughout the cross section of the members. This stay was fabricated as an emergency measure to replace a cast stay that had burned out after long service.

A special problem is encountered in

making a repair or replacement on obsolete equipment. If the original part was a casting, it is not unusual to find that the pattern and sometimes even the drawings have long since been discarded. In these cases a welded fabrication is the only practical answer, for the fabricated part, regardless of its complexity, can usually be made in the time which would otherwise be necessary to make a new pattern. A piece such as the base for a hydraulic press shown in Fig. 8 may thus be readily fabricated to comply with certain dimensional requirements governed by the dimensions of the machine of which it is a part. The remainder of the design characteristics may be left to the discretion of the designing engineer.

The diversity of parts which may be made is endless, ranging from such comparatively simple shapes as the flame-cut double crane hook and die blocks shown in Figs. 1 and 4, to elaborate structures such as the welded ladle illustrated in Fig. 11. Fabricated by welding, these pieces are lighter and stronger than comparable pieces made by other methods but more important than this is the speed with which the replacement part can be made ready and installed in service.

## Metallizer Process Covered in Manual

A 65-page book covering every phase of the Mogul metallizer process is now being offered by Metallizing Co. of America, 1330 West Congress street, Chicago.

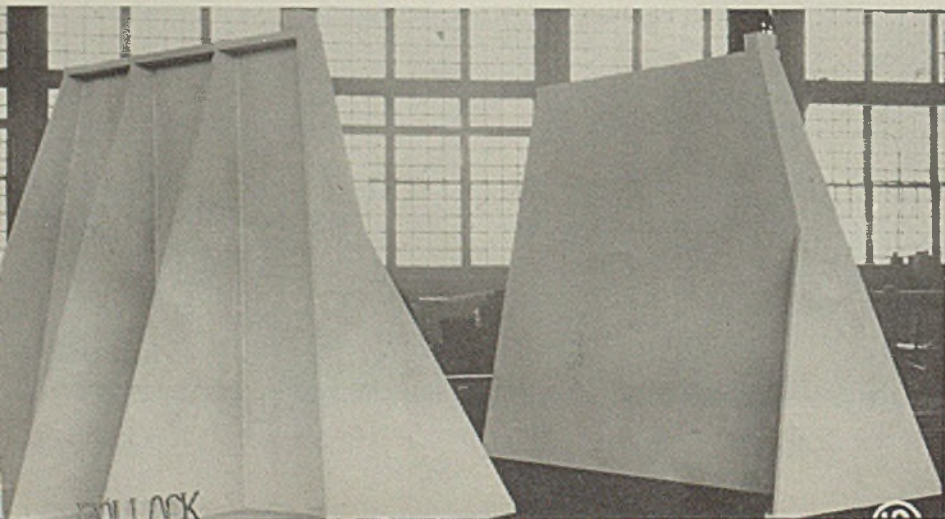
Carrying the title "Mogul Metallizer Process Manual", it contains illustrations and drawings to aid the reader in absorbing the text.

Discussions included in the manual embrace surface preparation, finishing, application of the coating, protective appliances, machining the coating, corrosion, machine element coatings, metallizing wires and their uses, "don'ts" and tips to operators. The manual may be obtained directly from the company for \$2.

## Offers Victory Lockers Of Wood for Workers

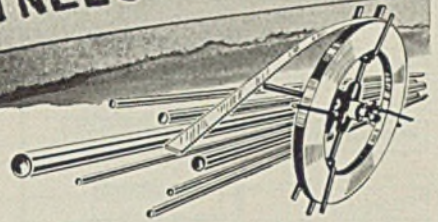
Because metal lockers for workers are out for the duration, Curtis Cos. Inc., Clinton, Iowa, is offering a new line of industrial type Victory lockers made entirely of wood.

According to the company, these units are practical and can be used in expanded plants to accommodate the increasing numbers of employes in war plants.





# 8 WAYS TO GET MORE PRODUCTION... FROM EVERY POUND OF STAINLESS STEEL



Getting increased output from every pound of Stainless Steel is more than an answer to your own production problem. It is also a measure by which the success of our war effort will be determined.

Part of Carpenter's job during total war is to help you get more perfect parts and fewer rejects from the Stainless Steel you use. In many plants like yours, Carpenter service representatives are helping to overcome many fabricating difficulties.

And our Metallurgical Department is giving a helping hand to fabricators of Stainless Steel who face new war production problems.

Use the suggestions on this page as *your* starting place for increasing the production of Stainless Steel parts. And when you are faced with a particularly tough problem, take advantage of the diversified experience of Carpenter's service representatives and metallurgists.

## Check these production Hints...

1. **FORGING** — Preheat Stainless *slowly* and bring it up to proper forging temperature. Never run furnaces hotter than the recommended forging temperatures.
2. **GRINDING** — Don't increase wheel pressure to save time. It overheats the metal, causes discoloring and distortion.
3. **STAMPING** — Re-check layouts to keep skeleton scrap losses at a minimum.
4. **DRAWING** — Be sure gauge of Strip is uniform. Off-size material can produce tearing and galling. Non-uniform material can cause wrinkling in the die.
5. **TUMBLING** — Be sure that "soft" water is used in the barrel. Hard water "coats" the balls, prevents them from giving parts a bright, clean finish. Check with your water

company on the "hardness" of the water you use.

6. **NARROW** Stainless Strip of specified width can often be used in place of sheet. This saves time spent handling sheet and allows more economical layout. One plant saved 30,000 lbs. of Stainless on one job by making this change.
7. **PRESS SPEEDS** — Only correct press speeds give maximum output. Faster press speeds may be the answer to your problem. Or perhaps slower press speeds would overcome die galling that interrupts production.
8. **CHECK PHYSICALS** — Can you take advantage of the natural strength of Stainless by using a lighter gauge Strip? When possible, an embossed rib can add extra strength to permit the use of lighter gauges.



The Carpenter Steel Company  
139 Bern Street, Reading, Pa.



For more of the kind of engineering and fabricating assistance you need today, ask for a copy of "Working Data for Carpenter Stainless Steels". It contains detailed information to help you select and fabricate Stainless Steel to meet your requirements. A request on your company letterhead will start a copy of this new 100-page Working Data Book on its way to you.

# Carpenter STAINLESS STEELS

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



Producing 30 and 50-Caliber Cartridge Cases with

# CARBIDE DIES

... including recommendations for improved die designs

By EARL GLEN  
Carboloy Co. Inc.  
Detroit

PRIME reason for the rapidly increasing usage of carbide dies for cartridge case production—from the smallest to the largest sizes—is their greater resistance to wear, reducing down time for die changes (thereby, increasing output), reducing the number of die reconditionings required, and reducing the total number of dies required for a given output. In addition to this of course, the decreased wear of dies of the carbide type insures greater uniformity of product.

While this discussion relates primarily to the production of brass cases, indications are that carbide dies of the same basic design can be used with equal success on substitute materials, including steel.

Experience has demonstrated that, to keep production going, the ratio of dies required is only 1 carbide in place of 20 of tool steel. Thus 200 Carboloy dies will take care of a plant that normally would require 4000 steel dies for the

same continuity and quantity of out-put, particularly is this true when die selection takes into consideration the possibilities of re-working worn dies.

In addition to the decidedly lower initial cost of die equipment for a given production, carbide dies also have demonstrated a marked advantage from the standpoint of operating costs. This is largely due to decreased die maintenance and production delays for die changes, since there are only fewer dies to take care of, but dies do not have to be re-conditioned as frequently. Today, it is common to get 1,000,000 pieces per carbide die change against an average of 50,000 with steel dies. Production up to 4,500,000 pieces before carbide dies required service has been reported. Car-

(Please turn to Page 122)

TABLE I—Die Dimensions in Inches

Part	Draw No.	Case		Nib		Rough Bearing Length	Finished Bearing Diam.
		Diam.	Height	Diam.	Height		
30-cal. A. P. Jackets	All 4	1.995	0.500	0.875	$\frac{3}{8}$	$\frac{1}{8}$	.305 to .496
30-cal. T. & B. Jackets	All 3	1.995	0.500	0.875	$\frac{3}{8}$	$\frac{1}{8}$	.305 to .422
30-cal. Jacket	size & resize	1.110	0.432	0.625	$\frac{3}{8}$	$\frac{1}{8}$	.306
30-cal. Cartridge Case	All	1.727	0.625	1.000	$\frac{1}{2}$	$\frac{3}{8}$	.4605 to .655
50-cal. A. P. & Tracer Jacket	1 & 2	2.245	0.625	1.25	$\frac{1}{2}$	$\frac{3}{8}$	.649 to .870
50-cal. A. P. & Tracer Jacket	3 & 4	1.727	0.625	1.000	$\frac{1}{2}$	$\frac{3}{8}$	.505 to .638
50-cal. Cartridge Case	1 & 2	2.740	0.937	1.5	$\frac{1}{2}$	$\frac{3}{8}$	.913 & .996
50-cal. Cartridge Case	Other:	2.370	0.625	1.375	$\frac{1}{2}$	$\frac{3}{8}$	.793 to .880

Fig. 1— Above, sequence of drawing and forming operations in production of bullet jackets. Below, sequence for cartridge case production

Figs. 2 & 3—Single Carboloy die may be used effectively on presses with limited stroke

Fig. 4—Solid Carboloy die used for form drawing of primer caps

Fig. 5—Die for first operation in shouldering and tapering cartridge cases

Fig. 6—Die for second operation in shouldering and tapering cartridge cases



②



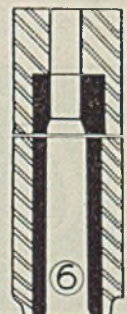
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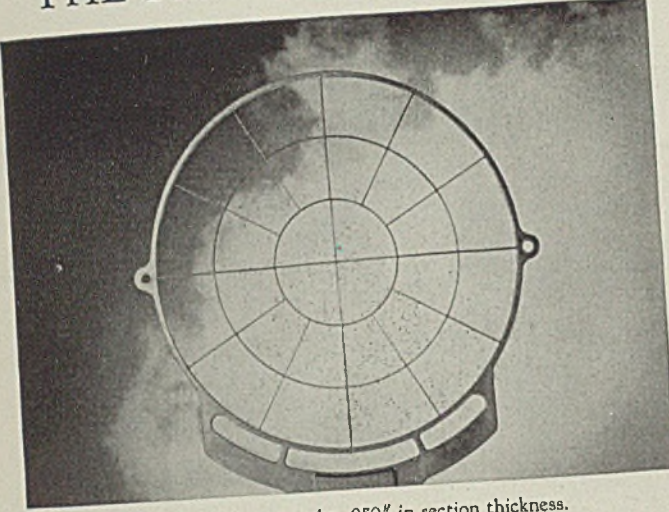
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⑥



# DIE CAST GUN SIGHTS FOR THE FIGHTING FRONTS



The cross ribs are under .050" in section thickness.

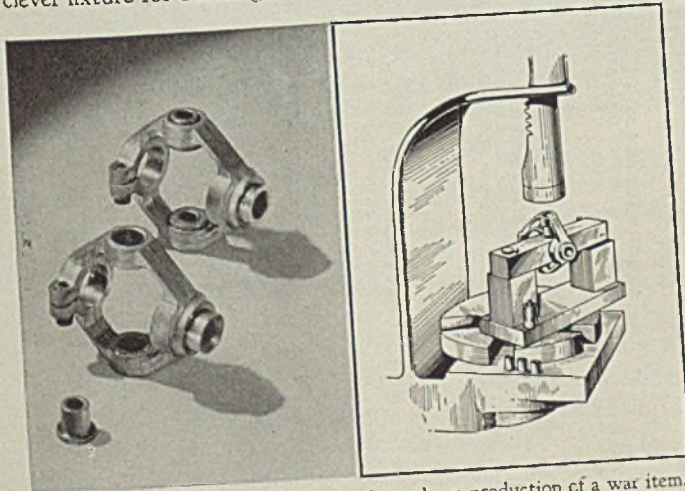
All metals and methods of fabrication will eventually find their proper places in the war effort. To the extent that special high grade zinc is available, and with high speed die casting equipment to be utilized for those applications where it can be of maximum value, a wider use of ZINC Alloy Die Castings probably lies ahead.

Our British Allies have, for example, been employing die castings of ZINC Alloy for a variety of war items which are not so produced in this country. Consider the Canadian-made anti-aircraft gun sight shown above. Although the diameter of this gun sight is 11 1/4", it has been possible, through ingenious die design, to chase the metal for the cross ribs in section thicknesses which range only .035" to .050".

The requirements of dimensional accuracy, production economy and strength for this gun sight all come well within the scope of ZINC Alloy Die Castings.

## A CLEVER FIXTURE FOR BUSHING INSERTION

A worker in the assembly department of a Company which uses large quantities of ZINC Alloy Die Castings has developed a clever fixture for bushing insertion. This fixture guards against



The fixture guards against distortion and speeds up production of a war item.

THE  
New Jersey  
Zinc



# ALLOY POT

A publication issued for many years by THE NEW JERSEY ZINC COMPANY to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

STEEL MAGAZINE EDITION

No. 3

possible distortion in a thin section of metal, by so supporting the die casting that the stress of insertion is taken by the boss around the bushing hole.

The part in the illustration is a differential gear carrier in the form of a spider. The casting is slipped over a pivoted bar which is swung back against a stop. This bar supports the bushing flange end down, and holds it in place for the arbor press ram.

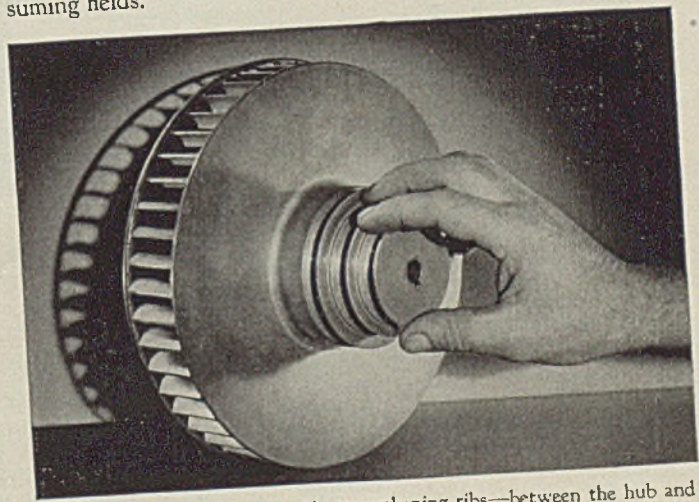
Because the bushing, when seated, protrudes above the surface of the casting, a hollow punch is used between the press ram and the casting at the end of the insertion stroke. This punch is placed over a pin next to the supporting block on the fixture when not in use (see sketch).

## THE ECONOMY OF ZINC ALLOY DIE CASTINGS

The pulley hub, the face and the blades of the 9 1/4" ZINC Alloy Die Cast rotor shown below are all integrally cast. By what other means could this blower rotor have been produced—one piece—without costly assembling and machining?

There are many physical reasons behind the adoption of ZINC Alloy Die Castings but, basically, the deciding factor is economy—the material and manufacturing method which will do the job best at lowest cost.

For further examples of this economy, ask us—on your company letterhead—for copies of five booklets illustrating ZINC Alloy Die Casting applications in five major peace-time consuming fields.



Not shown is a metal saver with strengthening ribs—between the hub and the largest diameter pulley.

THE NEW JERSEY ZINC COMPANY  
160 FRONT ST., NEW YORK CITY  
**HORSE HEAD SPECIAL** (99.99 + % Uniform Quality) **ZINC**



# Properties of Sand-Cast

By F. HUDSON

## LOW TIN ALLOYS

EMERGENCY specifications for certain low-tin content gunmetals and cast brasses will shortly be introduced, with the view of conserving virgin metal supplies, particularly as regards tin, and to enable full use to be made of available supplies of gunmetal and brass scrap. It is hoped that engineers and founders will substitute these new specifications wherever possible for the higher tin content bronzes and gunmetals widely favored in the past. In order to effect such a changeover intelligently and with discrimination, it is essential to have a comparison of properties and production data available, and it is hoped that the following condensed review will serve a useful purpose in this direction.

Before commenting on the properties of the alloys covered by the emergency

specifications, it will be appreciated that it is not possible to entirely eliminate the higher tin content alloys from engineering applications. For certain special purposes their use appears to be essential. For example, it has been shown<sup>1</sup> that in unlined bearings subject to pounding, such as those employed for railway wagon bearings and rudder bushes, etc., on ships, the resistance to deformation is markedly reduced as the tin content falls below 10 per cent and with the introduction of lead.

It is interesting to note that the presence of up to 4 per cent zinc has in most instances but little effect upon frictional properties and resistance to deformation. The use of gunmetal or bronze containing around 10 per cent tin is also considered essential for the pro-

duction of high-pressure air and hydraulic valves operating at 1000 to 4000 pounds per square inch. Alloys containing up to as much as 12.5 per cent tin have been unnecessarily specified for those latter applications in the past, the higher tin content making the production of sound castings more difficult in the foundry.

On the other hand, for many purposes gunmetal of the 88-10-2 type is being wastefully employed, and service conditions can be equally well met by the use of lower tin content alloys, or even by cast brass. The subsequent comparison of properties has been specifically compiled to offer guidance in this direction.

Part I—Low Tin Content Gunmetals  
88 per cent copper, 8 per cent tin, 4 per cent zinc  
• 86 per cent copper, 7 per cent tin, 5

The accompanying article was taken from the October, 1942 issue of THE FOUNDRY.

Table I  
Creep Data

Material	Approx. temp. permitting creep of		Range
	1% in 10,000 hrs. at 11.1 tons per sq. in. Degrees Cent.	1% in 10,000 hrs. at 1,000 lbs. per sq. in. Degrees Cent.	
Cast red brass (5.63% Sn; 6.28% Zn; 2.71% Pb; balance Cu)	204	427	223
Cast bronze (11.98% Sn; 1.36% Zn; 0.16% Pb; balance Cu)	232	399	167

Table II  
Creep Properties

Material	Temperature		Stress (tons per square inch) to produce a creep rate of	
	Deg. Cent.	Deg. Fahr.	0.01 per cent per 1000 hours	0.1 per cent per 1000 hours
88-10-2 gunmetal	205	400	5.0	7.0
	260	500	2.7	4.0
	315	600	1.3	2.0
90-6-2-2 gunmetal	205	400	4.0	6.0
	260	500	2.7	4.0
	315	600	1.4	1.8

Table III  
Alloy Compositions

	Admiralty Gunmetal A.S.T.M. Spec. B.60	Bronze A.S.T.M. Spec. B.61
Copper per cent	87.6	87.14
Tin per cent	10.18	6.22
Zinc per cent	2.2	4.61
Lead per cent	Nil	1.83
Phosphorus per cent	Trace	Trace
Maximum strength, tons per sq. in.	21.9	16.9
Elongation, per cent	35.4	34.3

Table IV  
Maximum Allowable Working Stresses

Material	For metal temperatures not exceeding degrees Fahr.								
	Sub zero	70 to 100.	150.	250.	350.	400.	450.	500.	550.
86-7-5-2	6,800	6,800	6,800	6,800	5,800	5,400	5,000	4,200	3,300
85-5-5-5	5,500	5,500	5,500	5,000	4,500	3,500			

Table V  
Mechanical Properties of Low Tin Gunmetals and Cast Brasses

Properties	Gunmetal				Cast brass	
	88-10-2	88-8-4	86-7-5-2	85-5-5-5	Type "A"	Type "B"
Y.P. (tons per sq. in.)	8-10	8-10	7-9	6-8	4-6	5-7
M.S. (tons per sq. in.)	16-20	16-20	14-18	12-16	11-15	14-18
Elong., % on 2 in.	10-30	10-30	12-30	15-35	20-40	15-35
Izod (ft.-lbs.)	7-17	7-17	7-17	6-12	10-20	—
Brinell hardness	65-80	65-80	60-70	55-65	40-60	45-65
Diamond pyramid hardness	70-100	70-100	70-80	60-70	—	—
Compressive strength (tons per sq. in., 0.001-in. defl.)	6-8	5-8	5-6	4-5	3-4	3½-4½
Modulus of elasticity (lbs. by 10 <sup>6</sup> )	12-14	12-14	12-14	11-13	11-14	12-14

\* Diamond hardness readings on cast material are likely to be variable and this method is therefore not recommended for control purposes.



# "dag" COLLOIDAL GRAPHITE

IS IMPORTANT In the Manufacture  
Or Use of these Products



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FILAMENT



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BOX  
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PHOTOGRAPHIC  
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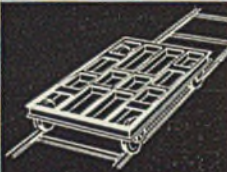
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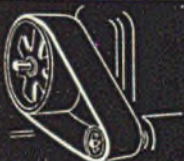
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ENGINE



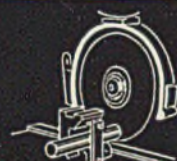
CORRUGATED  
PAPER



KILN CAR



LEATHER  
DRIVE BELT



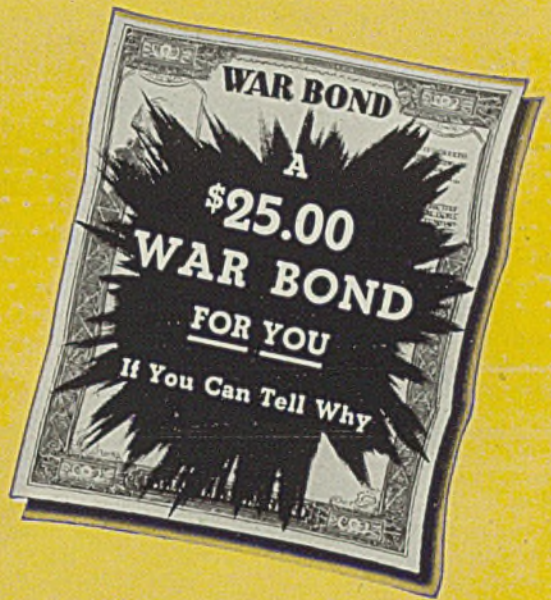
ABRASIVE  
CUT-OFF WHEEL



PISTON RINGS

## HERE ARE THE RULES

Acheson Colloids Corporation will give a \$25.00 War Bond to each of the 5 people who submit complete and accurate answers together with the 5 best letters on the question, "Why is 'dag' colloidal graphite important in the manufacture and use of the twelve products pictured above?" (1) State business connections (no one in the graphite field or their families will be eligible). (2) All entries must be legible. (3) All entries must state the publication in which the advertisement was seen. (4) Entries must be postmarked not later than December 1, 1942. (5) Entries become the property of the Acheson Colloids Corporation. (6) The verdict of the judges will be final.



## "dag" COLLOIDAL GRAPHITE AS A RUNNING-IN LUBRICANT

Years of experience have definitely established the fact that when "dag" colloidal graphite is present in the oil used for running-in engine and compressor cylinders, piston rings, bearings, reduction gearing and valves, the following results are obtained:

1. Smoother bearing and rubbing surfaces.
2. Less power lost from friction.
3. Lower operating temperatures.
4. Less oil needed for complete lubrication.
5. Shorter running-in period required.
6. Less danger from a temporary failure of the oil supply.
7. Less corrosion, especially in cylinders.
8. Reduction in maintenance and replacements.
9. Longer useful operating life of the mechanism.
10. Close tolerances maintained.

Here are several reasons for this. "dag" colloidal graphite is a good, solid lubricant. While the graphite particles coat the metal of the friction surfaces, the coating is so thin that its thickness cannot be measured. The coefficient of friction of metal on colloidal graphite is not much greater than fluid friction. "dag" colloidal graphite, by reducing the surface tension between metal and mineral oil, will cause the oil to spread farther over the metal surface and will re-establish more quickly an oil film that has been ruptured.

## DIFFERENCE BETWEEN COLLOIDAL GRAPHITE AND POWDERED GRAPHITE

"dag" colloidal graphite dispersions should never be confused with dispersions of powdered graphite which do not have the same properties. For instance, the size of a particle of colloidal graphite bears the same relationship to that of a particle of powdered graphite as a 12-inch cube would to the Great Pyramid of Cheops. Each colloidal particle is not only microscopic in size (readily passes through filter paper) but carries an electrical charge which makes it repel every other particle. Suspended in a fluid, these particles keep darting out of each other's way and consequently stay suspended in the liquid for long periods of time.



**ACHESON COLLOIDS CORPORATION**

PORT HURON • MICHIGAN



per cent zinc, 2 per cent lead  
85 per cent copper, 5 per cent tin, 5  
per cent zinc, 5 per cent lead.

**Mechanical Properties (Room and Elevated Temperature)**—Table V shows a comparison of mechanical properties at room temperature of the three gunmetals under consideration against admiralty gunmetal. Table VII gives the mechanical properties principally based on short-time tensile tests, at elevated temperature. Considerable work has been done by Spring<sup>2</sup> of the Crane Co., U.S.A., on cast materials for high temperature service, which shows that, while short-time tensile tests indicate that higher tin content alloys of the 86-12-2 and 88-10-2 types are stronger than 86-7-5-2 gunmetal at elevated temperature, the latter alloy is actually more creep resistant than the former at temperatures above 250 degrees Cent. (482 degrees Fahr.). Spring gives the figures shown in Table I for creep resistance considered from the approximate limiting temperature standpoint.

W. C. Stewart<sup>4</sup> publishes the figures on creep properties shown here in Table II.

It is interesting to note that the decreased tin and increased lead contents do not appear to affect creep properties appreciably. Further creep tests have been carried out on admiralty gunmetal and 86-7-5-2 gunmetal by Bolton.<sup>5</sup> The alloys tested had the composition and

room temperature properties indicated in Table III.

Creep tests were carried out on the above alloys at temperatures of 260 degrees Cent., (500 degrees Fahr.), 288 degrees Cent., (550 degrees Fahr.) and 315 degrees Cent., (599 degrees Fahr.) after being held in the creep test for periods ranging from 700 to 1700 hours. The specimens were also tested in tension at room temperature to determine whether long exposure at the temperature of creep testing had produced embrittlement. It was found that the 86-7-5-2 gunmetal was well suited for use up to 288 degrees Cent. (550 degrees Fahr.), but not for higher temperatures. Its limiting creep strength, based on the stress to produce a rate of flow less than 0.1 per cent in 10,000 hours (0.24 x 10<sup>5</sup> inches per inch per day) after the first 500 hours of creep test and running up to 2100 hours' duration, is about 3.57 tons per square inch at 260 degrees Cent. (500 degrees Fahr.), and a design stress of 2.23 tons per square inch is recommended at this temperature. At 260 degrees Cent. (500 degrees Fahr.), the load-carrying ability of admiralty gunmetal was lower than that of 86-7-5-2, and there was definite evidence of embrittlement. Bolton recommends that admiralty gunmetal should not be used above 232 degrees Cent. (450 degrees Fahr.), and suggests a design stress of 2.23 tons per square inch at that temperature.

Quite recently, the American Society of Mechanical Engineers<sup>6</sup> have indicated maximum allowable working stresses for 86-7-5-2 and 85-5-5-5 gunmetal in their Rules for Construction of Unfired Pressure Vessels, Table IV.

Bronze valves and fittings cast in 86-7-5-2 gunmetal can be employed up to 500 degrees Fahr., while if made in 85-5-5-5 material, the maximum temperature for use is limited to 400 degrees.

**Mechanical Properties (Sub-Zero Temperatures)**—Castings show a curious difference in behavior from wrought materials at low temperature, for while the strength is increased along similar lines to that which occurs in wrought materials, the ductility is always slightly less than that indicated at room temperature. Strauss<sup>7</sup> gives the data in Table VI in connection with 88-8-4 gunmetal.

It can be assumed that changes of similar magnitude will occur in regard to the other gunmetals under review. The alteration in properties with decreasing temperature may be generalized as follows There is an *increase* in yield point, tensile strength, hardness, endurance limit, modulus of elasticity, and compressive strength, and a *decrease* in elongation, reduction of area, and impact resistance.

**General Physical Properties**—Typical values for such properties as specific gravity, coefficient of expansion, thermal conductivity, etc., are given in Table VIII.

Table VI

Sub-zero Data

Temp. Deg. Cent.	Tons per sq. in. Yield point	Maximum strength	Elong. per cent on 2 in.	R.A. Per cent
20	8.3	17.9	31.3	36.7
-180	13.6	20.2	15.3	24.6

Properties

Specific gravity	8.6—8.8
Weight per cub. in. (lb.)	0.314
Coefficient of expansion	20—100 deg. C. 17.5 20—200 deg. C. 17.6 20—300 deg. C. 17.9 20—400 deg. C. 18.0 20—500 deg. C. 18.1
Thermal conductivity	Approx. 13—15% of copper at 20 deg. C.
Electrical resistivity	Approx. 18—22% of Cu at 20 deg. C.

Table VIII

Physical Properties of Low Tin Gunmetals and Cast Brasses

Properties	Gunmetals			Cast brass	
	88-10-2 88-8-4 8.6—8.8	86-7-5-2 8.6—8.8	85-5-5-5 8.6—8.8	Type A 8.45—8.55	Type B 8.4—8.5
Specific gravity	0.314	0.314	0.314	0.30	0.30
Weight per cub. in. (lb.)	17.5	17.7	17.8	17.9	19.4
Coefficient of expansion	17.6	17.9	18.1	18.4	20.5
20—100 deg. C.	17.9	18.2	18.4	19.0	21.8
20—200 deg. C.	18.0	18.4	18.7	19.6	22.5
20—300 deg. C.	18.1	18.6	19.0	20.2	23.2
20—400 deg. C.	18.1	18.6	19.0	20.2	23.2
20—500 deg. C.	18.1	18.6	19.0	20.2	23.2
Thermal conductivity	Approx. 13—15% of copper at 20 deg. C.			Approx. 18—22% of Cu at 20 deg. C.	Approx. 16—20% of Cu at 20 deg. C.
Electrical resistivity	Approx. 13—15% of copper at 20 deg. C.			Approx. 18—22% of Cu at 20 deg. C.	Approx. 16—20% of Cu at 20 deg. C.

Table VII

Mechanical Properties of Gunmetal at Elevated Temperature

Temperature	Per cent Sn 12.25 Zn 1.46 Pb 0.01 Fe 0.01 Cu 86.21			Per cent Sn 10.0 Zn 2.0 Cu 88.0			Per cent Sn 10.11 Zn 1.63 Pb 0.36 Cu 87.84			Per cent Sn 5.85 Zn 5.77 Pb 2.06 Cu 86.24			Per cent Sn 5.99 Zn 5.10 Pb 2.33 Cu 86.28			Per cent Sn 6.22 Zn 4.61 Pb 1.83 Cu 87.14			Per cent Sn 5.24 Zn 5.48 Pb 5.33 Cu 83.37				
	Y.P.	M.S.	Elong.	Elastic limit	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong.	Y.P.	M.S.	Elong.	Charpy impact	Creep strength	Elastic limit	M.S.	Elong.
20	8.9	18.0	15.0	11.4	15.2	8.0	8.3	15.2	14.0	7.4	17.0	36.5	7.1	15.2	20.5	7.3	17.5	31.2	20.0	6.25	7.5	14.2	11.0
200	9.3	18.0	15.0	9.8	16.1	8.6	7.5	15.0	15.0	6.7	16.6	37.5	6.6	16.8	28.7	6.7	16.7	27.2	..	..	..	..	..
300	15.0	18.0	15.0	..	..	..	5.9	11.8	11.5	6.4	15.8	31.0	6.3	15.9	25.5	6.6	16.8	28.7	..	..	5.7	11.8	15.0
400	20.5	18.0	15.0	..	..	..	..	..	..	5.7	15.2	28.5	6.3	15.9	25.5	6.3	15.9	25.5	19.5	..	..	..	..
500	26.0	18.0	15.0	..	..	..	..	..	..	5.8	13.0	24.5	5.8	14.6	20.5	5.8	14.6	20.5	15.2	4.0	..	..	..
555	28.8	18.0	15.0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1.9	..	..	..
600	31.6	15.0	9.5	8.2	9.5	3.7	..	9.0	7.0	5.8	7.3	2.5	5.6	11.4	16.0	5.6	13.2	15.7	2.2	0.72	5.0	5.4	11.0
700	37.0	12.7	9.5	..	..	..	..	6.7	4.0	6.0	6.0	1.0	5.5	6.8	1.5	5.5	8.3	4.0	..	..	..	..	..
800	42.7	10.1	3.5	..	..	..	..	4.4	2.0	4.0	4.0	0	5.3	6.4	2.0	..	..	..	..	..	..	..	..
900	48.2	..	..	..	..	..	..	..	..	3.3	3.3	0	..	..	..	..	..	..	..	..	..	..	..

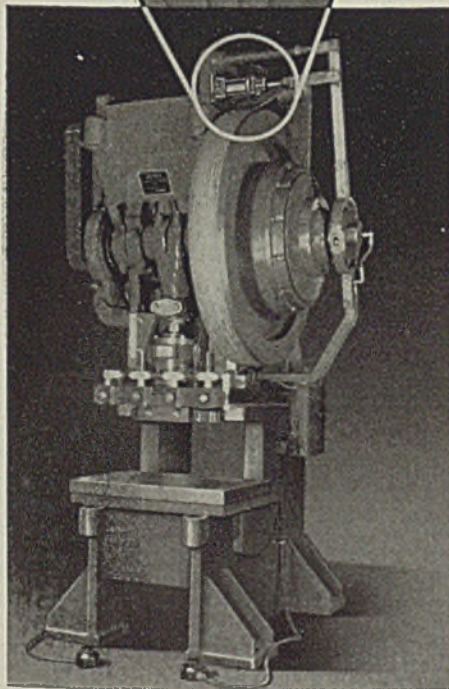
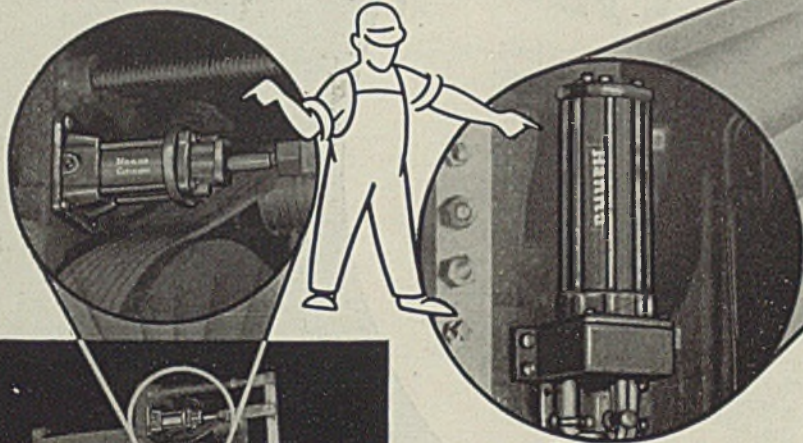
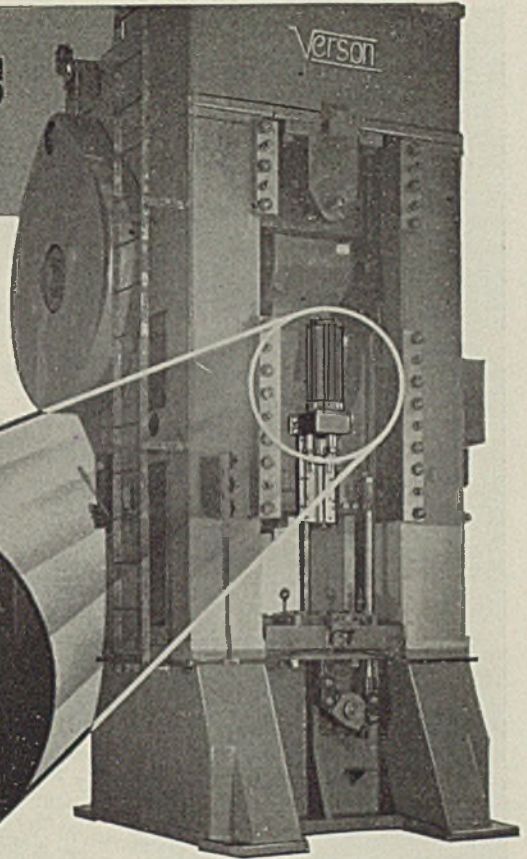
<sup>2</sup>Extracted from A.S.M.E.—A.S.T.M. Symposium on Effect of Temperature on the Properties of Metals, 1931.  
<sup>3</sup>Extracted from Compilation of High-Temperature Creep Characteristics, A.S.M.E.—A.S.T.M., 1938.  
<sup>4</sup>Courtesy of J. Amott (G. & J. Weir, Ltd.).



# Hanna Cylinders

Air and Hydraulic

*These SKILLED MECHANICS  
are helping presses  
operate at top efficiency*

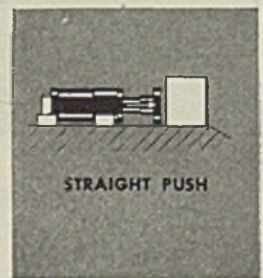
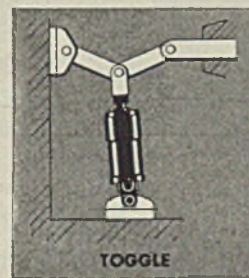
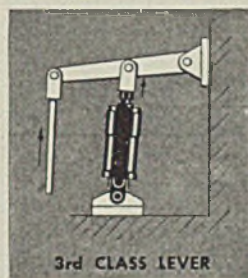
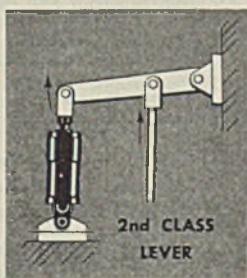
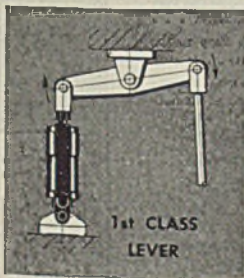


*Can you use them?*

**A**LL Verson Presses, like these two units, are built for top performance . . . in productivity, work quality and long life. Smooth-working, dependable Hanna Cylinders are used on many of them to perform varied operations with tireless skill and efficiency. For instance: in the top illustration a Hanna Cylinder is used for removing the finished shell casings after heading on a 1500 ton Verson Steel Knuckle Joint Press. At the left is shown a Verson Steel Single Crank Gap Press with a friction clutch shifted by a Hanna Cylinder. Both are good application examples of versatile, economical, easy-to-use Hanna "Skilled Mechanics" Cylinder Power.

