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STEEL

ESTABLISHED 1882

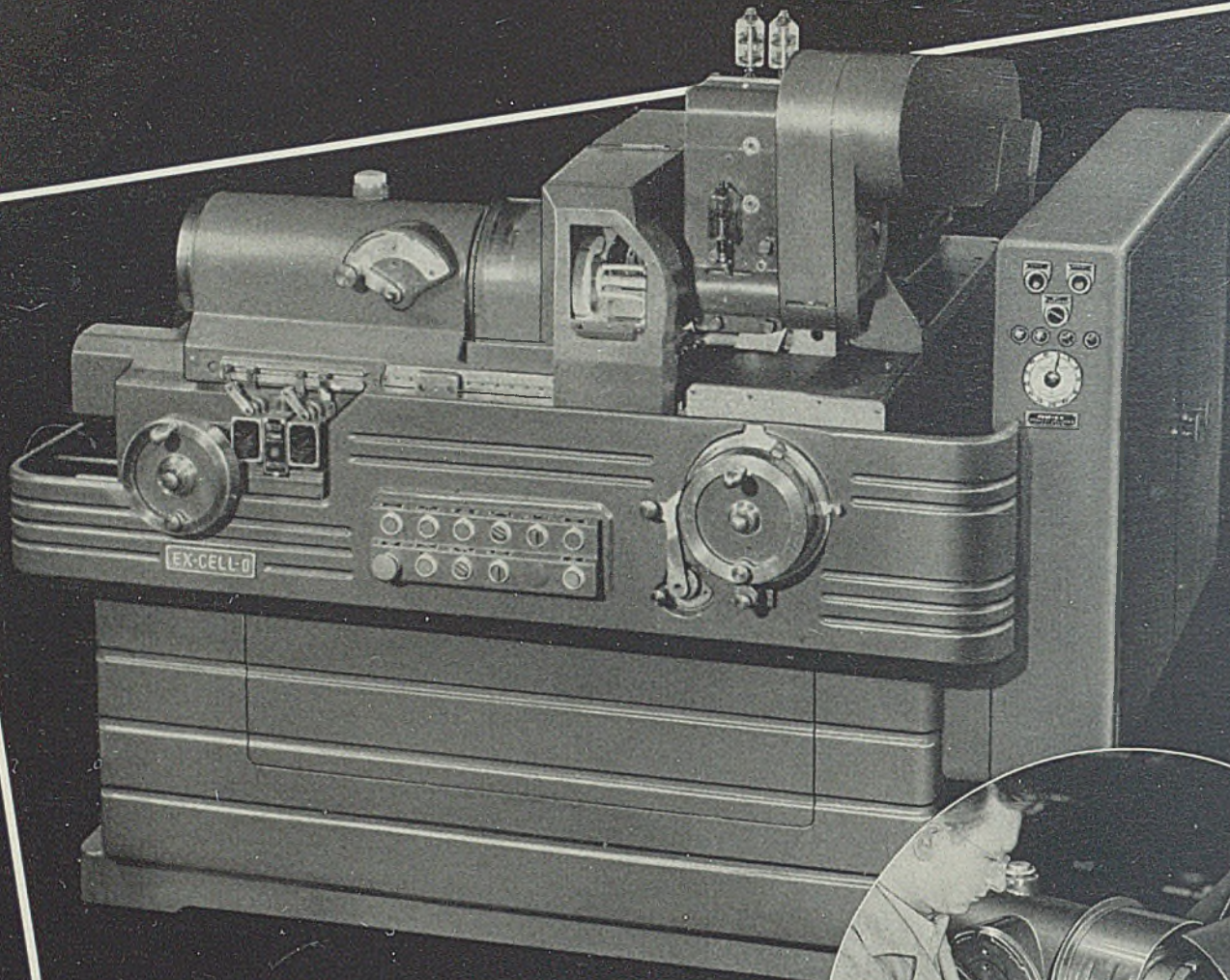
Contents

Volume 110—No. 8

February 23, 1942

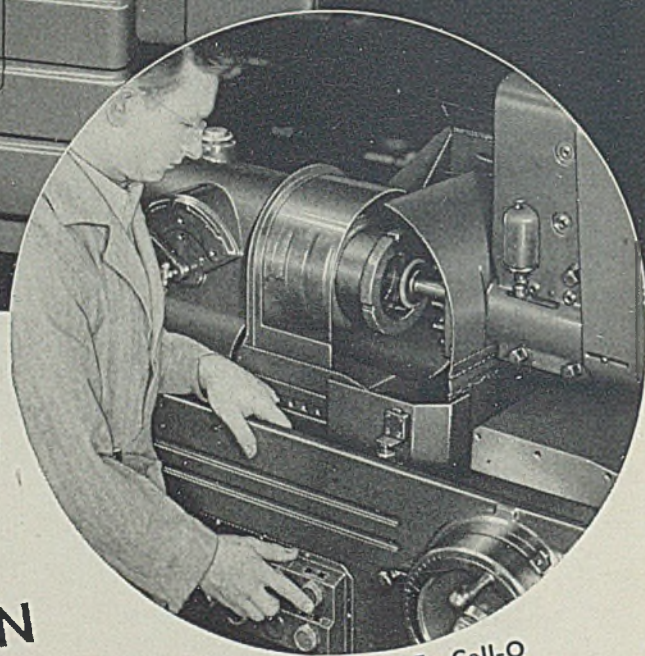
BEHIND THE SCENES WITH STEEL	4
HIGHLIGHTING THIS ISSUE	19
NEWS	
\$750,000,000 in Subcontracts Placed by Automobile Companies in First Month of Conversion	21
"Camouflage", Says Little Steel to Davis' Closed Shop Proposal	23
Steelworks Operations for Week	25
Men of Industry	26
Nelson Appoints WPB Planning Board of Three Members	29
Iron, Steel Branch Reorganized	30
Interior Department "Converted" to Mobilize Strategic Resources	30
Control Over Plate Production, Consumption, Allocation Tightened	36
Pre-assembly Speeds Building of "Ugly Duckling" Cargo Vessels	37
Scrap Consumers To Bid for Derelict Automobiles Within 90 Days	40
Engineer Sees Vast Scrap Tonnage Available at Remote Western Points	40
Control Over Aluminum Allocations Consolidated in One Order	47
Activities of Steel Users, Makers	48
Government Work Takes 70 Per Cent of Fabricated Structural Steel	49
"Essential Steel Needs To Exceed 1942 Output," Del Monte Group Hears	50
Obituaries	130
WINDOWS OF WASHINGTON	32
MIRRORS OF MOTORDOM	43
EDITORIAL—Nelson's Ten Silver Months	54
THE BUSINESS TREND	55
TECHNICAL	
Salvaging Worn Tools—By Herbert E. Fleming	58
Important Factors in Forging Practice—By Arthur F. Macconochie	60
Carbide Tooling Usually Involves Decreased Forces on Work and Tools —By Paul H. Miller	85
<i>Materials Handling</i>	
Spring Making—By C. W. Bartlett	66
<i>Finishing</i>	
Direct Radiant Drying Speeds Application of Heavy Synthetic Finishes— By Don A. Jacobson	72
<i>Progress in Steelmaking</i>	
Cold Rolling Strip Steel at 3900 Feet Per Minute—By J. D. Campbell and J. R. Taylor	78
<i>Joining and Welding</i>	
How Series Capacitors Reduce Peak Demands of Resistance Welders— By R. E. Marbury	88
INDUSTRIAL EQUIPMENT	94
HELPFUL LITERATURE	107
MARKET REPORTS AND PRICES	109
CONSTRUCTION AND ENTERPRISE	130
INDEX TO ADVERTISERS	138

PRODUCTION • PROCESSING • DISTRIBUTION • USE



TO LEFT: 39-A Internal —one of nine modern styles of Ex-Cell-O Standard Precision Thread Grinders being widely used today by war production industries.

BELOW: Precision grinding internal thread on aircraft part, typical of thousands of war production parts being accurately, speedily and economically ground on Ex-Cell-O precision thread grinders.



TODAY'S PRODUCTION CALLS FOR EX-CELL-O PRECISION

Ex-Cell-O's wide experience in designing and building precision machine tools makes Ex-Cell-O engineers exceptionally familiar with production requirements in today's emergency. Take, for instance, precision thread grinding, almost indispensable in the aircraft and other war industries where hardened threaded parts must be finished to the highest degree of accuracy. Ex-Cell-O engineers have designed nine standard thread grinders—automatics, universals, plain production machines. This variety in style and the flexibility in use of these Ex-Cell-O machines enable a manufacturer to select a standard machine that will meet specifically his exact thread grinding requirements today and provide him with equipment that can be readily and profitably adapted to production of civilian needs tomorrow. Because of their soundness in design, their thoroughness in construction, their simplicity and efficiency of operation, and their modern styling, Ex-Cell-O standard thread grinders are proving the first choice of America's war production industries.

EX-CELL-O CORPORATION • DETROIT

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EX-CELL-O means PRECISION

HIGHLIGHTING

THIS ISSUE OF

STEEL

STEEL'S guide to "Priorities, Allocations, Prices," completely revised and brought up to date, appears as Section Two of this issue. Between its covers are digests of all government priorities and price orders under which business under today's conditions must function. . . . So heavily have war orders increased that many steel companies (p. 109) now are unable to ship against commitments carrying lower than A-10 priority ratings; plate orders now may not even be scheduled (p. 36) unless they bear A-10 or better; the railroads so far in February have bought about 7000 cars, largest number since June of 1941. . . . Sign of the times (p.48) is a new file sharpening plant.

. . . .

In reporting on progress in converting the automobile industry to war production Ernest Kanzler (p. 21) says a delaying factor is the difficulty in obtaining releases from the Army and Navy on impending purchases; on the work that has been placed great ingenuity has been shown in getting into production despite lack of usual equipment. . . . Higher priorities now rule on aircraft construction (p. 33); refrigerator production is to be prohibited after April 30; installation of gas heating furnaces is curtailed in 17 states; large coal and coke users are asked to build up inventories. . . . "Ugly Ducklings," a term not in keeping with these sleek ships, are being launched one a day (pp. 37, 50) and shortly will be launched two to three daily.

. . . .

Cincinnati tool and die shops have pooled facilities (p. 39); sales of light aircraft have been limited. . . . An engineer (p. 40) cites large quantities of scrap at remote Western points. . . . Madagascar flake graphite is under control (p. 47); manufacturers whose production has been limited cannot acquire other manufacturers' quotas without permission; tungsten limitations are tighter; facsimile signatures are

Closed Shop Camouflage

permitted on priority extensions. . . . The steel industry protests against the proposal to settle its closed shop issue on the Marshall Field formula and (p. 24) cites President Roosevelt's publicly announced attitude. . . . Use of metals in musical instruments is limited (p. 30); shot and bullet steel is under allocations; lead price schedules are clarified; WPB's Iron and Steel Branch is reorganized. . . . Steel container and automotive parts manufacturers have industry advisory committees (p. 32); "Dollar-a-year" men are selected under a new method.

. . . .

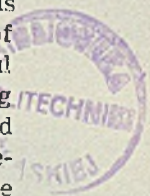
Section III of STEEL's forging series is devoted to major practical considerations governing forging practice. Professor Macconochie mathematically analyzes the forces acting and shows (p. 60) the limits of the diameter-thickness ratio in forging. . . . Don A. Jacobson explains (p. 72) how direct radiant drying speeds application of japan and other heavy finishes. . . . J. D. Campbell and J. R. Taylor concluded their description of high speed cold rolling (p. 78) by analyzing the control. . . . Electric resistance brazing is shown (p. 85) to offer a means of accurately controlling the amount of heat put into the joint.

. . . .

An efficient program for salvaging small tools proves successful at International Harvester plants. In describing it, Herbert E. Fleming offers (p. 58) a practical solution to the problem of how to get small cutting tools to keep machine tools going. . . . C. W. Bartlett details (p. 66) sequence of operations in production of heavy volute springs and leaf springs. . . . Paul H. Miller explains (p. 85) why carbide tooling usually involves decreased forces on work and tools instead of greater forces as popularly believed. . . . Series capacitors greatly reduce the peak current demands of resistance welders, according to R. E. Marbury who tells (p. 91) how they work.

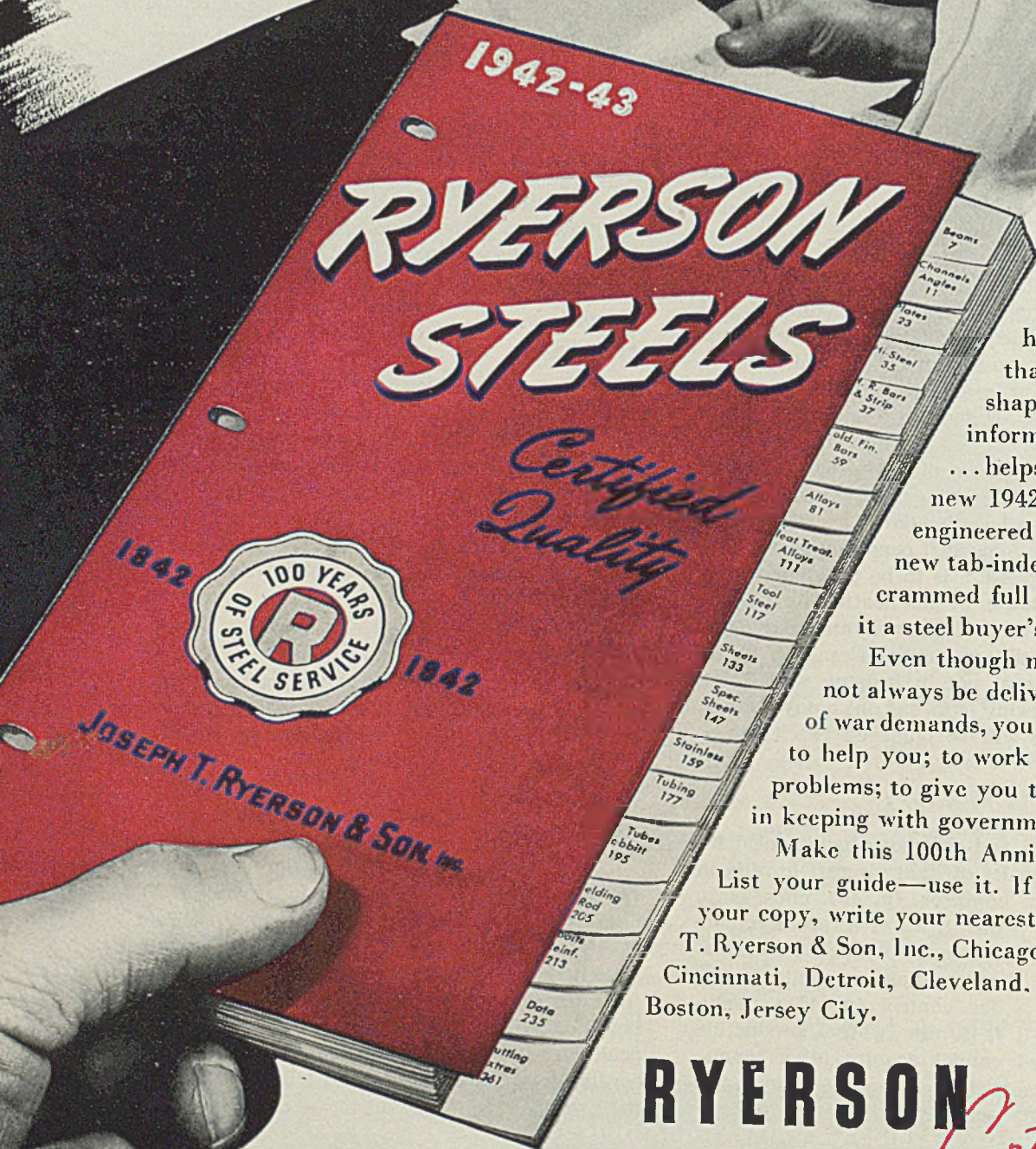
Forging Practices

Salvaging Small Tools



Here's Your PRODUCTION AID

The RYERSON 1942 STOCK LIST



Ryerson again assembles complete and helpful listings of more than 10,000 steel sizes and shapes...puts comprehensive information at your fingertips...helps you order steel. This new 1942 Ryerson Stock List is engineered for convenience—quick—new tab-indexed, handy pocket size, crammed full of facts that will make it a steel buyer's "book of knowledge."

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\$750,000,000 in Subcontracts

Placed by Automobile Companies

In First Month of Conversion

◆

Great majority of plants in suppliers' group only half converted . . . Companies not considered fully committed unless producing at least twice their 1941 dollar volume . . . Double present employment required . . . Kanzler reports progress

◆

DETROIT

TO THE call of "shoulder arms" the automotive and motor parts industries are responding just as rapidly as available tooling facilities and the rate of contract authorizations permit. Directing the vast reorientation is the automotive branch of the WPB, headed by Ernest Kanzler in Detroit, assisted by I. J. Reuter, in past years president of the Buick and Oldsmobile motor companies, and an expanding corps of technical and production experts.

Mr. Kanzler, in rapid-fire fashion, hit the high spots in a progress report of the auto industry's conversion effort at a press conference last Thursday.

Bottleneck in tool and die shop capacity is being blasted by conclusion of an agreement on wage stabilization Wednesday which, it is hoped, will pave the way for more rapid upgrading of trainees, especially in the independent shops where unions have been resisting training programs. Mr. Kanzler said that the 22,000 tool and die makers employed in the 274 plants in the Detroit area were not sufficient to handle the present tool and fixture load, that another 6000 are needed in the independent shops alone.

The automotive branch, for statistical purposes, has divided companies comprising the automobile

industry into four groups—the "big three" passenger car makers, six independent passenger car plants, 41 truck builders, and 152 suppliers out of a list of 1300. The latter group, all employing over 500, does 80 per cent of the business of the entire group. As of Jan. 29, 122 of these 152 were converted to war work 54 per cent on the basis of employment and 48 per cent on the basis of dollar volume of output.

When tooling is completed on present orders, they will employ 154,000 against a peak of 173,000 last year, and when running at full capacity on present orders they will produce \$116,000,000 a month, or 104 per cent of 1941 production level.

Must Double 1941 Output

Mr. Kanzler pointed out that companies generally are not considered fully committed on war work until they have agreed to produce in dollars at a rate equal to at least twice their 1941 base figure. Where subcontracting is feasible, this ratio is set higher, even to three or four times the 1941 base. Such increases are possible because war products are more expensive, and the work week has been considerably lengthened.

Analysis of war product commitments of General Motors, Ford

and Chrysler shows that when they are operating at full capacity on their present orders, they will be running at an annual rate of \$10,500,000,000, or 2½ times the volume of 1941.

During January the big three companies placed with suppliers orders totaling \$545,000,000 while six other auto companies placed orders for \$75,000,000, and other companies \$133,000,000, making a total of \$754,000,000 worth of business placed by these prime contractors with subcontractors during the first month of this year. The rate is continuing through February, will increase in March.

Labor load on the motor industry, in the face of its anticipated assumption of 25 per cent of the war production volume, will pick up in July. Not only will all former workers be recalled, Mr. Kanzler observes, but it will be absolutely necessary to recruit new employees, including many women. Before the automotive industry hits its peak war production schedule, it will need between 800,000 and 1,000,000 employes, compared with 550,000 during peacetime.

In the face of WPB estimates indicating a machine tool shortage amounting to one billion dollars this year, the maximum usage of available machinery is imperative. Hence the automotive branch has completed a telegraph-

ic survey of a list of "critical" machines and is now working out the most efficient distribution of this machinery.

One difficulty which the branch has met is the inability to get releases from the Army and Navy on impending purchases. Now in process of submission to the Army and Navy is a lengthy list of war products which the automotive industry is prepared to supply, but for which no contracts have been placed.

With respect to the critical position of new machine tools, it is pointed out that ingenuity of plant mechanics often will solve the problem of where to get machines. A specific case is that of a company making 20-millimeter shell boosters. Rather than wait two months for delivery of a machine to burr holes inside these boosters, this company rigged up a home-made machine equipped with a dental burr. In the same plant, mechanics built up in 60 hours a machine to ream holes, while the plant superintendent devised another machine from a fan base and two pieces of machine steel, to check treads on boosters. Finally, an old standard arbor press was converted into an air-operated machine which stakes screws in the shell boosters at a rate of 470 an hour, using a girl operator who herself was converted from a fashioner of looseleaf notebook binders.

OEM Records Detroit Conversion Effort in Motion Picture Short

Two motion picture crews from the Office for Emergency Management in Washington began grinding their cameras in Detroit and vicinity last week, starting work on a new movie "short" in the OEM series dealing with the war effort.

The film now in production will provide the nation with a graphic documentary record of Detroit's immense industrial conversion program from civilian to full-time war production. Virtually all of the district's important war industries will be covered by the OEM cameras.

Detroit Labor Section Aids WPB Automotive Branch

A Labor Section attached to the Detroit Automotive Branch of the WPB will be headed by Frederick H. Harbison. The section, representing the Washington Labor Division of the WPB, will have charge of labor relations, supply, training, housing and transportation.

Others in the Labor Section, assigned from various governmental agencies, include: George Seltzer, Chicago, who will serve as general

assistant to Mr. Harbison and specialize in employment; Allen Strachan, Detroit, labor relations; John Thurston, Detroit, of the Michigan Employment Service; Theodore Veenstra, Washington, who will coordinate housing and transportation of war production workmen; and William Conover, in charge of training programs.

70-Hour Week Lowers Workers' Efficiency at Ford Plant

Shortage of aluminum plus decrease in worker efficiency as a result of a long work week has resulted in trimming work schedules at the tool and die shop and airplane engine plant of Ford Motor Co., Detroit. Engine plant has ceased Sunday work and the work week will comprise six 10-hour days. Tool and die shop will close Sundays and work five 10-hour days and 8 hours on Saturdays.

In view of the payment of over-

time, the reductions will mean 20 hours less pay per week for engine plant workmen, and 23 hours less pay for the tool and die shop workmen.

The 70-hour work week in the tool and die shop resulted in a drop in efficiency from 500 man-hours per unit to 700 man-hours per unit, the company stated.

New Jersey Unemployment Highest in Three Years

Unemployment in New Jersey in January was at the highest point in three years, the state unemployment compensation commission reports. January benefits totaled \$2,619,936, about \$250,000 in excess of payments in March, 1939, when the present system was established. An average of 42,328 persons received weekly checks in January. The condition is attributed to heavy layoffs at the end of the year by employers not engaged in war work.

Tanks on Way to Front Line Action



INDICATIVE of the aid America is giving the United Nations are these United States tanks being hoisted from a barge to cargo ship which will take them to a far-away but undisclosed battle line. Wide World photo

"Camouflage" Says Little Steel to Davis' Closed Shop Proposal

◆

Four companies reject War Labor Board chairman's suggestion for "voluntary maintenance of membership and checkoff" . . . Companies hold real issue today is national security, not union security

◆

EMPHATIC protests against the closed shop in either open or camouflaged form were expressed last week by independent steel companies. The protests were called forth by Washington reports that William H. Davis, chairman of the War Labor Board, proposes to use the "Marshall Field formula" in settling the controversy between the independent companies and the Steel Workers Organizing Committee, now pending before the board.

The union has demanded a closed shop and \$1 a day wage increases from Bethlehem Steel Co., Republic Steel Corp., Inland Steel Co. and Youngstown Sheet & Tube Co. A fact-finding panel of the War Labor Board will begin deliberations on the case Feb. 24.

The "Marshall Field formula" is called a "voluntary maintenance of membership clause and voluntary checkoff" by the War Labor Board. The steel companies call it a "clever camouflage".

It resulted from the board's settlement of a dispute between the Textile Workers of America-CIO and the Marshall Field & Co. at Spray, N. C. Text of the clause follows:

"All employes who are now members of the union or who may in the future become members will be required as a condition of employment with the company to maintain their membership in good standing during the life of this contract: Provided, that this provision shall apply only to employes, who, after the consummation of this agreement, individually and voluntarily certify in

writing that they authorize union dues deductions, and will, as a condition of employment, maintain their membership in the union in good standing during the life of the contract. Upon receipt of the above authorization, the mill agrees to deduct from the weekly earnings union dues in the amount of 25 cents per week, to be paid to the union."

Union demands for closed shop have long been recognized as a major threat to uninterrupted war production. The danger apparently was minimized last November when President Roosevelt promised there would be no closed shop by government decree.

A few weeks later, however, an arbitration board, carefully weighted, granted the closed shop to John L. Lewis' United Mine Workers—

War Plants Lose 661,976 Man-Hours in Month

Work stoppages continue to impede production despite the war and despite the labor unions' pledge not to strike.

A survey by the National Association of Manufacturers reveals 68 strikes in January resulted in loss of 2,412,200 man-hours. Forty-three of these were in plants producing war materials and caused a loss of 661,976 man-hours.

According to the association, the lost time in war plants would have been sufficient to build four 170-foot steel submarine chasers.

the news coming simultaneously with the news of the attack on Pearl Harbor.

The steel companies involved in the present dispute have strongly attacked the Davis proposal. Republic Steel Corp. terms it "vicious" and charges the supposed "voluntary" action is a false cloak. The company's statement:

"According to Washington dispatches, the so-called voluntary maintenance of union membership clause used in the settlement of the Marshall Field case before the National War Labor Board is to be offered as a compromise substitute for the CIO closed shop demand upon Republic and three other 'Little Steel' companies.

"That plan, in the opinion of this company, is nothing more than the closed shop under a different name. This company is opposed to it or any other form of closed shop, no matter what it is called or how it is camouflaged.

"Moreover, we have made a careful check of the other steel companies involved and find none who favor such a plan.

"The plan is all the more vicious because its real purpose is to force men to become, and remain, members of unions under a false cloak of supposed 'voluntary' action on their part. The big job today is to keep plants running at capacity. Every worker should have the right to do his job without being under pressure to join in any particular scheme of compulsory union membership."

Wilfred Sykes, president, Inland Steel Co., Chicago, in a statement,

objected to what he said was a suggested compromise by the War Labor Board on the closed shop issue.

Mr. Sykes' statement follows:

"Our attention has been called to a dispatch from Washington which states that William H. Davis, chairman of the War Labor Board, will suggest what is termed a compromise of the closed shop and check-off issue at the board's hearing next week on the dispute between Inland Steel Co. and the Steel Workers' Organizing Committee. It is stated that the compromise is based on the board's recent settlement of the dispute between Marshall Field & Co. and the Textile Workers' Organizing Committee. This settlement requires the company to deduct union dues from the pay of employes who voluntarily authorize such deduction in writing and agree to maintain their union membership in good standing as a condition of employment during the life of the union contract. The dues are then turned over to the union.

Hopes for "Impartial" Hearing

"Inland Steel Co. has had no word from Mr. Davis with respect to this matter but since the suggested compromise has been made public we feel compelled to state our position.

"The Marshall Field formula, which it is stated Mr. Davis will sponsor, is subject to the important objection that it is simply a device for bringing about a closed shop. This is so because it furnishes no means of protecting employes from being coerced into signing up and once they have signed up they cannot withdraw. In addition it compels

the company to collect dues for the union, which is entirely contrary to the basic principle of all modern labor legislation that unions shall be free from interference or assistance by employers.

"The Washington dispatch also states that the officers of one of the steel companies have expressed themselves as having no major objections to the suggested compromise. Inland does have serious objection to it and we know of no other steel company that has taken any different position.

"It is unfortunate that a public announcement with respect to the attitude of the chairman of the board has been made in advance of the hearing and we can only hope that, when our evidence is presented, it will receive impartial consideration."

"A cleverly camouflaged closed shop" was Bethlehem Steel Co.'s comment on the Davis proposal. Bethlehem's statement:

"The Marshall Field clause is just one more confusing name for the same old idea. It is a cleverly camouflaged closed shop; and the public should not be and, as we believe, will not be fooled by it.

"President Roosevelt stated on Nov. 14, 1941, that 'The government of the United States will not order nor will Congress pass legislation ordering the so-called closed shop.' The real question before this country today is national security, not union security. Every man should have the right to work without being under pressure to participate in any particular scheme for any kind of membership security.

"We have made wide inquiry, but we have not found that any steel company regards the supposed compromise as anything other than the closed shop partially concealed by a new smoke screen and on that account entirely unacceptable."

Youngstown Sheet & Tube Co. branded the plan as "simply the closed shop in a different dress," adding that "it is a distinction without a difference." The statement continued.

"The formula now suggested is the closed shop with a limitation so useless that compulsion still exists. It is merely a subtle change in name, and is intended to bring the closed shop about progressively, but remorselessly."

Allis-Chalmers, CIO Dispute Submitted to Arbitration

National War Labor Board last week announced the wage dispute between the Allis-Chalmers Mfg. Co., Pittsburgh, and the United Electrical, Radio and Machine Workers of America CIO, has been settled by an agreement to submit the entire controversy to arbitration.

Independent Union Defeats CIO at Scullin Steel Co.

Independent Steel Workers' Organization defeated the Steel Workers Organizing Committee-CIO in a National Labor Relations Board election to determine the bargaining agent at Scullin Steel Co., St. Louis, by a 1033 to 495 vote.

Beware the Unexploded Torpedo, Mine or Bomb



A TORPEDO fired by an Axis submarine in its attack on tankers off Aruba Feb. 16 is inspected after it drove up on the beach. Later the 18-foot missile exploded killing four Dutchmen who were trying to take it apart. NEA photo

Gray Iron Founders To Give Technical Advice

Gray Iron Founders' Society is arranging to furnish expert technical advice on uses to which gray iron castings can be applied in the war economy.

The society has obtained the services of A. J. Edgar, who until recently was in charge of the gray iron, steel and nonferrous foundries of the General Railway Signal Co., Rochester, N. Y. He will serve on the staff of W. W. Rose, executive vice president of the society's Washington office, 1719 K street Northwest, where "he will be available to assist in every way the authorities of the War Production Board in determining to what extent gray iron castings can be safely employed in reducing bottlenecks as they develop in other and scarcer materials, and the full utilization of gray iron foundry capacity, made available by the many limitations placed upon civilian consumption to conserve material needed in the war effort."

Foundry Equipment Sales Index Soars in January

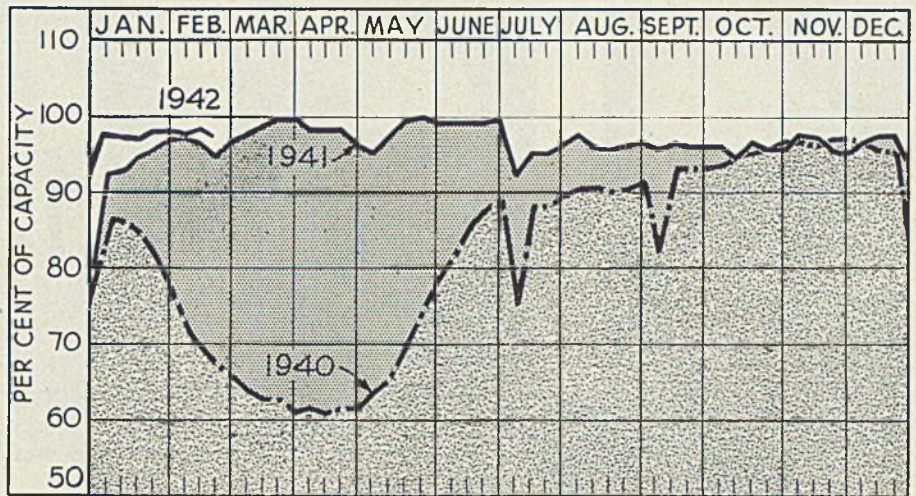
Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in January was 570.6, compared with 505.3 in December and 417.4 in November. Index for repairs was 418.5, compared with 408.7 in December and 381.7 in November. Total sales index was 532.7 in January, 481.2 in December and 408.5 in November.

Indexes are percentages of monthly averages of sales to metalworking industries, 1937-39.

Scrap Consumption Held At High Level in January

Record rate of consumption of iron and steel scrap of late 1941 carried over into January of 1942, when, it is estimated by the Institute of Scrap Iron and Steel Inc., Washington, 4,590,000 gross tons of home and purchased scrap were melted by steel mills and foundries to make new steel and castings. This was a slight decline from 4,634,000 tons consumed in December, which is attributed to the more severe weather which handicapped the operations of the steel industry.

Wickwire Spencer Steel Co., New York, is organizing a monthly pay allotment plan to aid employes in the purchase of United States Savings Bonds. Deductions are limited to \$3.75 a month or to multiples of this amount.



PRODUCTION . . . Down

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was 1 point lower, at 96 per cent, based on American Iron and Steel Institute's revised capacity figures. Five districts gained, four declined and three were unchanged. A year ago the rate was 94½ per cent; two years ago it was 67 per cent, both computed on the basis of capacity as of those dates.

Chicago—Advanced 1½ points to 104 per cent, ½-point below the all-time peak of Christmas week. Scrap supply has increased sufficiently to allow this slight rise. Four plants increased output.

Detroit—With 24 of the district's 26 open hearths active the rate is 1 point higher at 92 per cent. Ford Motor Co. has less scrap available since automobile production ceased.

Birmingham, Ala.—Up 5 points to 95 per cent, with 23 open hearths in production.

Central eastern seaboard—Unchanged at 90 per cent.

Cleveland—Gained 3 points over a revised rate for the preceding week, to 94 per cent. Two producers added open hearths.

Cincinnati—Moved up 4 points

to 88 per cent as scrap supply improved.

Buffalo—Held at 79½ per cent, not sufficient scrap appearing to allow additional furnaces to be lighted.

Pittsburgh—Down 1½ points to 95 per cent.

Wheeling—Declined 2½ points to 88 per cent.

St. Louis—Lack of sufficient scrap caused a drop of 5½ points to 72½ per cent.

New England—Continued production at 100 per cent.

Youngstown, O.—Down 2 points to 87 per cent, with 72 open hearths and two bessemers in production. Outlook for this week is 92 per cent with three bessemers and 72 open hearths active. Republic resumed bessemer production Friday after repairs. Republic dropped one open hearth at Warren, O., for repairs, resuming promptly.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended		Same week	
	Feb. 21	Change	1941	1940
Pittsburgh	95	- 1.5	94.5	63
Chicago	104	+ 1.5	95.5	63.5
Eastern Pa.	90	None	95	68
Youngstown	87	- 2	90	40
Wheeling	88	- 2.5	88	94
Cleveland	94	+ 3	93	68
Buffalo	79.5	None	90.5	67
Birmingham	95	+ 5	100	90
New England	100	None	92	63
Cincinnati	88	+ 4	95	59
St. Louis	72.5	- 5.5	93	63.5
Detroit	92	+ 1	95	92
Average	*96	- 1	†94.5	†67

*On basis of revised capacity as of Dec. 31, 1941.

†Computed on steelmaking capacity as of those dates.

Provo Blast Furnace Relining Sets Record

What is believed to be a world record in relining a blast furnace—31 days—is reported by Columbia Steel Co., United States Steel Corp. subsidiary. This is about 20 days under records previously established by eastern plants. The Ironton blast furnace, near Provo, Utah, was blown out Jan. 16. Removal of old lining was started Jan. 19 and the new lining was begun Jan. 29. The stack was blown in Feb. 17. The furnace was last relined in 1937 in an overall time of 64 days.

MEN of INDUSTRY



Bennett Burgoon Jr.



W. K. Bailey

W. K. BAILEY has been elected vice president in charge of sales, and a member of the board of directors, Warner & Swasey Co., Cleveland. He joined the company in 1919, following graduation from Oberlin College. He became a Chicago district office salesman in 1922; returned to Cleveland two years later as district manager; was made service manager in 1936; assistant sales manager two years later, and in 1939 sales manager.

D. M. Pattison, assistant sales manager since 1940, succeeds Mr. Bailey as sales manager. He has been associated with the company since 1928.



D. M. Pattison

Peter Voss, associated with Timken Roller Bearing Co., Canton, O., 24 years, has retired.

Theodore C. Fedders has been elected president and treasurer, Fedders Mfg. Co., Buffalo, to succeed his brother, the late Louis F. Fedders.

Ernest E. Tross has resigned as general superintendent and works manager, United Engineering & Foundry Co., Youngstown, O., to become a vice president, Federal Machine & Welder Co., Warren, O.

R. H. Cramer has been appointed factory manager, Hyatt Bearings Division, General Motors Corp., Harrison, N. J. Formerly assistant factory manager, Mr. Cramer succeeds **C. P. Millard**, resigned.

C. A. Puckett, associated with American Chain Division of American Chain & Cable Co. Inc. at York, Pa., several years, has been appointed sales manager of the Weldless Chain Department.

G. B. Berlien, the past two years assistant superintendent, and tool hardener for 13 years prior to that, Lindberg Steel Treating Co., Chi-

ago, has been named chief metallurgist. He succeeds **Roy G. Roshong**, who has resigned to engage in metallurgical consulting practice.

Bennett Burgoon Jr., formerly mechanical engineer, Railway Steel Spring Division, American Locomotive Co., has been appointed representative in western Illinois and Iowa by the McKenna Metals Co., Latrobe, Pa. His offices are at 917 Talcott building, Rockford, Ill.

L. J. Haga has joined Kaydon Engineering Corp., Muskegon, Mich., as chief metallurgist. Recently he was associate professor of metallurgy, Illinois Institute of Technology.

Harvey S. Pardee, consulting engineer, and **Roy G. Roshong**, consulting metallurgist, have opened engineering laboratories at 1512 West Lake street, Chicago, under the name of Harvey S. Pardee & Associates.

H. F. Merchant has been named sales and service representative in the Philadelphia area, including eastern Pennsylvania, New Jersey, Delaware and Maryland, by Progressive Welder Co., Detroit.

Frank T. Bumbaugh has been appointed assistant manager of sales, Alloy Division, Carnegie-Illinois Steel Corp. Formerly metallurgical engineer, bar and semifinished products, in Pittsburgh, Mr. Bumbaugh will make his headquarters at the corporation's Chicago offices. He has been associated with Carnegie-Illinois since 1926.

Gerald J. Stewart has been appointed manager, Houston, Tex., district sales office of Tennessee Coal, Iron & Railroad Co., American Steel & Wire Co., Carnegie-Illinois Steel Corp. and Scully Steel Products Co. He succeeds **E. E. Aldous**, who has become



C. A. Puckett



Gerald J. Stewart



A. H. Bond



James F. Towers



William von Phul

president and a director of Scully Steel Products. Mr. Stewart has been associated with United States Steel Corp. subsidiaries since July, 1921, and has been assistant manager of the Houston office since February, 1935.

A. H. Bond has been appointed co-ordinator of war industries work for Oakite Products Inc., New York. He joined the company in 1928 as a service engineer. He will have headquarters at 757 North Broadway, Milwaukee.

Wallace G. Kileen has been named comptroller, Eastern Aircraft Division of General Motors Corp., now in process of organization to produce fighting planes for the Navy. It is taking over five General Motors plants in New York, New Jersey and Maryland, formerly used for automobile production. Mr. Kileen was formerly assistant comptroller of General Motors in charge of the central office cost section in Detroit.

Walter H. Blocher has been named assistant manager of sales of Republic Steel Corp.'s Alloy Steel Division, Massillon, O. He joined Central Alloy Steel Corp. following graduation from Kenyon College in 1925, and was in the Indianapolis sales office of that company when it became part of Republic in 1930.

Henry C. Beal, manager of the Kearny, N. J., works of Western Electric Co., will become engineer of manufacture, effective March 1, with offices at the company's headquarters in New York. He will be succeeded as works manager by Reese F. Clifford, personnel director the past year. Arthur B. Goetze, assistant personnel director, will assume Mr. Clifford's post.

Don R. Berlin, designer of the Curtiss P-40 pursuit airplane, and formerly director of military engi-

neering of the airplane division of Curtiss-Wright Corp., Buffalo, has been appointed aeronautical engineer on the staff of O. E. Hunt, vice president, General Motors Corp., Detroit.

James F. Towers, heretofore vice president in charge of operations, has been elected president, Ford, Bacon & Davis Inc., New York, engineers. William von Phul, president from 1922 to date, will actively continue as chairman of the executive committee.

L. C. Rhodes has been appointed manager in the Pacific coast territory for Sullivan Machinery Co., Michigan City, Ind., with headquarters in San Francisco. Formerly manager of the Spokane-Butte territory, Mr. Rhodes succeeds the late Perry W. Olliver.

Replacing Mr. Rhodes as manager in the Butte-Spokane district is Robert T. Banks, manager of the Spokane office many years. His headquarters will remain in Salt Lake City.

E. K. Smith, the past 11 years service metallurgist, Electro Metallurgical Co., Detroit, has been given leave of absence to become senior metallurgist, industrial service, Tank and Combat Vehicle Division, Army Ordnance Department, Washington. His wife, Rebecca Hall Smith, has given up her metallurgical office in Detroit to take up similar work at the Naval Gun Factory, Washington Navy Yard, Washington.

Howard D. Grant, vice president, Whiting Corp., Harvey, Ill., has been named executive vice president and chairman of the executive committee. He will take over the duties of the president's office formerly handled by Gen. Thomas S. Hammond, who has resigned to devote full time as a civilian member of the Chicago Ordnance District staff. As chair-

man of the executive committee, Mr. Grant succeeds C. Q. Wright Jr., vice president, who has resigned to become naval adviser with the rank of lieutenant-commander for the state of Illinois, contract distribution branch, War Production Board, Chicago.

Stevens H. Hammond, vice president, has been elected a member of the executive committee. Son of General Hammond, he has been with Whiting over ten years. He will supervise sales activities.

John DeMooy, since 1922 treasurer, Cleveland Pneumatic Tool Co., Cleveland, has been elected president, succeeding the late Louis W. Greve. Mr. DeMooy has been associated with the company 40 years. Fred B. Greve, son of the late Mr. Greve, succeeds Mr. DeMooy as treasurer. He formerly was treasurer of the Cleveland Pneumatic Tool Co. of Canada Ltd., Toronto, Ont.

Alfred R. Mumford has been appointed to the research department of Combustion Engineering Inc., New York, under the direction of Henry Kreisinger. He formerly was assistant fuels engineer, United States Bureau of Mines; research and design engineer, New York Steam Corp., and since October, 1938, had been assistant director of research, Consolidated Edison Co. of New York.

Hugh Weissbrodt, superintendent, Springfield, O., plant of International Harvester Co., has joined the Automotive branch of the WPB as technical consultant at its Detroit headquarters. Starting as an apprentice machinist and toolmaker, he has spent 30 years in production work with various motor companies and with International since 1934.

Additional assignments to the staff of Ernest Kanzler, chief of the Automotive branch include Ernest Remenschneider, former superin-

tendent, Midland Steel Products Co., Cleveland; **D. J. Hutchins**, Detroit district sales representative, Firestone Tire & Rubber Co.; **Marx Leva**, senior attorney of the WPB; **Joseph E. Gilbert**, former western manager of *Automotive Merchandising*; **S. H. Werrell**, formerly associated with the Priorities Division of SPAB, and **M. J. Fox Jr.**, of the Statistics Division of WPB.

C. P. Cutler, since 1934 superintendent of finishing mills and special process department, South Chicago works of Republic Steel Corp., has been appointed assistant district manager of the Chicago district. Identified with the steel industry since 1909, Mr. Cutler started as an office boy with Interstate Iron & Steel Co., now part of Republic.

R. A. Hawkinson, heretofore assistant superintendent of finishing mills and special process department, has been promoted to superintendent, succeeding Mr. Cutler, while **J. C. Price** has become assistant superintendent of that department. Mr. Price formerly was foreman of finishing mills.

Forrest U. Webster, past president, National Industrial Advertisers Association, and account executive of McManus, John & Adams, Detroit, has been ordered to active



Walter Geist

Who has been placed in charge of Allis Chalmers Mfg. Co.'s newly established centralized sales administrative department as announced in STEEL, Feb. 16, p. 54

duty under his commission as captain, Field Artillery Reserve. He has been assigned to the Fort Wayne Motor Supply Depot, Fort Wayne, Mich.

Charles L. Wiswall, since 1933 director of sales of E. I. du Pont de Nemours & Co.'s R. & H. Chemicals Department, has been appointed assistant general manager of the newly created Photo Products Department. **Samuel C. Harris**, assistant director of sales, R. & H. Chemicals

Department since 1936, succeeds Mr. Wiswall as director of sales.

L. W. Peterson, assistant general traffic manager, Nash Motors Co., Kenosha, Wis., has been appointed general traffic manager, Massey-Harris Co., Racine, Wis.

John J. Davis Jr., assistant manager of sales, railroad metals and commercial forging division, Carnegie-Illinois Steel Corp., Chicago, will have charge of the division during the absence of **Orrin H. Baker**, manager, who is serving with the War Production Board in Washington.

Edwin L. Dennis, chief combustion engineer, Coppus Engineering Corp., Worcester, Mass., has resigned as instructor at Louisiana State University, Baton Rouge, La., to devote his full time to the problem of efficient combustion in industrial plants.

Walter Moehlenpah has been appointed manager of the newly created Frostrode Division of Weltronc Corp., Detroit, which will produce and market industrial refrigerating units designed for use in combination with resistance welding equipment. He formerly was associated with the Milwaukee railroad as engineer in air conditioning work.

Harold S. Osborne, plant engineer, Operation and Engineering Department, American Telephone & Telegraph Co., New York, has been nominated for the presidency of American Institute of Electrical Engineers, New York.

Nominees for vice presidents include: North eastern district, **Karl B. McEachron**, research engineer, General Electric Co., Pittsfield, Mass.; New York City district, **C. R. Jones**, eastern transportation manager, Westinghouse Electric & Mfg. Co., New York; Great Lakes district, **A. G. DeWars**, manager, System Planning Department, Northern States Power Co., Minneapolis; Southwest district, **E. T. Mahood**, engineer, Southwestern Bell Telephone Co., Kansas City, Mo.; northwest district, **E. W. Schilling**, professor and head of department of electrical engineering, Montana State College, Bozeman, Mont.

Directors: **K. L. Hansen**, consulting engineer, Harnischfeger Corp., Milwaukee; **W. B. Morton**, senior field engineer, Philadelphia Electric Co., Philadelphia; **W. R. Smith**, safety engineer, Public Service Electric & Gas Co., Newark, N. J.

National treasurer: **W. I. Slichter**, professor emeritus of electrical engineering, Columbia University, New York.

Win Foundrymen's Association Awards



J. E. Galvin

American Foundrymen's Association has announced its annual awards to be made at the First Western Hemisphere Foundry Conference and forty-sixth annual convention at Cleveland, April 20 to 24. They are:

J. H. Whiting Gold Medal will be presented to **A. L. Boegehold**, chief metallurgist of the General Motors



A. L. Boegehold

Research Laboratories, Detroit.

John A. Penton Gold Medal will be awarded **John E. Galvin**, president, Ohio Steel Foundry Co., Lima, O.

Honorary life membership will be conferred on **Patrick Dwyer**, engineering editor, *The Foundry*, and **Roy M. Allen**, consulting metallurgical engineer, Bloomfield, N. J.

WPB Planning Board of Three Members Appointed by Nelson

APPOINTMENT of three men to form the WPB Planning Board, with authority to formulate and propose policies and programs and to advise the chairman on plans and procedures relating to WPB operations, was announced last week by Chairman Donald M. Nelson.

Chairman of the Planning Board is Robert R. Nathan, formerly chief of the Requirements Branch of the WPB Division of Statistics.

Other members are Thomas C. Blaisdell Jr., assistant director, National Resources Planning Board, and Fred Searls Jr., industrial consultant with the Ordnance Branch of the War Department.

"The Planning Board is to be independent of operating responsibility and will bring in ideas and plans both at my request and of its own initiative", Mr. Nelson said. "Its job is to look ahead and spot problems that we will be running into six months from now, and develop proposals to solve those problems; it will also work on matters of more immediate, day-to-day concern and formulate plans for action. I expect the board to be alert, tough-minded and realistic".

It is his expectation, Mr. Nelson said, that the Planning Board will call in consultants and advisory groups from industry, from labor and from other fields to help it analyze problems and develop policies and procedures.

Steel Institute To Meet May 21

Fifty-first general meeting of the American Iron and Steel Institute will be held in Waldorf-Astoria hotel, New York, May 21. Program will be announced later. Attendance at all sessions again will be restricted to members.

Price Ceiling May Be Set for Auto Parts

CHICAGO

Little cheer was held out by Cyrus McCormick, chief of the automobile and truck section, OPA, Washington, in addressing 1000 automotive replacement parts dealers attending the convention of the Motor and Equipment Wholesalers' Association here, Feb. 18. He stated fewer automobiles will be operated and that this means fewer cars will be repaired.

He admitted that the trade faces hardships. The OPA may find it necessary to impose a price ceiling on automotive parts, but no such action will be taken unless an inflationary trend appears.

Brisk Demand for Farm Implement Repair Parts

Middle Western manufacturers of farm implements are experiencing a brisk demand for repair and replacement parts. This is believed to be the result of the Department of Agriculture's "repair now" slogan for farm machinery owners, in view of the fact that production of new machinery is being curtailed sharply. Some manufacturers are fearful that measures may have to be taken to keep potential buying of repair parts within reasonable bounds if the present volume should continue or increase.

Tons of Tin Cans Are Collected in Rockford

Five tons of tin cans were collected in Rockford, Ill., in the first two days of a tin can salvage drive launched by the city. The cans are

being picked up daily. They will be sold to salvage dealers for \$8 a ton and the proceeds will be used for civil defense work. It is estimated two tons will be collected daily.

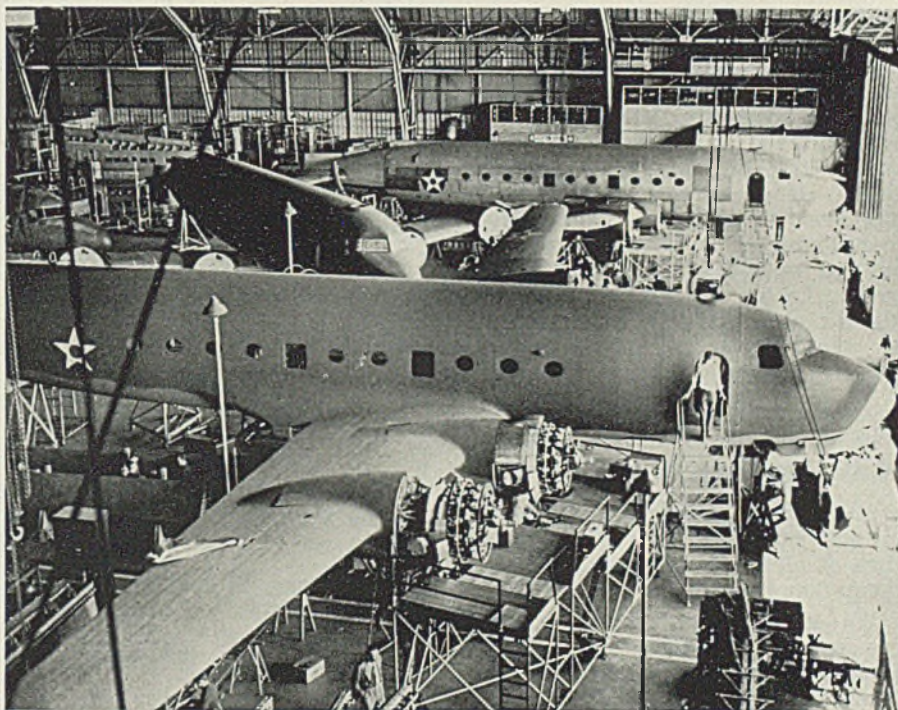
Copper Book Plates Must Be Scrapped

Copper plates, from which the nation's books of the last several years have been printed, must be scrapped and sent to smelters to speed the war effort. This decision was announced by E. W. Palmer, chief industrial consultant of the printing and publishing branch, WPB, Washington, in addressing the annual meeting of the Graphic Arts Association of Illinois, Chicago, Feb. 18.

Nonferrous Foundrymen Hear "Keep Prices Down"

Nonferrous foundrymen in the Midwest were told at a regional meeting in Chicago, that they will be expected to keep prices of their products below the maximums which prevailed between Oct. 1 and Oct. 15, 1941. Speaking before 200 executives representing about 40 per cent of the industry's capacity, Carl Holmquist, head of the nonferrous section, OPA, Washington, said that expanded volume as the result of war demands is expected to compensate for possibly higher production costs.

Aerial Troop Transports Roll Off the Line



NEARING completion are these Douglas C-54 troop transports, originally designed for commercial airline service, but now converted to military uses. They are the largest transport planes in mass production. NEA photo

Interior Department "Converted" To Mobilize Strategic Resources

WASHINGTON

SEVEN-PHASE program to mobilize America's strategic natural resources has been formulated by the Department of Interior, according to Secretary Harold L. Ickes.

All bureaus and divisions of the department are being organized to function as co-ordinated units in the war effort. Activities which were started in peace time and which now are vital to the armament program are being accelerated. Other projects, essentially peace-time in character, have been subordinated.

The program is designed to make available essential metals, oil, power, helium, food, land, water and timber for war. It includes 52 distinct proposals.

Secretary Ickes said the long experience of the department in conserving resources will ease the task of devoting these resources to the war effort. At the same time, he said, it will protect the resources from foolish, short-sighted or wasteful exploitation.

Technical aid and information will be supplied by the department's bureaus to the WPB and industries or agencies processing raw materials for war.

Through the Bureau of Mines, new processes for producing metals have been or are being developed. The Geological Survey is conducting explorations for new strategic ore deposits on a wider scale. Bureau of Reclamation proposes to triple its 1941 power output. Bureau of Mines proposes to double last year's helium output. Office of Petroleum Co-ordinator will seek to increase capacity for manufacturing aviation gasoline and to enlarge transportation capacity. Latter agency also is formulating plans for the manufacture of synthetic rubber from petroleum products.

Use of Critical Materials in Musical Instruments Limited

Sharp curtailment of the use of critical materials in the manufacture of all types of musical instruments has been ordered by WPB.

All musical instruments except radios, phonographs, radio-phonographs, and articles designed primarily as toys, are covered by the program, which is set forth in General Limitation Order L-37.

Accessories, such as bows, picks, music stands, piano stools and

benches, and instrument cases, also are affected.

Program covers the period from March 1 to June 1. Extent of the curtailment is based on the total amount of critical materials by weight contained in various types of instruments. The materials involved are iron, steel, magnesium, aluminum, nickel, chromium, rubber, copper and copper-base alloys, tin, lead, zinc, phenol formaldehyde plastics, neoprene and cork.

Shot, Bullet Core Steel Under Allocation System

Complete allocation system for shot and bullet core steel is set up in Order M-21-f, issued by WPB.

Order applies to steel for 20, 37, 40, 57 and 75-millimeter and 3-inch armor piercing and semiarmor piercing shot, and to .30 and .50 caliber bullet cores.

It provides that starting March 1 no deliveries of shot and bullet core steel shall be made except on an allocation order.

Weekly reports must be made to the WPB and the Army and Navy Munitions Board by producers on Form PD-307. Purchasers are required to make monthly reports on Form PD-308.

Purpose of the order is to stop over-buying and to reduce excessive inventories of this special type of

Form PD-1-A Available

Form PD-1-A which is to be used under Priorities Regulation Number 3 has been released.

Copies of this form may be obtained from local WPB offices or from STEEL, Readers Service, at the following prices:

- 5 sets and under, 20c each.
- 6 to 15 sets, 15c each.
- 16 to 25 sets, 10c each.
- 25 sets, \$2.
- 50 sets, \$4.
- 100 sets, \$6.
- 200 sets, \$9.

This form is available for immediate shipment from STEEL, Readers Service Department, Penton Building, Cleveland.

If your order originates in Ohio, please include 3 per cent additional to cover sales tax.

steel, which calls for unusual hardening and extra time in its manufacture. Under the order, a more effective and regular flow of the metal will be possible.

May Suspend Tariff Duties on Iron, Steel, Nonferrous Scrap

A bill suspending tariff duties on iron, steel and nonferrous scrap metal was favorably reported by the house ways and means committee last week. Relaying and rerolling rails also are affected by the bill.

The committee reported the United States this year will need

Iron, Steel Branch Reorganized

C. E. ADAMS, chief, WPB Iron and Steel Branch, last week announced reorganization of the branch, designed to place in charge of each unit an expert on that unit's particular problems.

The new setup divides the branch into six sections as follows: Office of the chief; plant facilities section; raw materials section; allocation and priorities section; products section; and control section.

R. C. Allen, formerly head of the raw materials section, was named deputy chief of the branch and will head the plant facilities unit.

Chart of the reorganized branch appears on the opposite page.

6,000,000 tons more scrap than is available and that some of this can be imported from South American countries. Argentina alone, the committee said, can fill its own needs and ship 1,000,000 tons to this country.

Last year the United States imported 40,000 tons of scrap.

Price Schedules for Primary Secondary Lead Clarified

Clarification of provisions establishing maximum prices for primary and secondary lead sold by plumbing supply houses is made in Amendments No. 2 both to Price Schedule No. 69 (primary lead) and Price Schedule No. 70 (secondary lead).

Amendments, reword provisions of the schedules to make it clear that plumbing supply houses are not limited to carload lot sales of lead, but may sell less than carload lots as well. The misunderstanding arose because plumbing supply houses are required to use the carload lot prices for lead established by the OPA as bases in the determination of their own ceiling prices.

Windows of WASHINGTON

War production chief outlines regulations for appointment of dollar-a-year men . . . Census of trucks under way . . . Aircraft granted A-1-a priority ratings . . . Price schedules issued before control act was passed to continue in effect . . . Domestic refrigerator manufacture to be banned after April 30, and industry converted to arms program . . . Installation of gas furnaces curtailed



By **L. M. LAMM**
Washington Editor, STEEL

WASHINGTON

WPB Chairman Donald M. Nelson last week announced new procedures to be followed in appointments on a dollar-a-year basis and for "without compensation" services.

Mr. Nelson instructed all division heads to examine the lists of all dollar-a-year men in their divisions and to terminate the appointments of all who do not qualify. Each division head was asked to report within 30 days, giving the names of such employes as can continue on a dollar-a-year basis, the names of all dollar-a-year men who have been transferred to a salary basis, and the names of all whose services have been terminated.

Governing procedures for appointment to dollar-a-year positions include the following:

Each appointee must be an American citizen of high integrity and good moral character, of outstanding experience and ability, qualified for a responsible administrative, technical, consulting or advisory position, and in receipt of earned income from his current non-governmental employment at a rate of at least \$5600 a year.

The position to which the appointment is made must be one requiring special business or technical knowledge and experience.

No dollar-a-year appointee shall make determinations directly affecting the affairs of the firm or company in which he is employed.

No permanent appointment shall be made except after a thorough investigation of the proposed appointee by one of the investigatory agencies of the government.

Procedure relating to appointment of persons on a "without compensation" basis stipulates that such appointees may serve in an advisory capacity as government consultants working in the public interest and not as representatives of a private employer or industry. Any person serving on such a basis may not

be permitted to assume any administrative responsibility or to exercise any authority over, or direction of the work of, executives or employes of the WPB.

Steel Containers Industry Advisory Committee Formed

Formation of a Steel Container Manufacturers Industry Advisory Committee has been announced by the Bureau of Industry Advisory Committees.

Government presiding officer of the committee is J. R. Taylor, chief, Metals and Glass Unit, Containers Branch.

Members are: F. T. Barton, Jones & Laughlin Steel Barrel Co., Bayonne, N. J.; S. A. Bennett, Bennett Mfg. Co., Chicago; R. L. Brammer, Wheeling Corrugating Co., Wheeling, W. Va.; C. W. Sasey, Stainless

Steel Products Co., St. Paul; J. A. Connolly, Petroleum Iron Works, Sharon, Pa.; T. W. Floyd, Wilson & Bennett Mfg. Co., Chicago; H. W. Lees, Draper Mfg. Co., Cleveland; D. F. Manion Jr., Manion Steel Barrel Co., Rouseville, Pa.; Fred Richman, Florida Drum Co., Pensacola, Fla.; H. P. Thelan, Owens-Illinois Can Co., Toledo, O.; F. O. Wahlstrom, Southern States Iron Roofing Co., Savannah, Ga.; L. B. Kepingler, Rheem Mfg. Co., New York.

Automotive Parts Advisory Subcommittee Appointed

Automotive Parts Industry Advisory Subcommittee has been appointed by the Bureau of Industry Advisory Committees.

Government presiding officer is R. L. Vaniman, deputy chief, Automotive Branch.

Members are: C. E. Hamilton, president, Automotive Gear Works Inc., Richmond, Ind.; C. C. Carlton, vice president, Motor Wheel Corp., Lansing, Mich.; C. S. Davis, president, Borg-Warner Corp., Chicago;

Burke Patterson, assistant to president, Thompson Products Co., Cleveland; J. D. Eby, vice president, Wagner Electric Corp., St. Louis; R. F. Koch, service manager, International Harvester Co., Chicago; M. D. Douglas, manager, parts and accessories, Chevrolet Motor Co., Detroit; F. C. Bahr, vice president and general manager, Motor Parts Corp., Chrysler Corp., Detroit; V. E. Doonan, general sales executive, Ford Motor Co., Dearborn, Mich.; B. F. Morris, executive vice president, Thomas A. Edison Inc., West Orange, N. J.; Max Miller, service merchandising manager, Yellow Truck & Coach Co., Pontiac, Mich.

Forms PD-25-c and PD-25-d Withdrawn by War Board

Reporting forms PD-25-c and PD-25-d have been withdrawn by the WPB. They were used under the Defense Supplies Rating Plan which has been replaced by the Production Requirements Plan.

OPA Questionnaire Asks Data on Truck Inventories

Complete information on light, medium and heavy trucks and truck trailers is sought in inventory questionnaires being sent by the OPA to automotive manufacturers, dealers and finance companies.

Price Administrator Henderson has called for data on passenger cars only. However, the questionnaire forms have been printed in such a manner that information can also be obtained on trucks and truck trailers.

WPB, in Supplementary Limitation Order L-1-d ordered manufacturers, dealers, distributors and finance companies to furnish all in-

formation on trucks and trailers called for by the designated forms, and to file it with OPA's Automobile Inventory Unit in New York. Forms R-204 and R-206 are being sent by OPA to dealers, distributors and finance companies, while forms R-205 and R-207 are being sent to manufacturers.

Return forms will be tabulated by OPA's Automobile Inventory Unit, and the data on trucks and truck trailers will be made available to WPB.

Nelson Overrules Military on Aircraft Priority Ratings

War Production Chief Nelson, overruling the industrial strategy planned by the Army and Navy, has ordered aircraft production put on a par with tank and naval ship construction.

The Army-Navy Munitions Board had assigned A-1-a priority ratings to materials needed for naval ships and tanks, rating 4-engine bombers only A-1-b, engines and propellers for other planes being given the lower rating of A-1-c, while airframes were rated only A-1-d.

Mr. Nelson has informed the Army-Navy board he is overruling this system of ratings, and is assigning an A-1-a rating to aircraft as well as to tanks and naval ships.

His action means the civilian production chief has overruled the industrial strategy planned by military services with obvious repercussions on the availability of military supplies and therefore upon military strategy.

Early Price Schedules To Continue in Effect

Price schedules issued by the Office of Price Administration since its creation on April 11, 1941, will remain in effect under terms of the emergency price control act of 1942 and must continue to be observed, Leon Henderson, administrator, has ruled.

"Businessmen who have been operating under the schedules should clearly understand," Mr. Henderson stated, "that enactment of the emergency price control act and the establishment of formal procedures for issuance and enforcement of price controls does not vitiate the price schedules previously issued. The act expressly provides that such schedules shall remain in effect. The only difference is that we now have more effective means of enforcement than heretofore."

Those schedules previously issued have been reviewed by the administrator and have been brought into conformance with requirements of the act.

Henceforth, price control orders issued by the OPA will take one of

two forms: (a) Maximum price regulations (these will be similar to the price schedules already issued); and (b) temporary maximum price regulations, which will remain in effect for 60 days.

Refrigerator Production To Be Prohibited After April 30

Domestic refrigerator production will be prohibited completely after April 30, WPB said last week. Manufacturers, however, will be permitted until that date to manufacture three times as many units as permitted under present quotas. February quota is 163,000 units; quota from now to April 30 will be 489,000 units.

Board also ordered the freezing of all stocks of new refrigerators in distributors or manufacturers' hands; these may be released only with WPB authorization. Retailers may sell one-twelfth the number they sold in 1941 or 100 units, whichever is greater, after which the freeze order automatically will apply to them.

Stocks frozen and production until April 30 will form a pool of about 750,000 units to meet military and highly essential needs.

The measure is preparatory to full conversion of the refrigerator industry to war production.

Installation of Gas Heating Furnaces Curtailed in 17 States

Curtailement in the consumption of natural gas and mixed natural and manufactured gas has been ordered by WPB to assure adequate supplies of gas for war production. It was necessary because of increased gas requirements for both war production and civilian use, coupled with the scarcity of materials that would be required if existing systems were expanded.

Parts of the order (L-31) apply to the entire country. They do not become operative until a gas shortage occurs or becomes imminent in any area.

Other parts of the order apply only to 17 states and the District of Columbia, where the need for curtailment is greatest. They become effective by March 1 but do not affect present uses of existing customers.

Order affects companies distributing natural gas or natural gas mixed with manufactured or artificial gas. It does not affect companies distributing only artificial or manufactured gas.

Gas companies operating in 17 states and the District of Columbia are:

1. Prohibited from delivering gas for heating new homes, stores, factories or other buildings, unless the

heating equipment is installed prior to March 1, 1942, or the equipment was specified in the construction contract and the foundation under the main part of the building is completed prior to March 1. This applies to a heating system intended to furnish all or the major part of the heat for a home or building. It does not apply to individual room heaters.

2. Prohibited from delivering gas for the operation of heating equipment that has been converted from some other fuel to gas, unless such conversion is completed within 10 days after the issuance of the order.

3. Prohibited from delivering gas to any new non-residential consumer or increasing delivery to any existing non-residential consumer, unless: (a) Such new or existing consumer has installed standby facilities sufficient to replace the new or increased delivery during periods of shutoff; or (b) such new or existing consumer cannot reasonably use any fuel other than gas; or (c) approval shall have been granted in advance by the director of industry operations for delivery to such new or existing consumer. This provision becomes effective ten days after the issuance of the order.

Areas subject to these prohibitions are: Alabama (except the area served by the United Gas Pipe Line Co.), Arkansas (only the area served by the Mississippi River Fuel Co.), California, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi (except the area served by the United Gas Pipe Line Co.), Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia.

Large Coal, Coke Users Asked To Build Up Inventories

Large users of coal and coke, especially utilities and industrial users, are being urged by the Division of Industry Operations to build up inventories as much as possible to avoid the danger of having to suspend operations in case of an emergency.

General Inventory Order M-97 revokes the inventory restrictions imposed by Priorities Regulation No. 1 insofar as they apply to coal and coke. This order was issued upon recommendation of the office of solid fuel co-ordinator.