On your equipment or in your plant there must be many places where Hanna Cylinders may be used to advantage: for replacing manual and skilled labor; and to deliver safe, reliable power, direct or through a lever or toggle for jobs needing a pushing, pulling or lifting movement.

The illustrations below point out a few of the fundamental mechanical movements for which Hanna Cylinder Power may be used to advantage. What applications of your own could they be adapted to? Send for catalog 230.



**HANNA ENGINEERING WORKS**  
1765 ELSTON AVENUE • CHICAGO, ILLINOIS

Air and Hydraulic  
RIVETERS

Air and Hydraulic  
CYLINDERS

Air HOISTS





## WORKING *with* FIRE without CARDOX Is Playing with Fire!

Fire is a tool of the metal working industries—as long as it is kept under control. It follows that a more complete and competent control than any heretofore available means a better use of the tool.

Reasoning as cold and unemotional as this has brought leading iron, steel and related companies to install Cardox Fire Extinguishing Systems.

Probably much more exciting angles were involved—saving of life and limb, preventing holocausts of fire which wipe out invested millions. But Cardox qualifications, as the single comprehensive yet flexible system to cover a whole plant's day-by-day working hazards, clinch the matter for men who work intimately with fire.

### How Cardox Built-In Systems Extinguish Fires

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO<sub>2</sub>.
- Mass discharge of Cardox CO<sub>2</sub> "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely without damage from extinguishing medium.

### CARDOX—CO<sub>2</sub> Systems with Enhanced Fire Extinguishing Performance

- A. Uniformity of CO<sub>2</sub> characteristics.
- B. Extinguishing medium with uniformly greater cooling effect.
- C. Accurate projection of CO<sub>2</sub> through greater distances.
- D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO<sub>2</sub>.

# CARDOX

NON-DAMAGING FIRE EXTINGUISHING SYSTEMS

District Offices in: New York • Detroit • Pittsburgh • Cleveland  
Kansas City • Atlanta • San Francisco • Los Angeles • Seattle

CARDOX CORPORATION • Bell Building, Chicago



So far as the gunmetals are concerned, there is little difference in general physical properties between 88-10-2 and other types under review.

**Corrosion Data**—The increased lead and zinc contents within the range of compositions covered do not appear to have much effect on the corrosion resistance of gunmetal by normal sea and fresh water. Laboratory tests show 88-10-2 to exhibit a loss in weight of 0.288 per cent after eight weeks' immersion in sea water. Gunmetal containing 7.0 per cent tin, 3.75 per cent zinc, 3.75 per cent lead, balance copper, showed a loss of 0.25 per cent under similar conditions. Practical observations based upon equipment, such as valves, in service tend to confirm these findings. Table X outlines further comparative corrosion tests conducted on gunmetal and bronze in fresh and sea water at 60 and 200 degrees Fahr.

It is interesting to observe that, while an increase of temperature accelerates the corrosion of gunmetal and bronze in fresh water, the effect of hot sea water apparently reduces the rate of attack over that experienced in cold water; although the degree of attack is appreciably greater than that experienced in fresh water. Care should be taken when utilizing gunmetals for handling softened boiler feed waters to keep the zinc content as low as possible.

Table IX  
Test Results

Alloy	Pouring temp. deg.	Yield point, tons per sq. in.	Max. strength, tons per sq. in.	Elong. on 2 in. per cent	Brinell hardness
88-8-4	1170	9.4	19.6	37.0	78
86-7-5-2	1160	9.1	17.4	39.0	67
85-5-5-5	1160	9.0	15.2	29.0	61

\*Taken by dividers.

Table X  
Weight Loss

Alloy	Loss in grams per sq. mt. per 24 hours			
	—Tap water—		—Sea water—	
	60 deg. Fahr.	200 deg. Fahr.	60 deg. Fahr.	200 deg. Fahr.
Admiral manganese brass	0.27	0.43	1.19	2.00
Gunmetal (85-9-2½-3½)	0.14	0.28	1.23	0.75
Cast phosphor bronze	0.09	0.11	1.20	0.64
Cast 90-10 bronze	0.14	0.19	0.87	0.71

Table XI  
Pouring Data

Section of casting	—Pouring temperature—	
	Type A Deg. Cent.	Type B Deg. Cent.
Light	1200-1100	1150-1050
Medium	1100-1050	1050-1000
Heavy*	1050-1000	1000-970

\*Range for test bars.

**Foundry Characteristics**—Gunmetals of the 88-8-4, 86-7-5-2 and 85-5-5-5 types are no more difficult to handle in the foundry than standard admiralty gunmetal. As a matter of fact, both 86-7-5-2 and 85-5-5-5 possess superior castability and are particularly adaptable to the production of pressure castings in large numbers. Similar pouring temperatures to those employed for 88-10-2 (1160 to 1180 degrees Cent. for test bars) give perfectly satisfactory results with the other alloys under review, as will be observed from the test results taken from production melts, all sand cast, made by the Phosphor Bronze Co.

Ltd., as given in Table IX.

Patternmakers' shrinkage for all the alloys is around 3/16-inch per foot. It should be noted that there is little danger of lead segregation occurring in gunmetal containing up to 6 per cent lead, so far as castings of average section (up to 1¼ inches) are concerned, but this point will have to be watched in heavier sections, particularly when using 85-5-5-5.

**Machinability**—The machinability of 88-8-4 gunmetal will be similar to admiralty gunmetal, while 86-7-5-2 and 85-5-5-5 will tend to be slightly better. (Please turn to Page 117)

Table XII

Suggested Applications of Gunmetals and Cast Brasses

Type composition	B.S.S. No.	Suggested application.
<b>Gunmetals</b>		
88-10-2	383	To be used only for special applications, i.e., high-pressure hydraulic and air valves working between 1,000-4,000 lb. per sq. in., control and stop valves, steering gear telemotor cylinders. Special unlubricated bearings subjected to pounding, vibration and corrosion, e.g., rudder post liners and bushes, steering gear bearings, etc.
88-8-4	...	Suitable for conditions of service intermediate between those specified for alloys of 88-10-2 and 86-7-5-2 type, e.g., hydraulic valves working between 500-1000 lb. per sq. in. (Does not possess much advantage over alloy of 86-7-5-2 type so far as steam service is concerned.) Sea cocks and other valves connected direct to hull below water-line.* Pump impellers. Stern tubes.
86-7-5-2	...	Suitable for all general-purpose castings subject to medium steam pressures (above 100 lb. per sq. in. working pressure) and at temperatures not exceeding 500 deg. F. (260 deg. C.), e.g., small engine control and boiler stop valves, cylinder cover bushes, neck rings, centrifugal pump casings, tail shaft liners and stern tube bushes. Hydraulic valves operating between 200-500 lb. per sq. in. pressure. Suitable for high-grade backings of lined bearings. Slip rings for electrical equipment (under 2 per cent lead if possible).
85-5-5-5	898	Suitable for general-purpose castings subject to steam up to 100 lb. per sq. in. working pressure and temperatures not exceeding 400 deg. F. (205 deg. C.) and water pressures up to 200 lb. per sq. in. working pressure, e.g., screw down valves, bulkhead and deck fittings, teepieces, etc., handling auxiliary steam heating services to galleys, pantries and thermo-tanks. Cocks, taps and sanitary fittings handling sea water, e.g., pump-type lavatory valves. Pumping, flooding and draining valves not directly connected to hull below water-line. Sluice valves to sea cocks. Fire hose connections. Centrifugal pump casings. Suitable for well-supported backings of certain lined bearings, e.g., small stern tube bushes, etc.
<b>Cast brasses</b>		
Type A (70-80% Cu)	...	Suitable for low-pressure fittings working under mildly corrosive conditions not recommended for use at elevated temperatures or for conditions requiring exceptional wear and tear, e.g., cocks, taps, pipe connections and sanitary fittings for use in fresh water at pressures up to 100 lb. per sq. in. Ventilating valves. Name plates. Lubricators. Better resistance to oils containing sulphur than gunmetal, therefore can be used with advantage for valves and fittings handling fuel oil and petrol.
Type B (62-70% Cu)	...	Non-pressure structural and ornamental castings. Pressure gauge and telegraph cases. Voice pipe fittings and connections. Funnel fittings. Hand wheels. Gear case covers. Steering wheel brackets. Porthole and skylight casings. Motor-boat deck fittings. Bearing backings where a copper alloy is required and the backing need not in itself possess bearing properties.

\*The use of cast aluminum bronze is more suitable, as there is no galvanic action between this alloy and steel in the presence of sea water.

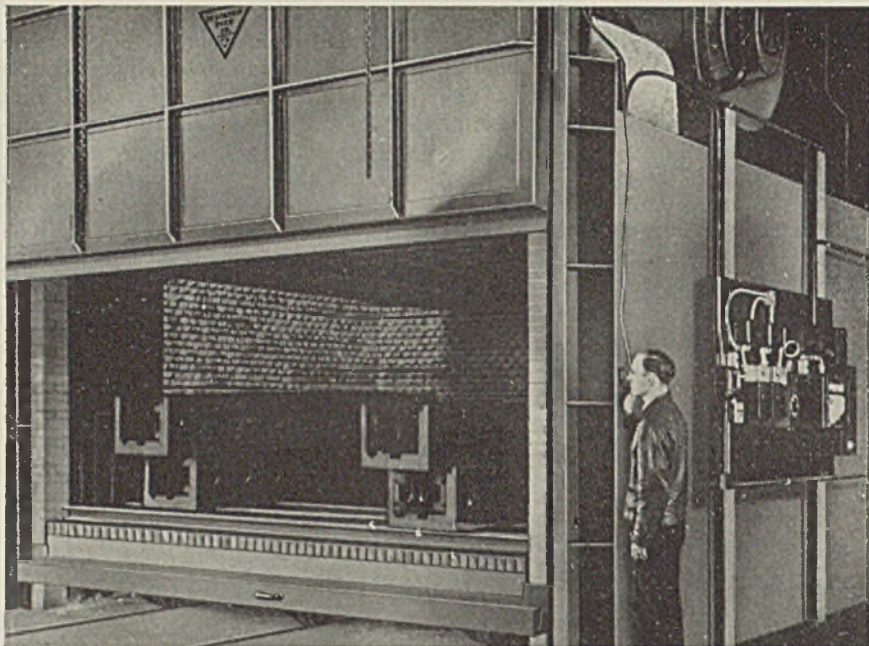
Table XIII

Data on Test Bars from Production Melts

Type	Composition							Pouring temp. deg. Cent.	Yield point <sup>o</sup> tons per sq. in.	Max. strength tons per sq. in.	Elongation % on 2 in.	Brinell Hardness
	Cu	Sn	Pb	Fe	Al	Ni	Zn					
A	72.15	0.40	4.71	0.42	nil	0.47	21.85	980	6.8	15.0	23.0	66
A	70.25	0.33	2.45	0.36	nil	0.11	26.50	960	4.8	13.2	42.0	68
B	63.64	0.27	2.80	0.19	0.03	0.10	32.97	960	5.4	16.3	39.0	63
B	63.80	1.22	2.93	0.35	nil	0.14	31.56	960	6.4	15.5	17.0	87

\*Taken by dividers.





*Preheating, soaking and cooling cycles are followed automatically with this new Despatch car-bottom stress-relief furnace. Control panel is at right; can be instantly reset for new heat specifications*

# Stress-Relief Furnace

. . . . has automatic cycle control

TO REMOVE stresses in weldments, a large midwest farm-implement plant currently engaged in large-scale production of military equipment has installed a new type car-bottom stress-relief furnace. The new furnace, designed and installed by Despatch Oven Co. of Minneapolis, has completely automatic heat control.

Simple operation of a few dials provides any desired sequence of time-and-temperature combinations for preheating, soaking and cooling.

Weldments are loaded on rugged, heavy-duty insulated cars which enter the furnace through either of the two lift doors at opposite ends of the heat chamber. Thus two cars may be used to facilitate handling and loading operations, one being loaded and reloaded while the other is inside the heat chamber.

Car bottoms, usually operated by winches, are carefully leveled when installed. This permits correct balancing of loads and minimizes danger of distortion which might result from off-level platforms.

Effective sealing of the work chamber to promote even heating of the interior is provided. Electrically operated doors at each end of the furnace slide down smooth channels to form sand seals at both ends of the car. As these doors descend to the bottom of the channel grooves, they are forced snugly against properly designed steel members. Final-

ly, sand is flowed mechanically along the sides of the car bottom to complete the sealing of the work chamber.

The secret of close temperature control lies in the precise balancing of heater, fans and circulating ducts on each installation. Heater is of heavy capacity and is connected with a specially designed alloy-steel high-volume fan, delicately balanced and furnished with a patented shaft cooler to insure continuous operation.

## Furnace Provides Even Heat

Distributing ducts carrying heated air to the working chamber have graduated ports, each of which is tested with an anemometer and adjusted to assure proper balance of heat input. This adjustment is always made after the furnace is installed so that a fast, even flow of heat throughout all portions of the chamber is obtained. Reports from various installations indicate that heat distribution thus secured is exceptionally uniform.

Automatic control equipment seen mounted on the furnace at the right in the illustration permits the operator to follow any predetermined cycle of heat treatment simply by setting the dials to the proper point. This control covers any desired set of time-and-temperature cycles through pre-heating, soaking and cooling. When specifications for a new load require a different setting of time or temperature, the control can be reset

instantly—an important factor that assures maximum flexibility. Since cycles can be preset, no fumbling or experimenting is involved in thus changing the work cycle once the desired cycle has been determined.

## Develops Liquid Type Temperature Indicator

A new temperature-signaling medium in liquid form, one that can be used to indicate temperatures in welding, heat treating or any other operation is announced by Tempil Corp., 132 West Twenty-second street, New York. Called Tempilaq°, it is available in a wide range of predetermined melting points between 125 and 1600 degrees Fahr.

The product is used by applying a thin smear or daub to the working surface of the work. This dries almost instantly but liquifies when the part being heated reaches the temperature noted on the product's container.

## Standard Change Made To Save Copper

A standard change which reduces the overall length of universal fuse links for distribution cutouts from 23 to 20 inches is reported by the National Electrical Manufacturers Association, 155 East Forty-fourth street, New York.

This action was taken upon a request from WPB to save critical materials. The links manufactured prior to that date to the former standard of 23 inches and which are now in stock will not be affected, according to the association.

## New Extinguishing Foam Puts Out Alcohol Fires

Alcohol fires now can be extinguished by a new all-purpose foam recently developed by American-LaFrance-Foamite Corp., Elmhurst, N. Y.

Called Alcofoam, the product which makes a smothering blanket that snuffs out flames is in the form of a powder. This is induced into the water stream being played on the fire, cutting off the supply of oxygen necessary to support combustion.

The foam produced stays in place despite fire draft. It coats and insulates any burning surface, liquid or solid, vertical or horizontal, according to the manufacturer.



# Muscle and Stamina

## for huge Navy Cranes



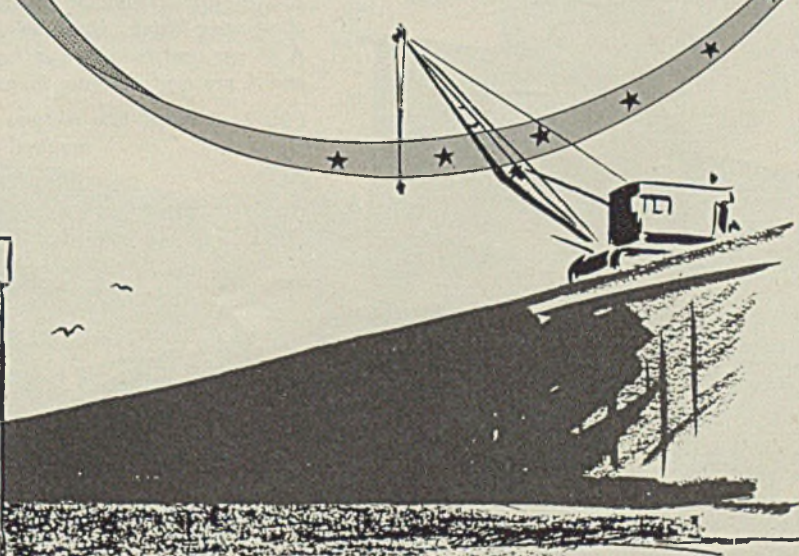
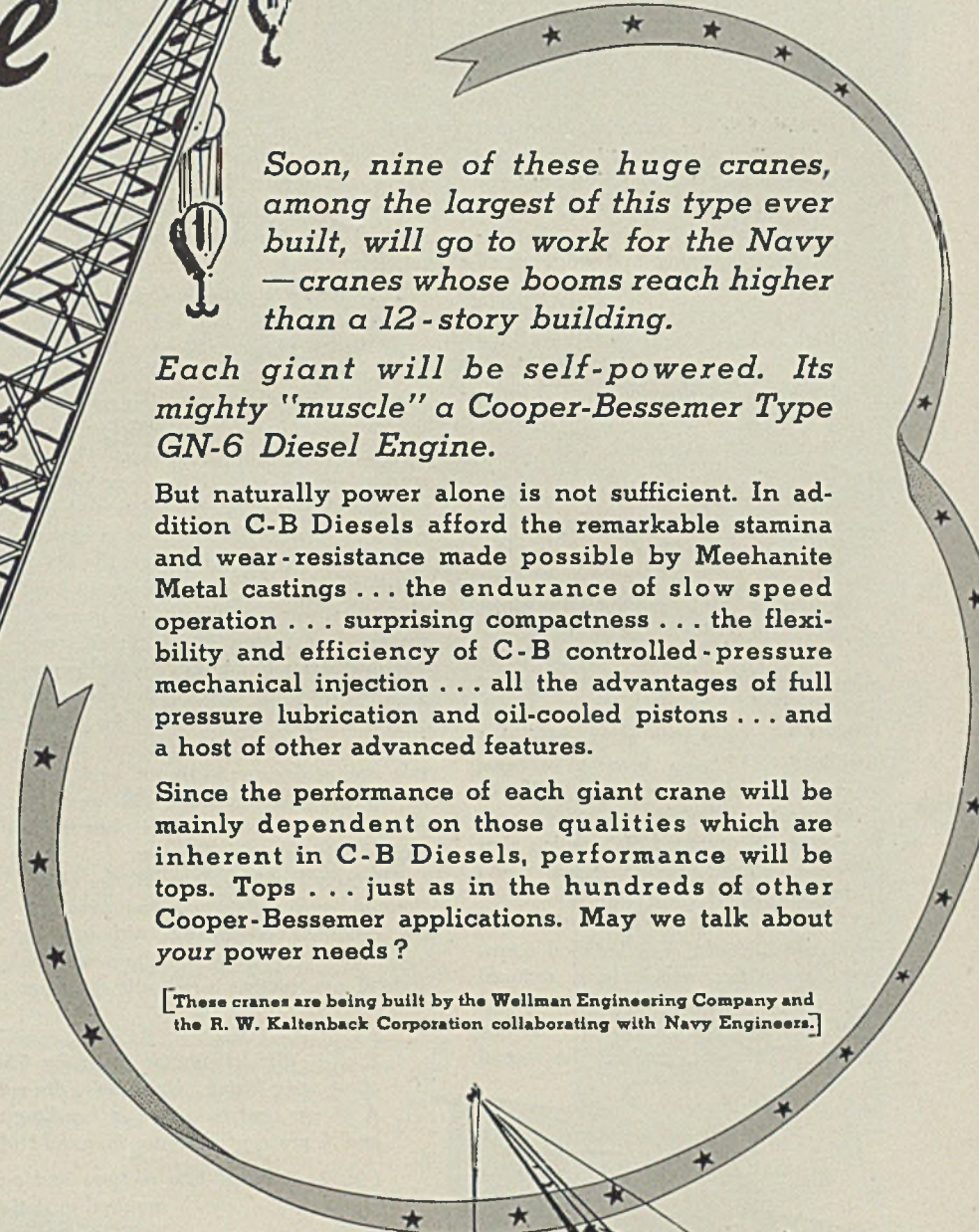
Soon, nine of these huge cranes, among the largest of this type ever built, will go to work for the Navy — cranes whose booms reach higher than a 12-story building.

Each giant will be self-powered. Its mighty "muscle" a Cooper-Bessemer Type GN-6 Diesel Engine.

But naturally power alone is not sufficient. In addition C-B Diesels afford the remarkable stamina and wear-resistance made possible by Meehanite Metal castings . . . the endurance of slow speed operation . . . surprising compactness . . . the flexibility and efficiency of C-B controlled-pressure mechanical injection . . . all the advantages of full pressure lubrication and oil-cooled pistons . . . and a host of other advanced features.

Since the performance of each giant crane will be mainly dependent on those qualities which are inherent in C-B Diesels, performance will be tops. Tops . . . just as in the hundreds of other Cooper-Bessemer applications. May we talk about your power needs?

[These cranes are being built by the Wellman Engineering Company and the R. W. Kaltenback Corporation collaborating with Navy Engineers.]



**THE COOPER-BESSEMER CORPORATION**  
MOUNT VERNON, OHIO GROVE CITY, PENNA.  
New York Washington Bradford, Pa. Parkersburg, W. Va.  
Tulsa Houston, Dallas, Greggton, Pampa, and Odessa, Texas  
Shreveport St. Louis Los Angeles



# HOW TO SHIP

## More Economically In Corrugated Boxes

THE WASTE of material, time and products damaged in transit due to incorrect packaging and shipping must not be tolerated under today's conditions. There is a best way to do everything, including the packaging and shipping of your products in corrugated boxes. Are you sure your present methods achieve this high standard? If not the Hinde & Dauch Paper Co., Sandusky, O., suggests that you ask yourself the following questions:

Is my package designed as simply as possible?

Does my corrugated box use as little corrugated board as is necessary?

Does my corrugated box amply protect my product?

Could my boxes be redesigned to effect economies in inside packing materials?

Is my box the lightest weight possible consistent with carrier regulations and safe packing?

Careful investigation may reveal that modification of your present package, or even its complete redesign, will pay dividends in materials and time saved. Or perhaps the method of handling your container before and after packing could be improved.

The first section of this article sets forth case histories of redesigned corrugated containers which have reduced costs, speeded shipments and eliminated waste. Perhaps you can profit from one or more of these examples. The second

section, to appear next week, will detail efficient methods of caring for and packing corrugated boxes to the end that the packaging be accomplished with the greatest speed and least waste of material.

The Parsons Hardware Co., Belvidere, Ill., recently found that a change in the basic design of their shipping box made a big difference not only in facilitating their own packing and shipping operations but also in increased efficiency and convenience for their customers. The old corrugated box, into which were packed ten complete sets of extension and end handles for steel caskets, was of slotted style construction. It apparently did a satisfactory job, but the company realized that there was much room for improvement. Each piece of hardware was wrapped separately in kraft paper to prevent marring of the finish and each wrapped piece was stenciled for identification. To provide sufficient protection against damage in transit, each layer of handles was protected with excelsior pads, and the ends of the box were stuffed with shredded paper.

The new box eliminates all the objections and even adds several improvements not originally considered. Although its appearance is essentially the same, its style of construction is radically different.

As shown in Fig. 7, it consists of a two-piece telescope corrugated box with full depth bottom and cover. Double corrugated thickness on both sides and ends provides greatly increased protection and eliminates the need for end stuffing. But the greatest improvement is in the interior packing which has made possible the complete elimination of hazardous excelsior pads and the individual wrapping of each piece with kraft paper.

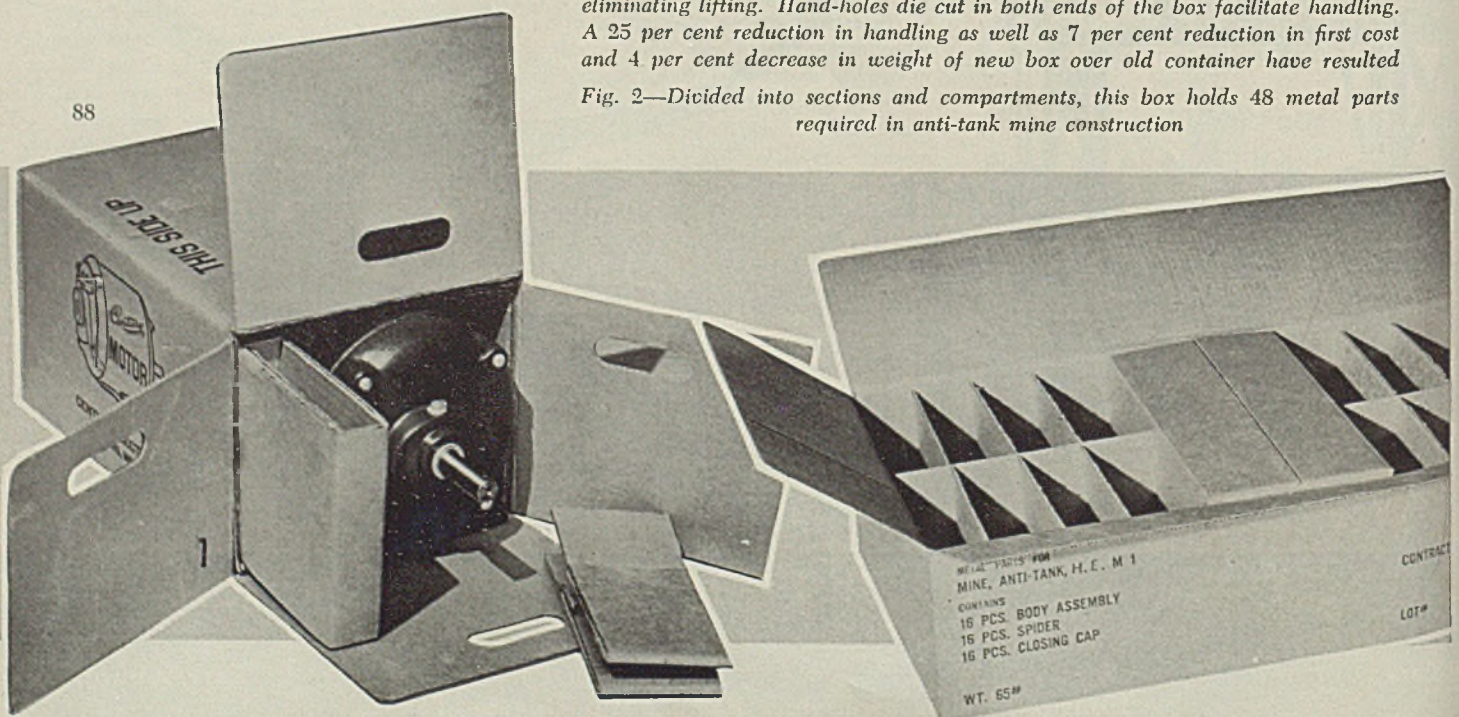
The extension handles are packed in pairs, back to back, in separate compartments, resulting in greater compactness and permitting the shipment of twelve complete sets of steel hardware as a unit instead of ten. Special provision is made for the end handles, three sets of each being packed in a separate corrugated box and placed in the master box between the partition packing and under the extension handles. This method keeps the partition packing in position and tends to add extra stiffness.

Upon receipt of shipment by casket manufacturers, all that is necessary is to remove the box cover. The hardware is immediately available for assembly with no unwrapping of individual pieces or disposal of large quantities of fire hazardous debris, the use of which is an economic waste today. Another important advantage lies in the fact that

*Fig. 1—Electric motor weighing 75 pounds is slid into the end of this box, eliminating lifting. Hand-holes die cut in both ends of the box facilitate handling. A 25 per cent reduction in handling as well as 7 per cent reduction in first cost and 4 per cent decrease in weight of new box over old container have resulted*

*Fig. 2—Divided into sections and compartments, this box holds 48 metal parts required in anti-tank mine construction*

88





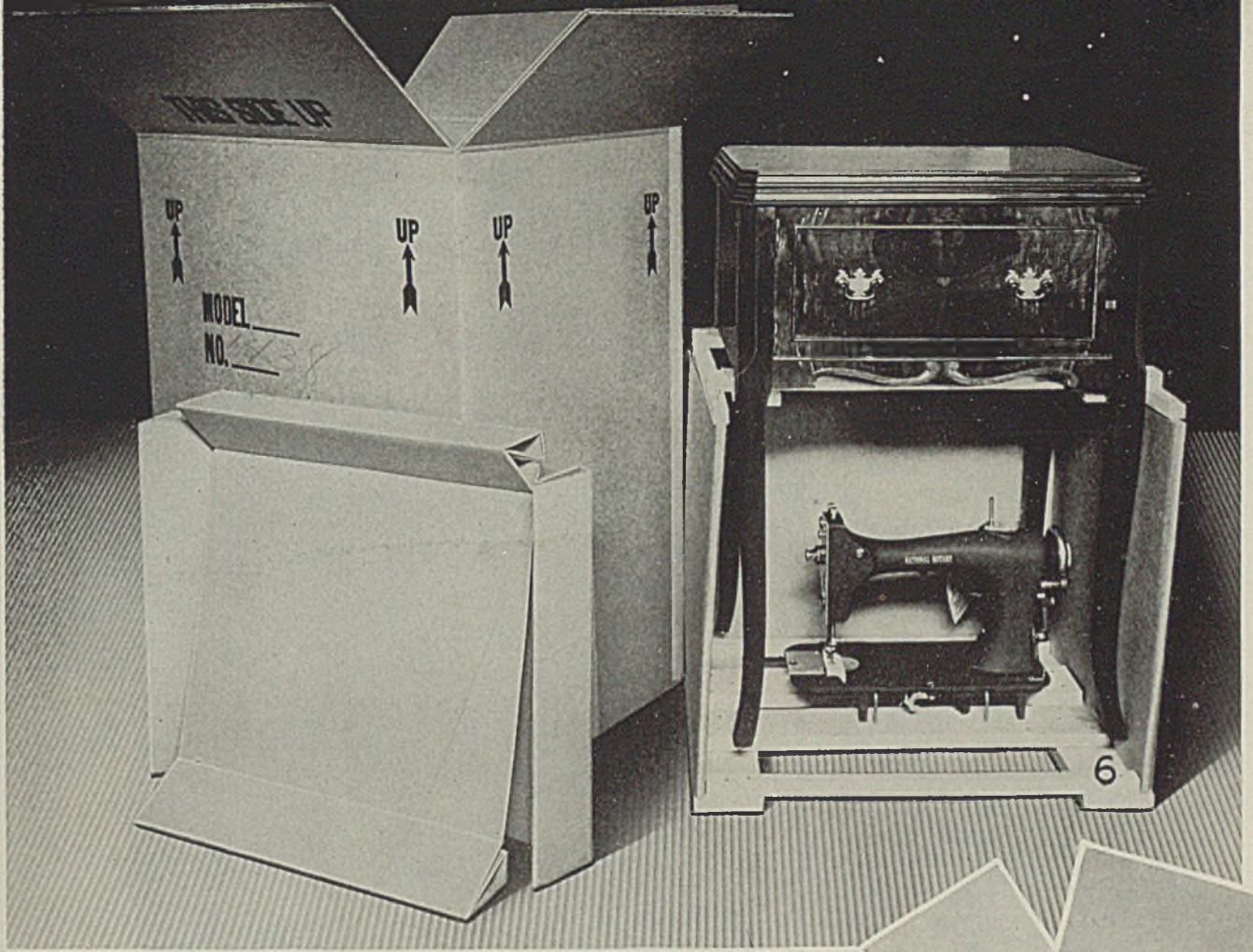
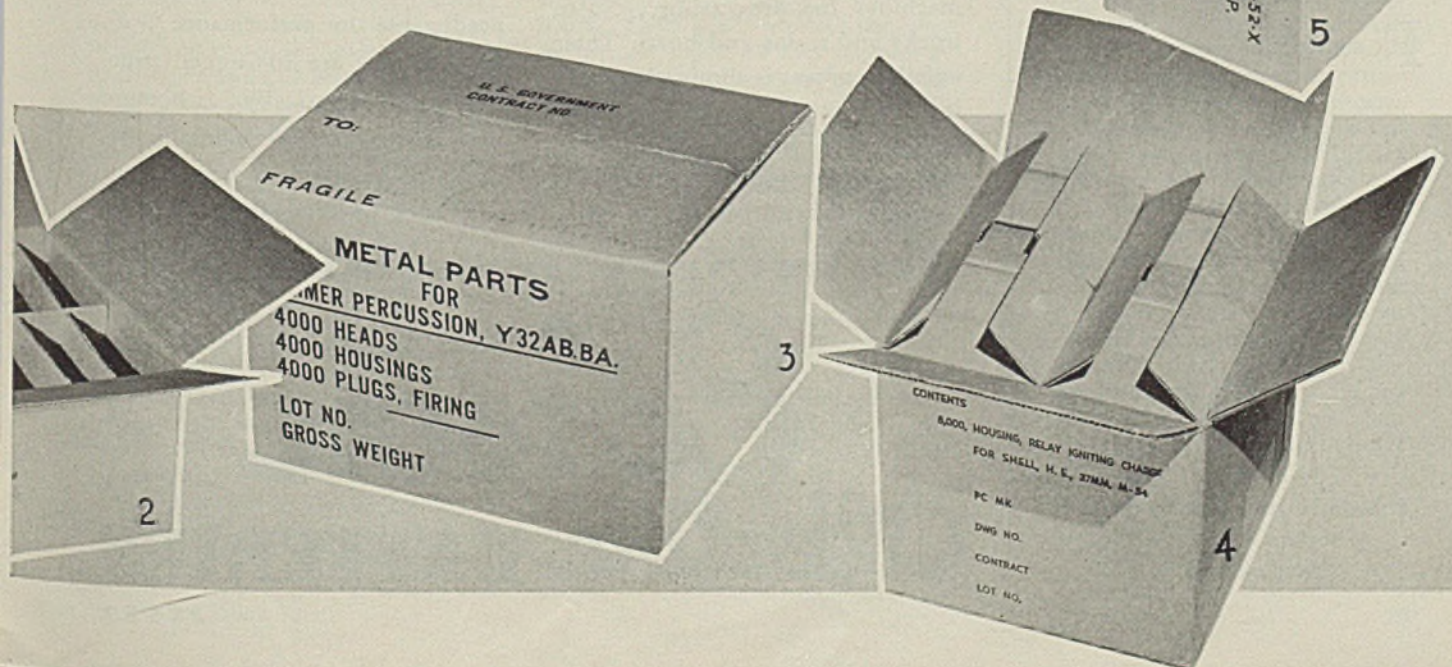
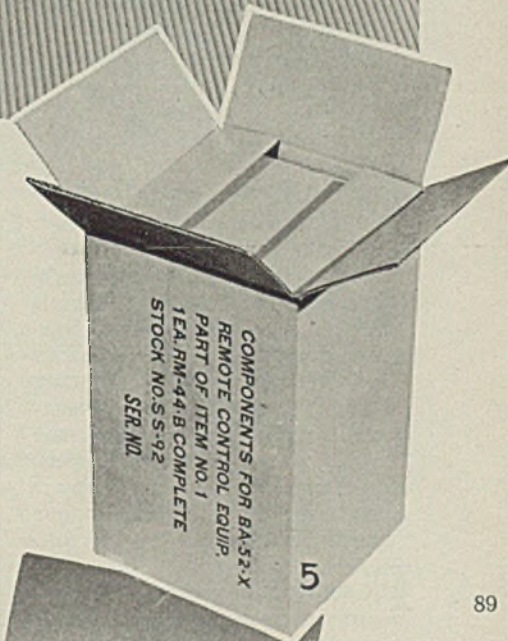


Fig. 3—This sturdy corrugated container protects 12,000 metal parts of primer percussions during shipment

Fig. 4—This master box contains two layers of four smaller boxes in each of which are packed 1000 housings for 27-millimeter shell

Fig. 5—Extra-heavy and resilient packing in this "cushioned" box protect parts for delicate remote control instruments. Double flap closures top and bottom furnish extra protection

Fig. 6—The package shown here "cradles" sewing machine cabinet to prevent marring and supports machine unit firmly on wood crossbar. Benefits include 10 per cent reduction in package weight, 33 per cent saving in packing time and 15 per cent reduction in original cost







**Simple Battens Conserve Precious Cars.** War materials boxed or crated for shipment in units of one to three tons can be loaded by battery industrial trucks into outgoing cars in a small fraction of the time formerly required. An aircraft engine manufacturer loads cars in as little as 20 minutes by this method. All that is needed is a pair of simple 2 x 2 battens underneath to provide the necessary fork clearance. *And, when the consignee unloads cars by the same method, the saving is doubled.*



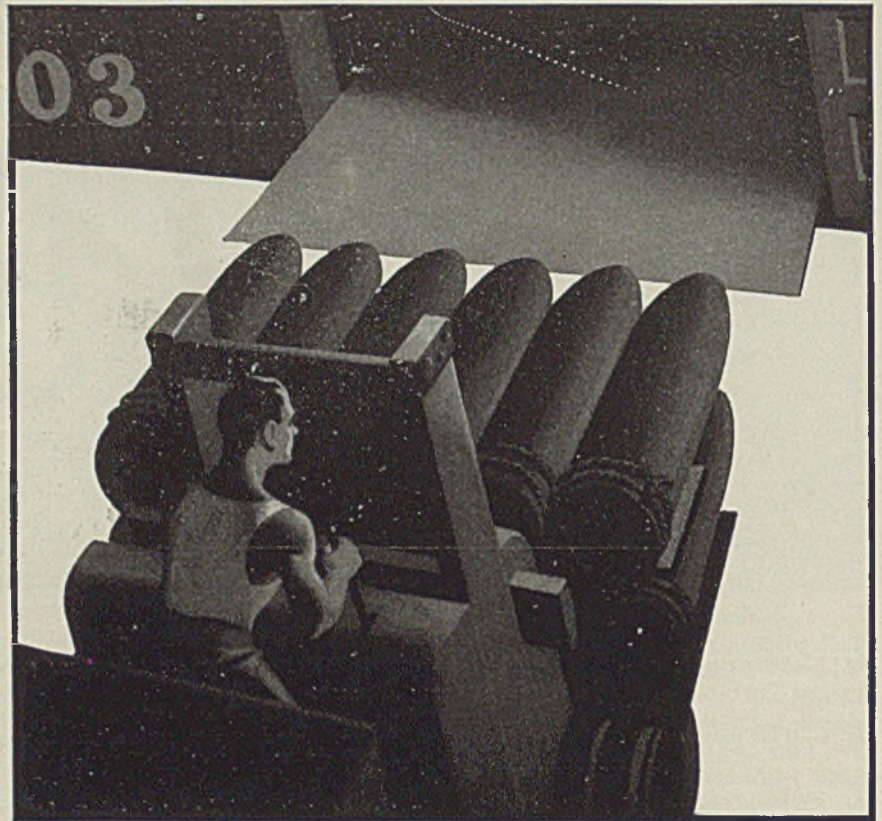
**New Ideas in Material-Handling.** New and better ideas for keeping war production flowing are constantly being developed by material-handling supervisors. One clearing house for such ideas—and an authoritative one—is Storage Battery Power, our house magazine. Articles describing the latest sound methods appear regularly. Write us for a copy if you are not already on our mailing list.

**Foresight.** Foresight is paying its dividends now in plants whose material-handling trucks are equipped with alkaline batteries. Men who specified them can take justified personal pride in their judgment. Alkaline battery care is restricted almost solely to simple maintenance and charging; repairs are seldom necessary; failure in operation rare indeed. They are like the good workman who shows up for his job every day on time—and does his work flawlessly the whole shift.

Edison Storage Battery Division  
Thomas A. Edison, Inc.  
WEST ORANGE, N. J.

# POWER

## delivered as ordered



American industry is mechanized, too. Industrial trucks powered by Edison Alkaline Batteries are carrying war production . . . to waiting machines for processing . . . to trucks and trains and boats. Their unflinching power is eliminating waiting time and congestion, expediting rush war materials . . . increasing production in every foot of space available.

Over half of the battery industrial trucks of America are powered by Edison Alkaline Batteries. This is because alkaline batteries are so predictable in performance . . . because they are so rugged structurally and electrically . . . because they are so easy to maintain. Because they deliver power where and when ordered—

**INDUSTRY NEEDS THE DEPENDABILITY OF**

# Edison

## Alkaline BATTERIES

STEEL





Fig. 7—This redesigned corrugated box for shipping steel casket extension and end handles holds twelve sets of hardware instead of ten, weighs 15 per cent less than the former box. Packing time has been reduced 20 per cent.

Fig. 8—A 40 per cent reduction in package weight and 50 per cent saving in handling time resulted from adoption of this new corrugated box. Note advertising value of package



these sturdy boxes can be stacked in a small space for storage, and if desired the body of the box can be placed in the cover forming a most rugged tote box or open storage tray for shelf or bin storage. Still in the original box and neatly arranged and separated, the hardware is readily accessible though still protected from any possible damage in storage or handling. Use of the box in this manner has demonstrated that the new method of package engineering not only speeds and simplifies assembly operations but eliminates much unnecessary handling.

This new box weighs 15 per cent less than the old, which means a saving in transportation costs. Packing time has been reduced 20 per cent by eliminating three handlings, and a similar saving is being effected at the receiving end.

A 40 per cent reduction in package weight with consequent savings on shipping charges and a 50 per cent saving in handling time are major economies effected by Sands Mfg. Co., Cleveland, after adopting a corrugated shipping box developed for shipment of their gas heaters for hot water tanks. See Fig. 8. The box also simplifies dealer storage, lends itself to eye-catching window display, eliminates repacking for delivery to final consumer.

The new box was tested severely and was not accepted until test shipments had proved its ability to protect the product in transit. Regular slotted construction insures minimum-space storage before packing as well as simple, fast setup and adequate rigidity. Interior engineering adds further to the inherent shock absorbing qualities of the corrugated ship-

ping box. Closure is made with metal staples on a swift, efficient production-line basis.

Thus not only were economies made possible for the company by reduced shipping weight and assembly line packing, but dealers and salesmen of the product reported improved selling and advertising qualities of the package.

A new shipping box designed for fractional horsepower motors, up to ¾-horsepower, manufactured by Century Electric Co., St. Louis, has yielded a 25 per cent reduction in handling. The box, as shown in Fig. 1, is constructed so that the motor, which weighs 75 pounds, can be slid in from the end, thus eliminating lifting. Convenient hand-holes, die cut in both ends of the box facilitate handling at the plant as well as storing at the warehouse. There is a 7 per cent reduction in first cost and 4 per cent decrease in weight of the new box over the container formerly used.

National Sewing Machine Co., Belvidere, Ill., has achieved great savings in simplification of packaging operations, in package weights and in actual box costs by adoption of two new corrugated shipping boxes—one for shipment of a sewing machine complete with cabinet (see Fig. 6), the other for shipment of a portable model. A double-wall slotted box forms the basic construction of the larger box, with corrugated padding and wood-and-corrugated framework to suspend the combination unit 1½ inches from all sides. Thus the sewing machine cabinet is "cradled." Cabinet legs are protected by corrugated padding, while the machine head itself is secured to a bottom

cross member of wood. Similar packing protects the portable sewing machine shipped in the smaller box.

A 10 per cent reduction in package weight, a 33 per cent saving in packing time and a 15 per cent reduction in original cost attest to the efficiency of the combination unit package. Savings are even greater in the smaller box, amounting to a 30 per cent reduction in package weight, a 15 per cent saving in packing time, and a 50 per cent saving in original cost.

Ordnance items are also coming in for their share of "engineered" corrugated containers and the savings they afford. The box shown in Fig. 4 was designed to protect 8000 parts for 37-millimeter shell. The master box contains eight smaller boxes—two layers of four—in each of which are packed 1000 housings. Manufacturers receiving parts in this type of shipping box can use the eight interior parts boxes on the assembly line.

Fig. 2 shows a corrugated shipping box engineered for shipment of 48 metal parts required in anti-tank mine construction. To accommodate all parts in a minimum of space, the entire box was divided into three sections, the outer two of which were in turn each divided into eight compartments. The center section is a separate corrugated box with compartments provided for the 32 smaller parts.

A "cushioned" box designed to protect parts for delicate remote control instruments is seen in Fig. 5. The interior packing is extra-heavy and extra-resilient, engineered to provide maximum protection at vital points and to accommodate parts of irregular size. Double flap closures provide extra protection top and bottom.

Twelve thousand metal parts of primer percussion—4000 beads, 4000 housings and 4000 firing plugs—are protected during shipment by the box shown in Fig. 3.

The above case histories are not just isolated instances of savings made possible by properly engineered corrugated containers. They are examples of what many manufacturers are achieving through redesign of their product containers according to the most modern package engineering principles.

(Concluded Next Week)



# CONSERVES ALLOYS

... in bolting materials by revamping temperature basing system, by wider use of carbon steels, by changing to lower alloy content

TO CONSERVE the alloy and high strength steels for war needs, the M. W. Kellogg Co., New York, refinery engineers have adopted a number of important changes in the composition of steels used in refinery bolting material. It has been suggested that these changes might also be adopted widely.

The proposals, announced in the latest Wartime Plant Design bulletin of Max B. Miller, chief, Procurement Section, Office of Petroleum Coordinator, Refining Division, War Production Board, call for wider use of carbon steels in bolts, studs and nuts. They also suggest some of the new National Emergency (NE) steels recently announced by the American Iron and Steel Institute as substitutes for low chromium and nickel steels in many bolting applications.

The emergency specifications of this company also call for basing the temperature requirements of bolting materials on the actual metal temperatures, rather than on the temperature of the oil or gas in the piping and vessels. The specifications present a formula for estimating the design bolting temperature in per cent of flow temperature under various conditions of insulation of piping vessels.

These proposals of the refinery engineering concern for conserving the nation's supply of alloy and high strength steels have been presented before committees of the American Petroleum Institute and the American Society of Mechanical Engineers who are considering the emergency requirements for steels for piping and pressure vessels. They are also under consideration by the Iron & Steel Division of the War Production Board.

While requirements for steel for bolting material are only a small per cent of structural steel used in new plants, heavy replacements in the present era of repairing and salvaging equipment will make bolting material an important item among refiner's needs. Thus the refiner specifying only to meet his actual operating re-

quirements will aid in conserving the strategically important chromium and nickel alloys for actual military needs.

"Now that the first and principal step has been taken toward simplifying and reducing alloy consumption for valves, fittings and pipe which comprise the principal part of oil refinery piping tonnage," W. W. Diemer of the Kellogg company wrote Procurement Section Chief Miller, "we believe it is an opportune time to give attention to the conservation of alloys in bolting materials." His letter goes on to point out that the established practice among many petroleum refiners has been to call for types of bolts, stud-bolts and studs heavier than actually required and composed of ma-

terial which in most cases would far more than withstand all anticipated service requirements. Alloy steels have been used in many cases where carbon steel would meet all needs.

This method of specifying eliminated extra work in engineering and ordering. It also helped customers' interests in reducing the types of bolts necessary to carry in stock, and prevented confusion in the use of materials. Nevertheless, the Kellogg company official stated, the war emergency need to conserve steel makes necessary a change in this purchasing policy.

Practice among refiners, he stated, has been to use mild alloy steels for bolts for pipes and pressure vessels in all applications from minus 75 degrees Fahr. to 900 degrees Fahr.; higher alloy for temperatures up to 1200 degrees Fahr. and carbon steel bolting material has been restricted to cast iron flanges.

The types of steel bolts and studs specified by the M. W. Kellogg Co., including the emergency types are as follows:

## CARBON STEELS

Type "A": For structural purposes, also for piping in connection with cast iron fittings.

Type "AA": Conforms to requirements for ASME and API-ASME unfired pressure vessel codes. It is suitable for pressure of 160 pounds per square inch maximum and temperatures of 450 degrees Fahr. maximum.

Type "AAA" (New Emergency):

TABLE I—Bolting Material Kellogg Type B  
Material B-7 preferred. Other materials listed to be furnished when specifically ordered, or on approval when B-7 is not available

Analysis Symbol	B-7	B-4	B-11	B-12	B-33
Identifying Mark	7	4	11	12	33
Description	SAE 4140	SAE 4340	Tung-Chr-Van	SAE 3140	Heppenstall C-55
Carbon—%	.35-.45	.35-.45	.40-.50	.35-.45	.50-.58
Manganese—%	.60-.90	.50-.80	.20-.40	.60-.90	.50-.80
Sulfur—%	.05	.05	.04	.05	.04
Silicon—%	.15-.30	.15-.30	.15-.30	.15-.30	.15-.30
Chromium—%	.80-1.10	.50-.80	1.0-1.5	.45-.75	.50-.80
Molybdenum—%	.15-.25	.30-.40			.15-.25
Nickel—%		1.5-2.0		1.0-1.5	1.0-1.5
			Tungsten 1.7-2.3		Vanadium .12 Max.
			Vanadium .20-.30		
Heat Treatment			M.D.T. 1000F.		
Min. U. T. S.			125,000 lbs./sq. in.		
Yield Point Min.			105,000 lbs./sq. in.		
Elong. in 2" Min.			16%		
Red. of Area Min.			50%		

Phosphorus was maximum of 0.04 per cent in all samples.

—N U T S—


Materials below equally acceptable—Class 2H nuts preferred

Analysis & Identifying Mark	2	2H	2Z
Description	C-.40 Min.	C-.40 Min. Oil Quenched	C-.35 Max. Oil Quenched
Carbon—%	.40 Min.	.40 Min.	.20-.35
Manganese—%			
Phosphorus—% Max.	.05	.05	.045
Sulfur—% Max.	.05	.05	.055
Silicon—%			
Molybdenum—%			
Brinell as furnished	160 Min.	248-352	160 Min.
Min. Brinell after 24 hr. draw	150	180	160

NOTE: M. D. T.—Minimum Drawing Temperature.

Mark nuts with identifying mark; follow with letter "B" if machined from bar stock.





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**EVERLASTING FASTENINGS**



Meets requirements of ASTM Specification A-96-39, Class A, (see p. 355, ASTM Standards 1939, Part I) except that the material shall be a medium carbon steel of the SAE 1000 series, with 0.1 per cent minimum silicon content and a maximum draw temperature of 100 degrees Fahr. If carbon steel is not readily available, any low alloy steel conforming to any of the 3 specifications of ASTM Specifications A-96-39 will be equally acceptable.

Commenting on the properties of this alternate carbon steel, the company stated: "This introduces a medium carbon bolting steel of the SAE 1000 series containing sufficient carbon so that, when heat treated and tempered at 1000 degrees Fahr., Class A physical properties to ASTM Specification A-96-39 can be obtained.

"Class A physical properties provide a sufficiently high yield point to permit setting the gaskets on any conventional types of facings used for oil refinery piping. We have in mind SAE 1040, or possibly SAE 1045 steel, which of course completely eliminates alloy content and yet provides a bolting material which should prove acceptable on 80 per cent or more of refinery piping.

"However, to make this substitution operable, it would be necessary for the War Production Board to make it possible or even mandatory for the mills, warehouses and bolting manufacturers to stock the series 1000 analysis selected as a standard material."

Type "AAB" (New Emergency): Covers stud bolts and studs furnished to requirement of ASTM Specification A-96-39, either Class B or Class C. Ma-

terial shall be manganese steels of SAE 1300 series or available low alloy steel capable of meeting these physical properties with a minimum draw temperature of 1000 degrees Fahr. In addition, it is required that the minimum annealed ultimate strength shall not be less than 80,000 pounds per square inch.

This type, the company states, is to fill the gap below Type "B" by providing a classification for bolting materials similar to present analysis but of lower alloy content, and possibly for other analyses which make use of non-strategic alloys. As a suggestion for the latter, the use is proposed of manganese steel of the SAE 1300 with heat treatment to ASTM Specification A-96-39, Class B or C physical properties.

Type B temperatures are from minus 20 to 900 degrees Fahr.; Type C temperatures from minus 20 to 1200 degrees Fahr.; Type D for use with flanges austenitic steel (18-8, 25-12, 25-20, etc.) pressure parts; Type L temperatures from minus 20 to minus 75 degrees Fahr.; Type M temperatures below minus 75 degrees Fahr.; Type P for corrosion and heat-resistant structural services.

To show the applications of the various types of bolting as listed earlier in the article, note the following:

"Piping Flanges and Tower Nozzles: Type A bolting shall be used for all cast iron flanges. Type AA bolting shall be used for all carbon steel series 15 ASA flanges where the bolt temperature does not exceed 450 degrees Fahr. and may be used for special carbon steel flanges within this temperature ranges.

"Type AAA bolting shall be used for all carbon steel ASA flanges, series 30 and higher, and specially designed carbon steel flanges where the bolt temperature does not exceed 900 degrees Fahr. This temperature is equivalent to a flow temperature of 950 degrees Fahr. where using integral flanges, fully insulated externally. Type AAA bolting shall be used for series 15 flanges where

TABLE II—Bolting Material Kellogg Type C

All materials listed hereunder are equally acceptable, for selection by the manufacturer, unless a specific material is ordered.

Analysis Symbol	B-5	B-7a	B-13	B-14	B-15	B-31	B-34
Identifying Mark	5	7a	13	14	15	31	34
Description	4-6% Cr-Mo	SAE 4140 1/4% Mo.	Beth-Super	Cr-Mo	Timken	2% Cr-Mo.	Heppenstall
Carbon—%	.35 Max.	.35-.45	.30-.40	.35-.50	.40-.50	.35 Max.	.25-.35
Manganese—%	.30-.50	.60-.90	.60-.90	.40-.70	.40-.70	.30-.50	.50-.80
Phosphorus—% Max.	.03	.04	.04	.04	.03	.03	.04
Sulfur—% Max.	.03	.05	.04	.05	.03	.03	.04
Silicon—%	.50 Max.	.15-.30	.15-.30	.15-.30	.50-.80	.50 Max.	.15-.30
Chromium—%	4.0-6.0	.80-1.10	.45-.75	.80-1.10	1.0-1.5	1.75-2.25	.50-.80
Molybdenum—%	.45-.65	.45-.65	.40-.65	.30-.40	.40-.60	.45-.65	.40-.50
Nickel—%							1.5-2.0
Heat Treatment			Tungsten Vanadium				Vanadium
Min. U. T. S.			85-135	20-30			.12 Max.
Yield Point Min.			M.D.T. 1200° F.				
Elong. in 2" Min.			125,000 lbs./sq. in.				
Red. of Area Min.			105,000 lbs./sq. in.				
			18%				
			50%				

—NUTS—

Materials below equally acceptable

Analysis & Identifying Mark	4	7
Description	Carbon Moly.	SAE 4140
Carbon—%	.40-.50	Analysis same as
Manganese—%	.50-.95	Bolting Material
Phosphorus—%	.04	B-7
Sulfur—% Max.	.05	
Silicon—%	.15 Min.	
Molybdenum—%	.20 Min.	
Brinell as furnished		248-352
Min. Brinell after 24 hr. draw		200

NOTE: M. D. T.—Minimum Drawing Temperature.

Mark nuts with identifying mark; follow with letter "B" if machined from bar stock.

TABLE III—Bolting Material—Kellogg Type D

Preferred materials are KA2S Studs.

Other materials are to be used with approval of the Engineering Dept.

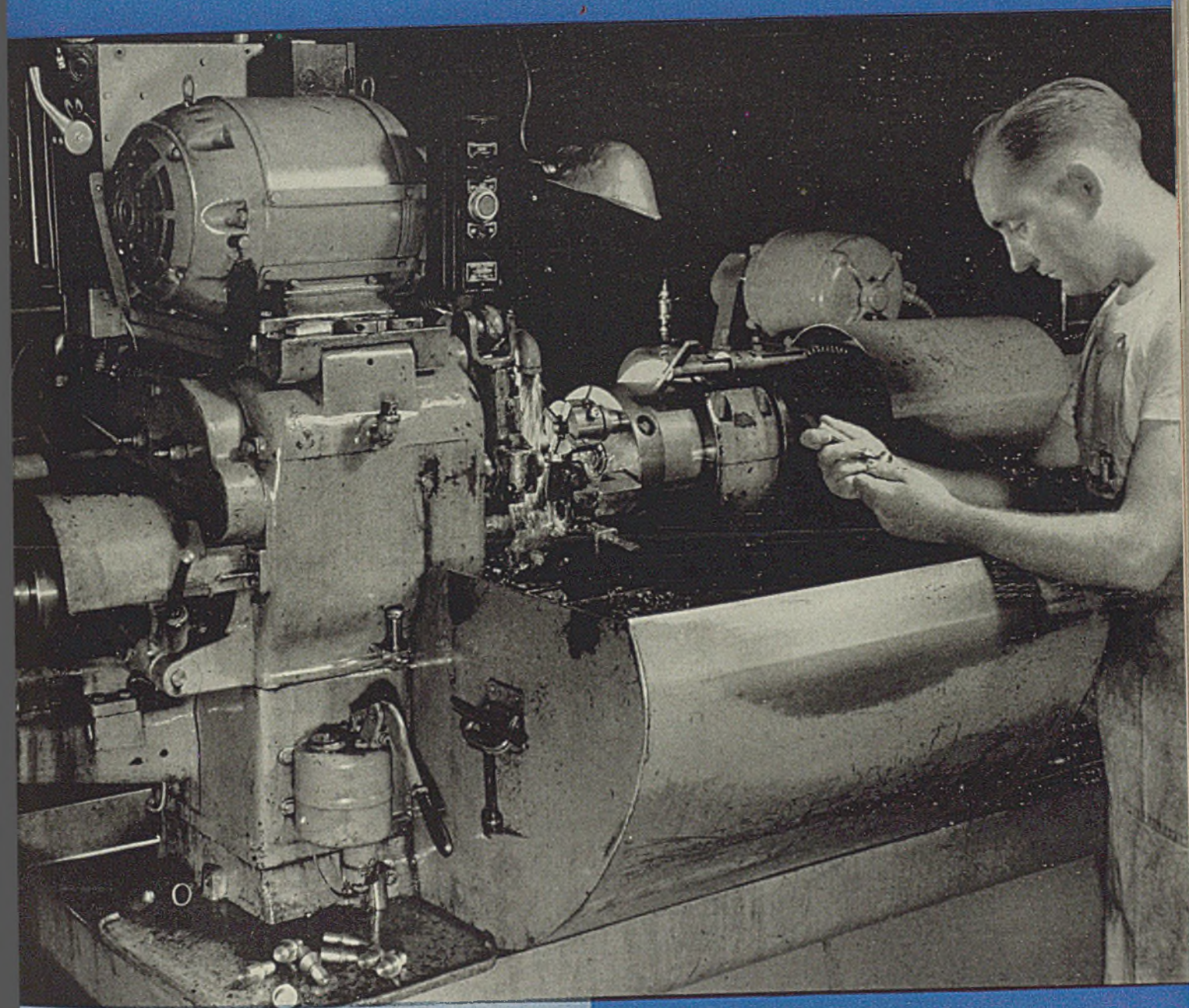
Analysis Symbol	B-41	B-8	B-42	B-40	B-39	B-43	B-44
Identifying Mark	41D	8D	42D	40D	39D	43D	44D
Description	KA2	KA2S	KA2SCb	25-12	25-20	8-18	8-18
Carbon—%	.08-.20	.08 Max.	.12 Max.	.20 Max.	.25 Max.	.25 Max.	.25-.55
Manganese—%	.20-.75	.20-.75	2.00 Max.	2.00 Max.	2.00 Max.	.20-.90	.20-.90
Phosphorus—% Max.	.035	.035	.035	.035	.035	.035	.035
Sulfur—% Max.	.035	.035	.035	.035	.035	.035	.035
Silicon—%	.75 Max.	.75 Max.	.75 Max.	2.00 Max.	2.00 Max.	1.50 Max.	1.50 Max.
Chromium—%	17.0-20.0	17.0-20.0	17.0-20.0	22.0-26.0	22.0-26.0	7.0-10.0	7.0-10.0
Molybdenum—%							
Nickel—%	7.0-10.0	7.0-10.0	8.0-12.0	11.0-15.0	18.0-22.0	19.0-23.0	19.0-23.0
Min. U. T. S.	80,000 psi	75,000 psi	75,000 psi	75,000 psi	75,000 psi	75,000 psi	100,000 psi
Yield Point Min.	30,000 psi	30,000 psi	30,000 psi	30,000 psi	30,000 psi	30,000 psi	50,000 psi
Elong. in 2" Min.	35%	35%	35%	35%	35%	35%	30%
Red. of Area Min.	50%	50%	50%	50%	50%	50%	50%

—NUTS—

Any material listed above for Type "D" Bolting may also be used for nuts, preferred material being KA2 Brinell as furnished—150 Min. NOTE: Mark nuts with identifying mark; follow with letter "B" if machined from bar stock.



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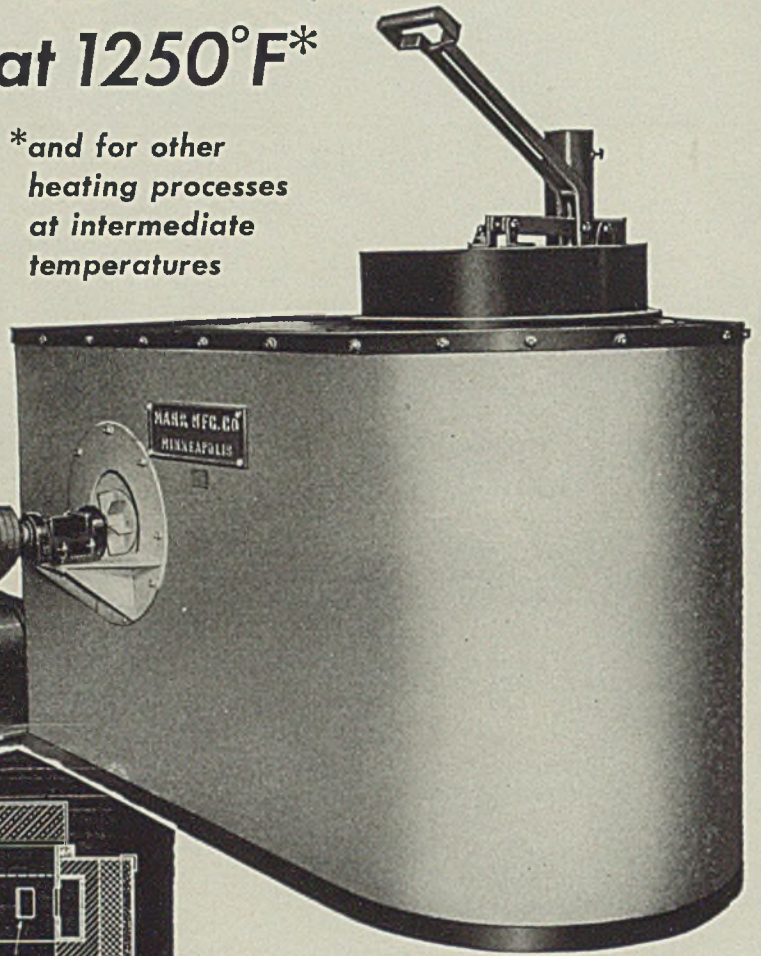
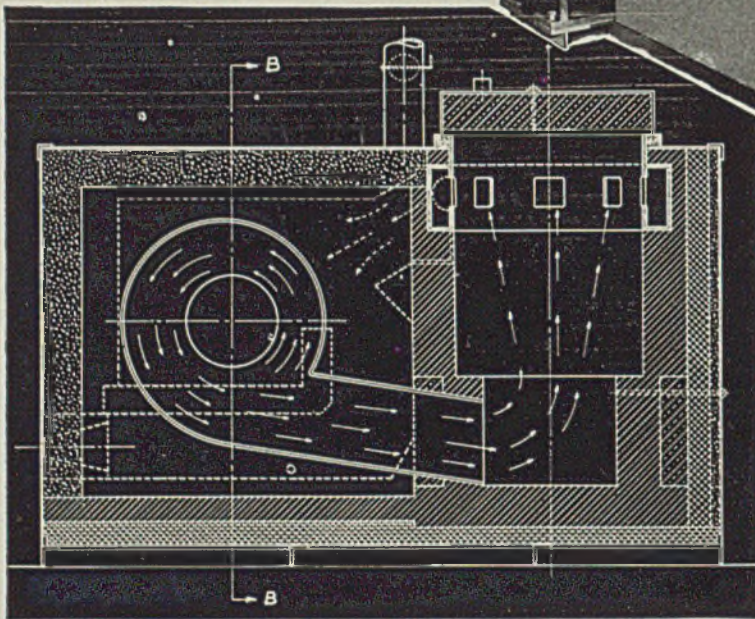
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*\*and for other heating processes at intermediate temperatures*

**LONGITUDINAL CROSS-SECTION VIEW** showing arrangement of blower, ducts, and cylindrical treating chamber, with collector ring at top proportioned for *uniformly even* flow of air back to heating chamber for recirculation.



**Gas or Oil Fired** with manual control as standard. Temperature control and flame failure safety equipment available at extra cost.

**Construction** is of mild steel casing with removable top for easy access to inside.

**Self-Sealing Lid** for heating chamber provides a tightly sealed joint when closed, and also locks itself in position when open. It is an extremely easy working mechanism.

**Fan, Shaft and Duct** are of special heat resistant alloy steel. Fan on shaft cools shaft bearing.

**Lining** is best grade refractory. Cover is lined with castable refractory insulation. Treating chamber is walled with fire brick.

**Insulation** as noted in cross section is brick and block insulation that effectively keeps the heat within the unit.

**Made in 9 sizes**—Cylindrical basket sizes for treating chamber range in diameter from 12" to 48" and in depth from 16" to 60". Special sizes can be made.

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the bolt temperature exceeds 450 degrees Fahr.

"Type B bolting shall be used for all carbon steel flanges where the bolt temperature exceeds 900 degrees Fahr., equivalent to a flow temperature of 950 degrees Fahr. where using integral flanges fully insulated externally.

"Type B bolting shall be used for all carbon 1/2 per cent moly flanges.

"Type B bolting shall be used for all chrome alloy flanges where the bolt temperature does not exceed 900 degrees Fahr.

"Type C bolting shall be used for all chrome alloy flanges where the bolt temperature exceeds 900 degrees Fahr.

"Type D bolting shall be used for all flanges of austenitic material (18-8, 25-12, 25-20, etc.) except where the austenitic material is used for corrosion resistance only and the bolt temperature does not exceed 450 degrees Fahr.

"The Pressure Equipment & Materials Division shall be consulted in all cases where bolting material of Types L, M and P is contemplated.

"Tower Manholes: Type AA bolting shall be permitted for infrequently opened manholes for pressures up to 250 pounds per square inch where a soft gasket is used and the bolt temperature does not exceed 450 degrees Fahr. Type AAA bolting shall be required for all manholes except as noted in part (a) above, where the bolt temperature does not exceed 900 degrees Fahr. For special cases, the Pressure Equipment & Materials Division shall be consulted.

"Exchanger Flanges: Type A bolting shall be used for all cast iron flanges. Type AA bolting shall be used for all carbon steel series 15 ASA flanges. Type AAA or AAB bolting shall be used for all flanges where the bolt temperature does not exceed 900 degrees Fahr. except as covered in parts (a) and (b) above.

"Specially Designed Flanges: Where carbon steel flanges are designed for bolt temperatures not exceeding 900 degrees Fahr., the design shall be based on Type AAA bolting.

"Internal Structural Bolts: Except where alloy material is essential for corrosion resistance type AA bolting shall be used for low stressed structural bolting such as holding down bolts for trays, etc."

To show how this concern suggests that bolt temperatures can be estimated from flow temperatures for various conditions of insulation in piping and vessels, the following is reprinted from their specifications:

"For the usual run of piping and vessels which are uninsulated internally and exposed to atmospheric temperatures on the outside, the design temperature of the bolts shall be taken as the follow-

TABLE IV—Bolting Material  
Kellogg Type L

Analysis Symbol Identifying Mark Description	Kellogg Type M				
	B-7 7L	B-4 4L	B-35 35M	B-37 37M	B-38 38M
SAE 4140	SAE 4340	SAE 2320	SAE 3130-	SAE 4640	
Carbon—%	.35-.45	.35-.45	.15-.25	.25-.40	.35-.45
Manganese—%	.60-.90	.50-.80	.30-.60	.50-.80	.50-.90
Silicon—%	.15-.30	.15-.30	.15-.30	.15-.30	.15-.30
Chromium—%	.80-1.10	.50-.80		.45-.75	
Molybdenum—%	.15-.25	.30-.40			.20-.30
Nickel—%		1.5-2.0	3.25-3.75	1.0-1.5	1.65-2.0
Heat Treatment	M. D. T. 1200° F.			M. D. T. 1100° F.	
Min. U. T. S.	105,000 lbs./sq. in.			105,000 lbs./sq. in.	
Yield Point Min.	80,000 lbs./sq. in.			80,000 lbs./sq. in.	
Elong. in 2" Min.		20%		20%	
Red. of Area Min.		50%		50%	

All materials listed hereunder are equally acceptable for selection by the manufacturer, unless a specific material is ordered.

NOTE: Phosphorus content was maximum of 0.04 per cent in all samples.  
Sulfur content was maximum of 0.05 per cent in all samples.

—N U T S—

Analysis & Identifying Mark Description	2Z C-.35 Max. Oil Quenched	
Carbon—%	.20-.35	
Manganese—%		
Phosphorus—% Max.	.045	Any material listed above for Type "M" Bolting may be used for Nuts.
Sulfur—% Max.	.055	
Silicon—%		
Molybdenum—%		
Brinell as furnished	160 Min.	190 Min.
Min. Brinell after 24 hr. draw		

NOTE: M. D. T.—Minimum Drawing Temperature.  
Mark nuts with identifying mark; follow with letter "B" if machined from bar stock.

TABLE V—Bolting Material Kellogg Type P

Manufacturer shall furnish specific grade of material ordered. High Sulfur, Free-machining grades of these materials suitable only where elevated temperatures are not involved and may be substituted only on approval.

Analysis Symbol Identifying Mark Description	B-5 5P	B-6 6P	B-8 8P	B-39 39P	B-40 40P
SAE 4140	SAE 51210	SAE 30905 (18-8)	SAE 25-20 Cr-Ni	SAE 25-12 Cr-Ni	
Carbon—%	.35 Max.	.12 Max.	.08 Max.	.15 Max.	.20 Max.
Manganese—%	.30-.50	.60 Max.	.20-.70	.50-.70	1.25 Max.
Phosphorus—% Max.	.03	.03	.03	.035	.030
Sulfur—% Max.	.03	.03	.03	.035	.030
Silicon—%	.50 Max.	.50 Max.	.75 Max.	.70-1.5	.50 Max.
Chromium—%	4.0-6.0	11.5-13.0	17.0-20.0	24.0-26.0	22.0-26.0
Molybdenum—%	.45-.65				
Nickel—%			7.0-10.0	19.0-21.0	11.0-13.0
Heat Treatment		Anneal		75,000 psi	
Min. U. T. S.	75,000 psi	60,000 psi		30,000 psi	
Yield Point Min.	30,000 psi	30,000 psi		35%	
Elong. in 2" Min.	30%	25%		50%	
Red. of Area Min.	50%	50%			

—N U T S—

Nuts shall be of the same material as Bolting, unless specifically ordered otherwise.

Brinell as furnished	248-352	150 Min.
Min. Brinell after 24 hr. draw	200	

NOTE: Mark nuts with identifying mark; follow with letter "B" if machined from bar stock.

ing percentage of the flow temperature:

"For Integral Flanges: Where fully insulated externally use 95 per cent. Where lightly insulated (maximum of 0.5 inches of plastic) and covered with a weathershield permitting air circulation, use 90 per cent. Where uninsulated and covered with a weathershield permitting air circulation, use 80 per cent.

"For Van Stone Flanges: Where fully insulated externally, use 90 per cent. Where lightly insulated (maximum 0.5 inches of plastic) and covered with a weathershield permitting air circulation, use 85 per cent. Where uninsulated and covered with a weathershield permitting air circulation, use 75 per cent.

"For internally insulated piping or vessels, the design metal temperature established in each individual case by the Pressure Equipment & Materials Di-

vision shall be converted into an equivalent (internally uninsulated) flow temperature by dividing it by 0.975 whereupon the percentages given above can be applied to obtain the design temperatures of the bolts."

## Publishes Standards on Non-Deaerating Heater

A booklet of standards published with the view of establishing standard terminology of non-deaerating heaters now is available from the Heat Exchange Institute, 90 West street, New York. It includes, besides a list of manufacturers of non-deaerating heaters, definitions, types and standards of constructions, rating standards, accessories and other engineering data.



# Design and Application of SPEED REDUCERS

By W. F. PLUME,  
Assistant Chief Engineer  
Philadelphia Gear Works Inc.  
Philadelphia

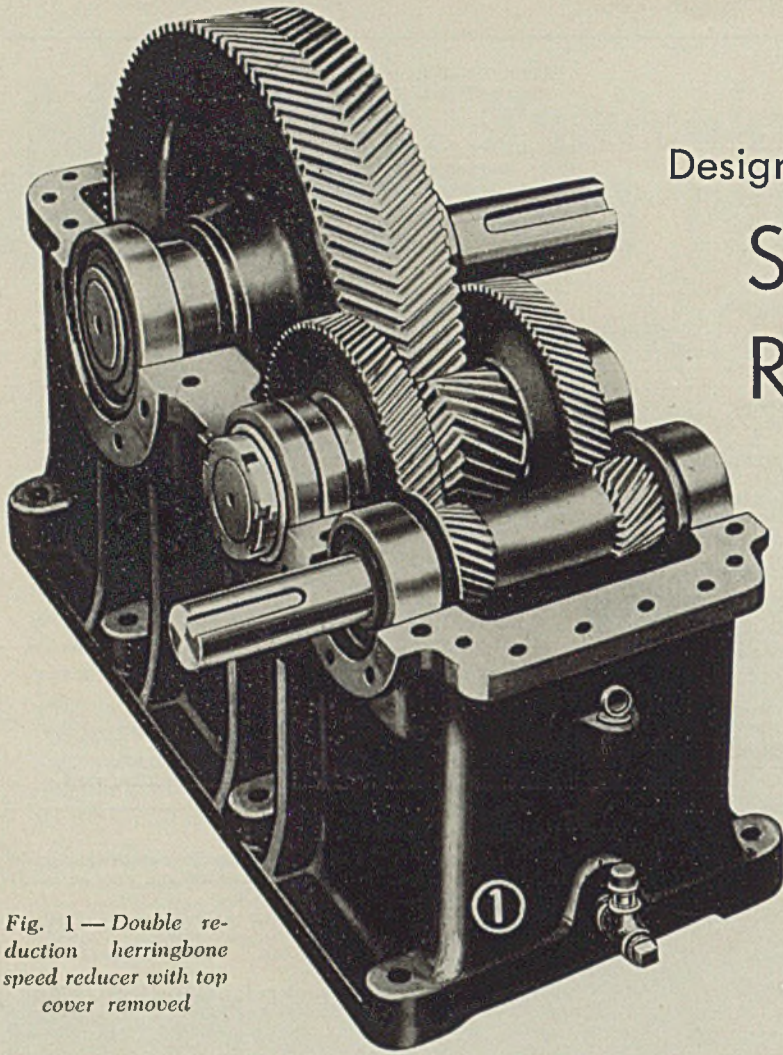


Fig. 1—Double reduction herringbone speed reducer with top cover removed

TRANSMISSION of power and reduction of shaft speeds in steel mills as well as in other industrial plants have been obtained effectively in recent years through enclosed speed reduction gear units.

The trend, these days, is constantly away from the use of belting, chain drives or separately mounted exposed gears.

Gears cannot give satisfactory service unless the following essential requirements are fulfilled:

1. Gears must be accurately manufactured from sound materials properly heat treated.
2. Perfect alignment of gear and pinion must be maintained at all loads.
3. An adequate supply of the proper lubricant must be supplied to the gear mesh at all times to reduce friction and wear, dissipate heat and keep the mating surfaces clean.