The order will enable large users to take advantage of the fact that there is at present considerable excess production of coal and coke, and transportation available for distribution of these materials.

Inventory restrictions are relaxed for coal and coke only. Inventories of all other materials must be kept to a practicable working minimum in accordance with the terms of Priorities Regulation No. 1.

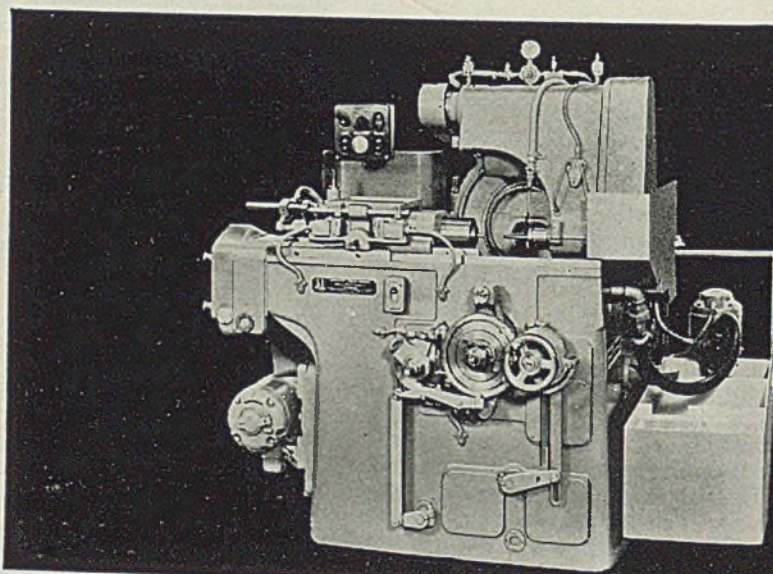
EMERGENCIES



"Rugged Individualists" 1840 Style

MODERN machine design and precision workmanship owe much to the "contractors" in the Vermont shops of a century ago. Not foremen, but independent operators of a business within a business, they hired in their departments and sold the "bits and pieces" made had every incentive for the constant development of new ways to cut costs and improve their product. Conspicuous among the achievements of this system was the early interchangeable manufacture of muskets for the American and British armies and weapons for the western settlers. More than a century of such successive improvements has not only contributed to defense but enabled the growth of American industry as we know it today.

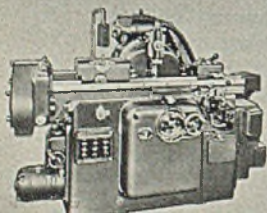
JONES &



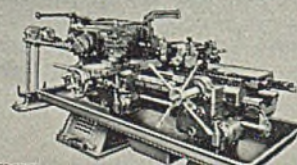
Jones & Lamson Automatic Internal Thread Grinder, model TG-63 (6 x 3").

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

AUTOMATIC THREAD
GRINDERS



OPTICAL
COMPARATORS



ARE NOTHING NEW TO JONES & LAMSON ENGINEERS

TO Jones & Lamson engineers, and to their direct predecessors in early Vermont machine tool shops, defense emergencies are nothing new. Working under the original contract system, they produced tools and arms to aid Britain in the Crimea, to help Texas win her independence, to equip the blue-clad armies of the United States in the almost forgotten war with Mexico and in the struggle to preserve the Union. Now, for the second time within the memory of living men, the full resources of Jones & Lamson Machine Company are working 24 hours a day, 7 days a week in defense of Democracy.

For more than a century such emergencies have been an old story to Jones & Lamson engineers and their predecessors.

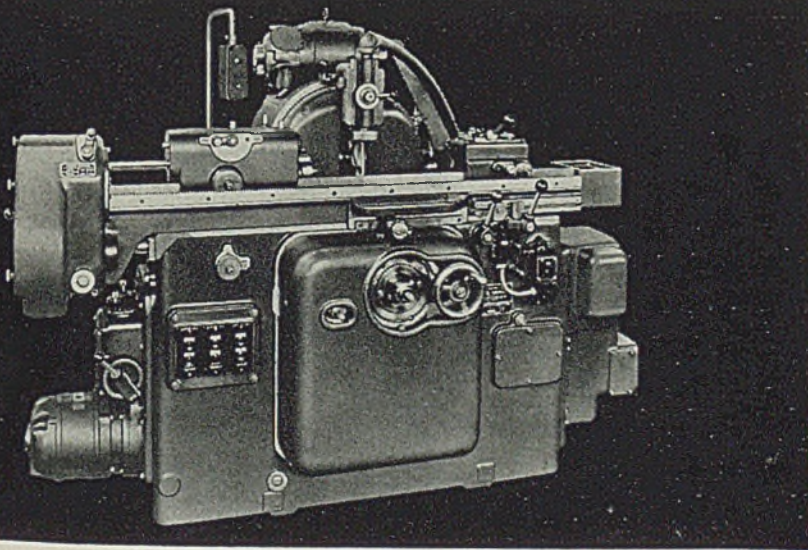
In every such crisis are the improvements, refinements and developments originating here. To cite a single example, the modern technique of optical projection inspection and precision thread grinding for mass production is a Jones & Lamson development which had its roots in the last emergency and is now full grown to meet this one.

And the best feature of such developments is that they not only implement defense, but they enable industry to meet peacetime competition.

That is why it pays two ways to put production problems up to Jones & Lamson engineers. By all means write them today. Inquiries from large plants or small receive prompt and thorough study.

LAMSON MACHINE COMPANY

SPRINGFIELD, VT., U. S. A.

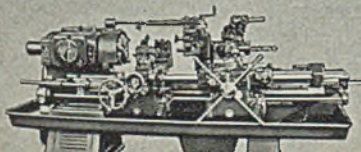


Jones & Lamson Automatic Thread Grinder, model TG-636 (6 x 36").

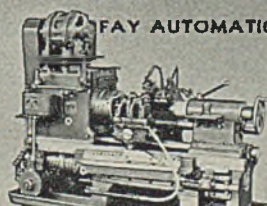


PROFIT PRODUCING
MACHINE TOOLS

SADDLE TYPE
UNIVERSAL TURRET LATHE



FAY AUTOMATIC LATHES



Control Over Plate Production, Consumption, Allocation Tightened

WASHINGTON
COMPREHENSIVE plan for rigid and detailed control over production, consumption and allocation of steel plates has been formulated by the WPB Iron and Steel Branch.

Purpose of the new setup is to insure fulfillment of all military requirements, particularly those of the Navy and the Maritime Commission for ship plates. Delivery of ship plate has lagged at times in recent months despite an increase in overall plate production.

Two forms must be filed monthly by consumers. Form PD-298 lists in detail requirements for the following month and the uses to which plates are to be put. Two copies are to be filed with the producer and one with the War Production Board, at least a month in advance. Form PD-299 must be filed by the seventh of the month and lists consumption, inventories and receipts for the

month and estimated requirements for the two months following.

Producers will report to the WPB daily, weekly and monthly by wire as to shipments of plates, and monthly, on Forms PD-169 and 169-a, on schedules for the month following.

Producers' schedules, which call for complete and detailed information, will be analyzed by the WPB and returned to producers with whatever changes appear warranted.

Only orders for plates carrying a preference rating of A-10 or higher, or those specifically allocated by the director of industry operations, may be requested, scheduled or delivered.

Objectives of the plan, as outlined by C. E. Adams, chief, Iron and Steel Branch, are:

1. To obtain accurate information as to monthly requirements for

steel plates and to correlate this data between producers, consumers and government agencies.

2. To obtain accurate information for government agencies as to steel plate consumption and inventories.

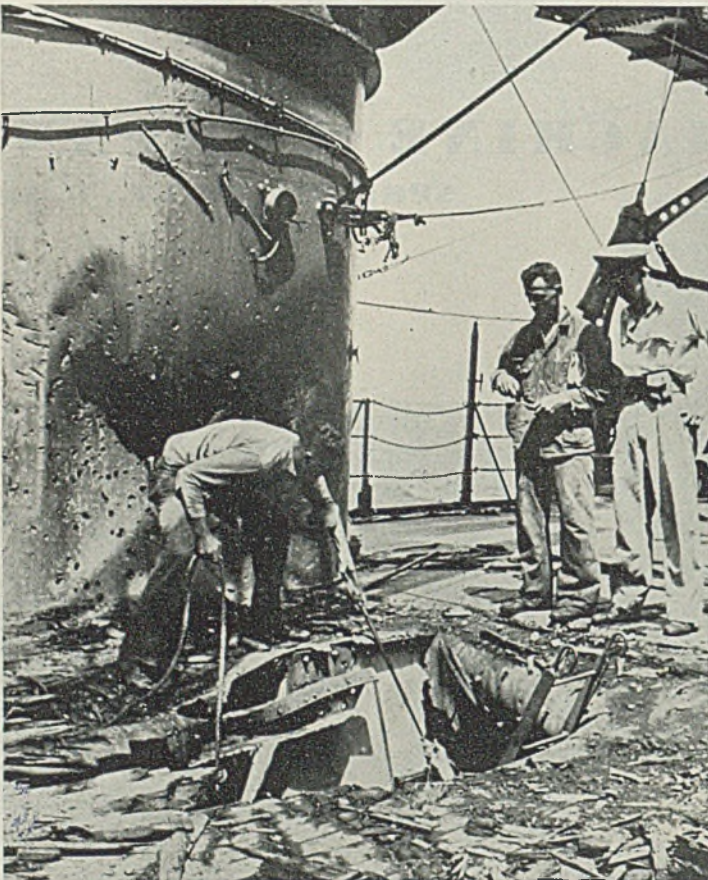
3. To promote more accurate and practical control over steel plate schedules and allocations.

Steel plate shipments in January were the highest in the nation's history, due largely to the conversion of strip and sheet mills to plate production. Shipments totaled 754,522 tons, as compared to 635,812 for December, 1941, the previous record production.

Consumers responded in gratifying fashion to the request of the branch that they redesign requirements to use as many as possible of the narrower plates produced by strip mill, January reports show. Strip mills shipped 250,396 tons of plates during the month.

It is expected that plate shipments by March will be well over 800,000 tons, which is about the expected limit of actual production. Rated capacity is approximately 950,000 tons monthly, of which sheared mills account for 400,000

Damaged Warship Repaired Quickly by Welding at Sea



SAN FRANCISCO: Pictures show damage and emergency repair work on board a United States vessel in the navy's attack Feb. 2 on Japanese bases in the Pacific. They were among the first to arrive here (last week), passed by the

sensor. A bomb struck the deck, tearing the plate, while fragments of the bomb punctured the steel housing, as shown at left. Welders with a torch and spare plate quickly repaired the ship, as shown at right. NEA photos

tons; universal mills 150,000, and strip mills, 400,000.

Approximately 40 per cent of total monthly plate production is required for the ship program alone and only by the most careful and accurate allocation can present plate

production be stretched to reach all necessary requirements.

While the shipbuilding program can be met, in the opinion of WPB and Maritime Commission officials, no delays of any kind can be permitted if it is to be accomplished.

wide, and 1620 long—the largest cargo ship shop in America.

By putting in new dies and cutting edges for tools already in the plant, almost all the machinery that had made freight cars was converted to the making of freighters. A 30 per cent increase in installations was needed, but most of them were second-hand. One of the largest additions to the plant was designed in Germany. It is a plate roller so big it looks like four coast defense guns employed as a wringer.

Built in Chicago in 1919-1920, at a cost of \$180,000 it was used by United States Steel until 1937, then went to a used-machinery dealer who found no buyer until the freight car shop was converted. Then it was sold for \$45,000—a bargain. It would take a year to replace the great machine.

Rolls 420 Plates Weekly

This roller, busy night and day, shapes 420 plates a week for the sides of ships. It is temperamental. It needs care and nursing. Without proper direction, the plates it bends would fit a ship as loosely as the petals of an artichoke. It is a one-man critter, and its master is Albert Alms, who, as a young machinist, helped build this wonderful wringer, learned to operate it, then made it his career. He has been with it ever since. When it was called into service last March,

Pre-assembly Speeds Building of “Ugly Duckling” Cargo Vessels

WASHINGTON

UGLY DUCKLINGS — as the President once referred to the Liberty ships—is a misnomer for a merchant vessel built at top speed in the race to put more freighters to sea than the enemy can sink.

In World War I they were ugly indeed, and very few were sunk, because hastily constructed shipyards got into production too late. Most were launched after the armistice, the majority in 1920.

But in this war, plant conversion and assembly line methods make a sleek, one-funnel job, 441 feet long and 57 feet wide at the hips, and they make it quickly. Ugly Ducklings pour out of inland and coastal plants in prefabricated subassemblies at the rate of one a day. Before the year is out, two a day will be splashing from the ways.

To make an Ugly Duckling, dump 3200 tons of steel plates, girders, bars, angles and channels at one end of a prefabricating plant. Haul the stuff by overhead cranes down a production line to be cut, bored, punched, sized, shaped and welded. Then load each resulting subassembly on a freight train at the other end of the plant and send it down to the sea, each to be welded or riveted into place.

Construction Time Shortened

But first get a factory that can do this. Hog Island and its kindred shipyards had to be built before an hour's work began on ships in the last war. The shortest span between breaking ground for a shipyard and launching a vessel was 16 months. But now, by converting inland and coastal factories—such as the one to be described here—only 11 months elapse between awarding of the contract and christening of a Duckling.

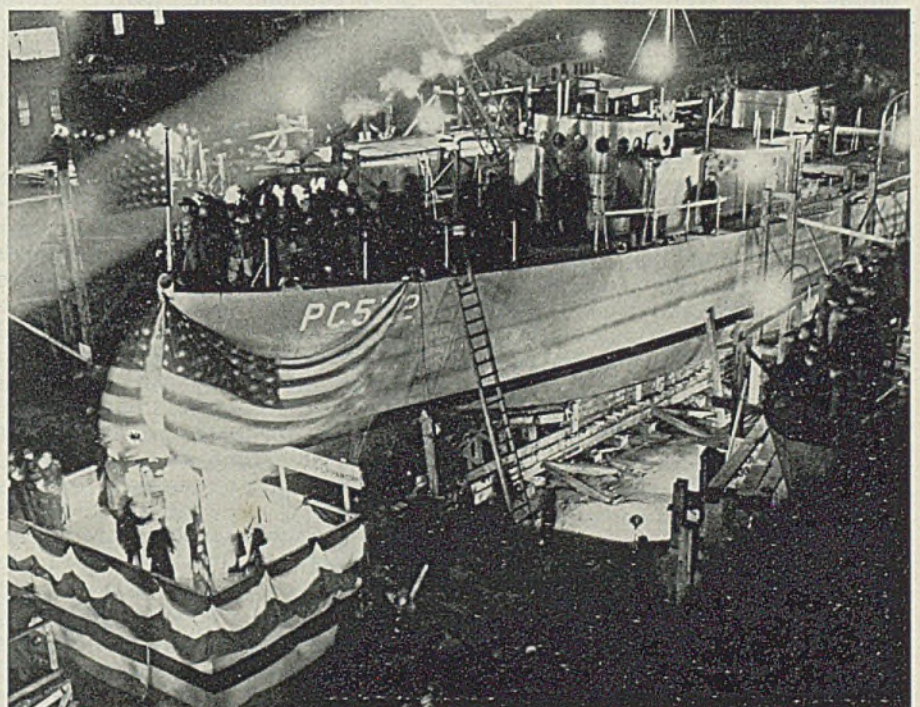
Consider this anonymous plant. Because it is near the coast and a likely target for bombers or saboteurs, the name and site of this factory may not be mentioned; but, before it was abandoned to a maintenance crew ten years ago, it turned out freight cars. Leased in March of 1941, the plant was converted quickly and began work be-

fore June. With a nearby shipyard to assemble its bits and pieces, it turned out its first ship before Christmas—a record. Now it is making one a week, and before long will hatch one every three and one-half days.

All in all, this plant and its shipyard surpass 1919's Hog Island. They have more speed and less noise. Welders have replaced most of the riveters of 22 years ago, who hammered out as much racket as our guns then banging at the Hindenburg line. In 1941 and 1942, sound effects are muted.

When shipbuilders took over this plant last April, they cleaned house, evicting thousands of sparrows from the rafters of the 15-acre roof, and moving machinery around to function like a streamlined auto plant. There was room to do it. The draughty, gloomy barn is 270 feet

Crowd Sees Night Launching of Sub-Combat Vessel



NEW YORK: Beneath a battery of powerful lights, the 1000-ton submarine combat vessel PC 552 was launched at a Brooklyn shipyard at 8:10 p.m. Friday, Feb. 13. The night launching was the first in the third naval district, witnessed by 2000 persons, including many workmen who helped build the craft. NEA photo



Wide World

Alms directed its installation, taught a new crew to run it, and stood by to direct their work.

The largest installations for the converted plant were the furnaces, where heavier work, such as the ribs of the ship boss, the bilge, stem, stern and thick keel plates, are softened up for shaping, in 3000 degrees Fahr. Hauled out on a steel floor perforated with squares like a waffle iron, the red-hot steel is shaped by crews operating hydraulic pushers and rams. These bend and shape the metal against steel molds or pattern of metal pegs driven into the floor.

Each Plate Marked

Each of a ship's 400 side plates has a shape and size of its own. Designers work months making these dummies show the exact shapes and dimensions. Symbols indicate rivet holes, cuts, bevels, sections to be reinforced, and the plate's definite position on the ship. When these marks are transferred to the metal in colored hieroglyphics by workmen flourishing long-handled paint brushes, each steel sheet looks something like a gigantic Chinese laundry slip.

So painted, the plates, dangling

from overhead cranes, sail down the production line. Safety crews escort them to the ringing of warning bells, so that no workman gets clipped on the head. At all times, at least 50 tons of steel—parts of 22 ships—are swinging through the factory.

Each plate stops at the machines that will process it, and once processed, the plate swings out the other end of the plant through hangar-like doors for welding into subassemblies—22-ton double-bottom sections, for example, 22 x 29 feet, and 4 feet thick. Two such sections span the breadth of a standardized boat.

Flat cars tote the subassemblies, 30 cars at a time, to the shipyard. Most of them are fastened together by welders; some by riveters. Respective subassemblies are interchangeable in this day of mass production. Parts of one ship fit another like parts of automobiles.

It takes 2550 tons of girders and plates, 55,000 rivets and 194,000 linear feet of welding to put an Ugly Duckling into floating condition. Once off the ways, it then gets its engine and deck fittings.

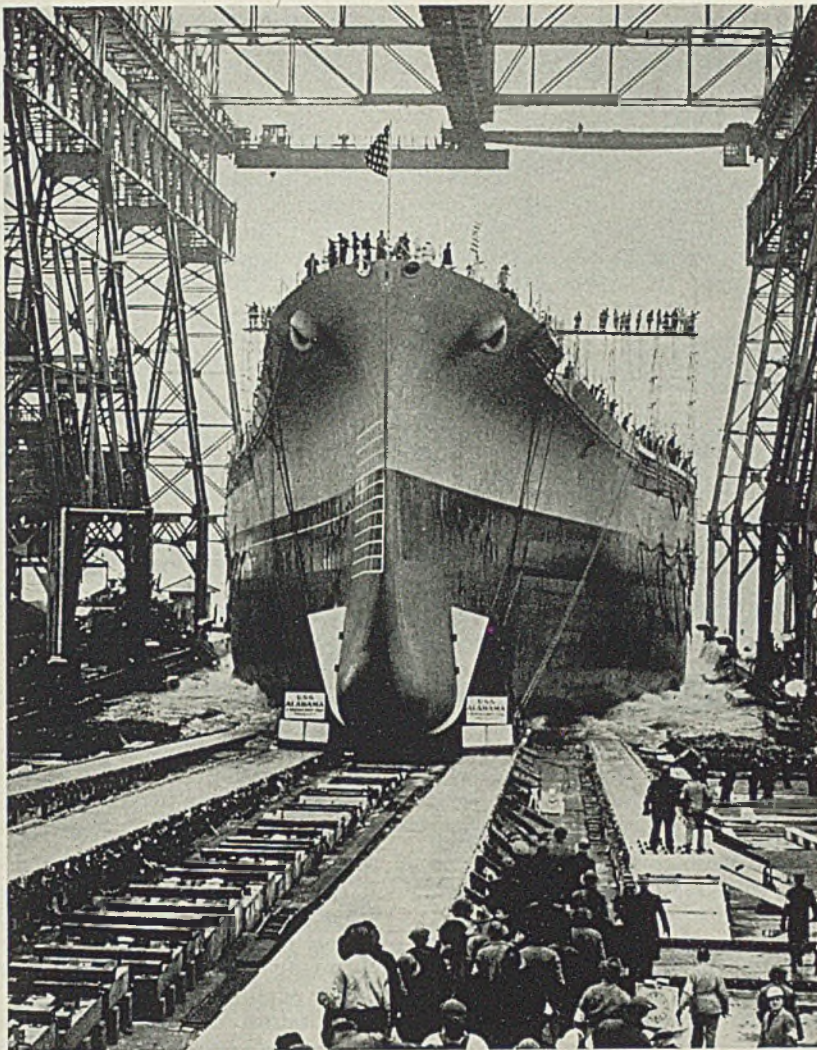
Although it requires more skill to put a ship together today than

it did 22 years ago, more than 85 per cent of the 2000 employes at the plant alone started from scratch, when work began last spring. These inlanders—98 per cent native Americans from plantations, steel mills and coal mines—had never seen an ocean-going ship, let alone a shipyard. Classes have taught trades to most of the 8000 employes at work now. In less than a year, industrial education has made them skilled erectors, fitters, reamers, drillers, welders, riveters, burners, and caulkers. Except for these experienced foremen and leadmen assigned from other shipyards, employes are enlisted at the gate.

782 Vessels Placed with American Yards in January

American shipyards in January received orders for 782 vessels to bring the total on order Feb. 1 up to 1809 ships aggregating 11,511,690 gross tons, according to the American Bureau of Shipping. On Jan. 1 there were 1046 vessels, aggregating 6,462,670 tons, on order.

These totals are exclusive of 52 ships being built for the British Purchasing Commission on Feb. 1 and 55 being built on Jan. 1.



Acme

Norfolk Celebrates Battleship Day

FIRST battleship to be built in the Norfolk, Va., navy yard in 50 years, the U. S. S. ALABAMA slid down the ways last week. Within four hours it was towed to a fitting-out basin where nine 16-inch guns, plus latest type anti-aircraft and secondary broadside guns, are being installed. The 35,000-ton vessel, 680 feet long, capable of 27 knots-an-hour speed, was launched nine months ahead of schedule, clearing the ways for the keel of a 45,000 ton battleship.

It was one of the most interesting and significant launchings in recent naval history—thousands of persons standing in the rain—see opposite photo—while workmen climbed the pillars of a new building under construction to witness the ceremony

Limits Sale of Planes of Less Than 500 Horsepower

WASHINGTON

In an order sent to each of the 53 manufacturers of light aircraft, WPB limits the sale of new planes having less than 500 horsepower and restricted the amount of aluminum that may be used in the airframes of certain of them.

It was stated that the Army and Navy will require large numbers of light aircraft in the immediate future and that additional quantities will be needed for the civilian air patrol, the civilian pilot training program, and various state guard units. There will be no limitation on the sale of light aircraft to these.

Others excepted in the order were:

The United States Maritime Commission, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard, Civil Aeronautics Authority, the National Advisory Committee for Aeronautics, the Office of Scientific Research and Development.

The governments of the United Kingdom, Canada and other dominions, crown colonies and protec-

torates of the British Empire, Belgium, China, Greece, Kingdom of the Netherlands, Norway, Poland, Russia and Yugoslavia.

Purchasers under the lend-lease act.

Purchasers specified in a delivery schedule which has been approved by the Joint Aircraft Committee.

Any other person who obtains a certificate showing that the WPB director of industry operations approves the purchase.

Planes affected by the order, No. L-48, were defined as all new aircraft using an engine or engines of less than 500 horsepower in the aggregate, which were completed on or after Oct. 1, 1941, and which have been flown less than 100 hours.

Order also restricts the use of aluminum in the airframes of light aircraft by providing that after the effective date of the order, no person shall commence to manufacture any light aircraft which has aluminum ribs and which contains in its airframe more than 18 per cent of aluminum, or any light aircraft which has ribs of any other material and which contains in its airframe more than 12 per cent of aluminum.

After Sept. 1, 1942, no person is

permitted to continue the manufacture of any light aircraft which contains in its airframe more than 12 per cent of aluminum irrespective of whether or not such aircraft has aluminum ribs. These restrictions on the production of light aircraft do not apply to planes manufactured for certain specified purchasers such as the United States Army and Navy, foreign countries, lend-lease purchasers and purchasers in a delivery schedule approved by the Joint Aircraft Committee.

Cincinnati Production Association Approved

WPB has approved the pooling of 13 tool and die manufacturers in the Cincinnati area who are operating under the name, Cincinnati Tool and Die Manufacturers' Association.

Members are: Accurate Tool & Die Works, Ace Tool & Die Works, Auto Sun Products Co., Bahrs Tool & Die shop, H. T. Colling Co., Press & Tool Co., Gerding Brothers, J. & R. Mfg. Co., Key Tool & Die Co., Knowlton Engineering Co., Modern Tool Co., M. Opitz Metal Products Co., and Superior Die & Engine Co.

Scrap Consumers To Bid for Derelict Automobiles Within 90 Days

WASHINGTON

DEFINITE offers will be made within 90 days for the purchase of all cars in the country's automobile graveyards that are located within reasonable distance of scrap consumers.

Arrangements have been completed with principal iron and steel scrap users to expedite the purchase and preparation of the potential scrap in the graveyards, of which there are about 30,000.

A directory of all the auto graveyards has been undertaken by the bureau in co-operation with the Department of Agriculture and the WPA. This listing will include the name of the owner and operator and the approximate number of jalopies on each lot.

Each of the approximately 80 companies operating steelmaking furnaces and foundries, as well as other large users of iron and steel scrap, are being or will be asked by the WPB to appoint one man to be responsible for that company's participation in the graveyard program. His job will be to see that the dealers through whom his company normally buys scrap will, as agents for the company, make offers for the purchase of the contents of all auto graveyards within economical shipping distance of the company's plants. The plan was submitted to and approved as to feasibility by the scrap subcommittee of the Iron and Steel Industry Advisory Committee.

Purchasers and bidders are to make reports to the Bureau of Industrial Conservation on each graveyard visited daily. Any members of such industries which are not already in contact with the bureau should communicate with it as soon as possible so that they may follow the reporting procedure which is being set up. A form has been prepared which will show whether or not the graveyard owner has accepted the offer made to him for his cars, and, if not, the price bid per ton.

These reports will be examined by the Bureau of Industrial Conservation and if it appears that any graveyard has rejected a fair offer, an investigation of all the facts and circumstances will be made by field agents of the automobile graveyard section of the bureau. If it appears advisable following this examination, the government may requisition the graveyard's entire contents.

Owners of automobile graveyards who accept offers made by prospec-

tive purchasers will be allowed to keep reasonable inventories of parts which may be necessary to service cars still upon the roads, it was announced.

To see that all of the graveyards are covered by the program, the steel companies, as the largest consumers of scrap, are being asked to appoint regional representatives for each of the fifteen regions into which the country has been divided.

The scrap iron and steel which

will be moved into normal channels of trade through this effort will be subject to allocation among scrap-consuming companies. This will mean that, even though a dealer may acquire the cars in a particular graveyard as agent for one company, the scrap metal may be given to another company whose need is greater or whose part in war production is more important. All such allocations will be made by the WPB Iron and Steel Section.

A natural by-product of this campaign will be to make available to consumers a supply of nonferrous metals such as aluminum, copper, brass, and zinc, which are present in smaller quantities in graveyard cars.

Engineer Sees Vast Scrap Tonnage Available at Remote Western Points

By KING H. GRAYSON
Azusa, Calif.

STEEL scrap is one of America's foremost problems, which can be solved with results that will reach eight figures in tonnages. Plain common sense is not being applied to starting the flow of metal toward furnaces.

Recently I inspected more than 1000 tons of scrap, discarded ma-

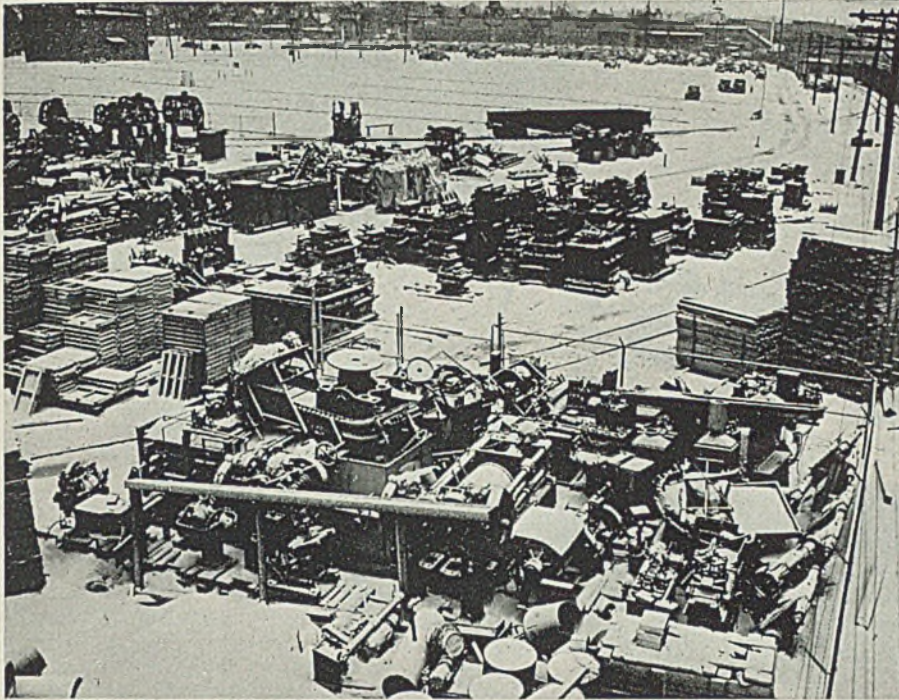
chinery, within 50 to 100 feet of railroad trackage. This is only one of 20 lots within two hours distance from my Los Angeles office. All of it can be purchased.

During the past 30 years development of the West has caused the importation of large quantities of metal products. Many have become

U.S. Acts To Make Auto "Graveyards" Disgorge



MOVEMENT of derelict automobiles from innumerable "graveyards" such as the one pictured above will be started within 90 days under a WPB program to make more iron and steel scrap available for the steel industry's furnaces. Considerable quantities of scrap aluminum, copper, brass and zinc also will be recovered. NEA photo



UNEMPLOYED FOR THE DURATION? This collection of presses, drills and other tools, used formerly to make Chevrolets at Flint, Mich., was moved outdoors to make room for machines necessary to produce war materials. Last week it was reported much of the equipment may stand idle until the war is over. NEA photo

ordinary junk, either through non-use or over-use. In many instances these metal products were transported by difficult means into interior points in the mountains or plains.

On one cattle ranch of 150,000 acres it is proven that there is 1700 to 2000 tons of scrap most of which can be classified as No. 1 and No. 2 melting steel. This is typical of many other ranches where considerable quantities of scrap steel are available.

The same conditions apply in various mining districts. Competent engineers and others who have spent their lives in the West know that the present scrap steel shortage can be relieved materially if adequate means and organizations are set up.

This organization requires that funds be made available so that those who collect the scrap can pay for it on the spot, can pay for trucking to a loading depot and for sorting and grading after being assembled. These men must be provided with complete specifications covering the grades, size of pieces, rates for payment if at certain distances from railroads and such other instructions as will permit them to function for the buyers.

While eastern scrap steel dealers claim that there is no scrap steel, I will reply with a few concrete examples from my own files.

1—At a mine idle and in receivership there is approximately 500 tons of heavy machinery not worth

reconditioning. This is about 45 miles from a railroad.

2—At an industrial plant there is available for immediate loading 35 to 50 carloads of heavy melting scrap, most of it near enough to trackage for a crane to reach it for

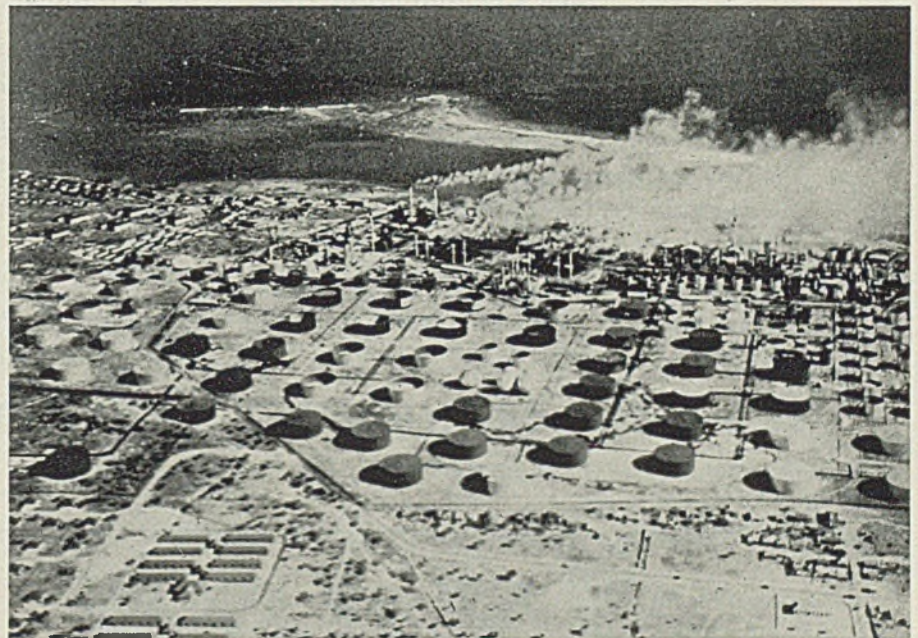
loading. This applies at a second industrial plant about 11 miles from the other one.

3—Between 30 and 50 tons of abandoned machinery is to be had from the owners by trucking not more than two miles from its location. The same owners have available 45 tons of agricultural scrap.

Those who claim no scrap steel is available to prevent closing of furnaces may doubt the existence of as much as 500,000 to 1,000,000 tons of usable materials that can be economically assembled at loading points. I can state that if those who wish to purchase it will allow us the same funds that they now expend without results, a large portion of this tonnage can be arranged for their purchase. Shipment can be started at once, with continuous delivery to follow, but this requires authority, working specifications, banking and payment instructions, and if it is to be sorted and graded prior to shipment, the buyer must provide the skilled men for this work.

Those of us who are familiar with these lots of scrap material acquired this knowledge at varying costs. We are just as patriotic as those who make a business of collecting scrap for a profit, and we feel that we are just as much entitled to the profit of 50 cents per ton from the consuming buyer as those who make it their regular business.

Where Axis First Struck at Western Hemisphere



OIL tanks and refineries on the island of Aruba, Netherlands West Indies, were slightly damaged last week when shelled by a Axis submarine, which also torpedoed four tankers. The attack was the first on a land objective in the Western Hemisphere since the war started. Later in the week President Roosevelt remarked to newsmen that it would be possible, under certain conditions, for New York or Detroit to be bombed. NEA photo

Why 10 MINUTES?



HARDEN THEM IN **1½** MINUTES with this new heat-treating process!



The incredible speed of TOCCO Induction Heat-Treating is smashing all sorts of production records. For example, surface hardening 14-inch sprockets: Where former method required 10 minutes per sprocket, TOCCO hardens them in only 1½ minutes . . . more than 6 times as fast!

And that isn't all! The electric speed and accuracy of TOCCO *eliminates rejects* due to distortion . . . *banishes straightening* and other time-consuming operations . . .

localizes hardening at the wearing surfaces for a *tougher structure* and *longer life*.

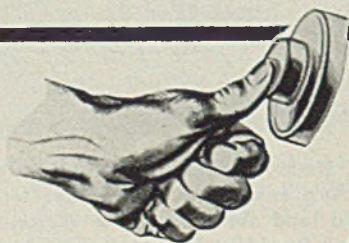
Simple push-button operation with automatic control . . . *doesn't require skilled labor*.

TOCCO machine is a clean, cool, compact unit . . . can be located right in assembly line to *cut hauling time*. It is *standard*; can be adapted to peace-time production in a few minutes with proper fixtures.

Investigate TOCCO for *faster production* and *better products* today!

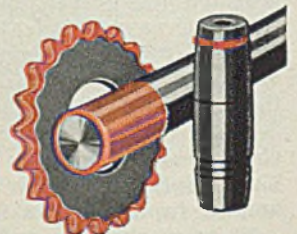
THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

SPEEDY ELECTRIC HEAT IS GENERATED WITHIN
THE SECTION TO BE HEAT-TREATED



TOCCO

World's Fastest, Most Accurate Heat-Treating Process



Mirrors of MOTORDOM

Motor capital, shouldering 25 per cent of war production, finds time to take stock of strategical situation on world fronts . . . Curtail 70-hour week at airplane engine, tool and die plants . . . Urge immediate study of industrial salvage possibilities; new local office to assist . . . Converted sheet-strip mill starts to roll plates



By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

AT LUNCHEON tables in office building restaurants, plant cafeterias and executive dining rooms, the "Monday morning generals and admirals" are busy masterminding the war, snatching a few minutes from the busy task of fashioning weapons for consideration of the utilization of these weapons. The following transcript, while of course not verbatim, is a compilation of many viewpoints expressed at these sessions:

Mr. A.: Well, MacArthur fights on, and I fail to see why our military forces cannot organize an expedition to relieve him. After all, the Japs are spread pretty thin between Tokyo and Singapore, so why couldn't a well-equipped tank force blast its way to the Bataan peninsula?

Mr. B.: You talk about being spread pretty thin. What about our own forces? Small to begin with, they are being dispatched in all directions as military strategy dictates, so how are you going to concentrate on one position today, when tomorrow another may be more critical?

Offensive Is Best Defense

Mr. C.: The trouble is we're playing the game too conservatively, preferring to drop back to what looks like a safe defensive position and then wait for the attack. George Washington's crossing of the Delaware would have probably looked like a silly move to conservative military strategists, but our history books say his daring won this country its independence. Imagination and daring on the offense will take even a well-organized defense every time. Remember the old football maxim—the best defense is a good offense.

Mr. A.: There's a lot in that. The British have been playing a conservative defensive game since 1939 and it certainly has not resulted in many touchdowns.

Mr. B.: And another thing; you hear the continual cry for more

and faster production of war goods, and this country's industries are doing a superhuman job along that line, but what good will superhuman production do if the output falls into the hands of the enemy before it can even be put to use? Look what was lost at Dunkerque and Singapore in the form of war materiel—and look what is liable to be lost at Rangoon.

Mr. C.: My wife tells me a friend of hers who left Singapore weeks ago declared there were American planes in crates on the docks there lying idle because no one was on hand who knew how to put them together, let alone fly them. That's a funny thing to happen in the strongest naval bastion between Pearl Harbor and Alexandria.

Miracles In Bomber Tooling

Mr. A.: Speaking of planes, you probably know that Nelson moved airplane priorities up to A-1-a, the same as tanks and ships. That ought to satisfy a lot of airplane people who have been kicking. However, the new rating still does not put planes in a class with the six battleships now being built, reportedly with AA priority.

Mr. B.: Well, even with A-1-b priority, they have worked miracles on this Ford bomber job at Willow Run. They even say that the bulk of the tooling is now nearly out of the way at the Ford tool and die shop and they are about ready to shift over to another tooling job.

Mr. C.: Maybe that's why they cut the hours at the tool and die shop from 70 to 58, although an air corps procurement officer said the reduction was principally due to a drop in efficiency of 30 per cent resulting from the long hours. The boys out there have been working seven 10-hour days for which they received 90 hours' pay;

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now they will receive only 67 hours' pay, with Sunday work stopped. That's quite a kick in the paycheck—a 25 per cent reduction.

Mr. A.: Yes, and the airplane engine plant at Ford also was reduced from 70 hours to 60 hours. This was said to be a temporary reduction because of restrictions on aluminum supplies. You know the first P&W engines from the Ford plant to be installed in a bomber were flown at Baltimore the other day, and the test pilot said that even in a steep climb they had plenty to spare.

Mr. B.: It is not going to be long before there will be so much war stuff rolling from plants in the motor industry that the docks are going to be inundated. There's another tough problem—the routing and shipping of all these tanks, trucks, airplanes, guns, shells and what not. Probably some of the overseas and export staffs of the motor companies are concentrating on this right now.

Salvage Becomes Important

Mr. C.: What a lot of good crating wood is leaving this country's docks, never to return. There's dissipation of raw material which we can't do much about. Maybe we should stamp all these crates—'Please return the carton by next boat and receive your nickel deposit'.

Mr. A.: When you start talking about raw materials and salvage in this country, you've hit on something really important. We hear about the dire shortage of scrap iron and steel, but there are a lot of other things which we have to start salvaging, such as old rubber, paper, wool and cotton rags, and so forth. The salvage section of the bureau of industrial conservation of WPB is digging into this matter in a thorough way. They are opening a Detroit office in charge of Brewster

MIRRORS OF MOTORDOM—Continued

Loud who used to be up with Campbell-Ewald in the GM building, and they are organizing the entire state of Michigan, with the co-operation of Kenneth Burns' present salvage committee to do a complete job of advising and expediting industrial salvage.

Mr. B.: Yes, the Board of Commerce had a meeting last Tuesday at which Loud was present and at which George Weymouth, chief of the salvage section, spoke for half an hour before 500 men at lunch. They came from all over the state, too. Weymouth gave some examples of how effective concentrated efforts can be in the matter of industrial salvage. It started in Erie, Pa., where an organized program drove in some 2200 tons of iron and steel scrap over and above the normal flow of this material. Then, a big rubber company in Akron, O., decided to give its plants a thorough combing for ferrous scrap and in one week dug up better than 1500 tons. He also told of a steel company which started a salvage program and in a couple of months scraped up 125 carloads.

Nosing Out Scrap

Mr. C.: I understand that steel company salesmen are going to be enlisted in the effort to drive in an estimated 3,000,000 tons of scrap from 30,000 auto graveyards throughout the country. They've already tried out the plan of sending such salesmen accompanied by army officers into these junkyards to speed up movement of scrap

and it has been very successful.

Mr. A.: What about the large stores of dies and punches in body shops around Detroit? Wouldn't they be good scrap stockpiles?

Mr. B.: Sure, that has already been thought of, and there is a large tonnage of iron and steel in the form of dies and punches. The thing is that it is valuable because of the thousands of man-hours of labor which went into making the dies. The owners might have a tough time writing off the cost of these dies if they are to be sold for scrap.

Question of Tin Cans

Mr. C.: What about old tin cans for scrap?

Mr. A.: Well, the salvage section says it is not interested in tin cans, but Great Lakes Steel Corp. here has been buying a lot of them for use in both open hearth furnaces and blast furnaces, so they say. The cans were being taken in, baled, at \$15.85 a ton, with shipments limited to one car of cans to two cars of regular No. 1 bundled steel scrap. Then the OPA came along and shoved the ceiling on can bundles down to \$9.85 a ton, or \$8 under the price on No. 1 bundles, so the scrap people had to stop shipping because they couldn't afford to collect and bale the cans at this price. They squawked like the devil to Washington, but so far it hasn't done much good.

Mr. B.: Well, why did the OPA put the ceiling price so low?

Mr. A.: Search me, unless they

figured the higher price was just a lever to drive in the No. 1 bundles. But under allocation the mill was getting most of the good bundles from around here. Other steel companies will not use can scrap, anyway, because too much tin in open-hearth steel will result in rolling cracks.

Mr. C.: If someone could figure out a way to de-tin an open-hearth heat, then the cans would start to move everywhere, and the ceiling price probably would go back up.

Mr. A.: You know, terne plate is another kind of scrap that open-hearth melters steer clear of. The lead on this stuff sinks down in the bath of the furnace and bores through the refractory bottom. But the report here is that a new type of furnace bottom has been developed which looks like it will stand up under molten lead. It is being investigated and might prove the answer to the use of terne plate scrap in open hearths.

Mr. B.: Well, anyhow, we are still getting the steel even though there is question as to how long the present rate can continue. Great Lakes started to roll some plates on its converted continuous mill the other day. They spent a lot of money and rushed the conversion job through in record time. In a few weeks the plates should be streaming from this mill. It's designed to turn out something like 25,000 tons a month.

Mr. C.: What is Ford going to do with the 15,000 tons of steel ingots he turns out every week at his open-hearth plant, now that car production has been shut off?

Ford Steel in Tanks

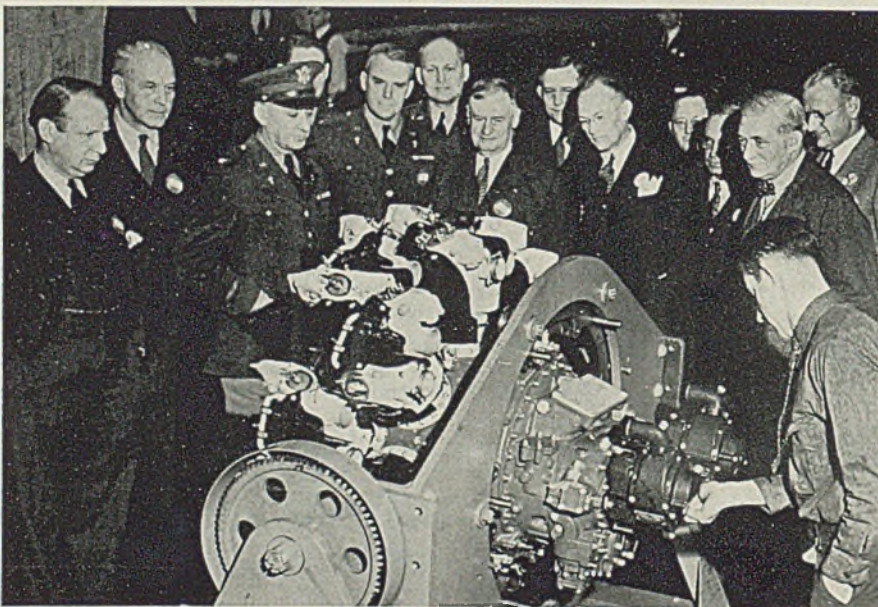
Mr. B.: A lot will go into trucks and jeeps. Some is being rolled into reinforcing bars to be used in Ford construction jobs. Some is being furnished to the hundreds of parts suppliers which Ford has on the bomber, airplane engine and tank jobs. It takes about 30 tons of metal for one of those M-4 tanks, you know.

Mr. A.: Did you read that Roosevelt told his press conference the other day Detroit could be bombed? That's all it would take to end whatever union complaining over wages and seniorities, civilian bickering over who is in charge of defense and whatever other deterrents to all-out production now confront us. Just one bomb, that's all, whether it hit anything or not.

Mr. B.: Sure, but don't you suppose the enemy realizes this and so would be pretty careful to avoid such a crystallizing of all-out war effort? From what you hear it would be far easier to organize an inside sabotaging job than to send over bombers. Look at the NORMANDIE!

Mr. C.: O.K. boys, back to work.

Inspecting Buick-Built Pratt & Whitney Engines



AT AN accelerating rate, Buick built Pratt & Whitney engines are rolling from the production lines. Photo shows Lieutenant General William S. Knudsen (second from right) and staff, on inspection tour of war production plants, inspecting a complete engine which is ready for initial test run

EFFICIENT MATERIALS HANDLING KEEPS THESE ★ ★ PLANTS ★ ★

ON THE *alert!*

It's always smart to stay on one's toes—but today it's more than merely smart . . . it's patriotic!

Wherever you go, metal working plants are *pre-planning* their routing schedules. They're making certain that materials handling will stay *ahead* of production quotas.

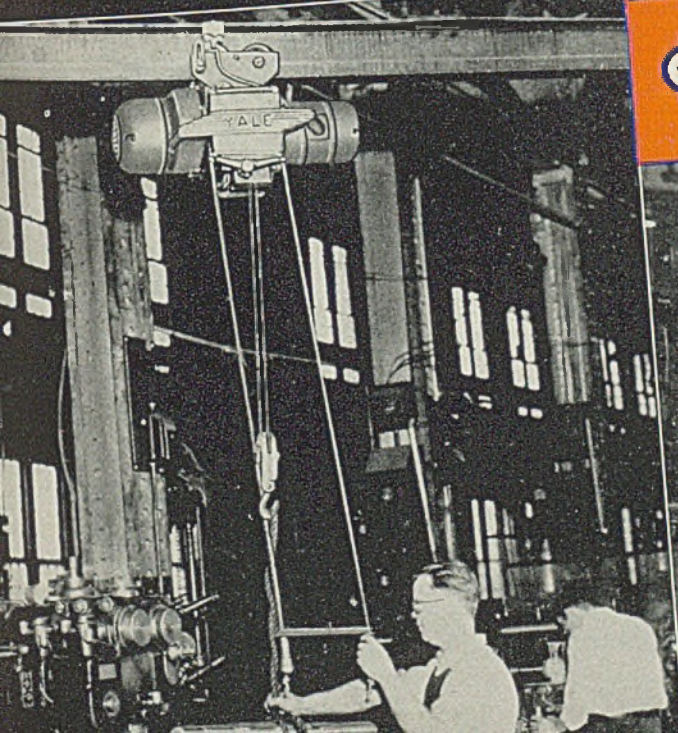
From raw materials to finished product, the flow of materials must keep free . . . must keep time. Note the surrounding photographs. These plants are on the alert—saving the countless minutes that do more than just keep schedules; *they beat them.*

Yale Hand and Electric Hoists, Electric Industrial Trucks, and Hand Lift Trucks are the mechanical efficiency experts of the Metal Working Industry. As individual units, or as part of integrated handling systems—they are essential to production speed.

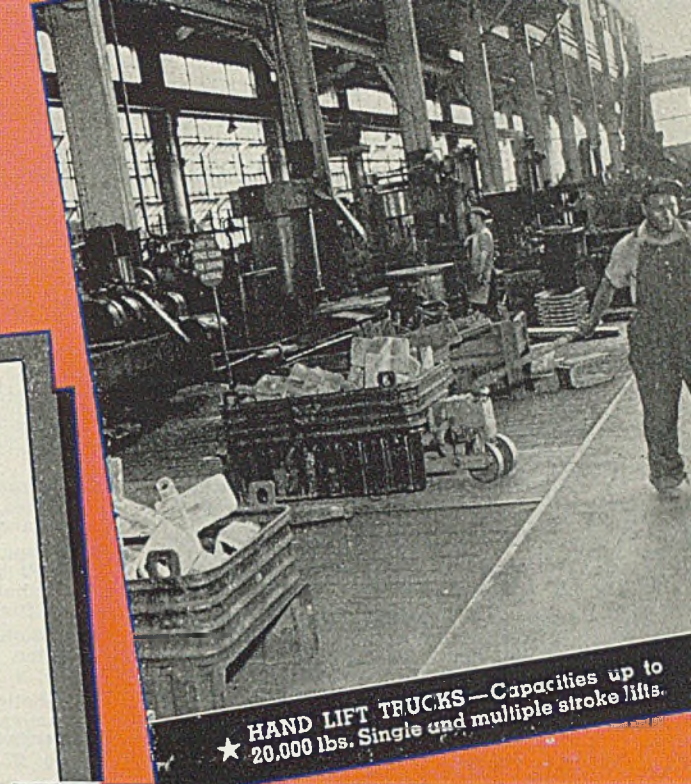
And production speed is essential to our war effort.

For further information on this equipment, check with your Yale representative, or write directly to The Yale & Towne Manufacturing Company, Philadelphia Division, Philadelphia, Pennsylvania.

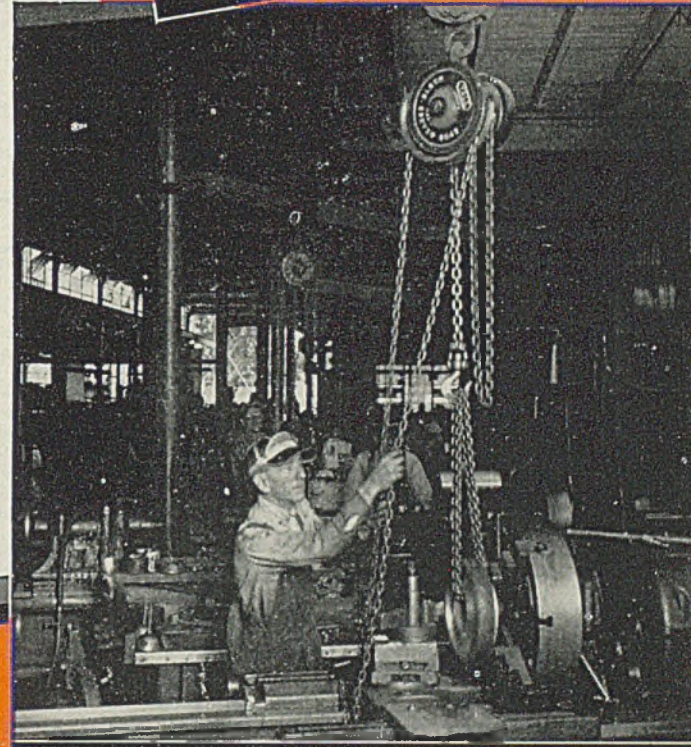
ELECTRIC WIRE ROPE HOISTS—Capacities $\frac{1}{4}$ to 10 tons.



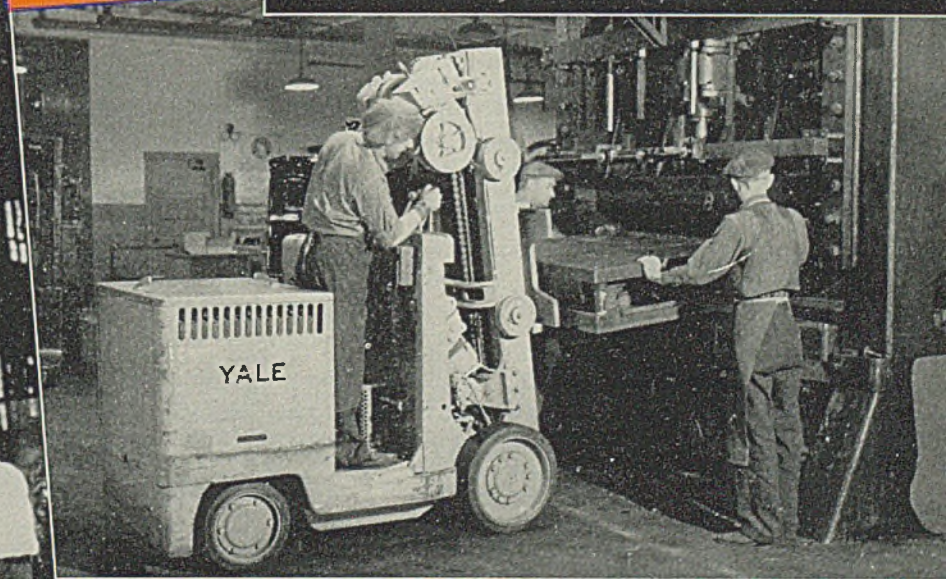
THE YALE COMPANY



★ HAND LIFT TRUCKS—Capacities up to 20,000 lbs. Single and multiple stroke lifts.



★ HAND CHAIN HOISTS—Ball bearing, spur-gear hoists—Capacities 300 lbs. to 40 tons.



Government Inquiries

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by wiring, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

WAR DEPARTMENT, AIR CORPS WRIGHT FIELD, DAYTON, O.

42-1989—Bench type lathe, screw cutting 10" swing, not less than 26" between centers, QR-249; cone-head lathe, 13" underneath belt, South Bend Lathe Co. No. 8113-B, or equal, QR-11. Bids Feb. 23.

BUREAU OF SUPPLIES, ACCOUNTS NAVY DEPARTMENT, WASHINGTON

370—Clothes lockers, marine use, aluminum alloy, triple tier, QR-4000; double tier, QR-300; steel, single tier, QR-250; steel, triple tier, QR-2000; steel, double tier, QR-250; safe lockers, steel, marine use, QR-5035. Bids Feb. 27.

374—Cranes, tractor, gasoline engine driven, rotating boom, QR-15. Bids Feb. 24.

376—Sheet steel, corrugated, flat, gal-

vanized, black, zinc coated, QR-large. Bids Mar. 3.

380—Brass, bronze and copper, sheets, strips and angles, QR-large. Bids Feb. 27.

381—Brass, bronze and copper, flats, squares, rounds, hexagons, and ingots, QR-large. Bids Feb. 27.

382—Plugs, base, shell, No. 17, Mk. 2, for 2 pounder anti-craft projectiles; fuze-hole, 1.05", Mk. 2, QR-200,000 of ea. Bids Feb. 24.

387—Boiler tubes, class B, steel, superheater, 1" O.D. x 16', QR-11,100; 1 1/4" O.D. x 22', QR-1560. Bids Feb. 24.

392—Boiler tubes, class A, carbon steel, seamless, 1" O.D., QR-7800; 1 1/4" O.D., QR-2500; 1 1/2" O.D., QR-1200. Bids Feb. 27.

384—Extractors, for 5"/38 caliber cartridge cases mark V, QR-1,992,450. Bids Mar. 3.

Sub-Contract Opportunities

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

5-F-A-203: A large prime contractor finds it urgently necessary to subcontract the machine work on two gun parts. Present quantities being 200 of each part. Work to be done by tool room methods or by production set-up. Order will be increased to 500 parts of each if responsible manufacturer can be located. In addition to this, there is a possibility of a continuing contract for a long period of time. Deliveries to start March 1, or sooner and continue through April. All materials to be furnished by prime contractor. Heat treating information will follow. Drawings available at this office. The following machine equipment is required: No. 3, No. 4, or No. 5 horizontal and vertical milling machines; at least one vertical milling machine to be provided with 18" to 26" rotary attachment; heavy spindle Cincinnati-Bickford drill press, or equal; keyseater and slotter; 18" and 24" heavy duty engine lathes; vertical and horizontal boring mills; heat treating facilities.

7-F-N-202: A Midwest manufacturer finds it necessary to subcontract for drill press work, requiring several two spindle cam driven drills, with capacity up to 3/4", of the Avey or similar type. Present deliveries are for 100 parts per day, starting April 1st, and building up to 500 parts per day by the end of May. Prime contractor will furnish parts.

8-F-O-117: An eastern manufacturer desires to sublet contracts for planning and boring 130 tons of cast steel anvils. The tools required consist of a 15' planer, a 5" floor boring mill and a 6' to 8' radial drill. The Prime contractor will furnish steel castings.

9-F-N-205: (1) The Navy requires 10

small parts. Samples and drawings are available for inspection at this office. Total number required is approximately 52,000 pieces. Requires multiple spindle-automatic, cylindrical grinders and milling machines. (2) Also, 15 items are needed. Require spur and bevel gear cutting, Potter & Johnson or Fay automatic broaching and milling machines and auxiliary tooling equipment. Blueprints are available for inspection in our permanent exhibit on the 28th floor.

10-F-A-123: A special request has been made to secure additional prime contractors for the manufacture of 37 mm shot. This work will carry high priorities. Machine requirements: 4, 6, or 8 spindle Greenlee, Gridley, Cone, or Acme automatic screw machines with bar capacity of 1 1/2" to 1 5/8"; hand screw machines with a capacity of 1 1/2" for second operation; centerless grinders; swaging equipment; hardening and heat treating equipment. Hardening, heat treating and centerless grinding may be subcontracted. Drawings available at this office.

11-F-N-206: A U. S. Naval Station will require 200 sets of manufacturing and inspection gages, each set consisting of a number of gages of the same kind. Delivery of at least 6 of each item to be made by June 10, 1942, balance by Dec. 10, 1942. Partial deliveries prior to dates mentioned are acceptable. Exact quantities and full details will be shown on formal proposals to be issued presently. For the purpose of this bid, estimates and quotation should be made on a basis of at least 6 of each item. Contractor shall provide all materials. Priority rating of A-1-A will apply. Formal proposals for bidding will be issued by the Navy Purchasing Office and necessary instructions and blank forms of proposal to be used in submitting bids, will be furnished. Pro-

posals should be submitted prior to opening date and for that reason we are submitting the drawing to the manufacturers now, in order to gain time. It is imperative that delivery of the first 6 sets be made on June 10, or sooner. 200 drawings covering this work available for examination at this office.

13-F-A-210: Chicago manufacturer desires to subcontract work requiring centerless grinders and external grinders with both wide and narrow wheel capacity for grinding 37 mm shot. Carries A-1-A priorities. Quantities large and continuous run.

14-F-N-207: Chicago manufacturer has a great deal of work to subcontract, requiring the following equipment:

1. Vertical boring mills with capacity ranging from 32" to 84" in diameter. Work consists of facing and turning on parts made of both cast iron and steel.

2. Automatic screw machines, either multiple or single spindle with capacity from 1/2" to 2 3/4" diameter stock.

3. Hand screw machines with capacities from 1/2" to 4" diameter stock.

(For items 2 and 3 material to be used mostly cold and hot rolled alloy steel.)

4. Turret lathes with a swing of 16" and up for chucking work, such as secondary operations on bar stock and both primary and secondary operations on steel forgings, iron and steel castings.

Tolerances generally plus or minus .005. All material and tools of a special nature, including form tools, flat drills and all necessary gages furnished by prime contractor. Quantities both large and small, varying from possibly 50 to 1000 pieces of the several parts. Carries A-1-A priorities.

15-F-A-207: Chicago manufacturer has considerable work to sublet for large boring mills, including 60", 72", 84" and 102". This work is on forged steel rings and will be practically continuous. Tolerances reasonable. A-1-A Priorities. Forgings will be furnished by prime contractor.

Massachusetts state office, Contract Distribution Branch, WPB, 17 Court street, Boston, reports the following subcontract opportunities:

A.E.C. 1: Rhode Island manufacturer requires facilities to center grind steel shafts 3/4" to 1 1/2-inch diameter by 30 to 60 inches long. Tolerance .002.

A.E.C. 2: Massachusetts manufacturer requires complete machinery facilities for turbine bucket wheels and shafts. Close tolerance. Also rough machining on heavy forgings, requiring engine lathes with 20-inch swing up to 48-inch swing.

P-6: Rhode Island Manufacturing Company requires subcontract capacity on external grinders, planers, small turret lathes, large turret lathes, general machine shop.

P-7: Vermont Manufacturing Company needs facilities for tools, jigs, fixtures, gages, dies, and cutters.

P-8: Rhode Island Manufacturing Company requires subcontract capacity on automatic screw machine (single spindle), grinders (external, internal, surface), vertical milling, tools, jigs, fixtures, gages, dies, cutters, and small turret lathes.

P-9: Massachusetts Manufacturing Company requires subcontract capacity on horizontal boring, radial drilling, steel and gray iron foundry, gears, milling, grinding, large engine lathes, plain milling, vertical milling, planers, tools, jigs, fixtures, gages, dies, and cutters.

P-10: Connecticut Manufacturing Com-

pany requires subcontract capacity on vertical boring, radial drilling, hand, universal, and vertical milling, planers, small turret lathes, large turret lathes, threading, milling, and grinding.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

I.S. 141: Local manufacturer urgently needs sources for grade 4 steel castings, 16 x 18 x 16 inches, approximately 250 pounds. Tensile strength 110,000 psi, yields 85,000. Quantity 3000 with delivery to start soon as possible. Prints available for inspection this office.

Cleveland office Division of Contract Distribution, WPB, Union Commerce building, is seeking contractor for the following:

87-26: Source to furnish miscellaneous die equipment of general type indicated on blue-prints available at this office. Prime contractor will furnish blanked out or roughed out tool steel pieces. Quantities ranging from 500 to 1500 pieces.

88-212: Subcontractor to machine complete extruded sections of 5 parts 91" to 154" lengths. 24 ST Aluminum "T" and "L" shapes. Equipment needed, Van Ormans or combination vertical and universal milling machines. Blue Prints on file (office No. 3).

melting of nonferrous metals and alloys. A small amount is used in steel furnaces.

The order provides Madagascar flake graphite of crucible grade cannot be used for any purpose other than crucibles, and crucibles cannot be made of this material except upon specific authorization.

Order makes the Metals Reserve Co. sole importer of crucible grade Madagascar flake graphite. Manufacturers must apply monthly on Forms PD-303A and 303B for specific authorization to make crucibles and suppliers to make deliveries which the manufacturer is authorized to receive.

Limits on Use of Tungsten Tightened

Further conservation of tungsten has been ordered by WPB in Conservation Order M-29-b.

Order prohibits use of tungsten in grinding wheels, gages, and as a coloring material for rubber, linoleum, paper or other similar materials after May 1.

Until that date, use of tungsten in these items is limited to 17½ per cent of the amount used during the year ended June 30, 1941.

All other users of tungsten, except those specifically exempted, must reduce their use between Feb. 1 and March 31 to 12 per cent of the amount used in the year ended June 30, 1941. Such users, after April 1, are limited by calendar quarters to 17½ per cent of the amount used in the base year.

Exemptions to the order include use of tungsten for Army, Navy, lend-lease and other government contracts; to comply with safety regulations; orders bearing preference ratings of A-1-j or higher; corrosion-resisting material; alloy steels; hard-facing materials; hard-cutting tools and tool tips; atomic hydrogen welding rods; laboratory reagents and pharmaceuticals; laboratory research equipment; electrical equipment; radio and x-ray equipment; electronic relays and electric lighting uses, both filament and fluorescent.

Facsimile Signatures Allowed In Extending Priority Ratings

To relieve companies which find it necessary to assign or extend a large number of preference ratings by endorsement in purchase orders from the necessity of having each one manually signed by a responsible official, Priorities Regulation No. 7 allows the use of a facsimile signature.

Use of a facsimile signature is subject to a number of specified conditions, and a written record of each use must be kept two years.

Control Over Aluminum Allocations Consolidated in One Order

WASHINGTON

SUPPLEMENTARY Order M-1-f, which brings into one order complete allocation control over aluminum, was issued last week by the Division of Industry Operations. It replaces Orders M-1 and M-1-a.

The order leaves allocation control over aluminum in substantially the form in which it now is being administered. Its main provisions are:

1. Each producer, approved smelter and fabricator must file, on Form PD-26a, a shipping schedule for each month by the 15th of the preceding month. Specific allocations for all deliveries will then be issued. All other deliveries are prohibited.

2. Shipping schedules must be limited to essential items, as defined in Order M-1-e. Customers must file, by the fifth of the preceding month, a request for any item, information as to the exact part to be made, and the end use to which it is to be put. Customers seeking aluminum for permitted civilian uses must have a preference rating certificate issued subsequent to Oct. 31, 1941.

3. Aluminum may not be bought or sold except for the fulfillment of rated purchase orders for essential items and may be used only for an authorized purpose. Persons other than approved smelters and producers may not acquire any aluminum which requires smelting or melting before it can be used.

4. Inventory reports must be filed by all users of aluminum, other than government agencies, by April 20, 1942, on Form PD-40a and quarterly thereafter.