4. Gears must be of adequate size to transmit the loads without over-stressing the materials used.

5. Bearings must be rigidly mounted in such a way as to reduce deflections to a minimum.

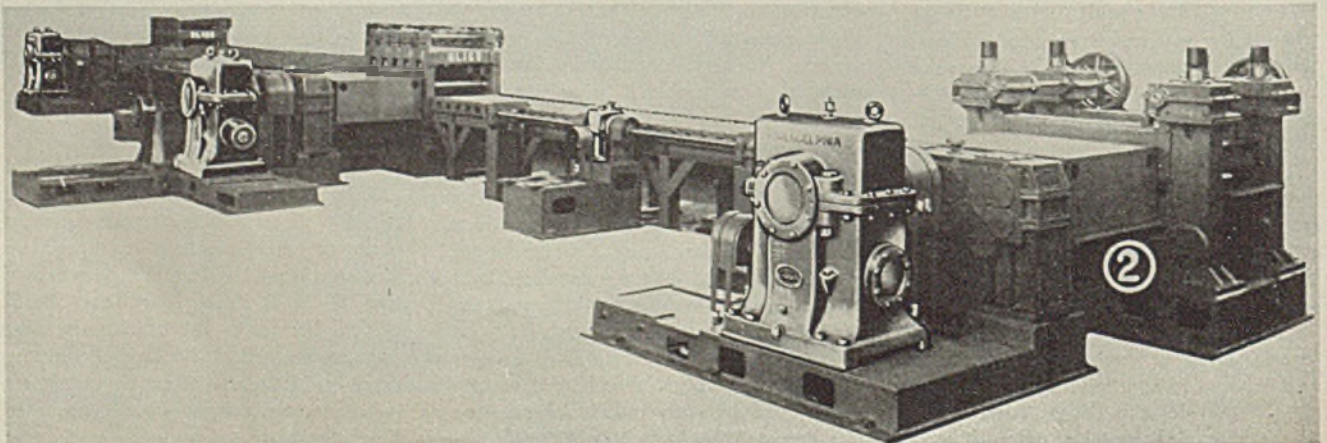
The enclosed speed reducer unit is designed to incorporate all of the foregoing features. Exposed or semi-enclosed separately-mounted gears cannot adequately fulfill conditions Nos. 2, 3 and 5.

Different types of speed reducers are manufactured. The gearing may be helical, herringbone, planetary, spiral bevel, or worm, or combinations of these types. Only three types will be discussed in detail since space does not permit a complete review of all possibilities.

Probably the most popular enclosed drive for steel mill service is the herringbone speed reducer. Fig. 3 shows the single reduction type with the top cover removed.

The gears are of the continuous tooth herringbone type. This type of tooth will carry more load than straight spur teeth, will operate more smoothly at high speeds yet does not have the end-thrust reaction of a single helical-type

Fig. 2—Worm gear units installed on slabbing mill auxiliaries





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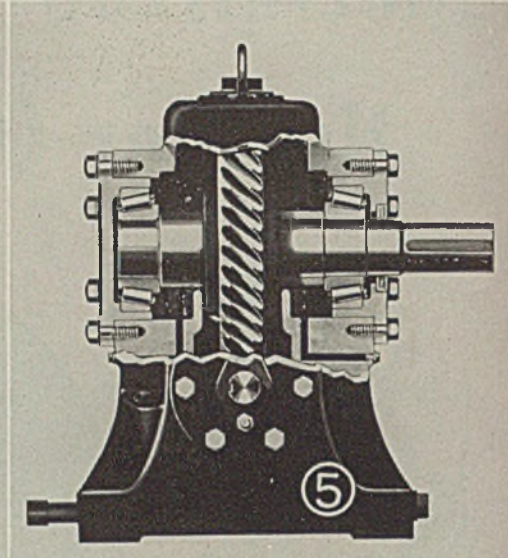
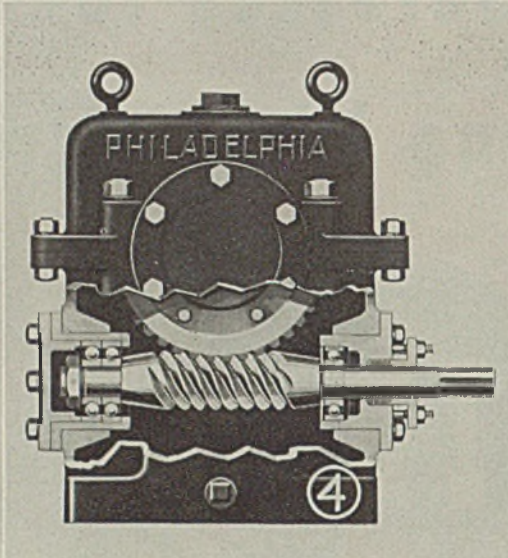
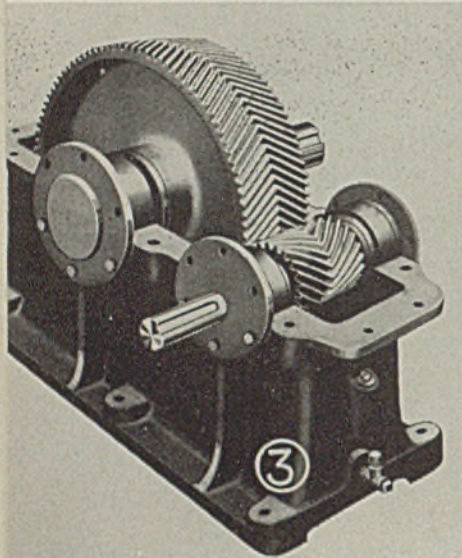


Fig. 3—Single reduction herringbone speed reducer with top cover removed

Fig. 4—Cut-away view showing worm shaft assembly

Fig. 5—Cut-away view showing gear shaft assembly

gear. The gear shaft is mounted in tapered roller bearings which hold the gear in a fixed axial position. The high-speed shaft is located axially by the gear teeth. The straight roller bearings on this shaft are of the "floating" type.

Note how the bearings are located as close as possible to the gear and pinion. This reduces deflections to a minimum and thus maintains proper alignment of gear and pinion at all loads.

A level of oil is maintained at a point where the gear will pick it up and carry it to the pinions and bearings, thus providing complete automatic lubrication.

Fig. 1 shows the construction of a double reduction herringbone unit. Here the high-speed set is split to secure a balanced design. Normal deflections in this construction will not affect the tooth bearing on the gears as it would if a single set of herringbone gears were used in each reduction. The opposed helical gears are in effect a split herringbone gear, and the side loads are balanced. The first and second shafts

"float". The low-speed shaft is fixed.

The first important step in selection of the proper drive is to supply the manufacturer with complete information on the character of the load, motor horsepower and speed, load requirements at low-speed shaft, ratio, operating temperature and duration of operation. This will determine the size unit required. For ratios up to about 10:1 the single reduction is used. For ratios between 10:1 and about 70:1 the double reduction is used. Higher ratios require a triple reduction unit.

Once the unit is built and installed, it becomes the user's responsibility to see that overloading does not occur and that a lubricant of the recommended type is maintained in the gear case at the proper level. It is good practice for a new unit to drain the oil after the first few weeks of operation and refill with

clean oil. Thereafter oil changes are required only about twice a year. But a periodic check must be made to see that the proper level of oil is held.

Herringbone units are suitable for a large variety of steel mill applications. One example is a tension reel drive with a ratio of 17.3:1. The selection is a double reduction herringbone speed reducer with a 13.5-inch second drive centers rated 85 horsepower at 850 revolutions per minute.

Another example is a reversing valve drive in a pit furnace. The requirements are 12,750 pounds-foot torque at the low-speed shaft at 27.8 revolutions per minute. The complete duty cycle is 3.25 revolutions of the shaft. The motor is rated 90 pounds-foot at 695 revolutions per minute. The selection here again was a double reduction herringbone unit ratio 25:1 with 12-inch second drive centers.

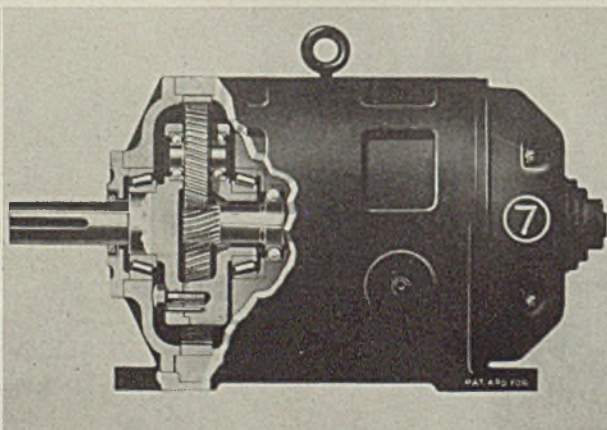
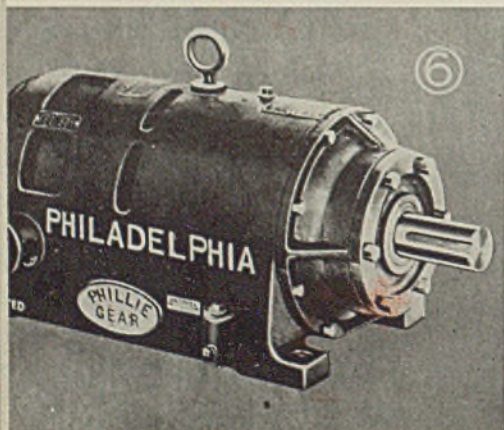
Another type of steel mill drive is the motorized gear unit. This has a more

(Please turn to Page 120)

Fig. 6—External view of motorized planetary gear drive

Fig. 7—Cut-away view of single reduction motorized planetary gear drive

Fig. 8—External view of worm-gear speed reducer





# BAD NEWS FOR BLOODTHIRSTY BIRDS



3-inch Navy  
Anti-Aircraft  
Shell Forging



THE hungry hawks of Hitler and Hirohito are getting a warm reception wherever they fly these days. American guns and American shells are blasting these bloodthirsty birds out of the sky in ever-increasing numbers.

We're proud to have a hand in the making of the shell forgings that are helping to seal the doom of the dictators. We're proud, too, to be making electric welded steel tubing and other forgings for a wide variety of war uses.

We want to do more. If you have a forging problem, bring it to us. We'll be glad to cooperate in any way we can.

**THE STANDARD TUBE CO.**

Detroit  Michigan

"All Out  for Victory"

★ Complete Tube Stocks Maintained by ★  
STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N. Y.  
LAPHAM-HICKEY COMPANY, 3333 West 47th Place, Chicago, Ill.  
UNION HARDWARE & METAL CO., 411 East First Street, Los Angeles, Calif.



# INDUSTRIAL EQUIPMENT

## Remote Control Unit

Hobart Bros. Co., Troy, O., is offering a new remote control unit which is now a standard feature on all welders offered by the company. It is one that is protected fully from accidental breakage by a metal pull-out handle set over



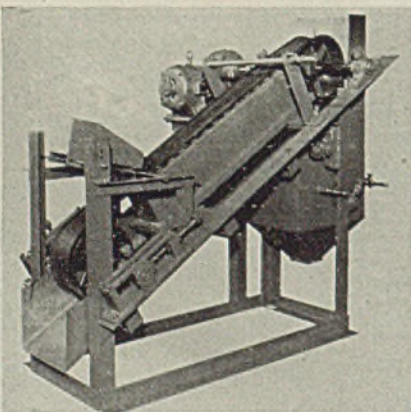
the control dial and by cushion springs on the back of the porcelain rheostat.

The dial, it is said, will increased weld qualities—especially welds made under high-speed techniques. The control places 100 steps of fine volt-amperage adjustment within reach of the operator's hand. It is easily set up by using an ordinary lamp cord extension to connect it to the machine.

The large outer control dial, illustrated, is the field rheostat which controls the differential compounds—while the remote control unit adjusts the open circuit voltage. One thousand combinations of voltage and current are possible with this multirange dual dial.

## Magnetic Separator

Dings Magnetic Separator Co., Milwaukee, announces a newly improved high intensity Roche type magnetic separator which receives the coolant fluid



from a grinder separating particles of abrasives and also particles of alloy steels suspended in the fluid.

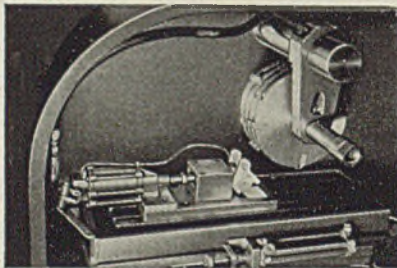
The magnetic portion of the fluid is pulled along by the main conveyor belt over a series of alternating-pole magnets. A water spray continually washes the material as it goes from pole to pole. All non-magnetic materials are therefore washed clean from the product, and the final concentrate is a pure magnetic product of alloy steel.

The magnet incorporated in the separator is of recent design. A welded stainless steel cover encases the electro magnet coils. Transformer oil within the casing not only helps cool the coils, but also assures that no water enters the casing. Separator is furnished complete with motor drive, and is ready for immediate installation in the coolant system.

## Air Motors

Smith-Johnson Corp., 623 East Twelfth street, Los Angeles, announces a new line of Senacon air motors complete with universal integral valves, for use wherever powerful reciprocating motion is required.

In these applications the valve lever of each unit can be linked to a moving



part of the machine for automatic synchronous operation. Dual exhaust ports provide selective utilization of the exhaust air blasts for ejecting work pieces, cleaning out chips and permitting adjustment of speed of one or both strokes. The air motors are being offered in standard models with strokes of 1½, 2½, 6 and 9 inches.

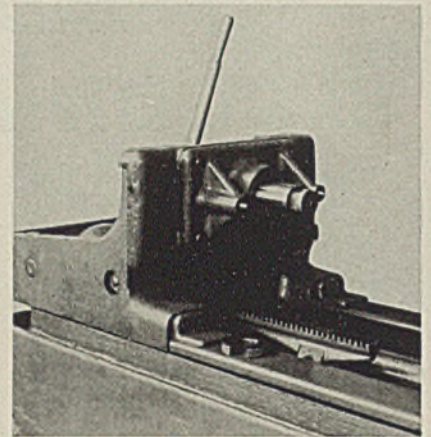
## Holding Fixture

Landis Machine Co., Waynesboro, Pa., recently developed a special work-holding fixture for use in threading vital components required in the munitions industries. It provides a means for accurately and rigidly supporting the work piece during the threading operation.

The fixture provides a work alignment arbor on which the work is retained by a collar which fits a square, milled close to the end of the arbor. A lever-operated cam arrangement at the rear end of the arbor provides a means for drawing

and locking the work piece upon two driving and locating pins.

The fixture is fastened to a face plate which bolts to the machine carriage in

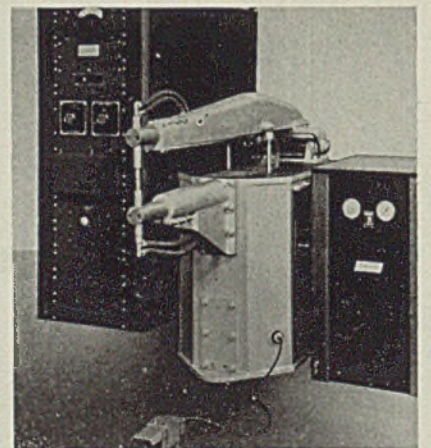


place of the conventional carriage front or vise. It has both horizontal and vertical adjustment of the carriage to assure accurate and permanent alignment of the work piece with the center of rotation of the threading unit.

## Rocker-Arm Welder

Progressive Welder Co., East Outer drive, Detroit, is offering a new line of rocker-arm welders for stored energy resistance welding. Designed for welding of aluminum, welders in the line feature a retractable stroke of 9 to 12 inches, depending on throat depth.

The welding stroke has a range up to a maximum of 3 inches. Rigidly locked yet slidable upper and lower arms may be adjusted in and out for throat depth, or may be turned for angle mounting



of electrodes.

Differential action double air cylinders are used for the welding stroke, the cylinder for the return stroke being smaller



# New SOUTH BEND TURRET LATHES

FOR SECOND OPERATIONS  
ON SMALL PARTS

Designed for the rapid machining of small duplicate parts, the new Series 1000 South Bend Turret Lathes are especially adaptable to second operation work. Their speed, accuracy and versatility make possible rapid production without sacrificing efficiency or precision.

Features that contribute to the versatility and efficiency of these lathes are the smoothly operating handlever bed turret, the handlever cross slide with double tool blocks, the compound cross slide with power longitudinal feeds and power cross feeds for the universal carriage, forty-eight precision thread cutting feeds driven by a lead screw, and a wide range of spindle speeds.

The handlever bed turret indexes automatically on the return stroke and is equipped with an adjustable feed stop for each face. The handlever cross slide has adjustable stops for both the front and back tool blocks. Standard extras simplify tooling this lathe for war production and make it easily convertible to other work when peace comes.

## Series 1000 Turret Lathes

The Series 1000 Turret Lathes have a  $1\frac{3}{8}$ " spindle hole,  $10\frac{1}{8}$ " swing over bed, and 1" maximum collet capacity. They are made in bench and floor types—with or without coolant equipment. Standard equipment includes quick change gear box, power feed universal carriage, handlever cross slide, compound rest cross slide, and handlever bed turret. Standard extras (not included in prices of lathes) include 4-way turret tool block, tailstock, collet attachment, taper attachment, thread dial indicator, and micrometer carriage stop. Write for Bulletins 1002 and 1004 which contain complete information and specifications.



SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA

Lathe Builders for 35 Years



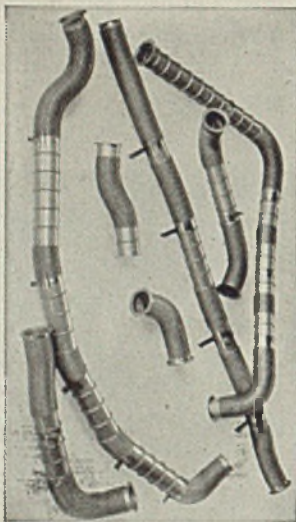


# In War Time, It's . . .

# FLEXPEDITE

★ Achieve design flexibility, conserve vital materials, speed conversion, assembly and production by utilizing flexible metal connections—specifically..

## REX Flexible METAL HOSE



Units Shown are Typical  
Vari-formed Assemblies.

The many production types of REX Flexible Metal Hose offer the widest range of adaptability—for simplifying re-design problems where space limitations and flexibility are imperative—for conserving more critical materials—for solving every kind of fluid and gas handling problem.

REX Flexible Metal Hose speeds manufacture by facilitating assembly. It can be bent to position or "snaked" into place and coupled in a fraction of the time required to fit multi-plane pipe connection. Easily attached fittings for every requirement. REX Flexible Metal Hose withstands severe flexing and vibration. All in the interest of war time economy.

### FLEXPEDITE YOUR PRODUCTION

Write for data and engineering recommendations on specific problems involving flexible connections.

REX-WELD Corrugated Flexible Metal Hose • REX-TUBE Interlocked Flexible Metal Hose  
REX-FLEX Stainless Steel Flexible Tubing • AVIOFLEX Oil Line Hose • CELLU-LINED Hydraulic Hose

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## CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS

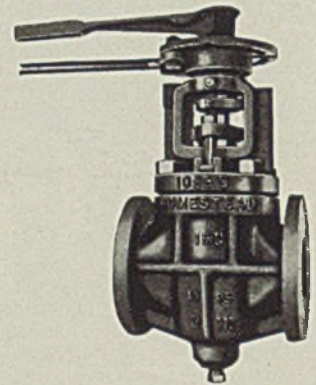
Factories: Maywood and Elgin, Ill.

than that for the pressure stroke. As a result, air pressure can be maintained continuously in the return stroke cylinder, insuring prompt point opening after completion of the weld and automatic discharge of the transformer secondary through a short circuiting gun.

Point dressing is accomplished by simply exhausting the return stroke of the air cylinder by means of a 3-way hand valve. According to the company, this new line is being offered with the new Revers-O-Charge capacitor discharge controls as well as Frostrade refrigerating units for below-freezing welding.

### Plug Valves

Homestead Valve Mfg. Co., Coraopolis, Pa. announces a new line of Lever-Seald plug valves for 150-pound working pressures. Face to face dimensions of each valve in the line are the same as those of corresponding size of wedge-



gate valves. Thus they are interchangeable with wedge-gate valves, without piping changes.

Other features include "quarter-turn" operation, and a powerful leverage to provide positive, extra-easy opening or shut-off under all conditions. Sizes being offered range from 1½ to 10 inches, in either semi or all steel.

### Turret Lathes

Jones & Lamson Machine Co., Springfield, Vt., has introduced two new saddle type turret lathes—a No. 9A machine with a maximum round bar capacity of 3¼ inches and swing of 23½ inches over the way cover, and a No. 10A machine with a maximum round bar capacity of 5 inches and swing of 27½ inches. These embody labor and time-saving features.

Notable among these features is the power traversing of the saddle and power indexing of the hexagon turret both operated by one lever through which both high and low positive traversing speeds can be obtained. This feature has allowed the No. 9A and No. 10A machines to be provided with particularly heavy walled turrets that al-

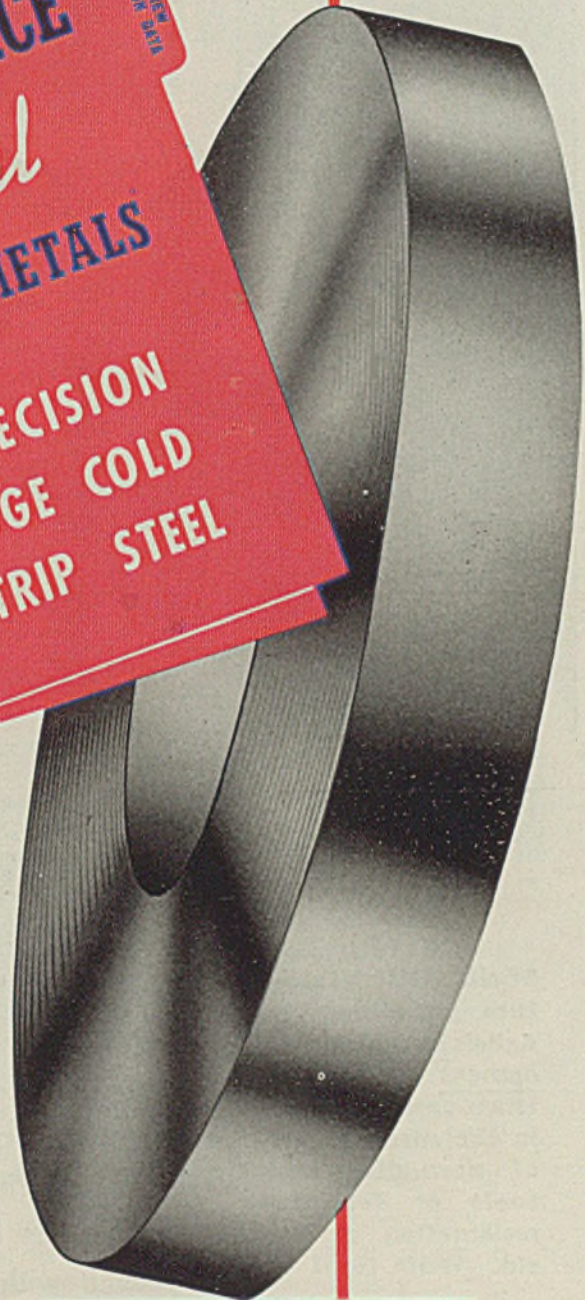




**THE RIGHT ANSWER  
 — RIGHT AT YOUR FINGERTIPS**

No — CMP doesn't have a standard type of cold rolled strip steel to replace all light gauge non-ferrous metals. Nor can we furnish you an illustrated piece of literature telling of the interesting accomplishments — war equipment case history material for publication is banned by censorship. But here in our files and among our experienced personnel, we may have information available on this question which would be the answer to your problem.

Already important applications of CMP precision light gauge strip steel are meeting essential physical characteristic requirements of metals formerly used, and helping to provide the increased production necessary to help speed victory. Don't wonder whether CMP could assist you in your metal problem—call Youngstown 4-3184 right now and learn the facts.



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Subsidiary of The Cold Metal Process Co., Youngstown, O.

**LET'S ALL  
 HELP TODAY**

*Get in the  
 Scrap!*



**RELIABILITY**  
ON THE  
**WELDING LINE**



*MEANS*  
**VICTORY**  
ON THE  
**FIRING LINE**

**Specify AGILE ELECTRODES**

SEND FOR literature pertaining to Agile's Newest Development - Electrodes that can be used in the manufacture of new dies and tools or for the reclamation of the old. Write Now!

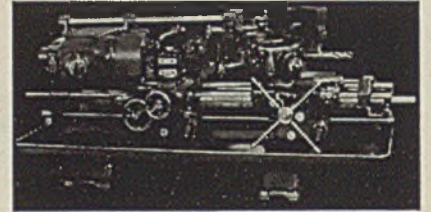


**AMERICAN AGILE Corporation**  
5806 HOUGH AVE. · CLEVELAND, O.

Step-up your war output with the use of reliable Agile Electrodes. They give you maximum weld metal deposit, efficient handling and smooth performance. The fighting forces demand the best of material. Weld it with the finest electrodes obtainable.

low bigger than normal boring bars to be supported without need for pilots.

Another predominating feature is the massive design of both these machines. The bed is of double-wall box-ribbed design, and is 17 inches across the ways on the No. 9A machine; and 20 inches across the ways on the No. 10A ma-



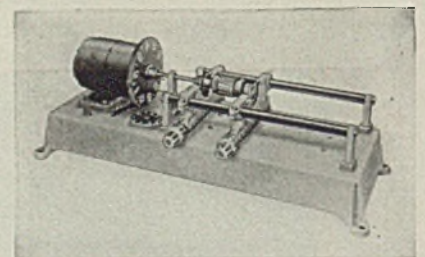
chine. The heavy-duty headstock is provided with antifriction transmission and spindle bearings throughout.

Another time-saving feature of these machines is the built-in power rapid traverse for the bridge-type carriage and cross slide. This has an all-gear drive and is operated by a single lever, through which all four movements of the carriage and cross slide, or a combination of these movements can be obtained.

Single-lever speed and feed selectors, coolant supplied under pressure directly to the working face of the hexagon turret are other features. Bar-feed mechanism for these machines is power operated. A reversible torque motor controlled by an electric switch actuates the stock feed chuck lead screw through a gear train and either advances or withdraws the stock as required.

### Balancing Machine

Bear Mfg. Co., Industrial Division, Rock Island, Ill., recently developed a Dy-Namic balancing machine embodying a new, sensitive balancing principle which facilitates operation of the machine. The unit eliminates noise and premature wear of shafts, bearings etc. resulting from the excessive vibrations of rotating parts caused by couple action. It reveals whether a static or Dy-Namic unbalance, or both, are present without reversing ends of the body be-



ing balanced.

Illustration shows a model 335 for balancing small armatures, fans, gears, ro-



tors, blowers, etc., weighing from 6 ounces to 20 pounds. Machines are being offered in a variety of models for balancing parts weighing up to 1000 pounds.

### Finger Guard

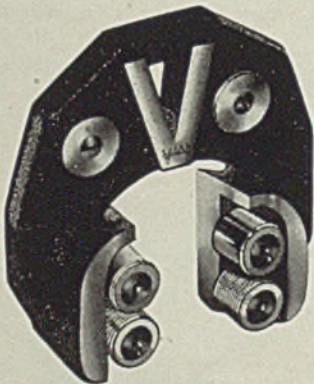
Industrial Gloves Co., Danville, Ill., announces an improved Steel-Grip finger guard for punch press work, sanding, grinding, buffing, assembling,



bling, etc. Feature in this new design is the added leather section over the back of the finger, at the tip end. This is said to assure the operator of protection on the back of the finger, (or thumb) as well as the front.

### Snap Gage

Vard Inc., Pasadena, Calif., announces an improved visual checking gage said to speed up production inspection. It



may be used flush against a working shoulder to check the pitch, thread form angle, and lead of the work to be inspected.

The gage features precision rolls ground from special tool steels, fitted with eccentric pins for adjustment to precision size—to compensate for wear and allow variable tolerances. The new

# ROEBLING Wires

## ROUND . . . FLAT . . . SHAPED

A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION

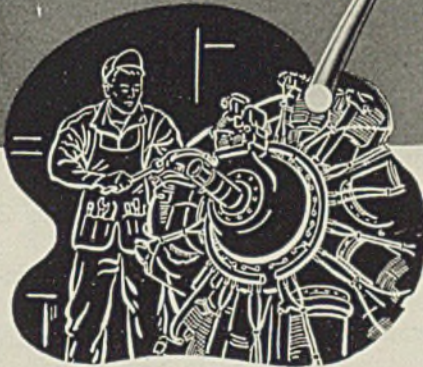
**WAR ORDERS SPEEDED BY THE WIRE PRODUCTION BOARD**

FLAT WIRE TO SPECIFICATIONS

SHAPED WIRES

STEEL, BRASS AND COPPER  
AIRCRAFT ENGINE SAFETY WIRE

The advertisement features a large illustration of wire production machinery, including a worker operating a machine. A red sign is placed over the machinery, and various types of wire are shown, including flat wire, shaped wires, and coils of wire.



The Roebling Board of Wire Production Strategists can save you hours of precious time by delivering wire that is *all ready* to be wrapped

into your victory products. For example, a "tremendous trifle" such as the Airplane Engine Safety Wire that prevents vital fastenings from shaking loose under thousand horsepower vibration.

Making these wires is a specialty. Some call for extremely close control of steel analysis . . . others require brass or copper to exacting "specs", and they *all* require extreme ductility.

Do these specialty wires suggest a short cut to beating your quota? Roebling round, flat and shaped wires have been the prevention of hundreds of "too little, too late" problems where wire is the critical factor. They may be the answer to yours.



**JOHN A. ROEBLING'S SONS COMPANY**

TRENTON, NEW JERSEY • Branches and Warehouses in Principal Cities



model has a strengthened frame and convenient machine pads for bench setups.

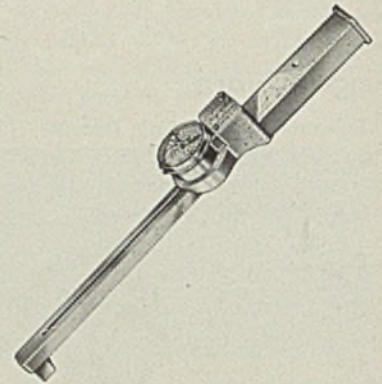
### Enameled Reflector

Westinghouse Electric & Mfg. Co., Lighting Division, Edgewater Park, Cleveland, announces a new porcelain enameled high bay reflector for general lighting of medium and low bay areas in foundries, machine shops, power plants, receiving and shipping departments and similar industrial locations. It is designed for either incandescent or high inten-

sity mercury lamps and is available with either the lockite 2-piece quick detachable construction or one piece type for conduit or outlet box mounting.

### Torque Wrench

Apco Mossberg Co., 118 Horton street, Attleboro, Mass., is now offering a new torque wrench in 4 dial sizes. With the four sizes of dials and the calibration range of each limited, dial graduations are larger, more widely spaced. This makes it possible to read them more quickly, and accurately.



inch pounds on an inside scale, second revolution; calibration range 0-600-inch pounds; range 0-1200; range 0-2400 inch pounds.

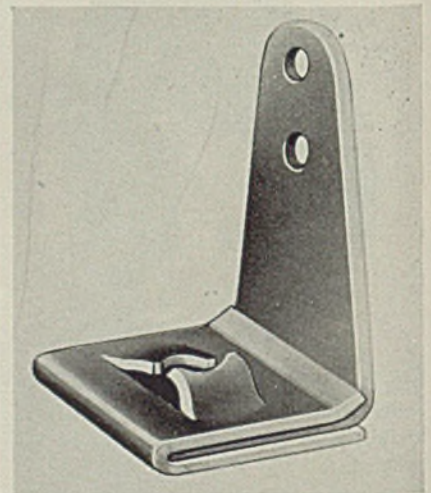
### Blackout Lamp

Sylvania Electric Products Inc., Lighting Division, Salem, Mass., is now offering a blackout lamp designed to provide a quick method of supplying sufficient illumination for ease of movement during blackouts.

Approved by the war department, it is available only on a priority rating better than A-2. The lamp is an A-15 type bulb, coated black except for a 1-inch aperture in the bulb end which emits an orange-red light. Having a 14-watt filament, it is available in two voltage ranges—115-125 volts and 30-34 volts.

### Angle Anchor Nuts

Tinnerman Products Inc., 2039 Fulton road, Cleveland, has introduced new angle anchor Speed nuts for blind, right-



angle attachments. Each fastener combines a standard U-type Speed nut with a cadmium plated angle bracket for right-angle attachments, where access is

**"Yes-BLAW-KNOX builds a complete line of buckets for STEEL PLANT SERVICE"**

"This 2-line hook-on bucket, used where 2 hook blocks are available, is especially advantageous because:

It is a simple, rugged design having few parts—maintenance expense is low.

It is very easy for the crane operator to handle in picking up and discharging loads."

Blaw-Knox can meet your exacting requirements in bucket design. Send us your specification without obligation.

**BLAW-KNOX** BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

*Digging and Rehandling* **BUCKETS**



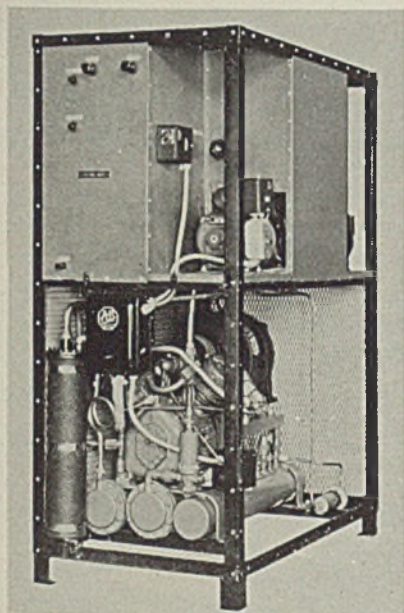
from only one side. It can be used for the attachment of junction box covers, switch box covers, fairings etc.

The fastener also provides the Speed nut with a double-locking spring-tension grip that resists vibration. It is available for use with 6-32 and 8-32 machine screws and 4Z, 6Z and 8Z sheet metal screws and come in 86, 90 and 94-degree angles. Standard shape and rivet hole spacings make them interchangeable with other angle anchor nuts.

### Welding Tip Cooler

Fairbanks, Morse & Co., 600 South Michigan avenue, Chicago, announces a self-contained spot welding tip cooler which circulates a special noncorrosive, nonprecipitating solution through welding tips of a spot welder. Its fast action is said to have made it possible for aircraft plants to increase the number of aluminum spot welds between tip cleanings as much as 1400 per cent.

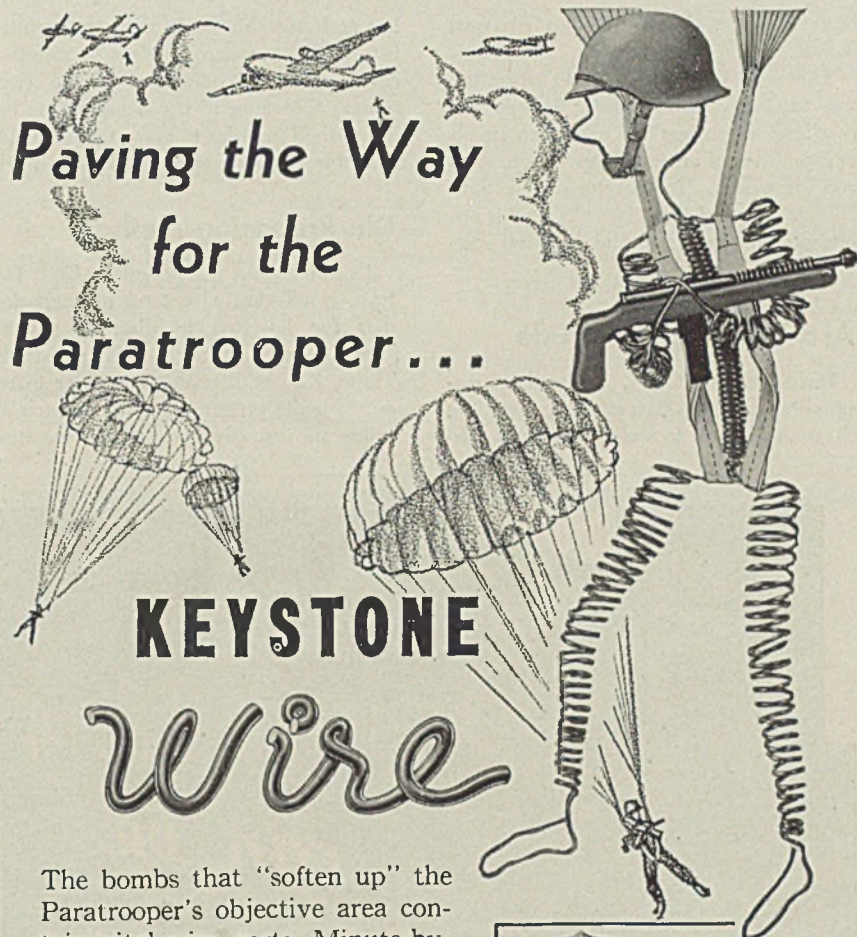
Operating fundamentally as a refrigerating machine, the unit is equipped with



two pumps driven by motors having cycling overload relays. A built-in-one group recirculating pump—operating continuously with the compressor circulates Freon-12 refrigerant through the evaporator for high heat transfer, and a built-in-one turbine-type pump circulates the special solution of high specific heat characteristics from the unit to the welding tips and back to the unit. This pump is controlled by manual switch.

### Four-Lamp Ballast

General Electric Co., Schenectady, N. Y., announces a new 4-lamp ballast for fluorescent lighting of war plants. It will operate four 100-watt lamps, yet

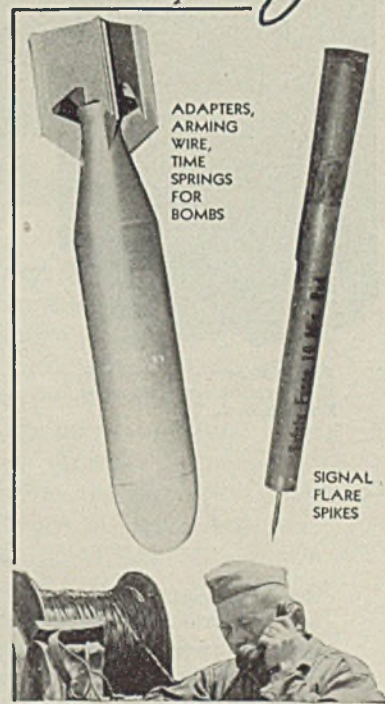


The bombs that "soften up" the Paratrooper's objective area contain vital wire parts. Minute-by-minute contact with supporting forces depends on miles of field, radio and telephone wiring. The very plane which carries him contains almost innumerable construction items made of wire.

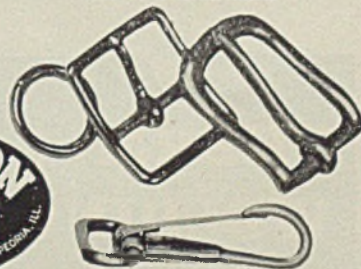
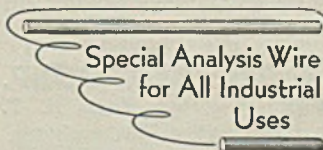
Thus do many thousands of WIRE products play their essential "fighting" roles — in planes, guns, tanks, ammunition — and far behind combat zones, in ships and services of supply.

Victory comes first. To that, the entire production facilities of Keystone are devoted. These facilities are backed by 53 years of wire making experience . . . to help assure the right wire for each job — in war as in peace.

**KEYSTONE**  
STEEL & WIRE CO.  
PEORIA • ILLINOIS



FIELD COMMUNICATIONS





costs no more than a Tulamp 100-watt ballast.

The new ballast is said to open the way to simplified fluorescent fixtures that cost less, weigh less and use much smaller quantities of critical copper, iron, steel and aluminum. It operates over a line-voltage range of 250-280 volts, and is applicable to circuits in the 265/460-volt-Y class.

### Arc Welding Electrode

Harnischfeger Corp., Milwaukee, announces a new Harcraft arc welding electrode for use in welding aircraft tub-

ing and assemblies. It is to be supplied in a complete range of sizes in standard cut lengths. Production of the electrodes, according to the company, is being pushed in order to make them quickly available to plants engaged in war work.

### Die Preparing Method

Detroit Mold Engineering Co., Detroit, is offering a method of preparing dies for injection molding of plastics through use of its D-M-E standards. These, it is said, enable a molder to reduce his die preparation time to such an extent he can advance the starting time

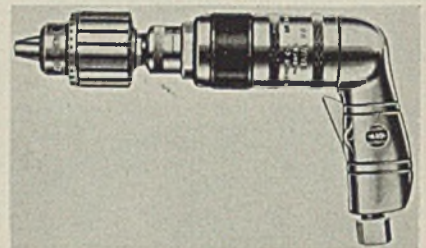
of his production at least a week.

Further saving of time is claimed through reduction of time required for laying out the die design and detailing. A master drawing in heavy line is supplied with each standard. Since this drawing carries all details of the standard, the designing of the base is eliminated and the work of drawing in the cavities is expedited.

Because the design provides rigid support for the back-up plate through pillars, the likelihood of sagging or settling of cavities is eliminated. Leader pins are purposely placed in unsymmetrical arrangement to guard against the possibility of having the parts reversed when put together.

### Pneumatic Drill

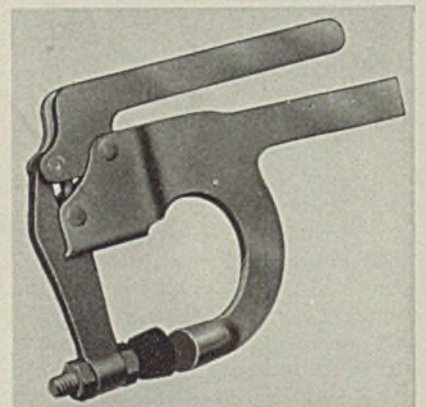
Aro Equipment Corp., Bryan, O., has introduced a new 3/8-inch capacity air



drill suitable for a wide range of jobs for war plants. It is available for both straight and right angle use.

### L-Clamp

Knu-Vise Inc., Detroit, now is offering a new L-Clamp for use in aircraft work to hold L-sections more satisfactorily. It is said to be practical in limited spaces



or where large throat capacity is necessary.

Handles are at right angles to clamping position. The clamp can be put in any position and will not project out into space to act as obstruction. Rubber caps on the contact places prevent slipping and marring of highly polished surfaces.



*Pinion Repaired by Thermit Welding. Risers and Gates Not Yet Removed.*

*Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.*



An interesting application of Thermit welding is the replacement of teeth in heavy pinions, as shown in this photograph. Pinions up to 17 tons have been repaired in this manner and there is no record of the failure of a single welded tooth.

Many difficulties in welding a relatively small part to a very heavy unit are overcome by Thermit welding.

Among the features of the process are special preheating methods and precautions to insure thorough amalgamation of the Thermit steel with the main part of the pinion, especially at the extreme edges of the line of junction, where the greatest strain occurs.

The fabrication of large units is another effective, though more recent, use of Thermit welding. Chief advantages are: elimination of large expensive castings in favor of small forgings or flame cut shapes, no need for positioning or stress relieving, and substantial savings in welding time.

### METAL & THERMIT CORP.

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## Camouflage

(Continued from Page 73)

fleurs have gained constitutes neither professional nor government secrets, for their use belongs to every industry which, in wartime, wants to protect its valuable assets and products for our nation's continued use, through the *passive defense* of concealment.

There is no opportunity to employ mass production methods in the design of camouflage. It is not like a ready-cut home or prefabricated fence that can be bought by the yard and installed according to a page of printed instructions and accomplish its mission equally well wherever or by whomever it is installed. It would be nice if the plant executive could phone his maintenance department and instruct them to order 20,000 square feet of camouflage material and roll it over the factory like a carpet, thus removing his plant from the landscape as far as visibility is concerned.

On the contrary, local conditions of the terrain—for instance, nearness to the seashore, with its change in actinec light—make it necessary for each job of camouflage to be given individual and specialized attention.

### Vivid Imagination Required

The camoufleur or designer is the man who formulates the scheme or manner in which each separate plant is to be obscured. In our opinion, he should be on the spot and familiar with the operations of the factory under transformation. He must understand the manner of living of the people in adjacent territories. He must see with his own eyes traffic problems and points of congestion, and should observe from the air the organic structure in the earth which weaves itself like a tapestry across the map.

Further, the camoufleur must be familiar with the type and construction of buildings surrounding the factory. In our work, we feel we must know what kind of foliage grows in the immediate area—when it is in full leaf—when the branches are naked—when the sun and fog and rain are most likely to bring about the critical condition of exaggerated visibility.

Clearly, all sections of the nation are not alike in soil, topography and foliage. It is impractical for a designer, working in one city, to direct camouflage theory and procedure for defense plants in a variety of local scenery scattered from Seattle to Boston, and from Pensacola to San Diego.

Perhaps among the most important weapons of concealment architecture are color and texture. Use of special paints compounded for low visibility and other factors to be later discussed, plus nets, artificial and natural foliage, earth and a *vivid imagination* combine to render

the most effective camouflage.

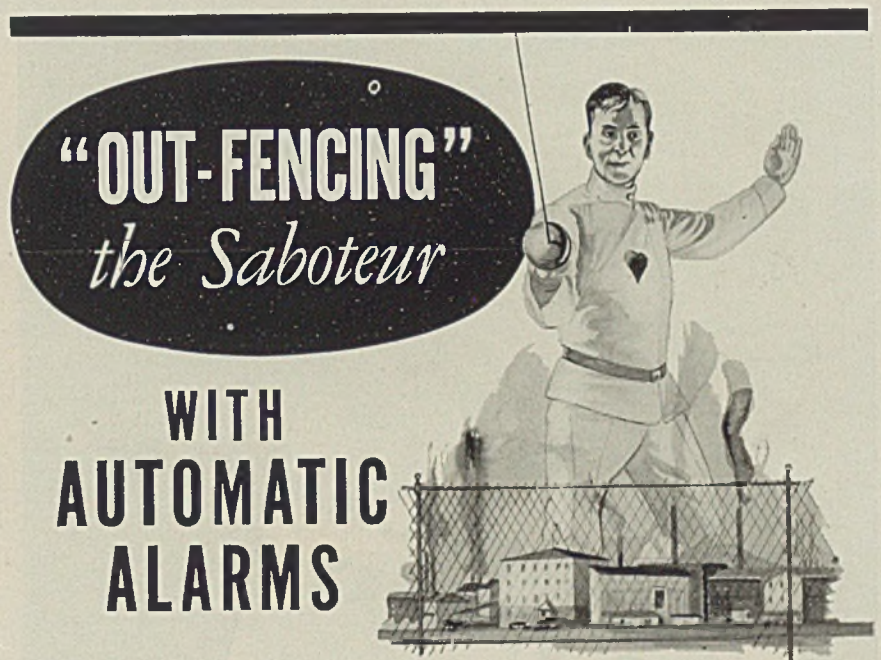
Contrary to prevalent opinion, it is not necessarily the camoufleur's function to hide or eliminate the factory from enemy eyes. One of his most important jobs is to confuse. It would be possible, with sufficient money and time, to hide completely many a plant, but most authorities, in computing the speed of an approaching bomber and the limited time which the bombardier has to find his target, agree that so-called total camouflage is not essential in many instances.

Because camouflage is a three dimensional problem, it is almost universally studied by means of a miniature. This

necessity is dictated by the fact that sunlight and shadow are ever changing and a two dimensional scheme does not solve this telltale factor.

Today when a camoufleur is commissioned to design a "cam job", he immediately confers with local civilian defense authorities, plant owners, adjacent property owners and the Army command. From air photos and sketches he painstakingly builds a scale model of the area, working out his problems thereon. These are sufficiently accurate that their public display would be against the nation's best interests.

However, I was recently commis-



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Neither stealth nor cunning, darkness nor fog, are any longer of aid to the saboteur who attempts entry to important properties and plants protected by wire guard fences equipped with A. A. I. Automatic Alarms. In the modern adaptation of sound detection, safety directors in industrial plants have found a modern, dependable, inexpensive way of "out-fencing" America's enemies of production. With Automatic Alarms any attempt to cross under, over, or through the fence is "heard" by tiny robot sentries, or detectors. These vibrations are converted into both audible and visual signals to give instant warning of danger and direct station guards to the actual zone of disturbance. A. A. I. Automatic Alarm Systems are adaptable to industries large and small, may be installed by plant engineers, and provide utmost protection at minimum cost.

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sioned to build a pair of hypothetical models, from which the photos appearing herewith were taken. These models were prepared for Premier Oil & Lead Works of California, developers of a spectacular infra-red, heat deflecting camouflage paint on which I rely for many effects. Together the models show the scene before, and after, a comprehensive camouflage design has been applied to a factory and its environs.

The center of interest is a large American factory, which we call the Greenhill Mfg. Co. embodying all the buildings to be found in nearly every kind of industry.

This imaginary factory exists on a river. On one side of the factory are main line tracks and rolling tree-dotted hills; on the other, the edge of an average size industrial town. It has various pronounced landmarks including a bridge, dock, slips, parking lots, storage tanks and numerous other reference points.

Across the river is a small town with nearby farms, and a curving highway which is normally used to transport farm produce and tourists rather than industrial trucking.

All the difficult problems that beset a camoufleur have been included in this one example. It is to be hoped that very

few plants would incorporate all of these trying problems.

To camouflage only the factory would not have been intelligent practice. If the enemy expects to find the target in a certain location, he will be suspicious if none is available. He will study photographs more carefully and quickly find the exact location of the hidden plant.

To hide or obscure adjacent reference points even several miles away is as necessary as to do so to the target itself. If the enemy is to be kept from rapidly penetrating our mask, we must resort to area camouflage. In this model, it will be seen that we have taken full advantage of common physical characteristics of the river above and below the actual target.

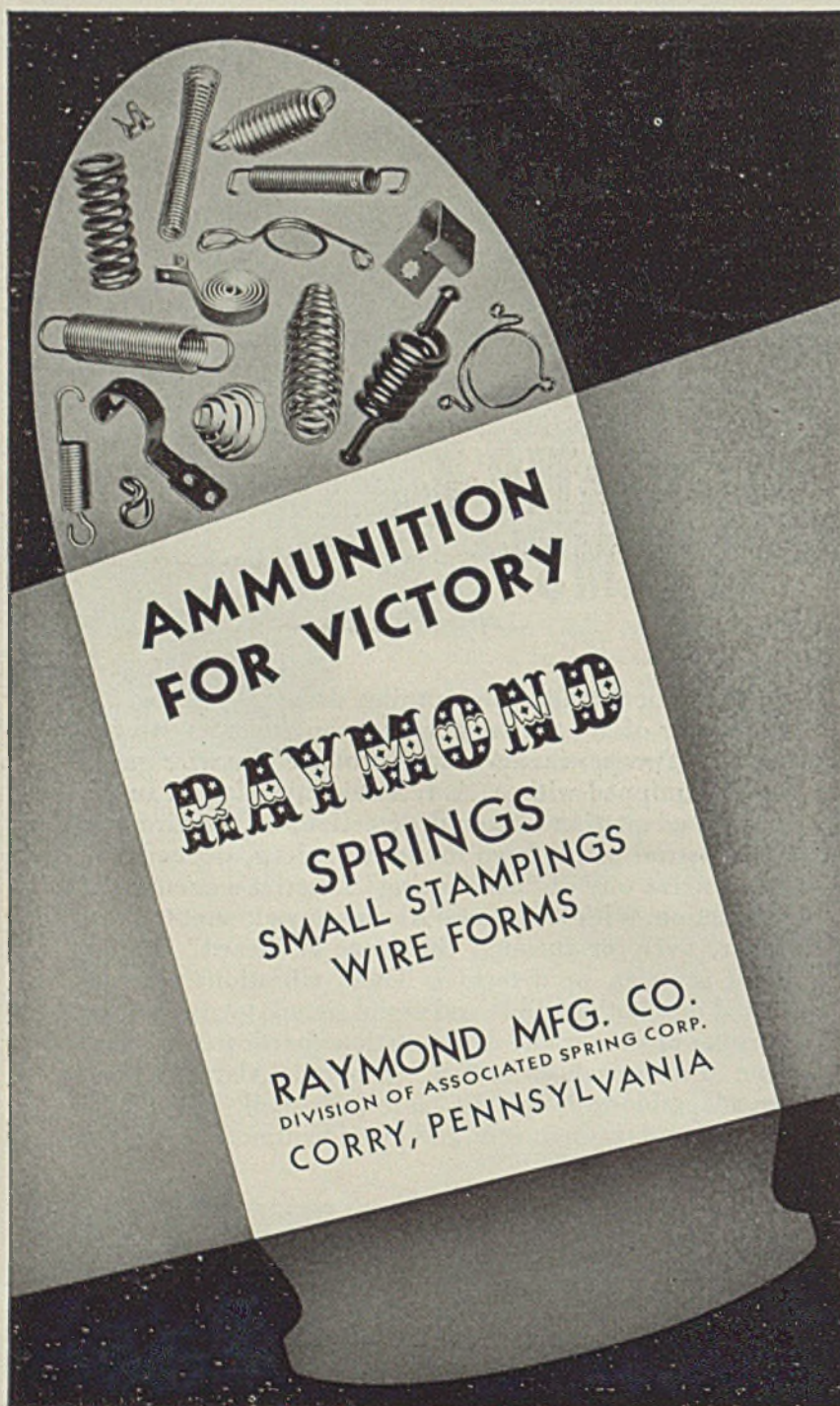
Of course, in a real problem, such total camouflage can only be accomplished with the understanding and co-operation of everyone in the target area. At least 35 per cent of the effectiveness of camouflage depends upon what is known as "camouflage discipline," or the willingness of everyone in the area under observation to abide by a set of rules. These may include such widely varied requests as the prohibition of smoking chimneys; the abandonment of certain roads; the constant maintenance of shine-reducing or glare-reducing properties on railroad tracks and high tension wires; the organization and distribution of traffic at certain hours; the parking of cars according to a preconceived plan; the frosting of certain windows to eliminate sunset and sunrise glare; and hundreds of other inconveniences that may be visited upon the people in the entire area surrounding the target.

#### Not a Job for Paint Alone

In this model, a large portion of the factory—administration building and numerous plant buildings—were "broken up" by painted surfaces having the appearance of smaller buildings from bombing altitudes. The shape and height of smoke stacks were minimized by irregular shaped light wood and cable fins attached about halfway up the stack—painted to blend into the surrounding design.

In dealing with our shadow problem, it can be seen that paint alone is not enough. Paint needs an ally—a three-dimensional structural sun-reflecting and shadow casting ally. Light must be introduced into shadow areas and incidental shadow areas introduced back into light areas.

Long straight persistent shadows cast by rows of buildings must be broken up by these structures. Their construction must be such that only its effect, or visual properties, are visible from the air. Methods of supporting and maintaining these shapes, nets or canopies must not be seen. No matter how clever and how



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# COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" Headquarters for BRASS, BRONZE and COPPER

## Unusual Properties of 70-30 Brass Make It Ideal for Cartridge Cases

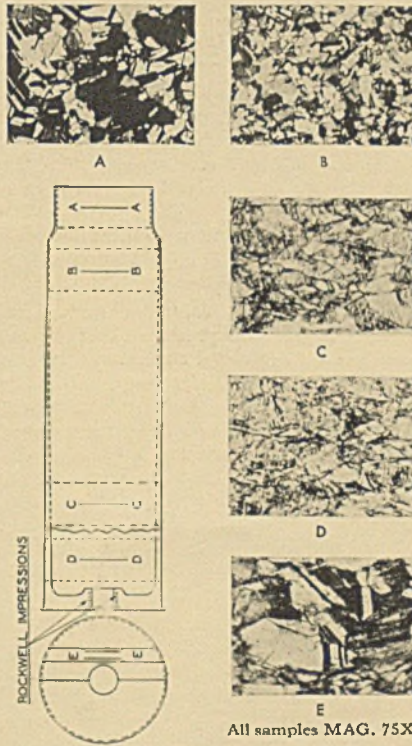
**Can Be Readily Annealed or Cold Worked to Meet The Wide Range of Physical Properties Required**

Because the properties of 70-30 Brass can easily be modified by cold working or annealing to achieve various degrees of strength, hardness and elasticity, this alloy is ideal for cartridge cases, where a wide range of physical properties must be met.

The purpose of a cartridge case is to provide a means of igniting a charge and preventing the escape of gases resulting from the explosive charge. The metal around the primer hole must be sufficiently hard and elastic to make sure that there is no loosening of the primer and no case leakage in the primer hole due to the pressure in firing. The wall of the case must be elastic enough to expand under pressure and make a tight seal against the breech wall of the gun. Unless it is properly supported by the breech wall, the pressure developed by the propellant charge is sufficient to burst any case. The low modulus of elasticity of 70-30 Brass permits the quick expansion of the case to take place without permanent set. When the pressure drops, the case returns to its normal size. These requirements are necessary to produce the gas seal and the easy removal of the case after firing.

The wide range of properties that must be met in making a cartridge case are illustrated in the accompanying drawing and photographs from the paper on "Physical Properties of Brass Cartridge Cases" by R. S. Pratt, Metallurgist for Bridgeport Brass Company, which was presented before the American Society of Mechanical Engineers on December 1, 1941. Section E in the drawing, taken from the base, has a tensile strength of about 52,000 lbs. per square inch. Its microstructure shows the effects of some cold working resulting from the heading operation. Section D, at the base of the shell, has a tensile strength of 101,900 lbs. per square inch and shows a characteristic se-

verely cold worked structure produced from the last drawing operation. Section C has a tensile strength of 96,800 lbs. per square inch and is also severely cold worked. Section B, below the mouth of the shell, has a tensile strength of 53,950 lbs. per square inch and its structure shows a fine grain resulting from the anneal prior to tapering. Some cold working of the structure has resulted from the tapering. Section A, taken from the mouth of the shell, is completely recrystal-



All samples MAG. 75X

TYPICAL SPECIFICATIONS FOR CARTRIDGE CASES 75 MM—M18		ACTUAL SPECIFICATIONS OF SAMPLES SHOWN	
POSITION	MIN. TENSILE STRENGTH LBS./SQ. IN.	TENSILE STRENGTH LBS./SQ. IN.	ELONGATION
A	45,000	52,000	51.6% in 2 in.
B	45,000	53,950	48.5% in 2 in.
C	65,000	96,800	7.0% in 2 in.
D	65,000	101,900	5.0% in 2 in.
E	60,000	62,100	30.0% in 1 in.

lized and has a tensile strength of 52,000 lbs. per square inch.

The ability of 70-30 Brass to meet this wide range of requirements will be seen from the rolling and annealing graphs on this page. In Figure 1, for example, it will be noticed that the tensile strength of 70-30 Brass varies from about 48,000 lbs. per square inch in the soft condition to above 110,000 lbs. per square inch at 80% reduction by cold rolling. In other words, it is possible to more than double the strength of annealed brass by cold working. How the degree of softness of 70-30 Brass can be controlled by varying the annealing temperature is shown in Figure 2. When the alloy is annealed at 350° C., for example, its tensile strength is approximately 58,000 lbs. per square inch, while at 650° C., the tensile strength drops to about 44,000 lbs. per square inch.

It is to be noted that the finished case had been given a relief heat treatment to free it from dangerous internal stresses resulting from previous cold working operation. The relief of these internal stresses prevents the danger of season cracking so prevalent in World War I. This heat treatment is carried out at temperatures ranging from 250° to 275° C., and must be carefully controlled to prevent overheating of the case, with a consequent softening and loss of tensile strength. Such a low temperature heat treatment is difficult to control in an ordinary furnace and for this reason special furnaces of the convection or salt bath type should always be used by the fabricator for relief annealing in order to obtain successful results.

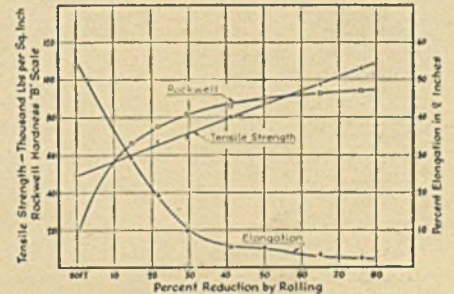


Fig. 1, Rolling curves, sheet Cartridge Brass annealed at 0.100 in. gage—grain size 0.058 mm.

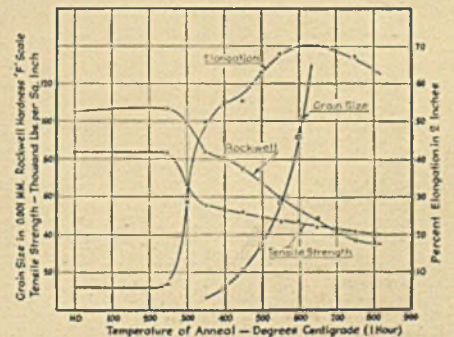


Fig. 2, Annealing curves, sheet Cartridge Brass rolled 50 per cent hard to 0.050 in. and annealed at indicated temperatures.



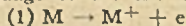
# COPPER ALLOY BULLETIN

## CAUSES OF CORROSION ELECTROCHEMICAL THEORY OF CORROSION

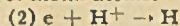
This is the first of a series of articles by C. L. Bulow, research chemist at Bridgeport Brass Company, discussing some of the fundamentals of corrosion as applied to numerous common failures occurring in various types of services. An extended discussion of the various factors influencing corrosion rates will show how complex the problem is, and on the other hand, may suggest the solution to a troublesome corrosion problem. It is hoped that readers will find this information helpful.

Since 1900 a steadily increasing amount of research work has been applied to the study of the fundamentals of corrosion. This work has shown that the basic phenomena are the same for all metals and alloys.

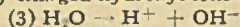
These fundamentals are the same as those which are used to describe all chemical reactions, namely the attraction and repulsion between electrically charged particles (atoms) such as in electroplating, storage batteries and dry cells. All metals when placed in water, or a water solution of an acid, base or salt, which can conduct electricity, have a tendency to dissolve at the surface in contact with the water as electrically charged atoms called "ions." Each atom of metal (M) in dissolving forms a positively charged metal ion ( $M^+$ ) and gives up one or more negatively charged electrons (e). This reaction in the language of the chemist becomes:



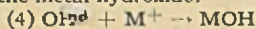
The electrons which are released immediately react with an equivalent number of positively charged atoms of hydrogen ( $H^+$ ) which form an invisible layer of neutral hydrogen atoms and thus replaces the dissolved layer of metal atoms:



These hydrogen ions were formed by a slight dissociation or break up of water into positively charged hydrogen ions ( $H^+$ ) and negatively charged hydroxyl ions ( $OH^-$ ):

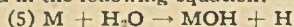


The negatively charged hydroxyl ion is attracted to the positively charged metal ion to form the metal hydroxide:



which also deposits on the metal surface.

The sum of these four reactions is expressed in the following equation:



If the metal is left in the water solution long enough the metallic hydroxide film becomes visible (for example rust). This in-

(Continued in column 2)

## Bronze Welding Advised For Rebuilding Pistons

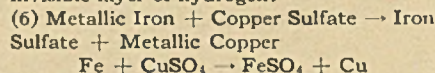
Because it is easily applied with a minimum of heating and easily machined, bronze welding rod is particularly suitable for the rebuilding of worn pistons. The usual temperature ranges found in industrial reciprocating equipment generally range from 300 to 400 degrees F.—well below the point at which the bronze weld metal loses strength. Furthermore, less preheating is necessary which reduces the possibility of warping.

Good results in this type of work are being obtained with Bridgeport Brass Bronze Welding Rods because of their purity, reliability and uniformity. They may be used on all cast iron, steel, and bronze work. For further information, write today for a free copy of Bridgeport's new manual on bronze welding alloys.

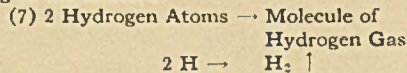
### CAUSES OF CORROSION

(Continued from column 1)

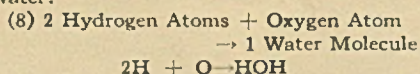
tangible displacement reaction (5) is similar to the familiar displacement reaction which occurs when a piece of iron immersed in copper sulfate becomes coated with a thin visible red layer of copper instead of the invisible layer of hydrogen:



When the more active metals, such as lithium, sodium and potassium are placed in water the hydrogen appears as bubbles of gas rapidly rising from the surface of the metal, instead of a film of hydrogen according to the reaction:



The less active metals, such as iron, nickel and copper generally produce a thin layer of hydrogen on the metal surface and seldom produce bubbles of hydrogen gas. The formation of this hydrogen film greatly retards the corrosion process and if it is not removed no chemical change or corrosion is apparent. However, if oxygen is supplied, the oxygen will react with the hydrogen to produce water:



The removal of the corrosion product hydrogen by reaction (8) permits the reaction (5) to continue until the oxygen, water or metal is completely consumed.

(The discussion of these reactions will be continued in this column next month)

## NEW DEVELOPMENTS

A liquid germicide for use in cutting oils has been developed to protect the worker. Application of 4 oz. in 55 gal. of cutting oil makes a 1 to 5,000 solution of p-tertiary amyl phenol that is said to destroy germs but not be irritating, corrosive or poisonous. (No. 380)

A tool stand to hold micrometers or snap gages without damage to the finish of the frame has been announced. It is said to permit faster work in checking parts because the operator, instead of holding the gage in one hand, has both hands free to handle the work. (No. 381)

A polishing disc lubricant is available which is said to increase disc lift from 25 to 33 per cent when applied sparingly to abrasive discs used on flexible shafts or on disc grinders. It is further claimed that the metal is not burned or discolored by overheating, cutting qualities of the abrasives are not retarded, and a finer, softer and more satin-like finish is obtained. (No. 382)

Inspection magnifiers have been developed for use on close inspection, parts assembly and precision machining operations. In three of the models offered, the head is balanced to bracket to permit use over a wide bench area. One of these models has a five-inch lens, one a four-inch lens and one has both of these lenses adjustable to focus. A fourth model, designed for precision machining applications, has a five-inch lens, is fitted with safety lens and is equipped with universal brackets. (No. 383)

A new cutting oil has been put on the market which is claimed to have greatly increased penetration, cooling power, film strength and "wetting" ability. Used alone or in combination with other oils, the maker says tools bite deeper and cut faster without creating excessive heat. (No. 384)

An angle type drill has been built especially for high speed drilling in difficult-to-reach, relatively inaccessible spots. It is said to remain cool even after prolonged operation. The overall length of this tool is 5 1/4 inches. The nose spindle is fitted with 10-32 thread and is available only in a 90-degree model. (No. 385)

A paint has been developed which is said to combine the hiding power and economy of water-type paints with the washability, durability and performance of oil-type coatings. The maker says it primes, seals, and finishes on any interior surface in one coat. It may be applied to plaster, concrete, brick, wallboard, wood, wallpaper and metal surfaces. The product is further said to be self-leveling, to set within two hours, to dry within 12 hours and to provide a dead-flat finish. (No. 386)

A precision plumb-bob is offered which features the use of phonograph needles to assure a true and constantly sharp point at practically no replacement cost. The needle is held by a watchmaker's pin chuck. (No. 387)

This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.

## PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

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**COPPER WATER TUBE**—For plumbing, heating, underground piping.

**DURONZE ALLOYS**—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; hot rolled sheets for tanks, boilers, heaters, flues, ducts, flashings.

**BRASS, BRONZE, DURONZE WIRE**—For cap and machine screws, wood screws, rivets, bolts, nuts.

**FABRICATING SERVICE DEPT.**—Engineering staff, special equipment for making parts or complete items.

**BRASS AND COPPER PIPE**—"Plumrite" for plumbing, underground and industrial services.



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# BRIDGEPORT BRASS



real a forest may look, a photographic interpreter is on the lookout for telltale signs that will reveal man-made construction.

The type of construction, of course, must be cheap, fire-proof, water-proof, and wind-proof. It must be light weight and have a certain amount of elasticity. Hard-boiled construction looks static and stiff from the air. Pliant circus tent construction, moving a little in the breeze, is more desirable.

This construction must also be designed with a view toward maintenance. If our war continues longer than optimist say, it may be necessary to renew our paint from time to time. And, of course, we have the changing seasons which in some climates present a continuous maintenance problem.

The appearance of forested areas in the camouflaged model are accomplished through nets and flexible wire mesh on which is laced and draped colored tattered cloth and kindred material, known as garnish, and the whole painted according to a pattern.

#### Colors Play Important Role

In an effort to make a flat surface take on protuberances and depressions, I find it helps to take advantage of the high and low visibility property of certain pigments. It is not done by contrasting values alone, but by the use of colors and shades of widely separated specular visibility. Brilliant primary colors of high visibility used next to background colors of olive drab and grays, will seem to pop or stand out giving the appearance of relief. This can be seen in studying textile designs of indifferent color choice. Often you will find bad combinations of colors which result in optical vibration and an erroneous conception of depth and dimension. Careful study of this phenomenon enables the camoufleur to simulate structures in relief on a perfectly smooth surface without resorting to tricks of perspective which are effective under some conditions and from certain view points but are completely in error from another.

The combination of deception, removal of shapes and substitution of others, alteration of appearance of highways, bridges, and parking lots—all were accomplished in this model without hindering the normal production of the plant or flow of surrounding traffic.

Of course, there are all degrees of camouflage besides the costly total camouflage which these models demonstrate. There are numerous places where the train and highway sheds included here, and necessary to continue the forest design, would not be practical. Yet, primary camouflage with paint alone is frequently considered enough to confuse the approaching bomber until an antiaircraft barrage can come into play.

No single mechanical consideration is

more important to the camoufleur than paint. For no matter how successful our camouflage hides the plant from the bombardier's eyes, one must remember that he is equipped with highly technical photographic apparatus which is designed to penetrate paint and net camouflage.

It does this by means of color filters and infra-red film, which betray man-made and man-painted imitation vegetation and other surfaces.

To overcome this weakness, alert paint manufacturers in America's paint industry have been on the job. Today,

we have camouflage paints that react to all known photographic and sensitometer tests precisely as does natural foliage. This one advancement in technology has been an immeasurable aid to camoufleurs throughout the land.

These new infra-red reflecting properties have also increased the durability of paint as well as to reduce the inside temperature of the object painted as much as 15 degrees when compared with the same color in ordinary paint.

Perhaps I should explain a little more about what we have learned to require of camouflage paints. Frankly, its tech-

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Ahlberg Engineering Help**

**D**ESPITE TODAY'S ABNORMAL CONDITIONS, **AHLBERG ENGINEERING SERVICE** is being maintained as usual. Bearing specialists are available in all 23 branches to help you with your immediate bearing problems.

In addition a definite part of Ahlberg Engineering Service is the assistance to bearing users in preparing for alteration of designs and the development of new products with a view to future conditions when new bearings are once again available for normal uses.

It is Ahlberg's desire to make all its facilities available for the needs of peace as well as for the immediate problems of war.

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nical requirements are such as virtually to nullify the camoufleur's efforts if they are not met. The architecture of concealment is worthless if it interferes with the normal production capacity of the plant to which it is applied. This means more than merely avoiding fastening nets and fabrics where they will be tripped over—it means retaining as pleasant working conditions as possible by specifying a heat-resisting camouflage paint to replace the gleaming aluminum paint widely used to deflect heat.

Responsibility of the executives and management of American industry is clear. They must see that America's

equity in their business is protected. Too often after reading the morning paper about how clever the Japs or the Nazis have been in concealing and protecting their centers of production, we mistakenly condemn our own Army command or civilian defense officials for lack of foresight in protecting ours.

Camouflage is like a dike. Its purpose is to keep the river of destruction away. Cairo, Ill., does not resent the cost involved in building her huge levees, because every spring she sees the water level above her housetops held back only by twenty yards of dirt and concrete.

Cairo didn't build her first levee until

she had been desolated by flood at least twice. Let's not wait to start thinking and acting camouflage until we have heard and felt enemy bombs. Then it might be too late.

## GE Turns Out Instrument Jewels Automatically

V jewels, those glass substitutes developed recently by General Electric for war scarce sapphires used in millions of delicate indicating instruments, soon will be "clicking" out on a completely automatic basis on forming machines due to a recent improvement now being installed.

Development of the jewels, according to J. H. Goss and F. K. McCune, engineers at one of GE's New England plants, was spurred by demand of miniature indicating instruments for use in wartime fighting and industrial control equipment. Moving parts of these instruments are of watch size and delicacy, each requiring two cup-shaped jewels comparable in size to the head of a pin. In the flat top of each jewel is a V-shaped depression in which a cone-shaped steel pivot rotates. And the radius of each depression measures about three to four thousandths of an inch.

Before the war, American demand for the jewels was supplied chiefly by Swiss craftsmen who cut them from natural or synthetic sapphires. Uncertainty of wartime shipping and lack of mass production methods led the GE laboratory to develop the glass jewel as a substitute. By this development a special type of glass is fused and formed into miniature jewels by a secret mass production process which can yield millions of glass jewels yearly.

## New Quenching Oil Aids Steel Output

Super-Quench, a new quenching oil reported to have a faster cooling rate than any known quenching oil was exhibited by Gulf Oil Corp., Pittsburgh, at the National Metal Show in Cleveland recently. Its cooling rate is said to be intermediate between other oils and water through the hardening temperature range, yet retaining the slow speed of other oils below the hardening temperature range.

"We know by tests and by the use already made of this oil that it is an exceptional product," a Gulf technologist said. "On some steels it gives results that are almost miraculous. It makes it possible to utilize steel with less alloy content without any decrease in durability."

In one plant, it was stated, the new oil was instrumental in speeding up of the production of shell by almost 25 per cent.

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## Low Tin Alloys

(Continued from Page 85)

**Soldering and White Metallizing**—All the alloys under review are soldered readily and white metallized.

**Brazing and Welding**—Brazing by the usual methods should be quite successful with all the gunmetals mentioned.

Welding operations on gunmetal are difficult to conduct due to the extreme heat fragility of the alloy and the production of zinc fume. Satisfactory results are most likely to be obtained by the use of the metallic arc process, using phosphor bronze type electrodes, as made by the leading electrode manufacturers, in conjunction with preheating.

### Quality of Casting a Factor

With these electrodes 88-10-2 and 88-8-4 should give good results in "building up" or repair welding. In the case of gunmetals of the 86-7-5-2 and 85-5-5-5 types welding operations become increasingly difficult and it may be more practical to adopt oxy-acetylene brazing methods, using filler rods of the Sif-Bronze type. The carbon arc process could also be employed in many cases, using phosphor bronze filler rods, containing 3 to 10 per cent tin and about 0.3 per cent phosphorus. Again, alloys 88-10-2 and 88-8-4 should give fairly good results, but 86-7-5-2 and 85-5-5-5 types will be more difficult. In general, the success of the process depends to a large extent on the soundness of the castings, gassy castings being almost impossible to weld without the production of gassy welds. The high thermal conductivity of gunmetals frequently renders the oxy-acetylene welding process difficult.

**Applications**—Examples of suggested applications for the modified gunmetals are outlined in Table XI.

### Part 2—Cast Brasses (Types A and B)

**Mechanical and Physical Properties**—The mechanical properties at room temperature are included in Table V. Cast brasses types A and B are not recommended for use at elevated temperatures and there is no published data available of their mechanical properties. The general remarks on mechanical properties at sub-zero temperatures given for gunmetals can be applied to the cast brasses. The effect of low temperatures is not likely to cause any serious change in mechanical properties, apart from some reduction in ductility. For their general physical properties see Table VIII.

In general, the corrosion resistance of these alloys in sea water is not quite so good as the gunmetals, but in contact with petrol or fuel oils containing sulphur their resistance is much greater. Care must be taken when applying the

cast brasses to industrial applications to prevent the possibility of "dezincification" arising. This is best avoided by the use of alloys containing not more than 20 per cent of zinc and in addition the presence of at least 0.03 per cent of an inhibitor, either arsenic, antimony or phosphorus.

Lines<sup>a</sup> recently established corrosive conditions that resulted in complete "dezincification" of 0.35-inch diameter plain 70-30 and naval brass rod in a period of 10 weeks. Under similar conditions the same alloys, modified by about 0.03 per cent of arsenic, antimony or phos-

phorus, did not dezincify nor did corrosion progress along the grain boundaries.