5. Stocks of aluminum in excess of immediate needs must be sold promptly on certification by the buyer that he will use the material in fulfillment of rated orders for essential items, or sold as scrap under the terms of Order M-1-d.

6. Those who operate in a dual capacity, such as producers who also fabricate, are subject to all

terms of the order.

7. The order does not apply to aluminum products being used by the ultimate consumer; to finished products which are moving in the regular channels of trade to the ultimate consumer, or to aluminum scrap as defined in Order M-1-d.

The order expires Dec. 31, 1942.

Quotas Under Conservation Orders Cannot Be Sold

Manufacturers whose production has been limited by a WPB order cannot increase their production by buying or otherwise obtaining the right to use the quota which has been assigned to another manufacturer in the same field without receiving express permission of the director of industry operations, WPB has ruled.

When a company which is operating according to a quota set by a limitation order, such as the order which permits manufacturers of farm machinery to produce a certain percentage of the number of machines which they made in 1940, is sold outright or ownership of the entire business is otherwise transferred, the new owner may continue to operate under the quota if he continues to make the same product at the same plant with substantially the same personnel other than executive officers.

Madagascar Flake Graphite Placed Under Strict Control

Madagascar flake graphite can be used only for the manufacture of crucibles and the crucibles only for the war effort, according to the terms of Order M-61.

All supplies of the material must be imported and present supplies are not sufficient to last indefinitely without drastic control of use.

Graphite crucibles are vital in the

Activities of Steel Users, Makers

L. E. DENMAN, president, C. R. Talbot Co., Cincinnati, announced sale of all its capital stock to Edgar T. Ward's Sons Co., Pittsburgh. The latter company is associated with Columbia Steel & Shafting Co. and Summerill Tubing Co., and operates warehouses at Boston, Newark, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago and Milwaukee. The Talbot company has represented the Union Drawn Steel Co. as sales agent more than 50 years.

Ward's File Farm, a resharpening business, has been established by Fred W. Ward on a farm near Hartford, Mich. Used files are cleaned with a wire buffer to remove loose dirt and rust, then run through the sharpening process which includes a treatment with steam mixed with abrasives. After testing and rust-prevention treatment, the files are ready for additional service. Seven workers now are employed at the plant. In addition to the economy factor, Mr. Ward suggests resharpening of files will conserve steel for other essential uses.

Standard Safety Equipment Co., Chicago, has completed negotiations for purchase of Fairway Laboratories, St. Louis, maker of salt tablets and dispensing equipment.

Charles H. Oppenheimer, president, Designers for Industry Inc., Cleveland, has changed his name to Charles H. Standish.

Massey-Harris Co. Inc., Racine, Wis., has purchased the local plant of Nash-Kelvinator Corp., and will convert it to the production of tanks for the War Department.

Frederick Post Co., maker of blue print, drafting and engineering materials, Chicago, has opened a factory branch at 1215 Capitol, Houston, Tex.

Chain Belt Co., Milwaukee, has appointed Pecaut Industrial Supply Co., 1819 East Fourth street, Sioux City, Iowa, distributor of Rex construction machinery in that area.

With the completion of three new furnaces, Oliver Iron & Steel Corp., Pittsburgh, has increased its capacity for heat treated high carbon steel and common black bolts by approximately 240,000 pieces per day.

Anton Smit & Co. Inc., 24 State street, New York, manufacturer of diamond tools, is moving to new quarters at 333 West Fifty-second street, effective March 1. This move also includes its subsidiary, Dia-

mond Core Bit & Tool Co., formerly of 108 Water street, New York.

Western Foundry Co., 3634 South Kedzie avenue, Chicago, is equipping its plant to produce steel castings and is installing a 1½-ton electric furnace, two converters and a No. 6 cupola. Between \$150,000 and \$200,000 is being spent to convert a larger portion of production to war products. The company has been engaged primarily in manufacture of gray iron castings. The new electric furnace will be in operation about March 1.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has licensed Joshua Hendy Iron Works, Sunnyvale, Calif., to use its plans and processes to produce marine turbines, gears and auxiliary apparatus.

New address of the Washington office of Gray Iron Founders' Society Inc. is 1719 K street, Northwest. This supersedes the address previously reported by the society as Apartment 400, 2633 Sixteenth street, Northwest.

Pomona Pump Co., Pomona, Calif., has purchased the Westco Pump Division of Micro-Westco Inc., Bettendorf, Iowa, and will operate it as

Pomona Pump Co., Westco Division, at 2621 Locust street, St. Louis. Management and key personnel of Westco will be transferred to St. Louis.

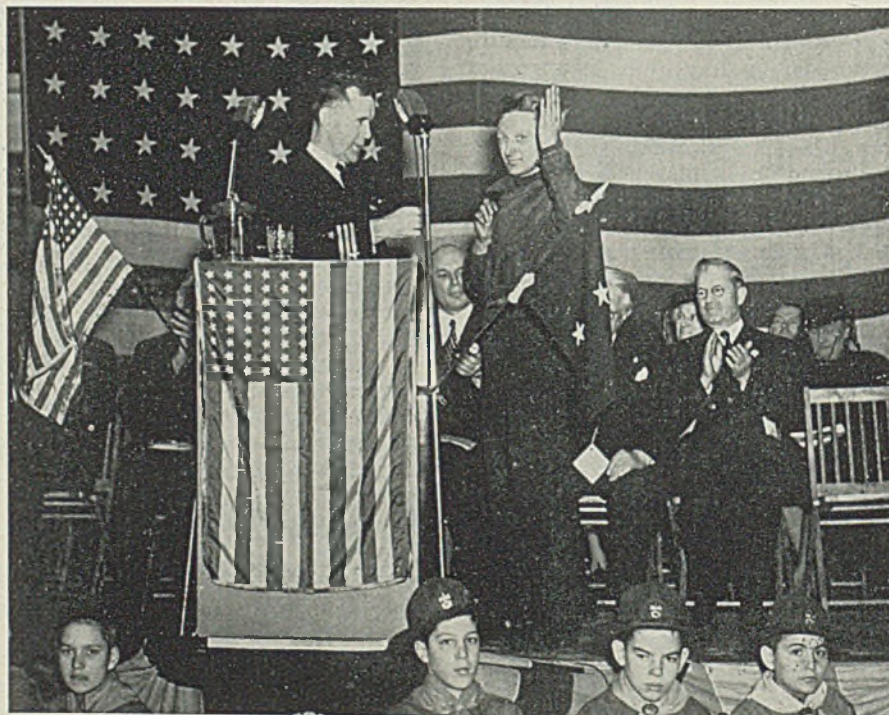
Imperial Brass Mfg. Co., Chicago, is undertaking a modernization program to expand production. Between \$100,000 and \$150,000 will be spent for new equipment, some of which has been installed and the remainder will be set up within four months.

Fansteel Metallurgical Corp., North Chicago, Ill., has started construction of a government-financed plant to expand production of tantalum carbide. Plant will be owned by Defense Plant Corp. and operated by Tantalum Defense Corp., a wholly-owned Fansteel subsidiary.

Wellman Engineering Co., Cleveland, has moved its Chicago office to Room 1112, Merchandise Mart, 222 West, North Bank drive. John E. Carlson, of the Williams Bucket Division of Wellman, is in charge of clamshell and dragline bucket sales and service at this branch office.

Navy Department, Washington, has confirmed arrangements whereby the former plant of Stover Mfg. & Engine Co., Freeport, Ill., will be rented to Fairbanks, Morse & Co., Chicago, for manufacture of diesel

American Pulley Co. Awarded Navy "E"



LIEUT. COMMANDER C. A. Misson, U. S. N., presents the Navy "E" emblem to Edward McCauley, representing about 800 employes of the American Pulley Co., Philadelphia. The "E" pennant and ordnance flag were presented to the company, which now is devoting more than 85 per cent of its production to war purposes

engines and other machinery. The Stover company was liquidated during the past year.

Aircraft Specialties Co., successor to Aircraft Specialties Corp., has moved to larger quarters at 601 South Anderson street, Los Angeles.

Sterling Grinding Wheel Division of Cleveland Quarries Co., Tiffin, O., has moved its Cleveland warehouse facilities, machines and stock to new quarters at 1293 West Ninth street.

Mathieson Alkali Works Inc., New York, manufacturer of fused alkalis and other chemicals used in metallurgy, is observing its fiftieth anniversary. The company was incorporated in Virginia in 1892.

Lea Mfg. Co., Waterbury, Conn., has taken over sales and distribution in southwestern New England of the Paasche line of lacquer and paint spraying equipment made by Paasche Airbrush Co., Chicago.

The former mechanical goods and sundries sales divisions of B. F. Goodrich Co., Akron, O., have been combined and given a new name, Industrial Products Sales Division.

Copperweld Steel Co. has moved its Chicago district office to 122 South Michigan avenue. R. S. Clingan is Chicago district manager.

Luria Steel & Trading Corp., 233 Broadway, New York, has been appointed exclusive distributor for Forged Carbides Inc., Long Island City, N. Y.

International Nickel Co., 67 Wall street, New York, has taken a long term lease on a major portion of the second floor in the building at that address for its mailing department.

Union Metal Mfg. Co., Canton, O., manufacturer of monotube poles for lighting standards, building columns, steel piling and similar products, is celebrating its thirty-fifth anniversary this year. It has large contracts for practice bombs for the Navy, booms and masts for cargo ships and standards for plant protective lighting.

F. W. Marshall & Co., Philadelphia, has moved from the Pennsylvania building, Chestnut and Fifteenth street, where it had been located 30 years, to Room 1306, Philadelphia National Bank building, 1416

Springfield Facing Co., Springfield, Mass., foundry facings and supplies, is celebrating its sixtieth anniversary. It was founded in 1882 by L. S. Brown, who was president until his death in 1937, at which time he was succeeded by H. E. Beckman.

Government Work Takes 70 Per Cent Of Fabricated Structural Steel

GOVERNMENT work absorbed 70.2 per cent of fabricated structural steel distributed in 1941, according to the American Institute of Steel Construction Inc., New York. This accounted for 1,614,000 tons of the total 2,296,954 net tons. In 1941 government work represented 61.2 per cent, or 1,071,000 tons out of 1,748,144 tons.

Greatest increase in 1941 was in buildings for the government, which represented 60 per cent of all fabricated structural steel, compared with 38 per cent in 1940. Bridges erected or financed by the government took less tonnage than in 1940, 9.6 per cent of the total compared with 22.2

per cent, in the previous year. Engineering projects dropped to 0.6 per cent from 1 per cent in 1940.

All classifications of private construction requiring structural steel declined last year except railroad bridges and buildings. The former absorbed 93,000 tons, 4.1 per cent of the total, compared with 48,000 tons, 2.8 per cent, in 1940. Railroad buildings took 7000 tons against 5000 tons in 1940.

Industrial buildings last year absorbed 13.5 per cent of all structural steel; 18 per cent in 1940. Commercial and institutional buildings took less than half their prior year's total in 1940.

Distribution of Fabricated Structural Steel
Sources, by Per cent

Government Work:	1936	1937	1938	1939	1940	1941
Bridges	33.0	26.0	28.0	28.9	22.2	9.6
Engineering projects ...	3.0	2.0	4.0	1.3	1.0	.6
Buildings	13.0	12.0	27.0	21.7	38.0	60.0
	49.0	40.0	59.0	51.9	61.2	70.2
Railroad:						
Bridges	4.5	2.5	2.6	3.9	2.8	4.1
Buildings .....	.3	2.6	1.3	.4	.3	.3
Industrial buildings	22.5	33.0	14.4	19.7	18.0	13.5
Commercial buildings	8.7	6.7	8.5	11.0	7.0	3.1
Institutional buildings	3.0	1.2	2.2	1.7	.7	.2
Jobs under 50 tons	12.0	14.0	12.0	11.4*	10.0	8.6
	100.0	100.0	100.0	100.0	100.0	100.0

Size of Individual Jobs
Per Cent.

	1936	1937	1938	1939	1940	1941
Under 50 tons	12	14	12	11*	10.0	8.6
From 50 to 500 tons	37	30	35	34	29.6	22.2
From 500 to 1000 tons	14	13	14	14	14.1	14.1
From 1000 to 10,000 tons ...	35	33	34	35	39.6	46.1
Over 10,000 tons	2	10	5	6	6.7	9.0

*Approximate.

Tonnages and Values of Fabricated Structural Steel

	—1936—		—1937—		—1938—		—1939—		1940	1941
	Tons	Value	Tons	Value	Tons	Value	Tons	Value		
Government Work:										
Bridges	526	\$42.5	420	\$38.2	359	\$30.4	377	\$30.8	392	221
Engineering projects	49	3.4	33	5.0	50	3.7	17	1.9	15	15
Buildings	208	16.9	195	15.9	334	23.8	284	20.6	664	1378
Railroad:										
Bridges	68	5.0	40	3.5	32	2.3	50	3.8	48	93
Buildings	5	.4	42	3.1	17	1.4	5	.3	5	7
Industrial buildings ..	359	25.0	530	43.3	182	14.8	257	20.5	315	308
Commercial buildings	139	3.4	19	1.4	28	2.0	143	10.3	120	73
Institutional buildings ..	49	9.1	109	9.0	106	8.6	23	1.7	13	4
Jobs under 50 tons ..	206	17.8	240	24.8	149	13.9	149	13.3	176	198
Total	1,609	\$123.5	1,628	\$144.2	1,257	\$100.9	1,305	\$103.2	1,748	2,297

Values discontinued after 1939.

	Bookings	Shipments	1934	1935	1936	1937	1938	1939	1940	1941
Net tons			1,052,779	1,068,603	1,609,016	1,628,641	1,256,639	1,305,049	1,748,144	2,296,954
1928	3,287,900	3,122,350								
1929	3,597,825	3,306,765								
1930	2,689,600	2,987,200								
1931	1,880,800	1,811,600								
1932	948,000	942,400								
1933	975,742	828,023								

"Essential Steel Needs To Exceed 1942 Output," Del Monte Group Hears

DEL MONTE, CALIF.

STEEL requirements, exclusive of nonessential civilian needs, will total 86,000,000 ingot tons, or 3,000,000 tons more than estimated production. This estimate was given by Dr. Samuel S. Stratton, chief consultant to the WPB Division of Industry Operations, Washington, before the eighteenth annual conference of the Iron, Steel and Allied Industries at the Hotel Del Monte here Feb. 12-13. The meeting, the group's second largest in history, was attended by 350 delegates.

Army, Navy and the Maritime Commission will need nearly 20,000,000 tons this year, compared with 8,000,000 in 1941, according to Dr. Stratton. Foreign requirements and construction needs will raise this figure 32,000,000 tons and machine tools, agriculture, petroleum, mining, transportation and similar essential needs will add another 34,000,000 tons.

Dr. Stratton quoted these figures to demonstrate the necessity for directing and allocating available steel into the most essential consuming channels.

"If we carry out our present war program," he said, "economists estimate we shall be spending 50 to 60 per cent of our national income on our war effort.

"In short, we shall be diverting half of the income of the American people to the production of guns and ships and tanks and planes. It does

not take a prophet among us to foresee that under these conditions a war of but a few years' duration can be more disrupting to our peacetime way of living than was the 30-years-war in the days of pre-industrial civilization. I see nothing to be



Dr. S. S. Stratton

gained by refusing to face this fact. I see no reason for believing that there could have been any alternative to the heroic and inspiring task of preserving the democratic way of living on this continent."

Dr. Stratton told the conferees the priorities and allocations system was not the topsy-like growth it must appear to many business men. It was, he said, planned and devel-

oped to meet the needs of the armament program as that program developed.

Rear Admiral Harold L. Vickery, vice chairman, Maritime Commission, in an address read by E. C. Mausshardt, Pacific Coast manager for the commission, explained the steel requirements of the merchant shipbuilding program. The 18,000,000-ton program scheduled for the next two years will take about 6,500,000 tons of plates and shapes. This year's needs will be about half that amount, or 3,200,000 tons, comprised of 2,575,000 tons of plates and 625,000 tons of shapes. Peak load will be reached in July, when a total of 299,000 tons will be needed, of which 239,283 tons will be plates and 59,821 tons of shapes.

"This tonnage," said Admiral Vickery, "which averages approximately 268,000 tons per month through 1942 and will be slightly higher in 1943, must be received in the sequence required by the yards for the proposed rate of construction. The importance of maintaining proper sequence in the receipt of plates and shapes cannot be over-emphasized."

Admiral Vickery said the commission has endeavored to change specifications to convert a considerable portion of the plates required so that they will fall within strip mill limitations and thus ease the great pressure on sheared plate mills. Number of gages required has been reduced from 85 to 27. Reduction also has been made in the number of lengths and widths specified, and provision made for universal and strip mill edges instead of sheared plates.

Tremendous expansion of the program from the original 50 cargo



ships a year to the presently contemplated more than 1800 in two years has necessitated not only large-scale expansion of shipbuilding facilities, but also the adoption of new ideas which might not have been considered at all feasible in normal times. In effect this is resulting in assembly line construction.

"Adaptation of the preassembly plan, where sections of ship are assembled in the shops, necessitating merely the joining of sections when they are taken onto the shipways, in most cases, has facilitated building beyond the fondest dreams of shipbuilders of 20 years ago."

By utilizing all the feasible short-cuts, Admiral Vickery said it now appears "we will be able to construct the Liberty type of vessel in an elapsed time of 60 days on the way and 45 days on the water or a total of 105 days from keel laying to delivery, which incidentally is an all-time record for ship production in this or any other nation . . . We will deliver a ship in a shorter period than we previously had estimated it would require on the ways."

Roswell Whitman, chief, OPA Iron and Steel Products Division, Washington, warned the delegates that "price and profit are on the sidelines, as far as many commodities are concerned, for the duration. The government takes over the direction of the economy—what shall be made and who shall make it . . . It has been found in every country that this cannot be done efficiently by bidding the supply away but only by a series of directives."

There is no need, Mr. Whitman contended, to permit "prices to go up to get production—other methods are better. Therefore, letting them go up will only create non-



H. M. Tayler
Who was elected chairman of the Iron, Steel and Allied Industries at the group's conference in Del Monte, Calif.

functional or profiteering profits, i. e., profits which are only an indication of a shortage and no new guide to production, and which result in a general inflation."

Prices will continue to perform a role within a limited field, however, the speaker said. Best two examples are farm products, where increased return stimulates increased production, and scarce nonferrous metals where bonus prices for above-quota output encourage the working of high-cost production units.

Mr. Whitman took cognizance of the danger of a price ceiling interfering with the efficient use of government production directives.

"We expect that price ceilings will be set up to be fair and equitable to

the seller—the act requires us to set ceilings thus. We also know that the business man is human. It goes against the grain, patriotic as he may be, to produce something for little or no profit, when, if left alone, he could produce something with a much bigger profit margin—and still be within the ceiling.

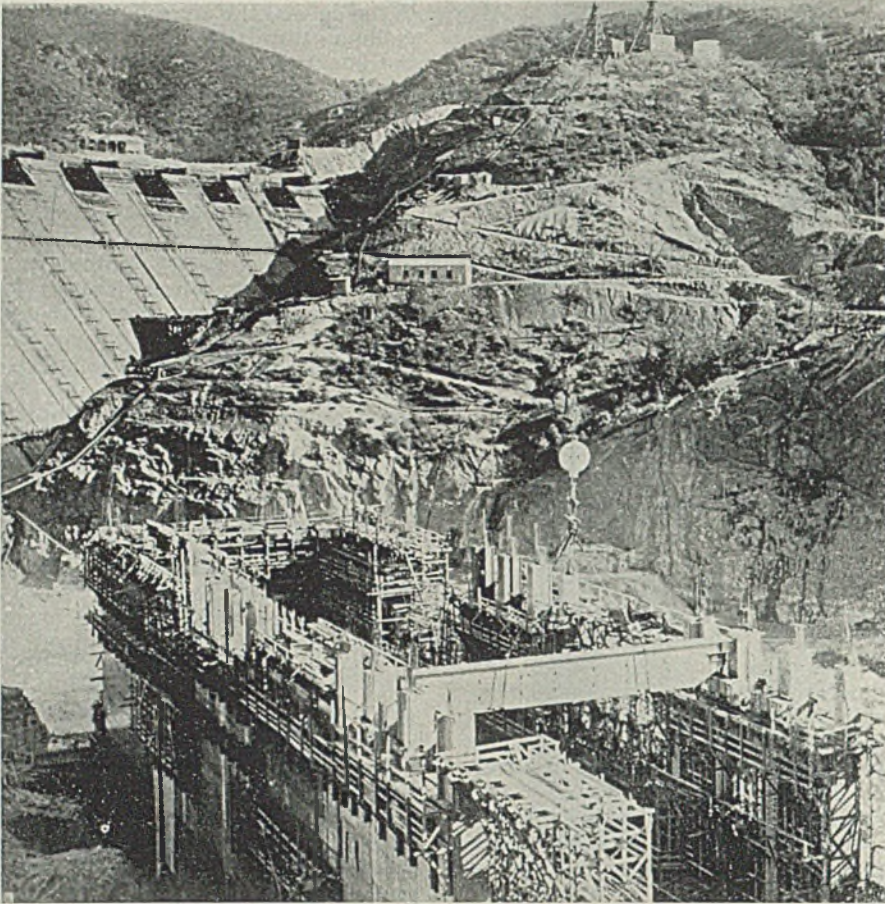
"We promise no miracles and we intend to make as few adjustments with the past competitive price structure as possible, but to the extent which is necessary the Iron and Steel Section of OPA will try to make it not too difficult for the steelmakers to co-operate happily with other parts of the government.

"I want to emphasize, however, that we will not be too patient with persistent grumbling. If you have a just grievance, we will try to adjust it. I have no sympathy with companies who call me up and say they won't take an Army or Navy order because there isn't enough profit in it. Please adjust the ceiling right this minute or we won't play ball, they say. The rules of the game just aren't going to be that way. I will say that to the great honor of the steel industry, the calls of that nature I have received have been few, indeed, and I expect that as time goes on they will be even fewer.

"About the role of profits in total war, I cannot speak so definitely. However, profits as a guide to production can be relied on no more than can high prices. That means that windfall profits—those that came because of an unexpected shift of demand—are out. American industry cannot expect to make money during the war from an intuitive anticipation of demand or its dynamic creation. The government makes the demand, and the

◆
DELEGATES to Iron, Steel and Allied Industries Conference in Del Monte, Calif.





SACRAMENTO, CALIF.: The steel girder shown in the foreground is 70 feet long, 8 feet high, and weighs 35 tons. It was shipped across country from an eastern fabricating plant and is here being picked up by cableway at Shasta dam for installation in the powerhouse. It is one of several that will be used to support heavy generating machinery. Photo United States Bureau of Reclamation

fact that it demands steel rather than rubber tires is no reason for the steel industry to get rich and the tire industry to go broke—as might be the case if general public demand in peacetime so shifted.”

The part castings are playing in the armament program was explained by Herbert S. Simpson, president, American Foundrymen's Association, and president, National Engineering Co., Chicago. Mr. Simpson spoke both to the general assembly of the conference and to a meeting of the foundry group.

“During the past 25 years more progress has been made in the castings field than was made before that time,” he declared. “This, perhaps, was partly due to the stimulus of competition from other products. Like all human beings, the foundryman is prone to go along on traditional lines, but when prodded by competition he sets to work and has shown what can be done.”

Now the foundry industry is casting steel turrets for tanks, shells, parts for guns and ships and many other items essential to the war effort. Floating foundries provide repairs for naval vessels. Mr. Simpson mentioned the U. S. S. VESTAL, as an example, which is equipped to

handle a wide variety of castings in ferrous and nonferrous metals in a shop below the waterline.

The conference adopted four resolutions favoring: Smith antistrike bill; work-week up to 48 hours before overtime is paid; opposition of costly social security proposals; and curtailment of federal, state and local government expenditures.

H. M. Tayler, Tayler & Spotswood Co., San Francisco, was elected chairman; Samuel E. Gates, manager, General Electric Co., Los Angeles, vice chairman; and Charles S. Knight, California State Chamber of Commerce, secretary.

Members of the executive committee for 1942:

Foundries—Ivan Johnson, Pacific Steel Casting Co., Berkeley; J. E. Eppley, Kinney Iron Works, Vernon; W. A. Schimmelpfening, California Foundries Co. Inc., Oakland; A. G. Zima, International Nickel Co. Inc., Los Angeles.

Manufacturers and purchasing agents—H. W. Sanuders, Air Reduction Co., Emeryville; E. F. Watkins, Southern California Edison Co., Los Angeles.

Merchant steel—Wakefield Baker, Baker, Hamilton & Pacific Co., San Francisco; O. E. Bean, Union Hardware & Metal Co., Los Angeles.

Steel mills—W. A. Ross, Columbia Steel Co., San Francisco; W. H. Stewart, Bethlehem Steel Co., San Francisco.

Steel plate fabricators—W. A. Meagher, Independent Iron Works, Oakland;

R. A. Stumm, Southern Pipe & Casing Co., Azusa.

Structural shops—P. F. Gillespie, Judson-Pacific Co., San Francisco; A. Neuffer, Bethlehem Steel Co., Los Angeles.

Reinforcing steel—W. S. Wetenhall, W. S. Wetenhall & Co., San Francisco; H. G. Haake, Ceco Steel Products Co., Los Angeles; C. M. Gunn, Gunn-Carle & Co., San Francisco; W. A. Godshall, Blue Diamond Corp., Los Angeles.

Seattle School Teaches Steel Erecting Trades

Techniques of structural steel and reinforced concrete work are being taught in an abandoned grammar school at Seattle, under joint sponsorship of the National Defense Vocational Education program and the Seattle public schools. A free three-months course is offered to men showing aptitude.

A steel bridge dismantled by the state was sold to the school and is being erected in the school yard by the students. Instructors are men who have worked many years at the trade. Students are trained in all details, crane operation, use of slings, riveting, chipping. Graduates are at work at Grand Coulee dam and on government construction projects in Alaska and Pacific islands.

Students also are given a classroom course, material for which was planned by the school's principal, Arthur Macfarlane, a former construction foreman. It includes lessons in steel cable splicing, knots, hitches and hoisting signals.

Dedicate \$2,000,000 Engineering Center

DETROIT

Dedication ceremonies were held here recently for the new \$2,000,000 Horace H. Rackham Educational Memorial at Woodward and Farnsworth avenues. The building will house activities of the Engineering Society of Detroit, extension service of the University of Michigan and affiliated technical societies, occupying an entire city block in the so-called “art center” of the city.

Made possible by the generosity of the estate of the late Horace H. Rackham, Detroit lawyer who grew wealthy through early investments in the Ford Motor Co., the building is a fitting symbol of the philanthropy to which Mr. Rackham dedicated his later life.

The building is of reinforced concrete with exterior principally of white Georgia marble, relieved by spandrels of dark granite and cast bronze ornamentation. Its interior provides main auditorium seating 1000, engineers' auditorium seating 300, banquet halls, dining rooms, numerous smaller meeting rooms, lounges, library, lecture rooms, offices, bowling alleys, game rooms.

Carnegie-Illinois Sets New Production Records

A new world's record for blast furnace production was established by No. 3 Carrie blast furnace of Carnegie-Illinois Steel Corp., Rankin, Pa., in January. The output was 41,782 net tons of pig iron, breaking the prior record of 41,701 tons established by Carnegie-Illinois' No. 10 furnace at Gary, Ind., in July, 1931. The January production of the Carrie stack, when converted finally into implements of war, would provide material for 1635 medium tanks, 23 destroyers, or one complete modern battleship.

Carrie blast furnace has contributed to the success of American arms in three wars. In the Spanish-American war in 1898 iron from this furnace was used to make armor plate for the battleship OREGON. In 1917 the furnace exceeded its 1,000,000-ton capacity in production of iron for armor plate and shells for the first A.E.F.

Carnegie-Illinois also established two steel rolling records in January. The 100-inch reversing plate mill at Homestead works produced 59,690 tons, exceeding its best former record, in March, 1941, by 2915 tons. The other record was made by the 140-inch plate mill at Homestead, which in January produced 32,867 tons, 1187 tons more than its previ-

ous output, attained also in March, 1941.

Carnegie-Illinois Steel Corp. in November, 1941, was awarded the Navy ordnance flag and "E" pennant for efficiency in quality and quantity of production for victory.

Columbia Machinery & Engineering Co. Formed

YOUNGSTOWN, O.

Columbia Machinery & Engineering Corp. has been formed here with E. D. Hopper as president; E. E. Swartswelter Jr., vice president and general manager; H. R. Hooper, secretary-treasurer; H. S. Ropke, assistant secretary-treasurer; A. W. Johnson, superintendent. Directors: Hopper, Swartswelter, Hooper, Judge C. F. Smith, Youngstown, and E. R. Rowley, Greenville, Pa.

The company was formed to purchase Columbia Machine Tool Co., of Hamilton, O., which has nearly \$5,000,000 worth of government contracts. Hopper will continue his connection with Buick-Youngstown Co.

New Owner Will Expand Davey Steel Co. Plant

M. W. Zack, M. W. Zack Metal Co., Detroit, who purchased the W. H. Davey Steel Co.'s plant in Cleveland recently, stated last week that he will continue it in operation and

install additional equipment. The complete line of products will include black and galvanized sheets, stainless steel sheets, and plates. Present equipment includes seven two-high hot sheet mills with annual capacity for 53,600 tons, four stands of cold rolls and annealing and pickling equipment.

The new owner will take title about May 1. The Davey company has been allocated 8000 tons of sheets for lease-lend, which will be rolled during March and April. Mr. Zack will continue to operate his nonferrous business in Detroit.

Bethlehem Steel Wins War Profits Case

United States Supreme Court last week upheld lower court decisions, declaring that the government could not recover allegedly excessive profits paid to Bethlehem Steel Corp. and its shipbuilding subsidiaries during World War No. 1.

The court put the question of preventing excessive war profits up to the executive and legislative branches of government, saying that they have ample powers under the constitution.

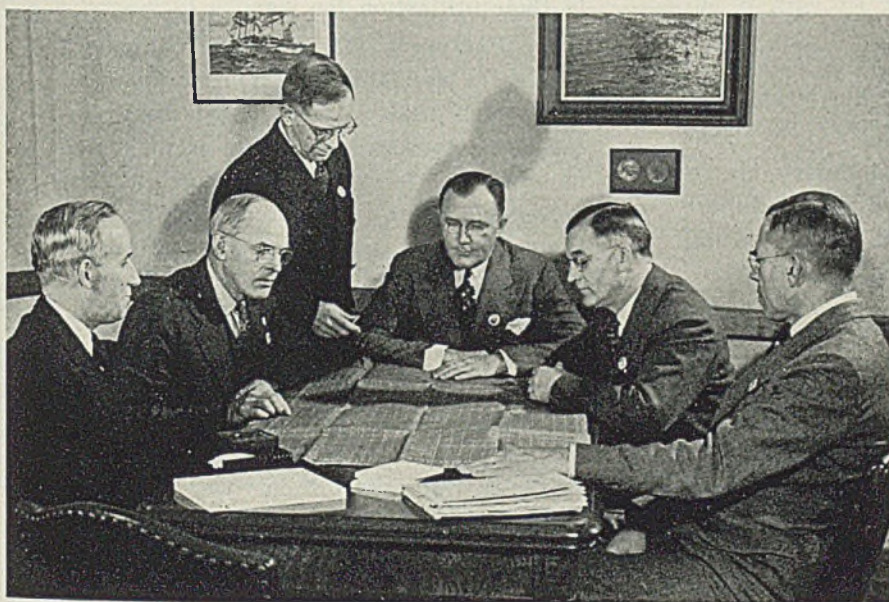
Two cases were involved. In the first one, the government had filed suit to recover from Bethlehem Steel Corp. certain bonus for savings payments made to it under shipbuilding contracts entered into during the war. In the second case, Bethlehem had filed suit to compel the government to pay \$5,272,075, which was a part of the bonus for savings and which the government had refused to pay pending the litigation.

International Machine Tool Doubles Output

International Machine Tool Corp., Elkhart, Ind., during the first ten months of its fiscal year ended Oct. 31, 1941, produced more than twice the volume of products shipped in the same period in 1940, employed more men, who worked more hours and received higher wages than ever before in the history of the company. More money was paid in taxes than ever before and the year closed with the highest net earnings in the 39-year history of the corporation.

C. Russell Feldmann, president, in a letter to stockholders, gave these facts, and pointed out that production was increased month by month through this period, and at its close was more than 200 per cent above January, 1941. Plans are being made to expand plants and install new equipment for an additional increase of 50 to 100 per cent in production this year.

Committee Directs General Electric's War Effort



CHARLES E. WILSON, president, General Electric Co., at head of table, and E. D. Spicer, vice president in charge of manufacturing, at extreme left, confer with General Electric's War Project Committee. Standing is Chester H. Lang, vice president in charge of war activities and chairman of the committee. Other members are: J. F. Cunningham, assistant to Mr. Spicer, at left of table; and, at right, John G. Farrar, assistant comptroller, and Harry A. Winne, vice president in charge of design engineering. The committee was first appointed by Mr. Wilson as the Defense Co-ordinating Committee on May 27, 1940, and it has guided G. E.'s war work since that date. It was renamed following the outbreak of war.

Nelson's Ten Silver Months

■ EVERYBODY who goes to Washington these days comes away with the comforting impression that the War Production Board, under the able leadership of Donald M. Nelson, is beginning to click.

On Friday, the thirteenth, Mr. Nelson and several key men in his organization were hosts to a group of business paper editors and publishers and representatives of industrial advertisers. The meeting was called by Mr. Nelson so that he and his associates might convey to American industry, through the medium of the industrial press, his conception of the urgency of WPB's program for converting industry to war production.

We wish we could transmit Mr. Nelson's message so that the reader could feel the power and sincerity of his words. He speaks simply, without oratorical effect and without emotion. Every sentence packs a punch. His even, modulated voice carries authority and determination.

• • •

Briefed into a nutshell, his message is this:

The task of American industry is tremendous. Already we have produced more of certain war items than we turned out in World War I, but this is not enough.

We have been smug. We have been complacent in the thought that we can "swamp the enemy with our mass production."

"We will do just that," said Mr. Nelson, "—when we get started. We are just getting started now."

The months of golden opportunity—the months when we could have expanded capacity to cope with the big job ahead—are behind us now, he said. Today the

urgency is so acute that we cannot wait for new capacity. We must do the best we can with what we have and with that which is under construction.

So, he concluded, having squandered away our priceless months of golden opportunity, we have left in this critical year of 1942 only 10 months—10 months, not of golden opportunity, but of silver opportunity.

• • •

What can we do in these 10 silver months that will be most effective?

We can convert American industry to production for war. We can scale American living down to a "lean but sound" economy and devote all remaining resources to war. We can convert in three ways:

1. Get more production out of facilities already engaged in war work. Work machines and men more hours per week. Strive for the greatest possible efficiency in their utilization for war.

2. Put every idle piece of equipment and every available workman to work on jobs which count in war. Shift from non-essentials to war essentials. A maker of metal frames for ladies' handbags has converted his plant to the production of loading devices for anti-aircraft guns. The conversion problem in thousands of metalworking plants is infinitely simpler than this. Convert! Convert! Convert!

3. Companies which have mastered simple war production jobs are in line to undertake more complex work. Be prepared to tackle the most difficult war jobs your equipment and personnel can handle.

Ten months left in critical 1942! Ten silver months for industry to perform miracles in conversion!

E. L. Shaner

EDITOR-IN-CHIEF

The BUSINESS TREND



Activity Index Declines Below the 130 Level

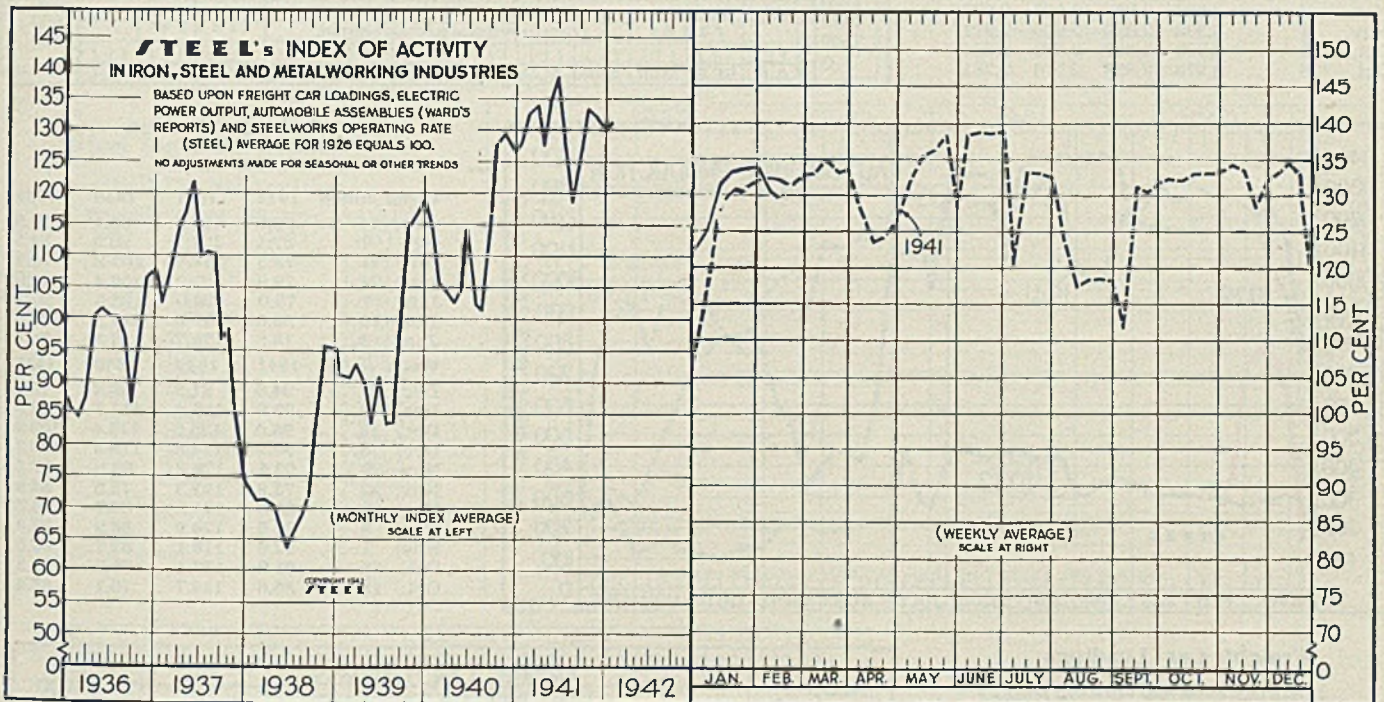
STEEL'S index of activity declined to 129.8 during the week ended Feb. 14. This is the lowest level recorded by the index for any full week this year, and compares unfavorably with the 132.3 level registered in the corresponding week a year ago.

Electric power consumption eased to 3,421,639,000 kilowatts during the week ended Feb. 14, compared with the all-time peak of 3,474,638,000 kilowatt hours recorded in the preceding week. However power output is 15 per cent above the like 1941 period. Revenue freight carloadings declined slightly to 782,699 cars during the latest week, but also topped the com-

parable 1941 week total of 721,176.

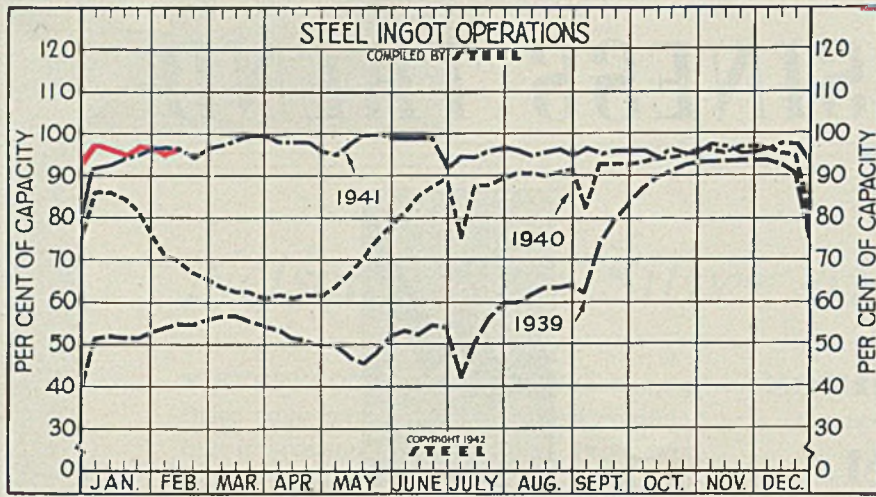
Steel operations advanced one point to 97 per cent during the week ended Feb. 14. Somewhat heavier movement of steel scrap in recent weeks seems to indicate that steel producing interests will be able to maintain operating schedules at better than the 95 per cent level for some time.

Passenger car assembly lines came to a halt during the week ended Feb. 14 in the United States, but some automobile output continued in Canada. Production of passenger cars and trucks totaled 29,830 units, compared with 37,125 in the preceding week.



STEEL'S index of activity declined 0.8 points to 129.8 in the week ended Feb. 14:

Week Ended	1941	1940	Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Dec. 13.....	134.8	132.6	Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Dec. 20.....	132.9	132.4	Feb.	.....	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
Dec. 27.....	120.5	107.5	March	.....	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
			April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
Week Ended			May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
Jan. 3.....	124.7	114.5	June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
Jan. 10.....	131.2	128.2	July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Jan. 17.....	133.1	130.8	Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Jan. 24.....	133.7	130.7	Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Jan. 31.....	133.9	132.0	Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Feb. 7.....	130.6	132.7	Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Feb. 14.....	129.8	132.3	Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3



Steel Ingot Operations

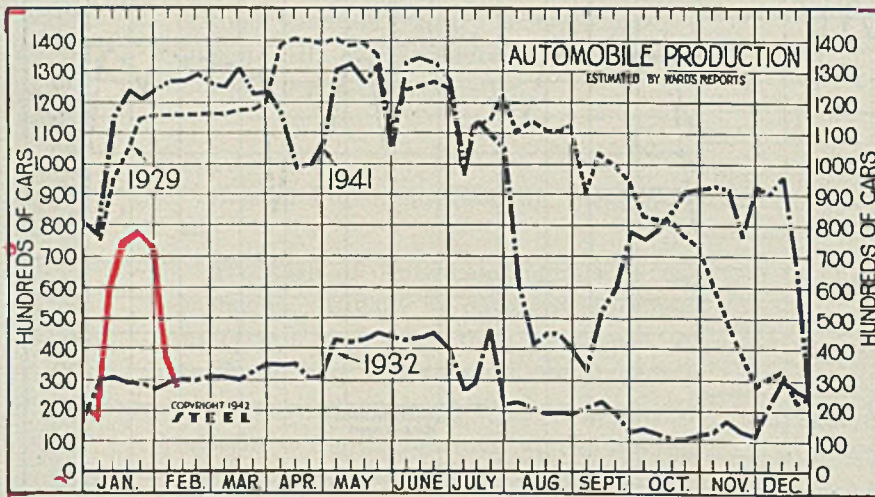
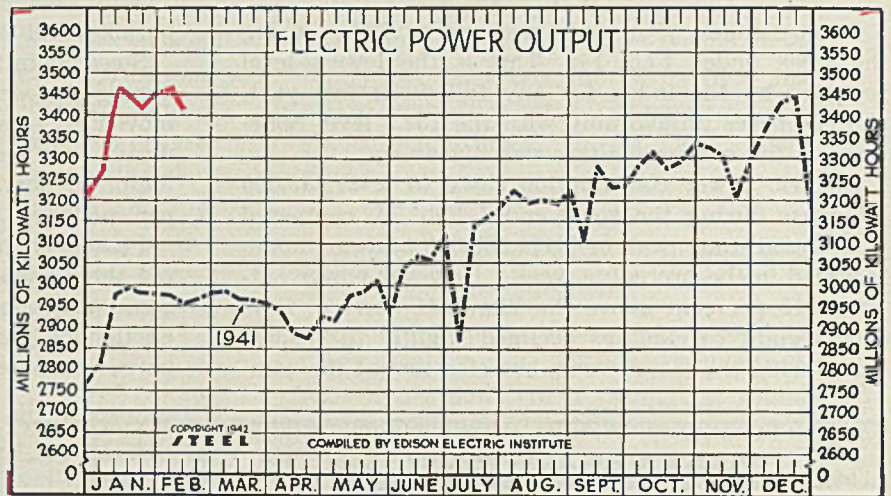
(Per Cent)

Week ended	1942	1941	1940	1939
Feb. 14.....	97.0	96.5	69.0	55.0
Feb. 7.....	96.0	97.0	71.0	54.0
Jan. 31.....	97.0	97.0	76.5	53.0
Jan. 24.....	97.0	95.5	81.5	51.5
Jan. 17.....	96.0	94.5	84.5	51.5
Jan. 10.....	96.5	93.0	86.0	52.0
Jan. 3.....	97.5	92.5	86.5	51.5
Week ended	1941	1940	1939	1938
Dec. 27.....	93.5	80.0	75.5	40.0
Dec. 20.....	97.5	95.0	90.5	52.0
Dec. 13.....	97.1	95.5	92.5	58.0
Dec. 6.....	96.5	96.5	94.0	61.0
Nov. 29.....	95.0	97.0	94.0	61.0
Nov. 22.....	95.5	97.0	93.5	62.0
Nov. 15.....	97.0	96.0	93.5	63.0
Nov. 8.....	97.5	96.5	93.0	61.5
Nov. 1.....	95.5	96.5	93.0	57.5
Oct. 25.....	95.5	95.5	92.0	54.5
Oct. 18.....	96.5	95.0	91.0	51.5

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
Feb. 14.....	3,422	2,959	2,565	2,297
Feb. 7.....	3,475	2,973	2,616	2,315
Jan. 31.....	2,468	2,978	2,633	2,327
Jan. 24.....	3,440	2,980	2,661	2,340
Jan. 17.....	3,450	2,996	2,674	2,342
Jan. 10.....	3,473	2,985	2,688	2,329
Jan. 3.....	3,287	2,831	2,558	2,239
Week ended	1941	1940	1939	1938
Dec. 27.....	3,234	2,757	2,465	2,175
Dec. 20.....	3,449	3,052	2,712	2,425
Dec. 13.....	3,431	3,004	2,674	2,390
Dec. 6.....	3,369	2,976	2,654	2,377
Nov. 29.....	3,295	2,932	2,605	2,335
Nov. 22.....	3,205	2,839	2,561	2,248
Nov. 15.....	3,304	2,890	2,587	2,325
Nov. 8.....	3,339	2,858	2,589	2,277
Nov. 1.....	3,339	2,882	2,609	2,271
Oct. 25.....	3,299	2,867	2,622	2,284
Oct. 18.....	3,273	2,838	2,576	2,281



Auto Production

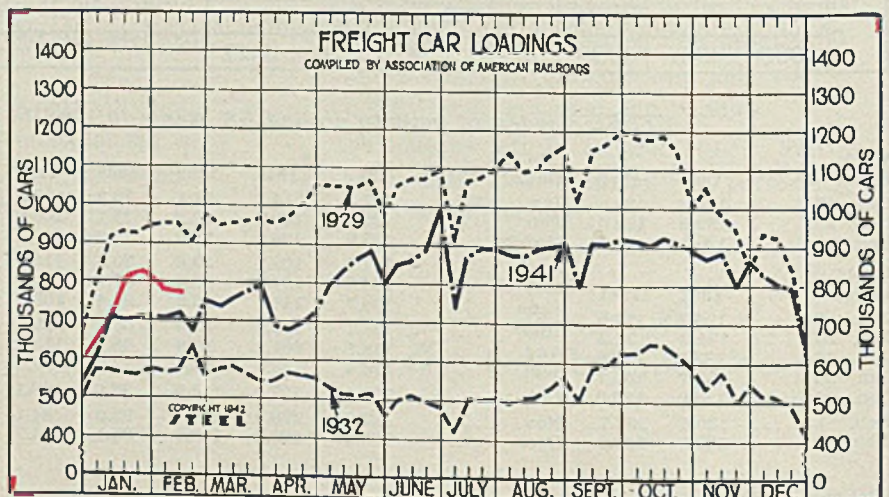
(1000 Units)

Week ended	1942	1941	1940	1939
Feb. 14.....	29.8	127.5	95.1	79.9
Feb. 7.....	37.1	127.7	96.0	84.5
Jan. 31.....	73.3	124.4	101.2	79.4
Jan. 24.....	79.9	121.9	106.4	89.2
Jan. 17.....	75.0	124.0	108.5	90.2
Jan. 10.....	59.0	115.9	111.3	86.9
Jan. 3.....	18.5	76.7	87.5	76.7
Week ended	1941	1940	1939	1938
Dec. 27.....	24.6	81.3	89.4	75.2
Dec. 20.....	65.9	125.4	117.7	92.9
Dec. 13.....	96.0	125.6	118.4	102.9
Dec. 6.....	90.2	124.8	115.5	100.7
Nov. 29.....	93.5	128.8	93.6	97.8
Nov. 22.....	76.8	102.3	72.5	84.9
Nov. 15.....	93.0	121.9	86.7	96.7
Nov. 8.....	93.6	120.9	86.2	84.3
Nov. 1.....	92.9	118.1	82.7	80.0
Oct. 25.....	91.9	117.1	78.2	73.3
Oct. 18.....	85.6	114.7	70.1	68.4

Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
Feb. 14.....	783	721	608	580
Feb. 7.....	784	710	627	580
Jan. 31.....	816	714	657	577
Jan. 24.....	818	711	649	594
Jan. 17.....	811	703	646	590
Jan. 10.....	737	712	668	587
Jan. 3.....	674	614	592	531
Week ended	1941	1940	1939	1938
Dec. 27.....	607	545	550	500
Dec. 20.....	799	700	655	574
Dec. 13.....	807	736	681	606
Dec. 6.....	833	738	687	619
Nov. 29.....	866	729	689	649
Nov. 22.....	799	733	677	562
Nov. 15.....	884	745	771	657
Nov. 8.....	874	778	786	637
Nov. 1.....	895	795	806	673



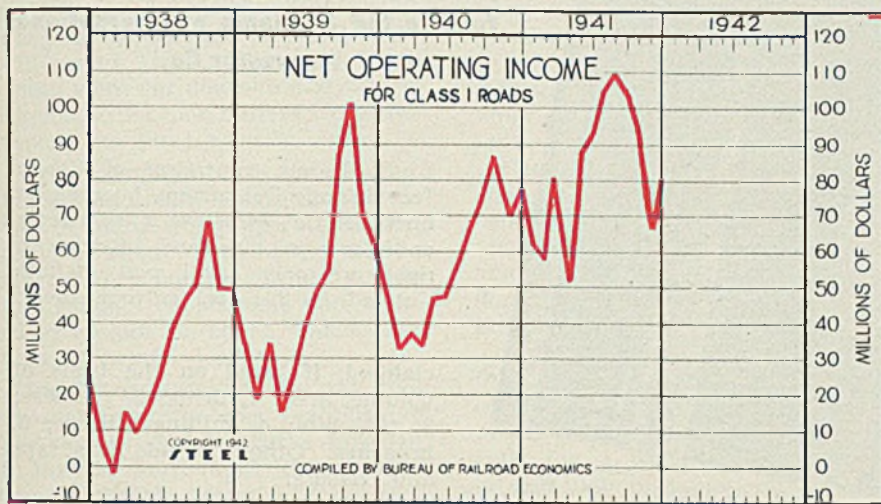
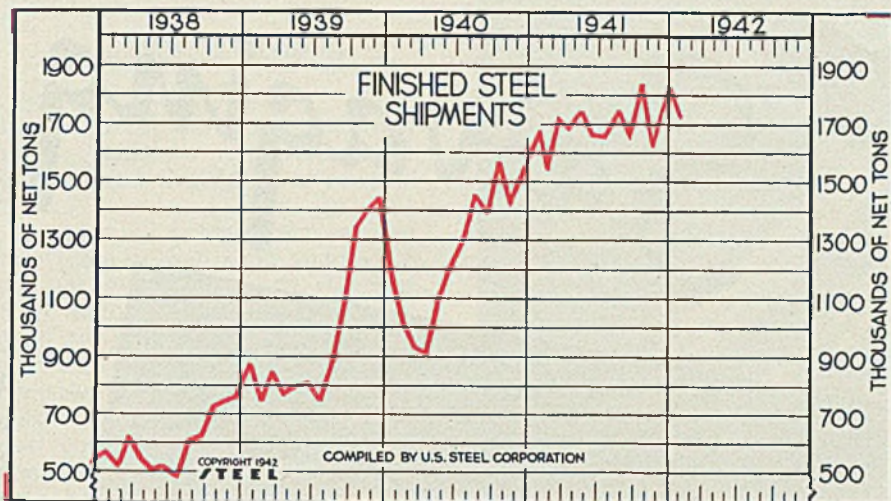
Finished Steel Shipments U. S. Steel Corp.

(Unit 1000 Net Tons)

	1942	1941	1940	1939	1938
Jan...	1738.9	1682.5	1145.6	870.9	570.3
Feb...	1548.5	1009.3	747.4	522.4	
Mar...	1720.4	931.9	845.1	627.0	
Apr...	1687.7	907.9	771.8	550.5	
May...	1745.3	1084.1	795.7	509.8	
June...	1668.6	1209.7	807.6	525.0	
July...	1666.7	1296.9	745.4	484.6	
Aug...	1753.7	1455.6	885.6	615.5	
Sept...	1664.2	1392.8	1086.7	635.6	
Oct...	1851.3	1572.4	1345.9	730.3	
Nov...	1624.2	1425.4	1406.2	749.3	
Dec...	1846.0	1544.6	1444.0	765.9	

Tot.† 15,013.7 11,707.3 7,315.5

†After year-end adjustments.



Class I Railroads Net Operating Income

(Unit: \$1,000,000)

	1942	1940	1939	1938
Jan.....	\$62.36	\$46.01	\$32.95	\$7.14
Feb.....	58.48	32.86	18.64	1.91*
Mar.....	80.63	37.03	34.38	14.73
Apr.....	52.57	34.12	15.32	9.40
May.....	88.63	47.41	25.17	16.67
June.....	93.26	48.09	39.17	25.16
July.....	106.31	57.73	49.00	38.43
Aug.....	111.32	66.53	54.57	45.42
Sept.....	104.07	74.72	86.53	50.41
Oct.....	93.66	87.64	101.72	68.60
Nov.....	68.76	72.00	70.41	49.69
Dec.....	80.55	78.79	60.95	49.37

Average. \$83.29 \$56.84 \$49.02 \$31.02

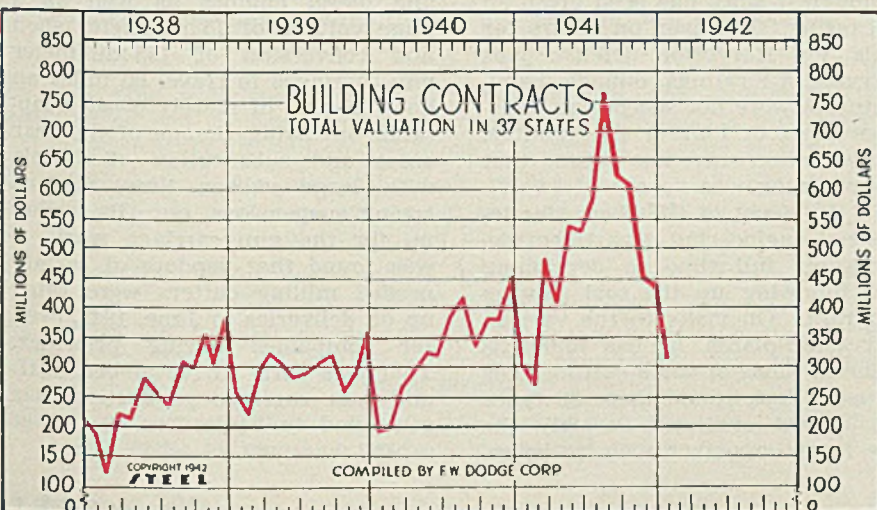
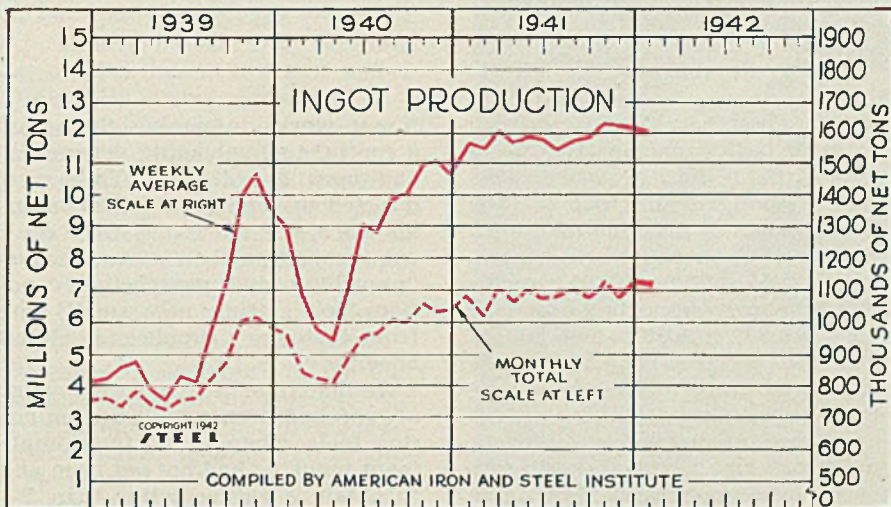
*Indicates deficit.

Steel Ingot Production

(Unit 100 Net Tons)

	Monthly Total		Weekly Average	
	1942	1941	1942	1941
Jan.	7,129.4	6,928.8	1,609.3	1,563.9
Feb.	6,237.9	.....	1,559.5	.....
Mar.	7,131.6	.....	1,609.9	.....
Apr.	6,756.9	.....	1,575.0	.....
May	7,053.2	.....	1,592.2	.....
June	6,800.7	.....	1,585.3	.....
July	6,821.7	.....	1,543.4	.....
Aug.	7,001.0	.....	1,580.4	.....
Sept.	6,819.7	.....	1,593.4	.....
Oct.	7,242.7	.....	1,634.9	.....
Nov.	6,970.0	.....	1,624.7	.....
Dec.	7,164.0	.....	1,620.8	.....
Total	82,927.6	.....	1,590.5	.....

†Weekly average.



Construction Total Valuation In 37 States

(Unit: \$1,000,000)

	1942	1941	1940	1939	1938
Jan...	\$316.8	\$305.2	\$196.2	\$251.7	\$192.2
Feb...	270.4	200.6	220.2	218.9	
Mar...	479.9	272.2	300.7	226.6	
Apr...	406.7	300.5	330.0	222.0	
May...	548.7	328.9	308.5	283.2	
June...	539.1	324.7	288.3	251.0	
July...	577.4	398.7	299.9	239.8	
Aug...	760.3	414.9	312.3	313.1	
Sept...	623.3	347.7	323.2	300.9	
Oct...	606.3	383.1	261.8	357.7	
Nov...	458.6	380.3	299.8	301.7	
Dec...	431.6	456.2	354.1	389.4	

Ave... \$500.6 \$333.7 \$295.9 \$266.4

Salvaging

WORN

... is one answer to the problem of how to get the small cutting tools needed to keep production going full blast on your machine tools. Here is the program now operating successfully in the 17 plants of International Harvester Co.

E. C. Tagatz, supervisor of Central Tool Salvage Department, International Harvester Co., examines a worn reamer. Tools in bins and broaches at right are only small part of tools stored in this tool salvage area

claimed, if rated on the basis of volume, are: 1, drills; 2, reamers; 3, tool bits; 4, milling cutters; 5, broaches. Others include hobs, taps and chasers.

Set Up Tool Salvage Center: The works chosen as the tool salvage center is one where space is available for cribs near its own tool salvage department. Too, Mr. Tagatz, then general supervisor of tool service, grinding and salvage at that works had already done intensive work on salvaging methods.

Before any of the 95 foremen at this works can get a tool from the tool store room where new tools are kept, he must apply to the tool salvage department and get an okay on his requisition, an okay given only if a usable salvaged tool is not available.

Another reason for selecting this works was that it has a great variety of production including tractors and diesel engines as well as a huge volume of 75-millimeter shell and conversion of 155-millimeter gun carriages to travel 60 miles an hour instead of merely 6—an adaptation involving change of the rear axles and substitution of wheels with large rubber tires, modern spring suspensions, etc. In tooling up for the gun carriage work, it was found that vendors of certain needed milling cutters were rated up on deliveries to June, 1942, even for companies having priorities. That was early in November, 1941, and gun carriage production was scheduled to begin Dec. 1. What to do?

ONE OF the most important problems facing machine tool users today is that of how to secure steadily the small cutting tools—the business ends of machine tools—for handling such operations as drilling, turning and milling in the production of the many important ordnance items needed to equip and supply our armed forces. With victory depending so much on an ample supply of mechanized tools of war, the importance of having a sufficient number of small cutting tools cannot be over-emphasized since upon them depends the operation of the machine tools themselves.

No Deliveries on Small Tools: The average machine tool requires three sets of the small cutting tools for continuous operation. With a machine tool production program calling for over a billion dollars' worth of machine tools in 1942, any method by which more small tools can be made available must be given serious consideration. The gravity of the small tool supply situation was realized some time ago by International Harvester Co.—in fact, a notice was issued as far back as August, 1941, to the superintendents of all of the company's 17 dif-

ferent works informing them that a central tool salvaging department had been established. They were directed to send to it for salvaging all worn out tools that they could not recondition themselves, because "prevailing and prospective conditions for getting new small tools from customary suppliers is almost hopeless."

At that time, a mandatory rating of A-10 had been established on cutting tools, whereas the farm implement industry had not yet been able to obtain a rating better than B-1, although it since has been given an A-8 rating. But even on orders for tools for Harvester defense jobs carrying A-1 ratings, outside manufacturers were not scheduling deliveries short of four or five months. The situation since has proved that this warning was no cry of "wolf".

H. W. Hecht of the Harvester industrial engineering department devotes his full time to developing and following up the tool salvage program. On visits to the various Harvester plants, he has found 38 different kinds of small cutting tools in use. Varieties of these 38 types are almost endless. Possibly the five most important tools to be re-

TOOLS

Save the Day! But it was found that in the tool salvage department were five worn milling cutters of a larger size than those needed. While the grinding department does much sharpening, it was not equipped to cut them down, so these cutters were sent out to a company specializing in the salvage of small tools. Cutters of 7-inch radius and 1-inch width were cut down to 6 x 3/4-inch. Similarly, 5 3/4-inch cutters were converted into 5-inch tools.

The salvaging of taps for a threading job on cream separator disks is one of many other operations that could be cited. Taps of the desired length were not procurable, so the tool salvage department butt welded extensions on short shanks that were at hand.

Dig Them Out! When the tool salvage program was inaugurated and notices sent to works foremen to turn in worn tools, the response was negligible, even at the tool salvage center. So the salvage supervisor and an assistant personally visited the various departments and looked for drills, reamers, tool bits and the like that had accumulated in drawers and under work benches. In a short time they collected several truck loads.

After this incident, superintendents of the various other plants had their works combed for worn out and broken tools with the result that a recent typical shipment to the tool salvage center consisted of seven boxes of tools containing some 2305 pieces including 110 milling cutters, 1385 drills, 353 reamers, 300 key seat cutters, 39 hobs and 17 broaches. Making it a definite point to gather up worn out and broken small tools thus assures the

success of the salvaging operation since it makes a large volume of raw material available for reworking.

Establishing a central tool salvage store room in each plant and seeing that all worn tools are returned there naturally has spurred the plant superintendents to see first what can be done about keeping themselves supplied with cutting tools. Each plant superintendent must now produce in his own toolroom all the small tools which formerly had been purchased. In many cases it is necessary to change the method of doing the job in the shop to get away from tools that are difficult to produce in the toolrooms. Most cutting tools used by Harvester are special.

Change Methods: An example of changing methods is a case of a combination drill and reamer, formerly used in one operation. To simplify tooling, the work now is done by a separate drill and a separate reamer in two operations.

A further advantage is that the tool salvage program has stimulated effort to avoid tool breakage. A practice developed by one works calls for a weekly display of all broken tools on tables numbered by departments. When one department can see how its breakage compares with others, breakage is reduced. This practice has now been adapted by other Harvester plants.

Repair by Brazing: One reclamation process which many tool salvage men at first thought impracticable is the joining of broken parts of high-speed-steel tools by means of low-temperature brazing. However, this method has been developed to a point where it now is quite satisfactory for many parts.

A conspicuous feature of the tool salvaging program at Harvester is the sending of tools out to small reconditioning companies. Fortunately, the present emergency has called attention to many highly efficient

(Please turn to Page 105)

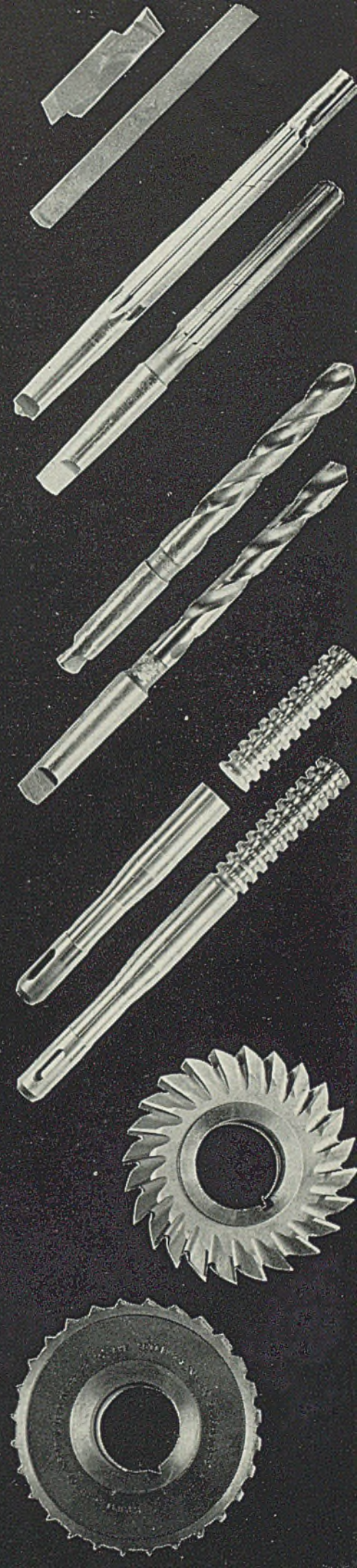
Top view, right, worn tool bit, at left, of high-speed steel is too short to use. But when heated and hammered out as shown at right, it becomes a usable bit of sufficient length, although of course it is smaller in cross section

Second from top, pilot reamer at left (pilot at fluted end) has broken shank on opposite end. At right, same reamer has been reconditioned by removing pilot and regrounding broken shank

Third from top, worn 21/32-inch drill at left is made over into 9/16-inch drill at right by grinding and resharpener

Fourth from top, the broken spline broach at left was repaired by brazing the broken parts together. Unit works satisfactorily after repair. Low temperature avoids distortion

Bottom, right, worn-out thread cutter at left is converted into a new side-milling cutter by regashing, grinding to size and sharpening



Important Factors in

FORGING

. . . including references to early forging practices; relation of dendritic structure to grain flow; major practical considerations governing forging practice; influence of inertia on the flow of the metal; mathematical analysis of forces acting on a slug to determine radial force in terms of intensity of vertical pressure and coefficient of friction; limits of the diameter-thickness ratio in a forging operation

(Section III in a Series on Forgings, Forging Methods and Forging Equipment)

THE ORIGIN of forging is so remote that written history sheds no light upon the techniques employed. Legends and relics of the distant past furnish such meager information as we possess. Bronze gives the impression of playing a much more conspicuous part in the progress of the human species than recent researches would suggest because it is uninfluenced by the elements and the passage of time. On the other hand, iron tends to return to its pristine condition, and so no iron objects have come down from that far distant past.