The test results on the uninhibitive naval brass are of interest. It is fairly well established that the 1 per cent of tin associated with this alloy is a retardant of "dezincification." The results of Lines' work are in agreement with this statement when temperatures around 70 degrees Fahr. are involved. At 150 degrees Fahr., however, it was found that tin was without influence on the rate of the dezincification reaction. Dezincification is encountered with

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corrosive water supplies in plumbing work with alloys such as muntz metal, containing 60 per cent copper, 40 per cent zinc, and with brasses containing 67 per cent copper, 32.5 per cent zinc, 0.5 per cent lead. It is particularly serious at hot water temperatures, resulting in some cases in very short life of the installation. In condenser tube applications for marine power plants and the oil industries, dezincification occurs with naval brass containing 70 per cent copper, 1 per cent tin and 29 per cent zinc.

In view of the foregoing remarks,

it will be advisable to utilize cast brass, type A, for those castings required to resist corrosion, keeping composition as far as possible to the 80 per cent copper end of the specification, and to include preferably 0.03 per cent phosphorus, as an inhibitor. The presence of around 1.0 per cent tin will also be of benefit in minimizing corrosion. Cast brass, type B, should be reserved for applications not subject to corrosion or where a protective coat of paint can be readily applied.

*Founding Characteristics*—Cast brass, type A, has good castability, and is not

difficult to handle in the foundry. It is suitable for small pressure work and the best results are obtained in this direction at the 80 per cent copper end of the compositional range. The presence of tin and lead assists the production of sound castings, but care must be taken to exclude aluminum so far as possible. Over 0.01 per cent of this element will produce excessive porosity. The production of brass castings also entails the use of more permeable molds than used for gunmetal, particularly as regards green sand work. Gating and feeding methods required are similar to gunmetal.

#### Danger of Brittleness Present\*

Cast brass type B, is more difficult to handle, particularly as the 62 per cent copper end of the compositional range is approached. As most of the supplies of this material will be obtained from scrap, it is possible that manganese will also be present from time to time, and it will, therefore, be advisable to handle this alloy in the foundry along similar lines to manganese bronze, taking the precaution of providing heavier gates and riser than one would normally allow for gunmetal. The presence of maximum tin and aluminum contents allowed will tend to aggravate troubles due to the above and promote brittleness.

Test bars taken from production melts by the Phosphor Bronze Co. Ltd., gave the results present in Table XIII.

A guide to suitable pouring temperatures is given in Table XI.

Patternmakers' shrinkage will vary from 3/16 inch per foot for cast brass type A, up to 1/4 inch per foot for type B.

*Machinability*—The machinability of both types A and B cast brass is excellent.

*Soldering and White Metallizing*—Both the cast brasses under review are readily soldered and white metallized, even with the maximum allowed aluminum content of 0.25 per cent.

*Brazing and Welding*—Brazing by the usual methods should be quite successful except in the case of type B brass, when considerable care will be necessary when the copper content is at the low end of the range and a high melting point brazing spelter is used. Welding operations conducted on the cast brasses should give little trouble with the oxy-acetylene process, using an oxidizing flame and brass filler rods of the Sif-Bronze type. Electric welding is not recommended.

*Applications*—Examples of suggested applications for cast brass, types A and B, are given in Table XII.

#### References

\*H. J. French, S. J. Rosenberg, W. Le C. Harbaugh and H. C. Cross "Wear and Mechanical Properties of Railroad Bearing Bronzes at Different Temperatures," *Journal of Research*,



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Research Paper No. 13, U. S. Bureau of Standards, Vol. 1, September, 1928.

\*H. J. French and M. E. Staples, "Bearing Bronzes With and Without Zinc," *Ibid*, Vol. II (R.P.68), June, 1929.

\*L. W. Spring, "Some Considerations and Tests for Cast Materials for High-Temperature, High Pressure Service." Proc. Institute of British Foundrymen, Vol. XXIV, 1930-31, p. 239.

\*W. C. Stewart, American Society of Naval Engineers, 1938, Vol. L, p. 107.

\*J. W. Bolton, Proc. American Society for Testing Materials, 1935, Vol. XXXV, Part 2, pp. 204-217.

\*"Rules for Construction of Unfired Pressure Vessels," Section 8, A.S.M.E. Boiler Construction Code, 1940 edition.

\*J. Strauss, "Metals and Alloys for Industrial Applications Requiring Extreme Stability." Transactions of the American Society Steel Treating, 1929, Vol. XVI, p. 191.

\*W. Lines, "Prevention of Dezincification," *Metal Industry*, Oct. 31, 1941.

This is the second part of the Reports on Low-tin and Tin-free Bronzes and Brasses prepared by members of the Nonferrous Subcommittee of the Technical Committee of the Institute of British Foundrymen and presented at its thirty-ninth annual conference held in London on June 20. The first part of the report on silicon bronze alloys appeared in the September issue.

The Editors.

## Rotor Tool Co. Promotes Tool Conservation

Following a plan similar to that recently developed in connection with air-driven grinders, buffers, sanders and drills, Rotor Tool Co., Cleveland, now has set up a comprehensive "Keep 'Em Working" campaign covering high-cycle electrically-riven portable tools.

Basic materials of the campaign consists of an 18 x 24-inch poster and a 12-page 8½ x 11-inch pamphlet. The poster, in color and illustrated by cartoon-type drawings, is designed primarily for instruction of shopmen who use the tools. Its seven "commandments" deal with:

Periodic inspection; lubrication; ball bearings; switches; cable stators; and safety. Under each of these headings brief details are given which enable operators to spot trouble as soon as it develops.

The book, designed for maintenance men and plant electricians, follows the same basic lines as the poster, but goes into considerably more detail as to the mechanical and electrical design of the tools, maintenance records, ordering and installation of parts, electrical testing, etc.

Speaking of the material just described, H. P. Bailey, president, Rotor Tool Co., says:

"We regard these presentations only as effective approach to secure serious consideration of the tool maintenance and conservation problem. We are relying on our own service engineers to really do the job for industry.

"The service men to whom I refer are experts who take off their coats and get right down to business with individual maintenance men—repeating the

story over and over if necessary to drive it home. These men often have to repeat this performance with maintenance men on different shifts and in various departments. In many cases it also is necessary for these men to reach individual operators who are expected to do part of the tool maintenance work themselves."

Full details and material involved in this conservation plan are available from Rotor Tool Co., to company executives, maintenance men and electrical engineers who make their requests on official company letterheads.

## Substitute Adhesive for Grinding Wheels Offered

A new type of adhesive developed as a substitute for glue in facing polishing wheels is announced by Hanson-Van Winkle-Munning Co., Matawan, N. J. Called H-VW-M adhesive, it is used the same as glue.

Since the substitute is ready to use it is not necessary to weigh out ingredients or to dissolve and cook beforehand, but simply heat it and proceed to use it as soon as warm, according to the company.

## AMPCO CASE HISTORIES



The designing engineers of a power shovel increased the service life of bronze bushings used with track rollers 50% or more when they standardized on bronze bushings made from Ampco alloys. Formerly, these bushings were made of ordinary bronze, but after considerable experience under all types of field service, Ampco-made bronzes were found more desirable.

Since the parts in power shovels are subject to grit, dust, and abrasive particles in normal operation, each part must stand up under these severe conditions. The wear-resistant characteristics of Ampco alloys, combined with great strength and hardness, make them especially desirable in this service. Full information sent on request.

### AMPCO METAL, INC.

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## Speed Reducers

(Continued from Page 100)

limited application, but it is widely used as roll drives for transfer tables. It may be direct connected through flexible couplings to the rolls.

The planetary gear arrangement is best suited to motorized drives since the input and output shafts are concentric and the gears occupy a symmetrical, cylindrical space that blends in with the motor. Thus, the complete unit is the same width and height as a standard motor and increases only slightly in

length. Figs. 6 and 7 illustrate the motorized planetary gear unit. The single type shown in Fig. 7 is built in ratios of 4:1 to 11.5:1.

This type unit permits use of high-motor speeds with low-output speeds which result in high-motor efficiency, good power factor at all loads, and reduced space requirement. The overall dimensions of a unit of this type are much less than those of a low-speed motor of the same horsepower and speed. The cost is also lower. Another alternate would be to use a herringbone unit coupled to a motor on a baseplate. The

dimensions and cost of this arrangement also are greater than for the planetary unit. It can be seen that the motorized planetary gear unit is ideal where a quantity of units are to be assembled side by side in a limited space.

The same care in the selection and maintenance applies for the planetary gear unit as for the herringbone gear speed reducers.

In one plant hundreds of the motorized planetary gear units are used on runout tables with ½-horsepower at 850 revolutions per minute alternating-current motors, gear ratio 8.1:1 to give 105 revolutions per minute output speed. The output torque requirements are 20 pounds-foot continuous, 45 pounds-foot starting torque. In another application the requirements are 1 horsepower at 870 revolutions per minute alternating-current motor with 10:1 gear ratio giving 87 revolutions per minute on the output shaft.

### Ideal for Heavy-Duty Jobs

A third type of drive is the worm gear unit. This is popular for heavy-duty work where low speeds and smooth action are required. Fig. 8 shows a standard worm gear speed reducer with the worm at the bottom. Note that the shafts are at right angles. This results in more compact baseplate designs since the motor does not project out opposite the low-speed shaft as in a herringbone drive.

Fig. 4 shows the worm shaft assembly. The bearing at the blind end is designed to take heavy thrust loads in either direction. The bearing at the opposite end is floating, which permits thermal expansion of the worm shaft without cramping the bearings. The oil level is kept up to the center of the worm, which makes the stuffing box necessary.

Fig. 5 shows the gear shaft assembly. This shaft is carried in heavy tapered roller bearings to support any external loads as well as internal gear loads. Note the oil wells for the tapered roller bearings. When the unit is filled, the oil flows into these wells. During operation a constant oil level for the bearings is maintained.

The sliding action of worm gears in operation makes it necessary to provide a special lubricant. In herringbone or helical gears a pure mineral oil should be used of sufficient viscosity to reduce impact stresses. In worm gear units a compounded oil should be used with 3 to 10 per cent acidless tallow or other suitable animal fat.

Ratios of 4:1 to 60:1 are common in a single reduction worm unit. For higher ratios the reduction should be split up either by using a helical gear set in combination or a double worm gear reduction, since the efficiency drops off



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rapidly for high ratios. A single reduction worm gear set of 81:1 ratio is approximately 60 per cent efficient, whereas a double reduction worm gear unit of the same overall ratio has an efficiency of about 91 per cent since each set has a ratio of only 9:1.

One application of a worm gear drive is for a roll turning lathe serving a 40-inch blooming mill. The worm gear center distance is 16 inches; the unit is rated 12.2/18.5 horsepower at 300/720 revolutions per minute with a ratio of 60:1.

Fig. 2 shows the application of worm gear drives to a slab milling machine. Two of the units are rated 17.5/29 horsepower at 400/1200 revolutions per minute with 48:1 ratio. Another unit for the 7-roll leveler is rated 19/35 horsepower at 400/1200 revolutions per minute, ratio 42:1. All three units are 16-inch center distance.

Other gear types in addition to those mentioned might suit some particular application. It is a good policy to submit all of the load characteristics and space requirements to the speed reducer manufacturer for recommendations. If the unit is properly selected for type and size, the only maintenance required will be a periodic check on lubrication.

The enclosed gear drive in steel mills is playing an important part in cutting yearly operating costs and insuring uninterrupted production schedules.

## New Tool Shows How To Save 5700 Tons of Steel

A new application of Tocco electrical induction hardening that has possibilities of saving the cement industry an estimated 5700 tons of steel a year was demonstrated for the first time at the National Metal Congress in Cleveland recently.

This saving, it is said, can be effected in the steel slugs or balls used by cement makers as grinding media to pulverize cement clinkers coming from the kilns.

In collaboration with the Portland Cement Association, exhaustive tests made over the past year by the Ohio Crankshaft Co., Cleveland, originators of the Tocco process, indicated a doubling of the life of 1-inch steel slugs when hardened inductively.

Steel or cast iron slugs are used by the hundreds of thousands by cement manufacturers. They undergo excessive wear during the grinding process. Frequently they crack to clog the ball mill meshes or pit to become coated with cement which ruins their grinding properties.

"In one mid-western cement mill," reported Dr. Harry B. Osborne, Tocco research and development engineer, "tests revealed that inductively hardened slugs showed a loss by wear of only 0.06

pounds of steel per barrel of cement as against 0.13 pounds lost by slugs hardened by older methods."

Significance of this saving in steel is seen in the fact that the 1941 national output by the cement industry was more than 164,000,000 barrels.

Capacity of a typical induction hardening machine can be as high as 5000 slugs an hour. Slugs pass through an inductor coil on a roller feed and are immediately quenched in the same unit after they have been heated to the proper degree. Heat is induced into the metal by means of high frequency electrical currents which flow into the coil and

then into the metal as it comes into range of the field of the inductor.

## Booklet Gives Facts On Care of V-Belts

Plain facts on wartime care of rubber V-belts are embodied in a 15-page booklet recently made available by Allis-Chalmers Mfg. Co., Milwaukee.

The booklet tells why a loose belt will stretch more in use than a tight one, what determines its "life expectancy" and relates the tale of seven V-belts and what killed them. Post mortems contain a moral for maintenance.



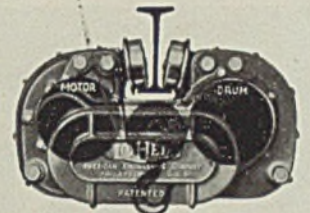
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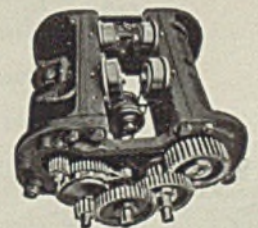


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The other day one of our hoist engineers said to us: "In our advertisements we've talked a lot about the balanced design of the Lo-Hed hoist, how it achieves minimum headroom (for which no premium is charged), and allows us to use an efficient all-spur gear drive.

"I think we ought to tell people that balancing the motor and drum about the beam also enables us to design short, strong shafts that minimize torsional stresses and reduce the chances of failure. We might also say that the unique balanced construction of the Lo-Hed hoist permits the use of covers that can be removed with a screw driver to gain access to the motor, brake, cable or drum . . . good points in these times.

"And don't forget that though more Lo-Heds are built today than ever before they are as carefully precision-machined as they were in normal times. A Lo-Hed bought now for war work is an investment in the future." All right, Mr. Engineer, since you've said it all for us, we'll sign off by simply asking the reader of this ad to send in for his copy of the Lo-Hed catalog.



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## Carbide Dies

(Continued from Page 78)

bide tapering and shouldering dies, experience has shown, last almost indefinitely.

So far, carbide dies have been used largely in sizes interchangeable with tool steel dies, dimensions having been based on the latter to facilitate substitution. If carbide dies are to continue to expand in use for such work—as they promise to do—it probably would be desirable to give greater consideration to design requirements for carbides in the construction of press equipment.

One of the points to be considered is that die recesses in presses should preferably be larger for carbide dies than for equivalent dies of tool steel. In carbide dies, the wall thickness is reduced by the amount of the carbide nib, and the case is thus slightly weaker.

The advantages of a larger die recess, die shoe or holder would include both the ability to provide greater die-case support for the carbide nib and the ability to increase nib dimensions to give the die greater reserve for re-finishing to larger work when worn.

**Changing Over To Carbides:** When starting in to use carbide dies it would

probably be best to secure such dies in finished form from the die producer for the original setup. From the standpoint of continuous operation, minimum cost and avoidance of delays, however, plants should provide as rapidly as possible thereafter their own service facilities for finishing and re-working of carbide dies. When this is done, rough cored dies can be purchased and finished in the cartridge-case plant, permitting a further reduction in original die costs and reducing die stock requirements to the very minimum. This practice has been followed for years in wire drawing mills and is now an established procedure throughout that industry.

Since the early days of carbide die usage, grinding, lapping and general re-working technique has been greatly simplified and improved. It is now possible to maintain carbide dies just as easily as tool steel varieties. In this connection, the Carboloy has for some time provided assistance to users in training die service men both at Carboloy and in their own plants. As to service equipment, all that is really required are standard tool room speed lathes, flexible shafts and diamond tools for boring. Some shops prefer the use, in place of the latter, of a selection of diamond splints for pliers for turning inside diameters of the die nibs.

**General Production Sequence:** Irrespectively of whether carbide or steel dies are used, manufacturers with deep-drawing experience would have no major difficulties in setting up to draw cartridge cases.

Basic operations required for production of 30 and 50-caliber cartridge cases consist of blanking and cupping, four drawing operations, three trimming operations, two indenting and heading, two tapering and shouldering (usually combined) one form turning, one mouth chamfering, one drilling or punching for vent at bottom of pocket or indentation, and a marking operation. (See STEEL, May 19, 1941, p. 56 and STEEL, May 26, 1941, p. 56).

Fig. 1 shows typical sequences for both bullet jacket and cartridge case.

After each draw the case is annealed to remove work hardening effect, while before each draw the case should also be pickled to remove oxides, followed by immersion in rinsing baths, soaping, and a final hot rinse. The same applies to cupping operations.

**Blanking and Cupping:** Currently, practice is divided about 50-50 as to whether or not this operation is performed by the cartridge-case producer. By far the better procedure is to have these operations—particularly the blanking—performed by the material supplier in order to reduce the necessity of han-



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dling a large amount of scrap. Normally it is advantageous to purchase the cups rather than disks, since the blanking and cupping can be combined in the same operation. Sometimes, the cupping die forms part of a two-piece die assembly, the upper half being for blanking. For the blanking portion of the die, tool steel is preferable. However, experimental work is being done also on carbides for this purpose.

Where disks are purchased by the cartridge case producer, the cupping can be performed in a die of the general shape shown in Fig. 2.

**Drawing:** The established practice today is to use four draws. Where press equipment permits, drawing operations are usually performed in pairs, using two dies—an upper and a lower—the latter being self-aligning and usually of semi-floating construction. Carbide dies for these operations do not differ materially from steel dies. This is due primarily to the previously mentioned fact that machines were designed originally for the use of tool steel rather than carbide dies.

For the first draw it is generally better to use a single rather than a double reduction. Some manufacturers eliminate one die in the second draw, making this also a single reduction operation particularly in drawing 50-caliber cases. Carbide dies lend themselves somewhat better to this than tool steel dies, since they maintain their shape longer. To some extent, the die assembly depends on the press equipment available. Usually, today, where there is a sufficient length of press stroke, dies are assembled in pairs—two carbide dies replacing the usual double reduction steel die—one above the other. On presses with limited strokes, a single Carboly die may be used effectively.

Dies for this type of work are shown in Fig. 3. Figs. 5 and 6 show dies for the first and second operations respectively in shouldering and tapering cartridge cases. Fig. 4 shows a solid Carboly die used for form drawing of primer caps.

**Recommended Die Designs:** Table I represents the results of a major effort on the part of carbide die producers to simplify the production, maintenance, and procurement problems for cartridge-case manufacturers.

Primary step in the simplification of dies, which formerly ran all over the lot, was to group dies for consecutive operations so as to enable re-use of worn dies by a simple re-cutting process which may be carried out in the plant of the cartridge-case manufacturer.

Thus it will be noted, only a single basic die size is now required for all draws for 30-caliber armor piercing and

tracer and ball jackets. At the outset, of course, it would be necessary to secure a group of such dies to finish to proper size. To simplify this problem, the rough cored hole of this particular basic die is available in a series of stepped diameters, thus reducing the amount of re-cutting necessary.

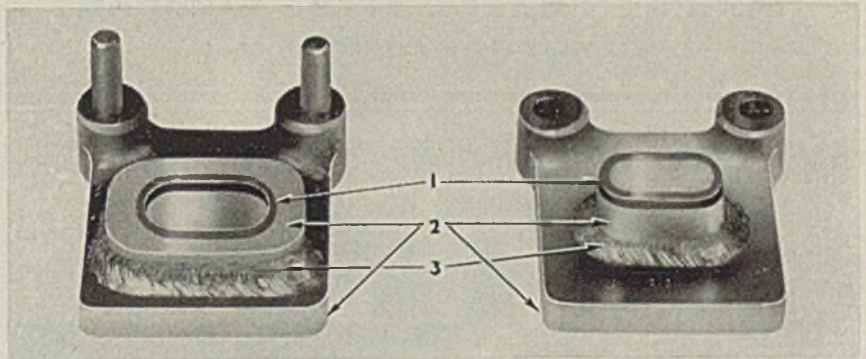
After initial setup it is usually necessary only to purchase dies for the last draws on the jacket, since the dies which they replace can be recut to take care of the earlier draws on the jacket.

Similarly, for the 50-caliber jackets, two basic dies sizes will take care of top

and bottom dies for all draws. For the 30-caliber cartridge case, one basic nib and case size again takes care of all draws, and both top and bottom dies where these are used in tandem. In addition 30-caliber case dies are now interchangeable with the third and fourth draws of 50-caliber jackets. This gives greater recutting value and cuts down the stocking problems. In this case there is a slight difference in approach angles between dies for different draws, and the rough cored dies may be secured with these variations in angles for the initial setup. The variation is sufficiently

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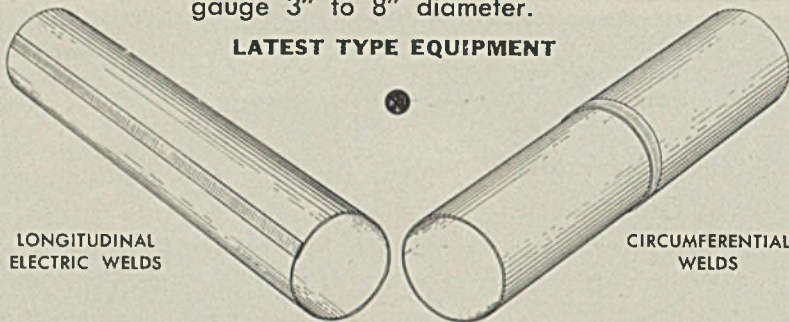


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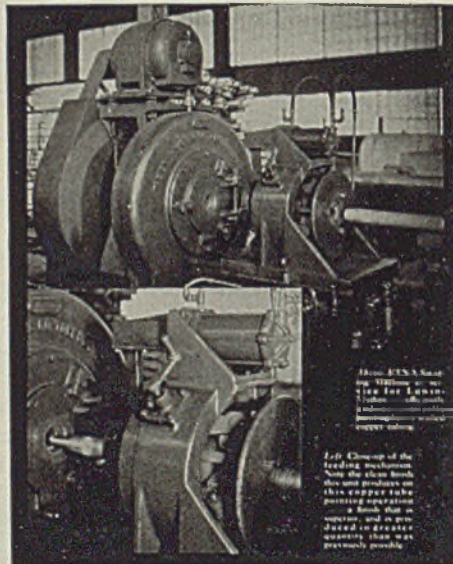
LEWIN-MATHES *Got the right answer at*

# ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from  $\frac{3}{8}$ " to 4" and the experience to help you get the most out of this type of machine.



IF IT'S A QUESTION OF TAPERING,  
SIZING OR REDUCING OF ROUND SOLIDS  
OR TUBING...

Ask **ETNA**  
About Swaging

## ETNA

MACHINE COMPANY  
TOLEDO OHIO

slight however, so that when a fourth-draw die is re-cut to a third-draw die size, the correction can be easily made in the die-refinishing operation.

For the 50-caliber cartridge case, two basic die sizes are required, the die for the first and second draws having a somewhat larger case diameter and height than the dies used for subsequent draws. One advantage of this procedure is that the larger case provides additional strength for the initial reductions, taken through a single die as compared to the use of upper and lower dies for each of the third and fourth draws.

**Stripping and Drawing Compounds:** One point might well be mentioned. With carbide dies it is preferable to use a mechanical stripper, although some manufacturers strip with the dies on the reverse stroke—as with steel dies. In the latter case, the back edge of the die must be kept in good condition as otherwise the case will not strip properly and may damage the die or the punch. If the bottom die is used for stripping, a reverse taper of 0.2 to 0.3 in the bearing is desirable. Some users of carbide dies provide a stripping edge on the carbide die as well as using a mechanical stripper—as an additional precaution.

As to drawing compounds, there are practically as many opinions as there are producers of cartridge cases. Not only are numerous types of compounds used, but the manner in which they are applied and diluted also varies. Some producers for instance dilute soluble oil 40 to 1. Others dilute to a thick emulsion. Some flood the dies and work while others control the amount on both the inside diameter of the die and the outside diameter of the work by the use of felt wipers, and the like.

## Skin Cream Forms Invisible Work Glove

Cadet Creme Co., 151 Farrar avenue, Worcester, Mass., announces a Skin Kote cream to protect workers against skin irritations and infections caused by industrial materials and certain manufacturing processes. It is applied as an invisible glove, preventing pores from becoming clogged with substances hard to remove.

The cream is said to be unaffected by carbon tetrachloride, toxic petroleum solvents, ether, thinners and other solvents which defat tissue causing dryness, cracking and infections. Also, corrective factors embodied assist in healing industrial dermatitis if already present.

Dirt, grime and other substances which prevent proper healing and cause infection are kept from entering wounds. The film which the product forms over the skin does not affect the work, is not greasy and can be washed off.



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Proven over 5 years practical use. Now used by literally hundreds of war plants. Can be used on any hard surface material such as glass, metal, wood, etc. Distinctive types for marking hot metals, too! Insist on the genuine—specify PAINTCIL.

Inexperienced help—even boys and girls just out of school—can save you large sums of money by identifying your war materials with Paintcil.

This amazing material is handy as a pencil to carry and use. It marks precious wartime materials with markings that will not rub off or fade—that will withstand sun, rain and slashing sleet. Marks are removed only when you want them removed. Paintcil is actual paint compounded into sticks. Marks are made as quickly



HELMER-STALEY, INC.  
331 W. Huron St.  
Chicago, Illinois

## Gisholt Makes Turret Lathe Sound, Color Film

Gisholt Machine Co., Madison, Wis., manufacturer of turret lathes, automatic lathes and balancing machines, has prepared a sound and color motion picture, "Turret Lathes, Their Operation and Use," to aid in training industrial workers. It is intended to be used as a supplement to actual basic shop practice in the effort to increase supply of skilled machinists.

The film includes comparison of the turret lathe with other metalworking machines and detailed sequences illustrating basic types of work done on a turret lathe and production methods in each case. It is available to recognized trade schools, technical schools and manufacturers, at no charge.

## Engineer's Calendar Features Giant Numerals

A new engineer's 1943 weekly calendar, which measures 15¾ x 24½ inches and features giant numerals that can be seen clearly across a room is being offered by Frederick Post Co., Box 803, Chicago. It also embodies a section of technical data for the engineer and draftsman including charts on wire and sheet metal gages, screw threads, etc. The calendar is being offered free to those who request them on business letterhead.

## Sheet Metalwork Manual For Aircraft Beginners

*Aircraft Sheet Metalwork*, by J. W. Giachino; Part I, cloth, 123 pages, 7 x 10 inches, \$2.50; Part II, paper, 59 pages, 8¾ x 13 inches, \$1.50; published by the Manual Arts Press, Peoria, Ill.

This modern text was written to meet the needs of the beginning worker in sheet metal, as especially applied to aircraft construction. Information is presented simply and clearly, with the help of leading airplane builders and tool-makers.

The author is a licensed pilot, has already established himself as the author of two other texts on metalworking and prepared this work under ideal conditions. Illustrations are from photographs taken under the author's supervision in his own shop at one of the best equipped training schools in this country.

Co-ordinated with the text is the workbook, Part II, containing 27 typical aircraft sheet metal problems in blueprint form. The problems are applied directly to basic aircraft metalwork. Only elementary knowledge of mechanical drawing is required for reading the blueprints and all pencil work may be done on special pages facing each drawing.



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The Jeep—our Army's mechanical mule, has achieved a reputation of out-climbing, out-pulling and out-maneuvering anything of its weight ever put on four wheels. On every war front in the world, the Jeep is now the pride and joy of Brass Hats and Buck Privates alike.

But remember the men who build the Jeeps—those who train to operate and follow them—and the millions of others who are engaged in our war effort. For all there had to be an abundance of water. It was the Layne Organization, who in the majority of cases, drilled the wells and built the systems that provide water by the millions of gallons. To a well water system, the name Layne is as famed as is the name Jeep to a four wheel vehicle.

Layne's reputation like that of the Jeep has been won on the field of action. Throughout the entire Nation, Layne wells and pumps are doing a magnificent job—providing water for ordnance plants, munition factories, training camps, air fields, ship yards and all kinds of war material producers. For late bulletins, address,

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- ★ Chisel Steel
- ★ Cold Finished Steels
- ★ Cumberland Ground Shafts
- ★ Drill Rod
- ★ High Speed Tool Bits
- ★ S. A. E. Steels
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## Norton Offers Grinding Lessons Via Films

To meet the demand for practical information on grinding methods, Norton Co., Worcester, Mass., has produced a new series of motion pictures for distribution to industrial apprentice schools, Army and Navy training schools, all other classes where machine shop practice is being taught, colleges, universities and vocational schools.

Entitled "Lessons in Grinding," the films present merely the fundamentals of grinding in a way that the inexperienced man can understand them.

Four films are included in the series. These cover cutter sharpening, the cylindrical grinder, the surface grinder and care of the grinder wheel. In offering these films, the company is making no charges for one-time showings except for return transportation.

Films are loaned with the understanding that they will be handled and projected by experienced operators with dependable equipment and returned in good condition. If desired, films also may be purchased for permanent use.

## New Shell Turning Tools Easy To Maintain

Two new styles of steel-cutting carbide tools having a lead angle especially suited for shell turning operations are announced by McKenna Metals Co., Latrobe, Pa. Designated as styles 39 and 40 tools, these combine the lead angle or side cutting edge angle with a tip longer than customary on carbide tools.

The tools are said to be particularly economical in shell turning operations because only the edge on the lead angle is sharpened and it is easy to maintain the control position of the nose as the tool is reground. Tools being offered are in sizes of  $\frac{1}{8}$  x  $\frac{5}{16}$  x  $\frac{3}{8}$  inches to  $\frac{3}{4}$  x  $\frac{1}{2}$  inches.

## Absorbent Compound Eliminates Greasy Floors

An absorbent compound, Quik-Sil, which reduces slip hazards on steel, cement and wood floors and keeps them "bone dry" is reported by Trojan Products & Mfg. Co., Chicago. It also is harmless to shoes and is odorless and dustless.

The product, according to the company, will not burn when oil soaked, removes heavy thick oil and grease accumulations to facilitate better trucking and dries up kerosene, gasoline and various solvents quickly. In addition it can be re-used.

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## ASA Approves Two Gas Equipment Standards

Two standards, one governing requirements for installation of gas-burning equipment in power boilers, 221.33-1942, and the other governing listing requirements for gas valves, 221.15-1942, have been approved by the American Standards Association, 29 West Thirty-ninth street, New York.

The first of these, developed under the leadership of the American Gas Association, covers such requirements as installation of burners and controls; gas piping and meters; inspections and tests; as well as boiler room ventilation, accessibility for cleaning and inspection, and flues and flue connections.

The approved standard listing requirements for gas valves include such construction requirements as dimensions; compensation for wear; valve stems and handles; stops; latching type valves; strength; materials; assembly and marking; and such performance requirements as leakage capacity; gas range burner valves with adjustable orifices, and continued operation.

## Layout Dye Simplifies Scribing on Sheet Metal

Scribing of work instructions on flat sheet metal is simplified by a new layout dye recently developed by Acme White Lead & Color Works, Detroit. The product is semitransparent, extremely fast drying, and purple in color. Brushed on the sheet metal, it dries in about a minute.

The coating enables the layout to be scribed on the stock with a sharp-pointed stylus, nail or other similar tool. This makes the layout stand out bright and clear, as the bright metal shows through the purple dye where scratch lines are made.

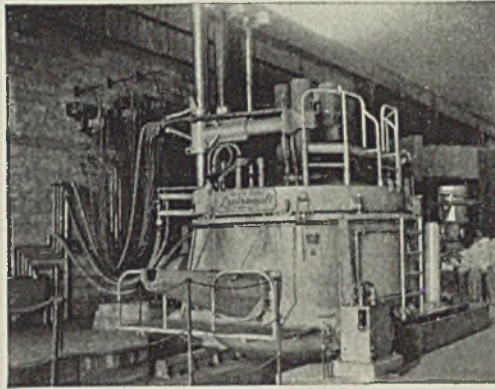
When work on the sheet metal has been completed, remaining layout dye may be quickly and easily washed off with a rag soaked in denatured alcohol.

## Breaking Bottleneck of Skilled Labor Supply

*Breaking the Skilled Labor Bottleneck*, by Eugene J. Bengé, management engineer; cloth, 47 pages, 8 x 10 inches; published by National Foremen's Institute, Deep River, Conn., for \$2.

This is a treatise on how to divide labor skills to gain maximum production. In the summer of 1940 the National Foremen's Institute undertook a study of the impending labor shortage. At that time the greatest pinch would not be felt for several years, but the war has hurried events.

*the furnace of today and tomorrow*



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MOORE RAPID  
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PITTSBURGH, PENNSYLVANIA

# ACE

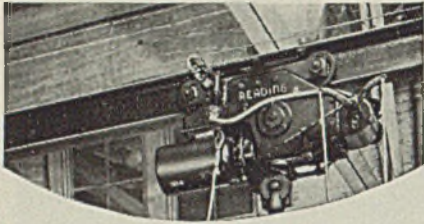
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## How to keep PRODUCTION UP!

When a product must be transferred from one process to another, the job must be done continuously. There is no time for repairs or breakdowns that might interrupt several related processes.

For instance, this 1-ton Reading Electric Hoist was installed in a paint manufacturing plant to help keep production UP, to safeguard quality control and to save valuable man-hours.

Is there a similar place in your plant where a Reading Hoist could provide the trouble-free operation that keeps production running smoothly?

"Modern Materials Handling Magic" is a new 16-page booklet that can help you get the most from every dollar you invest in hoist equipment. A note on your company letterhead will start a copy on its way to you.

**READING CHAIN & BLOCK CORP.**  
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# READING

Chain Hoists, Electric Hoists,  
Cranes and Monorails

The study has brought to light many ways in which labor shortage may be avoided or overcome, subdivision of skill and intensive training offering the best methods.

The volume has been written from practical experience, a manual of definite procedure, intended for foremen, supervisors, job setters and vocational instructors. It explains how to maintain peak production; how to train "green" hands in half the time usually required; how to utilize labor resources to greatest advantage; what to do about upgrading; what training principles to follow; how to obtain more satisfactory results in supervision; practical psychological attitudes to be followed by foremen, supervisors and plant heads.

## Paper Discusses Elastic Properties of Steel

Research paper RP 1459 entitled "Tensile Elastic Properties of Nickel, Copper, Open-Hearth Iron and Typical Steels" is now available from the United States Department of Commerce, National Bureau of Standards, Washington.

Prepared by Dunlap J. McAdam Jr., and Russell W. Mebs, it discusses measurement of stress, strain and permanent set, tensile elastic properties of nickel, the secant modulus at any stress, tensile modulus of elasticity of 18-8 chromium nickel steel and of copper as affected by stress and by plastic extension, tensile elastic properties of open-hearth iron and some carbon steels, crystal orientation and its influence on elastic properties, and some important factors associated with plastic extension; their effects on modulus of elasticity and on its stress coefficients.

## Diagnoses Aircraft Engine Ills by Sound

*Aircraft Engine Trouble Shooting Chart*, by Andrew Wallace, crew chief, Eastern Air Lines Inc.; published by Norman W. Henley Publishing Co., 17-19 West Forty-fifth street, New York, for 75 cents.

This reference chart, based on years of practical experience, is arranged so that anyone can easily trace and learn the proper way to correct engine trouble, which is quickly diagnosed through the medium of the sound section on the chart. This identifies the trouble in smaller sections, with guide lines pointing to proper procedure for correction.

It tells how through the medium of sound, to detect and remedy short circuits, pre-ignition, overheating, poor suction, no spark, irregular valve action, poor mixture, poor compression, back-firing, poor propeller action.

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For your convenience a miniature city of shops, in the Hotel.

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*Cleveland*



## Canada Freezes Steel And Mining Manpower

(Concluded from Page 66)

owned Wartime Salvage Ltd. at \$2 per ton, the proceeds being held for the owner. Windmills on farms, if not in use, should be reported as scrap.

Canada is adding ten new plants under its wartime explosives and chemical program, six being major undertakings. Three are for large scale production of alkylate for high-octane aviation gasoline, the first to go into production in November and the others early next year. The remaining three will manufacture special chemicals. Of the four smaller plants one is now going into production, another will be ready early in November and a third early in 1943.

Completion of this program will bring the number of chemical, explosives and ammunition filling plants to 38, of which 28 are in operation. Individual plants manufacturing rifle cordite and ammonia set new records in the past month. The ammunition filling program is approaching capacity with output of 27,000,000 rounds per year, in addition to large scale production of aerial bombs, mines, depth charges and other materials.

### Copper for United States

International Nickel Co. of Canada Ltd. is completing enlargement of its plant at Sudbury, Ont., and expects to increase its production of nickel and copper 10 per cent by the end of the year.

The Canadian government has taken over control of mining properties of Britannia Mining & Smelting Co. at Howe Sound and Granby Consolidated Mining Co. at Copper Mountain, the two largest copper producers in British Columbia. The metals controller states production from these properties will be for the United States government and they will be subsidized by the Metals Reserve Corp. The Britannia property has rated daily capacity for 4700 tons of ore and Granby 5000 tons.

Authority to issue individual preference ratings to Canadian firms without special authorization from Washington has been delegated to the director of the War Production Board Canadian priorities review division by an administrative order issued by the director general for operations. The power is limited to assignment of ratings on PD-1A certificates where the amount is less than \$500 in United States currency. The order forbids assignment of ratings to Canadian companies operating under PRP, except as proscribed by authorities regulation No. 11. The plan will save considerable time in purchases of small amounts of material from the United States.

# Serving the Airplane Plants

**USERS:**  
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Boeing Aircraft  
Republic Aviation  
Lockheed Aircraft  
Etc.

A large aircraft manufacturer writes: "Krane Kar is used in the production of Flying Fortresses: handling jig sections in erection; handling steel for jig sections; unloading equipment from flat cars; loading aircraft spare parts and assemblies on cars; placing large pieces of production equipment and handling repair parts for same when necessary; lifting, moving, and rearranging production equipment, raw materials, etc.; for building maintenance and repair, etc." Write for details.