It is certain that the forging of metal is as old as civilization itself and that it played an important part in the lives of the most ancient peoples. In all probability the first iron was used in western Asia, the earliest source of this material being the meteorite since no reduction process stood between man and the prized material. Even though such iron is rare, it is reasonable to suppose that such deposits as existed were put to use. No iron oxide is found in ancient tombs, indicating that custom may well have op-

posed the burial of such useful material. African savages carefully preserved their iron-headed arrows and spears for use when they were certain to be recovered, wooden tips being employed in other cases.

Supposedly too brittle to be worked, actually 99 per cent of all meteoric iron can even be cold worked. Iron of celestial origin has been reported in use by Eskimos, a principal source being the Melville bay meteorite. Patience and great labor have resulted in some 12 cubic feet of the softer of the two masses having been detached by 1818. Flakes, flattened by working cold between two stones, are inserted into a groove formed in a bone to make a knife.

Since iron ore can be reduced at comparatively moderate temperatures, primitive man no doubt made some iron by reduction. Thus forging as a method of shaping the resulting metal to the desired form antedates casting. Even copper with its much lower melting point was originally fashioned by forging. All this occurred in the stone age.

It was not until man learned the

Fig. 1. (Top view, left)—Structure of a medium carbon cast steel given no heat or mechanical treatment. This is shown for comparison with other micrographs here which show same material after various treatments. Constituents shown in this view are sorbite and free ferrite. Coarse structures like this possess less ductility and strength than the finer structures shown in accompanying views

Fig. 2. (Center view, left)—Same steel as shown in Fig. 1 but here the material has been annealed, recrystallizing it into small grains. Both strength and ductility are improved by this treatment. Structure here consists of small pearlitic grains and ferrite. All micrographs shown at 100 diameters

Fig. 3. (Lower view, left)—Same steel as Fig. 1 but after hot working (forging) Grain has been refined. Strength and ductility are further improved by the combination of mechanical work and heat treatment. Structure now consists of pearlite and ferrite. Photos made for STEEL by G. R. Vilella through courtesy of Bausch & Lomb Optical Co.

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical
Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

PRACTICE

art of smelting that the "age of metals" began, copper and its alloys presenting much less troublesome metallurgical problems than iron. Then soon gold, silver, lead and tin made their appearance in increasing amounts. The superior physical properties of iron, however, led slowly but surely to the "iron age" and hence with the advent of alloys to the modern "steel age".

Two major considerations have resulted in the continued use of the forging process long after casting was developed. Ease of manufacture (cost) is the first. The second is the excellent physical properties obtained.

Prior to 1350 wrought iron was the only product made from iron ore since no furnace before that time was capable of raising the charge to the melting point. Thus the forge was the only available means of *shaping* the part to the desired form, even if no other considerations of carbon and slag distribution existed. But the familiar microstructure of wrought iron displays long fibers of slag lying in a direction parallel to that of forging or rolling, the ferrite present appearing as a polyhedral mass of crystalline grains. This ferrite is a solid solution of iron and small quantities of silicon, phosphorus and other minor impurities.

The ferrite grains exhibit little evidence of having been drawn out in the direction of the hot work, the fibrous structure of the metal arising almost wholly from the presence of the slag inclusions, consisting principally of silicates and phosphates of iron and manganese. Thus the variation of the physical characteristics of wrought iron with and across the grain are readily explainable as they result largely, if not wholly, from the relative weakness of the slag as compared with the metal. If the iron were chemically pure, some difficulty might be anticipated in imparting directional properties by hot work.

By the same token, modern steels should respond rather feebly to directional work since they are relatively free from "dirt". But dendritic segregation imparts to steel the well known laminated appearance found in the macroetch. As the steel crystallizes in the ingot, dendritic segregation, results from the tendency of individual crystals to grow in a direction perpendicular to the mold walls, thus segregating the inclusions in the form of "fillings" between these crystals of pure metal. Then when steel (even of high quality) is subjected to mechanical work, especially while hot, both elongated crystal axes and fillings are elongated further in the direction of flow, and a banded structure results. Obviously the more pronounced and persistent the dendritic segregation, the more apparent the grain structure will be and the greater the variation in physical characteristics with change in the direction of the applied stress.

In certain operations such as forging of a gun tube, a large amount of work may be required in a direction at right angles to that of the stresses arising in service. This may make it difficult to bring up the physical properties to the desired level in that direction.

The relation between grain size and strength of the steel is well known, but the precise nature of crystal breakdown may merit some discussion. In a polycrystalline material, failure takes place first in those crystals most favorably situated with respect to the applied stress. As work hardening increases resistance, deformation takes place in those grains less favorably placed, the action ceasing at the boundary of the grain. Hence the change in orientation of those planes along which slippage tends to take place results in increased resistance at those points.

Suppose the test bar were to consist of a single crystal. Then distortion would not be inhibited in

any important degree by work hardening along some particular plane but would proceed with equal facility along neighboring parallel planes most favorably oriented with respect to the applied stress. But in a polycrystalline aggregate, deformation must be transmitted through the grain boundaries, and the change in crystal shape must conform to the change in shape of neighboring grains. Thus in a heterogeneous group, deformation takes place with greater difficulty, and it is easy to see how hardness and strength may increase with the greater number of crystalline grains per unit volume. This not only increases the tensile strength but markedly raises the resistance to impact.

Those parts of machines and structures which lend themselves to production under the forging hammer or press or which obviously are most readily rolled involve certain basic considerations which govern the methods employed. These are principally of an inherently practical nature—not theoretical. Pressures used must be of sufficient magnitude to flow the metal at the desired rate, yet not so large as to cause rupture. Precautions must be taken to insure the successful filling of the die cavity as the action proceeds. Consideration must be given to the orientation of the grain in the finished piece and to production of the desired fiber structure in the direction and position desired in the finished part.

Truly few modern manufacturing techniques involve so much "mystery" as forging. Nothing is more surprising to the engineer only casually familiar with forging methods than the genuine inability of the forging man to offer an analytical explanation of his procedure. Most forgers upon being

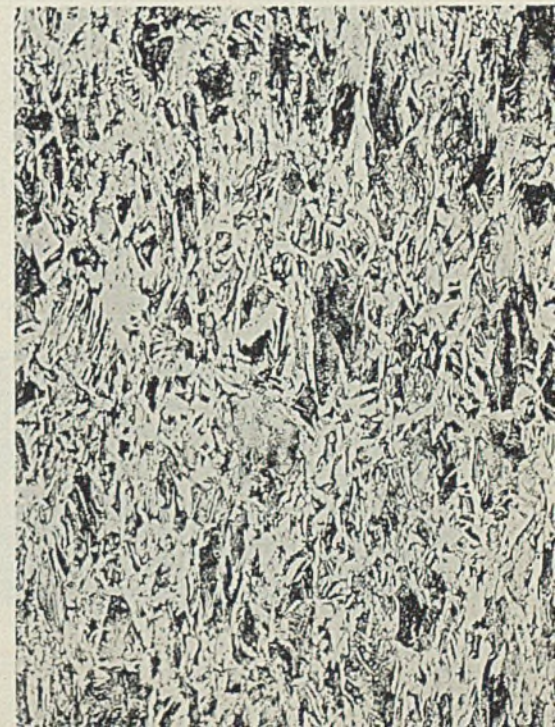


Fig. 4—Here the same medium carbon steel has been cold worked by wire drawing. The treatment has broken up the grains and elongated them in a vertical direction. Steel in this condition possesses great strength and moderate ductility. Structure consists of pearlite and ferrite

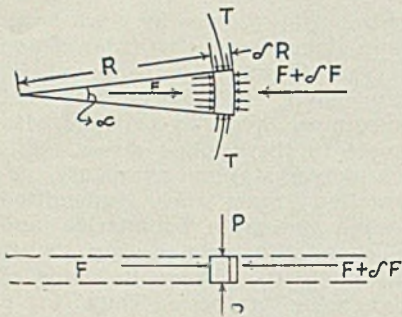


Fig. 5—Diagram of forces acting on radial segment during forging

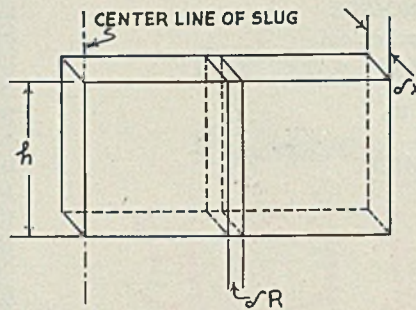


Fig. 6—Diagram of elements considered in analysis of radial pressures resulting from vertical forging pressure

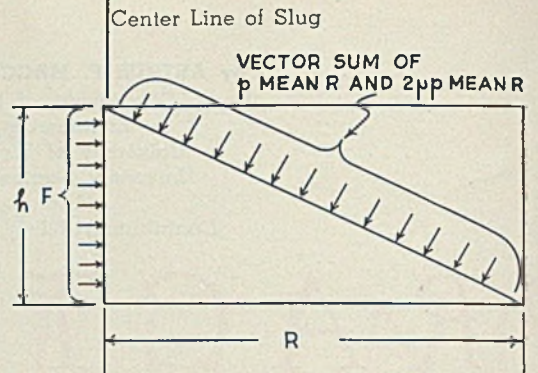


Fig. 7—Diagram of forces after radial flow has taken place and forces are in equilibrium. Note p_{MEAN} above should be p_{mean}

given a part to forge will say, "Well, you can do thus and so; it will have to be made on such and such equipment; the dies will have to be this and that." They appear to find difficulty in telling the exact reason.

Yet a certain degree of conscious understanding of the fundamental principles involved in forging is not impossible if the elements of mechanics are applied to the problem. *Here and in subsequent sections in this series will be found an attempt to make a rational appraisal of the various factors involved in terms of the equipment available, the height and surface of the part, and the specific resistance of the metal to deformation.*

In hot working, the metal flows in the direction of the resultant force against the inhibiting tendencies of friction and resistance to deformation. In the rapidly applied pressures experienced in hammering, inertia, too, plays an important part for depressions in the upper half of the die are more readily filled than those in the lower portion.

Consider the simplest possible case—the effects which result from hot working a cylindrical slug set on end. If friction and inertia were absent, the result of applying a force to the top of the slug would still be a cylindrical slug. However, surface friction of the part against the upper and lower dies confines the action at top and bottom with the result that a barrel shape is produced—if the action be carried on in a press at relatively slow speed. Under the hammer, however, where the impact produces an almost instantaneous action, the barrel form might fail to develop. Indeed, the radial spread of the metal might produce a peripheral concavity or "waist" in defiance of friction and the greater plasticity of the core. Possibly this may result from inertia causing greater flow of metal at top and bottom of the piece.

This inertia may also account for the fact that comparatively light blows tend to spread the upper surface of the forging, while heavy blows extend both upper and lower

regions. The familiar appearance of almost any forging as revealed by the macroetch lends complete support to the oft-repeated statement that in thick sections the beneficial effects of hammer work are largely confined to shallow depths and that a thorough kneading of the metal is best accomplished by slow and steady pressure. Fortunately, in virtually all parts subjected to stress, the condition of the exterior is of the greatest importance, since failure will generally begin at the surface. This is one factor that accounts for the wide use of the hammer.

A gun tube is a notable exception. For the smaller calibers up to, say, 37 millimeters, the hammer will answer. For larger calibers the hydraulic press is preferred.

It is possible to interpret the flow characteristics of hammered forgings in terms of inertia. If we consider the slug to be composed of a pile of disks, we note that the limiting value of the inertia force on the upper slice will be:

$$\frac{w \cdot A \cdot v^2}{g} \dots \dots \dots (1)$$

in which w is density of the metal, A the cross-sectional area of the slug, v the velocity of the ram on impact, and g is gravity.

This calculation is predicated on the instantaneous acquisition of the velocity of the ram by the uppermost disk in the pile. Thus:

Let the thickness of the slice be δx . Now if it be assumed that the velocity of the ram does not change over the elementary interval of initial contact δt , the acceleration becomes $\frac{v}{\delta t}$; and since in the interval

δt the ram travels a distance δx , δt is equal to the quotient of distance and velocity or $\frac{\delta x}{v}$. Thus the inertia

force, P , acting on the slice is:

$$P = \frac{w \cdot A \cdot \delta x}{g} \cdot \frac{v^2}{\delta x} = \frac{w \cdot A \cdot v^2}{g}$$

Obviously the summation of these forces approaches infinity as the rigidity of the metal approaches completeness, and the number of slices involved multiplies. But in practice the total will reach some finite level determined by the plasticity of the metal. Thus we would expect that the harder the metal, the fewer the number of elementary slices required to produce an inertia "head" sufficient to exceed the limit of elasticity deformation. It might be predicted, therefore, that a peening action would result from striking cold steel a number of localized blows; while if the metal were heated and its rigidity thereby diminished, the effects of hammer work would penetrate more deeply. Experience proves that this is true.

The effect of hammering the head of a cold chisel in turning over the metal around the periphery is familiar to all. If the same chisel were heated to forging temperature and then hammered, it would upset for a distance rather closely related to the plasticity.

No acceleration can take place on the lower face of the slug if the anvil does not move. This may explain the failure to spread the lower side of a slab when only light blows are struck. On the other hand, heavy blows produce a visible descent of the anvil against its powerful elastic restraints. It is not, therefore, inconceivable that the return of the anvil, or lower half of the die, as the case may be, to its normal position, is responsible for the upset of the lower surface and for the penetration of hammer work from both upper and lower directions. Thus the end result of any hammer forging operation is a combination of the "hydrostatic" pressure developed throughout the plastic mass by the decelerating ram, inertia "heads" and frictional resistance to movement. Now let's investigate this last factor and determine its importance.

Let the flattened slug be again considered. A short concentric element at inner radius R , Fig. 5, and outer radius $R + \delta R$ is in equilibrium under: The pressures acting

The Road to FASTER PRODUCTION with *Stainless Steel*

THIS Stainless Strip is giving wartime production the *Full Speed* signal in many plants because it blanks cleaner and requires less finishing.

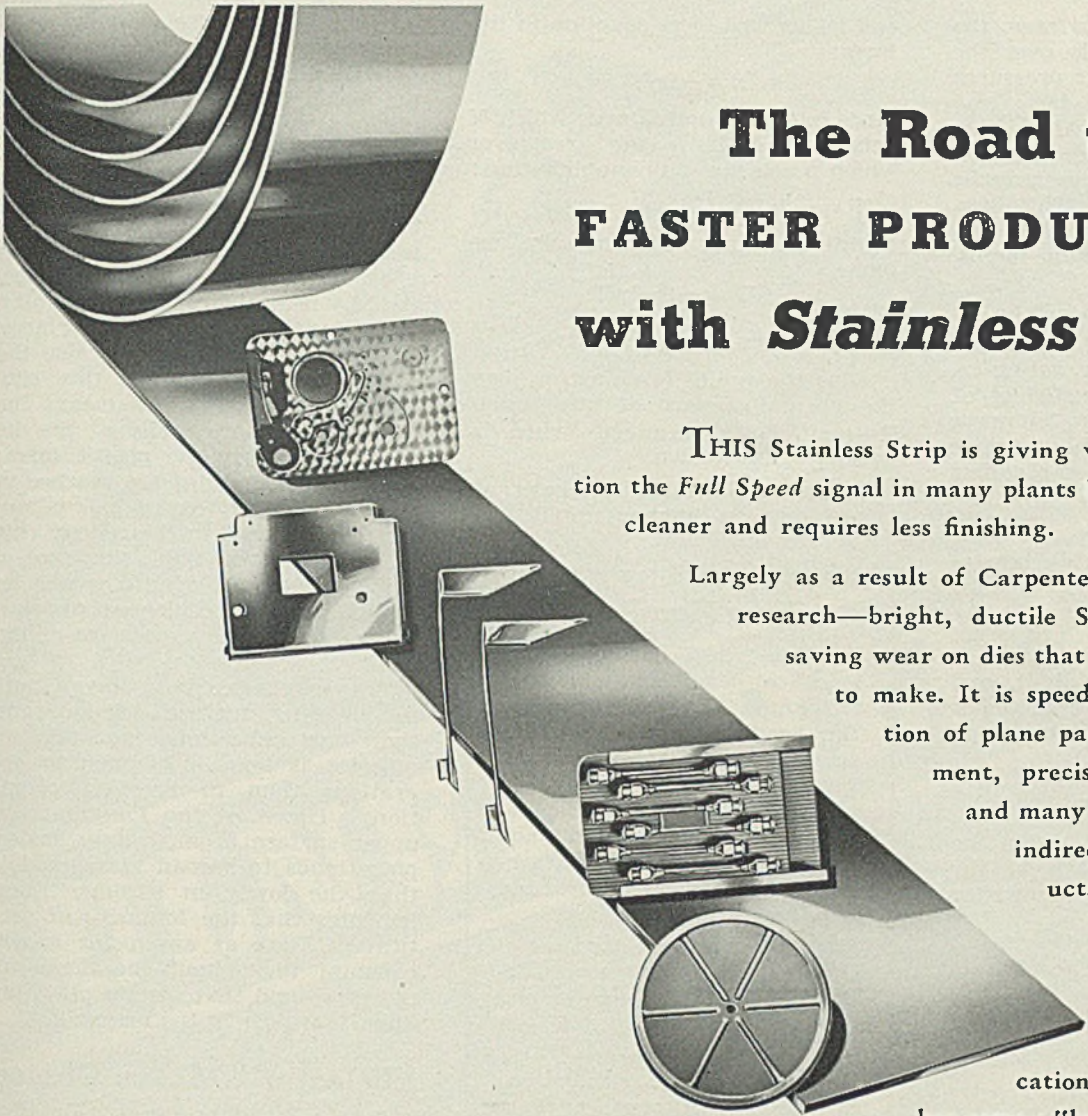
Largely as a result of Carpenter's metallurgical research—bright, ductile Stainless Strip is saving wear on dies that take a long time to make. It is speeding the production of plane parts, radio equipment, precision instruments and many other direct and indirect defense products. From Carpenter's vast experience with the selection and fabrication of Stainless Strip has come a "know how" that is

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THE CARPENTER STEEL COMPANY
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radially on its curved surfaces, the pressures acting normally over the ends of the segments, the pressures on its upper and lower faces and the frictional forces acting over these faces. Since the pressures on the upper and lower faces may be supposed to neutralize each other, we are concerned only with the equilibrium of the remaining forces.

See Fig. 5.

If F represents the radial force (not stress) acting over the curved segment, δT the pressure acting on one end and μ is the coefficient of friction, we obtain the following equation by resolving these forces in the direction of the mean radius of the segment:

$$\left\{ F - (F + \delta F) \right\} \frac{2 \sin \frac{1}{2} \alpha}{\alpha} + 2\delta T \cdot \sin \frac{1}{2} \alpha - 2\mu \cdot \delta p = 0$$

or, as we approach the limit, and the sine of the angle α approaches the circular measure of the angle of the segment, we have:

$$F - (F + \delta F) + 2\delta T \cdot \frac{1}{2} \alpha - 2\mu \cdot \delta p = 0$$

If f be the radial stress within the metal at radius R , and h be the thickness of the slug, we may write:

$$\alpha R h \cdot f - \alpha (R + \delta R) h (f + \delta f) + 2h \cdot \delta R \cdot f \frac{1}{2} \alpha - 2\mu p R \alpha \delta R = 0$$

which becomes on reduction:

$$\delta f \cdot h = -2p \cdot \delta R \cdot \mu \dots \dots \dots (2)$$

($\alpha R \cdot h$ is the area over which F acts; $h \cdot \delta R$ is the area over which δT acts; and $R \cdot \alpha \cdot \delta R$ is the area over which P acts; p is the intensity of vertical stress.)

Since we find that the difference between the vertical and radial intensities of pressure in any given material is constant for any given conditions of hardness, temperature, etc., we may write:

$$p - f = a \text{ constant. So also,}$$

$p + \delta p - f - \delta f =$ the same constant and thus:

$$\delta p = \delta f \dots \dots \dots (3)$$

and again:

by substitution,

$$\frac{\delta p}{\delta R} = - \frac{2p\mu}{h} \dots \dots \dots (4)$$

Hence we observe that the intensity of pressure across the face of the slug is not constant, but that it has a maximum value at the center and declines towards the periphery; and that this rate of change of p with R is directly proportional to the intensity of the pressure at any point and to μ , and inversely proportional to the thickness of the slab.

Now refer to the diagram, Fig. 6,

and let us write our equation in the form:

$$\delta f \cdot h \cdot \delta x = -2p\delta R \cdot \delta x \cdot \mu$$

Since $h \cdot \delta x$ is the area over which δf acts, and $\delta R \cdot \delta x$ is the area over which p acts we may simplify thus:

$$\delta F = -2\mu\delta P \dots \dots \dots (5)$$

Hence, per unit width of slice, we have:

$$\int \delta F = -2\mu \int p \delta R$$

or,

$$F = -2\mu p_{\text{mean}} R$$

Thus the radial force acting over the normal surface at any radius R may be determined when μ and p_{mean} are known.

When equilibrium has been attained and no further radial flow

it will lock in the die; while if too thick, the metal will tend to flow into the flash rather than fill the die.

Again we note that if the barrel form develops under slow pressure, the internal friction of the plastic mass is less than the friction between the forging and the die surfaces in contact with it. This means it is easier for the metal to flow radially near the center of the plastic mass than at the die surfaces. If the upper (and perhaps also the lower) surface spreads, this situation is reversed, which means the metal flows more easily at the die surfaces than in the plastic mass; or equilibrium states are reached in the upper and lower regions before they are reached in the center. This means that the final shape of a part produced in open dies will be influenced by the degree of plasticity in the various portions of the work.

Trapped gases may play a part in lowering surface friction, and there are indications that this coefficient is less in hammering operations than in pressing operations. However, the fact that the upper surface of an evenly heated piece tends to spread more readily than the lower in hammer work indicates that the intensity of vertical pressure at any point is not constant throughout the depth of the mass and that inertia plays an important part in the action.

“Selector” Makes Choice Of Paints Easy

American-Marietta Co., 43 East Ohio street, Chicago, is offering a “paint selector” which designates the best paint without making a detailed technical study of properties of all finishes that may be suitable for a given application. Consisting of two charts, it makes available to architects, contractors, purchasing officials and plant and building maintenance engineers all information necessary to choose properly from the company’s 43 paint, enamel and varnish products.

Fifty-one divisions on the first chart list all types of surfaces that may be encountered in painting, and under which are listed one or more paints suitable for the application. The second chart gives all properties of each paint. Information included is whether the finish may be used under water or over graphite paint; maximum heat resistance in degrees Fahr., etc. A table of geometric equations, one showing light reflection values of standard colors, and tables to aid in estimating paint requirements for exteriors and interiors are also included. The “selector” folds to letterhead size making it convenient to keep on a desk.

New Handbook

The latest in STEEL’s series of ordnance handbooks, “Modern Small Arms”, is now off the press. This handbook includes information on various types of automatic rifles, machine guns and sub-machine guns, automatic firearms, cartridge cases and small arms ammunition. It is attractively bound, contains 70 pages, and is priced at \$1.00 per copy.

Also available are copies of “Modern Shell Production, Revised” at \$1.50 per copy and “Modern Gun Production” at \$1.00 per copy.

These handbooks may be ordered separately at the above price, or \$3.00 for the set from STEEL, Readers Service, Penton building, Cleveland.

is taking place no matter how great the pressure applied, we may think of the slice as cut by a diagonal as illustrated in Fig. 7. Thus the slope of the wedge is the angle whose tangent is -2μ .

Suppose, to take a specific example, μ is 0.2; then when flow has ceased and the slug is locked between upper and lower faces, R will be equal to $h/2\mu$, or 2.5 times h . Hence the ratio of the diameter to the thickness of the slug will be 5:1 and no amount of hammering would make it any larger. For higher values of μ this ratio declines, being 3.33: 1 when μ is 0.3 and 2.5: 1 when μ is 0.4.

The result above arrived at puts a definite limit to the shape of the parts which can be forged successfully without undue strain on the equipment. When applied to forms which include a flash (see an interesting paper by Professor George Sachs in the March, 1941, issue of *Modern Industrial Press*), it indicates that if the flash is too thin,



VULNERABLE?



FIBREEN

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It's a blazing demon in action—but during those idle weeks or months when it's in shipment or in storage, its vital nervecenters are vulnerable to the attacks of moisture and rain, salt air and water, dirt and dust.

That's why motors, transmissions, generators, carburetors, radio and control equipment — and repair parts, too, must be carefully and thoroughly wrapped for shipment — from production line to assembly line, and then to the firing line.

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There is no other product quite like FIBREEN. It is a waterproof, dirtproof, reenforced paper with amazing strength and durability. It's used as a wrapping material for products of every description, size and shape.

Because of the importance of properly protecting the tremendous volume of war materials, parts and supplies now pouring from America's industrial plants, FIBREEN is being allotted to essential wartime uses for the duration.

If your product comes in the "essential" classifications — if materials and methods of effective protection in shipment are a problem — write The Sisalkraft Co. Experienced shipping experts are at your service. Explain what you make — and how you now pack it. We will try to help you.



FIBREEN is 6 ply: TWO layers of strong kraft, reenforced, with

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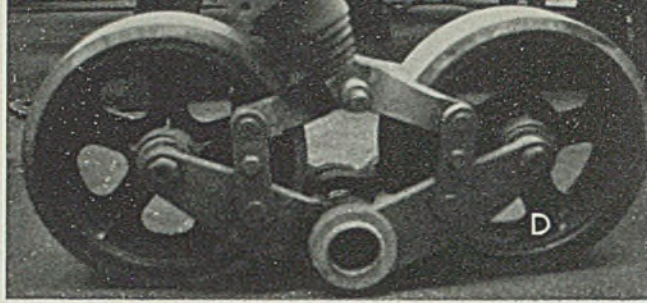


Fig. D—Volute spring and linkages which form bogie suspension unit of caterpillar vehicle. Hub of two main arms slips over axle projection seen to immediate right of top of volute spring on vehicle in background

SPRING MAKING

(Concluded from Last Week)

ALL OF the reheating furnace setups used in this plant are located to feed one or more machines or to form part of series of reheating and forming operations. Many of these furnaces are arranged so that as the operator removes work from one machine it is placed upon the conveyor of the next reheating furnace, the operator of the next machine removing the heated work from the opposite end of that same conveyor and placing his work on the conveyor of the subsequent furnace. This allows forming operations which cannot be handled with one heating to be done in a continuous high-production setup. Several of these setups can handle as high as 7000 to 8000 pieces per 8-hour shift. Fig. 7 shows how the forming and rolling equipment is located close to the reheating furnace conveyors. Fig. 9 shows the reheating furnace conveyors. It also shows how the reheating furnaces are arranged in adjacent parallel lines to facilitate handling the work on a continuous production basis.

Fig. 8 is a closeup showing the type of conveyor used on the re-

... operations in production of heavy volute springs for caterpillar and other heavy track laying vehicles are detailed here. Leaf spring procedure is also described

By C. W. BARTLETT
Assistant Engineer
Spring Perch Co. Inc.
Lackawanna, N. Y.

heating furnaces. This particular unit is formed of a series of plates hinged together to make a continuous belt conveyor. A workman is shown putting spring ends through a roll to taper thickness of the ends. He takes the work off the discharge end of an adjoining heating furnace at the right, but not shown in this illustration, puts it through the rolls and places it on the reheating

furnace conveyor at his left for heating the opposite end of the work for subsequent working. Only that end of the work is heated which is to be worked. This, of course, involves at least two reheating operations.

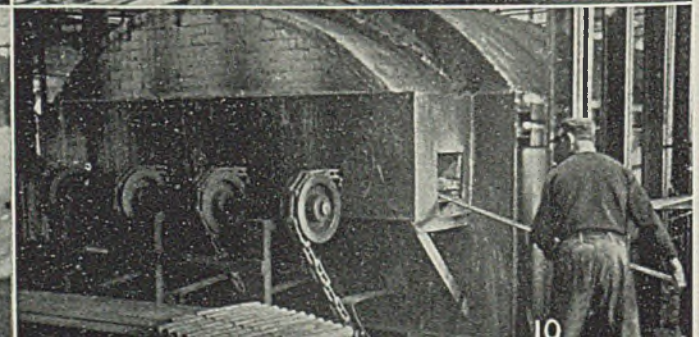
Volute Springs: Typical of the special springs made for caterpillar tractors and other heavy equipment is the heavy volute spring which is a spiral wound on edge from heavy stock. Fig. D shows a typical bogie subassembly for a caterpillar type vehicle. The arms going to the two wheels are pivoted on a hub on the vehicle. The con-

Fig. 7—Work from press is placed on conveyor of adjacent reheating furnace

Fig. 8—Here leaf spring end is being rolled; then operator places work on conveyor of next reheating furnace in the line

Fig. 9—This shows how lines of reheating furnaces and presses, rolls, etc., are positioned so work flows directly from one unit to the next to form continuous processing lines

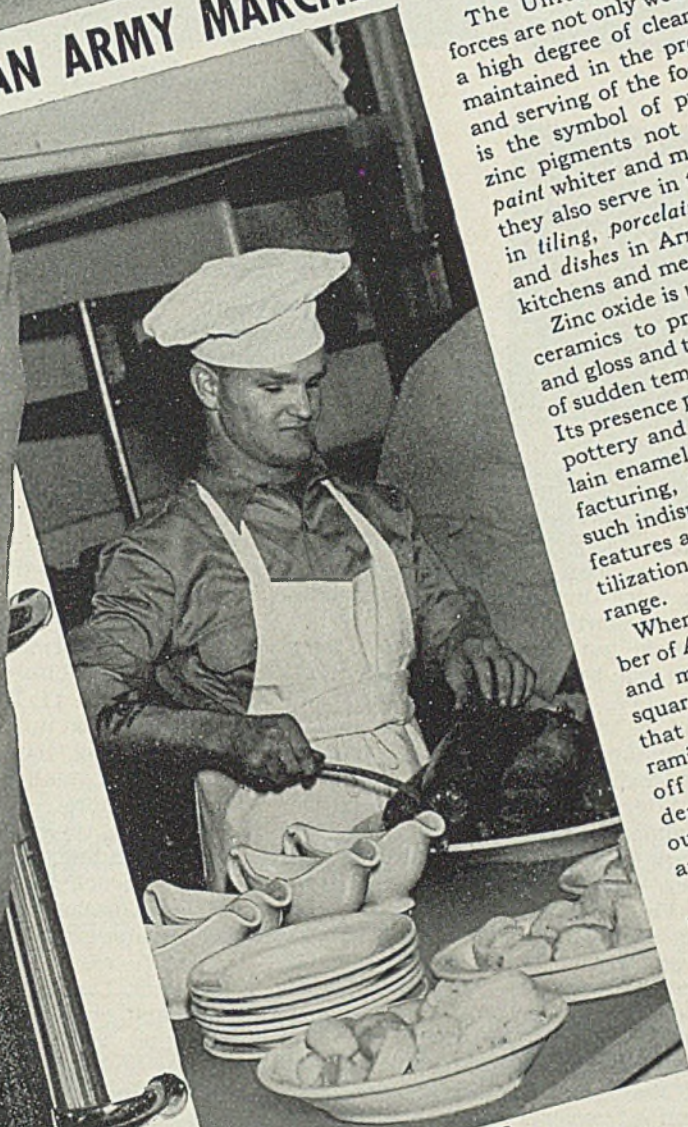
Fig. 10—After eye is rolled up on one end of the volute spring blank, entire blank is heated in this big chain conveyor furnace preparatory to forming



ZINC IN WAR

5
CERAMICS

"AN ARMY MARCHES ON ITS STOMACH"



U. S. ARMY SIGNAL CORPS PHOTO

The United States armed forces are not only well fed, but a high degree of cleanliness is maintained in the preparation and serving of the food. White is the symbol of purity, and zinc pigments not only make paint whiter and more durable, they also serve in this capacity in tiling, porcelain enamelware and dishes in Army and Navy kitchens and mess halls.

Zinc oxide is used as a flux in ceramics to provide whiteness and gloss and to resist the shock of sudden temperature changes. Its presence prevents crazing of pottery and chipping of porcelain enamel. In ceramic manufacturing, zinc oxide provides such indispensable formulation features as fusibility, non-volatilization and wide temperature range.

When one considers the number of American soldiers, sailors and marines to be fed "three squares a day"—plus the fact that imports of European ceramic products have been cut off almost completely—the demands for zinc oxide by our ceramic industry can be appreciated.

This is just another one of the normal uses for zinc which has become greatly expanded by war needs — one more reason why civilian users may not be able to obtain all of the zinc they would like to use.

DIE CASTING

METAL SPRAYING

GALVANIZING

PHARMACEUTICALS

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2
RUBBER

3
PAINT

4
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MANUFACTURERS OF THE FAMOUS



ZINC COMPANY
HORSE HEAD ZINC PRODUCTS



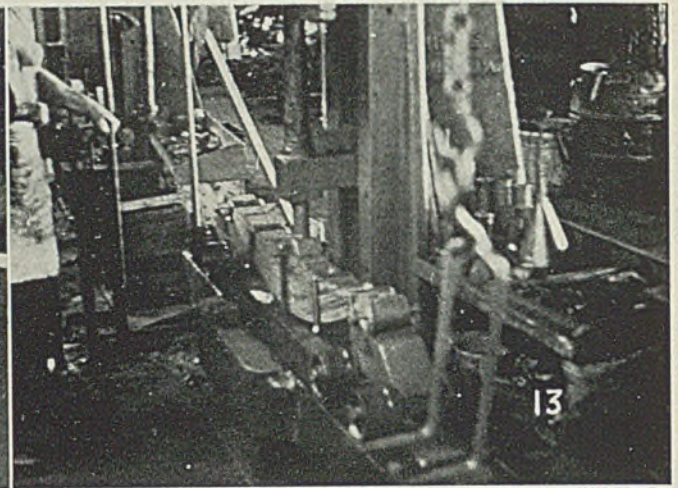
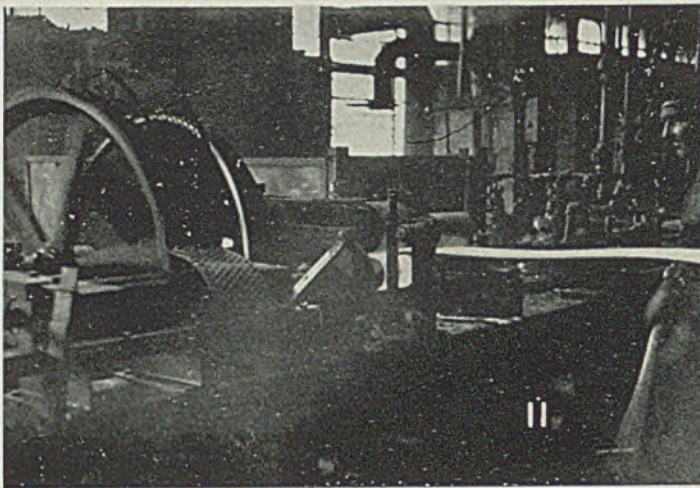


Fig. 11—At opposite end of furnace shown in Fig. 10 hot blank is withdrawn, eye fastened to mandrel of forming machine and then the volute rolled up as shown here. Stripped from mandrel, work falls into oil quench tank

Fig. 12—Leaf springs coming from circular hardening furnace are placed in clamps on quench tank conveyor seen at left to hold work in position as it is quenched, thus assuring correctness of final shape

Fig. 13—Even the heaviest of leaf spring assemblies is given a full compression test on the assembly line in this hydraulic tester. Note spring assembly is supported from mounts carried on rollers which enable tester to take any spring in a wide range of sizes

tinuous caterpillar track is mounted to operate under several bogies of this type, around the drive and idler sprockets at each end of the track assembly system. The bogie wheels shown in Fig. D ride on the inside surface of the track as it is laid down continuously in movement of the vehicle. The upper end of the volute spring is anchored firmly into the framework of the vehicle. Thus the up-and-down movement of the wheels is absorbed by compression of the spring.

Some idea of the loads carried by these springs can be had from the fact that every spring in production is given a test for initial set. The spring is 13 15/16 inches high when put in the testing machine and is compressed down to an 8-inch height. After this compression it must return to such a height that when subsequently a load of 6000 pounds is placed upon it, it stands 8 inches high. Maximum deflection thus allowed is something between 4 and 4 1/2 inches at loads between 5000 and 6000 pounds. It is evident each spring is rated at practically 3 tons normal load; it, of course, must withstand much higher loadings as the vehicle rides over obstructions and the spring is compressed still further by impact loadings.

At the Spring Perch plant, first step in making the volute spring is to cut 86-inch lengths from bar stock which is about 6 inches wide and 9/32-inch thick.

Next operation is to heat to between 1700 and 1800 degrees Fahr. This is done in a furnace equipped with a chain conveyor for carrying the work through the heating chamber crosswise.

First hot-working operation is to thin out both ends by rolling a taper 14 1/2 inches long on one end and 5 inches long on the other. Minimum thickness at both ends is 1/16-inch.

After rolling up an eye in the manner previously described, the work is ready to pass through the large chain conveyor furnace shown in Fig. 10. Here the operator is loading the bars upon the chain conveyor through the small opening shown since the bars are loaded into the furnace crosswise the heating chamber. The pieces with the eyes already rolled are seen stacked at the lower left. This furnace, as well as several other heating furnaces and all of the heat-treating furnaces, is provided with a protective atmosphere produced by burning 900-B.t.u. gas which is subsequently filtered and refrigerated to give a nearly neutral atmosphere in the working chamber. The oil-fired reheating furnaces shown in Figs. 2, 3, 6, 7, 8 and 9 (See Part I, STEEL, Feb. 16, 1942, p. 85) are direct-fired units and hence have no protective atmosphere.

The chain conveyor travels at a speed which allows the work to remain in the furnace about 15 minutes, ample time for it to reach the

1700-degree Fahr. temperature of the furnace. As the work emerges from the opposite end of the furnace in Fig. 10, the operator pulls it out through a small door similar to the loading door and hooks the eye already formed upon the mandrel of the volute winding machine shown in Fig. 11. In 21 seconds this machine rolls up the volute form by advancing the end of the coil forward a small amount continuously as the strip is wound to produce the typical pyramid-shaped volute winding shown in Fig. D.

The quench tank, into which the work is discharged from the winding mandrel is provided with a conveyor to carry the springs out of the tank. Due to the high temperature and considerable mass of the 46-pound volute springs quenched in this tank, it is necessary to have an exceptionally large circulating system for cooling the oil since much heat must be absorbed and removed from the quenching oil.

As the springs come out of the quench bath, they have a hardness ranging from 477 to 555 brinell. Next they are checked carefully and then loaded into one of the rotary tempering furnaces such as shown in Fig. 5, where they are given a tempering treatment at 900 degrees Fahr. for a period of 40 to 50 minutes. Final hardness produced is within 375 to 430 brinell.

Leaf Springs: A large portion of the work handled here consists of

DIES THAT DON'T
"DIE YOUNG"



How a wire manufacturer speeds output and saves by using a Pennsalt Cleaner

"Our wire drawing dies aren't lasting as long as they should," decided the production men in a leading steel mill. "And tungsten carbide dies are getting harder to replace, now that expert die makers are scarcer than hen's teeth."

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Success! Tungsten carbide dies in this steel mill now last 15-20% longer. There is less scrap loss and less scratching of wire. Rusty wire, requiring re-processing, has been practically elimi-

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Most important of all, the longer die life, lower scrap loss and elimination of rusty wire . . . achieved with the aid of this Pennsalt Cleaner . . . helped *speed up production* of wire rope and other wire products vitally needed for Defense.

Today Pennsalt Cleaners are helping to speed up Defense in many other ways . . . by saving time, labor and materials in plants

making metal parts for airplanes, tanks, naval craft, guns and other munitions.

There's a Pennsalt Cleaner designed to meet practically every kind of metal cleaning problem. What's *your* specific need in a metal cleaner? Our technical staff, backed by adequate supplies of all Pennsalt Cleaners, is at your service. Phone, wire or write our Pennsalt Cleaner Division, Dept. S.

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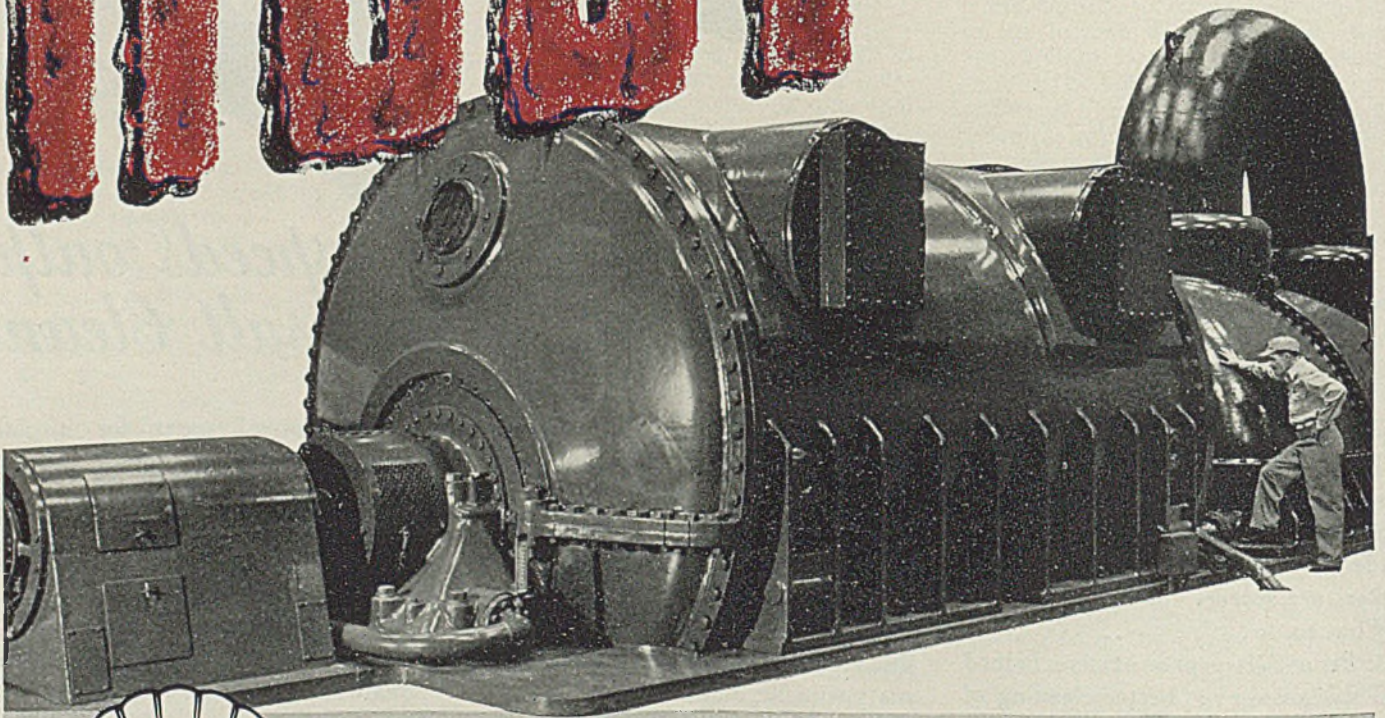
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leaf springs. As previously described, these are notched, punched and cut off from bar stock on the large Bliss press in a 3-station die. Then they are heated in the direct oil-fired furnaces, end tapered and placed in the large rotary furnace for heating for hardening. These furnaces have protective atmospheres to prevent scaling of the work. Here also arrangements are made for continuous production by mechanical handling facilities.

Because the work is loaded into and unloaded from the hardening furnaces continuously, it is possible to combine the forming of the springs and the quenching operation into a continuous process by utilizing the setup shown in Fig. 12. This is an unusual arrangement of automatic dies or clamps carried on the quench tank conveyor.

As the operator pulls the heated work from the hardening furnace, the leaf spring is placed between open dies in the conveyor at the left. Immediately the dies are closed to clamp the work in the desired position to produce the final form wanted. At the same time the conveyor moves continuously, so the work is almost immediately im-

mersed in the oil quench bath.

This operation is a sight to watch for the conveyor and dies of the clamping mechanism are covered with oil as they come from the tank. This oil ignites as it drips upon the hot work to produce a continuous series of flames.

The testing department has complete facilities. A regular production test on one of the large leaf spring assemblies is shown in Fig. 13. This is one of the stations in the long leaf-spring assembly conveyor shown in Fig. A. The hydraulic press in Fig. 13 produces maximum load and deformation of the spring. This not only affords a means of checking the strength or resiliency of the spring by means of scales attached to the press but also gives the initial set required. This testing machine is unusually flexible as the supporting blocks at either end of the spring are mounted on rollers on a track over a heavy bar so they may be positioned almost instantly to check springs of varying lengths.

Testing department also includes complete fatigue testing facilities, with one machine capable of making a 4-inch stroke at a rate of

approximately 30 to 120 strokes per minute.

All up and down this conveyor line, which incidentally consists of a steel-faced surface about 5 feet wide, a number of interesting handling devices are provided for getting the work off the conveyor and upon the pieces of equipment alongside it for the assembling and processing operations. In immediate center foreground of Fig. 13, for instance, can be seen a special J-clamp used for handling certain items while they are suspended from an overhead hoist in turn hung on a jib which swings over the conveyor and adjoining machines.

After springs come off the final assembly line and are tested, they are ready for painting and then are moved directly on to the shipping area.

Maximum use is made of mechanized processing equipment all the way through this plant to facilitate materials handling operations as well as to speed the work itself. Mechanized handling combined with continuous processing and fabricating equipment is responsible for the high production rates obtained.

Protected Sheet Steel For Construction Use

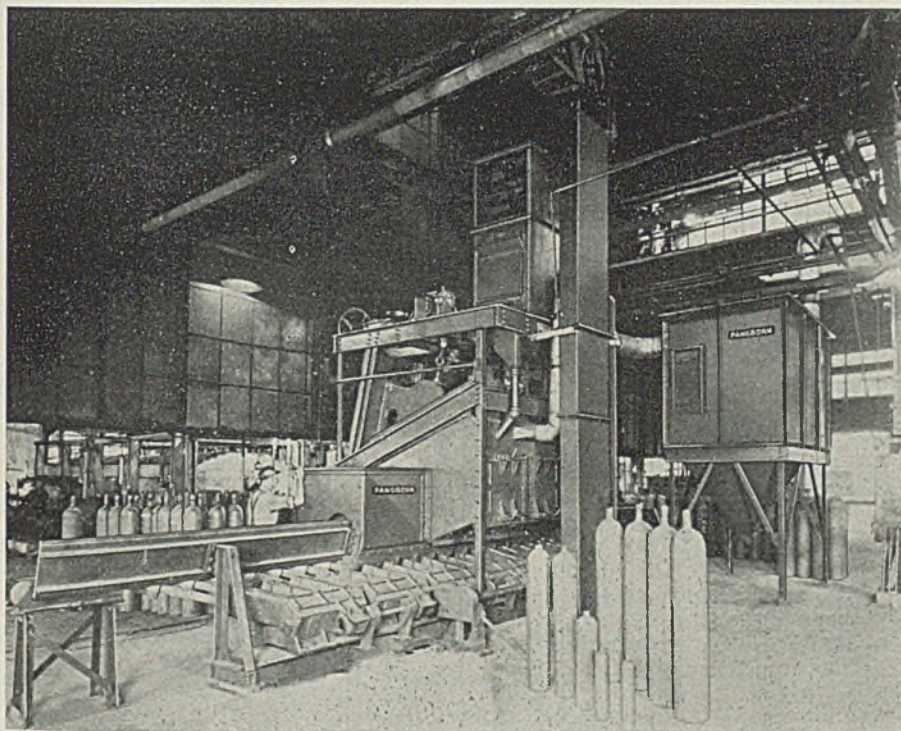
■ Protected Steel Products Co., Pittsburgh, announces an asphalt protected steel sheet for use as roofing and siding in industrial construction. Called A-P-S, it is uniformly coated on both sides with a special composition coating, which is said to give it extreme durability and protection against extreme ranges of weather conditions. It also resists acid fumes and acid gases, making it suitable for use on industrial and chemical plants, and for depots, sheds, hangars, etc. A further advantage of this sheet steel is its economy of maintenance, since it requires no paint or other finish.

Develops Dry Type Inspection Sticker

■ A new dry type sticker having a special adhesive substance that makes it particularly valuable as an inspection, rejection, instruction and identification medium in industries is announced by Avery Adhesives, 451 East Third street, Los Angeles. Marketed under the trade name Kum-Kleen, it is applied quickly, without moisture, on any smooth surface, including polished metal, glass and plastics, simply by a slight finger pressure.

Unaffected by intense heat, cold or humidity, the sticker sticks permanently, though it may be peeled off easily by hand without leaving a stain or mark.

Oxygen Cylinders for the Flying Forces



HARRISBURG STEEL Corp., Harrisburg, Pa., manufactures oxygen cylinders used by the United States flying forces. When the aircraft program was expanded and demand for the cylinders multiplied, it was found blast cleaning equipment for removing scale before finishing was inadequate. Pangborn Corp., Hagerstown, Md., was asked to help, installed the new airless rotoblast cabinet, with automatic system of conveying work through blast stream, pictured above, in record time. Now Harrisburg Steel is turning out more than three times the amount of cylinders it did formerly

DIRECT RADIANT DRYING

... speeds application of japan and other heavy synthetic finishes

IT IS unusual to find a dipping process with japan finishes where the complete installation including drying can be automatically controlled, especially where a long heavy dip is involved. Yet at the Michigan Bumper Co., Grand Rapids, Mich., an automatic japanning oven has been in operation more than a year and a half, satisfactorily handling various asphaltum and synthetic (japan) materials. The oven, after operating 14 hours per day for this period of time, retains the same interior appearance as when installed, with walls still clean.

The japanning oven is an automatically controlled proportioning type installation using a combination of radiant heat plus recirculated convection heat. Referring to the elevation diagram, Fig. 2, it will be noted that there is a separate recirculation motor and blower which handles the recirculating system. This system consists of two ducts extending lengthwise through the oven at either side near the top, through which hot air and gases are collected and conducted to the blower where they are directed through connecting ducts to two other longitudinal ducts extending lengthwise through the oven at floor level on either side of the burners. Hand shutters are installed at frequent intervals in both intake and exhaust ducts to control air flow properly.

In addition, there is a separate exhaust motor and blower connected into the system and designed to exhaust the exact amount of air from the oven that is necessary to handle the input of the volatiles in the paint being dried. Fresh air is introduced into the oven through open-end air seal shown at the extreme left in Fig. 2. About 4 ounces of pressure is maintained at all horizontal levels of the vertical seal. Approximately 135 complete air changes are made in oven per hour.

The heat source consists of five banks of Burdett No. 25 infra-red ray generators or radiant gas burners (blanketed) throughout the oven at floor level as is shown in Fig. 3. The burners are spaced on 12-inch centers and are interconnected by means of 10-inch retainer tubes for automatically lighting all the burners by means of pushbutton control and electric ignition devices. The 175 burners consume a maximum of 1750 cubic feet of gas per hour. The entire oven,

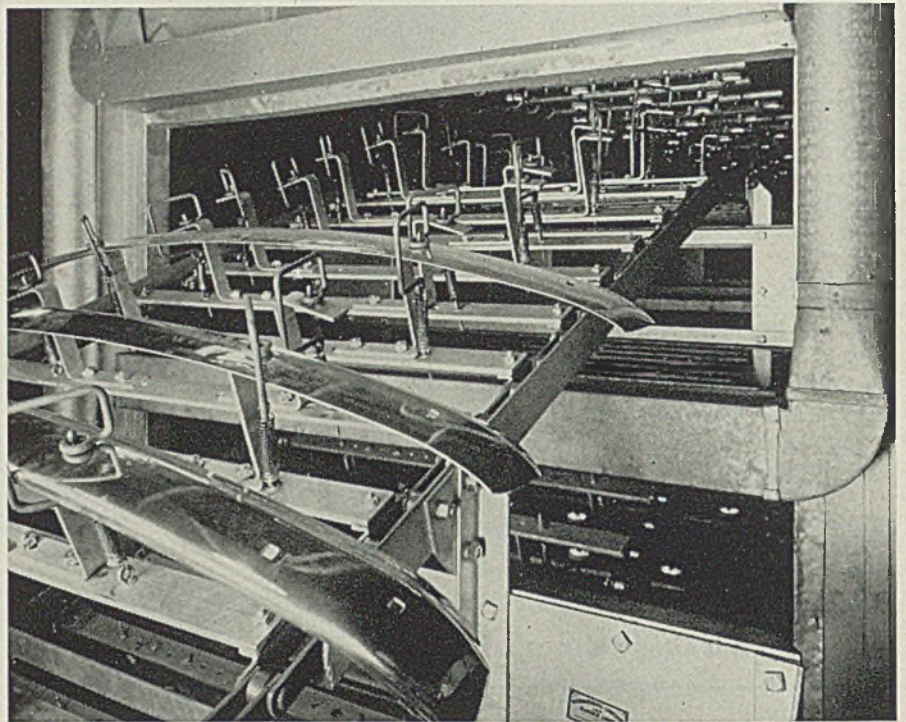


Fig. 1—This second oven has a bank of infra-red burner units located above and another below the work which is hard to heat due to great reflection from the chromium plated surfaces of the bumpers

which measures 44 feet long, 9 feet wide and 10 feet high can be brought up to working temperature of 510 degrees in 12 minutes. This is an unusual pickup time for this size oven. Note that this is

between 495 and 980 cubic feet of natural gas per hour, depending upon the type of finish being handled.

The work handled consists of brackets or bumper supporting bars which previously have passed through a conventional bonderizing cycle to clean them thoroughly and prepare them for the paint coat. These brackets and bars are suspended from tree-type hangers as shown in Fig. 3, these hangers carrying an average of five brackets or bumper supports each. The trees or hangers are hung on 18-inch centers on the monorail, which travels at a speed of 1½ to 4 feet per minute according to the exact baking time of the enamels being handled. With each bumper bar weighing 18 pounds, it is evident that an unusually large amount of steel is handled.

A typical cycle consists of operating the oven at 510 degrees Fahr., the conveyor at 28½ inches per minute, the maximum time cycle of 28 minutes in and out allowing the work to reach peak temperature of 510 degrees for at least 7 minutes.

The japan material utilized here is furnished by the Becker Var-

By DON A. JACOBSON

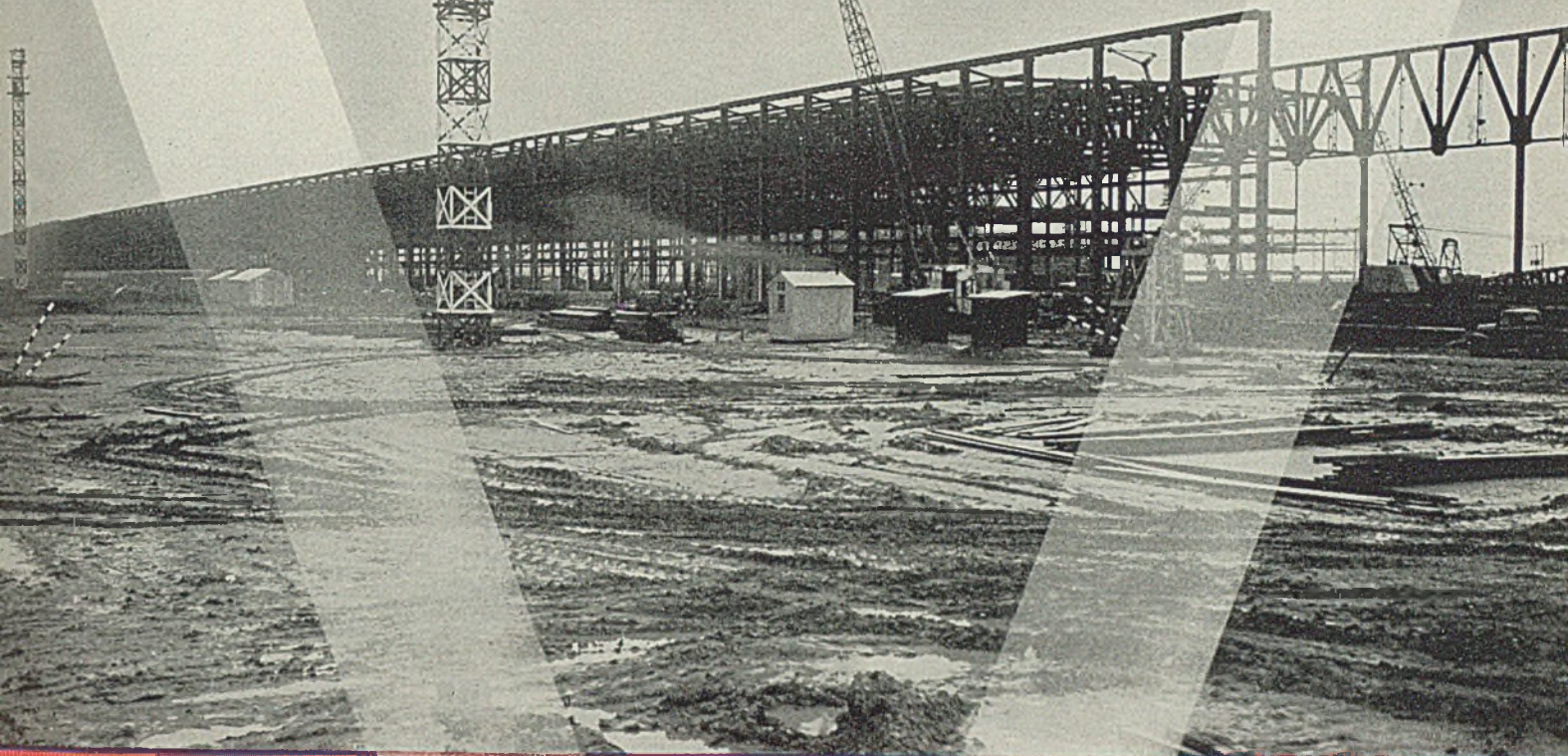
Engineer
Burdett Mfg. Co.
Chicago

done even with the oven sealed only by the open-end air seal.

This is a hairpin-type oven with the work being carried in on overhead monorail conveyor down the length of the oven, across one end, and back up the other side. Both conveyor lines are clearly shown in Fig. 3.

The burner consumption mentioned of 1750 cubic feet per hour of course is maximum and occurs for only the short period of time during which the oven is being brought up to temperature. From then on, the burners are automatically turned down as much as 60 to 70 per cent. Actual consumption works out to be something

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BIGGEST and TOUGHEST
FABRICATING PROBLEMS!



Tulsa Aircraft Assembly Plant

THE construction problem of industry today is to build swiftly and efficiently—a task that demands full use and close cooperation of all available facilities.

Four V Structural Steel Companies are organized to help speed this program of industrial expansion through their combined resources of time, men and equipment. They have capacity to produce 8,000 tons of fabricated structural steel per month.

Thus Four V offers another needed source for the fabrication of mass tonnage under the supervision of a single engineering and production staff, and with responsibility centered

in one management to secure top efficiency.

Each associate in the Four V Structural Steel Companies contributes a background of broad experience and proved ability, which in combination makes the organization outstanding in its capabilities. Many thousands of tons of structural steel have rolled from their shops into the rapidly expanding construction of munitions, ordnance and aircraft plants—thousands of tons more are in production.

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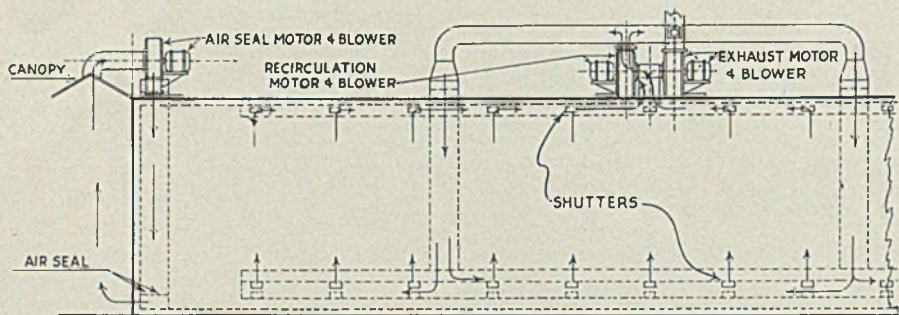
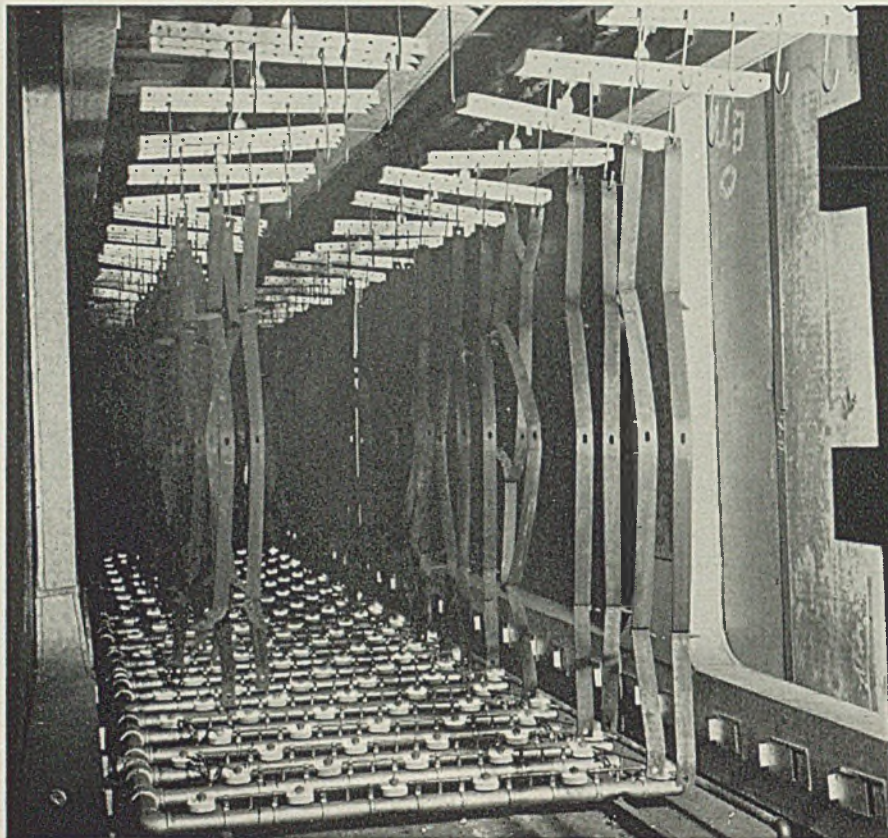


Fig. 2. (Upper illustration) — Diagram showing side elevation arrangement of blower and duct systems in drying oven. Heating units are arranged on floor of oven

Fig. 3. (Lower illustration)—Looking in open end of Michigan Bumper drying oven. Note infra-red burner units are grouped on floor of oven. Duct outlets have individual dampers to allow accurate control of air flow



somewhat unusual. The oven is fired directly from the top and from the bottom, using two sets of radiant burners placed about 5 inches from the chromium plated bumper. The temperature of the bumper is brought to a point to dry and bake the enamel at a high rate of speed since the work is in the baking zone a maximum of 3½ minutes.

The oven is sealed at the open end by means of a high-pressure air seal similar to that shown at the extreme left in Fig. 2. Air is exhausted from a point near the center in this particular oven.

Note in Fig. 1 that the work is placed on a conveyor fitted with clamps to hold it in position since the conveyor carries the work on its upper side as the work enters the oven, turns it over at the far end and brings it back and outside of the furnace in an upside down position. The conveyor travels at a speed between 4 and 7 feet per minute. The conveyor, including the hooks, weighs approximately 75 pounds per lineal foot. Each bumper weighs approximately 45 pounds. Bumpers are mounted on 9-inch centers. Thus practically a solid mass of chromium-finished surface passes through the oven continually.

The great reflecting power of the highly polished chromium finish requires an enormous amount of heat energy in order to raise the temperature in the limited time to complete a satisfactory and ideal drying time cycle. That is the reason that this is a double-fired installation with duplicate sets of burners mounted on floor and roof.

Thus heat is being applied to the bumper from the minute it enters the oven at the top through the entire cycle as the conveyor carries it around and over the bottom group of burners.

Operating temperature of this oven is generally 325 degrees Fahr. The oven itself is constructed of metal sheets separated 4 inches, the intervening space being filled with rock wool for insulation. The air seal operates to maintain 4-ounce pressure at outlet of seal.

This oven, too, is automatically controlled except for the ignition, which is handled manually.

nish Co. of Cincinnati. The japan is applied by dipping the brackets and bars in exceptionally large tanks as they are moved along on the conveyor. Each of these tanks holds approximately 2000 gallons of japan. It is a long, gradual dip with the dipping tank located about 50 feet from the entrance to the oven. This allows for a slight amount of drip so that the final dripping occurs in the first setting section at the entrance to the oven. Here asbestos paper is placed on the floor to absorb the material that drips off the work. The asbestos paper is replaced once a week.

The oven is constructed of sheet metal interior and exterior surfaces with rock wool in between as insulation. Wall sections are 4 inches thick, ceiling is 5 inches. Thickness is 4 inches for the floor section, which is built 6 inches above the concrete floor of the building, leaving ample space for bottom cooling.

The japanned finish produced has been found equally as satisfactory

as those baked in a batch-type oven recirculated with heat at 490 degrees Fahr. for 1 hour and 15 minutes. In addition, cost of the finishing materials has been reduced.

This same oven is also utilized for a considerable amount of secondary work in the low-temperature field, handling different colors at temperatures ranging between 350 and 500 degrees Fahr. Work is handled satisfactorily at temperatures up to 550 degrees.

The controls include full provision for lighting the oven by means of pushbuttons and an electric ignition system. Also automatic safety controls are installed.

A second installation is a somewhat smaller oven, the entrance to which is shown in Fig. 1. This unit is utilized to bake the urea synthetic which is impressed into the depressed section of the bumper to bring out the words "Luxury Liner." This job is done in a short overall time cycle.

Construction of this oven is



★
Multiply
by 127,272
 ★

To make the eleven army cots you see here requires 128 feet of steel tubing, 195 feet of angle steel, 1073 feet of spring wire and 1933 feet of galvanized wire - not to mention rivets and other small pieces of steel.

Multiply these figures for 11 men by 127,272 and you have the amount of steel fabricated into beds for our new army of 1,400,000 men - a total of 451 million feet of material - 33,367 tons of steel.

Such an essential item as beds for soldiers is just one of the many defense uses for which much of the regular production of Youngstown mills is going now. This, of course, is in addition to the ever-increasing tonnage of special steels produced for armament.

Day and night, our plants are working to deliver every ton of steel possible.



Youngstown products include
 Pipe and Tubular Products -
 Sheets - Plates - Conduit - Bars -
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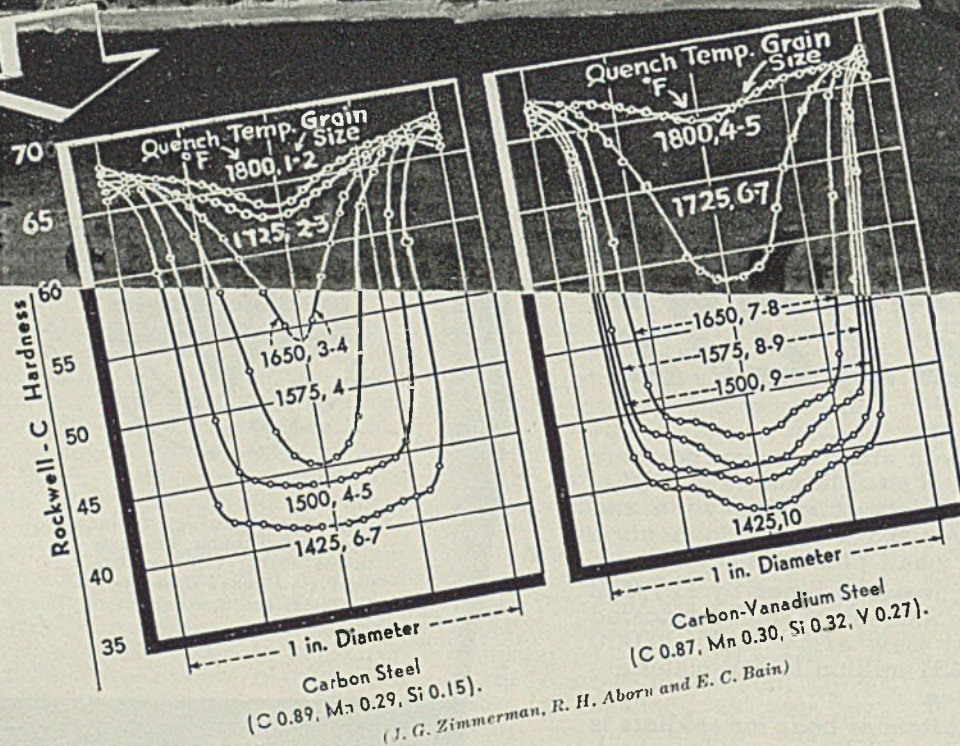
THE
YOUNGSTOWN
SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Tool Steels

General Offices - YOUNGSTOWN, OHIO

25-27D

VANADIUM STEELS



↓
EFFECT OF VANADIUM UPON
AUSTENITIC GRAIN SIZE AND
DEPTH OF HARDENING OF
CARBON TOOL STEEL

W A N A

CORPORATION OF AMERICA • NEW YORK, N. Y.

INHERENTLY FINE-GRAINED



One of the most characteristic and important features of a great many vanadium steels is inherent fine grain size.

Not only are these steels fine-grained when quenched from low temperatures; the grains coarsen but slowly up to temperatures well above the normal heat treatment range, and even then, reheat treatment in the normal range restores fine grain size.

Why is this important?

Uniformity of structure. Fatigue and impact resistance. Reproducibility of physical properties. Response to heat treatment. Relative insensitivity to small changes in heat treatment temperatures. In some compositions, shallow hardening plus excellent core properties. In other compositions, particularly with molybdenum and chromium, deep hardening with fine grain. Favorable characteristics in machining, forging and other fabricating operations.

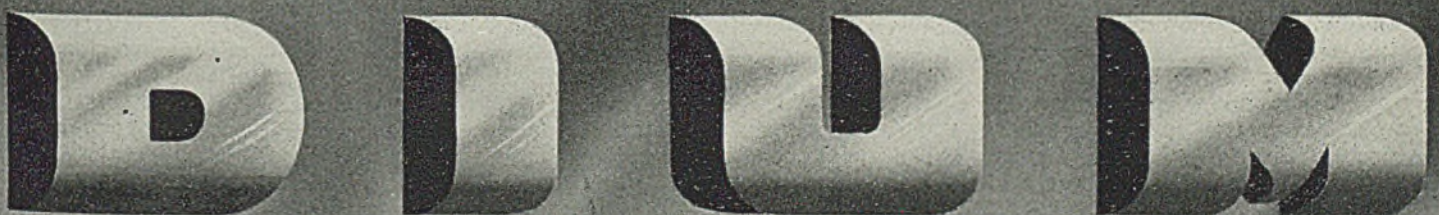
For example, this is what fine grain size means to one consumer of a chromium vanadium die steel: "With most steels, we have to watch quenching temperature like a hawk. But with chromium vanadium, we don't give a rap if the heat treaters quench it from 1650° or 1450°F".

A glance at a comparison in U-curve form on the opposite page clearly illustrates the background of this remark. The left-hand chart shows the depth-hardness gradients of a simple carbon steel brine-quenched from temperatures between 1425° and 1800°F. On the right, comparative curves are shown for a carbon vanadium steel of closely similar composition.

It will at once be observed that there is but little difference in skin hardness in either steel for any of the quenching temperatures. However, depth-hardness characteristics of the simple carbon steel are rapidly altered as quenching temperature is increased. By contrast, depth-hardness and core properties of the vanadium steel vary relatively little as quenching temperature is increased.

These properties are closely related to fine grain size — even the finest grain of the carbon steel developed at 1425°F only occurring in the vanadium steel at 1725°F — well above the usual heat treatment range.

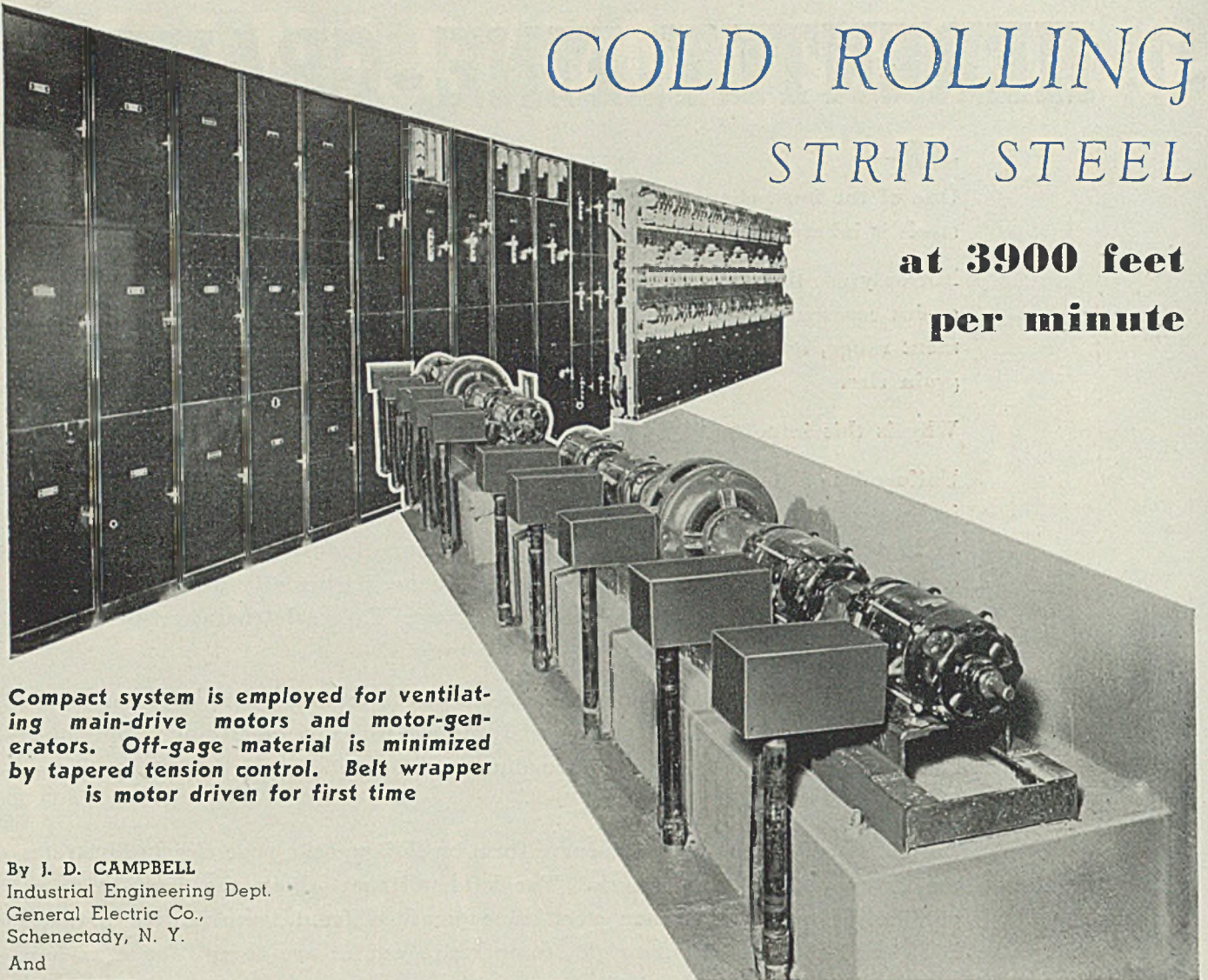
Thus, the Vanadium steel develops full surface hardness and at the same time retains a tough and ductile core of notably uniform characteristics throughout the entire range of usual heat treatment temperatures from 1450° to 1650°F.



FERRO-ALLOYS

COLD ROLLING STRIP STEEL

at 3900 feet
per minute



Compact system is employed for ventilating main-drive motors and motor-generators. Off-gage material is minimized by tapered tension control. Belt wrapper is motor driven for first time

By J. D. CAMPBELL
Industrial Engineering Dept.
General Electric Co.,
Schenectady, N. Y.

And

J. R. TAYLOR
Pittsburgh Office
General Electric Co.,
Pittsburgh

Fig. 6. (Upper view above)—In foreground are dead-front, drawout type 440-volt alternating current auxiliary control panels. In rear are direct current magnetic screwdown control panels and wedge motor panel for tension reel

Fig. 7. (Lower view above)—Amplidyne motor-generator sets. These generators are sole regulators used in the mill control

(Concluded from Last Week)

COOLING air is supplied to all motors from a semienclosed recirculating system. The motors are fitted with totally enclosing covers with air entering their coupling ends from below and being discharged downward at their commutator ends. Fig. 9 shows a section of the ventilating system, with surface coolers and blowers located on a mezzanine floor midway between the control room and the mill floor.

The system is arranged so that the air recirculated is used for auxiliary motor-generator sets in the control-room basement, as well as for main-drive motors. The fans discharge air into the control room, the air carrying with it the heat from the auxiliary motor-generator sets. From the control room, it goes up through the mill motors, through water-cooled surface coolers, and finally once more to the

ventilating fans and the basement.

The compactness and out-of-the-way features of the ventilating system are apparent. The four blowers, two per motor, are driven by two 75-horsepower induction motors. Cool, clean air for the system is drawn from the adjacent basement under the other cold mills. Each mill motor is assured its share of air supply by arrangement of low-resistance ducts, surface air coolers, and fans to proportion air according to individual motor requirements. Provision was made for installation of entry duct dampers in the event that the desired distribution was not realized.

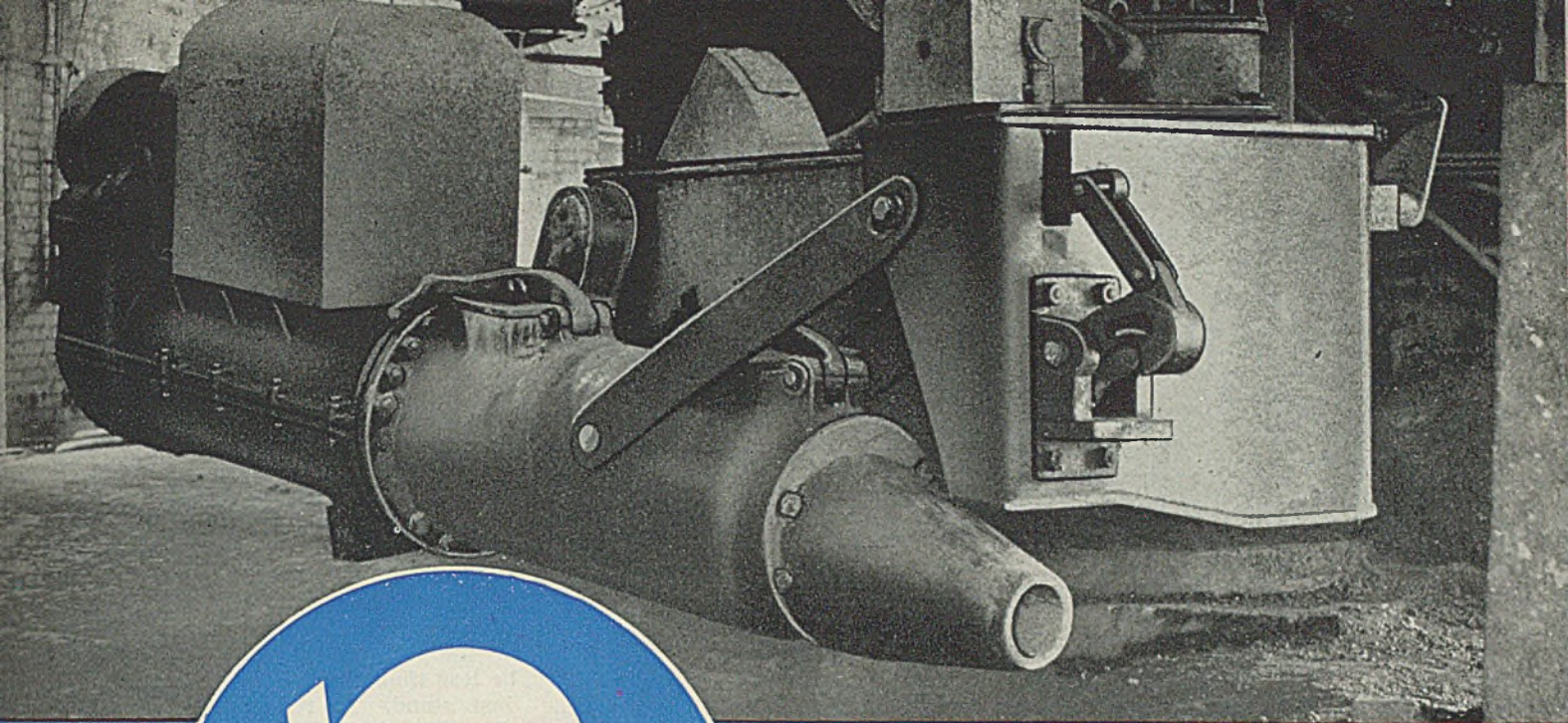
Control Features

Small devices in the control of the mill motors are inconspicuous, but they frequently provide flexibility that makes quality and quantity production possible. Anything

that makes a mill a little more flexible, makes the operator's job easier and usually will result in increased production with attendant reduction in cost.

Outstanding of these devices are instruments for operators, for maintenance men, and for industrial, starting, statistical, and design engineers. Again, there is a close parallel between aviation and operation of high-speed mills. The average pilot and the average mill operator of 10 years ago could and preferred to get along without instruments. Today, they depend upon them and insist that they be maintained accurate. Maintenance men can no longer observe complete controls from one location or analyze unsatisfactory performance without them. Engineers must have facts to progress with their work.

In addition to speed, load and gage indicating meters on the mill



BAILEY ELECTRIC PLUNGER CLAY GUN



DEFENSE HELPERS
that

Speed **IRON PRODUCTION**



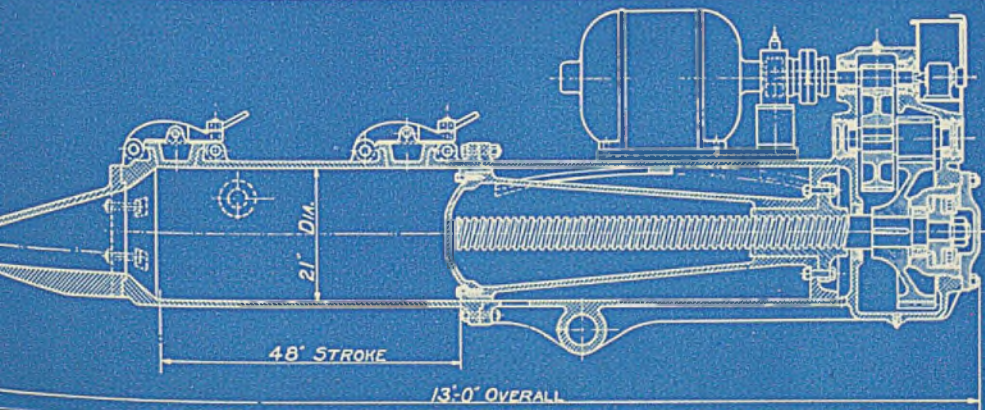
BAILEY CINDER NOTCH STOPPER

Two proved allies of iron production . . . the *Bailey Electric Plunger Clay Gun* for Tap Hole stopping and the *Bailey Cinder Notch Stopper!* Both are examples of mechanical perfection . . . both do their jobs completely and surely year after year without maintenance.

The electric plunger principle . . . which is a

power driven, screw action mud cylinder, never fails . . . forces mud into the hole at terrific pressure. Every movement of the gun is direct power driven . . . faultlessly accurate and positive.

To cut tapping time and speed blast furnace production, switch now to Bailey Clay Guns and Cinder Notch Stoppers . . . the fast, dependable method.



**WILLIAM M.
BAILEY COMPANY**
ENGINEERS
PITTSBURGH, PENNSYLVANIA

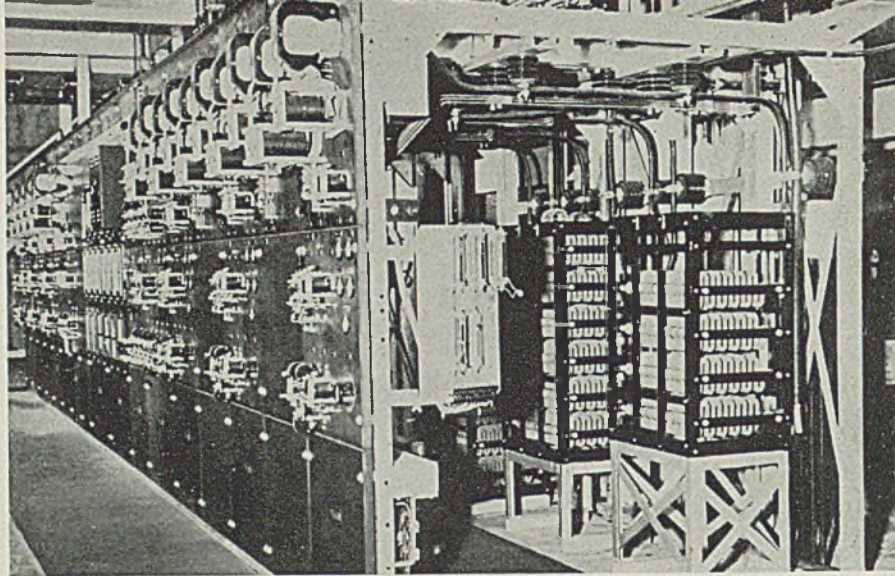
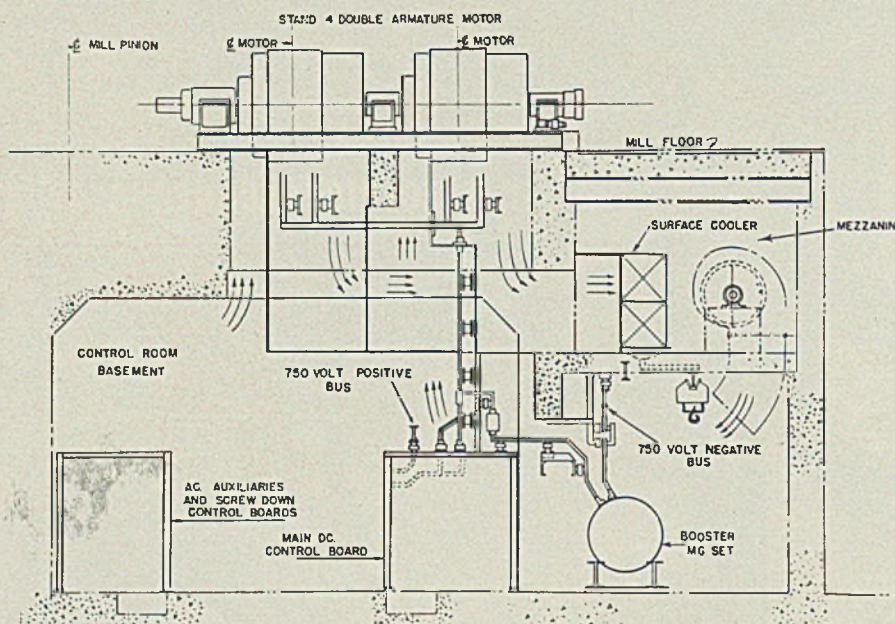


Fig. 8. (Upper view)—Main direct current control panels with recording instrument panel in front center section. Dynamic braking grid resistors are shown at rear

Fig. 9. (Lower view)—Elevation of ventilating system location of surface coolers and blowers on mezzanine floor



housing control cabinets, a complete set of recording speed, load, and tension meters are installed in the control basement. The charts from these instruments are used by all groups to observe past performance, make adjustments, analyze trouble, determine power demand and consumption, and for checking existing as well as new designs.

As in most modern cold mills, the Irvin tandem mill has a tensiometer between each stand, or a total of four. The primary purpose of these is to give the operators a meter indication of strip tensions between the stands. They aid the operators by giving them tension values at all times. The rolling mill operators therefore, can roll at tensions consistent with good quality and gage, without fear of strip breakage due to abnormally high tensions between stands.

On most tandem mills, the strip gage tends to go "heavy" (for a given screwdown setting) at low rolling speeds (threading speeds) and because of the desire for increased production by reducing the

amount of this off-gage material, the tension between stands is increased automatically at lower speeds, while at higher speeds, it is decreased. This arrangement is termed "tapered tension control". The tension is "tapered" in that the tension between stands may be gradually decreased to a fixed value as the mill is accelerated to top speed. Then as the mill is decelerated to a threading speed, the tension is gradually increased. The savings in off-gage material undoubtedly make this feature a practical operating tool.

Without the use of tapered tension control, off-gage strip is accompanied by some increase in tension between stands at threading speed. This increase in tension being undesirable in rolling some grades of steel in light gages, tapered tension control is used in the reverse sense. That is, as the mill is decelerated from top speed to threading speed, the tension between stands automatically is decreased. At low speeds, therefore, the strip tension is low. The advantage of this is

evident in rolling some grades of steel and light gages where the possibility of strip breakage can be decreased while rolling the coil ends at near threading speed.

Since all motors are operated from a common bus, their armature voltages will be the same if the difference in their respective booster-generator voltages is neglected. Therefore, for a given threading voltage on the bus, the linear speed of the rolls in the first stand will be less than that of the rolls in the last stand. To reduce the overall threading time, each mill stand may be "stuck" at approximately the same strip speed. Graduated threading speed push buttons are located on all the mill housings so that the operators may speed up or slow down the threading speed at will.

Thus, the first stand is threaded at a particular bus voltage and as the second stand is threaded, the bus voltage is lowered by momentarily pushing a "thread" slow-down button. The third, fourth, and fifth stands then are threaded at successively lower bus voltage, making the average threading speed higher than if the same low value of bus voltage were used throughout the threading period.

For the first time, the belt of the belt wrapper has been motor driven. Where formerly the belt was driven by friction with the real drum or the strip, the belt now is driven by a variable-speed, mill-type, direct-current motor. The purpose of this added feature is to enable the strip to be more quickly "caught" on the reel drum, so that there are fewer initial wraps on the reel that are off-gage, and to save on belt wear.

Operation of the belt wrapper takes place when the belt wrapper carriage is advanced toward the reel. The belt is started up as the carriage is advanced, and is driven at a speed slightly above the speed of the oncoming strip. As soon as the first few wraps are caught, the belt-wrapper carriage is withdrawn, and the belt-driving motor is stopped automatically.

Amplidyne Control System: The amplidyne generator* is widely used in the control of the mill, there being a total of nine in various circuits.

Each mill-motor booster-genera-

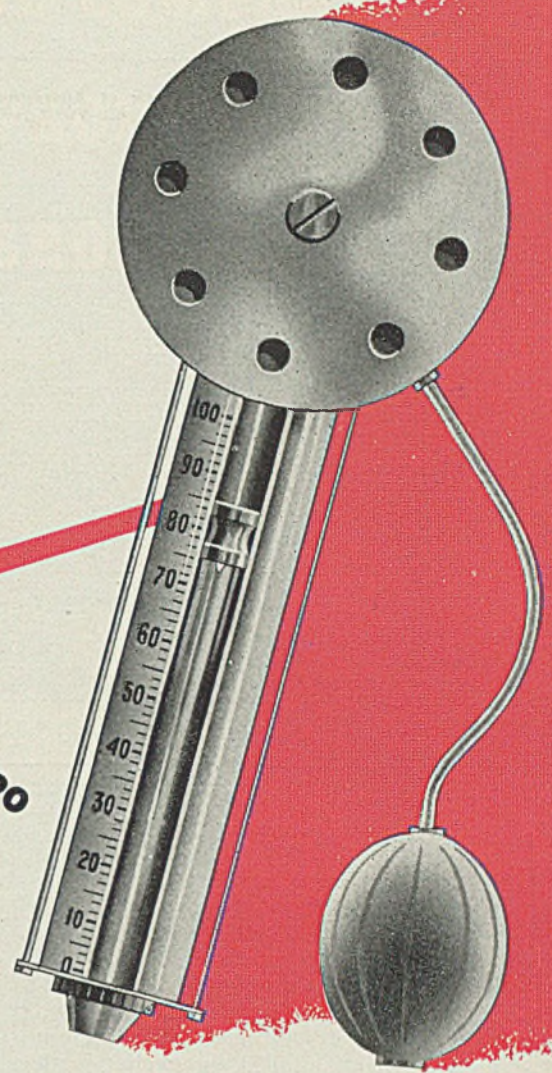
* "The Amplidyne — A New Tool of Many Uses" by F. Mohler, *Iron and Steel Engineer*, September, 1940.

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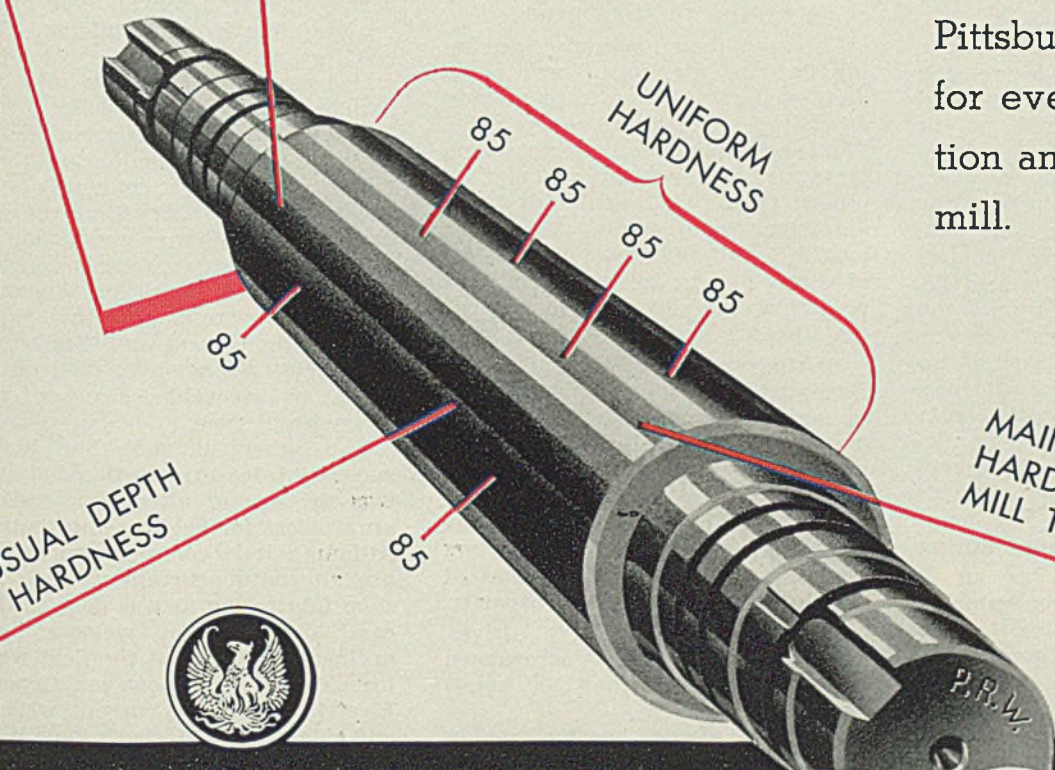
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for every rolling opera-
tion and every variety of
mill.



MAINTAINS ITS
HARDNESS AT USUAL
MILL TEMPERATURES



Pittsburgh ROLLS

Table II—Total Horsepower of Alternating and Direct-Current Auxiliary Motors
440-VOLT A-C MOTORS

Name of Motor Drive	Horsepower each	No. of motors	Total horsepower
Booster motor-generator sets	350	2	700
Exciter set No. 1	200	1	200
Exciter sets No. 1 and No. 2	30	2	60
Amplidyne sets No. 1 and No. 2	10	2	20
Motor ventilating fans	75	2	150
Fume exhaust fan	60	1	60
Oil cellar fan	40	1	40
Sump pump	15	1	15
Strip coolant pumps	200	2	400
Coolant agitator pumps	7½	2	15
Skimmer pumps	20	3	60
Motor lubrication pumps	5	2	10
Hydraulic pumps	30	1	30
Roll bearing lubrication	15	4	60
Stand lubrication	2	1	2
Foamite system	15	1	15
Roll balance pumps	40	1	40
MG set bearing lubrication	¾	4	3
Filter motors	1	6	6
Centrifuge motors	2 & 3	2	5
Electric heaters			88
MG set ventilating fans	40	2	80
Total Horsepower			2059

230-VOLT A-C MOTORS

Name of Motor Drive	Horsepower each	No. of motors	Total horsepower
Screwdowns	50	10	500
Beltwrapper belt drive (600 V.)	5	1	5
Reel wedge drive	7½	1	7½
Total Horsepower			512½

tor is controlled by an amplidyne amplifier so that the booster voltage is always proportional to the mill-motor armature current. With such a proportional relationship, the booster-generators are a means of partially or completely compensating for the armature circuit IR drop. The amplidyne generator herein acts as an amplifying exciter with a high-speed response, so that the booster voltage change is practically in phase with any change in motor-armature current, thus insuring booster-generator stability.

Two amplidyne generators are utilized in the control of the tension reel drive motor. During normal running periods, the reel motor armature current is controlled so as to maintain a practically uniform strip tension while winding the strip on the reel drum. At mill threading speeds the reel control regulates the speed of the reel before the strip is threaded onto the reel and its belt wrapper. As the strip wraps around the reel drum and is caught by the reel, the reel control automatically transfers from speed regulation to tension regulation. "Speed matching" of the reel with the strip thus means fewer initial wraps on the reel and hence less off-gage material coiled during the threading period.

Another amplidyne generator is part of the field control for the two 4000-kw, 750-volt, main generators. Its control of the generator fields is through a generator field exciter. Instead of strengthening or weakening the generator field by means of a generator field rheostat, the variable-voltage generator field exciter supplies power for the main genera-

tor fields. The amplidyne generator in turn excites the generator field exciter, so that the motor operated rheostat need carry only the relatively minute amplidyne field currents. Finally, by means of voltage-maintenance control, the amplidyne generator maintains any preset value of bus voltage independent of load. Voltage maintenance control is important where two main paralleled generators are purposely given an inherent drooping voltage characteristic in order to make them equally share the total load.

The amplidyne generators are being used as amplifiers, regulators, and exciters. In no case is any other type of regulator necessary. The control panel equipment has no vibrating contact, carbon pile, or other types of regulators. The amplidyne equipments themselves look little different from conventional direct-current exciters, and they require an equally small amount of maintenance and adjustment.

Auxiliary Motors and Control: The auxiliary motors include such motors as those for the screwdowns, the lubricating pumps, the roll coolant pumps, the ventilating fans, and the hydraulic system pumps. As one might expect, the total horsepower of these motors goes up with the increased size of generators and with motor capacity.

Direct-current auxiliary drives, consisting mainly of the screwdown motors, total more than 500 horsepower.

The mill-motor booster motor-generator sets cannot correctly be called auxiliaries, since they add to the output of the main generator. However, if we add the connected

horsepower of the booster motor-generator set driving motors to the horsepower of all other alternating-current auxiliaries, there is the surprising total of over 2000 horsepower. Certainly this is a far cry from the time when tandem mill main drives were often less in combined horsepower than that of the auxiliaries on the new mill.

Because delays are costly in a mill of this size, close attention was given to the 440-volt control panels. These were designed with dependability, safety in operation, convenience in maintenance, and minimum space as factors of prime importance. The controls for each motor are in cubicle-type units. In each cubicle is a drawout panel on which are mounted the contactors, overload relays, and other control devices. To inspect or adjust a unit, the door of that unit first is opened, which de-energizes the contactor. The unit then may be pulled out of its operating position, automatically "pulling" the 440-volt power in that panel. The unit thus may be safely worked on, or it may be completely removed and replaced.

Welding Cuts Steel Required by 20 Per Cent

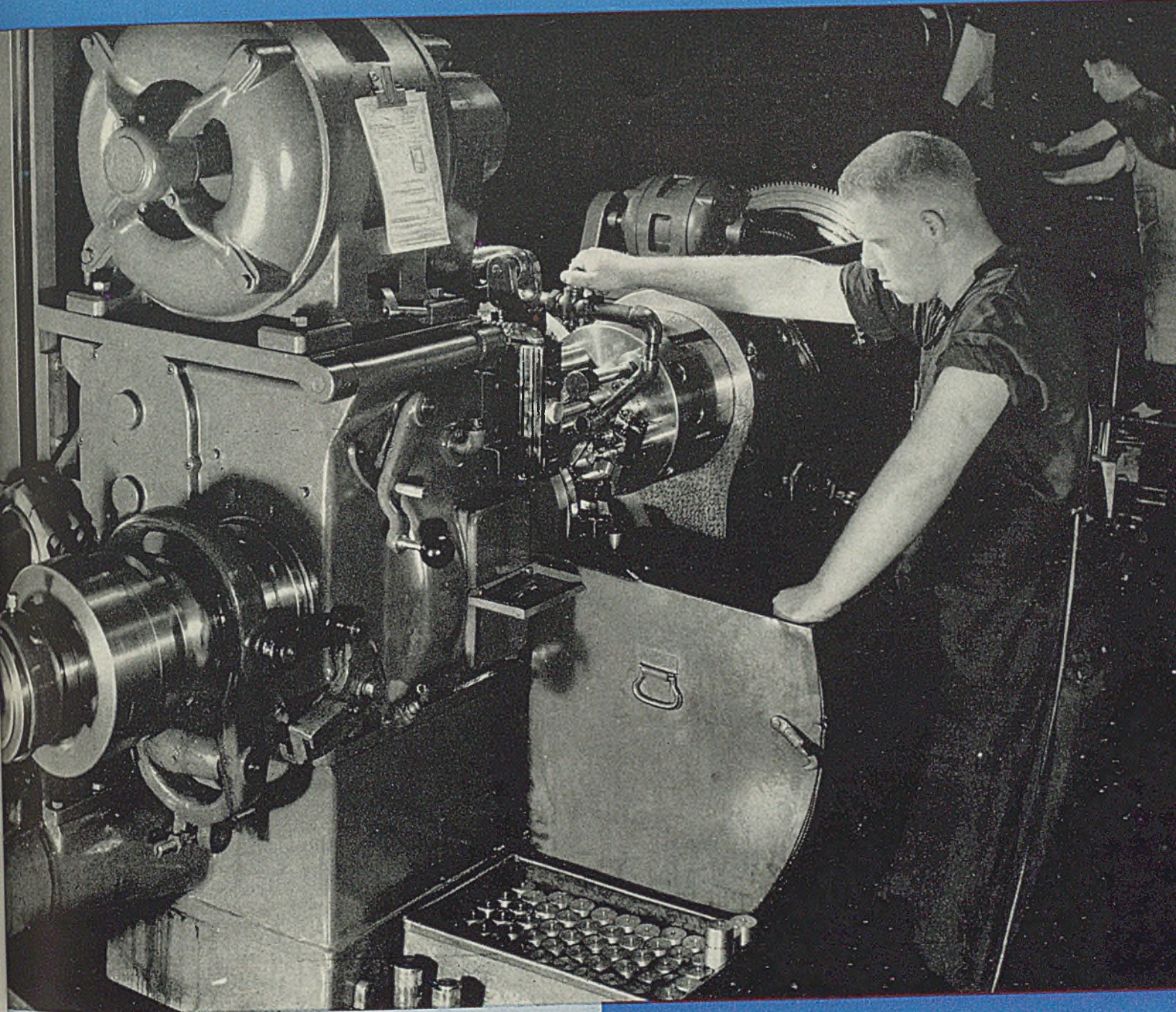
By fabricating the steel framework of a factory building and an office building by arc welding, the California Cold-Rolled Steel Corp., Los Angeles, achieved a saving of 20 per cent of the steel which would have been required had the frames been joined by a conventional method. The new factory building, 55 x 250 feet, with sides of sheet steel, will house a cold-rolling mill for handling narrow strip work.

Two innovations reported in the design and construction of these buildings are: First, instead of the usual column construction, the columns of the buildings were made up of three I-beams arranged to form an H-section. The beams forming the flanges were smaller than those forming the central web. The beams were held together over their entire length by arc-welded seams of the intermittent type.

The other unusual but highly successful feature of this building was the use of alternating-current arc welders for field assembly work. Although it is common practice to use alternating-current welding for shop fabrication as was done in this case, direct-current welders have ordinarily been used for field welding. On this job, however, General Electric alternating-current welders and shielded arc electrode type W-25 were employed with complete success. Both field and shop fabrication were done by the Steel-weld Building Corp., Los Angeles.

KINGSBURY MACHINE TOOL COMPANY

PRODUCTION
Doubles
OF PARTS ON SMALL LOTS, SHORT RUNS



● Builders of high speed machine tools themselves, Kingsbury Machine Tool Company at Keene, New Hampshire, is working at top speed to manufacture full and semi-automatic drilling and tapping machines for American industry—mostly for aircraft builders. And in speeding up production in this plant Cleveland *Single Spindle Automatics* are used for *small lots, short runs* of a variety of parts. Since installing these new 1 $\frac{3}{8}$ -inch and 3 $\frac{3}{4}$ -inch *Cleavelands* production has been doubled over previous methods of manufacture. Cleveland Model A machines are built in 1 $\frac{1}{16}$ -inch to 8-inch capacity with universal camming and variable tool feed.

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AUTOMATIC

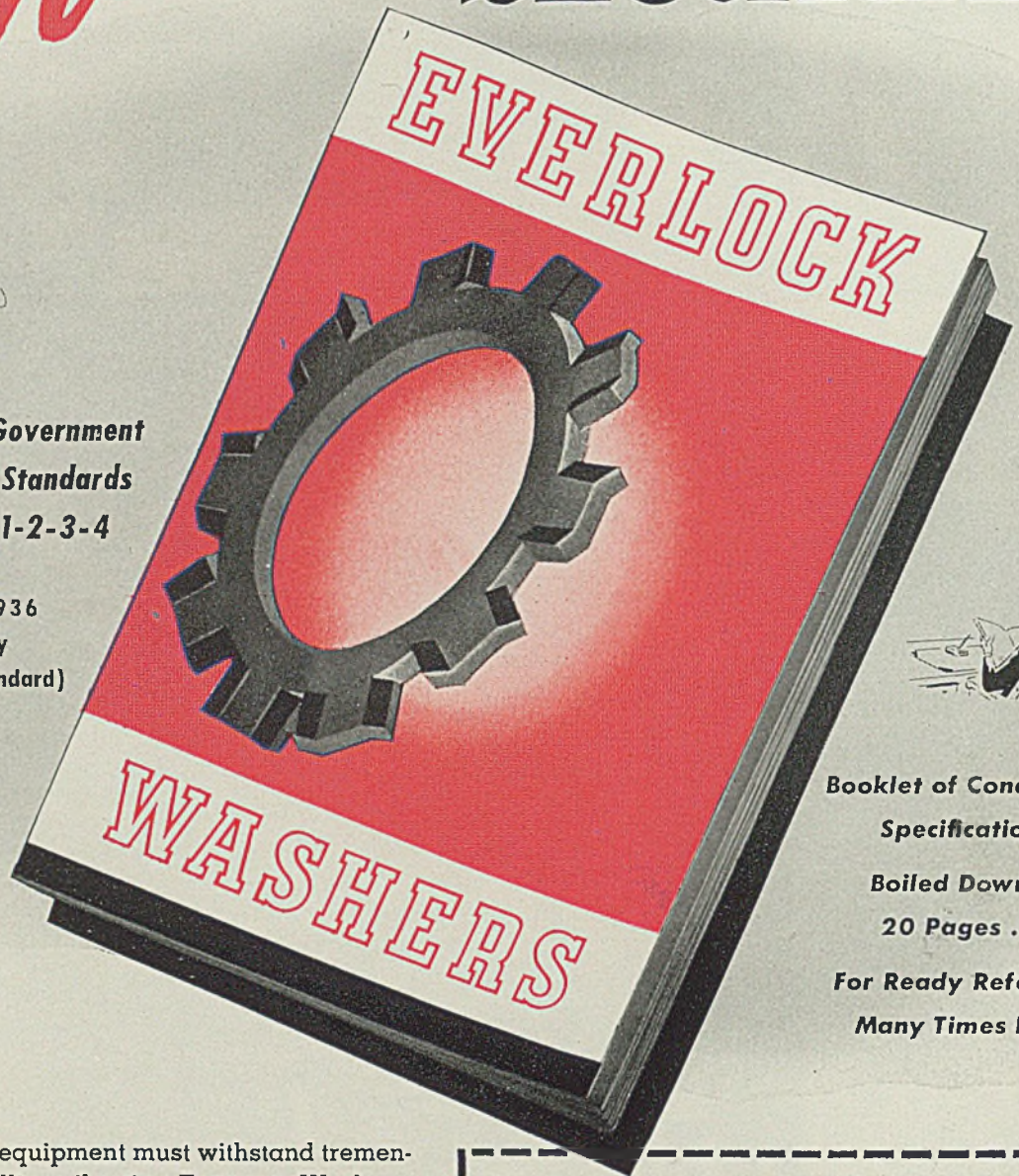
GET THIS TIME-SAVING GUIDE TO *Mechanical* SECURITY



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Booklet of Condensed
Specifications
Boiled Down to
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Carbide Tooling Usually Involves Decreased Forces on Work and Tools

By PAUL H. MILLER
Chief Engineer
Carboloy Co. Inc.

MANY A shop man hesitates to use carbide tools because he thinks that:

1. Increased rate of metal removal will increase tendency for work to slip in the chuck.

2. That it will be necessary to tighten the chuck unduly to prevent slipping—thus distorting work.

3. That increased cutting speed will cause long work to "twist up" to a dangerous degree.

4. That there will be marked tendency to distort thin wall (hollow) parts, etc., due to increased pressure of tool against work.

Such erroneous beliefs probably have arisen from the fact that increased rate of metal removal, when carbide tools are used with machine speeded up, actually involves more power requirements.

As a matter of fact, however, this increase in horsepower may be accompanied by a decrease in tool loads and torque. Simple basic engineering considerations demonstrate this to be the case.

For a given tool set-up, tool loads—that is, pressure on the tool and pressure by the tool on the work—are determined by two major factors. These are:

Cross-sectional area of chip, and nature of material being cut, expressed by this simple formula:

Total tool load (in pounds) =
(feed in inches) × (depth of cut in inches) × (a constant depending on the material) × 33000.

Value of the constant, see table

on page 104, varies from 6 to 10 for various classes of steel, and from 3 to 5 for various cast and malleable irons. For all except extremely hard bronzes and brasses, the constant is around 3 to 4. For "hard to machine" non-ferrous metals it may run as high as 10.

Irrespective of value of this constant, however, it will be noted that for all practical purposes actual "tool load" is independent of cutting speed.

To determine cutting torque, that is, the amount of "twist" or force which tends to slip the work in the chuck, it is necessary only to multiply the tool load figure by the distance of tool from center of work.

Again it will be noted that speed has nothing to do with the subject.

Why more horsepower is required with carbide tools at high cutting speeds is shown by the following simple formula:

HP = (tool load as given above)
× (cutting speed in feet per min-

(Please turn to Page 104)

Electric Resistance Brazing of Switch Parts

... offers means of accurately controlling amount of heat put into the joint

STRIPS and rings of Gilsiloy Grade-A silver-nickel contact material are brazed to heavy copper castings to make 4000-ampere disconnect switch jaws and hinges at Gibson Electric Co., 8350 Frankstown avenue, Pittsburgh, using heat developed by current from a resistance welder. Eight strips $1/64 \times \frac{1}{2} \times 3\frac{1}{2}$ inches are brazed to the jaw, and four rings $1/64$ -inch thick, 3 inches outside diameter and $2\frac{3}{4}$ inches inside diameter are brazed to the hinge. Handy & Harman Easyflo silver solder is applied as a solder flushing to the sheets of silver-nickel from which contacts are made.

All contacts on each casting have to be brazed simultaneously as the bonds of contacts first brazed might be damaged by heat of brazing subsequent contacts. The 35-pound castings are first degreased, bright dipped and fluxed with Handy & Harman Handy flux. Casting then is held between graphite electrodes of a 50-kilovolt-ampere resistance welding machine. Outer contacts are held in place by welder electrodes, while inner contacts are held between graphite blocks pressed against the contact material by means of wedging clamp as illustrated. Current passing through the assembly heats the parts to

the proper brazing temperature.

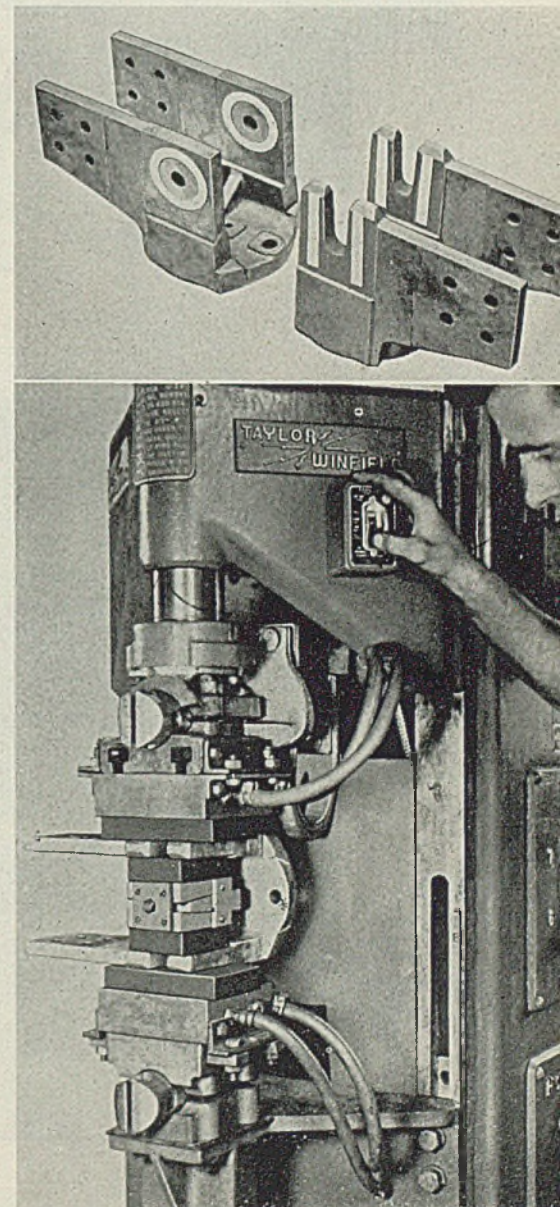
Most of the heat is generated in the outer electrodes since little current passes through the inner clamping device because it is bypassed by the base of the copper casting itself. Therefore the casting is brought up to heat slowly so inner contacts will be brazed before outer contacts tend to melt. Current of 20,000 amperes is applied 5 to 7 minutes for each assembly.

Two silver-nickel strips and one ring are also brazed to each blade of the switches on which the jaws and hinges are used. In this case, one end at a time can be heated so the two strips are first brazed to one end of the blade, and then the ring is brazed to the other end in a separate operation.

The electric brazing method is also applicable for attaching contacts to smaller parts such as contact fingers, springs, screws, studs, stampings and extruded sections.

Upper view, right, eight strips and four contact rings of nickel-silver alloy are brazed upon heavy copper castings which form these switch parts

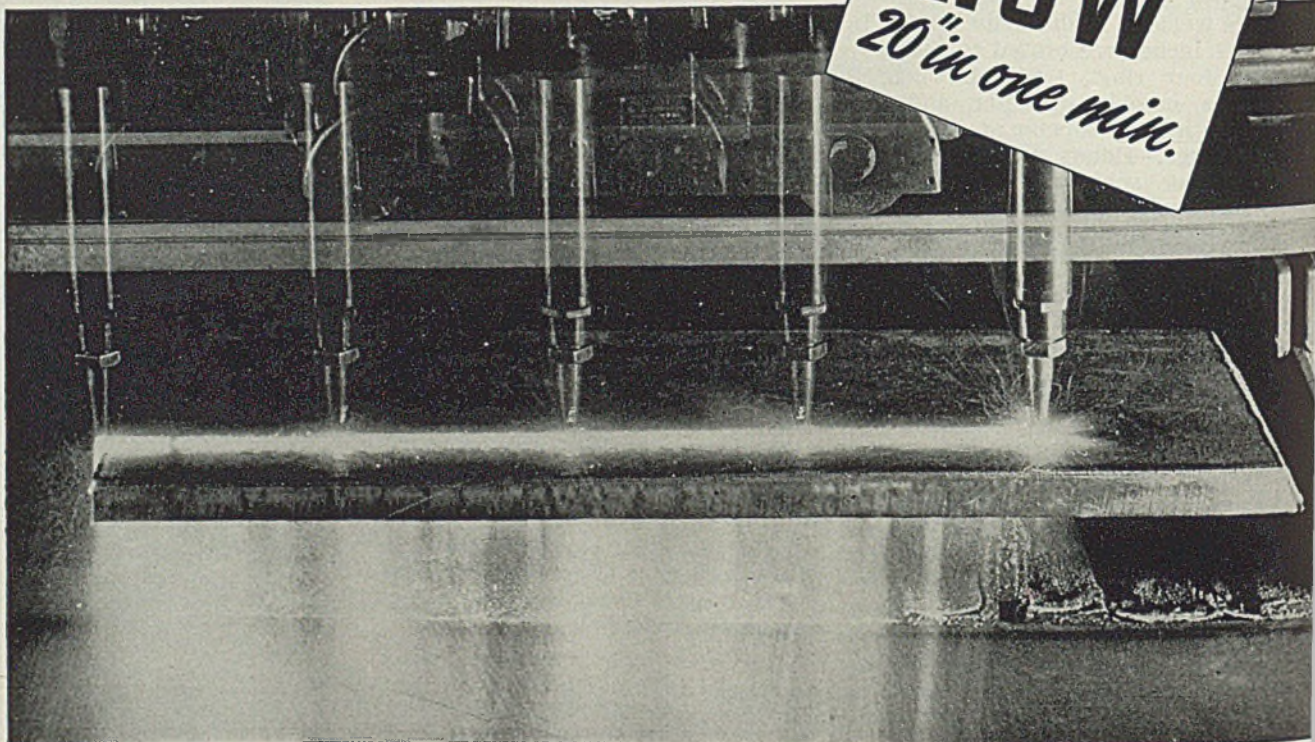
Lower view, right, this is the setup employed for brazing the switch parts by heat generated by passage of current from a resistance welding machine



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Airco "45" High Speed Machine Cutting Tips are at present available in sizes to cut metal thicknesses up to 8 inches. To obtain full value they should be used on oxygen pressures of 85 psi or higher. By substituting a High Speed Tip for the conventional tip in your machine cutting torch you save precious production hours.

*Method Patent No. 1985080



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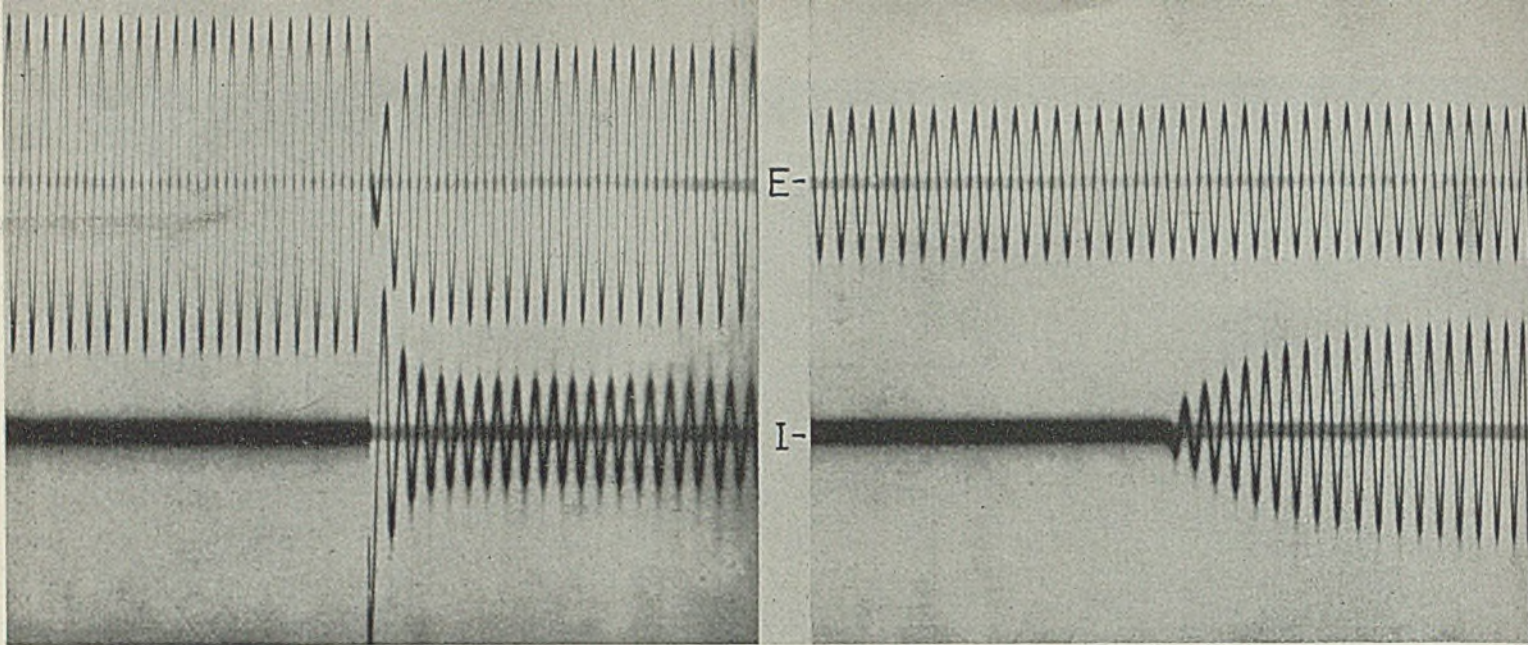


Fig. 1 (Left, above)—Top is voltage wave and bottom current wave showing transient inrush current and voltage dip caused when a parallel inductance and capacitor are connected to a line.
 Fig. 2 (Right)—Similar set of curves showing absence of inrush current and voltage dip when series capacitor and inductance are connected to the line

HOW SERIES CAPACITORS

Are Used To Reduce

PEAK DEMANDS

Of Resistance Welding Machines

WELDING equipment, like other electric devices employing a magnetic circuit, usually has low power factor and consequently draws a considerable amount of magnetizing current from the line in addition to the power or work current. The power factor of resistance welders is usually about 50 per cent or less due to the large proportion of reactive (magnetizing) current. Where a plant load consists of a number of welders and induction motors, the overall power factor may often be no better than 60 or 65 per cent. This means that the power lines and transformers are burdened with so much wattless current as to limit seriously the amount of real power that can be supplied.

The effect of this wattless current (current that does no work) is to lower the power factor or to increase the kilowatt-ampere demand, either of which means higher power rates and increased cost of plant power lines, switchboards and distribution systems.

Capacitors also draw wattless current, but capacitor current is leading with respect to voltage while magnetizing current is lagging. Thus it is possible to balance mag-

By R. E. MARBURY

Switchgear Engineer
 Westinghouse Electric & Mfg. Co.
 East Pittsburgh, Pa.

netizing loads with capacitor loads so they cancel and the power factor becomes unity (100 per cent).

Arc welders and certain types of resistance welders run long periods of time and therefore directly affect the kilovolt-ampere demand as indicated by the usual 15-minute kilovolt-ampere demand meters. Shunt or parallel capacitors can therefore be applied directly to such loads to reduce the kilovolt-amperes drawn from the line, the same as is commonly done in the case of induction motor loads. The capacitors may be floated on the feeders to compensate for the average load conditions, or they may be placed in parallel with individual welders and the welder and capacitor switches on and off together. The choice depends largely on the load diversity factor.

Although a shunt capacitor balances the reactive kilovolt-amperes under steady state conditions it does not reduce the initial inrush. A low power factor device like a resistance

welder draws a large momentary kilovolt-ampere demand when the circuit is closed. A shunt capacitor will not help this condition which prevails during the first few cycles of the 60-cycle wave. A shunt capacitor will therefore not reduce instantaneous kilovolt-ampere demand.

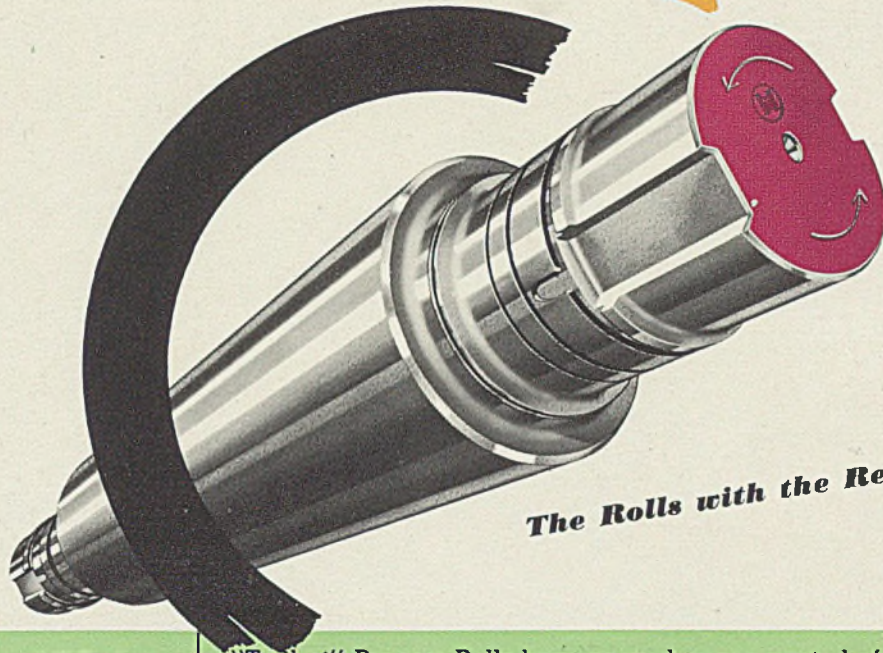
Fig. 1 shows the voltage and current transient of the type that occurs when a highly inductive load shunted with a capacitor is connected to the circuit. Note the severe dip in the supply voltage which corresponds to the high inrush current in the lower oscillogram. Since resistance welders are connected and disconnected frequently in the normal course of operation, these transients are occurring constantly. These dips in voltage are reflected back into the power circuit which is also supplying lighting load, resulting in lamp flicker. The condition is even more serious because resistance welders are single-phase devices since the result is to unbalance the phase loading seriously. The only remedy for this condition is to use large power supply circuits, introduce motor-generator sets between the welder and power source or *cancel the reactive kilo-*

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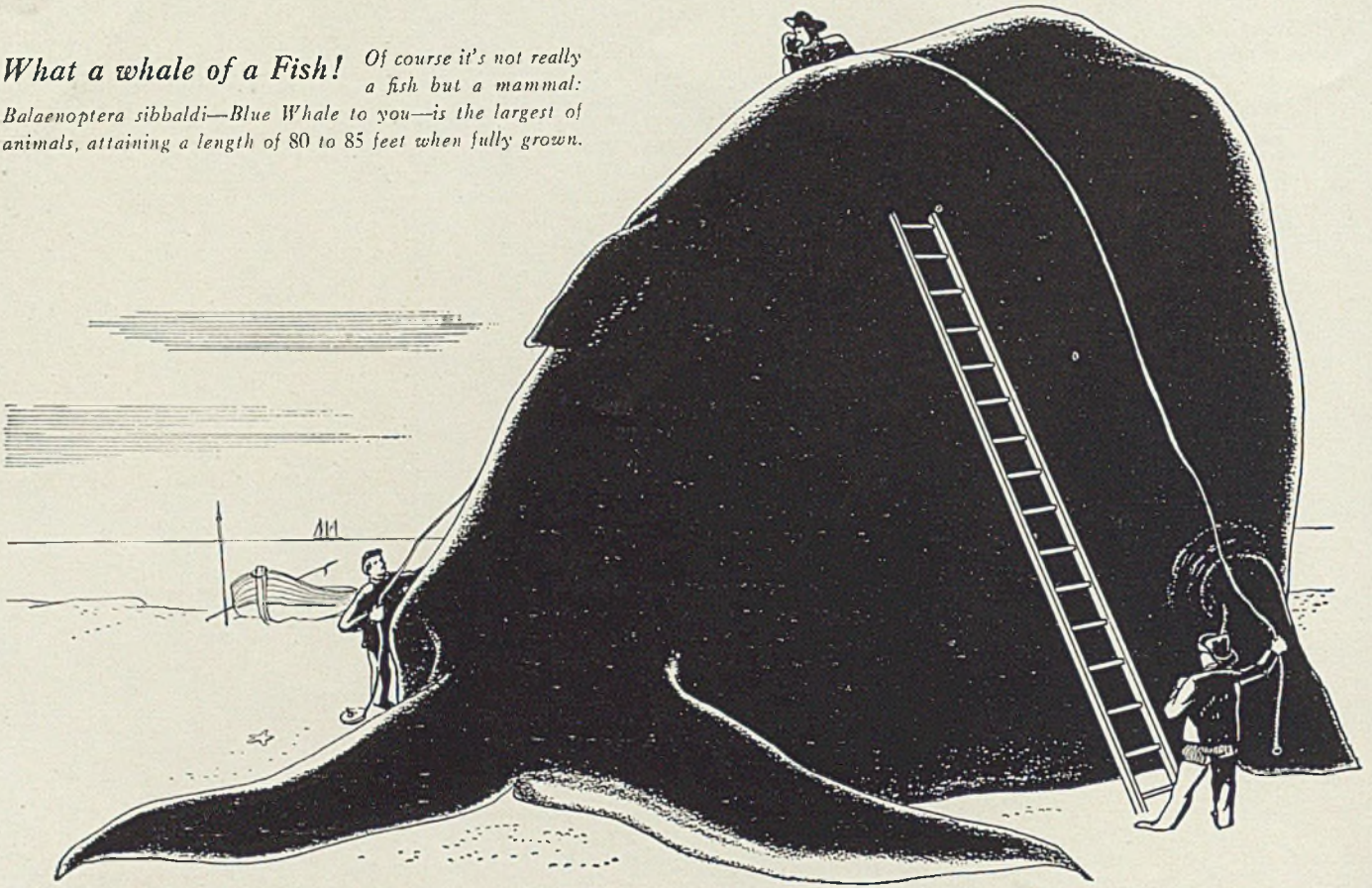
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volt-ampere inrush by means of a series capacitor.

A series capacitor is connected in series with the load rather than in parallel with it. Except for method of rating, series capacitors are the same in construction as shunt capacitors. The rating of a shunt capacitor depends on the line voltage and load reactive kilovolt-amperes. The rating of a series capacitor is determined by the load reactive ohms and reactive kilovolt-amperes and is relatively independent of the supply voltage.

Fig. 2 shows the same load as Fig. 1 and the same electrical size capacitor when the two are placed in series and thrown on the line. Note that the line current builds up gradually to final steady state value, producing no dip in the supply voltage. The slow buildup is exaggerated here for the sake of illustration. In an actual welder, the current builds up fast, but high transients are absent. If the welder is energized at a certain correct point on the voltage wave, and the capacitor is already charged by terminating the previous weld at the right point in the wave, the full steady state welding current is established at once, and practically ideal operation is obtained. Such a welding control is usually referred to as a synchronous setup or control.

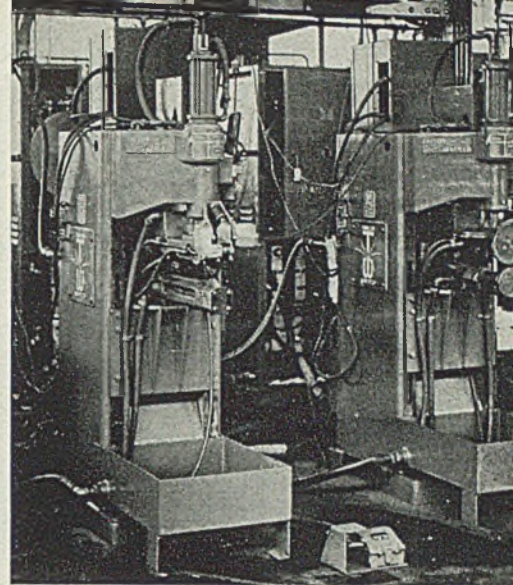
Application Not Easy

While a series capacitor may be installed on a circuit supplying a group of welders, it is usually not practical. Therefore the series capacitor is usually fitted to each welder and the combination operated as a unit.