"KRANE KAR TRANSPORTING AIRPLANE MOTOR"

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**SWING BOOM TRACTOR CRANE**  
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ACCURATE, CLOSE WORK

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PURDY looks at steel products from the point of view of the men who have to "put them together"

in the manufacture of fighting equipment. When ordinary methods or standard procedures can't get jobs done, Purdy men are ready to help "tear 'em apart", analyze the problem from a production standpoint, and recommend materials and methods that *work*—and the complete PLANET line of Spring Steels, Tool Steels, Drill Rod and Cold Drawn Steels is here to help them.

**HOW PURDY'S KNOW-HOW SOLVED ONE PROBLEM:**

A manufacturer, unable to get shim steel to finish urgently needed dies, put in a call to Purdy. Purdy men suggested using PLANET Blue Tempered Spring Steel as a substitute. It worked—and the dies went out *on time!* Whatever *your* Victory product, whatever its problem: in steel supply or application, or something demanding *extra* ingenuity in using steel—call on Purdy for quick service.

A. R. PURDY CO., INC.  
792 Greenwich St., New York, N. Y.



**Anaconda Copper Buys Basic Magnesium Control**

Announcement is made by Jesse Jones, secretary of commerce, that Anaconda Copper Mining Co. has purchased the 52½ per cent stock interest of Howard P. Eels Jr. and associates, of Cleveland, in Basic Magnesium Inc. In connection with this purchase Defense Plant Corp. has bought ore lands of Basic Magnesium near Gabbs, Nev.

Basic Magnesium Inc. is operating and will complete the magnesium plant at Las Vegas, Nev., owned by Defense Plant Corp. The first unit produced magnesium Aug. 31 and additional units have been brought in since. Completion is scheduled for April 15. It will have capacity for 112,000,000 of metallic magnesium and will cost over \$100,000,000.

Basic Magnesium stock, in addition to that bought by Anaconda, is owned by British interests represented in this country by Maj. C. J. P. Ball, who furnished the technical information and designed the plant. Basic Magnesium will operate the plant for account of Defense Plant Corp. and will receive ½-cent per pound on magnesium produced, which will be about 2 per cent of sales.

At New York Cornelius F. Kelley, chairman of the board of Anaconda,

said: "The release by Secretary of Commerce Jesse Jones sets forth in detail the nature of the transaction. All that I wish to add is that the participation of Anaconda in this great enterprise has been undertaken at the invitation of the government and of the English and American interests in Basic Magnesium. Our function is that of management, without responsibility for anything that has occurred prior to our taking over and is undertaken only for the purpose of doing what we can at the request of all interested parties to aid the war effort.

"J. R. Hobbins, president of Anaconda, has been elected president of Basic Magnesium; Frederick Laist, vice president of Anaconda has been elected vice president and they, with myself, have been elected directors of Basic Magnesium."

Lead production in principal mines of Morocco has been greatly reduced in recent years but it is expected 1942 output will be considerably larger, according to a report to the Department of Commerce. Mines closed in September, 1940, for lack of chemicals and labor have been reopened and annual output of 5400 to 6000 tons is expected. Production in 1939 was 12,620 tons and in 1941 it had dropped to 3440 tons.

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**GUY LOMBARDO AND HIS ORCHESTRA IN THE GRILL**

**HOTEL ROOSEVELT**

BERNAM G. HINES, *Managing Director*

MADISON AVE. AT 45th ST., NEW YORK



## Scrap Situation Eased But Problem Not Yet Solved

*WPB warns recent salvage drives are non-recurrent. . . PRP allotments insufficient for many consumers. . . Warehouse situation improves under new directive plan*

DESPITE the generous outpouring of steel and iron scrap in the recent salvage drive and the continued effort to draw out dormant material from industrial and other sources, the scrap problem has not been solved.

War Production Board officials point out the fact that the recent campaign can not be repeated with equal success and such scrap is non-recurrent. No estimate has been made of the tonnage resulting from this effort as the mass of material is undigested and much has not yet reached yards for preparation. Considerable tonnage is expected to result from the campaign now under way to bring out dormant scrap in outmoded machinery and structures in industry, but this also is non-recurrent and once the reservoir is exhausted further sources will be necessary. Present rate of steel output requires more scrap than is provided by normal production in industrial processes and other sources are imperative to sustain operations.

Some melters have accumulated stockpiles but in no case enough for winter supply and allocations are still in force to insure sufficient for melters who have no reserves.

Adding to complications created recently by restrictions on fourth quarter quotas under Production Requirements Plan is an increasing volume of reratings, most of them downward. Some mills find they are falling behind in getting these changes through their order departments. This trend is in marked contrast to the heavy upward revision last summer when the AA ratings were created, although not as pronounced. This revision is explained by alterations in the ordnance program, placing slightly less emphasis on some types of equipment, while increasing that on aircraft and ships.

For the third consecutive week steel production was at 99 per cent of capacity. A rise of 1½ points to 99 per cent at Pittsburgh and 1 point to 96 per cent at Youngstown balanced slight losses at other points. The scrap situation being easier, necessity for open-hearth repairs is the only deterrent to capacity output. Chicago slipped back ½-point to 103 per cent, Wheeling 2½ points to 77, Cincinnati 5 points to 92 and St. Louis 3 points to 94 per cent. Rates were unchanged at the following: Cleveland, 98.5; Buffalo, 93; Detroit, 92; eastern Pennsylvania, 96; Birmingham, 95; New England, 95.

Numerous manufacturers operating under Produc-

### DEMAND

*Orders greater than output.*

### PRODUCTION

*Unchanged at 99 per cent.*

### PRICES

*Manganese ore ceiling set.*

tion Requirements Plan complain they are not allowed enough steel to maintain production through fourth quarter. This reflects tightness in supply, production being insufficient to provide for lower ratings after directives, allocations and top ratings are satisfied. New steel orders are slightly less than ten days ago in the experience of some mills, but continue to involve more tonnage than is being shipped.

Considerable relief for warehouses is expected to follow application of the new directive, which became effective Nov. 1. Receipts of little more than 50 per cent of quotas are expected to rise to 75 per cent or more thus making it possible to care for the heavy demand for small lots from users engaged in war work. Extensions of high priorities will be more effective in obtaining replacements.

To stabilize the major cost element in manganese alloys Office of Price Administration has issued a maximum price regulation on manganese ore for all domestic sales except battery or chemical ore.

Pig iron distribution under the allocations plan continues to meet requirements of war needs, with only small changes from month to month. Recent limitation on other products under the Production Requirements Plan has had indirect effect on pig iron where the latter enters into the assembly as castings, causing smaller tonnage to be allocated in some cases.

Effect of war limitations on use of structural steel is seen in the report by the American Institute of Steel Construction that in September bookings were only 61,750 tons, smallest since the beginning of the war. September shipments were 164,501 net tons, compared with 204,085 tons in September, 1941.

Railroads are placing open contracts for 1943 rail requirements, tonnages to be determined by War Production Board allocations. Necessity for keeping tracks in condition to carry the heavy war traffic is a factor in determining how much steel can be spared for renewal in face of direct war demand.

Composite steel and iron prices are frozen by ceilings imposed by Office of Price Administration, with no variation from these levels. Finished steel composite is \$56.73, semifinished steel \$36.00, steelmaking pig iron \$23.05 and steelmaking scrap \$19.17.



# COMPOSITE MARKET AVERAGES

	Oct. 31	Oct. 24	Oct. 17	One Month Ago Sept., 1942	Three Months Ago July, 1942	One Year Ago Oct., 1941	Five Years Ago Oct., 1937
Finished Steel	\$56.73	\$56.73	\$56.73	\$56.73	\$56.73	\$56.73	\$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.00

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

## COMPARISON OF PRICES

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

Finished Material	Oct. 31,	Sept.	July	Oct.	Pig Iron	Oct. 31,	Sept.	July	Oct.
	1942,	1942	1942	1941		1942,	1942	1942	1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c	Bessemer, del. Pittsburgh	\$25.19	\$25.19	\$25.19	\$25.34
Steel bars, Chicago	2.15	2.15	2.15	2.15	Basic, Valley	23.50	23.50	23.50	23.50
Steel bars, Philadelphia	2.49	2.49	2.49	2.47	Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
Shapes, Pittsburgh	2.10	2.10	2.10	2.10	No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
Shapes, Philadelphia	2.22	2.22	2.22	2.22	No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Shapes, Chicago	2.10	2.10	2.10	2.10	Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Plates, Pittsburgh	2.10	2.10	2.10	2.10	Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.08
Plates, Philadelphia	2.15	2.15	2.15	2.15	No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.215
Plates, Chicago	2.10	2.10	2.10	2.10	Malleable, Valley	24.00	24.00	24.00	24.00
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10	Malleable, Chicago	24.00	24.00	24.00	24.00
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05	Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50	Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10	Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05					
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50	<b>Scrap</b>				
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60	Heavy melting steel, Pitts.	\$20.00	\$20.00	\$20.00	\$20.00
Tin plate, per base box, Pittsburgh	\$5.00	5.00	5.00	5.00	Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55	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
<b>Semifinished Material</b>					<b>Coke</b>				
Sheet bars, Pittsburgh, Chicago	\$34.00	\$34.00	\$34.00	\$34.00	Connellsville, furnace, ovens	\$6.00	\$6.00	\$6.00	\$6.25
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00	Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00	Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25
Wire rods No. 5 to 1/2-inch, Pittsburgh	2.00	2.00	2.00	2.00					

## 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 and Feb. 4, 1942. 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. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

### 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.)

Alloy Steel Ingots: Pittsburgh base, uncropped, \$45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, \$34.00; Detroit, del. \$36.25; Duluth (bil.) \$36.00.

(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under leasehold during first quarter 1942 at \$37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs \$41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, \$40.00; Detroit, del. \$42.25; Duluth, \$42.00.

(Andrews Steel Co. may quote carbon forging billets \$50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., \$52.00; 12-18 in., \$54.00; 18 in. and over, \$56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, \$54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, \$34.00.

(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel sheet bars at \$39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., \$1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., \$2.00.

Do., over 9/32—47/64-in., incl., \$2.15. Wor-

cester add \$0.10 Galveston, \$0.27. Pacific Coast \$0.50 on water shipment.

### Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.)  
 (Phoenyx Mfg. Co. may quote 2.35c, Chicago base, Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

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. 2.82c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr.	0.15
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds,	
3400	3.20	squares	0.40
4100	15-25 Mo.	0.55 T 1300, Mn, mean	
46.00	20-30 Mo.	1.51-2.00	0.10
1.50-2.00; Ni	1.20	Do., carbon under	
		0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c; all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

### Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila del. 2.28c; New York del., 2.35c Pacific ports 2.65c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area to the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila del. 3.68c; Pacific ports 4.05c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.  
 Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24. Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.



base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.  
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.  
Electrical Sheets, No. 24:

	Pittsburgh	Pacific	Granite
	Base	Ports	City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c

	Base	Ports	City
Transformer			
72	6.15c	6.90c	
65	7.15c	7.90c	
58	7.65c	8.40c	
52	8.45c	9.20c	

**Hot-Rolled Strip:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit, del. 2.22c; 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. 2.92c; Worcester base 3.00c.

**Commercial C. R. Strip:** Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; 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.

**Tin Mill Black Plate:** Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

**Laminated Terne:** Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

**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. \$16.00; 30-lb. \$17.25; 40-lb. \$19.50.

**Plates**

**Carbon Steel Plates:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del. 2.30-2.55c; Phila., del. 2.15c; St. Louis, 2.34c; Boston, del. 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)

**Floor Plates:** Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

**Open-Hearth Alloy Plates:** Pittsburgh, Chicago, Coatesville, 3.50c.

**Wrought Iron Plates:** Pittsburgh, 3.80c.

**Shapes**

**Structural shapes:** Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.28c; Phila., del. 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)

**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): Bright basic, hessemer wire 2.67c Galvanized wire 2.67c Spring wire 3.20c

**Wire Products to the Trade:** Standard and cement-coated wire nails, polished and staples, 100-lb. keg \$2.55

Annealed fence wire, 100 lb. 3.05 Galvanized fence wire, 100 lb. 3.40

Woven fence, 12 1/2 gage and lighter, per base column 67

Do., 11 gage and heavier 70

Barbed wire, 80-rod spool, col. 70

Twisted barbless wire, col. 70

Single loop bale ties, col. 59

Fence posts, carloads, col. 69

Cut nails, Pittsburgh, carloads \$3.85

**Pipe, Tubes**

**Welded Pipe:** Base price in carloads 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.

Steel			Iron		
In.	Blk.	Galv.	In.	Blk.	Galv.
1/2	56	33	1/2	24	31 1/2
3/4	59	40 1/2	3/4	30	10
1	63 1/2	51	1-1 1/2	34	16
1 1/4	66 1/2	55	1 1/2	38	18 1/2
1-3/4	68 1/2	57 1/2	2	47 1/2	18

Lap Weld					
Steel			Iron		
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49 1/2	1 1/4	23	3 1/2
2 1/4-3	64	52 1/2	1 1/2	28 1/2	10
3 1/4-6	66	54 1/2	2	30 1/2	12
7-8	65	52 1/2	2 1/4	31 1/2	14 1/2
9-10	64 1/2	52	4	33 1/2	18
11-12	63 1/2	51	4 1/2-8	32 1/2	17
			9-12	28 1/2	12

**Roller 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	Seamless		Hot		Steel	Charcoal Iron
	B.W.G.	Rolled	Drawn	Cold		
1".....	13	\$ 7.82	\$ 9.01	.....	.....	.....
1 1/4".....	13	9.26	10.67	.....	.....	.....
1 1/2".....	13	10.23	11.72	\$ 9.72	\$23.71	.....
1 3/4".....	13	11.64	13.42	11.06	22.93	.....
2".....	13	13.04	15.03	12.38	19.35	.....
2 1/4".....	13	14.54	16.76	13.79	21.63	.....
2 1/2".....	12	16.01	18.45	15.16	.....	.....
2 3/4".....	12	17.54	20.21	16.58	26.57	.....
3".....	12	18.59	21.42	17.54	29.00	.....
3 1/4".....	12	19.50	22.48	18.35	31.38	.....
3 1/2".....	11	24.63	28.37	23.15	39.81	.....
4".....	10	30.54	35.20	28.66	49.90	.....
4 1/2".....	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, \$40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, \$40.00.

\*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, \$28-\$30.

Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

\*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.

**High Speed Tool Steels:**

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	1	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
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
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†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
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

**STAINLESS CLAD STEEL (20%)**

304	118.00	19.00	.....
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\*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. **Emergency basing point** is the basing point at or near the place of production or origin.

**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**

1/2 x 6 and smaller	65 1/2 off
Do., 3/8 and 1/2 x 6-in. and shorter	63 1/2 off
Do., 5/8 to 1 x 6-in. and shorter	61 off
1 1/4 and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	56 off
Step bolts	56 off
Plow bolts	56 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.K.
3/8-inch and less	62	64
1/2-1-inch	59	60
1 1/4-1 1/2-inch	57	58
1 1/2 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, 1/2-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

3/8-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	*\$6.00
Connellsville, foundry	7.00-7.50
Connellsville prem. foundry	7.25-7.60
New River, foundry	8.00-8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

**By-Product Foundry**

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	112.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

\*Operators of hand-drawn ovens using trucked coal may charge \$6.50, effective Aug. 12, 1942.

† \$12.75 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



**Pig Iron**

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	\$25.00	\$24.50	\$26.00	\$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65			28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	120.38	119.00		
Baltimore, del.	25.67			
Boston, del.	25.12			
Chicago, del.	24.47			
Cincinnati, del.	24.30	22.92		
Cleveland, del.	24.12	23.24		
Newark, N. J., del.	26.24			
Philadelphia, del.	25.51	25.01		
St. Louis, del.	24.12	23.24		
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53		26.53	26.03
Syracuse, del.	26.08		27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38			27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50		25.00	24.50
St. Paul, del.	26.76		27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00		24.50
Hamilton, O., base	24.00	23.50		24.00
Cincinnati, del.	24.68	24.68		25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
†Pittsburgh, del.				
No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00			
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50		
Baltimore, del.	26.05			
Steeleton, Pa., base		24.50		25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39		26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

\*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. †For McKees Rocks, Pa., add 55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Alliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

**High Silicon, Silvery**

6.00-6.50 per cent (base)	\$29.50
6.51-7.00	\$30.50
7.01-7.50	31.50
7.51-8.00	32.50
8.01-8.50	33.50
8.51-9.00	34.50

9.01-9.50 \$35.50  
9.51-10.00 36.50  
10.01-10.50 37.50  
10.51-11.00 38.50  
11.01-11.50 39.50

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%.

**Bessemer Ferro-silicon**

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 irons, Nos. 5 and 6.)

**Charcoal Pig Iron**

Northern	
Lake Superior Furn.	\$28.00
Chicago, del.	31.54

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.	\$23.50
Valley, base	23.50

**Low Phosphorus**

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., \$29.50 base; \$30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: 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%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

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: Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and 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, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by \$2.25 per ton, effective July 27, 1942.

**Refractories**

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick Super Quality	
Pa., Mo., Ky.	\$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick  
All bases \$59.85

Silica Brick	
Pennsylvania	\$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	\$31.00
Wire cut	29.00

Magnesite  
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00  
net ton, bags 26.00

Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	\$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

**Fluorspar**

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$23.00-25.00
Do., barge	23.00-25.00
No. 2 lump	23.00-25.00
(OPA May 11 established maximum at Jan. 2, 1942, level.)	

**Ferroalloy Prices**

**Ferromanganese:** 78-82%, carlots, gross ton, duty paid, Atlantic ports, \$135; Del. Pittsburgh \$140.65; f.o.b. Southern furnaces \$135; Add \$6 per gross ton for packed carloads \$10 for ton, \$13.50 for less-ton and \$18 for less than 200-lb. lots, packed.

**Spiegeleisen:** 19-21%, carlots per gross ton, Palmerton, Pa. \$36.

**Electrolytic manganese:** 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

**Chromium Metal:** Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

**Ferrocolumbium:** 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. \$2.25; less-ton lots \$2.30. Spot prices 10 cents per lb. higher.

**Ferrochrome:** 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton lots	200 lbs.
2% C	19.50c	20.25c	20.75c	21.00c
1% C	20.50c	21.25c	21.75c	22.00c
0.20% C	21.50c	22.25c	22.75c	23.00c
0.10% C	22.50c	23.25c	23.75c	24.00c

Spot is 1/4c higher

**Chromium briquets:** Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices 1/4-cent higher.

**Ferromolybdenum:** 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

**Calcium Molybdate (Molyte):** 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

**Molybde Oxide Briquets:** 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

**Molybdenum Oxide:** 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

**Molybdenum Powder:** 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. \$2.60; 100-200 lb. lots \$2.75; under 100-lb. lots \$3.00.

**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.

**Ferrophosphorus:** 23-26%, based on 24% 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 Mt. Pleasant, Tenn.; contract price \$75, spot \$80.

**Ferro-silicon:** Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50% .....	\$ 74.50	\$ 87.00
Unitage .....	1.50	1.75
75% .....	135.00	151.00
Unitage .....	1.80	2.00
85% .....	170.00	188.00
Unitage .....	2.00	2.20
90-95% .....	10.25c	11.25c

Spot prices 1/4-cent higher.

**Silicon Metal:** Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

**Silicon Metal:** Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices 1/4-cent higher.

**Silicon Briquets:** Contract basis; in carloads, bulk freight allowed, per ton \$74.50; packed \$80.50; ton lots \$84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot 1/4-cent per lb. higher on less-ton lots; \$5 per ton higher on ton lots and over.

**Silicomanganese:** Contract basis freight allowed, 1 1/2% carbon; in carloads per gross ton \$135; ton lots \$147.50. Spot \$5 per ton higher.

**Silico-manganese Briquets:** Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices 1/4-cent higher.

**Ferrotungsten:** Carlots, per lb. contained tungsten, \$1.90.

**Tungsten Metal Powder:** 98-99%, per lb. any quantity \$2.55-2.65.

**Ferrotitanium:** 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained

titanium; ton lots \$1.23; less-ton lots \$1.25. Spot 5 cents per lb. higher.

**Ferrotitanium:** 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots \$1.35; less-ton lots \$1.40. 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 destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon \$142.50; 3-5% carbon \$157.50.

**Ferrovandium:** 35-40%, contract basis, per lb. contained vanadium, f.o.b. producer's plant with usual freight allowances; open-hearth grade \$2.70; special grade \$2.80; highly-special grade \$2.90.

**Vanadium Pentoxide:** Technical grade, 88-92% per cent V<sub>2</sub>O<sub>5</sub>; contracts, any quantity, \$1.10 per pound V<sub>2</sub>O<sub>5</sub> contained; spot 5 cents per pound higher.

**Zirconium Alloys:** 12-15%, contract basis, carloads bulk, per gross ton \$102.50; packed \$107.50; ton lots \$108; less-ton lots \$112.50. Spot \$5 per ton higher.

**Zirconium alloy:** 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot 1/4-cent higher.

**Alsilfer:** (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot 1/4-cent higher.

**Simanal:** (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.



# WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials, As of April 16, 1941

	Soft Bars	Hot-Rolled Strip		Plates 1/4-in. & Over	Structural Shapes	Floor Plates	Sheets			Cold Rolled Strip	Cold Drawn Bars		
		Bands	Hoops				Hot Rolled	Cold Rolled	Galv. No. 24		Carbon	S.A.E. 2300	S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	4.05	5.05	3.40	4.04	8.40	7.16
Norfolk, Va.	4.00	4.10	4.05	4.05	4.05	5.45	3.85	4.40	5.40	3.40	4.15	8.40	7.16
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	4.05	4.65	3.40	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.40	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	3.40	4.42	8.70	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	4.25	5.01	3.40	3.97	8.40	6.75
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	4.50	5.40	3.40	4.39	8.40	6.75
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	4.50	5.25	3.40	4.31	8.40	6.75
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	4.25	4.75	3.40	4.43	8.40	6.75
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	4.50	5.25	5.00	4.60	8.40	6.75
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	4.75	5.25	3.40	6.90	8.40	6.75
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	3.40	5.75	8.40	6.75
Los Angeles	4.35	4.90	6.70	4.90	4.60	7.15	4.95	7.15	5.95	3.40	6.60	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	3.40	6.80	10.80	9.80

\*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed)				
	1035-1050 Series	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	7.70
Philadelphia	4.10	7.56	5.86	5.61	7.56
Baltimore	4.45	7.85	6.15	5.90	8.00
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.60	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	8.00	6.25	6.00	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

### BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-1999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham, Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999

in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds. New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

### Ores

#### Lake Superior Iron Ore

Gross ton, 51 1/2%

#### Lower Lake Ports

Old range bessemer	\$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

#### Eastern Local Ore

Cents, unit, del. E. Pa.	
Foundry and basic 56-63%, contract	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	7.50-8.00c

#### Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	\$24.00
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#### Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees	
Indian and African, 2.8:1 lump, 48%	\$39.00
South African (excluding war risk) No ratio lump, 44%	28.00
Do. .... 45%	29.00
Do. .... 48%	34.00
Do. concentrates, 48%	33.00
Do. .... 50%	34.00
Brazilian (nominal) 2.5:1 lump, 44%	28.50
3:1 lump, 48%	38.00

#### Manganese Ore

(Nominal)	
Including war risk but not duty, cents per unit cargo lots	
Caucasian, 50-52%	80.00-86.00
S. African, 48%	80.00-86.00
Indian, 50%	80.00-86.00
Brazilian, 46%	78.00-84.00
Cuban, 51%, duty free.	85.00
Domestic, 48%, f.o.b. mines	\$1.00

#### Molybdenum

Sulphide conc., lb. Mo. cont., mines	\$0.75
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## NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

### CHEMICAL COMPOSITION LIMITS, PER CENT

Designation	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Nickel	Chromium	Basic Open-Hearth		Electric Furnace	
								Bars Blooms, & Bar-Strip	Billets, & Bar-Slabs	Billets, Bars Blooms, & Bar-Strip	Billets, Bars Blooms, & Bar-Slabs
NE 8024	.22-.28	1.00-1.30	.040	.040	.20-.35			.10-.20	.45c	\$9.00	.95c\$19.00
NE 8124	.22-.28	1.30-1.60	.040	.040	.20-.35			.25-.35	.85	17.00	1.35 27.00
NE 8233	.30-.36	1.30-1.60	.040	.040	.20-.35			.10-.20	.65	13.00	1.15 23.00
NE 8245	.42-.49	1.30-1.60	.040	.040	.20-.35			.10-.20	.65	13.00	1.15 23.00
NE 8339	.35-.42	1.30-1.60	.040	.040	.20-.35			.20-.30	.75	15.00	1.25 25.00
NE 8442	.38-.45	1.30-1.60	.040	.040	.20-.35			.30-.40	.90	18.00	1.40 28.00
NE 8447	.43-.50	1.30-1.60	.040	.040	.20-.35			.30-.40	.90	18.00	1.40 28.00
NE 8547	.43-.50	1.30-1.60	.040	.040	.20-.35			.40-.60	1.25	25.00	1.75 35.00
NE 8620	.18-.23	.70-.95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25 25.00
NE 8630	.27-.33	.70-.95	.040	.040	.20-.35	.40-.60	.40-.60	.15-.25	.75	15.00	1.25 25.00
NE 8724	.22-.28	.70-.95	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30 26.00
NE 8739	.35-.42	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30 26.00
NE 8744	.40-.47	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30 26.00
NE 8749	.45-.52	.75-1.00	.040	.040	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30 26.00
NE 8817	.15-.20	.70-.95	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	.90	18.00	1.40 28.00
NE 8949	.45-.52	1.00-1.30	.040	.040	.20-.35	.40-.60	.40-.60	.30-.40	1.20	24.00	1.70 34.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and \$54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.



# MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

## PRICES FOR OTHER THAN RAILROAD SCRAP

### ELECTRIC FURNACE AND FOUNDRY GRADES

	Machine Shop Turnings	Machine Shop Turnings	Machine Shop Turnings	Low Phos. Grades		Heavy Structural Plate		Cut Auto Scrap		Alloy-Free Cut		Electric Furnace Bundles
				Billet, Bloom, Forges, Crops	Bar	3 ft. and less	2 ft. and less	3 ft. and less	2 ft. and less	1 ft. and less	1 ft. and less	
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren, Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	\$20.00	\$16.00	\$14.75	\$23.00	\$22.50	\$21.00	\$21.50	\$20.00	\$20.50	\$21.00	\$18.00	\$21.00
Bethlehem	18.75	14.75	14.25	23.75	21.25	19.75	20.75	19.25	18.75	19.75	16.75	19.75
Buffalo	19.25	15.25	15.25	24.25	20.75	20.25	20.75	19.25	18.75	20.25	17.25	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	14.75	24.50	22.00	20.50	21.50	20.00	19.50	20.50	17.50	20.50
Dayton	17.85	13.85	13.85	22.85	20.35	18.85	19.85	18.35	17.85	18.85	15.85	18.85
Toledo	18.75	14.75	14.75	23.75	21.25	19.75	20.75	19.25	18.75	19.75	16.75	19.75
Chicago	18.25	14.25	14.25	23.25	20.75	19.25	20.25	18.75	18.25	19.25	16.25	19.25
Kokomo	18.00	14.00	14.00	23.00	20.50	19.00	20.00	18.50	18.00	19.00	16.00	19.00
Duluth	17.50	13.50	13.50	22.50	20.00	18.50	19.50	18.00	17.50	18.50	15.50	18.50
St. Louis	17.00	13.00	13.00	22.00	19.50	18.00	19.00	17.50	17.00	18.00	15.00	18.00
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburgh, Calif.	16.50	12.50	12.50	21.50	19.00	17.50	18.50	17.00	16.50	17.50	14.50	17.50
Minneapolis, Colo.	14.50	10.50	10.50	19.50	17.00	15.50	16.50	15.00	14.50	15.50	12.50	15.50
Seattle												

### RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Balls		Scrap Rails		18 in. and under
			Rolling	3 ft. and under	2 ft. and under	18 in. and under	
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton, Philadelphia, Wilmington, Sparrows Point	21.00	22.00	23.50	24.00	24.25	24.50	24.50
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	19.75	20.75	22.25	22.75	23.00	23.25	23.25
Chicago	20.50	21.50	23.00	23.50	23.75	24.00	24.00
Buffalo	19.75	20.75	22.25	22.75	23.00	23.25	23.25
Detroit	20.25	21.25	22.75	23.25	23.50	23.75	23.75
Kokomo	19.25	19.85	21.35	21.85	22.10	22.35	22.35
Duluth	19.00	20.25	21.75	22.25	22.50	22.75	22.75
Kansas City, Mo.	19.00	20.00	21.50	22.00	22.25	22.50	22.50
St. Louis	17.00	18.00	19.50	20.00	20.25	20.50	20.50
Birmingham	18.50	19.50	21.00	21.50	21.75	22.00	22.00
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00	19.00

### CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A		Group B		Group C	
	\$18.00	\$20.00	\$19.00	\$20.00	\$20.00	\$20.00
No. 1 Cupola Cast	18.00	20.00	19.00	20.00	20.00	20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	20.00	19.00	20.00	20.00	20.00
Clean Auto Cast	18.00	20.00	19.00	20.00	20.00	20.00
Stove Plate	17.50	19.50	18.50	19.50	19.50	19.50
Unstripped Motor Blocks	17.50	19.50	18.50	19.50	19.50	19.50
Heavy Breakable Cast	15.50	17.50	16.50	17.50	17.50	17.50
Charging Box Size Cast	17.00	19.00	18.00	19.00	19.00	19.00
Miscellaneous Malleable	20.00	22.00	21.00	22.00	22.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.  
 Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.  
 Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.  
 \*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles dealers' No. 2 bundles and No. 1 busheling.  
 No. 1 chem. borings, 1 per cent oil, \$1 under No. 2, 1.5 per cent oil, \$2 under heavy melting steel. No. 3 bundles \$2 under No. 1 heavy melting; cast steel, \$2.50 over No. 2 busheling, \$2.50 under No. 1 heavy melting steel, auto springs, crankshafts, \$1 over No. 1 heavy melting. Blast Furnace Grades prices refer to mixed borings and turnings, stoveling turnings, and cast iron borings.  
 A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Philadelphia basing point includes the switching district of Newport, Ky. St. Louis basing point includes Cincinnati basing point.

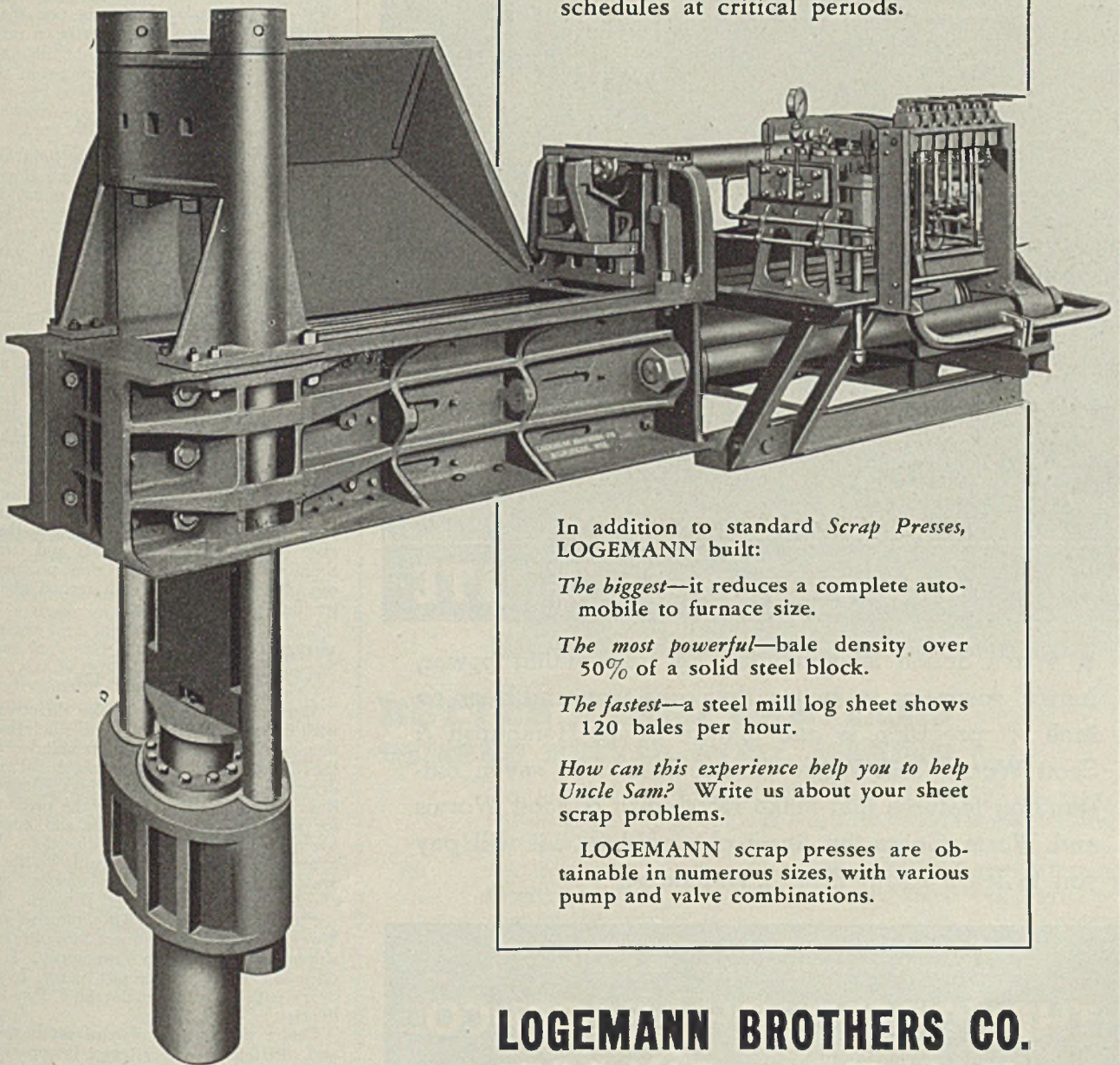


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In addition to standard *Scrap Presses*, LOGEMANN built:

*The biggest*—it reduces a complete automobile to furnace size.

*The most powerful*—bale density over 50% of a solid steel block.

*The fastest*—a steel mill log sheet shows 120 bales per hour.

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### LOGEMANN BROTHERS CO.

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Milwaukee, Wis.



**Sheets, Strip . . .**

Sheet & Strip Prices, Page 134

Leading sellers of hot-rolled sheets are quoting January shipments on new top-rated tonnage. One maker tentatively promises mid-January as his best. On the other hand, strip mills, somewhat relieved on plate tonnage, have some sheet and strip tonnage available for this year and in some instances have been soliciting orders.

Some sheetmakers have found allocations for warehouse account have disturbed delivery dates on some high-priority orders, instructions being to serve jobbers regardless of other preferences.

Limitation on tin plate production for fourth quarter has released cold rolling

facilities and has resulted in mills seeking cold-rolled sheet tonnage to keep equipment busy. Curtailment of many civilian articles has cut down demand for cold-finished material to a degree not made up by war uses. In some cases sellers have met considerable demand. An eastern mill can take some tonnage down to A-1-a priority and has found considerable tonnage with higher ratings. Occasionally a mill finds capacity open for some hot-rolled production, due to easing in demand for strip plate.

Contracts for about 4500 tons of 19 and 22-gage hot-rolled sheets for ammunition boxes have been distributed by an eastern manufacturer, shipments to start before the end of the year.

Difficulties of bottle cap manufacturers

under restricted tonnage of sheets for that purpose may be partially solved by use of thinner black plate of higher carbon content, experimental rollings now being made by a midwestern sheetmaker. By reducing the thickness the tonnage allowed can be made to go further, and repeated use of the caps will extend it further.

Bookings of narrow cold strip are heavy and in excess of quotas for hot strip with some rerollers in another spurt of buying. While the ratio differs with individual cold mills, indications are hot strip allotments will allow finishing operation schedules at 75 to 80 per cent of capacity, dependent on degree of ratings and importance of end-use. Users are rather sharply cut down on tonnage under PRP in some instances, inventories being an important factor in allocations covering the remainder of the year. Fabricators of cartridge cups, links and small arms ammunition are heavy consumers. A lend-lease contract includes 1000 tons, which may be reduced, of writing pen steel, material being processed mostly on razor blade equipment.

**Bars . . .**

Bar Prices, Page 134

Steel bar deliveries continue tight and except on directives deliveries are almost impossible to obtain over the remainder of the year, not only on larger rounds but on all sizes of rounds and also on flats.

Cold-drawn bar producers in some cases found deliveries of hot-rolled bars in October lagged behind schedule, with some carryover into this month. Inasmuch as October was the first month this plan has been in operation this was not unexpected. Better deliveries are expected this month, as the plan is worked out. Allocations on alloy bars to cold drawers go into effect this month.

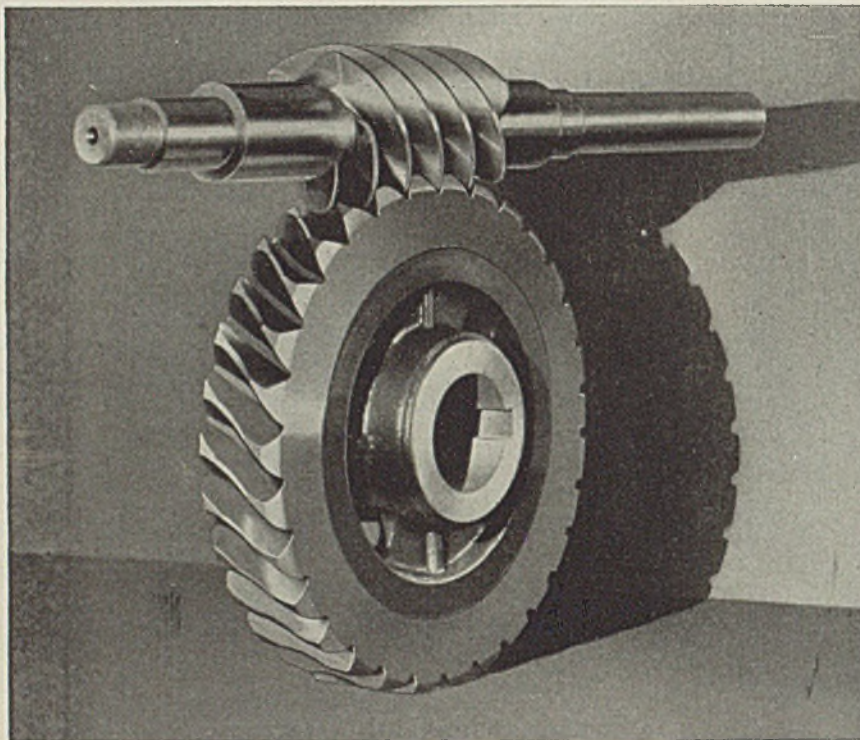
One eastern barmaker can offer shipment on small rounds during December, on top ratings, but this is the exception in that area. Most producers there can offer practically nothing this year and are in poorer position than ever on certain sizes of flats and large rounds. On some sizes one producer can offer little earlier than second quarter delivery.