Applying a series capacitor to a welder is quite different from applying a shunt capacitor. In the case of the shunt capacitor, only the load, power factor and supply voltage need be known. To apply a series capacitor, one must know the reactance of the welding machine and its power factor under the different conditions of operation, as for example during welding and when electrodes are shorted.

In addition it must be understood that after the welder reactance is compensated with the capacitor, the voltage necessary to operate the combination is less. Thus if a 460-volt welder is equipped with a series capacitor and no change is made in the welder, the combination may have to be operated on 230 volts. In other words, the current remains the same but the voltage necessary is lower because the impedance of the welder is offset by the capacitor. The voltage necessary is determined now by the real power required and not by the

Fig. 3—Two seam welders equipped with series capacitor units. Welders built by Taylor Winfield Corp. located at Warren, O.



power plus reactive kilovolt-amperes.

If one wishes to operate the welder and series capacitor on the same voltage as before, the welder must be rewound. The application of the series capacitor therefore involves changes in supply voltage or re-winding the welders, or use of auto transformers.

Since most welders are controlled by electronic switches and since these switches are actuated by grid control or the equivalent, the application of series capacitor must be closely co-ordinated with the control equipment and provisions made for the necessary modifications in control so that proper welding can be assured after the installation of the capacitor. The control must be insulated to stand the voltage stress which is now greater due to the reactance voltage and capacitor voltage.

The principle of operation of the series capacitor can best be understood by presenting a few calculations based upon a typical case. Assuming the following requirements, the rating of the capacitor can be readily calculated in terms of ohms and current: Welding demand, 350 kilovolt-amperes, power factor of 50 per cent; short circuited electrodes, 870 kilovolt-amperes, power factor of 25 per cent; line voltage, 440 volts, 60 cycles; power during welding then is 350×50 per cent power factor or 175 kilowatts.

The current after capacitor is installed and power factor is unity will be the current drawn by a 175-kilowatt load on 440-volt circuit which is $175 \times 1000/440$ or 398 amperes.

After correction, the current is limited only by the resistance of the welder, which is $440/398$ or 1.1 ohms.

In this calculation, the resistance of the capacitor (or its losses) is ignored because they are so small as to be negligible.

Since the welder is still drawing 350 kilovolt-amperes after the capacitor is in and the current flowing is 398 amperes, the voltage across the welder is $350 \times 1000/398$ or 880 volts on welder terminals. The welder in this case should be wound for 880 volts and its impedance should be Z equals E/I or $880/398$ or 2.21 ohms. But welder resistance

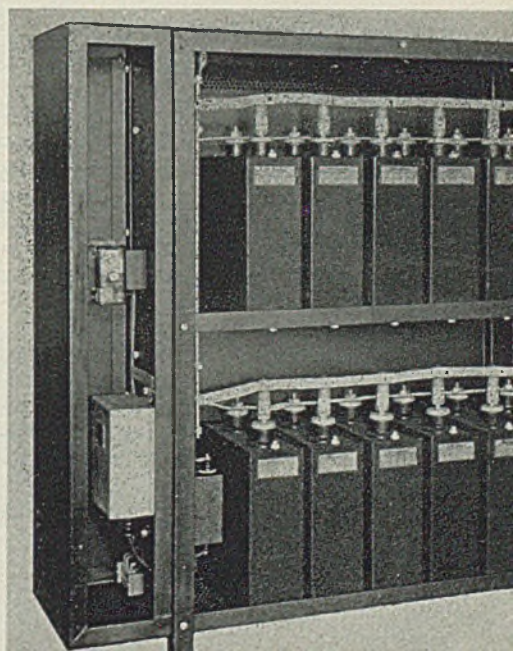
Fig. 4—Series capacitor equipped with over-voltage relay protection. Unit is equivalent in size to a 180-kilovolt-ampere shunt capacitor

was found to be 1.1 ohms so the inductive reactance of the welder then would be the square root of 2.21 squared minus 1.1 squared, which is 1.915 ohms. Since the capacitor should cancel the reactance of the welder, the capacitor should have a reactance of 1.91 ohms.

Thus the capacitor must have an impedance of 1.91 ohms at 60 cycles and must be capable of handling a welding current of 398 amperes. Also welder transformer must be rewound for 880 volts.

The voltage across the capacitor during welding will be 398 amperes multiplied by 1.91 ohms or 760 volts. It is not necessary, however, to use a capacitor with a continuous voltage rating of 760 volts because of the momentary duty. Welders are usually operated on a duty cycle less than 44 per cent and the welding current seldom flows more than a few seconds at a time. In most cases, therefore, the capacitor may work during use or while welding at 150 per cent of its continuous rating. On this basis, 760 is divided by 1.5, which shows a continuous rating of 507 volts to be ample.

Thus a 507-volt 60-cycle capacitor



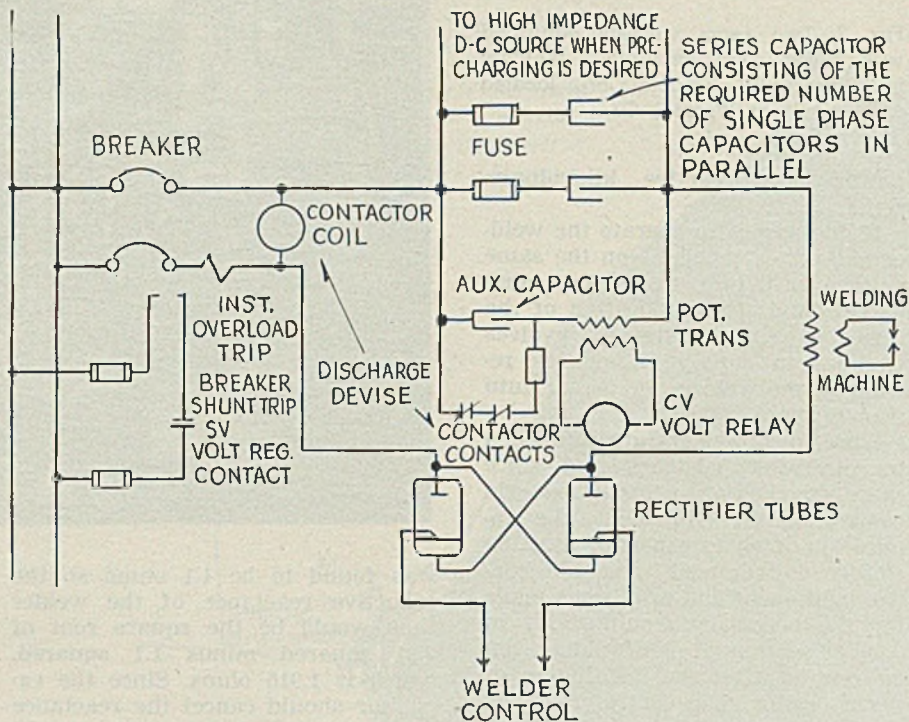


Fig. 5—Wiring diagram for a series capacitor type spot welder application with provision for automatic discharge and over-voltage relay protection

with a reactance of 1.91 ohms is required. To convert this into a kilovolt-ampere rating, multiply the current corresponding to 507 volts by 507.

Thus if 398 amperes corresponds to 760 volts, the current at 507 volts will be 266 amperes and the kilovolt-ampere capacity becomes 266×507 or 135 kilovolt-amperes.

Thus the capacitor for a momentary current of 398 and voltage of 760 is the same size as one with a continuous rating of 507 volts, 266 amperes, 135 kilovolt-amperes [also, a shunt capacitor of 135 kilovolt-ampere rating]. The capacitor unit would differ from standard shunt capacitor units only due to the special rating of 507 volts and the fact that they must not contain internal discharge resistors—otherwise the capacitor would lose part of its charge between one weld and the next.

Must Note Drop

The above calculations are primarily to illustrate the relative values and the method of approach to the problem. In actual applications, the drop in the ignitron tubes must be taken into account, and also the voltage developed across the capacitor when the electrodes are shorted. The latter is necessary to determine the type of over-voltage protection needed, if any.

Fig. 3 shows two seam welders which were designed for use with series capacitors. The working conditions were as follows: Kilovolt-amperes during weld, 90 (power factor of 60 per cent); kilovolt-amperes with electrodes shorted, 125

(power factor of 30 per cent); duty cycle, 50 per cent; supply voltage, 440 at 60 cycles; current during weld, 127 amperes; current with electrodes shorted, 311 amperes; voltage across capacitor during weld, 566 volts; voltage across capacitor when electrodes were shorted, 1385.

Each of these welders required 11 capacitor units rated at 850 volts. The normal continuous rating of 850 volts was necessary because of the high voltage (1385) existing when the electrodes were shorted. Since the voltage is permitted to go to 165 per cent during this condition, $1385/1.65$ is 850 volts. This condition of shorted electrodes determines the rating of the capacitor rather than the voltage during welding in a case of this kind.

Fig. 4 shows a detail view of the capacitor assembly when provided with a voltage relay to prevent operation at voltages beyond nameplate rating, as for example with electrodes shorted. The circuit for an arrangement as illustrated in Fig. 4 is shown in the diagram, Fig. 5.

The purpose of the auxiliary capacitor in Fig. 5 is to prevent the potential transformer from discharging the series capacitor between welds. The potential transformer serves the purpose of a discharge device by closing contactors shown when supply breaker is opened.

Acquires Patent Rights On Refrigerating Units

Acquisition of all patent, manufacturing and sales rights to the recently developed refrigerating unit for welding machines originally introduced by Progressive Welder Co. is announced by the Weltronic Corp., East Outer drive, Detroit. According to the announcement, the unit will be manufactured under the trade name Frostrode by the company's newly created Frostrode Division.

Sales will be handled by manufacturers of welding equipment and York Ice Machinery Co., with installations being supervised by the organization making the sale. All servicing, however, will be handled by the nearest York representatives.

Offered in five standard sizes, these units reduce electrode temperatures to a point where the electrode will be covered with frost continuously in spite of the high heat, thereby decreasing interruptions for point dressing and increasing the life of the electrode point.

Motion Pictures Aid In Speeding War Work

The part motion pictures can play in stepping up war production was pointed out recently in an article by Lt. Col. Roy L. Bowlin, "Shell Production—Motion Pictures as an Aid to Quantity Manufacturing," which appears in the current January-February issue of *Army Ordnance*.

The author details clearly how General Signal Co. combined sound-and-color motion pictures with words in assembling the production analysis required on an educational order.

He points out that films may enable other manufacturers to save weeks, possibly even months, in determining whether they have available machines and other facilities to handle similar orders. He states that manufacturers can learn from the picture the required floor space, methods of handling, scrap disposal, and the economical sequence of operation and machining methods.

Operating time for every operation as actually checked in the educational line-up of machines is given in the General Railway Signal picture.

Figures such as these, according to the article, are valuable guides in designing a production layout. Lieutenant Colonel Bowlin states that "the picture represents a valuable service and short cut not previously applied to ordnance manufacture" in this country.

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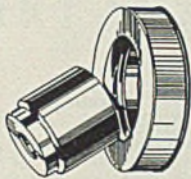
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Chromium plated tools often outwear others many times over. In drawing seamless nickel tubing, for example, one manufacturer finds plated dies average 10 times longer life than unplated dies—plated mandrels give up to 20 times the service.

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Another concern cites the saving in tool steel—plus 90 per cent of the time required for new drawing tools—simply by replating tools when worn—to obtain another long span of service.

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Industrial Equipment

Electric Tractor

Mercury Mfg. Co., 4140 South Halsted street, Chicago, announces a new electric tractor for use in tunnel operation or under low overhead obstructions. It is a modification of the "Tug" tractor in which

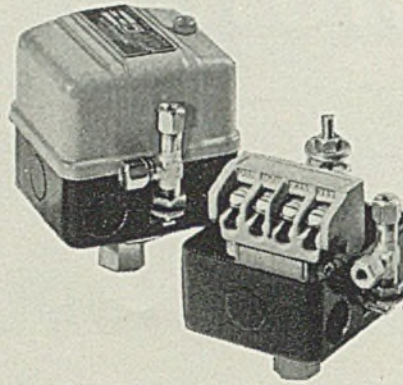


the seat, floor, brake pedal and steering and traveling controls have been lowered, and a protective metal canopy provided. The truck has a high overload capacity. It is equipped with ball bearings and embodies brakes of the internal expanding type. It also is provided with semi-elliptic springs — both front and rear.

Pressure Switch

Square D Co., Regulator Division, 6060 Rivard street, Detroit, has placed on the market a class 9213 pressure switch for use with intermediate size air compressor motors. Its terminal block is of porcelain and the terminal screws are plainly marked for quick wiring. Inspection of contacts can be made without removing screws. Actuating diaphragm of the switch is a high-grade fabric, impregnated with rubber. Slip-on cover is gray enamel, the lower portion of the case is black enamel while the interior parts are cadmium plated to prevent corrosion. Range and differential can be changed easily to meet varying conditions in the field. Switches are available in two types—A, the standard type without a valve and A3,

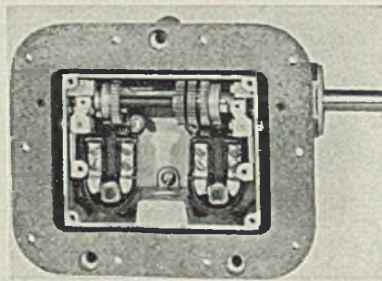
illustrated, which comes with a pressure release valve. The valve may be positioned on the switch for con-



venience of tubing attachments and may be manually unloaded without opening the switch contacts.

Limit Switches

General Electric Co., Schenectady, N. Y., announces two new forms to its line of CR9441-C2 rotating-type limit switches—one form is for Class 1 Group D hazardous gas locations and the other is for applications requiring a water-tight switch. Both are housed in heavy, flanged, cast-iron enclosures. Mechanism of each switch is adjusted to operate the contacts between a minimum of one-half turn of the driving shaft and a maximum of 120 turns. Indefinite overtravel will not harm the mechanism. Double-break fine-silver contacts that clean themselves by opening and closing with a rocking motion are incorporated. One

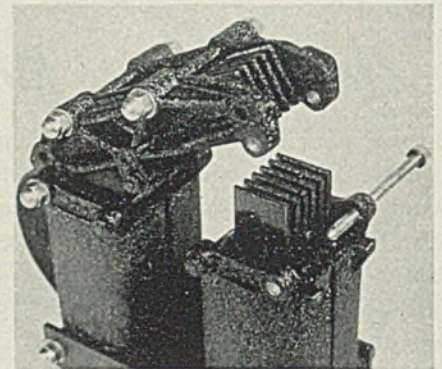


double-break contact is located at each end of the travel, and can be made normally closed or normally opened without additional parts. A large (3/4-inch) conduit entrance and roomy box allow rapid and easy wiring.

Current Transformer

R. B. Annis Co., 1101 North Delaware street, Indianapolis, announces a new split core current transformer for testing power circuits. It eliminates necessity of opening the circuit in question, whether it is carrying a load or not, making the test quickly as it is only necessary to

connect the instrument to the transformer's secondary terminals and close its separable core around the circuit's cable or buss to effect a reading. An important feature of the development is that its accuracy is practically independent of the tightness of closing the magnetic core. In fact, it is said, the separable core may be left open as much as 1/4-inch from "closed" position, without appreciably affecting instrument readings. The transformer also is capable of operating instruments drawing heavy volt ampere loads such as recording ammeters and wattmeters. It is compensated for a 10-volt ampere instrument burden. Due to its inherent ratio stability, other instrument burdens may be used with a slight reduction in accuracy. Secondary windings and inter-connecting leads of the new unit are well insulated and completely protected from mechanical injury. Windings are tested at 2500



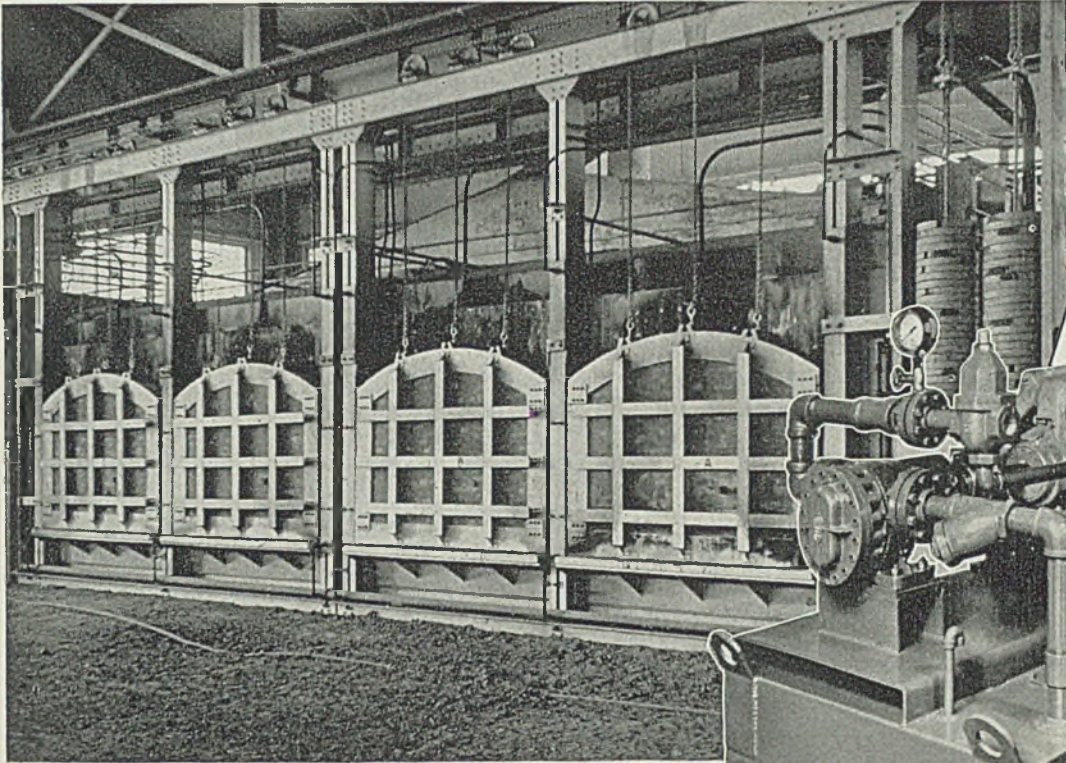
volts to ground for one minute. The transformer may be used on circuits of any voltage providing the conductor is properly insulated before placing the unit in position. Dimensions of the opening through the transformer case are full 19/16 x 3 1/2 inches, large enough to accommodate two 1,000,000 circular mill rubber or lead covered cables, or a 3-inch buss structure. Rigid, interleaved core construction is responsible for the transformer's accuracy and long life, it is said. Hinged, magnetic yoke embodied is equipped with a lock pin, allowing the transformer to be sealed "closed" during test. The unit weighs only 12 pounds and is easily carried by the strap leather handle attached to the protective aluminum case.

Die Cushion

Dayton Rogers Mfg. Co., 2830 Thirteenth avenue, South, Minneapolis, announces a new model DE pneumatic die cushion for drawing and forming operations. It is a complete self-contained unit that maintains automatically a predetermined cushioning pressure on either the draw ring or pressure pad at all times. Pressure pad control is made

ROPER Rotary PUMPS

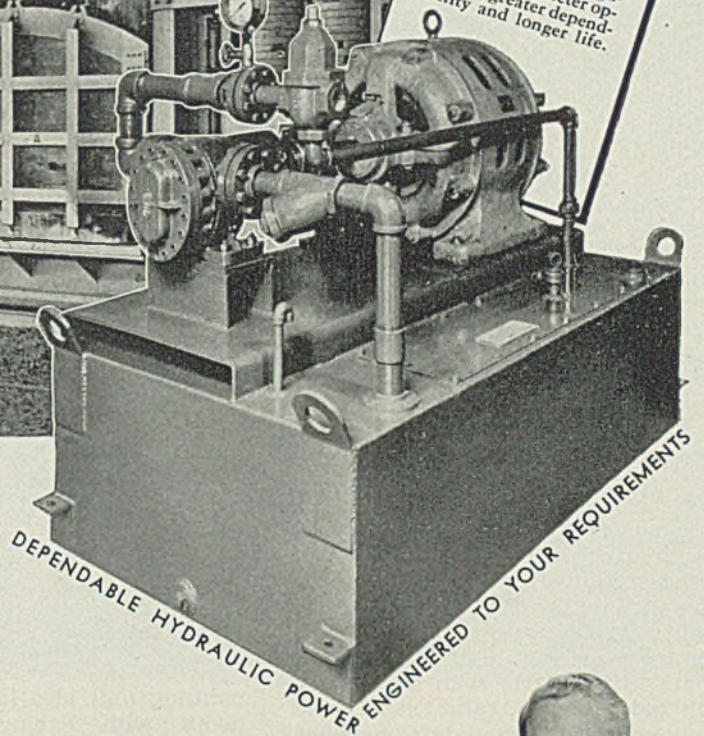
DEPENDABLE SINCE 1857



Actual Photograph of Furnace Doors Hydraulically Operated by Roper Pumps. Installed Two Years Ago.

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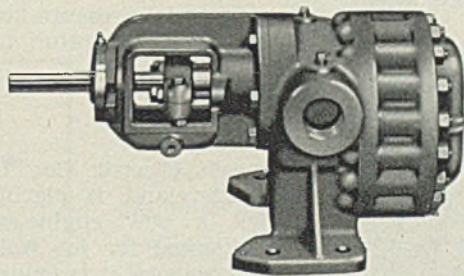


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Roper Rotary Pumps, backed by 85 years of engineering and building experience, are simple in design (only two moving parts), easy to install, easy to service and they produce the very maximum in mechanical and volumetric efficiency. Their maintenance and replacement costs are extremely low.

From the hundreds of different standard Roper models available you can select practically a custom-built pump to handle your particular job. There are eight series of pumps with capacities



ranging from one to 1000 gallons per minute, pressures up to 1000 pounds per square inch, speeds up to 1800 r.p.m., 21 drives and mountings and 8 piping arrangements.

WRITE FOR CATALOG 948 with illustrations, cut-away views, drawings, dimension and pumping capacity tables and complete information on Roper Pumps.



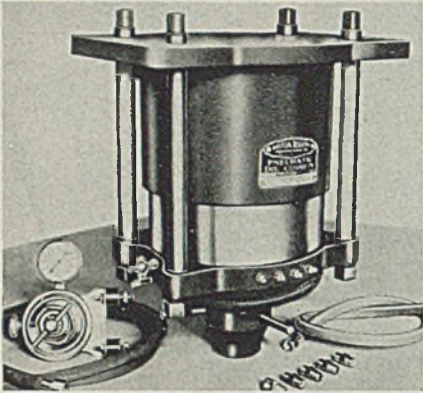
FOR STEEL MEN ONLY

Since 1927 most steel mills have been equipped with Roper Rotary Pumps for use on giant gear drives; stand, rack and manipulator bearings; reversing tables; table rollers; moving parts of screw down mechanisms . . . all of which demand the safest form of constant lubrication under pressure without risk of shut down.

Roper Rotary Pumps have earned the preference of steel mill engineers because space-saving direct drives eliminate belts and pulleys and because of better all-around performance.

**GEO. D. ROPER CORP., ROCKFORD, ILLINOIS
PITTSBURGH OFFICE — 207-209 BLVD. OF THE ALLIES**

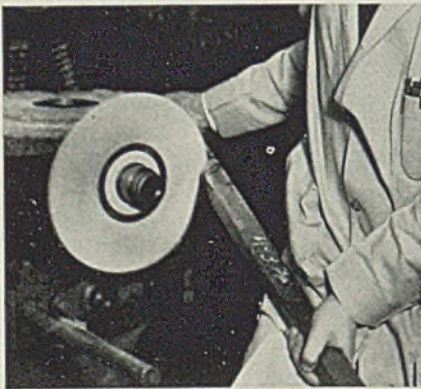
possible by a combination regulator and gage. A record of the pressure is kept by means of the pressure gage and on future setups this pressure is quickly duplicated. Each cushion is available with a special pin pressure pad to take advantage



of the entire pin area in connection with the maximum press bed opening. The die cushion can be mounted to the bolster plate by drilling and tapping four holes for mounting studs. Cushion units are lubricated from the front of the cushion cylinder. Die cushions are being offered in sizes from 6 to 20 inches, having a maximum drawing capacity of 10 inches, and ring holding pressures up to and including 15 tons.

Burr Removing Brush

Osborn Mfg. Co., 5401 Hamilton avenue, Cleveland, has placed on the market a new type Tampico fiber industrial brush for removing burrs, to polish or form metal parts, or to finish welded seams. With proper abrasives, it is said to remove tool marks from parts such as connecting rods, tappets, cams, etc. It will remove burrs without damage, when

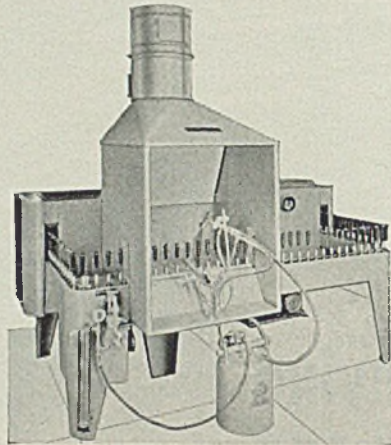


used without abrasives, from metals such as aluminum and Alclad. The discovery that the material used in the treatment of the brush spaces the fibers to a definite relationship, one with the other, and eliminates the tendency of the fibers to group or "knife" at high speeds, lead to the introduction of this development, it is said. The treatment also is responsible for the retention of

abrasive compounds to a greater degree, preventing it from fluttering off the brush. Brushes are being offered in diameters of 4, 6, 8, 10, 12, 14, 15 and 16 inches.

Airpainting Unit

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago, has placed on the market a new type unit for airpainting shell. It paints the exteriors of these cylindrical units at the rate of 1800 pieces per hour. In operation, the work is loaded manually and conveyed to the spraying station on removable holding and shielding fixtures. Special "off" and "on" control operates the automatic airbrushes as the work comes in position. While being sprayed, work is revolved rapidly to insure complete coverage. After receiving a coat of lacquer the work is conveyed through an electrically heated, thermostatically controlled oven for a 3-minute drying period. The

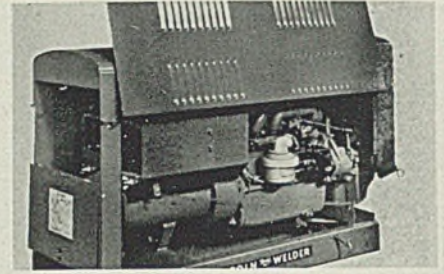


painting unit also includes a spray booth with exhaust, Clamptight cover material pressure tank, water, oil and dirt separator to provide clean dry air.

Arc Welder

Lincoln Electric Co., 12818 Coit road, Cleveland, is placing on the market a new engine-driven arc welder suited for job welding. Of 200-ampere size, it is engineered for profitable welding applications of all types and sizes. It can be used for welding light gage metal, for repairing cast iron parts, machine parts and structures of many kinds. The unit's self-indicating voltage control and current control make it easy for the operator to select any type of arc and any arc intensity to suit the job. The welder will generate its rated current of 200 amperes at 1400 revolutions per minute. Engine speeds above that are only necessary for currents in excess of 200 amperes. The generator is single-operator variable-voltage type with laminated pole pieces.

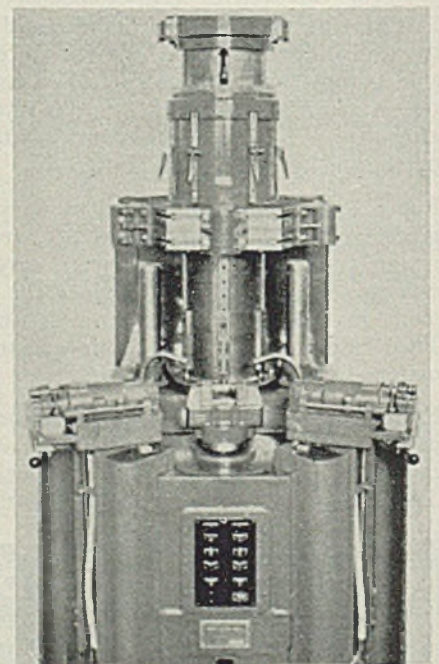
Class B insulation, used in the armature of this welder, contains no inflammable materials. The coils wound with glass-covered wire, are held in mica-lined slots, separated by mica dividers. Leads are con-

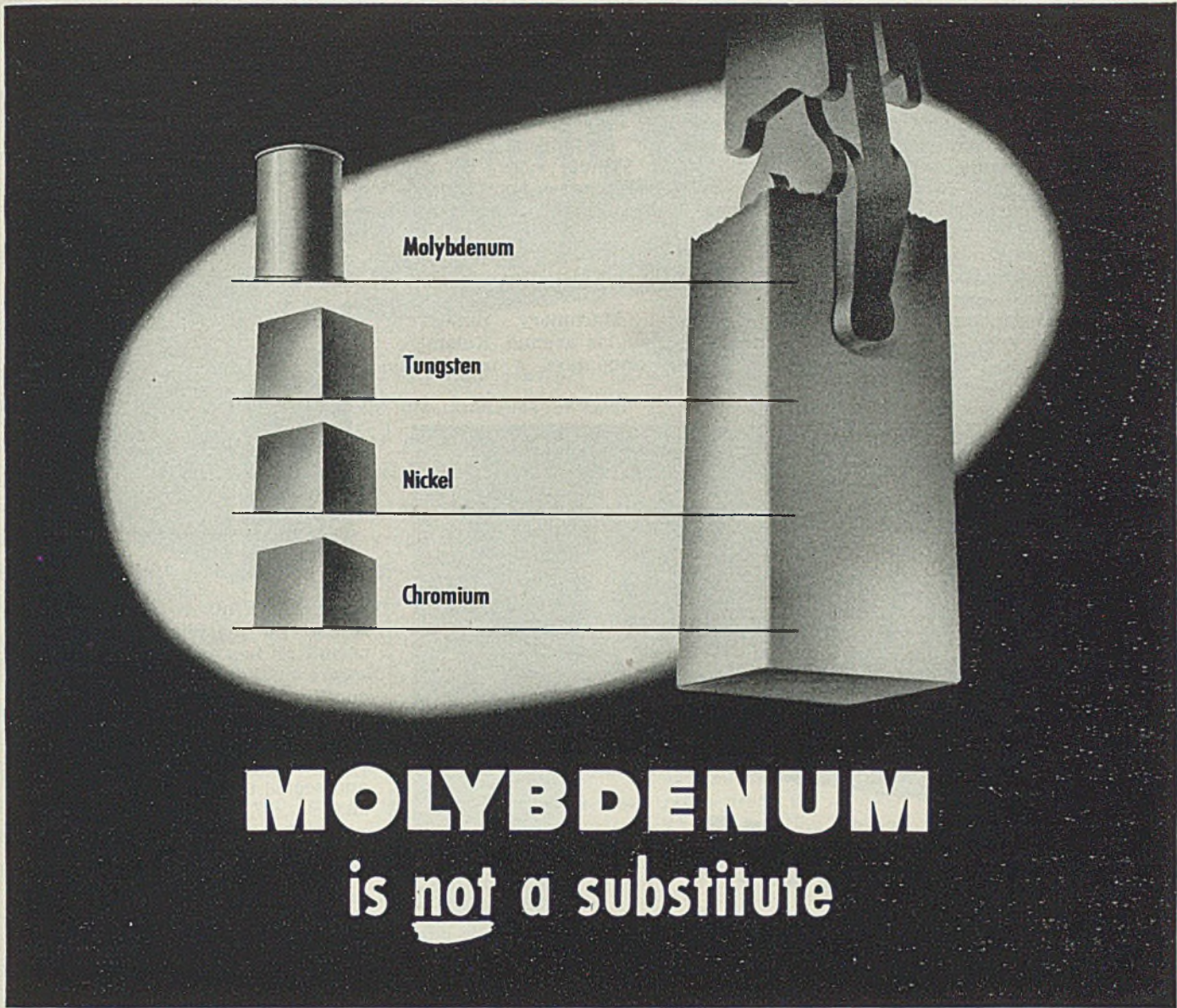


nected into the commutator by special high-melting solder. A Hercules industrial engine equipped with centrifugal type governor, high tension magneto with impulse starter coupling and oil bath aircleaner is used to power the welder.

Chucking Machine

Production Machinery Development Co., 4845 St. Aubin avenue, Detroit, announces a new model Verti-Hydra-Matic designed to fill the gap between extremely high production automatics and slower manually operated machines and single purpose automatics. While its automatic operation makes it suitable for continuous production, the simplicity of its control set-up makes it equally valuable for short run jobs. It consists of a rigid central column bearing a 6-faced turret, and two side heads adjacent to a central chuck. The turret is indexed by a system of intermittent self-locking gearing driven by an independent motor, all mounted on top of the column. The turret reciprocates vertically on the central





MOLYBDENUM is not a substitute



AMERICAN Production, American Distribution,
American Control—completely integrated.
Mines: Tucson, Arizona; Questa, New Mexico.
Smelting and Refining Works: York, Pa., Washington, Pa.
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Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C.
Donaldson & Co., Los Angeles, San Francisco,
Seattle.
Ample stocks, sales facilities, technical advice available.

Molybdenum is not a substitute for any other metal, in the sense that it can be used precisely as they are, with identical results. For tungsten, in that sense, there is no substitute. Nor for chromium.

Nor for manganese, or nickel, or any element of sovereign virtue.

Yet Molybdenum and some of these other alloying elements can be employed, each according to its own nature, for many exacting requirements, and physical properties can be developed that give entirely satisfactory performance.

Such a recourse is very important when some of the materials in question become scarce while others are still abundant.

Molybdenum can be obtained for all desired uses. The knowledge of what can be done with it has been greatly extended, and its possibilities go far beyond what had been supposed. New literature is available.



MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING, PITTSBURGH, PA.

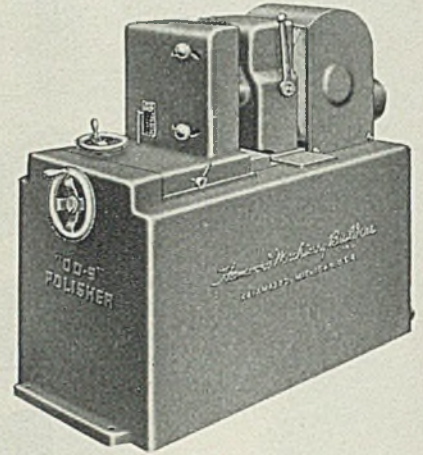
column and is kept in register during its travel by two heavy guide pins. Except for turret indexing, all movements of the turret and the side heads are hydraulic. Settings for sequence of operations of both turret and side heads are made on a control drum, mounted on top of the machine directly back of the column. The limit switches, controlling the hydraulic system and the turret indexing, also are mounted on this drum. The electrical system is so designed that either automatic or manual operation may be used. Vertical arrangement of the machine reduces the floor space to 4 x 6 feet and permits grouping of

all controls within easy reach of the operator. Turret faces are 5¼ x 15 inches and the turret has a vertical travel of 18 inches. The side heads have a 12-inch vertical movement and a horizontal movement of 3½ inches which may be adjusted for any part of a 16-inch diameter circle. The spindle nose is the standard 6-inch type 1-A for standard chucks. Eighteen speed changes are provided.

Cylindrical Polisher

Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., announces a new OD

cylindrical polishing machine capable of handling ¼ to 9-inch outside diameter cylindrical shapes, rods and tubes. It is especially adaptable to the use of abrasive belts with back stand attachments, polishing or buffing wheels. The unit's range of feed is said to be 0 to 50 feet per minute, forward or re-



verse. One other feature claimed is that the machine is designed to permit an inexperienced operator to secure quality finishes at high production rates. Wheel head mounting of the polisher is heavy. It incorporates a large spindle running in ball bearings, lubricated with oil and sealed to prevent the ingress of dirt.

A slide provides quick adjustment of the polishing wheel. The Vari-Matic feed embodied is motor driven through a variable speed drive. A quick release lever enables the operator to control the work being fed through the machine. Work support also is adjustable to the wheel. All parts are guarded and readily accessible.

Industrial Gloves

Surety Rubber Co., Carrollton, O., announces a new Sureseal industrial glove line to provide protection against caustics, acids, solvents and oils. Gloves in the line are produced from a new synthetic plastic material that has sufficient



elasticity to give ample flexibility and very comfortable finger freedom.

The transparent material also is

**INLAND
4-WAY
FLOOR PLATE**

Safeguards war production workers against accidents resulting from slips and falls.

INLAND STEEL CO.
38 S. Dearborn St., Chicago

Sales Offices: Milwaukee • Detroit • St. Paul
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WALKER-TURNER MACHINE TOOLS

Solve a "hundred and one"
War Production Problems!

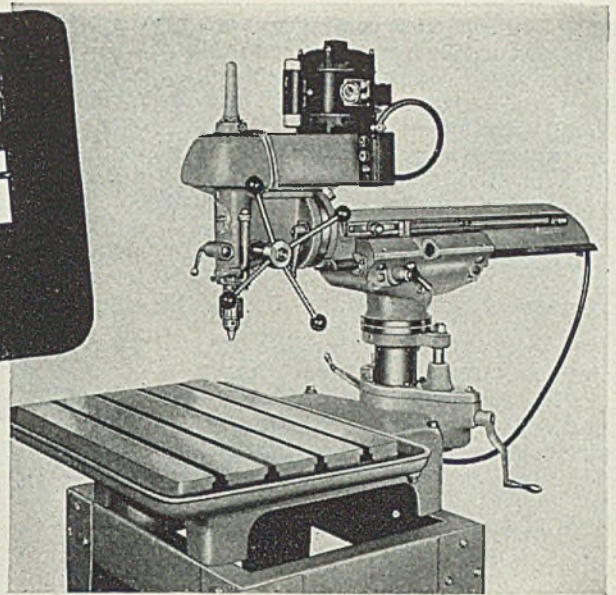
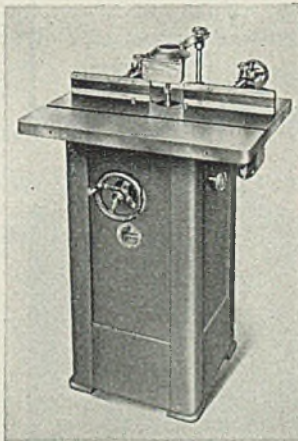
Giant battleships, huge bombers and heavy field guns get the headlines . . . but equally important are the thousands of small parts, accessories and countless lighter products that go into our vast War production. Here, Walker-Turner Machine Tools are proving "lifesavers" for aircraft, munitions, shipbuilding, electrical, tool-making and other war production plants . . . relieving large, costly machines for heavier work . . . easing machine tool shortages . . . performing every kind of operation on metals, wood and plastics.

Walker-Turner Machine Tools are carefully engineered for speedy, accurate production -- ruggedly constructed to stand up under 24-hour, 7-day week schedules. Volume production assures prompt delivery. Write today for the catalog of Walker-Turner Machine Tools and discover how many of these versatile machines fit immediately into your production set-up. Walker-Turner Co., Inc., 5032 Berckman St., Plainfield, N. J.

METAL CUTTING RADIAL SAW. Cuts, saws, trims, grooves, profiles, shapes and miters metals, wood and plastics. Handles many sizes and shapes, including large flat pieces. Geared motor gets shaft closer to work, permits smaller wheels with greater rim force and increased cutting capacity.



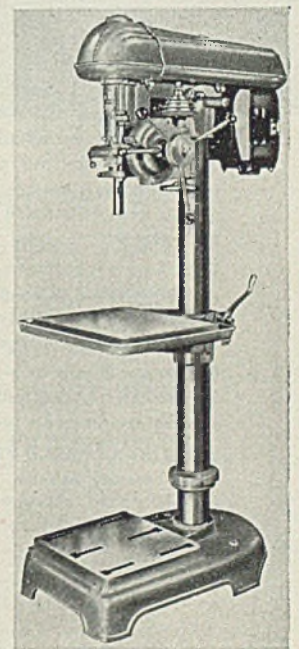
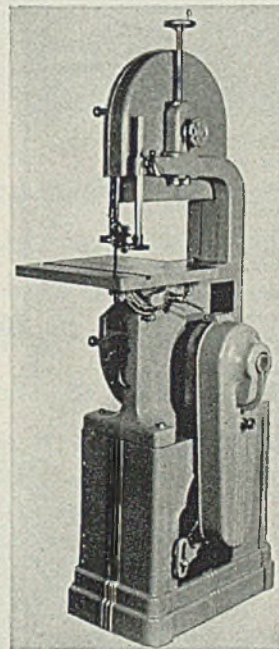
SPINDLE SHAPER for wood, aluminum, non-ferrous metals, plastics. Geared motor operates spindles at 7600 r.p.m. Has reversing switches, many useful accessories, other features.



RADIAL DRILL. Handles many light drilling, routing, tapping and profiling operations as effectively as larger machines costing 5 to 6 times as much. Drills to center of 62" circle. Head tilts 45° left or right. Maximum distance nose of chuck to table, 13 1/2". Spindle traverse 3 3/4".

METAL CUTTING BAND SAWS. 14" and 16" models. Back gearing and cone pulley provide speed range from 61 to 5300 s.f.m. for cutting practically any material from tool steel to wood.

20" DRILL PRESS with smooth, positive Power Feed, operated by clutch and powered from drill press spindle. Drills to center of 20" circle. Holes from 1/16" to 1". Speeds 260 to 5200 r.p.m.



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WALKER-TURNER MACHINE TOOLS FOR METAL, WOOD AND PLASTICS

DRILL PRESSES • BAND SAWS • BENCH SAWS • TILTING ARBOR SAWS • LATHES
JIG SAWS • RADIAL SAWS • RADIAL DRILLS • BELT AND DISC SURFACERS • JOINTERS
SPINDLE SHAPERS • GRINDERS • FLEXIBLE SHAFT MACHINES • CUSTOM BUILT MOTORS

applied as a bonded coating to various styles of fabric and leather work-gloves and is available in aprons and finger-cots. Aging, sunlight, Ultra-violet lights, acids, alkalis, alcohols, ketones, etc. have little or no effect on the material. Also, resistance to abrasion and tearing is particularly good in comparison tests.

Heavy-Duty Drills

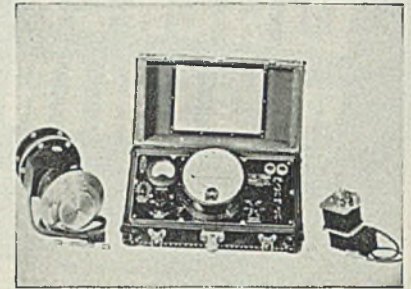
Black & Decker, Towson, Md., is offering four new model heavy duty Holguns (drills) especially engineered for ¼-inch production requirements of airplane, aircraft ac-

cessories and similar fabricating and assembly operations. They are offered as a standard and low speed model in the end handle type, and as a standard and low speed model in the side handle type. The standard speed end handle model weighs 60 ounces, is 7¾ inches long. All units have 2-pole instant-release switches with the pistol grip and trigger switch control suited to either right or left hand operation.

Balancing Unit

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces a portable dynamic type HQ balanc-

ing unit for reducing harmful vibration and undesirable noise in rotating machines assembled by mass production methods. It con-



sists of a sensitive wattmeter assembly, a sine wave generator, a velocity type vibration pickup and necessary connecting cords. To balance a rotating machine the 2-pole sine wave movable-stator generator is coupled to the shaft of the rotor to be balanced. The pickup is held against some part of the frame and produces a voltage whose amplitude is proportional to the vibration to be measured. The voltage generated in the pickup coil varies directly as the frequency and amplitude of the vibrations being measured. Amplitude and vibration phase angle are indicated on the wattmeter.

Forming Tool Holder

Gisholt Machine Co., 1217 East Washington street, Madison, Wis., has introduced a circular forming tool holder for use on turret lathes. It is for use on either the front or the rear of the cross slide, since cutters may be mounted on either side of the holder. Provision has been



made for adjusting and locking the cutter so the cutting edge can always be properly positioned after grinding. A further feature is the pivot mounting of the holder, the pivot having an adjustment for correcting slight inaccuracies of the cutter.

Fluorescent Starters

Hygrade Sylvania Corp., Salem, Mass., is offering a new line of fluorescent lamp starters to protect ballast and starter and to eliminate flashing of failed lamps. Called Premium Mirastat starters, units in the line open the circuits automatically when lamps fail. Each unit not

ARE YOU LOOKING FOR A SUBCONTRACTOR FOR ANY OF THESE ITEMS?

Due to curtailed production of automobiles and trucks, the facilities of the American Metal Products Company are available, for immediate volume production, on a sub-contract or co-contract basis, on any or all of the items listed at the right.

American Metal Products Company has been producing these and similar items for the automobile, truck and allied industries for the last 24 years. During this period we have grown and expanded to the point where we now occupy nearly 5 acres in an ultra-modern, up-to-date plant.

Our force of engineers, production men and craftsmen totals 800—all men who have been trained for years in meeting the most exacting demands and volume requirements.

For further details as to how our facilities and manpower may best fit into your future production requirements write, wire or phone.

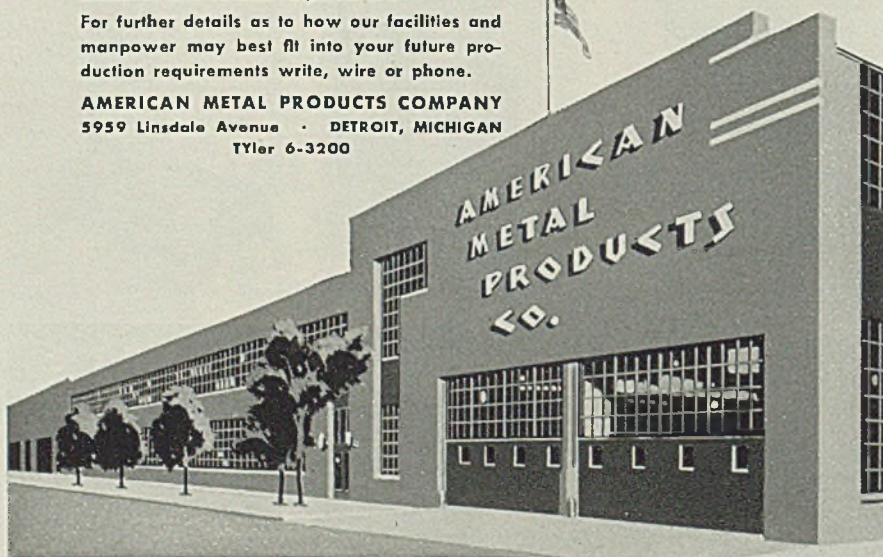
AMERICAN METAL PRODUCTS COMPANY
5959 Linsdale Avenue · DETROIT, MICHIGAN
TYLER 6-3200

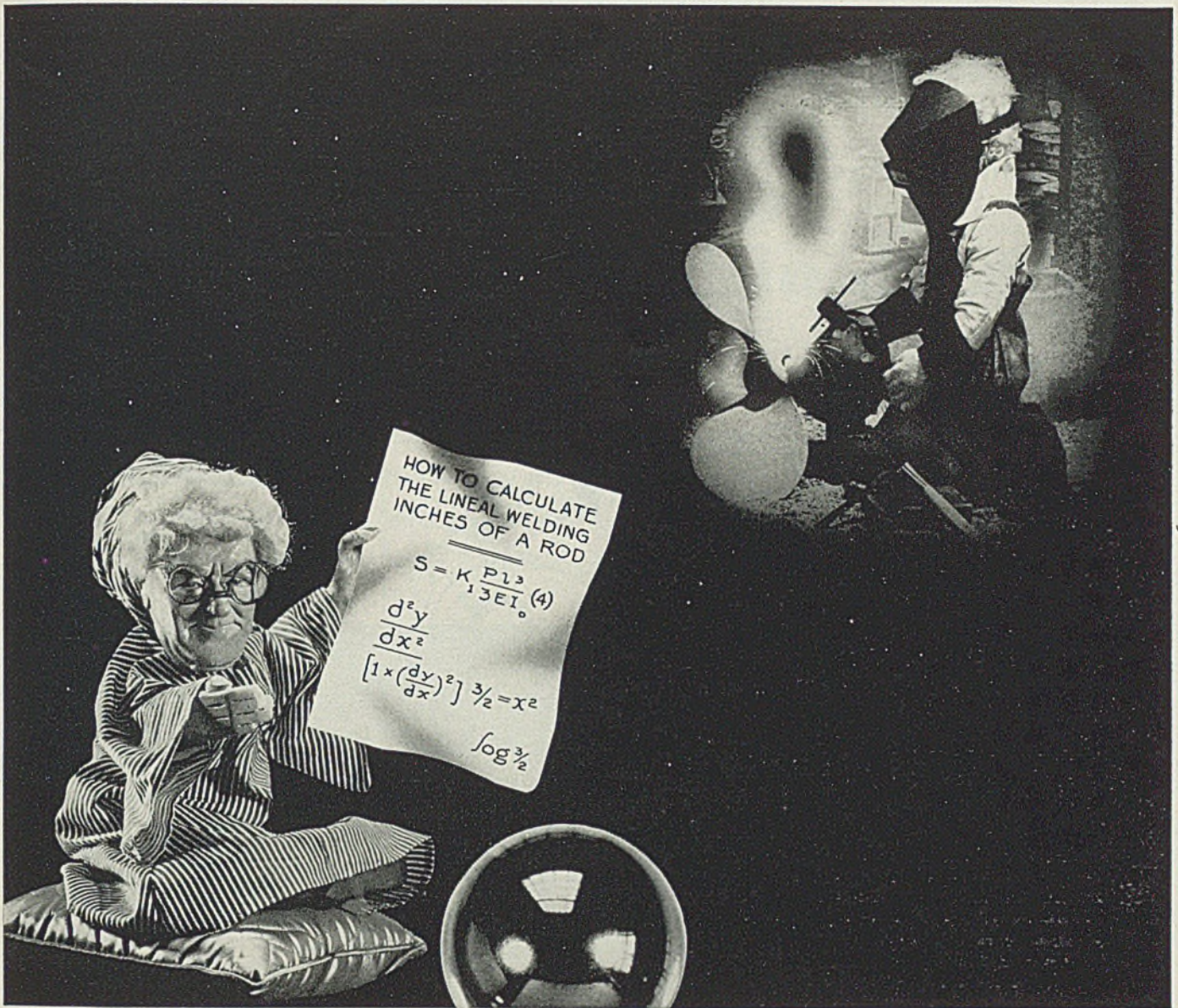
★ WELDED STEEL TUBES AND TUBING in diameters from ¾" to 5" and in gauges up to ¼".

★ FABRICATED STEEL TUBULAR PARTS AND WELDED ASSEMBLIES.

★ LARGE AND SMALL STEEL STAMPINGS.

★ FORGED AND UP-SET PARTS FROM 2", 3", 4", 5" upsetters.





WHITEY SEZ: "IT TAKES A GENIUS TO COUNT THE COST BEFOREHAND — ESPECIALLY IF HE'S ONLY HALF FAMILIAR WITH HIS TOOLS (BUT THEN HE'S NO GENIUS) . . . YOU CAN'T GUARANTEE A ROD TO WELD ANY PRE-DETERMINED LENGTH OF STAINLESS WITHOUT KNOWING THE OPERATOR'S TECHNIQUE AND WORKMANSHIP OF FIT—BUT, BY KNOWING THE MAKE AND QUALITY OF THE ROD YOU CAN BE A BIT PSYCHIC IN YOUR ESTIMATE."

STAINLESS		
Type Numbers Available		
302-B	316	330
308	316-Cb.	347
309	317	410
309-Cb.	321	430
310	325	442
311	329	446
312	•	502
	15% Cr.—65% Ni.	
	20% Cr.—80% Ni.	

MAURATH, Inc.
 Builder of better welding

CLEVELAND
 electrodes in all analyses

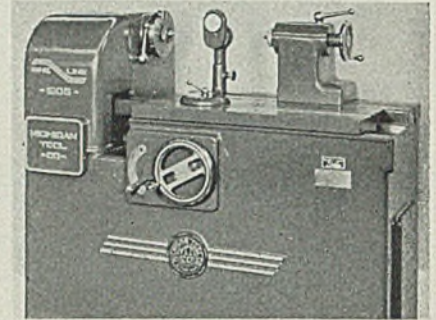
only protects itself, prevents abuse of the ballast and effects a substantial saving of power, but also does away with the usual annoying flashing of the burned-out lamp, it is stated.

Gear Checking Machine

Michigan Tool Co., 7171 East McNichols road, Detroit, has placed on the market a new model 1205 Sine-Line lead checking machine for checking right and left hand spiral gear leads from zero to infinity. Of the adjustable sine-bar type, it eliminates any need for master rolls, disks or lead screws in check-

ing gears. Gear size capacity of the standard unit is 0 to 18 inches diameter, with distance between centers of 24 inches. Operating mechanism, including the sine-bar is completely enclosed and protected against dust. The machine consists primarily of two tables, a transverse table enclosed in the left end of the machine, which carries the sine-bar, and a longitudinal indicator table which carries the indicator. The first is arranged to reciprocate crosswise of the machine, while the longitudinal table moves lengthwise paralleling the face of the gear to be checked. The sine-bar table when moved back and forth rotates the spindle on

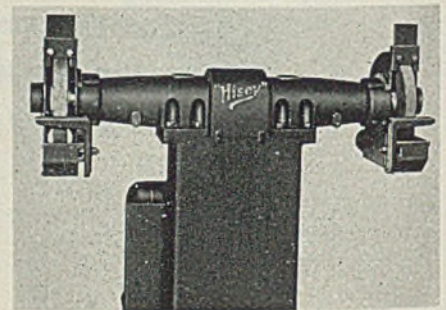
which the gear is mounted for checking. Friction rolls provide two ratios of the spindle to the sine-bar table. Selection of the proper set of rolls is made by moving a lever under the cover enclosing the sine-bar table. The two ratios provide for all diameters and lengths of gears within the operating range of the machine.



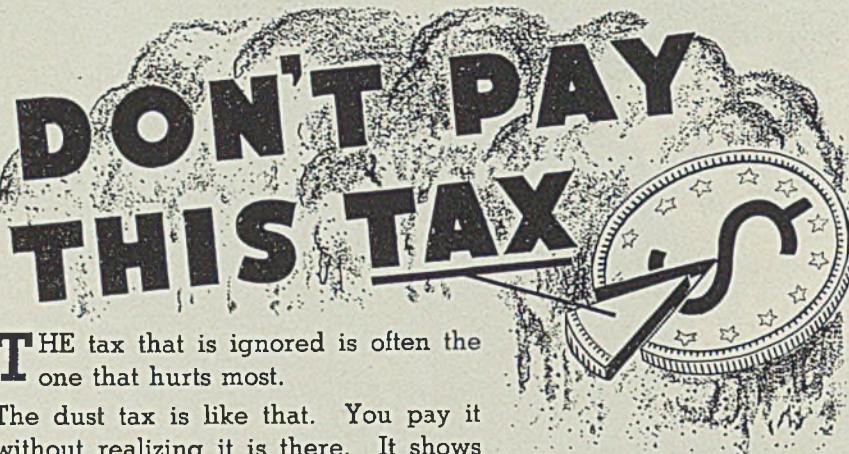
The correct setting of the sine-bar is established either by the use of micrometers or gage blocks. The sine-bar is fully exposed by swinging open the cover at the left end of the machine. Complete flexibility also is provided for checking either face of each gear tooth and at any depth, whether right or left hand spiral. Movement of the indicator along the face of the gear is accomplished by two controls on the front of the machine. A special feature of the sine-bar table is the use of narrow 3-point ball contact guides, combined with grooved wide ways, also on ball bearings, which are adjustable to eliminate entirely lateral movement in the sine-bar table. The indicator is graduated in ten-thousandths.

Swing Grinder

Hisey-Wolf Machine Co., Cincinnati, announces a new type FE wide swing grinder which because of the large spacing between the wheels and the working clearance around the wheels permits grinding of large, awkward pieces and ir-



regular-shaped work. Its spindle is driven by a V-belt, obtaining power from a motor mounted on the rear of the pedestal. The grinder's wheel guards pivot to any angle. They also are equipped with hinged covers and exhaust pipe connections. The machine also can be furnished without the guards for buffing and polishing applications.



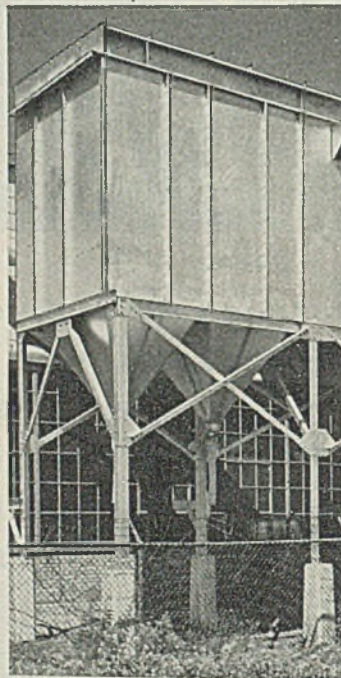
THE tax that is ignored is often the one that hurts most.

The dust tax is like that. You pay it without realizing it is there. It shows up in higher insurance rates, increased labor costs, and expensive repair bills.

Moreover, the fact that you have dust collecting equipment does not always mean that your dust condition is under perfect control. The dust you cannot see is what should concern you most. This is especially true of foundry dusts ranging from 2 to 10 microns in size.

When you consider that it is possible to place more than 3000 dust particles of 2½ micron size on the head of a common pin, the necessity for high efficiency dust control becomes apparent.

American "Dustubes" provide this kind of protection at surprisingly low cost. They are extremely simple in design and are easy to operate and maintain. Hundreds are in daily use throughout industry.



AMERICAN FOUNDRY EQUIPMENT CO.

509 S. Byrkit St.

Mishawaka, Ind.

**DUSTUBE
DUST COLLECTORS**

BEAUTY *is more* than skin-deep

Ferro-Carbon Titanium, used as the final deoxidizer and cleanser, improves the quality of rimming steel. Many users enthusiastically report that ingots are cleaner throughout with blow holes deeply seated. Besides,

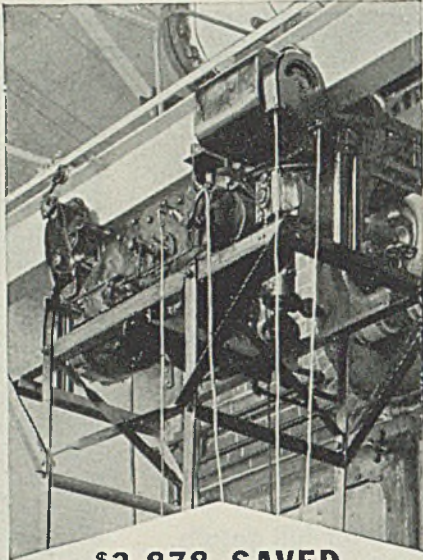
they appreciate the higher production yield that usually results with the use of Titanium. Write for full details.

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**\$3,878 SAVED
EVERY YEAR**

AND STILL "GOING STRONG!"

And savings like that every year for twelve years don't just happen. They are engineered. But this manufacturer got even more advantages from letting Reading engineers solve his handling problem.

- Coal and ash handling was speeded, letting the engineer take care of the engine room, too. (The company saved money and the engineer made more.)
- Maintenance costs averaged less than 1% a year for twelve years.
- Fuel costs were cut by more even firing of the boiler.
- Less dust and dirt reduced the need for frequent boiler room cleaning and repaint jobs.

NOTE: This Reading installation did such a good job that it has been duplicated in several manufacturing plants.

Remember that when results and savings are in the specifications . . . it pays to rely on Reading's engineering ability.

READING CHAIN & BLOCK CORP.
DEPT. D-2, READING, PA.



READING

Chain Hoists, Electric Hoists,
Cranes and Monorails

Carbide Tooling

(Concluded from Page 85)

ute) ÷ 33000; or HP = (depth of cut in inches) × (feed in inches) × (surface feet per minute) × (the constant).

Thus it becomes evident that even when the tool load is kept constant (that is, feed and depth of cut unchanged), horsepower required increases whenever speed is increased. We are referring now to horsepower required for actual cutting.

To determine total amount of motor horsepower required when switching to carbide tools, it is necessary to add to the foregoing figure the horsepower lost in driving the machine itself at the higher speeds recommended for carbide cutting tools. This usually is estimated at around 30 per cent of cutting horsepower.

Actually in many cases when switching from high speed steel to carbide tooling, amount of torque and tool loading is decreased. As a matter of fact, in some cases—particularly on extremely large work—it is necessary to decrease the tool load to make carbide tools perform properly.

Carbide tools cannot stand as much pressure as can high speed steel tools. On extremely large work involving slow speeds, deep cuts and coarse feeds, it sometimes is necessary to cut down on the feed to prevent tool breakage. However, this decrease in feed is more than made up in metal removal by the increased speed.

Consider this typical large job tooled with high speed steel:

Outside diameter of work 36 inches
Depth of cut ½ inch
Feed ⅞ inch
Maximum cutting speed
 40 ft. per min. (40 x 12 in./min.)
Horsepower required for cutting . 22 ½ hp

Amount of metal removed here is 45 cubic inches per minute (½ × 3/16 × 40 × 12).

Now with this same job tooled with carbides, we can assume the following operating conditions:

Depth of cut ½ inch
Feed Reduced to ⅜ inch
Speed Raised to 125 ft. per min.

Here is what happens:

Amount of metal removed is now 70 cubic inches per minute, a gain of 55 per cent. Horsepower required for cutting has been increased to around 35, an increase likewise of 55 per cent.

But tool load has been reduced 50 per cent since feed and therefore cross-section of chip are reduced 50 per cent and torque on work and chuck also has been reduced 50 per cent for the same reason.

In other words, while rate of metal removal and horsepower have gone up, tendency of work to slip in the chuck has been cut in half, its tendency to twist has been cut in half and tendency of work to distort because of cutting pressure also has been reduced 50 per cent.

At the same time, finer feeds yield finer finish, and tool life between grinds has been increased—amount of down-time naturally being decreased in proportion.

Table of Constants for Calculating Power Requirements and Tool Loads for Various Materials

Material	Power Constant
SAE 1010—1025	6
SAE 1030—1095	8
SAE 1112—1120	6
SAE X1314-X1340	6
SAE T1330-T1350	9
SAE 2015—2320	7
SAE 2330—2350	9
SAE 3115—3130	8
SAE 3135—3450	9
SAE 4130—4820	9
SAE 5120—5200	10
SAE 6115—6195	10
Cast Steel	9
Cast Iron, Hard	4
Cast Iron, Medium	3
Cast Iron, Soft	3
Cast Iron, Hard (Alloy)	4
Cast Iron, Medium (Alloy)	3
Cast Iron, Soft (Alloy)	3
Cast Iron—Up to 25% Semi-Steel	3
Cast Iron—Over 25% Semi-Steel	4
Cast Iron Brake Drums	4
Cast Iron Chilled Rolls	5
Malleable Iron, Hard	5
Malleable Iron, Medium	4
Malleable Iron, Soft	3
Brass and Bronze, Hard	10
Brass and Bronze, Soft	4
Aluminum Castings	3
Aluminum Bar Stock	4
Copper	4
Commutators	4

Plastic Coating Protects Steel

For permanent protection of metal plating tanks, acid storage tanks, tank cars, etc., Adolph Hurst & Co. Inc., 330 West Forty-second street, New York, is offering an entirely new type of liquid plastic coating, Lin-Tite, which is said to be acid and alkali proof. Applied like paint, after evaporation of solvents, it presents an impermeable, tough, dielectric membrane which adheres firmly to steel, and other surfaces.

Salvaging Worn Tools

(Concluded from Page 65)

shops doing this work. The superintendent of each works is charged with having his tool salvage department send tools out to such a local shop when his own tool room can not rework them. This applies even to tools drawn out of the central salvage department.

Although the main object of the tool salvage program is to provide a supply of tools to keep production going, it has resulted in important savings that reduce costs. All small tools are classed as "perishable tools" so their cost is a day-to-day operating expense which in a typical works equaled 24 per cent of that of productive labor. In another plant it was 8 per cent of the overhead. Totals mount quickly when drills cost from 60 cents to \$21 each; reamers from \$2.50 to \$15; tool bits, from 35 cents to \$4; milling cutters from \$4 to \$100; and broaches from \$25 to \$200.

Save Money: Cost of reconditioning whether done in any of the Harvester works or sent to a salvaging company, is usually about 60 per cent of the cost of a new tool. Company officials state that even when the war is over the company will continue its program of tool salvage.

Reclamation methods include two classifications of existing tools other than "worn tools". These are "obsolete tools" and "surplus tools". Lists of such tools are prepared by each works and circulated to other Harvester plants regularly. This facilitates transfer of needed tools. The receiving works is charged and the sending works is credited with the total original cost of "surplus tools" and with 50 per cent of that of "obsolete tools" since the first class are usually of a newer type and in better condition than the latter.

And such a tool salvage program need not be confined to a big company with a number of plants from which to gather worn cutting tools

and between which transfers of obsolete and surplus tools can be made for there are many things that the management of a single small plant can do to assure a supply of cutting tools.

What the Small Plant Can Do:

1—Avoid the need for new cutting tools by changing the methods of doing certain jobs on the machine tools.

2—Adopt a table-display plan for stimulating foremen to avoid tool breakage by displaying broken tools with a card or label telling who

broke the part and on what work.

3—Call on neighboring plants in search of tools that may have become obsolete or surplus in these plants and interchange with them.

4—Search under benches and in corners for tools that have been pigeon-holed but are capable of being reconditioned.

5—Put it up to the tool room to reclaim all possible tools.

6—If the tools cannot be reconditioned in the plant tool room, send them out to be reconditioned by a local company specializing in tool salvage.



...WITH A PIECE OF CHALK

Frequently a minor and simple change in weld design may be all that is necessary to overcome a difficulty. Murex engineers have frequently worked out such changes on the spot—saving the manufacturer many valuable hours of productive time.

In one instance a new weld design helped a road machinery manufacturer overcome weld failures where cold rolled pins were joined to bearing plates. Investigation showed that only about 70% penetration was being obtained. The new design called for a 45° bevel of the bearing plate instead of 60° and the machining of a U groove in the pin which previously had been neither beveled nor grooved.

The result was full penetration and elimination of the failures.

The Murex engineering staff is at the service of all companies with war contracts to help them speed up production and improve welding procedure. It is not necessary to be a Murex electrode user to receive this service.

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

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ARC WELDING ELECTRODES

METAL & THERMIT
120 BROADWAY



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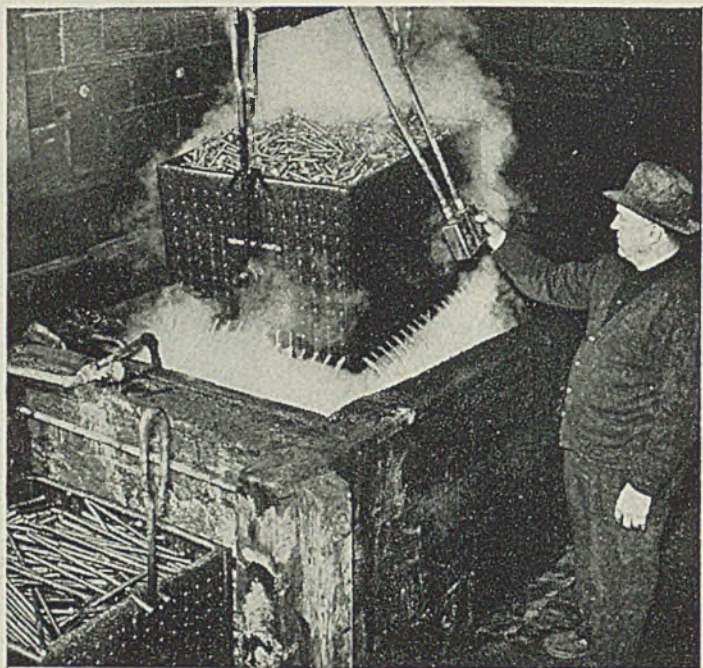
Two Battles to win on the PICKLING FRONT

BATTLE No 1.

SPEEDING PRODUCTION

Monel's resistance to pickling acids reduces those costly break-downs that slow the movement of material through the pickling department.

Strong, tough, welded, light-weight Monel crates, hooks, hangers, yokes and chain mean bigger loads and greater production.

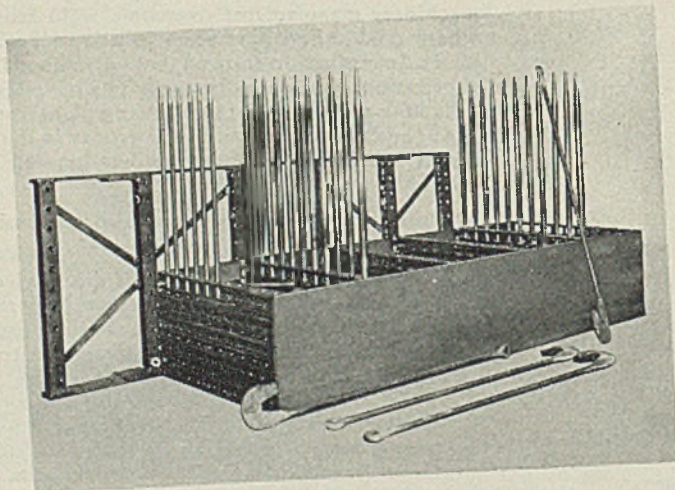


BATTLE No 2.

CONSERVING VITAL MATERIALS

In the present all-out effort for victory every ounce of metal must be conserved. Here is one way that Monel helps you win *that* battle.

Inherent corrosion resistance and ease in forming and welding make it possible to re-use Monel equipment in many ways after the original service has been fulfilled. For example, tank tie-rods are easily made into *spacer bars, tapered pins, hooks* and other useful individually shaped pieces of pickling equipment.



MONEL 

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

FIRST THINGS FIRST . . . With the Nation at war, supplies of Monel, Nickel and Nickel Alloys are needed for our armed forces. All efforts must now be aimed toward victory. In the meantime, The International Nickel Company will continue to issue information which it is believed will be of interest to metal users who are concerned with the war needs of today and the peace-time progress of the future.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

Helpful Literature

1. Hydraulic Presses

Denison Engineering Co.—4-page illustrated bulletin No. P.H. 200 is entitled "How To Get Triple Duty From Your Straightening Presses." It tells how to increase production of straightening presses by using them for assembling, broaching, bending and forming operations. Sketches show tooling needed for these operations.

2. Magnetic Separators

Stearns Magnetic Mfg. Co.—10-page illustrated bulletin No. 701 describes type K series of magnetic separators for concentration of ores and minerals and for segregation of values and extraction of reluctant impurities. Two pages are devoted to operating characteristics and features. Schematic drawings indicate construction details.

3. Marking Machines

Acromark Corp.—6-page illustrated bulletin is entitled "Skill In Machines." It deals with three models of marking machines for stamping name plates, number plates, tags, checks, labels, parts, gages and tools. Detailed specifications and prices are given for each model.

4. Air Pumps

Gast Mfg. Co.—26-page illustrated catalog is devoted to "Rotary" vacuum pumps and compressors. Explained, with cutaway views and line drawings are details of construction and operation of vacuum pumps with capacities from 1½ to 22 cubic feet of air, measured at normal outlet conditions. Two pages cover price schedules.

5. Skin Cleansers

Magnus Chemical Co.—24-page bulletin No. 51 deals with subject of care and cleaning of hands and arms in industrial plants. Subjects covered include what hand cleaner should and should not do, safe detergents and scouring agents, germicides and medicants, lime scums and rinsing, cleaning routines, and protection of hands and arms on the job.

6. Small Electric Motors

Westinghouse Electric & Manufacturing Co.—8-page illustrated folder No. F-8623 describes small motors from 1/6 to ½ horsepower, 145 frame size for general use. Standard parts making available more than 5000 combinations of type, rating and mounting are covered. Charts show motor characteristics, plotting per cent synchronous speed against per cent full load torque.

7. Shipping Containers

General Box Co.—12-page booklet comprises series of action photographs showing packing and shipping of varied products in containers designed especially for their use. Pictured being packed are lock washers, axles, universal joints, jacks and miscellaneous automobile parts.

8. Arc Welder

Harnischfeger Corp.—4-page illustrated bulletin W-28-1 describes model WE-150 square frame welder which has welding range from 200 down to 15 amperes. Units can be used singly or in multiple, mounted stationary or on portable frames. Features and advantages of equipment are described in detail.

9. Carbide Tools and Blanks

Vascoloy-Ramef Corp.—24-page illustrated general catalog and price list, dated January 1942 lists 22 typical grades of single point tantalum-tungsten carbide single point tools. Included is grade selector chart for selection of tool for practically every cutting condition in steel, cast iron and abrasive materials. Tables permit computing cost of standard tools and blanks and special blanks.

10. Marine Gears

Farrel-Birmingham Co.—36-page illustrated booklet deals with "Farrel" marine reduction gear drives now in service in tugs, freighters, tankers, ferries, dredges and pleasure boats. Drawings are used to show relationship of propulsion unit to other engine room equipment.

11. Drum and Barrel Carrier

Ernst Magic Carrier Sales Co.—6-page illustrated folder explains important features of all-metal barrel and drum carrier, explaining what it does, how it works and where it is used. Large two-page photograph of device points out graphically construction and operation details. Three sizes and capacities are available.

12. Machine Tool Rebuilding

Simmons Machine Tool Corp.—58-page plastic bound bulletin entitled, "The Simmons Way of Engineered Machine Tool Rebuilding," outlines and shows facilities of company for this work. Typical rebuilding jobs are shown. Section covers lathes, milling machines and other tools manufactured by company.

13. Protective Lighting

Goodrich Electric Co.—Illustrated folder No. 101 entitled, "Plant Protection Begins with Floodlighting," deals with protective lighting around industrial plants. Various styles of porcelain enameled floodlights are described.

14. Heat Insulation

Ehret Magnesia Manufacturing Co.—Illustrated "Heat Insulation Handbook" presents complete data on heat insulations and related products selected from "Ehret" thermal insulation manual. Technical data and formulas are included, in addition to descriptions of heat insulating products and application information.

15. Molded Fabric Bearings

Gatke Corp.—12-page illustrated bulletin No. HB-520 describes molded fabric bearings of various types for grease or oil lubrication, water lubrication, acid-resisting service and some unlubricated applications. Operating characteristics of various types and performance results on typical applications are included.

16. Salt Baths

Park Chemical Co.—4-page bulletin describes "Park Salt Baths" for heat treatment of carbon and alloy steels, high speed steels and non-ferrous metals. Various salt baths are listed and their applications described.

17. Power Transmissions

Ideal Commutator Dresser Co.—52-page illustrated catalog and handbook contains reference data on "Ideal" variable speed pulleys, variable speed transmissions and automatic tension control motor bases. Sizes, rated capacities, design and operating details are given. Application data are included, also.

18. Creosote-Coal Tar

Koppers Co., Tar & Chemical division—Illustrated data sheet No. TD-6 gives description, uses, specifications and other information on line of creosote-coal tar solutions for preservation of wood products.

19. Low Alloy Steel

Great Lakes Steel Corp.—8-page illustrated bulletin, "An Important Announcement," gives analyses, physical properties, plain end quench bar tests and heat treated properties charts on "N-A-X 9100 series" of low alloy steels.

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20. Hydraulic Machinery

Weinman Pump & Supply Co.—9-page illustrated catalog No. SM3 covers hydraulic and lubricating systems. Described are high and low pressure hydraulic power units, lubricating or fuel oil transfer and general duty pumps, hydraulic valves and cylinders. Drawings and specifications are given on pressure relief valves, suction strainers, submerison strainers and packing of pumps.

21. Stainless Steel

Allegheny Ludlum Steel Corp.—4-page illustrated bulletin "Pluramelt Conserves Vital Alloys" tells how amounts of nickel and chromium can be saved by using steel consisting of outer layer of alloy steel and inner layer or core of plain steel. Figures are cited to show savings in pounds of metal.

22. Compressed Gases

Walter Kidde & Co.—20-page illustrated booklet, "Magic Bottles," describes aviation applications of compressed gases. Uses of carbon dioxide in high pressure cylinders and oxygen breathing equipment are covered. Built-in fire extinguishing devices are shown. Section deals with flotation equipment for airplanes.

23. War Materiel

E. F. Houghton & Co.—32-page illustrated booklet, "Defense Data from the Houghton Line," contains factual information on metal working, heat treating and machining of armament. This is reprint of defense articles taken from regular publication, "The Houghton Line."

24. Power Shovel

Link-Belt Speeder Corp.—8-page illustrated bulletin No. 1929 gives complete details on model LS-60 "Link-Belt Speeder" which can be converted for use as shovel, dragline, crane, clamshell or trench hoes. Features and construction of this machine are shown and described.

25. Conveyors

Chain Belt Co.—16-page illustrated catalog No. 410 describes "Rex" bulk handling conveyors. Numerous photographs show belt conveyors, apron conveyors and bucket conveyors. Typical installations are pictured and their important features summarized.

26. Power Distribution

General Electric Co.—16-page illustrated bulletin No. GEA-3758 explains basic principles of load-center power distribution for industrials, naval and military projects, shipyards, central stations and commercial buildings. Listed are advantages of system, available circuit arrangements, typical installations and available equipment.

27. Lapping Machines

Ultra-Lap Machine Co.—6-page illustrated folder depicts and describes "Ultra-Lap" machines which are engineered to comply with finishing requirements. Typical parts finished on these machines are illustrated.

28. Turret Lathe

South Bend Lathe Works—4-page illustrated bulletin No. 67-T gives complete specifications on No. 2-H turret lathe with 16-inch swing, 1½-inch spindle hole and 1-inch collet capacity. Details of design are described and features covered.

29. Electric Hoists

Shaw-Box Crane & Hoist division, Manning, Maxwell & Moore, Inc.—28-page illustrated catalog No. 350 contains descriptions of complete line of "Load Lifter" electric hoists for overhead tracks, push type trolleys, hand operated trolleys and hand geared trolleys. Applications, mountings, current supply, design details, capacities and accessories are covered.

30. Diesel Electric Plants

Ready-Power Co.—6-page illustrated bulletin No. 523 describes and gives specifications of diesel electric plants available in 8 models with ratings of 12½ to 50 kilowatts. These alternating current units are driven by "International" diesel engines which are started as gasoline engine.

31. Tool and Cutter Grinder

Roan Manufacturing Co.—Illustrated bulletin describes new universal tool and cutter grinder which is combination of fixtures. It enables users to grind and sharpen all types of metal working tools. It may be used for contour and surface grinding operations, also.

32. Zinc

New Jersey Zinc Co.—4-page illustrated bulletin, "Zinc in War" shows typical applications of zinc alloys and materials in ordnance equipment and other products essential to the war effort. Use of zinc is described in these parts and materials.

33. Electric Lifters

Economy Engineering Co.—32-page bulletin 940 covers manual and electric motor operated lifters for lifting, moving and stocking materials. Models are shown and described for handling dies, boxes, drums, skids and pallets, roll paper, bales, and other types of containers.

34. Manganese Steel

American Manganese Steel division, American Brake Shoe & Foundry Co.—Illustrated bulletin is regular monthly publication dealing with company news and details of applications of manganese steel products.

35. Welding Rod

American Brass Co.—24-page illustrated bulletin "Anaconda Welding Rods" contains detailed information on welding properties, melting points and individual characteristics of Tobin bronze, phosphor bronze, Everdur, manganese bronze, copper, and Super-nickel welding rods. Welding procedures are also outlined.

36. Cast Steel Valves

Edward Valve & Manufacturing Co.—54-page illustrated catalog No. 12-C deals with cast steel valves in globe and angle stop types, check types, feed-line stop-check types and certain special designs. Cross-sectional views of each type show design and construction details. Tables list dimensions, weights and capacities.

37. Hot Water Pumps

De Laval Steam Turbine Co.—2-page bulletin is trade paper reprint covering subject of "Relation of Suction Head to Capacity with Hot Water Pumps." It answers such questions as why it is necessary to have so much head on suction when handling hot water and why pump will not work just as well with 10 foot suction head as with 13 foot.

38. Piping Recommendations

Crane Co.—6-page folder is No. 4 of series of shop bulletins on how to get better service from piping equipment. Entitled "Tips on Valve Trim," this bulletin comprises check chart which shows suitability of trim of brass, iron and steel valves for steam, fresh and salt water, air, gas, oil, and gasoline services.

39. Overhead Conveyors

Cleveland Crane & Engineering Co.—12-page illustrated bulletin No. 2008-A covers engineering and application data. Various layouts for overhead rail systems for diversified industries, types of hand-propelled and electric carriers and various types of accessories are described in detail.

40. Platform Trucks

Atlas Car & Manufacturing Co.—4-page illustrated bulletin No. 1261 describes electrically operated platform trucks in two and three ton models. One-page lists full specifications, covering such details as drive unit, steering, springs, wheels, brakes, lubrication, motor, controller, and shipping weights.

41. Graphite

Acheson Colloids Corp.—12-page bulletin No. 220.6 is one of series of technical bulletins pertaining to applications of colloidal graphite to industry. Entitled "The Properties of Graphoid Surfaces And Their Role in Lubrication," bulletin explains methods used to examine mechanics of formation of graphite films on friction surfaces.

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Broader Control of Steel Is Developing

Highest priorities load mill books. Plates placed under full allocation. Scrap program promises some relief. Pig iron supply tight

INCREASING pressure for war steel is evidenced in the preponderance of tonnage on mill books bearing highest preference numbers. So great is proportion of this demand that deliveries below A priority have practically ceased and some producers are unable to provide tonnage for lower A ratings. In some instances delivery on A-1 classifications are much extended.

This situation results in tighter regulation on products subject to broad allocation, such as has been placed on plates, and increased allocations of various products involved in particular projects and programs. As the picture develops and more manufacturers are engaged in war production necessity arises for closer control, involving more forms of steel, to avoid delays arising from lack of material to complete assemblies well under way. It is believed the War Production Board will proceed with complete allocation programs for other forms of steel after the plate situation has been clarified.

Pig iron distribution has been worked out satisfactorily to most interests but choke point is feared when some large users, who have been working entirely on inventory, exhaust their supplies and begin to request allocation. These melters have not been a factor in distribution since allocations started but their reserves are nearing exhaustion and they will need monthly supplies.

Unprecedented demand for steel plates caused the War Production Board to take its action to tighten regulation of production and shipments to assure filling of all military requirements, including the Navy and Maritime Commission. Only orders bearing A-10 priority or better, or specifically allocated, may be scheduled or delivered.

Production of steel ingots last week was 96 per cent of capacity, 1 point lower than the preceding week, based on revised capacity figures of the American Iron and Steel Institute, as of Dec. 31, 1941. Chicago gained 1½ points to 104 per cent, only ½-point under its all-time record. Cleveland rose 3 points to 94, Birmingham 5 points to 95, Cincinnati 4 points to 88 and Detroit 1 point to 92. Pittsburgh declined 1½ points to 95 per cent, Wheeling 2½ points to 88, St. Louis 5½ points to 72½ and Youngstown 2 points to 87. Rates

were unchanged in Eastern Pennsylvania, at 90; Buffalo, 79½ and New England, 100.

Railroads in February have bought about 7000 freight cars, with another week to go, which will give the largest number for any month since June, 1921.

More determined efforts are under way to loosen scrap tonnages from automobile wrecking yards. Initiative is placed in hands of scrap dealers, who are charged with the duty of making bids on the accumulations. If the bid is accepted the wrecker has the option of reserving such parts as may be used for repairs, the remainder being prepared and moved by the dealer. If the bid is refused a government agent may make an inspection to determine the justice of the bid. In case the wrecker refuses to sell the material may be commandeered and placed in the hands of dealers, the owner being paid according to the price for which it is sold to the consumer. This plan already is bearing fruit and a large tonnage is expected to follow soon.

War Production Board is exploring the possibility of placing all scrap supplies on a broad allocation basis, similar to that in force for several months on pig iron and now being applied on plates. Difficulties inherent in controlling flow of scrap through the yards of several thousand dealers are recognized and a formula is being sought to bring them under control.

A revision of price regulations on steel warehouse sales has been announced, releasing small dealers from compliance. Sales by retail dealers of 25 kegs or less of nails or 2500 pounds or less of wire products need not be priced under the ceiling rules. Former requirement that sellers doing \$50,000 annual business must file prices with OPA has been liberalized by making the volume \$100,000 annually.

Lake Superior iron ore consumption in January totaled 7,158,423 gross tons, compared with 7,061,981 tons in December, with 178 blast furnaces in production Feb. 1, compared with 176 a month earlier. Ore on hand at furnaces and Lake Erie docks Feb. 1 was 33,919,063 tons, against 29,794,047 tons at the same date a year ago.

Composite prices, based on ceilings imposed by OPA, continue at the recent level, finished steel \$56.73, semi-finished steel \$36.00, steelmaking pig iron \$23.05 and steelmaking scrap \$19.17.

Demand

War needs predominate.

Prices

No changes scheduled.

Production

Down 1 point to 96 per cent.

COMPOSITE MARKET AVERAGES

	Feb. 21	Feb. 14	Feb. 7	One Month Ago Jan., 1942	Three Months Ago Nov., 1941	One Year Ago Feb., 1941	Five Years Ago Feb., 1937
Finished Steel	\$56.73	\$56.73	\$56.73	\$56.73	\$56.73	\$56.73	\$55.18
Semifinished Steel ...	36.00	36.00	36.00	36.00	36.00	36.00	36.20
Steelmaking Pig Iron. 23.05	23.05	23.05	23.05	23.05	23.05	22.95	19.98
Steelmaking Scrap... 19.17	19.17	19.17	19.17	19.17	19.17	20.05	19.40

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	Feb. 21, 1942	Jan. 1942	Nov. 1941	Feb. 1941	Pig Iron	Feb. 21, 1942	Jan. 1942	Nov. 1941	Feb. 1941
Steel bars, Pittsburgh.....	2.15c	2.15c	2.15c	2.15c	Bessemer, del. Pittsburgh.....	\$25.34	\$25.34	\$25.34	\$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.....	2.47	2.47	2.47	2.47	Basic, eastern, del. Philadelphia.	25.34	25.34	25.34	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.....	2.215	2.215	2.215	2.215	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.	24.06	24.06	24.06	24.06
Plates, Philadelphia.....	2.15	2.15	2.15	2.225	No. 2X, del. Phila. (differ. av.)...	26.215	26.215	26.215	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	31.34	31.34	31.34	30.34
Sheets, No. 24 galv., Pittsburgh....	3.50	3.50	3.50	3.50	Gray forge, del. Pittsburgh.....	24.19	24.19	24.19	24.17
Sheets, hot-rolled, Gary.....	2.10	2.10	2.10	2.10	Ferromanganese, del. Pittsburgh.	125.33	125.33	125.33	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					
Bright bess., basic wire, Pitts....	2.60	2.60	2.60	2.60	Scrap				
Tin plate, per base box, Pitts....	\$5.00	\$5.00	\$5.00	\$5.00	Heavy melting steel, Pitts.....	\$20.00	\$20.00	\$20.00	\$20.75
Wire nails, Pittsburgh.....	2.55	2.55	2.55	2.55	Heavy melt, steel, No. 2, E. Pa....	18.75	18.75	18.75	18.50
					Heavy melting steel, Chicago.....	18.75	18.75	18.75	19.25
					Rails for rolling, Chicago.....	22.25	22.25	22.25	23.75
					No. 1 cast, Chicago.....	20.00	21.12	21.50	19.875
					Coke				
					Connellsville, furnace, ovens....	\$6.25	\$6.25	\$6.25	\$5.50
					Connellsville, foundry, ovens....	7.25	7.25	7.25	6.00
					Chicago, by-product fdry., del....	12.25	12.25	12.25	11.75

Semifinished Material

Sheet bars, Pittsburgh, Chicago..	\$34.00	\$34.00	\$34.00	\$34.00
Slabs, Pittsburgh, Chicago.....	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh....	34.00	34.00	34.00	34.00
Wire rods No. 5 to 3/4-inch, Pitts.	2.00	2.00	2.00	2.00

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

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

Sheets, Strip

Hot-Rolled Sheets	
Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base.....	2.10c
Granite City base.....	2.20c
Detroit, del.....	2.20c
Pacific ports.....	2.65c
Cold-Rolled Sheets	
Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base..	3.05c
Granite City, base.....	3.15c
Detroit, del.....	3.15c
Other Mich. pts., del.....	2.25c
Pacific ports.....	3.70c
Galvanized Sheets, No. 24	
Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base	3.50c
Granite City, base.....	3.60c
Pacific ports.....	4.05c

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
Fild gr... 3.20c	3.95c	3.30c
Armat... 3.55c	4.30c	3.65c
Elect... 4.05c	4.80c	4.15c

Motor ...	4.95c	5.70c	5.05c	Detroit, del.....	2.90c
Dynamo ...	5.65c	6.40c	5.75c	Other Mich. pts. del.....	2.95c
Transformer				Commodity C.R. Strip	
72.....	6.15c	6.90c		Pittsburgh, Cleveland, Youngstown, base 3 tons and over.....	2.95c
65.....	7.15c	7.90c		Worcester, base.....	3.35c
58.....	7.65c	8.40c		Detroit, del.....	3.05c
52.....	8.45c	9.20c		Other Mich. pts. del.....	3.10c
Hot-Rolled Strip				Cold-Finished Spring Steel	
Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less.....		2.10c		Pittsburgh, Cleveland, base; add 20 cents for Worcester.	
Detroit, del.....		2.20c		26.50 Carbon.....	2.80c
Other Mich. pts. del.....		2.25c		51.75 Carbon.....	4.30c
Pacific ports.....		2.75c		76-1.00 Carbon.....	6.15c
				Over 1.00 Carbon.....	8.35c

Cold-Rolled Strip	
Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less.....	2.80c
Chicago, base.....	2.90c
Worcester, base.....	3.00c

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
Long Ternes	
Pittsburgh, Gary No. 24 unassorted.....	3.80c
Pacific Ports.....	4.55c
Special Coated Mfg. Ternes	
Pittsburgh, Chicago, Gary, 100-base box.....	\$4.30
Granite City.....	\$4.40
Roofing Ternes	
Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.	
8-lb....	\$12.00
25-lb....	\$16.00
15-lb....	14.00
30-lb....	17.25
20-lb....	15.00
40-lb....	19.50

Stainless Steels

TYPE	Base, Cents per lb.—f.o.b.			H. R.	C. R.
	BARS	PLATES	SHEETS		
302.....	24.00c	27.00c	34.00c	21.50c	28.00c
303.....	26.00	29.00	36.00	27.00	33.00
304.....	25.00	29.00	36.00	23.50	30.00
304-20% clad.....		18.00	19.00		
308.....	29.00	34.00	41.00	28.50	35.00
309.....	36.00	40.00	47.00	37.00	47.00
310.....	49.00	52.00	53.00	48.75	56.00
311.....	49.00	52.00	53.00	48.75	56.00
312.....	36.00	40.00	49.00		
316.....	40.00	44.00	48.00	40.00	48.00
317.....	50.00	54.00	58.00	50.00	58.00
347.....	33.00	38.00	45.00	33.00	42.00
403.....	21.50	24.50	29.50	21.25	27.00
410.....	18.50	21.50	26.50	17.00	22.00
416.....	19.00	22.00	27.00	18.25	23.50
420.....	24.00	28.50	33.50	23.75	29.50
430.....	19.00	22.00	29.00	17.50	22.50
430F.....	19.50	22.50	29.50	18.75	24.50
431.....	19.00	22.00	29.00	17.50	22.50
442.....	22.50	25.50	32.50	24.00	32.00
446.....	27.50	30.50	36.50	35.00	52.00
501.....	8.0c	12.00	15.75	12.00	17.00
502.....	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown	2.10c
Coatesville, Sparrows Point, Claymont	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c
Steel Floor Plates	
Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

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

Bars

Hot-Rolled Carbon Bars	
Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Duluth, base	2.25c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail, Houston from Birmingham	2.59c
Pac. ports, dock	2.80c
All-rail from Chicago	3.25c
Rail Steel Bars	
Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail, Houston from Birmingham	2.59c
Pac. ports, dock	2.80c
All-rail from Chicago	3.25c

Hot-Rolled Alloy Bars	
Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size	2.70c
Detroit	2.80c
Alloy	
S.A.E. Diff. S.A.E. Diff.	
2000..... 0.35 3100..... 0.70	
2100..... 0.75 3200..... 1.35	
2300..... 1.70 3300..... 3.80	
2500..... 2.55 3400..... 3.20	
4100 .15-25 Mo. 0.55	
4600 0.20-0.30 Mo.; 1.50-2.00 Ni. 1.20	
5100 80-1.10 Cr. 0.45	
5100 Spr. flats 0.15	
6100 Bars 1.20	
6100 Spr. flats 0.85	
Carb., Van. 0.85	
9200 Spr. flats 0.15	
9200 Spr. rounds, squares 0.40	
T 1300, Mn, mean 1.51-2.00 0.10	
Do., carbon under 0.20 max. 0.35	

Cold-Finished Carbon Bars	
Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs.	2.65c
Detroit	2.70c
Cold-Finished Alloy Bars	
Pitts., Chicago, Gary, Cleveland, Buffalo, base	3.35c
Detroit	3.45c
Galveston, add \$0.25; Pacific Coast, \$0.50.	

Turned, Ground Shafting	
Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras)	2.65c
Detroit	2.70c
Reinforcing Bars (New Billet)	
Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base	2.15c
Gulf ports, dock	2.50c
All-rail, Houston from Birmingham	2.59c
Pacific ports, dock	2.80c
Detroit, del.	2.25c
Reinforcing Bars (Rail Steel)	
Pitts., Chicago, Gary, Cleveland, Birm., base	2.15c
Gulf ports, dock	2.50c

All-rail, Houston from Birmingham	2.59c
Pacific ports, dock	2.80c
Detroit, del.	2.25c
Iron Bars	
Philadelphia, com. del. 3.06-3.50c	
Pittsburgh, muck bar.	5.00c
Pittsburgh, staybolt	8.00c
Terre Haute com., f.o.b. mill	2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads	
Standard and cement coated wire nails	
(Per Pound)	
Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	
Single loop bale ties, (base C. L. column)	59
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade	
Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire at Birmingham)	
Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.	

Cut Nails

Carload, Pittsburgh, keg.	\$3.85
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Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa.	3.50c
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Rails, Fastenings

(Gross Tons)	
Standard rails, mill	\$40.00
Relay rails, base, 35 lbs. and over	28.00-30.00
Light rails, billet qual., Pitts., Chicago, Bham.	\$40.00
Do., rerolling quality.	39.00
Cents per pound	
Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.75c
Do., heat treated	5.00c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c
Base, light rails 25 to 60 lbs., 20 lbs. up \$2; 16 lbs. up \$4; 12 lbs. up \$8; 8 lbs. up \$10. Base railroad spikes 200 kegs or more; base plates 20 tons.	

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.	
Carriage and Machine	
½ x 6 and smaller	65 ½ off
Do., ¾ and ¾ x 6-in. and shorter	63 ½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1 ½ and larger, all lengths 59 off	
All diameters, over 6-in. long	59 off
Tire bolts	50 off

Stove Bolts	
In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.	
Step bolts	56 off
Plow bolts	65 off
Nuts	
Semifinished hex. U.S.S. S.A.E.	
½-inch and less.	62 64
¾-1-inch	59 60
1 ½-1 ½-inch	57 58
1 ½ and larger.	56

Hexagon Cap Screws	
Upset 1-in., smaller	60 off
Square Head Set Screws	
Upset, 1-in., smaller	68 off

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

Piling

Pitts., Chgo., Buffalo	2.40c
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Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.	
Structural	3.75c
¾-inch and under	65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l.	\$3.50 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.	
Carb. Reg. 14.00	Oil-hard-ening 24.00
Carb. Ext. 18.00	High car.-chr. 43.00
Carb. Spec. 22.00	

High Speed Tool Steels

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

Boiler Tubes

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

Lap Welded	
Sizes	Gage Steel
1 ½" O.D.	13 \$ 9.72
1 ¾" O.D.	13 11.06
2" O.D.	13 12.38
2 ¼" O.D.	13 13.79
2 ½" O.D.	12 15.16
2 ¾" O.D.	12 16.58
3" O.D.	12 17.54
3 ½" O.D.	12 18.35
3 ¾" O.D.	11 23.15
4" O.D.	10 28.66
5" O.D.	9 44.25
6" O.D.	7 68.14

Seamless	
Hot Rolled	
Sizes	Gage Steel
1" O.D.	13 \$ 7.82
1 ¼" O.D.	13 9.26
1 ½" O.D.	13 10.23
1 ¾" O.D.	13 11.64
2" O.D.	13 13.04
2 ¼" O.D.	13 14.54
2 ½" O.D.	12 16.01
2 ¾" O.D.	12 17.54
3" O.D.	12 18.59
3 ½" O.D.	12 19.50
3 ¾" O.D.	11 24.62
4" O.D.	10 30.54
4 ½" O.D.	10 37.35
5" O.D.	9 46.87
6" O.D.	7 71.96
Cold Drawn	
3-12-inch	\$52.00
12-18-inch	54.00
18-inch and over	56.00

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2 ½ and 1 ½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld Steel	
In.	Blk. Galv.
½	63 ½ 51
¾	66 ½ 55
1-3	68 ½ 57 ½
Iron	
¾	30 10
1-1 ¼	34 16
1 ½	38 18 ½
2	37 ½ 18
Lap Weld Steel	
2	61 49 ½
2 ½-3	64 52 ½
3 ½-6	66 54 ½
7 and 8	65 52 ½

Iron	
2	30 ½ 12
2 ½-3 ½	31 ½ 14 ½
4	33 ½ 18
4 ½-8	32 ½ 17
9-12	28 ½ 12
Line Pipe, Plain Ends	
Steel	
1 to 3, butt weld	68 ½
2, lap weld	63
2 ½ to 3, lap weld	66
3 ½ to 6, lap weld	65
7 and 8, lap weld	64
Seamless, 3 pts. lower discount.	

Cast Iron Pipe

Class B Pipe—Per Net Ton	
6-in., & over, Birm.	\$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00
Class A Pipe \$3 over Class B	
Std. figs., Birm., base \$100.00	

Semifinished Steel

Rerolling Billets, Slabs (Gross Tons)	
Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point.	\$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00
Forging Quality Billets	
Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars	
Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago.	34.00
Detroit, delivered	36.00
Wire Rods	
Pitts., Cleveland, Chicago, Birmingham No. 5 to 5 ½-inch incl. (per 100 lbs.)	\$2.00
Do., over 5 ½ to 5 ¾-inch incl.	2.15
Worcester up \$0.10, Galveston up \$0.25 and Pacific Coast up \$0.50 on water shipments.	

Skelp	
Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c
Shell Steel	
Pittsburgh, Chicago, base, 1000 tons of one size, open hearth	
3-12-inch	\$52.00
12-18-inch	54.00
18-inch and over	56.00

Coke

Price Per Net Ton	
Beehive Ovens	
Connellsville, fur.	\$6.00
Connellsville, fdry.	7.00-7.50
Connell, prem. fdry.	7.25-7.60
New River fdry.	8.00-8.25
Wise county fdry.	7.50
Wise county fur.	6.50
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside del.	11.50
Chicago, delivered	12.25
Terre Haute, del.	12.00
Milwaukee, ovens	12.25
New England, del.	13.75
St. Louis, del.	12.25
Birmingham, ovens.	8.50
Indianapolis, del.	12.00
Cincinnati, del.	11.75
Cleveland, del.	12.30
Buffalo, del.	12.50
Detroit, del.	12.25
Philadelphia, del.	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do less than car lots	13.25c
Do tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	\$29.00

Pig Iron

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

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

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

Delivered from Basing Points:

	25.39	25.39	24.89	25.89
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham	25.61		25.11	
Boston from Birmingham	25.12			
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00		
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	24.22			
Cincinnati from Hamilton, O.	24.44	25.11	24.61	
Cincinnati from Birmingham	24.06		23.06	
Cleveland from Birmingham	24.12		23.12	
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago				
Toledo or Detroit	27.19	27.19		
Newark, N. J., from Birmingham	26.15			
Newark, N. J., from Bethlehem	26.53	27.03		
Philadelphia from Birmingham	25.46		24.96	
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	
Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Allquippa, 84c; Monessen, Monongahela City, \$1.07; Oakmont, Verona, \$1.11; Brackenridge, \$1.24.				

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	
St. Louis from Birmingham	24.50		23.62	
St. Paul from Duluth	26.63	26.63		27.13

†Over 0.70 phos.
Low Phos.
 Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., \$29.50 base; \$30.74 delivered Philadelphia.

	Gray Forge	Charcoal
Valley furnace	\$23.50	Lake Superior fur. \$28.00
Pitts. dist. fur.	23.50	do., del. Chicago 31.34
		Lyles, Tenn., high phos. 28.50

Silvery
 Jackson county, O., base, 6.00 to 6.50 per cent \$29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base \$1.25 higher.

Bessemer Ferrosilicon
 Jackson county, O., base; Prices are the same as for silveries, plus \$1 a ton.
 Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

	Per 1000 f.o.b. Works, Net Prices	Ladle Brick (Pa., O., W. Va., Mo.)
		Dry press \$31.00
		Wire cut 29.00
Fire Clay Brick		Magnesite
Super Quality		Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
Pa., Mo., Ky.	\$64.60	net ton, bags 26.00
First Quality		Basic Brick
Pa., Ill., Md., Mo., Ky.	51.30	Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.
Alabama, Georgia	51.30	Chrome brick \$54.00
New Jersey	56.00	Chem. bonded chrome 54.00
Second Quality		Magnesite brick 76.00
Pa., Ill., Ky., Md., Mo.	46.55	Chem. bonded magnesite 65.00
Georgia, Alabama	38.00	
New Jersey	49.00	
Ohio		
First quality	43.00	
Intermediate	36.10	
Second quality	36.00	
Malleable Bung Brick		
All bases	\$59.85	
Silica Brick		
Pennsylvania	\$51.30	
Joliet, E. Chicago	58.90	
Birmingham, Ala.	51.30	

Fluorspar

Washed gravel, duty pd., tide net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	\$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%	Less than 200-lb. lots	14.25c	Carloads	Ton lots	Less ton lots	1.25
Carlots, duty pd., seab'd	67-72% low carbon, cts. per pound:		\$ 74.50	\$87.00	20-25% C, 0.10 max., in ton lots per lb. contained	
Carlots, del. Pittsburgh			1.50	1.75	TI	1.35
Carlots, f.o.b. So. f'ces.			135.00	151.00	Less-ton lots	1.40
Add \$10 for ton, \$13.50 for less ton, \$18 for less than 200-lb. lots.	Car loads	200	1.80	2.00	(Spot 5c higher)	
Spiegelstein, 19-21%, gross ton, Palmerton	Less	200	170.00	188.00		
	2% C	19.50	2.00	2.20		
	1% C	20.50	21.25	21.75		
	0.20% C	21.50	22.25	22.75		
	0.10% C	22.50	23.25	23.75		
	Spot is 1/4c higher.		10.25c	11.25c		
			(Above for contracts; spot 1/4c higher)			
Manganese Briquets, Contract carloads, bulk freight allowed, per lb.	Ferromolybdenum, 55-75%		Silicon Metal, Spot 1/4-cent higher (Per Lb., Contracts):		Ferro-carbon-Titanium, 15-20% Titanium,	
Packed	per lb. contained molybdenum, f.o.b. furnace	95.00c	1% Iron	2% Iron	6-8% C	3-5% C
Ton lots	Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant	80.00c	Carlots	Carlots	Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis.	\$157.50
Less-ton lots			Ton lots	Ton lots	Ferrovandium, 35-40% contract per pound contained vanadium	\$2.70-\$2.80-\$2.90 (Spot 10c higher)
Less 200-lb. lots	Molybde Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant	30.00c	Less-ton lots	Less-ton lots	Vanadium Pentoxide, Per lb. contained, contracts	\$1.10
Spot 1/4c higher.			Spot 1/4c higher on less ton lots; \$5 higher on ton lots and over.		Do., spot	1.15
Manganese Electro, 99.9+%, less car lots	Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants	80.00c	Silicomanganese, Carbon		Zirconium Alloy, 12-15% carloads, contract, bulk	\$102.50
			1 1/4% 2 1/2%		Packed	107.50
Chromium Metal, per lb. contained chromium	Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs	\$2.60	Carloads		Ton lots	108.00
	Do., 100-200 lb. lots	2.75	(contract)	\$128.00	Less ton lots	112.50
	Do., under 100-lb. lots	3.00	Ton Lots	140.50	Spot \$5 a ton higher	
	Ferrophosphorus, 17-19%, gross ton carloads, f.o.b. sellers' works, \$3 unitage, freight equalized with Rockdale, Tenn. for 18% phos.		(contract)	130.50	35-40% contract, carloads, bulk or package, per lb. alloy	14.00c
	Contract	\$58.50	Freight allowed spot \$5 above contract		Do., ton lots	15.00c
	Spot	62.25			Do., less-ton lots	16.00c
	23-26%, \$3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos.		Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten	\$1.90	Spot is 1/4-cent higher	
	Contract	75.00			Alsilfer, Per lb., f.o.b. Niagara Falls.	
	Spot	80.00			Contract	Spot
Ferrosilicon, Gross tons, freight allowed, bulk			Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity	\$2.60-\$2.65	Carlots	7.50c
			Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots	\$1.23	Ton Lots	8.00c
					Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)	8.50c
					Less	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

As Kansas City, Mo., Chattanooga, Tenn., Tulsa, Okla., and Portland, Oreg., were not named in the order fixing ceiling prices they have been omitted below.

	Soft Bars		Hot-rolled Strip Bands		Plates 1/4-in. & Over		Structural Shapes		Floor Plates		Sheets			Cold Rolled Strip		Cold Drawn Bars			
											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	4.48	5.11	3.46	4.13	8.88	7.23						
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19						
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16						
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....				
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....				
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75						
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75						
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75						
Detroit	3.42	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05						
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....				
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10						
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75						
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44						
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	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	....	5.01	....	3.97	....	....				
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....				
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....				
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....				
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....				
Seattle	4.35	4.35	....	4.35	4.35	6.10	4.35	6.35	5.60	....	5.75	....	....				
Los Angeles	4.50	5.00	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.60	10.55	9.55						
San Francisco	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	....	6.80	10.80	9.80						

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis. Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, 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; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

	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	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.75	9.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.60	9.80	8.80	8.65	9.05

EUROPEAN IRON, STEEL PRICES

Dollars at \$4.02 1/2 per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH	
	Gross Tons f.o.b. U.K. Ports	£ s d
Merchant bars, 3-inch and over	\$66.50	16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20 0 0
Structural shapes	2.95c	15 10 0
Ship plates	2.90c	16 2 6
Boiler plates	3.17c	17 12 6
Sheets, black, 24 gage	4.00c	22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c	25 12 6
Tin plate, base box, 20 x 14, 108 pounds	\$ 6.20	1 10 9
British ferromanganese \$120.00 delivered Atlantic seaboard duty-paid		

Domestic Prices Delivered at Works or Furnace—

	£ s d
Foundry No. 3 Pig Iron, Silicon 2.50-3.00	\$25.79 6 8 0(a)
Basic pig iron	24.28 6 0 6(a)
Furnace coke, f.o.t. ovens	7.56 1 17 6
Billets, basic soft, 100-ton lots and over	49.37 12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c 14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c 17 12 0††
Shapes	2.77c 15 8 0††
Ship plates	2.91c 16 3 0††
Boiler plates	3.06c 17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c 22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c 26 2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c 23 15 0
Rands and strips, hot-rolled	3.30c 18 7 0
(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.	

Ores

Lake Superior Iron Ore		South African (excluding war risk)	
Gross ton, 51 1/2% Lower Lake Ports		No ratio lump, 44%	28.00
Old range bessemer		Do.	29.00
Mesabi nonbessemer		Do.	34.00
High phosphorus		Do. concentrates, 48%	33.00
Mesabi bessemer		Do.	34.00
Old range nonbessemer			
Brazilian			
2.5:1 lump, 44%		2.5:1 lump, 44%	31.00
2.8:1 lump, 44%		2.8:1 lump, 44%	32.50
3:1 lump, 48%		3:1 lump, 48%	41.00
No ratio lump, 48%		No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%		Do. concentrate, 48%	33.00-33.50
Eastern Local Ore			
Cents. unit, del. E. Pa.			
Foundry and basic 56-63% contract			12.00
Foreign Ore			
Cents per unit, c.i.f. Atlantic ports			
Manganiferous ore, 45-55% Fe., 6-10% Mang.			
N. African low phos.		Nom.	
Spanish, No. African basic, 50 to 60%		Nom.	
Chinese wolframite, net ton, duty pd.		\$24.00	
Brazil iron ore, 68-69% ord.		7.50c	
Low phos. (.02 max.)		8.00c	
F.O.B. Rio Janeiro			
Scheelite, imp.		23.50-24.00	
Chrome Ore			
Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees			
Indian and African, 2.8:1 lump, 48%		\$39.00	
Rhodesian		nominal	
Manganese Ore			
Including war risk but not duty, cents per unit cargo lots			
Caucasian, 50-52%			
S. African, 48%			65.00
Indian, 50%			66.00
Brazilian, 48%			65.00
Chilean, 48%			68.00
Cuban, 51%, duty free			81.00-83.00
Molybdenum			
Sulphide conc., lb., Mo. cont., mines			\$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices 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	Low Phos. Grades	Heavy Structural, Plate	3 ft. and less	2 ft. and less	1 ft. and less	3 ft. and less	2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle Forge Turnings
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren...	\$16.00	\$25.00	\$21.00	\$21.50	\$22.00	\$20.00	\$20.50	\$21.00	\$21.00	\$18.00	\$19.50
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	14.75	23.75	19.75	20.25	20.75	18.75	19.25	19.75	19.75	16.75	18.25
Bethlehem	14.25	23.25	18.25	19.75	20.25	18.25	18.75	19.25	19.25	16.25	17.75
Buffalo	15.25	24.25	20.25	20.75	21.25	19.25	19.75	20.25	20.25	17.25	18.75
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	15.50	24.50	20.50	21.00	21.50	19.50	20.00	20.50	20.50	17.50	19.00
Detroit	13.85	22.85	18.85	19.35	19.85	17.85	18.35	18.85	18.85	15.85	17.35
Toledo	13.85	22.85	18.85	19.35	19.85	17.85	18.35	18.85	18.85	15.85	17.35
Chicago	14.75	23.75	19.75	20.25	20.75	18.75	19.25	19.75	19.75	16.75	18.25
Kokomo	14.25	23.25	19.25	19.75	20.25	18.25	18.75	19.25	19.25	16.25	17.75
Duluth	14.00	23.00	19.00	19.50	20.00	18.00	18.50	19.00	19.00	16.00	17.50
St. Louis	13.50	22.50	18.50	19.00	19.50	17.50	18.00	18.50	18.50	15.50	17.00
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	13.00	22.00	18.00	18.50	19.00	17.00	17.50	18.00	18.00	15.00	16.50
Minneapolis, Colo.	12.50	21.50	17.50	18.00	18.50	16.50	17.00	17.50	17.50	14.50	16.00
Seattle	10.50	19.50	15.50	16.00	16.50	14.50	15.00	15.50	15.50	13.50	15.00
Portland, Ore.	.....	.....	.....	14.00	14.50	.....	13.00	13.50	13.00	11.00	12.50

RAILROAD SCRAP

	Heavy Melting Steel		Scrap Rails		Rails for Rolling	
	21.00	19.75	3 ft. and under	2 ft. and under	18 in. and under	16 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton, Philadelphia, Wilmington, Sparrows Point	21.00	19.75	24.00	24.25	24.50	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	21.50	20.75	22.75	23.00	23.25	24.00
Chicago	20.50	19.75	23.50	23.75	24.00	23.25
Buffalo	20.25	19.25	22.75	23.00	23.25	24.00
Detroit	18.85	18.25	21.85	22.10	22.35	23.75
Kokomo	19.25	18.75	22.25	22.50	22.75	23.75
Duluth	19.00	18.50	22.00	22.25	22.50	23.75
Kansas City, Mo.	17.00	16.50	20.00	20.25	20.50	23.75
St. Louis	18.00	17.50	21.50	21.75	22.00	23.75
Birmingham	18.00	17.50	21.50	21.75	22.00	23.75
Los Angeles, San Francisco	18.00	17.50	21.50	21.75	22.00	23.75
Seattle	15.50	15.00	21.00	21.25	21.50	23.75

CAST IRON SCRAP OTHER THAN RAILROAD

	Shipping point prices in gross tons		
	Group A	Group B	Group C
No. 1 Cupola Cast	\$18.00	\$19.00	\$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.00	16.00	17.00
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	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. scrap. No. 2 heavy melting steel, No. 1 hydraulic compressed black sheet iron borings. Add \$3 for chemical borings, \$5 when chemical borings used in manufacture of explosives.
 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, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.
 Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, blooms and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.
 Commissions: No commission is payable except by a consumer to a broker for services rendered. The commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. No commission is payable for preparation of scrap.
 Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, \$1 at Great Lakes ports, \$1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, \$8.27 per ton. Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on lowest rate for rail shipment, minimum \$1.00 per ton.
 Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than \$1 the prices listed in the table for the nearest basing point. Certain exceptions specified in OPA Price Schedule No. 4 (Amendment 11) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan.
 Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are \$2.50 less than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.
 Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon and Utah. Delivered price may exceed by not more than \$5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than \$5 the nearest basing point price.

Sheets, Strip

Sheet & Strip Prices, Page 110

Increasing stringency in steel sheets is reflected in inability of buyers to do much better than seven to eight weeks on even A-1-a priorities, at least one mill being unwilling to make definite delivery promise on that top priority. Numerous producers refuse definite promise on anything under A-1-a. Sheetmakers seek to keep their books filled with A-1 contracts, to protect their claim on supplies of pig iron, scrap and semifinished.

Much larger volume of high-priority tonnage is available than a few weeks ago and this, combined with increased continuous mill capacity being converted to plate production and drain on some producers for semifinished to go to outside consumers, accounts for extension of delivery.

Mills are being called on to accept increased allocated tonnage for drums and shell cases. Recently a substantial tonnage of galvanized sheets was allocated for early shipment, upsetting schedules considerably. While no suggestion of allocation has been made, a large tonnage of No. 11 and 18 gage hot-rolled sheets for 105-millimeter shell carriers is before the trade.

With increasing sheet shortage some cancellations are being noted, mainly from consumers whose normal production has been adversely affected by the war program. In some cases these consumers ask only deferment. When such tonnage has been rolled or is in process mills have little difficulty in passing it on, warehouses being willing to take it, regardless of specifications.

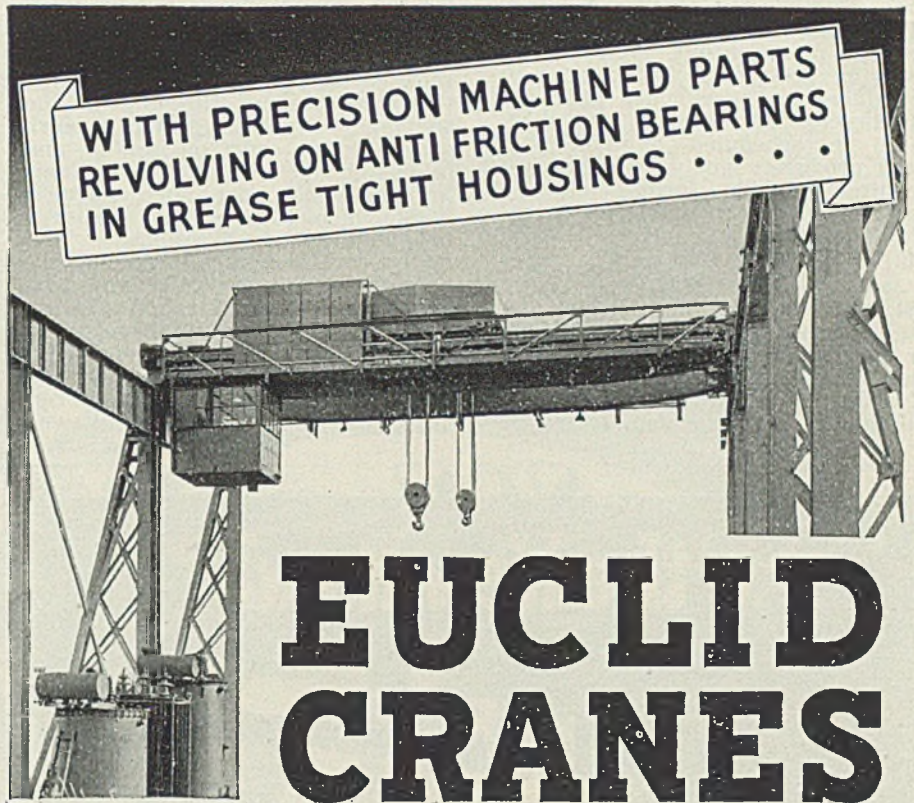
Some automobile builders, production being stopped, are selling sheet inventories to other consumers, such as makers of refrigerators and other household utilities.

Highly rated orders for narrow cold strip are heavier, about equal to shipments. Bookings this month will exceed those of January by a small margin. Declining tonnages from curtailed industries producing civilian goods is being replaced by defense tonnage, most of which is for prompt delivery. Production is regulated by supply of hot-rolled strip, which is dependent on semifinished supply. Controls and allocations of chromium and nickel confine cold strip alloy output to high-rated orders, but allocations of the former usually are filled promptly. Considerable tonnage of chromium-type alloys is being held up, although ready to ship. This is used for decorative work and is unsuited for aircraft use and may be remelted for the chromium.

Plates

Plate Prices, Page 110

Closer control over production and shipment of steel plates is being put into effect by WPB to assure filling of all military requirements, including Navy and Mari-



Typical anti - friction shaft bearings.



Showing short shafts, rugged gears and grease-tight housing of mechanical load brake.



Trolley drives are also especially rugged, mounted on anti-friction bearings and enclosed in grease-tight housing split on shaft centers to afford accessibility.

EUCLID HOISTS

are available in a wide range of types and capacities. Write for Bulletin No. 838.

EUCLID Cranes embody features of design and construction that assure years of satisfactory service with minimum attention.

Modern control units give instant response to every demand of the operator with shock-free pick-up and lowering of the load, smooth movement in all directions and safety under all conditions.

Practical design with excellence of construction are assured by decades of experience and a policy of using nothing but the highest grades of materials.

Short rugged shafts, massive broad-faced gears and liberally proportioned anti-friction bearings are enclosed in dirt and grease-tight housings, yet all are uncommonly accessible.

Euclid cranes are designed to meet specific requirements but all detail parts are standardized and jig-machined. This assures accuracy, interchangeability, low maintenance costs and economy of manufacture which permit giving great value to the purchaser.

Write for catalog describing various types of cranes in capacities from $\frac{1}{2}$ ton to 500 tons.



THE EUCLID CRANE & HOIST CO.

EUCLID, OHIO, Suburb of Cleveland

time Commission needs, in face of lagging deliveries, despite increased plate output. Only orders carrying preference rating of A-10 or higher or specifically allocated by director of industry operations may be scheduled or delivered. Both producers and consumers are required to file forms detailing requirements, consumption, inventory, receipts and schedules for the following month.

January plate shipments were 754,522 tons, the highest in history, compared with 635,812 tons in December, the previous high mark, due largely to conversion of sheet and strip mills. By March shipments are expected to reach

800,000 tons, close to practical capacity.

Filling of small-lot orders, even those with top ratings, presents the most serious difficulty in the shortage of plates. Partially fabricated work, short estimates and fill-in tonnages of five to 20 tons are affected, most such requirements being for prompt delivery to avoid delays. Warehouses normally covering such tonnage, are operating with depleted and broken inventories. Shipyard fabrication is heavy, most tonnage being delivered under allocation with reasonable promptness. Shops building ship equipment have record backlogs and are being well

supplied with ratings just below direct allocations.

The more rigid control in plates, which appears to be following the pattern of pig iron allocations, is expected to eliminate much of the difficulty now resulting from over-allocation to various plants and allocation to mills not best suited mechanically to handle it. A frequent complaint by plate producers is that Washington needs better conception of plate mill facilities if present confusion and delay are to be eliminated. Mills are doing all they can to get necessary forms to their customers for reporting requirements and uses, though the time allowed is short.

PLATE CONTRACTS PENDING

100 tons, 250,000-gallon elevated steel tank, Richmond, Ky.; bids Feb. 24, United States engineer, Cincinnati.

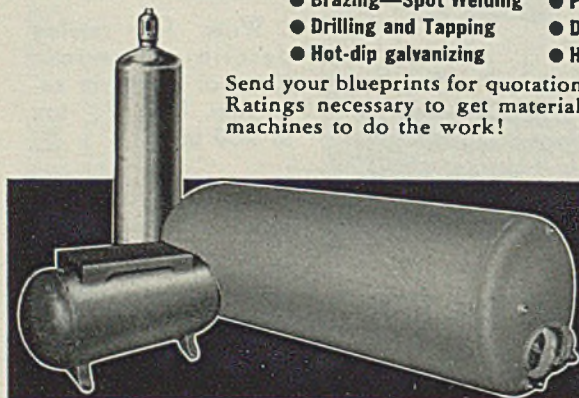


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Send your blueprints for quotation. If you have the Priority Ratings necessary to get materials, we have the men and machines to do the work!



SCAIFE COMPANY

General Offices and Works:
OAKMONT, PA.
 (Pittsburgh District)
 Representatives in Principal Cities

Bars

Bar Prices, Page 111

Only allocation and top priority afford promise of delivery on carbon bars before the end of first quarter, particularly in large rounds and some flat sections. Some consumers find that even with A-1-a priority they can do little under eight weeks. In addition to heavy consumption of alloy bars demand has increased for cold-finished material. Tool steel demand is also active.

Cold-drawn bars are expected to be returned to the general allocation basis April 1, after being taken off a fortnight ago. This was done because not sufficient time had been allowed to set up the new schedule.

Cold-finished bar shipments are up, probably due in some measure to increased use of production machinery. The main difficulty has been labor shortage, a condition remedied only by intensive training of men to handle skilled jobs. Some of these men are now being broken in on production work, with a consequent increase in output.

Hot-rolled bar mills are still pushing for higher output, but are hampered by variations in sizes of high rated bars. Rolling cycles have been shortened to closer attunement with top rated orders, which means a greater time loss but better deliveries on the more highly rated orders. All orders are being given equal consideration by integrated mills, so that nonintegrated producers, as well as other finishing departments of the producer, get the same treatment as far as rated tonnage is concerned. This is opposed to a quota system which operated formerly, although mill output to the various factors, and then applying ratings to that tonnage.

In New England, while some contracts for carbon and alloy bars extend through second quarter and even into third quarter, allocation of shell steel bars after March 1 is not likely to have important effects, except for a few consumers in Connecticut. Most capacity engaged on shell steel is

for machining only. Little forging capacity is available for anything but aircraft work.

Pipe

Pipe Prices, Page 111

The plumbing supply trade, normally the largest outlet for merchant pipe in several districts, finds demand increasingly limited by seasonal factors and wartime restrictions on commercial building. Some of these distributors are endeavoring to shift to the industrial field, which is comparatively active, but find difficulty in obtaining other material to accompany the pipe.

Much oil country tonnage is being held up while well drillers continue efforts to obtain relief from order M-68, which became effective late in December. Mechanical and boiler tubing deliveries are further extended, in spite of increased capacity, reflecting largely requirements from airplane and shipbuilding industries.

CAST PIPE PLACED

175 tons, 12-inch, East Eighth Street project, Seattle; to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

100 tons, 12-inch and valves, Thirty-sixth Avenue West improvement, Seattle, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; fittings to Olympic Foundry Co., Seattle.

CAST PIPE PENDING

100 tons, 12 and 8-inch and fittings for Auburn and Monroe, Wash.; bids Feb. 17 and Feb. 25, respectively.

Unstated, water system at Kodiak, Alaska; bids soon to Defense Public Works Agency, Seattle; \$77,000 available.

STEEL PIPE PENDING

2700 tons, fabricated steel pipe, Washington Suburban Sanitary Commission; bids Feb. 25.

Wire

Wire Prices, Page 111

Increase in defense orders for wire, carrying high ratings, has lifted volume of incoming business above shipments. Drop in civilian requirements is more than balanced by rated tonnage. Alloys of chromium, nickel and tin are confined to higher priorities, under allocation, and production is limited by available rod supplies, electric furnace and alloy material being especially scarce. More than 50 per cent of orders for specialties entering into defense work is being placed through contractors.

Wire deliveries to rope mills are maintained, the latter having a large backlog of rated tonnage. Fine wire is affected more by allocations and controls than are the more standard goods and in the matter of substitute material attempts are being made to utilize those most easily obtained and less affected by priority.

Tin Plate

Tin Plate Prices, Page 110

Tin plate production continues steady at 92 per cent of rated ca-

DURABLE
ADAPTABLE
AVAILABLE

REX-WELD
flexible
Metal
hose

Both Steel and Bronze

The Immediate Solution to Your Flexible Connection Problems!



Type RW-81
(annular corrugations)



Type RW-91
(helical corrugations)

REX-WELD (corrugated) **Flexible METAL Hose**

Sizes from $\frac{1}{8}$ " I. D. to 4" I. D. inc.
Pressures to 14,500 p.s.i. Temperatures to 1000° F. One-piece, all-metal construction. Continuous lengths to 50 feet.

Rex-Tite Mechanical (Re-attachable) couplings; solder couplings; brazed and welded couplings and flange assemblies for Rex-Weld Flexible Metal Hose.

Complete Data on Request

CHICAGO METAL HOSE
CORPORATION
MAYWOOD, ILLINOIS

capacity and is expected to maintain that rate for some time. As actual rationing is done by can users, rather than by tin mills, production probably will go forward until stocks of packers, can companies and mills are filled. The order provides that packers shall not buy more than their orders require but this is not expected to result in much cancellation as buying usually is in bulk rather than for specific orders. In cases of large orders for cans not on the approved list some tonnage may be held up. Heavy vegetable packs this year are not definitely enough forecast to allow packers to buy closely and tin mills prob-

ably will continue production until the packing season ends or their stocks are built up sufficiently for all needs.

Rails, Cars

Track Material Prices, Page 111

Placing of 2500 freight cars by the New York Central with its subsidiary, Despatch Shops Inc., East Rochester, N. Y., brings domestic car buying this month to almost 7000 cars. The New York Central has also distributed 57 locomotives among several builders. These orders include 25 heavy steam freight engines, two 4000-horsepower diesel passenger loco-

motives and 30 diesel switch engines.

Argentine State Railways are inquiring for 225 to 450 twenty-five-metric ton box cars, in addition to 400 flat cars and fifty 9500-gallon tank cars which have been pending for several weeks.

Rail buying is light, in accord with government request that only pressing needs be placed. The Reading has closed on 10,000 tons of 130-pound rails to Bethlehem Steel Co.

OPA has ruled that contracts for relaying rails entered into before Feb. 7 at \$32 a net ton, the price prevailing then, may be completed if it can be done before March 15. The maximum price was revised as of Feb. 7 to \$32 per gross ton.

Association of American Railroads announces Class 1 railroads had 68,070 new freight cars on order Feb. 1, the largest number on record for that date, compared with 41,600 on the same date last year. At the same date 543 new locomotives were on order, 249 steam and 294 electric and diesel. Feb. 1 last year 238 were on order. Class 1 railroads in January put in service 8143 new freight cars, compared with 6525 in the same month last year. New locomotives put in service in January totaled 71.

CAR ORDERS PLACED

Baltimore & Ohio, 1000 fifty-ton hoppers, to Bethlehem Steel Co., Bethlehem, Pa., and 1000 fifty-ton box cars to General American Transportation Corp., Chicago.

Central of Georgia, 100 fifty-ton box cars, to American Car & Foundry Co., New York.

Chicago & North Western, two 50-ton box cars, to American Car & Foundry Co., New York.

Lehigh Valley, 500 hopper cars, to Bethlehem Steel Co., Bethlehem, Pa.

New York Central, 2500 cars, to Despatch Shops Inc., Rochester, N. Y., a subsidiary: Includes 1100 fifty-five-ton box cars, 600 seventy-ton gondolas, 500 fifty-five-ton self-clearing hoppers and 300 seventy-ton flat cars.

Nickel Plate, 50 standard 70-ton covered steel hoppers to American Car & Foundry Co., for Berwick, Pa., shops; fifty 50-ton steel flat cars to Pullman-Standard Car Mfg. Co., for Michigan City, Ind., shops.

CAR ORDERS PENDING

Argentine State Railways, 225 to 450 twenty-five metric ton box cars, bids asked; these are in addition to 400 forty-ton flat and fifty 9500-gallon tank cars pending since early in the year.

Carnegie-Illinois Steel Corp., 25 seventy-ton gondola cars, pending.

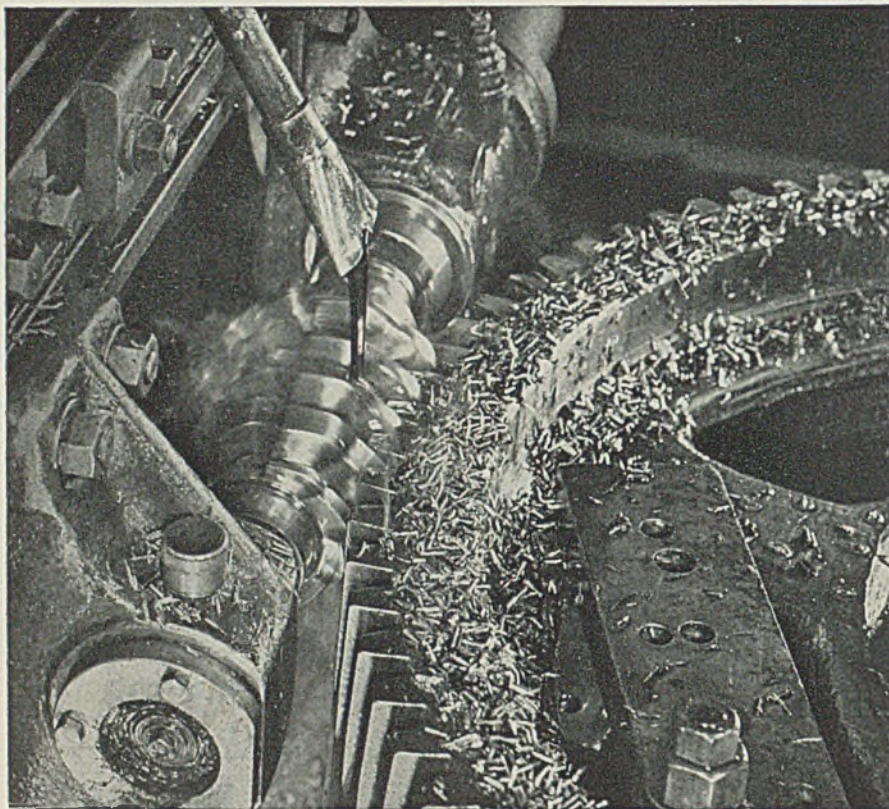
Navy, Bureau of Supplies and Accounts, 28 flat cars, 40-ton capacity, and 15 box cars, 40-ton capacity, standard, delivery Oakland, Calif.; bids March 10, schedule 436.

Tennessee Central, 100 hopper cars, bids asked.

War department, 470 narrow gage freight cars, bids asked; list includes 350 thirty-ton box and 120 thirty-ton gondola cars.

LOCOMOTIVES PLACED

New York Central, 57 locomotives, 25 heavy freight steam locomotives to Lima Locomotive Works, Lima, O.; two 4000-horsepower diesel passenger locomotives to Electro-Motive Corp., La Grange, Ill.; 30 diesel-switch engines divided among Electro-Motive



When we **CUT** we **CUT**...

...accurately to an unexcelled precision. Modern engineering, skilled craftsmen and the most up-to-date gear cutting machines combine with fine materials to make Horsburgh & Scott gears the finest made. From an ounce to 20,000 pounds... here's one source for all gears and gear products with precision plus features.

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THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

Corp., American Locomotive Co., New York, and Baldwin Locomotive Works, Eddystone, Pa.

New York, New Haven & Hartford, five 250-ton freight locomotives, to General Electric Co., Schenectady, N. Y. Nickel Plate, ten 2-8-4 freight locomotives, to Lima Locomotive Works, Lima, O.

LOCOMOTIVES PENDING

Boston & Maine, five 4-8-4 type steam locomotives; bids asked.

BUSES BOOKED

A.c.f. Motors Co., New York: Thirty 45-passenger motor coaches for Eastern Massachusetts Street Railway Co., Boston; now has over 400 a.c.f. units.

Memphis Street Railways, 10 trolley coaches, to Pullman-Standard Car Mfg. Co., Chicago.

United Electric Railways, Providence, R. I., 35 trolley coaches, to Pullman-Standard Car Mfg Co, Chicago

Structural Shapes

Structural Shape Prices, Page 111

Additional war production plants are being awarded and volume of steel shapes shows some increase. Material now being placed is highly rated and delivery is wanted at earliest possible time. Three large government plants are planned for the Middle West, at least one to be erected as soon as possible and inquiry for steel is expected soon. Fabricators are loaded with work and in some instances are unable to meet delivery requests.

Some bridge work has been abandoned as non-essential and private building is not being undertaken as steel can not be obtained in face of heavy war demand.