**Wire . . .**

Wire Prices, Page 135

Wire mills operating under directives, with quotas on what and how much they may produce during the remainder of the quarter, are booking substantial orders covered by top AA ratings. Reductions under PRP are easing the pressure for some high carbon wires and opening up production in other directions. As a result deliveries on rope mill contracts are more extended; inventories are checked closer for better balance. In scattered cases where PRP allotments are lower, based on current inventories, shipments are held up temporarily. This does not apply to aircraft wires, however, with pressure maintained for deliveries.

Under the budget plan of production and distribution, the attempt is apparent to push more essential products ahead for war contract requirements and further restrict the less important wires, indications being deliveries will improve on some materials. In several cases more



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**GEARS AND SPEED REDUCERS**

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rods are likely to be available to non-integrated producers, semifinished quotas being relatively higher than scheduled finishing capacity.

**Rails, Cars . . .**

Track Material Prices, Page 135

Rail producers are receiving some rail contracts for 1943 delivery. Tonnages are not specified, the contracts to cover whatever may be allocated later by WPB. It is understood a number of standardization programs are under way for railroad equipment, one project being simplification of design for wheels.

The rail picture is somewhat uncertain. Rail mills estimate 1943 tonnage will be slightly more than 2,000,000 tons, or more than will be produced in 1942. The question now is ability of bar mills to meet demand for their products. Since the merchant bar market is probably the tightest of any steel market, rail mills have been called upon to help, particularly on larger sizes. In all probability, this will continue in 1943, and in addition, a fairly large proportion of the shell program is dependent on steel being rolled on rail mills. The picture is further complicated by the fact that railroads are not permitted to take delivery on rails until they intend to use them. This prevents stocking rails during the winter. This will no doubt create a bulge in the spring and it will be most difficult for rail mills to keep up with demand then.

Rail program during 1942 failed to reach the expected volume, and one of the reasons was that distribution of orders and available time on mills was not successfully co-ordinated. Unless there is some change in WPB policy, the same thing will hold true next year.

Last week the Pennsylvania opened bids on cross and switch ties and the New York Central on track fastenings.

Missouri Pacific has been authorized by the United States district court to buy 10,000 tons of 112-pound rails and sufficient accessories, to cost \$663,375.

**Structural Shapes . . .**

Structural Shape Prices, Page 135

Structural shape deliveries continue to average six to eight weeks, with a tendency to further delay, not so much from improved structural demand, which is light, as to limitations in steel supply. With building activity dull structural shops are relying increasingly on other types of work. As an example, Carolina Steel & Iron Co., Greensboro, N. C., has booked 760 tons of circular ship hatches.

Shipments of fabricated structural steel in September totaled 164,501 net tons, compared with 166,959 tons in August and 204,085 tons in September last year, according to the American Institute of Steel Construction. Tonnage shipped in nine months was 1,591,826 tons, compared with 1,674,632 tons in the comparable period last year. New business booked in September was 61,750 tons, smallest since the beginning of the defense program in 1940.

**Pig Iron . . .**

Pig Iron Prices, Page 136

Pig iron allocations for November fall about 85 to 90 per cent in priority classifications of A-1-k and higher, well in line with ratings in customer applications.

Some sellers see greater limitation on tonnage allowed this top priority group. In the experience of one producer fully 25 per cent of those applying for high-rated iron received less than asked for and in some cases none. This is attributed largely to inventories but in some cases to limitations on other materials entering into the manufacture of a product, rendering additional iron this month unnecessary. This is mainly the result of reductions under the Production Requirements Plan. The latter does not affect pig iron distribution directly but only through limitation of other products entering into an assembly.

Foundry operation is affected by lack of light castings orders with high priorities and foundries engaged in this class

of work are much handicapped and many are threatened with shutdowns. Steel foundries are actively engaged and are receiving sufficient iron for all essential products.

Fitting blast furnace production schedules into the whole is the major problem, resulting in some changes in analysis or short delivery delays if the specific grade is not immediately available. This situation has not developed seriously and applies for the most part to lower rated volume. Blast furnaces have little or no reserve stocks to draw upon to meet fill-in demand and frequently analysis is changed or the consumer has to wait until the wanted iron is available from current production. In a few instances, tonnage is re-allocated.

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Scrap . . .

Scrap Prices, Page 138

War Production Board officials call attention to the fact that steel and iron scrap gathered in current drives to uncover material in households and industrial plants is of non-recurrent character and can not be repeated. Definite figures on the result of the recent country-wide salvage effort have not been compiled, as much of the tonnage is still going through yards or has not yet reached yards for sorting and preparation.

Some melters have been able to establish fair reserves but in no case sufficient for winter requirements. New sources must be found to maintain the

flow necessary to support the high rate of steel production. Allocations to provide sufficient for many steel mills are in force and are to be continued. The board recognizes the necessity for continued effort to obtain scrap from other sources than the regular production in industrial plants if steelmaking is to be supported at the present rate.

In eastern Pennsylvania mills now have supplies for about 30 days, the best position in several months, but not sufficient for winter demand. The position in heavy breakable cast is less favorable than in steel scrap, due in part to disposition of dealers to break it to cupola size to realize the premium. Scrap shipments are on the increase and some large tonnages of rail scrap are scheduled to be

reclaimed in the next few weeks. Close to 20,000 tons owned by the Philadelphia Transit Co. may be scrapped and in southern New Jersey the public service commission is understood to have approximately 40,000 tons of unused rails scheduled for salvage.

Following the highly successful general salvage campaign, which lured from households and other sources a surprisingly large tonnage of scrap material, though not of high grade, a concentrated drive is being continued under direction of the industrial salvage section of the War Production Board. Results already are being achieved and the grade of scrap is better than in the case of the general drive.

The plan calls for direct visits by volunteers, mainly steel and warehouse salesmen, to industrial plants. Both production and dormant scrap are considered, the former when it has not been moving promptly. In many instances the salvage men have been taken through plants to make specific recommendations as to disposition of dormant materials and equipment.

Under this drive the Michigan Alkali Co., Detroit, has salvaged 3202 tons of scrap, of which 1500 tons has been scrapped in the past month. It consisted largely of old and wornout equipment at three plants and a limestone quarry. Ford Motor Co. has formed a board of review to examine borderline cases. The board inquires whether the material can be used for necessary plant replacement, for necessary standby purposes or used by some other manufacturer to advantage. If the answers are negative the material is scrapped.

Buffalo yards are overflowing and much material is being received from adjacent towns and villages. Scrap from outside the city averages much better grade than that collected inside. Material dumped on a city-owned vacant lot still is to be removed to dealer yards for sorting. Industrial scrap is being given preference in preparation as it requires less labor.

Facilities at St. Louis have been unable to collect from outlying centers the accumulations brought forth by recent drive. Movement to melters is hampered by lack of labor. One mill was able to add 500 tons to reserves during October but others with less essential war work are faring badly. Some apprehension is felt for the future, two large consumers completing units which will call for increased tonnages, Scullin Steel Co. and Commonwealth division of General Steel Castings Corp.

In the Chicago district supply continues to improve, with some gain in inventories as shipments slightly exceed current melt. However, apprehension is felt over small supply for winter.

Warehouse . . .

Warehouse Prices, Page 137

Many warehouses recently have been receiving only about 55 per cent of their quotas on numerous products but hope for 80 per cent when the new directive becomes effective Nov. 1. Demand continues heavy, emanating from all sections of the country and for all products handled.

Heavier replacements on some products are indicated under the new directives, with extensions of higher priorities under PD-83-g. On several finished steel items better receipts are expected by the middle of November. Several warehouses



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Core Ovens — Heat Treating Furnaces—Portable Mold Driers — Airheat Conversion Units.

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have already received deliveries on orders which have been on books for some time. Material covered by AA-1 and AA-2 rating extensions will be affected first and practically all tonnage will be directed into war contracts with corresponding priorities. Improvement in black sheets and larger diameter carbon bars is not expected until late in the month. Nail buying is holding at an unusually strong rate.

Since Aug. 1, warehouses have been permitted to sell most steel products on orders rated A-1-a or higher, except for small lots sold under repair and maintenance orders such as P-100. Certain other items, such as wire, nails, staples and farm fence, may be sold for repair purposes without a rating. This permissive feature of Order M-21-b regarding sales on A-1-a ratings actually has been a compulsion to sell against such ratings when material is available, in accordance with provisions of Priorities Regulation No. 1.

**Metallurgical Coke . . .**

Coke Prices, Page 135

Tightness in both furnace and foundry coke is a direct result of the coal situation. Coke consumers have rejected considerable coke in recent weeks, because of excessive sulphur, resulting from use of low-grade coal. Producers find difficulty obtaining sufficient coal with low sulphur and have been forced to use inferior grades and in many cases have been unable to guarantee sulphur content.

Upper limit of sulphur has been raised during the past few months but even these concessions are not enough to cover some coke now being shipped. Plans are under consideration to overcome this difficulty, particularly in by-product coke. Meanwhile it is almost impossible to increase by-product or beehive production, because of shortage of low-sulphur coal.

**Ceilings Established For Manganese Ores**

Office of Price Administration has issued regulation 248 for manganese ore, designed to stabilize major cost elements for manganese alloys. It will be effective Nov. 9 and provides a ceiling for all domestic sales of manganese ore of every kind, other than domestic battery or chemical ores, to any private buyer, as follows: (1) For metallurgical ores of base analysis of manganese 48 per cent, iron 6 per cent, silica plus alumina 11 per cent, and phosphorus not over 0.18 per cent on dry basis, 85 cents for Mobile and New Orleans, 90 cents for Norfolk, Baltimore, Philadelphia and New York, 96 cents for Fontana, Pueblo and Provo. (2) For battery and chemical, other than domestic; (a) highest charged for March deliveries; (b) if no deliveries, highest quoted list price; (c) price approved by OPA if not determined under a or b.

**Steel in Europe . . .**

Foreign Steel Prices, Page 137

London—(By Cable)—Heavy tonnage of plates and sheets is required for the shipbuilding industry in Great Britain. Locomotive building is also enlarged and steel requirements for this purpose are large. Further expansion of output

of special steel alloys is under way to meet definite needs in the war effort.

**Pacific Coast . . .**

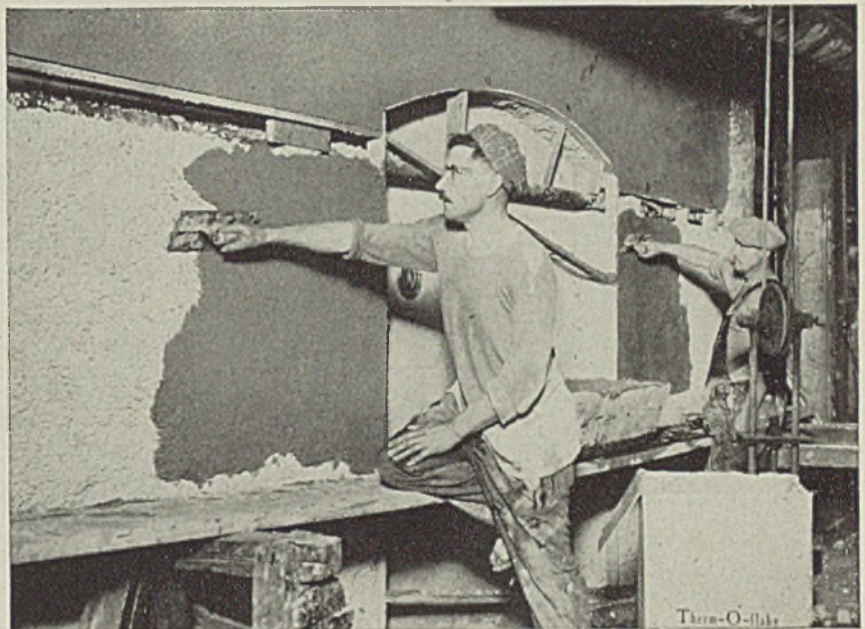
Seattle — Steel warehousemen are hopeful that proposed easing of priority regulations will permit them to replenish inventories, which are at an all-time low. Demand for all items in stock continues strong, it being impossible to fill many orders. Deliveries from mills are slow and uncertain. In addition to other problems, they are faced with a labor shortage.

The reinforcing market is slack, with few new inquiries and only small tonnages being up for placement. Substitutions, completion of the larger de-

fense projects and other factors account for this. However, mills report a continued strong demand for merchant bars, shops and shipyards being heavy buyers. Plants are unable to keep abreast of new business and are refusing orders, where possible, in an effort to reduce backlogs, which at present will keep them at capacity for five or six months.

First of a number of navy craft to be constructed at the new plant of the Everett-Pacific Co., Everett, Wash., the steel USS REBUILDER, was launched Oct. 24. This yard was assembled in record time. The first ship steel was laid May 15 and the contract is well ahead of schedule.

United States engineers at Portland and Seattle are awarding contracts al-



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COATING**

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- One inch thickness equivalent to about nine inches of fire brick wall in insulation value.
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most daily for air base and other projects in the Northwest area. Bids were received Oct. 25 and 27 for water supply pipeline and additions to air corps gas storage system in Idaho, also for disposal plant and outfall at the same base. Anderson Building Co., Spokane, has an award in excess of \$100,000 for sewage treatment plant in Spokane county. Other projects are under negotiation.

While the quality may be questioned, the volume of scrap being assembled in drives in this area confirms the fact that the public has become scrap conscious. After the year's contracts are ended, Seattle will still have 10,000 tons of street car rails for the scrap heap. Dulien Steel Products Co., Seattle, has pur-

chased the 20-mile narrow gage Nevada County railroad in Nevada, the 25-mile Silvertown Northern in Colorado and the 20-mile Port San Luis road in California for dismantling.

**Canada . . .**

Toronto, Ont.—Announcement by F. B. Kilbourn that the United States government has readjusted its steel allocation program as far as Canada is concerned, and this country will receive a larger quantity of steel than was indicated in the Oct. 1, report, will enable Canada to continue with its war production program on schedule. Plans were announced by the minister of munitions and supply some weeks ago that maxi-

mum war production would be reached about February of next year, but the proposed restrictions on steel from the United States temporarily threw plans in abeyance. Later word from Washington indicates that the original plan will be carried out.

However, to meet all steel requirements of the Dominion, much more drastic action is planned with regard to non-essential use of steel and also curtailment in production of certain war materials that now are running ahead of schedule and exceed current needs. Mr. Kilbourn also announced that Canadian steelmaking facilities will be further extended, but these enlargements will not be ready for several months. In the meantime, the Canadian government is going ahead with its industrial expansion program, and demand for steel of all types is increasing steadily.

Shipbuilding is given top priority rating in Canada and demand for plates, sheets and other steel on this account is continually expanding. Despite reports from Ottawa that there is no slowing down in ship construction through lack of steel, word was received from British Columbia in the past few days to the effect that shipbuilding in that area could be further extended if steel were available, and that some plants had been slowed down through shortage of some materials.

Canadian steel mill representatives state that orders are increasing for merchant bars, with heavy call recently for special alloy grades and high carbon bars. Curtailment in structural steel output is providing larger quantities of steel for bar mills and production of the latter materials has been increased in recent weeks.

While merchant pig iron sales hold at previous levels of about 8000 tons per week, it is reported further restrictions have been placed on sales, indicating a general tightening in shipments, with only more important war consumers favored. All pig iron orders must first be approved by the steel controller before acceptance by blast furnace operators.

Scrap offerings are well sustained, with principal receipts from the rural districts. Steel interests and government officials are making special requests for greater action in salvage campaigns and plans have been completed whereby a Dominion-wide collection campaign will be fully under way in a short time. Special attention is to be given to mining centers.

**Charles H. Norton Dead**

Charles H. Norton, 90, founder of the Norton Grinding Co., which merged in 1919 with the Norton Co., Worcester, Mass., died Oct. 26 in Plainville, Conn.

He learned the machinist's trade with Seth Thomas Clock Co., Thomaston, Conn., and joined Brown & Sharpe Mfg. Co., Providence, R. I., as assistant engineer in 1886. In 1890, he became a partner in Leland, Faulconer & Norton Co., Detroit, now the Cadillac Automobile Division, General Motors Corp. He founded Norton Grinding Co. in Worcester in 1900 and subsequently originated many modern methods of machine grinding and special machinery for grinding metals.



*Let's* **GET GOING**

**T**HE kids over the land know the importance of getting every pound of scrap into service—all of us in industry must make desperate efforts to collect scrap wherever it is, in plants, in yards, on farms—everywhere.

It means that obsolete equipment must get the axe—there can be no hedging. Old metal that does not work is a total waste at this time.

We know the critical condition for we use tons and tons of scrap to make crankshafts and other heavy forgings for the Nation's "Ships for Victory" Program. All of us know the urgency, so let's get going.

Even the kiddies know that every pound of scrap

is needed --- **THROW YOUR SCRAP IN THE FIGHT**



**ERIE FORGE COMPANY, ERIE, PA.**





## Hails Accident Prevention As Aid in War Effort

(Concluded from Page 46)

toughest of all problems—manpower substitution, declared A. J. Cochran, superintendent of Plant No. 1, Inland Steel Co., Indiana Harbor, Ind., in addressing the Metals section. This requires great diligence in safety and health programs because of the inexperience of many workers. A new man presents a 50 per cent greater accident risk than the man he replaces. To illustrate his point, he cited a few hazards.

It is customary to use alloy steel chains in handling hot blooms. High strength alloy metal is now scarce and, where possible, parts probably will be redesigned to permit use of medium carbon alloys.

Shipping requirements have changed so greatly that many new methods had to be developed and substituted for the old. Bundling and loading requirements for export require special handling. This has called for many substitutes over regular shipping practices and has spread the work over already crowded shipping areas.

### Paint on Scrap a Hazard

An additional hazard, Mr. Cochran mentioned, is the resort to inferior raw materials. Best example is the grade of scrap being received at mills now. The average number of pan cars per heat of steel has increased as much as 30 per cent due to bulky scrap. This bulky scrap which contains many painted articles causes so much fuming in the furnaces that charging car operators cannot see in the furnaces when charging. Special arrangements had to be made to insure the safety of workmen under the new conditions.

Only 34 per cent of our war contract plants today keep any kind of an accident frequency record, declared V. A. Zimmer, director of the division of labor standards, Department of Labor, Washington. "Unless and until safety sense can be substituted for safety cynicism, we shall go on wasting manpower in the face of an increasingly critical shortage of workers on our production lines," he warned.

There is no panacea for safety and no magic wand that will create 100 per cent safety—safety is horse sense and the art of driving horse sense into people is a science, asserted R. E. Frederick, safety director, International Business Machines Corp., Endicott, N. Y., before the Power Press section. Recognition of that basic set of principles, he said, was a controlling influence in decision of his company to create and run "pre-em-

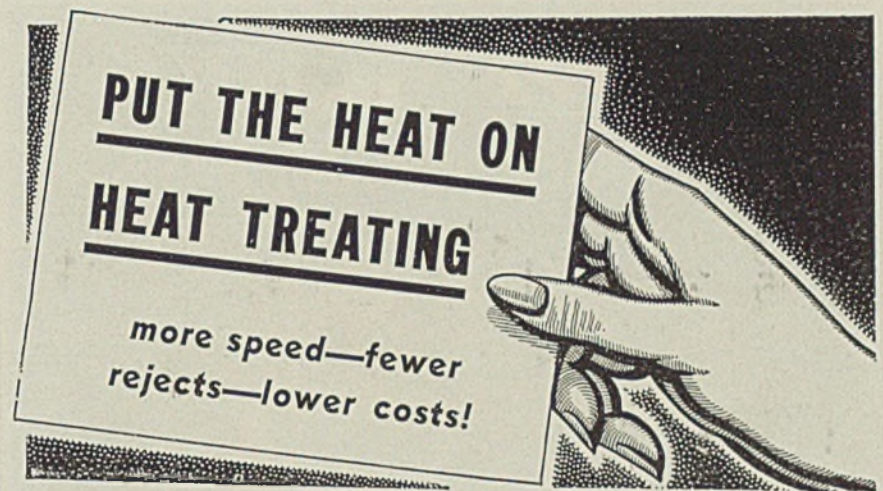
ployment schools" during the current difficult period.

"The training schools have been very satisfactory because they bring out the qualifications of the employes," he stated. "Many employes had been on jobs to which they were not adapted, and any test or pre-training that will show a person's qualifications is an excellent idea."

The accident prevention programs of plane manufacturing plants have been complicated by reason of a 2000 per cent jump in women employes over a 10-month period, declared W. S. Rhodes, safety engineer, Douglas Aircraft Co.,

Santa Monica, Calif., speaking before the Aircraft Manufacturing section. Around 90 per cent of these women never had seen more machinery than a kitchen mixer or a washing machine.

Continuing, he said: "Employment of women as punch press operators has focused attention more than ever on the problem of guarding punch presses, for even though the press is one of the most natural machines for women to operate, we in aircraft have had most of our lost-time accidents on them. For women to operate punch presses safely in our industry, I found that it was not a ques-



## "Turns 40% Reject Loss Into 100% Output Of Vital War Parts"

If the heat treatment of small parts is an important step in your production of finished war products. . .then read this!

One large manufacturer's total output was constantly being slowed down because of rejects that ran as high as 40% during heat treating. The remedy? Let Garrett do them! Today, hundreds of thousands of these parts are being heat treated by Garrett. . .held to the most exacting specifications. . .and there hasn't been a reject yet.

### LET GARRETT HEAT TREAT FOR YOU!

Whatever kind of small parts you are manufacturing—up to 2" x 2"—Garrett offers you the possibilities of more speed . . .no rejects. . .and resultant lower

costs. Our plant is fully equipped with the latest type of equipment to efficiently heat treat bullet cores, gun sight parts, fuse parts, etc. in small or large quantities—as much as 10,000 pounds daily. Exacting scientific heat control instruments guarantee you hardening and tempering that is held to a tolerance of within 2 points of Rockwell Hardness. Controlled heat treating which makes possible "Controlled Tension." That's why we have heat treated millions of parts without a single reject!

Before you place your next order for heat treating small parts—up to 2" x 2"—write, wire or phone Garrett. You'll be surprised at the quick service and high efficiency available. You'll be pleased with the reasonable prices.

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tion of guards, but a question of re-designing the tooling so that the woman worker would not have to hold the part in the machine."

Col. Stilwell was re-elected president of the council. This will constitute his fourth consecutive term. Ned H. Dearborn, 20 South Wacker drive, Chicago, was re-elected vice president and managing director.

Other officers named were: Vice president for education—Lewis A. Wilson, associate commissioner for vocational and extension education, New York state department of education, Albany, N. Y.; vice president for finance and treasurer

—Irwin W. Millard, president, Industrial Gloves Corp., Danville, Ill.; vice president for engineering and industry—Walter S. Paine, manager, engineering and inspection division, Aetna Life and affiliated companies, Hartford, Conn.; vice president for transportation—Lew R. Palmer, conservation engineer, Equitable Life Assurance Society of the United States, New York; vice president for membership — R. T. Solensten, vice president, Elliott Service Co., New York; vice president for home and farm safety —A. V. Rohweder, superintendent of safety and welfare, Duluth, Missabe & Iron Range Railway Co., Duluth; vice

president for public safety—Leslie J. Sorenson, city traffic engineer, Chicago; vice president for community councils—Judge Lee E. Skeel, Cleveland, president of the greater Cleveland safety council.

As might be expected, much attention was paid at this year's Safety Congress to matters pertaining to women workers, including training, working hours, and dress. The great influx of women into industry has forced emphasis on these problems.

## Republic Steel Mills Win Top Safety Awards

Republic Steel Corp. plant at Warren, O., won first place in the safety contest sponsored by the National Safety Council in the large steel mill classification, plants working 750,000 hours or more per month, 25 plants included in the group. The Warren plant had an accident frequency of 1.58 and had only 17 lost-time accidents in 10,753,734 man-hours. Second award was to a plant with 2.16 accident frequency and the lowest record was 10.45. The Warren plant since 1938 has won two firsts, one second and two thirds.

The Republic plant at Niles, O., finished first in competition with 37 others in the medium sized finishing and fabricating group with a perfect score, with no lost-time injuries, in 1,228,146 man-hours worked. Since 1934 this plant has received five first and two second awards.

Other safety awards to Republic plants included a first in group B steel plants, to its South Chicago plant, and first, second and third in group C rolling, finishing and fabricating plants. First was to Truscon Steel Co., Los Angeles, second to Union Drawn Steel division, Hamilton, Ont., and third to the Culvert division, Canton, O.

Awards were made to Frank E. Flynn, Warren district manager, G. H. McClain, superintendent of industrial relations, and H. H. McCorkle, safety supervisor, at the National Safety Congress in Chicago, Oct. 27.

## Foundry Equipment Sales Index Down in September

Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in September was 452.4, compared with 536.7 in August and 909.1 in July.

Total sales index was 446.4 in September, 510.8 in August and 800.8 in July. Index for repairs in September was 428.4, in August 443.0 and in July 474.0.

Indexes are percentages of monthly averages of sales to metalworking industries, 1937-39.



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**PRECISION-BUILT...to your specifications-  
MASS PRODUCED...for speed and economy-**

**FOR SUB-CONTRACTING  
WAR PRODUCTION, WE  
OFFER THESE SPECIAL-  
IZED SERVICES:**

- ★ ARC WELDING—hand, automatic or semi-automatic.
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Many manufacturers have found that they save time, cut costs and get a better job by letting SCAIFE design and build their tanks, cylinders and pressure vessels.

Years of rich experience covering thousands of designs of containers for water, air and gases, has given us a wealth of knowledge that is available to you.

You can use these facilities NOW—to your definite advantage.



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**Nonferrous Metal Prices**

Oct.	Copper			Straits Tin, New York		Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Anti-mony Amer. Spot. N. Y.	Nickel Cathodes
	Conn. del.	Midwest del.	Casting refinery	Spot	Futures						
1-28	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

*F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper*

Sheets	
Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes	
High yellow brass	22.23
Seamless copper	21.37

Rods	
High yellow brass	15.01
Copper, hot rolled	17.37

Anodes	
Copper, untrimmed	18.12

Wire	
Yellow brass (high)	19.73

**OLD METALS**

*Dealers' Buying Prices (In cents per pound, carlots)*

Copper	
No. 1 heavy	9.25-10.00
Light	7.25- 8.00

**Nonferrous Metals...**

New York—Henry P. Nelson, chief, System Planning, Bureau of Priorities, WPB, says industry now has converted to war production until productive capacity has passed the available material supply. It is evident, he said, that further changes are necessary in the priorities and allocation system. However, present controls will remain in effect during the balance of this year and, with some modification, during the first quarter of 1943.

Officials are still giving their utmost attention to the problem of satisfying the requirements of the armed forces. In a drastic move WPB reduced to practically zero the installation of copper in buildings. Under amended order M-9-c-4 use for his purpose is limited to not more than 25 pounds for repairs, and then only if the metal was in possession of the user on Oct. 27.

Despite a very comfortable supply of lead, there is a distinct shortage of common grade lead, being about 50 per cent less than a year ago. Officials of the Lead Branch oppose any increased use of lead for other than war or essential civilian work and may decide to discard the proposed liberalization of the lead conservation order.

It is now up to military buyers to specify lead as an alternate material for war work to release more critical metals and, at the same time, it is up to the lead fabricating industry to bring new military uses of lead to the attention of proper officials.

**Tin Plate...**

Tin Plate Prices, Page 135

Tin plate production has been reduced to about 40 per cent of capacity in some districts, the recent order to cut further causing about 10 per cent deeper slash. This adjustment places output in closer relation to allowable uses. Electrolytic lines are carrying much of the present load as the coating is thinner than in the hot-dip process, saving much tin.

Brass	
No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc	
Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum	
Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead	
Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys	
Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50

**SECONDARY METALS**

Brass ingot, 85-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

**MAGNESIUM**

(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

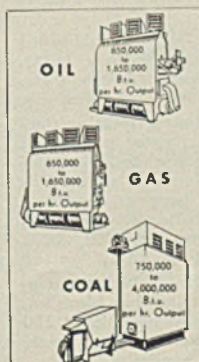


**T**ABULATION of Weights of one recent heating job showed that a Dravo Direct Fired system required 350 tons less of vital metals than would be required for a conventional heating plant!

A few years ago a steam plant and distributing system for heat were practically foregone conclusions when plans for industrial buildings were formulated. Today heat produced direct by Dravo Heaters

has been proved to be more, economical of materials—manhours—money—and time! It's easier to get materials when you can prove this!

Acceptance and increased use of the Dravo Direct Fired method of heating industrial buildings over the last 10 years merit the thoughtful consideration of anyone—architect—consultant—heating engineer—plant owner—purchasing agent—anyone who has anything to say about specifying or purchasing heating equipment for needed war production plants.



Complete description of construction and function of Dravo Direct Fired Heaters as well as comparison table showing savings they offer in weight, floor space and fuel consumption, will be found in Dravo Bulletin No. 506, available upon request.

**DRAVO CORPORATION**  
 HEATER DEPARTMENT  
 Sales Offices in Principal Cities  
**DRAVO BUILDING PITTSBURGH, PA.**



# NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries,  
Sub-Contract Opportunities, Contracts Placed and Pending

## SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

**Keefer-57-1:** A government agency is interested in obtaining subcontracting facilities for manufacture of precision dies for radio tube parts.

**O'Hara-53-1:** New Jersey concern requires machining facilities for water cylinders and powder containers. Steel castings furnished by prime contractor and are available immediately. Cylinders weigh approximately 8020 pounds and powder containers about 6020 pounds. Machines required are horizontal boring mills with 5 to 7-inch bar with 6-inch horizontal travel, vertical boring mill, 60 to 72-inch head clearance or engine lathe, 60-inch swing and 72 inches center to center. Requirements, 3000 to 5000 hours before March 1. Priority AA-3.

**Roystuart-57-1:** Government agency requires 22,000 spray body vanes. Machine tools required, precision lathe, No. 1 universal milling machine. Material, naval brass, type 1, half hard. Close tolerance. Overall dimensions, finished diameter .330-inch, length .443-inch. Solid. Material not supplied to contractor.

**Roystuart-57-2:** Government agency requires 112,522 special cap screws, three types. Machine tools required, automatic and hand screw machines, ½-inch spindle; bench-type miller and drill press, heat treat and cadmium plate. Overall lengths, .938 to 1.031-inch. Tolerances, .005. Material steel, navy specification 49-S-2 alloy No. 3. Material not supplied to contractor.

**Roystuart-57-3:** Government agency requires 102,200 check valve plungers. Machine tools required, automatic screw machine ¾-inch spindle, bench milling machine, centerless grinder. Tolerance, .005. Overall dimensions, .281 x 1.950-inch long. Material, brass, navy specification 16-B-6, type 1 half hard. Material not supplied by contractor.

**Roystuart-57-4:** Government agency requires 4700 spacers. Machine tools required, automatic screw machine 1½-inch spindle, heat treat, internal, cylindrical and surface grinders. Material, navy specification 49-S-2, alloy No. 3. Tolerance, .0005. Finished overall dimensions, 1.5-inch O.D. by 1.181-inch I.D. by .450-inch long.

**Roystuart-57-5:** Government agency requires 47,420 locating pins. Equipment required, hand screw machine with ¼-inch spindle. Material, navy specification 49-S-2, alloy No. 2, Rockwell C-25 to C-30. Material not supplied to manufacturer.

**Roystuart-57-6:** Government agency requires large quantities conduit couplings, adapters and connectors. Machine tools required, automatic screw machines spindles from ¾-inch up, turret lathes, spindle size up to 4 inches, hand screw machines or bench lathes. Material, aluminum alloy, hex bar stock, navy specification AA-A-351, cond.

T, specification QQ-A-601, class 4; specification AN-QQ-A-366. Overall dimensions O.D. from 11/16 to 3¾-inch, length from ¾ to 1½-inch. Material not supplied to contractor.

**Roystuart-57-7:** Government agency requires up to 1600 barrel spring case assemblies per month for duration. Machine tools required, engine lathe 14-inch swing, butt welder for tubing O.D. 3.666-inch, .150-inch wall. Swedging machine to reduce 25/32-inch end of tube from 3.666-inch O.D. to 2.612-inch O.D., heat treating. Pull test, 10 tons. Tolerance, .005. Material, seamless steel tubing, SAE 4640 and drop forgings SAE 4640. Forgings will be furnished. Overall dimensions, 14¾ by 6¾-inch.

**Roystuart-57-8:** Government agency requires 37,570 engine control rod terminals. Machine tools required, turret lathe No. 3 Warner & Swasey or equivalent, bench drill press and milling machine. Minimum 300-pound drop hammer, cadmium plating. Tolerance, .002. Material, SAE 1035 steel forgings. Overall size 1¾-inch by ½-inch. Material not supplied to contractor.

**Roystuart-57-9:** Government agency requires large quantities of turnbuckle eyes. Machine tools required, screw machines from ¾ to 1½-inch spindles, bench milling machine, drill press ½-inch chuck. Tolerance, .006. Material, nickel steel, navy specification 12-T-7. Overall dimensions, ¾ to 1.188-inch wide by 1.697 to 4.219-inch long. Material not furnished to contractor.

**Roystuart-57-10:** Government agency requires 69,000 shackles. Machine tools required, 300 to 500-pound drop forge hammer, drill press ½-inch chuck. Tolerance, .010. Material, nickel steel, navy specification 12-S-13, grade 1. Overall dimensions, ¾ to 1¼-inch wide x 1.266 to 3.188-inch long. Material not furnished to contractor.

Detroit office, Contract Distribution Branch, Production Division, WPB Boulevard building, is seeking contractors for the following:

**Job No. 2313:** Insert for Ogive windshield. Screw machine stock, tubing. Hand screw machine. Order is for 10,000 per day on A-1-a priority.

**Job No. 2332:** Anvil. WDX1314 cold-rolled steel, which is furnished. (¾-inch O.D.). Automatic screw machine, cadmium plate. Order is for up to 150,000 pieces per month.

**Job No. 2343:** Prime contractor seeks production facilities on various motor parts, such as connecting rod assemblies, cylinder heads, crank case, valve rocker arms, various types of bearings, housing assemblies, gears, crankshaft, camshafts. Jobs involved number 39. Orders are for 4000, 6000 and 10,000 units. Priority is AA-1.

**Job No. 3088:** Main gear. Machining operations on steel castings to be furnished. Vertical boring mill, two operations, 100 inches O.D., gear hobber, involute tooth. Order is for 12 on A-1-a priority.

**Job No. 3089:** Main pinion. Machining operation on steel forgings to be furnished. Vertical boring mill 18 inches O.D., two operations, gear hobber, involute tooth, heat treat. Order is for 12 on A-1-a priority.

**Jobs No. 2558 to 2565:** Local contractor is in urgent need of production facilities on a number of jobs. Various quantities are involved and reference is made to prints in exhibit room. Priority is AA-1. Jobs include end push ball rod, slinger-propeller shaft, pin valve, socket valve tappet ball, plug crankshaft crankpin, bushing, sleeve and nut imog shaft, body oil pressure relief.

**Jobs No. 2659 to 2731:** Prime contractor requires facilities to produce three assemblies, including folding cylinder wing assembly, folding cylinder wing lock assembly, hand pump selector valve assembly. Material is furnished. Various types of equipment is necessary. Orders are for 1000, 2000 and 3000. Priorities are A-1-a. Prints for reference in exhibit room.

**Jobs No. 2732 to 2738:** Prime contractor seeks production on six jobs, including spray whirler, check valve seats, check valve nozzles, inner valve seats, injection pump cylinder, injection pump plunger. Material is furnished. Delivery to start Nov. 1.

**Jobs No. 2843, 2845, 2847, 2849:** Prime contractor requires forging facilities on four jobs. Include rocker beam, track wheel, track shoe. Bearing bracket. Priority AA-1. Order is for 19,000 monthly for three and 125,000 monthly for fourth.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

**S.O. No. 270:** Sources required for manufacture of wide variety of generator parts, gears, pinions, bushings, housings, shafts, bearing assemblies, etc. Turning, boring and drilling capacity required. Deliveries extend to March, 1943. Drawings at Minneapolis office.

**S.O. No. 279:** Local prime contractor seeks source for manufacture of various bakelite molds and molded parts. Drilling and tapping required on some. Parts are small and require high accuracy. Drawings at Minneapolis office.

**S.O. No. 260:** Sources needed for manufacture of aircraft engine parts, including valve tappets, studs, piston pins, bushings, etc. Grinding operations required on most parts. Tolerances close. Samples at Minneapolis display room.

**S.O. No. 281:** Minneapolis firm wants 7000 hours on 10 or 12-inch engine lathes for highly accurate precision work. Also 14,000 hours on 6 or 10-inch hand millers for accurate precision work on small parts.

**S.O. No. 271:** Cleveland prime contractor wants forging capacity, production basis, large quantity of shifting levers. Drawing at Minneapolis office.

**S.O. No. 276:** Minneapolis manufacturer needs capacity on 4 or 6-spindle automatic to machine 150,000 trunnions from 1¼-inch round stock. Tolerance, .001.

**S.O. No. 277:** Several small screw machine parts in quantities from 2000 to 50,000. Material, brass. Closest tolerance is .001. Sizes from .09-inch to .75-inch diameter.