Close to 10,000 tons of fabricated structural steel are required for eight to ten power houses to be erected in various parts of the country, bids being in with a Boston engineering firm. Needed to supply additional power, these take A-1 ratings. Current inquiry is supported almost exclusively by additional extensions to war plants, including industrial shops, while an aircraft plant at Willimantic, Conn., takes 3500 tons. Some talk of allocation of plain structural material is heard, but no official action has been taken.

SHAPE CONTRACTS PLACED

4000 tons, aluminum foundry, Buick Motor division, General Motors Corp., Flint, Mich., to Gage Structural Steel Co., Chicago.

2531 tons, plant, Amertorp Corp., Forest Park, Ill., subsidiary of American Can Co., to Mississippi Valley Structural Co., Decatur, Ill.; R. C. Wieboldt Co., Chicago, contractor; bids Feb. 11.

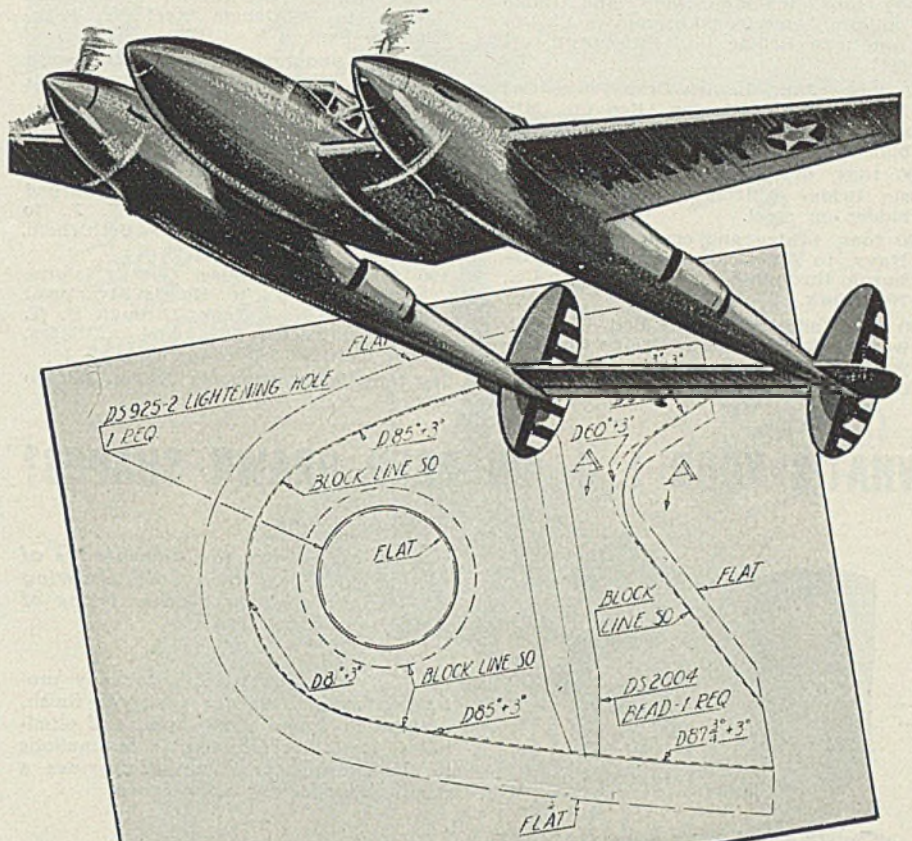
1800 tons, addition, Ohio Steel Foundry

SHAPE AWARDS COMPARED

	Tons
Week ended Feb. 21	14,661
Week ended Feb. 14	18,856
Week ended Feb. 7	41,905
This week, 1941	23,782
Weekly average, 1942	23,224
Weekly average, 1941	27,373
Weekly average, Jan., 1942	21,786
Total, 1941	277,562
Total, 1942	162,565

Includes awards of 100 tons or more.

TO KEY MEN: Can You Use Sheet Metal Working Data for Defense Products—and Post-War Plans?



Warplanes...

from Printed "Cut-Outs"!

Draw-by-hand days are gone for draftsmen in most of America's giant warplane plants. Work templates that once required days and even weeks of a designer's time now are reproduced in a few minutes!

Only a "master" pattern is needed. In many plants ARMCO Galvanized PAINTGRIP sheets are used for these master drawings. After a special coat of paint is applied to the PAINTGRIP sheet an original full-scale design is drawn by hand. Exact transfers to the aircraft metal are made in a few minutes either by electrolytic or photo processes. (Names of patent holders will be supplied on request.)

ARMCO PAINTGRIP is used for master templates because it is smooth, flat and easy to work. Extra wide sheets are available. PAINTGRIP takes and holds paint and does not smudge. Moreover the paint does not peel or flake.

The result: Aircraft companies save valuable time and money — boost the mass production of warplanes for victory-bound America.

Write us if you can use fabricating information on ARMCO Galvanized PAINTGRIP sheets for war uses or for products you will make when peace comes. The American Rolling Mill Co., 461 Curtis St., Middletown, O.

A LABEL KNOWN TO MILLIONS



Co., Lima, O., to Joseph T. Ryerson & Son Inc., Chicago; bids Feb. 17.

1400 tons, machine shop and office building, American Locomotive Co., to American Bridge Co., Pittsburgh, direct.

980 tons, plant, Ladish Drop Forge Co., Milwaukee, to Worden-Allen Co., Milwaukee; Klug & Smith Co., Milwaukee; bids Feb. 4.

900 tons, first unit, plant, to Wisconsin Bridge & Iron Co., Chicago, low bidder on steel.

590 tons, bridge and crane runway for Navy, to American Bridge Co., Pittsburgh, through Lynn Construction Co., New York.

500 tons, addition, Chain Belt Co., Milwaukee, to Milwaukee Bridge Co., Milwaukee; Klug & Smith Co., Milwaukee, contractor; bids Jan. 13.

500 tons, airplane engine testing building, Chevrolet Motor Division of General Motors Corporation, Tonawanda, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

375 tons, underground loop, Fourteenth street S. W., Washington, Colmar Construction Co., New York, low.

250 tons, building addition, Lennox Furnace Co., Syracuse, N. Y., to American Bridge Co., Pittsburgh.

250 tons, bridge repairs, Central Railroad of New Jersey, Elizabeth, N. J., to Bethlehem Fabricators, Bethlehem, Pa.

190 tons, power house, Goulds Island, Newport, R. I., to Harris Structural Steel Co., New York, through P. T. Cox Contracting Co. and affiliates, New York.

180 tons, boiler supports, Dana, Ind., to

Bethlehem Steel Co., Bethlehem, Pa. through Combustion Engineering Co., New York.

115 tons, pumping station, Bayonne, N. J., to American Bridge Co., Pittsburgh; Bayonne Associates Inc., contractors.

100 tons, shops, Penn Jersey Ship Co., Camden, N. J., to Cantley & Co., Philadelphia.

Unstated, 230,000-volt steel transmission power line, Bonneville-Midway section, Bonneville Power Project; general contract to Fritz Ziebarth, Vancouver, Wash., low at \$719,037.

Unstated, foundations, steel towers, etc., Rainier-Longview transmission line, Bonneville Power Project; general contract to Fritz Ziebarth, Vancouver, Wash., low at \$163,825.

SHAPE CONTRACTS PENDING

2444 tons, relocation, St. Louis-San Francisco railroad, Liggett-Platter and Lakeside-Meade, Tex.; bids to United States engineer, Dennison, Tex.; also 103 tons, reinforcing bars.

1650 tons, Eastern avenue bridge, Essex, Md., bids Feb. 24 to state highway commission.

1500 tons, expansion program, Farrel-Birmingham Co. Inc., Buffalo.

835 tons, steel sheet piling, Wolf river flood wall; bids March 17, United States Engineer, Memphis, Tenn., inv. 133F; also 125 tons, reinforcing steel.

530 tons, tantalum carbide plant, North Chicago, Ill., for Tantalum Defense Corp., subsidiary of Fansteel Metallurgical Corp.; bids asked.

500 tons, building addition, Worthington Pump & Machinery Corp., Buffalo.

417 tons, state bridge over Pecatonica river, Freeport, Ill.; Clinton Bridge Works, Clinton, Iowa, low on bids Dec. 19; project abandoned for lack of priority.

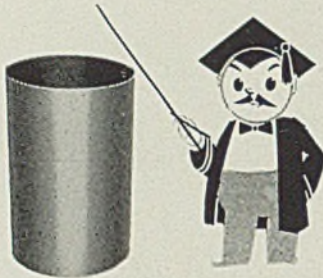
285 tons, Puget Sound navy yard project; bids Feb. 19; No. 4204.

248 tons, Puget Sound navy yard project; bids Feb. 24; No. 4173.

164 tons, beam bridge, Sec. 136 F-3, Cache, Alexander county, Illinois, for state, Illinois Steel Bridge Co., Jacksonville, Ill., low; bids Feb. 10.

150 tons, highway bridge, Pennsylvania Railroad, Erie county, New York.

WHAT'S YOUR I. Q. ON DEEP DRAWN SHAPES?



Q What are the advantages of the Hackney Cold Drawing Process over other types of construction?

A This special Hackney production method assures a smooth finish, uniform thickness and temper, and eliminates possibility of flaws or laminations in the finished product. It provides a much better looking appearance.

Q In what ways have Hackney Special Deep Drawn Shapes or Shells helped solve manufacturers' problems?

A The many successful Hackney solutions to engineering problems have given the products of many manufacturers: decreased over-all weight, increased strength, improved appearance, faster production, greater durability and a combination of these and many other important advantages.

Q What are some of the problems which Hackney has solved for manufacturers of civilian and defense products in many industries?

A The special design and manufacturing facilities of Pressed Steel Tank Company have produced air receivers, hydraulic accumulator housings, grease dispensing tanks, pressure tanks, fire extinguishers, carbonator drums, heat exchangers, boiler tanks, light weight cylinders, and many other special parts for scores of manufacturers.

Q What is a Hackney deep drawn shape?

A A solid, circular sheet or plate of ferrous or non-ferrous metals, cold-drawn to shape by means of high pressure, hydraulic presses, especially designed for the purpose.

Q Why is Pressed Steel Tank Company especially fitted for solving problems involving special parts?

A They have been specialists in the manufacture of seamless deep drawn shapes and shells of various sizes for more than 40 years.

Q How small and how large can Hackney make its special deep drawn shapes?

A Pressed Steel Tank Company has the dies and equipment to handle shapes and shells that have been classed "out of the ordinary." They have been made as small as one quart and as large as 110 gallons.

Q What should you do regarding your problem that involves the use of seamless drawn tubes, shells, special cylindrical shapes or pressure tanks?

A Write today to Pressed Steel Tank Company. A Hackney engineer may be able to suggest several ways in which you can improve your product. There is no obligation.

PRESSED STEEL TANK COMPANY

1387 Vanderbilt Concourse Bldg., N. Y. • 208 S. LaSalle St., Room 1511, Chicago
688 Roosevelt Bldg., Los Angeles • 1461 S. 66th St., Milwaukee
HACKNEY DEEP DRAWN SHAPES AND SHELLS



Containers for Gases, Liquids and Solids

Reinforcing Bars

Reinforcing Bar Prices, Page 111

Not much change has taken place in demand for reinforcing steel, most business being for war projects, with high rating. Increased activity is expected to be met soon as various structures now being planned reach bidding stage.

Numerous contracts for concrete reinforcing bars placed weeks ago are exceeding original estimates and shipments against supplemental releases continue heavy. This

CONCRETE BARS COMPARED

	Tons
Week ended Feb. 21	3,469
Week ended Feb. 14	6,813
Week ended Feb. 7	1,500
This week, 1941	10,325
Weekly average, 1942	8,194
Weekly average, 1941	13,609
Weekly average, Jan., 1942	11,394
Total, 1941	76,287
Total, 1942	57,357

Includes awards of 100 tons or more.

is notably true of dry docks, also other defense projects, including Atlantic bases. Outstanding inquiry in the east include several thousands tons for reinforced concrete tanks and two large housing projects in the Boston district. Practically all reinforcing orders now require ratings in the higher A group for satisfactory delivery, even small lots. Bridge and highway needs will be the lowest this spring in years, even some more important access roads to be constructed without steel.

REINFORCING STEEL AWARDS

- 1500 tons, additional facilities, Floyd Bennett Field, New York, to Bethlehem Steel Co., Bethlehem, Pa., through White Construction Co. and affiliates, New York.
- 600 tons, army cantonment, Triangular Division, for war department, to Ceco Steel Products Corp., Chicago; Consolidated Construction Co., Chicago, contractor on Sec. A-3 involving 300 tons, and Birmingham Contracting Co., Birmingham, Mich., contractor on Div. E involving 300 tons.
- 300 tons, building, Monroe Calculating Machine Co., Orange, N. J., to Igoe Bros., Newark, N. J., through Ryan Construction Co., New York.
- 250 tons, Edwin Markham Homes, Staten Island, N. Y., to Igoe Bros., Newark, N. J.
- 230 tons, Saint Luke's School of Nursing, Chicago, to Concrete Steel Co., Chicago; Bulley & Andrews, Chicago, contractors, bids Oct. 7.
- 225 tons, Dow Chemical Co., Midland, Mich., to Republic Steel Corp., through Truscon Steel Co., Youngstown, O.
- 205 tons, army cantonment, Triangular Division, for War Department to Joseph T. Ryerson & Son Inc., Chicago; O'Driscoll & Grove Inc., New York, contractor.
- 159 tons, building, Extruded Metals Corp., Grand Rapids, Mich., to Great Lakes Steel Corp., Ecorse, Mich., through Taylor & Gaskin Inc., Detroit, Barnes Construction Co., contractor.

REINFORCING STEEL PENDING

- 2000 tons, housing project, Boston; taking bids.
- 1255 tons, Invitation B33075A, Coram, Calif., Bureau of Reclamation; Carnegie-Illinois Steel Corp., Pittsburgh, apparent low bidder; bids to Denver, Feb. 6.
- 520 tons, powder plant, Hercules Powder Co.; Mason & Hanger Co., New York, engineer.
- 450 tons, smoke house, Oscar Mayer & Co., Madison, Wis.; bids Feb. 18.
- 133 tons, bridge No. 21, War Department building - road network, Arlington county, Virginia; bids March 5, Public Roads Administration, Washington.
- 106 tons, superstructure, South district filtration plant, Chicago, for city; bids taken Nov. 21 rejected, new bids to be asked shortly.

Pig Iron

Pig Iron Prices, Page 112

Number of pig iron melters engaged in war work is increasing and many foundries with little on books at the beginning of the year now have considerable backlog. Not all carries highest priority but it is moving them out of the B classification, which in a short time will supply them little or no iron. In February little iron was allocated against B classifications, a trend started in December, and in March it is expected still less

It's the Zip-Lift — neatest, smoothest little load-lifter in the business! This is no glorified chain block, but a true electric hoist with non-spinning wire rope and full magnetic push-button control. It's built for 3 types of interchangeable mountings — for hook, bolt, or trolley suspension. It'll cut your costs with "thru-the-air" handling wherever loads must move quickly, efficiently, and dependably.

It's surprising how far your hoist dollar goes with the long life Zip-Lift. And remember, honest delivery promises are P&H by-words. Call your nearest P&H representative or write us direct.

P&H Electric Hoists are available in all capacities up to 15 tons.



CAPACITIES: 250, 500, 1,000 lbs.

General Offices: 4411 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER
CORPORATION

HOISTS • WELDING ELECTRODES • MOTORS  EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

will be allowed. At the peak, in November, only 9.5 per cent of the total went to B users, it is estimated, and in January about 7.4 per cent. This indicates the rising proportion of iron used for war production and the gradual disappearance of tonnage available for civilian use.

Deliveries in February have been closer to schedule than in January, quotas being closely met. Production is at a better rate, as nearly as can be determined, as furnaces are pushed to capacity. An instance of this is the new record set by Carrie No. 3 stack of Carnegie-Illinois Steel Corp. in January.

While the tonnage of iron in-

involved will be small a number of melters probably will receive no iron in March because of failure to file PD-69 forms with producers by Feb. 5. Frequent warnings have been given of the importance of having these forms in on time and results have been better each month, especially after some late requests have been disregarded. In some instances this month, under instructions from Washington, the forms have been returned.

In several areas containing large foundry units a surprising number of melters are operating on inventory accumulated before allocations were established, having received no iron in six months. Some have reached practically the

end of their supply and will be requesting shipments in April.

Office of Price Administration has ruled that provisions in the pig iron price schedule, No. 10, are applicable only to Continental United States, exclusive of territorial possessions. This interpretation was promulgated as a temporary step in all steel price schedules because of insufficient data from territorial areas to include them at this stage, OPA said.

Scrap

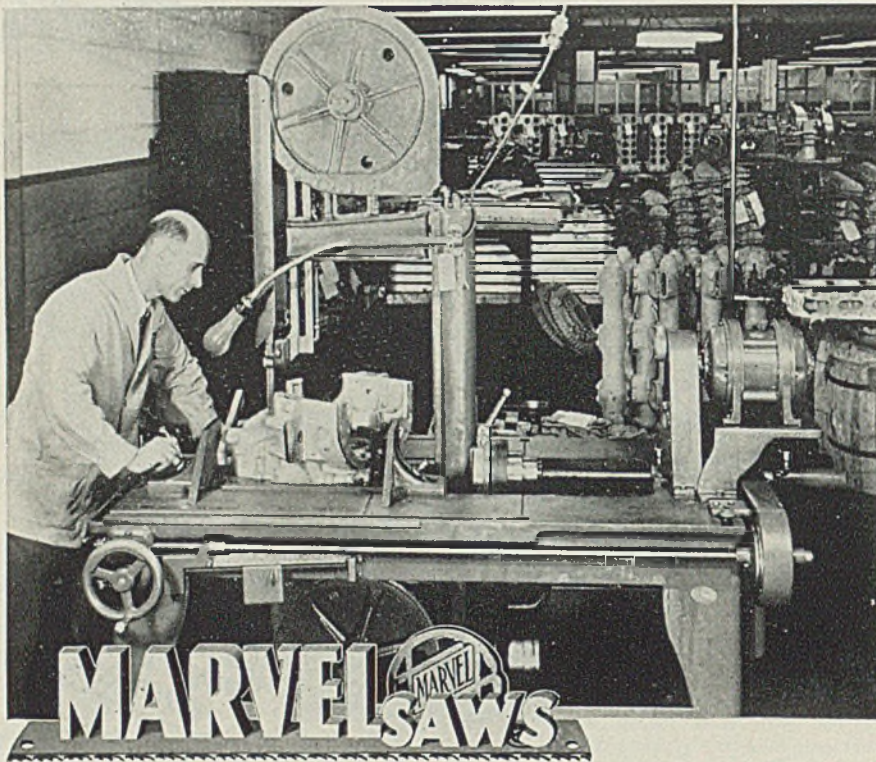
Scrap Prices, Page 114

Scrap supply, still inadequate to full steel production, is fairly steady and there are prospects of better tonnage in coming weeks when material from automobile wrecking yards and farm areas begins to move in better volume. Meanwhile numerous open hearths in condition to operate are idle, keeping production below capacity.

Supply of cast grades shows no improvement and usual sources offer much less than normal. Foundries are forced to use a larger proportion of pig iron in their melt, which amounts to robbing the future.

Iron and Steel Branch, WPB, is exploring possibility of placing the scrap industry under complete allocation, similar to that which has worked successfully in pig iron. An organization is being built up to serve as the nucleus of such a plan. Difficulty of controlling scrap flow handled by thousands of dealers is recognized and a formula is being sought to improve distribution to fit into the war pattern.

WPB is moving definitely against automobile wrecking yards, placing the burden on scrap dealers in their vicinity. They are instructed to make an offer for these accumulations, reporting their bid. The wrecker may accept or decline. In the latter case the scrap may be requisitioned by the government, payment being whatever is available after preparation



Photograph courtesy Packard Motor Car Co.

A MARVEL No. 8 Speeds All-out Production of Packard Rolls - Royce Aircraft Engines

MARVEL Sawing Machines are playing an important part in speeding production for National Defense. Not only the MARVEL 6A and 9A High-Speed Production Saws that automatically cut-off rifle barrels, gears and parts from bar stock in great quantities; or the giant MARVEL No. 18 Hydraulic Saw so well known for its cutting Speed; but all other MARVEL Saws, too, each in its own way, are at work in America's "all-out production." Take for example, the MARVEL No. 8 Universal Band Saw illustrated above, working on aircraft engine crankcases in the "D" Division of the new Packard Rolls-Royce Engine Plant.

Because of its large capacity (will handle work up to 18" x 18") because it cuts at any angle from 45° right to 45° left; and because the blade remains vertical throughout its straight-forward carriage travel, the MARVEL No. 8 will do trimming, notching, mitering and cutting-off, and will save hours of machining by roughing out work to size and shape.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 BLOOMINGDALE AVE.

CHICAGO, U. S. A.

Eastern Sales Offices: 225 Lafayette St., New York

Tool Steel Scrap

Cents per pound, to consumers
f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)	
Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing	
over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under	
5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)	
Solid scrap, each 1% contained	
tungsten	1.60
Solid scrap, each 1% molybdenum . . . . .	.80
Millings, turnings, each 1%	
tungsten	1.40
Millings, turnings, each 1% molybdenum . . . . .	.70

A Boltmaker Bolts

Pittsburgh:

■ The hammering clank of heading machines, the whirl of threaders, screw machines, shavers and grinders in the metal fastener industry have taken on an even higher pitch as productive capacity strives to meet the President's quota of armament.

No . . . bolts, nuts and rivets are not armament, but . . . not a tank rolls, not a battleship floats, nor aircraft flies that doesn't contain these metal fasteners in hundreds of vital points. Many of these are



. . . part in 36 hours.

Oliver Iron and Steel Corporation products and because you need them, Oliver "bolts" into top speed production . . . enlarges every needed facility . . . adds manpower . . . gets set to serve the Victory Program and your requirements to the best interest of the nation.

A recent lend-lease order . . . scheduled for delivery in 5 months, became crucial material due to the turn in the war. A cable from the foreign Purchasing Commission brought partial shipment in 36 hours . . . final shipment in 30 days. Oliver Iron and Steel is fulfilling and will meet the united nations' demands and is doing everything in its power to speed America's War and Victory Program.



and transportation are paid. Tonnage is expected to start moving from these sources in a short time.

New ceiling price on bundled tin cans, \$8 per ton under No. 1 bundles, compared with a \$2 differential formerly prevailing, is causing protest on the ground that cost of collection and compressing leaves little margin of profit for collectors or dealers.

An additional 969 tons of abandoned street car rails, 700 tons in Joliet, Ill., and 269 tons at the Rock Island arsenal, Rock Island, Ill., are to be removed by WPA for scrap, according to Charles P. Casey, Illinois WPA administrator. This will bring the total tonnage of rails removed or to be removed by WPA to 1329. The streets will be reconditioned by WPA.

A large eastern steelmaker has rejected 15 carloads of bundled scrap within a few days because of tin can scrap being included. This consumer holds that tinned scrap is not suitable for open-hearth melting and that the tin should be reclaimed in view of shortage of that metal.

Bids on about 10,000 tons of structural steel and 5000 tons of rails to be salvaged from demolition of the Atlantic avenue section of the Boston Elevated Railway Co. have been postponed to Feb. 25. This follows notice from OPA that under price schedule No. 4 railroad scrap loses its identity as such when sold from dealer's yard. This is interpreted to cover demolition contractors to whom the material is to be sold. As a result bidders must sell the prepared scrap at \$15.05 f.o.b. cars or f.a.s. vessel, Boston, or \$2.50 per ton under this if unprepared. All other scrap must be sold in accordance with other schedules.

Small Sellers Relieved Of Warehouse Rules

Small dealers, essentially in the retail group handling iron and steel products, have been removed from the price limitations on such sales, under clarifying revisions of price schedule 49. resale of iron and steel products, issued by OPA. An important amendment provides that sales by retail dealers amounting to 25 kegs or less of nails and 2500 pounds or less of merchant wire products or five standard lengths of pipe are not covered by the schedule. However, the limitations remain on sales by any party comparable to jobbers. Sales in large quantities to industrial consumers still are covered by the schedule. Sales even of small quantities by steel warehouses or recognized jobbers and wholesalers still are covered.

A further provision is a change in the requirement under which sellers doing a gross business of \$50,000 annually were directed to file prices with OPA, which now is altered to limit this to sellers doing business of \$100,000. Under the interpretation of this amendment prices must be filed if only a part of the gross is done in iron

Grips for the Navy

Somewhere in the Pacific

■ With a "wham" that makes thunder sound like a toy bass drum, the U. S. Navy lets go a salvo of 16-inch rifles. Concussion sweeps the decks like a hurricane and screaming projectiles soar miles to the objective. With each recoil the giant ship rolls, hesitates and quickly rights itself . . . every plate, angle and stringer shocked but sound.

Oddly enough the strength of this mighty sea warrior and much of its capacity to give and take battle punishment is directly dependent



on the common bolt and rivet. We seldom think of these metal fasteners as playing an important part in Victory, yet millions of pounds of rivets, bolts, nuts, washers, cold headed or forged lugs, clips and fasteners in hundreds of shapes and sizes go into the building of warships. They are the vital links that join structures so quickly, grip so dependably and install so economically.

Like the man behind the man behind the gun . . . Oliver Bolts, Nuts, Rivets and Fasteners receive little of the praise . . . yet do a vital job exceptionally well. Take a tip from the toughest performance requirements in the world, look to Oliver Products for a sound answer to metal fastener problems and prompt attention to every essential requirement.



and steel products in making up the total.

An important announcement is made that under the revised schedule OPA may shortly issue published price lists for specific cities, which lists will replace the published list prices of sellers named in such cities under the present schedule. Amendment has authorized OPA to proceed with this plan, which, it is stated, awaits only a checkup of prices now being filed for various cities.

Warehouse

Warehouse Prices, Page 113

Warehouse conditions have not improved, shipments from mills

being slow under A-9 ratings when books are filled with higher priorities. Steel warehouse section, WPB, has recommended some liberalization of replacements by which jobbers may obtain tonnage on a basis of ratings covering sales, some products already being under this system through extensions.

While plates are tightest with most warehouses, bars, sheets and shapes are becoming more so and inventories are broken and unbalanced. Much low-rated volume is being refused. Inquiries are appearing from many new consumers who have taken war work, usually with high ratings. Floor plates are tighter, though easier than sheared or universal plates, most

being covered by priorities. Cold-finished bars are in heavy demand. Aircraft tubing of any analysis, mainly X4130, is under allocation through Wright Field, Dayton, O.

Pacific Coast

Seattle—Expansion of ship construction facilities is being rapidly consummated in the Pacific Northwest with the award of additional contracts for government agencies. At Vancouver, Wash., 2000 men are engaged in building the plant of the Kaiser shipyards, where it is expected 12,000 workers will soon be employed. Vancouver is facing a problem with this expected influx and has asked \$10,000,000 federal funds for housing, and \$1,500,000 for increased facilities, including \$200,000 for water system enlargement, \$811,000 for expansion of sewer system and \$200,000 for fire department equipment.

Oregon War Industries, comprising 14 Portland metal working shops, announced award of a \$500,000 Maritime Commission contract to manufacture reciprocating marine engines for vessels of the merchant marine. Additional awards for similar machinery are anticipated, work to be distributed among smaller plans. Willamette Iron & Steel Corp., Portland, Oreg., has an additional contract for building 14 minesweepers and will enlarge facilities and increase personnel. Albina Engine & Machine Works, Portland, has a contract for six more sub-chasers.

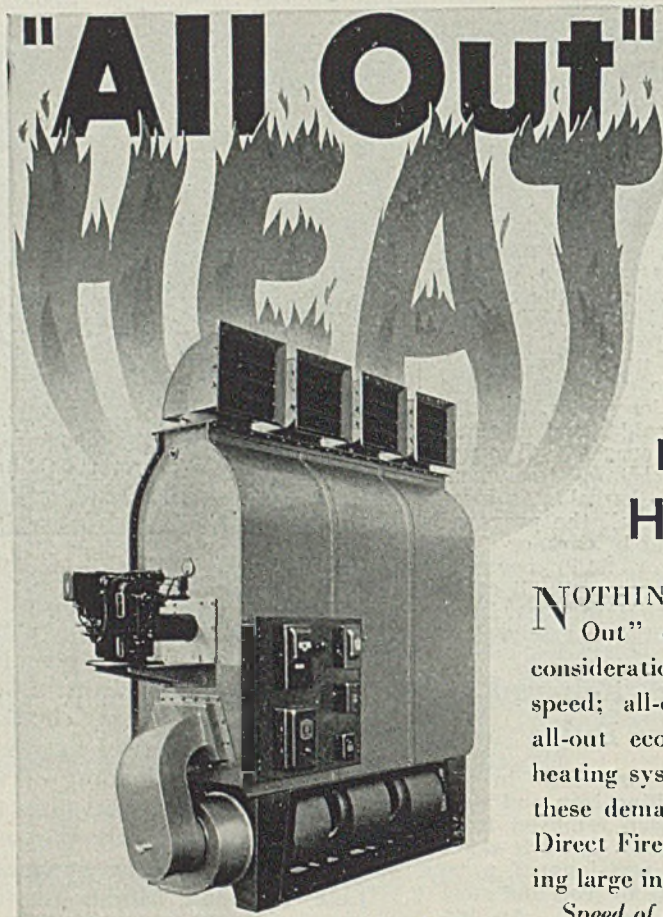
Two large shipbuilding plants at Vancouver, B. C., engaged in constructing 10,000-ton steel merchant freighters, are exploring the possibilities of changing equipment to permit enlarged welding operations as production of rivet gangs is considered below reasonable levels.

A major award went to Westinghouse, low at \$2,792,330, for furnishing three 108,000-kw. generators for the west power plant at Grand Coulee dam.

Bonneville Power Administration announces that 180,000 kilowatts have been contracted to eight new industrial operations for this area, sites not yet selected. These include plants for producing chlorine, TNT, two elemental phosphorus, magnesium, two ferro-silicon plants and expansion of the aluminum rolling mill. Bonneville has \$30,000,000 available, of an approved \$65,000,000 budget, for increased generating and distributing facilities.

Bids will be called soon for a proposed \$77,000 water system at Kodiak, Alaska. H. G. Purcell, Seattle, has been awarded 175 tons of 12-inch cast iron pipe for two water system improvements at Seattle. Tonnages for several housing projects in this area are still pending.

While rolling mills report ample inventories of scrap for current needs, foundries are still cramped by lack of cast scrap. Receipts are below consumption and dealers generally are disturbed over price ceilings, claiming insufficient margin to cover cost of preparation.



DRAVO DIRECT FIRED Heaters

NOTHING short of "All Out" qualifications get consideration today... all-out speed; all-out performance; all-out economy. And the heating system that answers these demands is the Dravo Direct Fired method of heating large industrial buildings.

Speed of installation... just spot the heaters, connect and

turn on for heat. No boiler plant required. Top performance as high as 85% heat transfer efficiency. Economical first cost and maintenance... used only when and where needed; easily relocated for permanent or temporary projects.



Dravo Heater sizes range from 750,000 to 1,500,000 B.t.u. p.h. Fuels are oil, gas, or coke oven gas. Refer to your Sweet's, or write or wire for 12 page data bulletin No. 502 showing quick solution for industrial heating problems.

DRAVO CORPORATION

Machinery Division

Heater Department

DRAVO BUILDING • PITTSBURGH, PA.

4800 Prospect Avenue, Cleveland

Broad Street Station Building, Philadelphia

Nonferrous Metal Prices

	Copper			Straits Tin		Lead	Lead	Zinc	Alumi-	Anti-	Nickel
	Electro,	Lake,	Casting,	New York		N. Y.	East	St. L.	num	mony	Cath-
Feb.	Conn.	Midwest	refinery	Spot	Futures	N. Y.	St. L.	St. L.	99%	Spot, N.Y.	odes
1-20	12.00	12.12 1/2	11.75	52.00	52.00	6.50	3.35	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12
-------------------	-------

Wire

Yellow brass (high)	19.73
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OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.50
Cleveland	9.25-9.50
Chicago	9.50
St. Louis	9.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Nonferrous Metals

New York—WPB-OPA control over nonferrous metals is now nearly complete with indications that existing regulations will be tightened to cut off additional civilian use and to force stricter compliance with price orders. Emphasis is placed now on production problems.

Copper—Output is averaging 85,000 tons monthly in the United States, unchanged from a year ago, while output in Mexico, Peru and Chile is averaging 60,000 tons. Stimulation derived from the present favorable price arrangements may boost domestic production 10 to 15 per cent this year.

Lead—Optimistic estimates for 1942 production range up to 825,000 tons compared with the 1926 record output of 799,000 and the 1941 total of 635,000 tons. The premium price plan will bring out marginal production which was not available last year.

Zinc—Rise in zinc metal output from primary smelters from 66,121 tons in January, 1941, to 79,213 tons in January, 1942, made possible average monthly output of 72,000 tons in 1941 against only 58,000 tons in 1940. Further increases in production are expected

Lead

New York	5.25-5.60
Cleveland	5.40-5.50
Chicago	5.25-5.60
St. Louis	5.25-5.35

Old Zinc

New York	5.00-5.25
Cleveland	5.25-5.50
St. Louis	4.50-5.00

Aluminum

Old castings	10.50
Segregated borings	3.50
Old sheet	10.50
Clips, pure	9.50

SECONDARY METALS

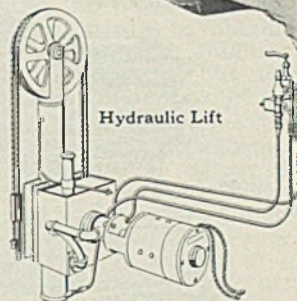
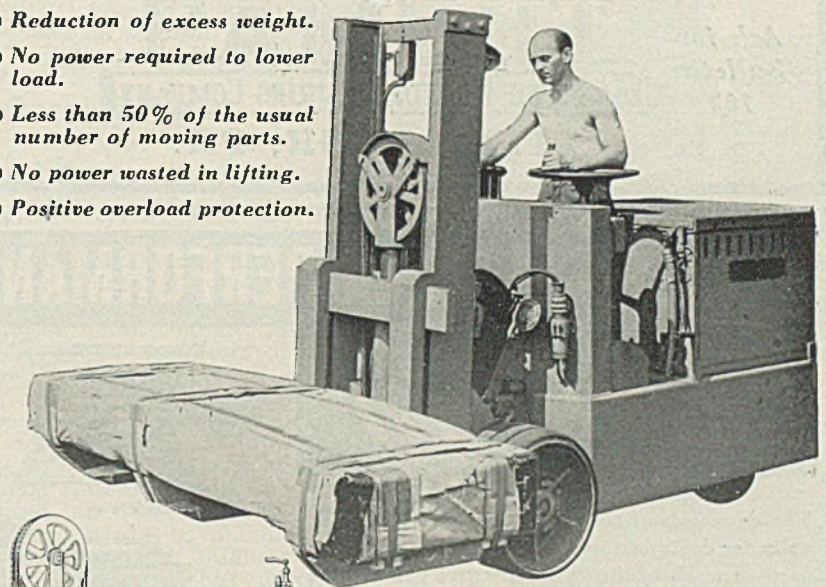
Brass ingot, 85-5-5-5, l.c.l	13.25
Standard No. 12 aluminum	14.50

Mercury pioneered and perfected

THE
HYDRAULIC LIFT

TO BRING YOU
THESE 5 EXTRAS

- Reduction of excess weight.
- No power required to lower load.
- Less than 50% of the usual number of moving parts.
- No power wasted in lifting.
- Positive overload protection.



Greater operating efficiency—lower operating cost—lower maintenance cost, that's what the 5 extras of Mercury's Hydraulic Lift mean to you.

Design Is Simple: Heavy gear reduction units and gear cases common with the mechanical lift are completely eliminated. This means

an important reduction in weight . . . less than 50% of the number of moving parts.

Greater Economy: The lift requires no power to lower the load—no power is wasted in lifting. Increased efficiency of as high as 25% in the overall elevating and lowering cycle.

Overload Protection: Relief valve provides complete overload protection at all times.

For the complete story on the Mercury Hydraulic Lift and Mercury Material Handling Equipment write for Bulletin 201-5.

Mercury Pioneered and Perfected These Lift Truck Improvements:

The Hydraulic Lift
Snap-Action Cam Operated
Controller
Single Unit Double Reduc-
tion Drive Axle Assembly
All Welded Frame
Special Trail Axle Design

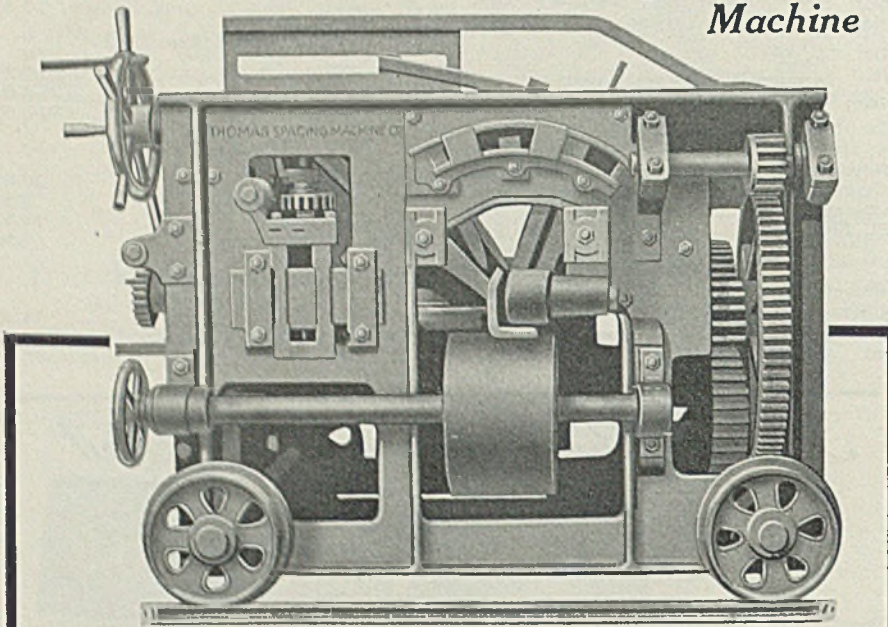
MERCURY

MANUFACTURING COMPANY, 4149 S. Halsted St., Chicago, Ill.

• Tractors
• Trailers
• Lift Trucks

For the Shipbuilder . . .

Angle-Beveling Machine



Ask for
Bulletin
102

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH, PA.

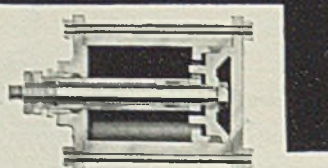
BETTER CYLINDER PERFORMANCE

Built-In

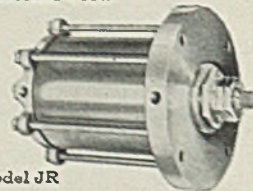
The demands of continuous production make cylinder design more important than ever before—and Hannifin cylinders give you the features that mean maximum use of air power, without leakage, with minimum friction loss and simplest maintenance. Hannifin pneumatic cylinders, including even the largest sizes, are bored and then honed, producing a cylinder bore, straight, round, perfectly smooth. Piston packing is adjustable from outside the cylinder, for easy maintenance of efficient piston seal.

Hannifin Pneumatic Cylinders are built in a full range of standard mounting types, sizes 1 to 16 in. diam., for any length stroke. Both single and double-acting types, with or without cushion. Write for Cylinder Bulletin 34-S.

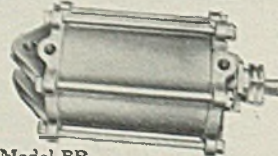
HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois



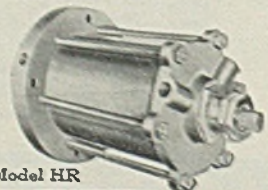
Sectional View



Model JR



Model BR



Model HR

HANNIFIN PNEUMATIC CYLINDERS

during the current year. Stocks at the yearend were the largest recorded throughout 1941.

Tin—Conservation of present supplies, enforced by WPB orders, coupled with projected output from the Texas smelters is expected to provide essential war needs for four or five years.

Canada

Toronto, Ont.—New business continues in heavy volume and while sales for January held only slightly above the December figure, they were substantially higher than in January a year ago. Production of steel and iron is at maximum capacity. Canada's war program, in addition to calling for greater quantities of steel also has made it necessary for mills to enlarge the scope of operations and extend production lines. With shortage of steel to maintain capacity production in all rolling departments continually, mill operators are swinging from one line to another at frequent intervals with the result that frequently one or more departments are idle to provide steel for others whose output is urgently needed.

In addition to the record output of steel by Canadian mills, imports from the United States are increasing steadily and this year will show all-time record figures. Demand for plates on shipbuilding account is increasing and construction of merchant vessels is to be increased. No plates are available for other than war purposes and even with large increase in imports from the United States freight car builders are not receiving sufficient to enable them to complete orders closed last year. Tank building is being retarded, due to lack of armor plate and demand is gaining much more rapidly than the available supply. Sheets and strip also are in heavy demand and mills are out of the market, accepting only such commitments as are placed by the government. Government demand for plates and sheets cover Canadian mill production for an indefinite period and it is not expected there will be any surplus for civilian use until the war ends.

Merchant bar sales continue to increase and inquiries are well in excess of supply. While reduction in sizes rolled has increased output for war needs and enabled producers to reduce costs, it has not relieved pressure on demand. Tool-makers are pressing for delivery and there has been some slowing down, due to difficulty in obtaining material.

Notwithstanding almost total suspension of use of structural shapes in civilian construction work, demand for war projects continues heavy. Awards for the week were about 10,000 tons, with further orders in prospect totaling close to 30,000 tons. Fabricators are on full time operation with backlogs sufficient to maintain this rate well into 1943.

Pig iron sales continue at peak,



Check THESE ESSENTIAL SCREWS - BOLTS - NUTS - RIVETS and PRESTOLE FASTENING DEVICES with Your DEFENSE Needs...

★ You can depend on the uniformity and strength of Central products to speed and solidify your defense assemblies.

Parts pictured above typify items now being used extensively in DEFENSE APPLICATIONS listed below. There are many more.

USED and RECOMMENDED for SPEEDY ASSEMBLY of:

- Ammunition Box Components
- Incendiary Bombs
- Parachute Flares
- Bomb Release Assemblies
- Navy Push Button Switches
- Radio and Communications Head Sets—Microphones—Transmitter Timing Units—Compass—Aerials—Receivers for Army, Navy, Marine Corps
- Aerials
- Gas Masks
- Anti-Aircraft Guns
- Signal Corps Reels
- Electrical Control Equipment for Army, Navy and Marine Corps
- Steel Lockers for Defense
- For Construction And Maintenance Of Every Type Of Defense Plant

WRITE TODAY — Send your defense requirements to CENTRAL for QUICK ACTION.

CENTRAL SCREW COMPANY
3517 SHIELDS AVE., CHICAGO, ILL.

slightly better than 10,000 tons weekly, which practically absorbs all output available. Inquiries for foundry and malleable exceed supply and it is stated that a number of melters unable to obtain full quotas of iron and faced with shortage of scrap have little hope of maintaining operations at the current rate.

While improvement in weather conditions was reflected in increased offerings of scrap, there is a shortage of iron grades. Deliveries from outside sources were resumed during the week, but only small volume was received by local dealers.

Steel in Europe

Foreign Steel Prices, Page 113

London—(By Cable)—Steel output in Great Britain is mainly concentrated on shipbuilding and producers of alloy steel plates, wire rods, wire are fully occupied. Production of alloy steel is expanding. The tin plate position is affected by reduced tin supplies and an increase in use of lacquered plate is expected, as well as a reduction in weight of tin coating where possible. Market for black sheets is fair but galvanized sheets are considerably restricted.

Metallurgical Coke

Coke Prices, Page 111

Blast furnace coke supply continues tight, mainly because of shortage of coking coal for beehive operations. Coal of low sulphur content is increasingly more difficult to obtain and beehive producers meet many rejections for excessive sulphur content. Because of the \$6 ceiling operators of high-cost ovens seek a method of reducing sulphur, to enable them to use coal from nearby mines. Many operators find it difficult to operate at a profit on coal from a distance. Rail shipments are being attempted, on the possibility that a special rate can be obtained for specific hauls, which might reduce transportation costs, but this has not yet been accomplished.

Survey of beehive coke oven facilities in the Pittsburgh area, which accounts for nearly all the ovens in the country, shows that during the past year there has been an increase of 20 per cent in the number of ovens put in condition to operate, and 22 per cent in the number operating.

There are now nearly 11,000 ovens ready to operate, while last year at this time there were 9000. Nearly 9500 ovens are in operation, against 7800 last year. There are still some potential producers which have not been conditioned for operation, and under the present price ceiling it is unlikely that any of these will be prepared.

All ovens which are machine drawn, or which have their own coal supply on the property, are now in operation. In addition, several banks of hand drawn ovens are now producing, which must bring in coal from some distance.

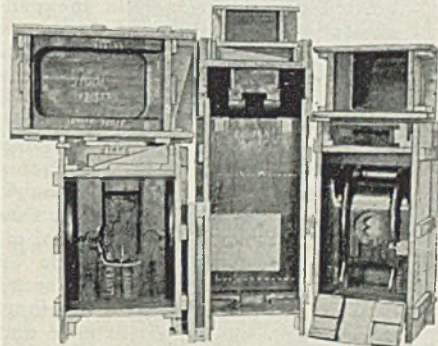
PATTERNMAKING in Step with TODAY'S PRODUCTION PACE

★ This pattern, for casting steel housings for rolling mills, was produced at our new Peerless Plant.

9 feet high and 42" wide, it took over 1800 feet of pine. Required in record-breaking time it was turned out right on schedule.

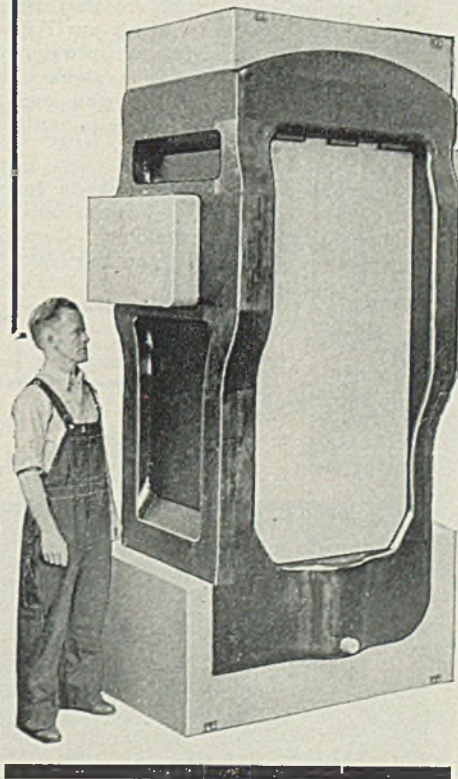
Whatever your requirements in patterns—large or small—we are equipped with the added facilities of our new plant to meet exacting requirements.

THE WELLMAN BRONZE & ALUMINUM CO.
6011 Superior Ave., Cleveland, Ohio



These core boxes are faced with steel and screwed together.

Large as this pattern is, we are equipped to produce patterns of even much larger size.





Yes, an ounce of prevention is worth much more than a pound of cure, particularly when a little inexpensive precaution will save thousands of dollars. Stacks of steel sheets improperly protected along the edges, even if the surfaces have been treated, deteriorate in a hurry. This can be prevented by spraying the edges with our No. 20 Protex Non-Rust Oil. For lengthy storage, we recommend our F.B. Protex. One man can hold a 5 gallon tank of either of these rust-proofing oils on his back, and can control the spray easily as he walks about. In plants where dies, tools, jigs, fixtures and machinery are scheduled for temporary retirement because of changes in production, rust-proofing guarantees valuable inventories. You can find no better way of crossing up Demon Rust than by using our F.B. Protex, or our No. 6 Protex Spraying Consistency. We carry a stock of pumps, large and small, and can furnish all the oil your requirements call for.

Check with us on your needs for non-scratch drawing compounds, fluxes, soaps or chemicals. Complete data available upon request.

This quart size pump is recommended for those plants not requiring the larger size.



**WAYNE
CHEMICAL
PRODUCTS CO.**
9502 COPELAND ST.
DETROIT, MICH.

These are high cost producers, but are better located than many of the now idle plants. There are estimated to be about 500 ovens which could be repaired and placed in operation if it were not for the high costs involved. These, together with the 1500 ovens in condition to operate, make 2000 units which could produce if necessary.

Iron Ore

Iron Ore Prices, Page 113

January consumption of Lake Superior iron ore totaled 7,158,423 gross tons, compared with 7,061,981 tons in December and 6,331,018 tons in January, 1941. Ore on hand at furnaces and Lake Erie docks Feb. 1 totaled 33,919,063 tons, compared with 40,456,893 tons Jan. 1 and 29,794,047 tons Feb. 1, 1941.

Furnaces in blast Feb. 1 numbered 178, of which 171 were in the United States and seven in Canada. This compares with 169 in the United States and seven in Canada Jan. 1. A year ago 162 stacks were in blast in the United States and five in Canada. Idle stacks Feb. 1 numbered ten in the United States and one in Canada, compared with 12 in the United States and 1 in Canada Jan. 1 and 17 in the United States and two in Canada Feb. 1, 1941.

Equipment

New York—Contracts for 75-ton jib cranes, shipbuilding docks, have been awarded by the Bureau of Yards and Docks, Navy Department, as follows: R. W. Kaltenbach Corp., Cleveland, three, Philadelphia, \$1,191,750; Wellman Engineering Co., Cleveland, two, Norfolk, and three, New York, \$1,986,250. Harnischfeger Corp., Milwaukee, at \$400,600, took the contract for 12 bridge and wall cranes, Brooklyn, and Bellevue, D. C.

Seattle—The enlarged program of the Bonneville Power Administration has brought this agency to the front as one of the most active purchasers of equipment in this area, being rated as essential to defense industrial activity. General Electric Co. is low at \$144,463, for furnishing 4000/5333 transformers, also at \$16,254 for transformers for Tillamook substation and at \$45,738 for metal clad switchgear, Longview station. Caterpillar Tractor Co. has an award at \$19,201 for furnishing tractors for J. D. Ross station, Graybar Electric Co. is low at \$6,190 for insulator pedestals and three identical bids were received for voltage regulators. Bids are in for transformers and no offers were received for furnishing 10 tons of black annealed wire. Bids are asked as follows: Feb. 17, 193 tons copper cable, No. 2587; Feb. 26, ¼-yard power shovel, No. 2609; March 2, five circuit breakers, No. 2611; telephone equipment, No. 2596; March 6, synchronous condensers, No. 2595. Tacoma has awarded Crane Co. a contract at \$4486 for furnishing wrought iron and steel pipe and fittings.

**53 HOURS OF
STEADY PUNISHMENT** . . .



**WITHOUT
REDRESSING!**

■ That's the record set by this BISCO Tool Steel chisel, chipping burrs from rough castings.

Such service records are typical of BISCO Tool Steels. Each bar is thoroughly inspected to insure greatest durability when subjected to the most severe service conditions found in industry. We carry a large range of standard size Tool Steel chisels for hand or pneumatic work, either in blanks, or finished, ready for use.

Consult us for further information or advice on your special needs on any steel product.

ANOTHER TIME SAVER

TOOL STEEL TUBING

Conserve time, manpower and machine-power with BISCO Tool Steel Tubing, and save expensive steel wasted through milling solid bars. BISCO Tubing is stocked up to 12" O.D. When cut to your exact specifications, it is ready for immediate use as ring dies, spacers, bushings, etc.

Free Catalog on Request

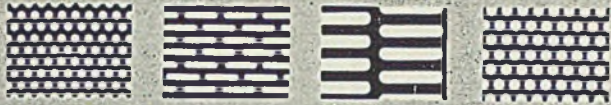


943 East 67th St. - Cleveland, Ohio - Henderson 0995

SCREENS

of Perforated Metal

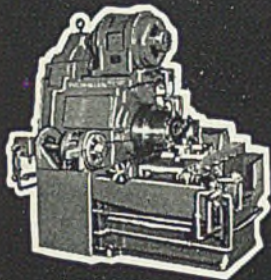
ANY METAL • ANY PERFORATION



The **Harrington & King**
PERFORATING CO.

5634 Fillmore St., Chicago, Ill.
New York Office—114 Liberty St.

TAYLOR-WILSON



Rotary Type
**CUTTING-OFF
MACHINES**
for Rounds
1" to 24" Dia.

TAYLOR-WILSON MFG. CO.
15 Thomson Ave. Pittsburgh Dist. McKees Rocks, Pa.

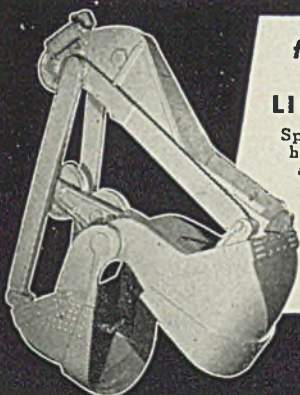
SIMONDS

QUALITY GEARS

Simonds make all types of quality gears; cast and forged steel, gray iron, bronze, aluminum, also of silent steel, rawhide and bakelite. We cut gears of any size and can produce spur gears up to 12 feet in diameter. Also Ramsey Silent Chain Drives and Couplings.

THE SIMONDS GEAR & MFG. CO.
25TH STREET, PITTSBURGH, PA.

WILLIAMS *Buckets*



for STEEL MILL SERVICE
are sold under
LIBERAL GUARANTEES

Specially built of alloy steels for handling heavy ore, slag, scale and skull cracker pit service. All-welded construction at vital points. Catalog FREE.

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ENGINEERING CO.
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Ford Triblocs

**LOW FIRST COST
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FORD TRIBLOCS are not only low in first cost, but they are *extremely* low in maintenance cost. They provide the most economical load transportation—vertical by chain block and horizontal by Ford trolley. FORD TRIBLOCS are fast and smooth in operation and they are "on the job," available for use on the instant. They help you maintain production schedules—help you avoid costly delays.

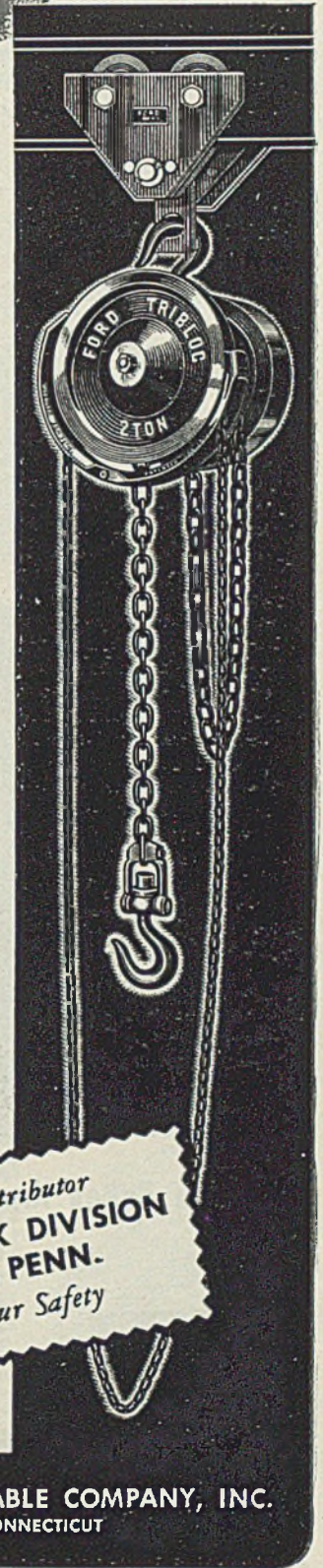
The FORD TRIBLOC is a quality spur-gear hoist. It is made throughout of high grade drop forgings and malleable castings of certified grade. Its Acco High Carbon Heat Treated Chain has great strength and high elastic limit. Hoists are tested to a 50% overload before shipment.

Write for information on TRIBLOCS in 1/4-ton to 40-ton capacities.

Order from your distributor
FORD CHAIN BLOCK DIVISION
PHILADELPHIA, PENN.
In Business for Your Safety



AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT, CONNECTICUT



DIED:

August Ziesing, 83, noted bridge engineer, and from September, 1905 to 1927, president of American Bridge Co., a United States Steel Corp. subsidiary, Feb. 16, at his home in Glencoe, Ill. He was a member, American Society of Civil Engineers, Western Society of Engineers and American Railway Engineering Society.

Howard B. Drake, 64, since 1923 general auditor, Pickands, Mather & Co., Cleveland, and mayor of Avon Lake, O., Feb. 13. Mr. Drake had been associated with Pickands, Mather 48 years.

Sidney E. Collins, 68, president, Spangler-Loomis Mfg. Co., Chicago, at his home in that city, Feb. 19.

James T. Considine, 63, superintendent of yard department, Carnegie-Illinois Steel Corp., Gary, Ind., in Gary, Feb. 17.

Axel N. Lindberg, 66, organizer and president, Lindberg Engineering Co., and Lindberg Steel Treating Co., Chicago, at his home in Evanston, Ill., Feb. 2. Mr. Lind-

berg was a past president, Metal Treating Institute, and a member, American Society for Metals.

Edward M. Miller, 64, for 35 years president, Miller & Van Winkle Inc., Paterson, N. J., maker of precision springs, Feb. 14, at Essex Falls, N. J.

Donald G. Sherwin, vice president and a director, Caterpillar Tractor Co., Peoria, Ill., at his home in San Leandro, Calif., Feb. 11.

Alan G. Wikoff, 46, editor-in-chief, General Publicity Department, Union Carbide & Carbon Corp., New York, Feb. 11, in White Plains, N. Y.

George F. Wilson, 53, the past eight years Philadelphia district manager, Vanadium-Alloys Steel

Co., Latrobe, Pa., in Philadelphia, Feb. 14.

Louis F. Fedders, 59, the past 22 years president and treasurer, Fedders Mfg. Co. Inc., Buffalo, Feb. 4, in that city.

Frank R. Schubert, 47, assistant general manager, Houde Engineering Corp., Buffalo, Feb. 4, in that city. He had been identified with the company since 1936.

Forest P. Sprague, direct sales representative, Lucas Machine Tool Co., Cleveland, Feb. 7. He had been associated with the company more than 40 years.

John W. Worsdell, 50, sales engineer, Ilg Electric Ventilating Co., Chicago, at his home in Park Ridge, Ill., Feb. 1.

Construction and Enterprise

Ohio

AKRON, O.—Wellman Engineering Co., 7000 Central avenue, Cleveland, is making repairs and alterations to its factory here. Estimated cost \$127,000.

BEDFORD, O.—Jack & Heintz Inc.,

W. S. Jack, president, Hanna building, Cleveland, plans two-story 40 x 150-foot factory and office addition here, to cost about \$50,000. Wilbur Watson & Associates, 4614 Prospect avenue, Cleveland, consulting engineers.

CAMDEN, O.—Village, Lloyd Downesley, mayor, plans municipal light and power plant, costing \$111,600. Carl J. Simon & Associates, Evans-Central building, Van Wert, O., consulting engineer.

CLEVELAND—Cleveland Tractor Co., W. King White, president, has acquired plant at 2066 Random road, to increase production.

CLEVELAND—Black Drill Co., Lester G. Black, plans an addition to plant at 1400 East 222nd street, Euclid, O., costing \$25,000.

CLEVELAND—Homer Commutator Corp., 4748 Hough avenue, is erecting 2370-square foot addition to shop at 5313 Perkins avenue.

CLEVELAND—Hickok Electric Instrument Co., 10514 Dupont avenue, is expanding production space with 1800 square foot addition. Wilbert H. Eberle is secretary.

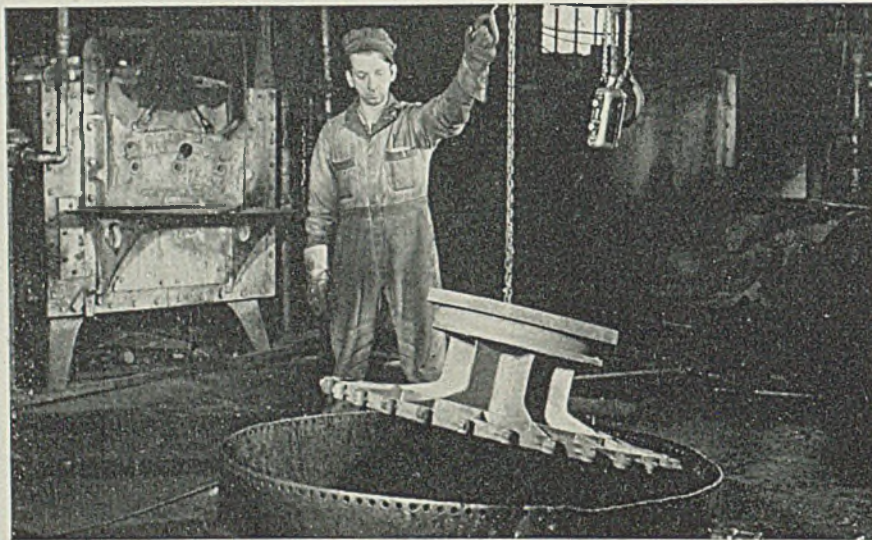
CLEVELAND—Leece Neville Co., 5363 Hamilton avenue, has purchased the former Sears-Roebuck warehouse at 5109 Hamilton avenue, and will convert the 100,000-square foot building for war production.

CLEVELAND—Fisher Body Division of General Motors Corp., Edward J. Gleason, general manager, will spend about \$3,000,000 for machine tools to convert part of space for production of diesel engine parts.

DILLES BOTTOM, O.—Ohio Public Service Co., Hanna building, Cleveland, care of E. L. Franklin, vice president, 290 East Market street, Warren, O., plans 100,000-kilowatt power plant, including pump house, coal dock, etc. Cost between \$7,000,000 and \$8,000,000.

ELYRIA, O.—K & S Tool & Mfg. Co. will increase office and manufacturing space.

EUCLID, O.—Breckenridge Machine Co., 2300 St. Clair avenue, has let con-



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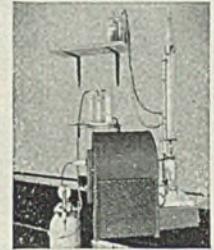
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tract for one-story 90 x 140-foot factory addition to Dunbar Co., 8201 Cedar avenue, Cleveland. Cost \$40,000. C. Merrell Barber, Hanna building, Cleveland, engineer.

NEWTON FALLS, O.—Village, W. Elmo Bailey, mayor, will take bids Feb. 28, for power plant expansion, including two 300-kilowatt Fairbanks-Morse diesel engines, direct connected generator and exciter, evaporator condenser for cooling, etc. Estimated cost over \$85,000.

OAKWOOD, O.—Village, I. G. Mohr, mayor, will take bids March 6, for pump house, turbine pumps, tank and appurtenances. Ellis & Wertz, 122 East

Main street, Van Wert, O., consulting engineer.

YOUNGSTOWN, O.—Columbia Machine & Engineering Corp., Hamilton, O., has been taken over by a local syndicate headed by Eugene Hopper, 1021 Wick avenue. Ernest E. Swartzlander Jr. is vice president, and H. R. Hooper, secretary-treasurer.

Connecticut

BRIDGEPORT, CONN.—Auto-Ordnance Corp., 1437 Railroad avenue, R. Maguire, president, is considering factory addition, costing approximately \$55,000.

BRIDGEPORT, CONN.—Owner, care of

Fletcher Thompson Inc., 1336 Fairfield avenue, engineer, will soon take bids for plant extension, to cost over \$40,000.

MIDDLEBURY, CONN.—Waterbury Clock Co., 31 Cherry avenue, will build one-story, 300 x 400-foot factory costing \$550,000. L. F. Caproni, 1221 Chapel street, New Haven, Conn., engineer.

STAMFORD, CONN.—Baer Bros., 700 Canal street, has plans by D. Mansell, 24 Park Row, for two-story 90 x 160-foot factory. Estimated cost \$110,000.

Massachusetts

FITCHBURG, MASS.—Fitchburg Engineering Corp., 52 Oak Hill road, soon lets contract for one-story, 100 x 250-foot factory, costing \$75,000. S. N. Haynes & Associates, 336 Main street, engineers.

New Jersey

WALLINGTON, N. J.—Tube Reducing Corp., Main avenue, has let contract to Deakman Wells Inc., 921 Bergen avenue, Jersey City, N. J., for erection of one-story building, and alterations to other factory buildings. Cost about \$60,000.

Pennsylvania

BETHLEHEM, PA.—Bethlehem Foundry & Machine Co., R. Miller, general superintendent, plans to spend approximately \$40,000 for plant expansion.

SCRANTON, PA.—Breeze Corp. Inc., 35 South Sixth street, Newark, N. J., will erect \$300,000 plant here.

Michigan

ALLEGAN, MICH.—Blood Bros. Machine Co., Allegan, has let contract to Muskegon Construction Co., Muskegon, Mich., for an addition to its plant.

DEARBORN, MICH.—City has filed application for federal grant for addition to sewage treatment plant, estimated to cost \$175,000.

DETROIT—John L. Pottle, 2424 Calvert, Detroit architect, is preparing plans for a factory addition in Detroit.

DETROIT—Falcon Tool Co., Greiner and Harburg streets, plans \$37,000 plant extension.

GRAND RAPIDS, MICH.—Jarecki Machine & Tool Co. is having plans prepared by Robinson, Campau & Crowe, Grand Rapids architects, for addition to factory.

JACKSON, MICH.—H. R. Graf, Jackson architect, is preparing plans for an addition to the shop of Industrial Automatic Co., Jackson.

Illinois

CHICAGO—Chicago Tool & Engineering Co., 8389 South Chicago avenue, is constructing a one-story factory building which will add about 12,500 square feet to present plant capacity. Cost will be approximately \$30,000.

CHICAGO—International Rolling Mill Products Co., 3136 West Fifty-first street, has plans by Rawson & Eisenberg, 4930 West Adams street, and will take bids soon on one-story 75 x 100-foot mill addition. Cost about \$100,000.

DECATUR, ILL.—Illinois-Iowa Power Co., A. Van Wyck, president, will construct steam turbine generating plant.

LOCKPORT, ILL.—Texas Co., 332 South Michigan avenue, Chicago, will build plant addition here, costing \$2,000,000.

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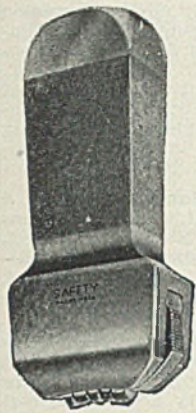
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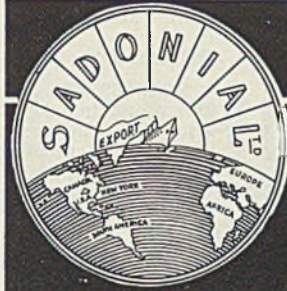
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North Carolina

SOUTHPORT, N. C.—Electric light department has plans maturing for extensions and improvements in municipal power plant, including installation of equipment. Estimated cost \$91,100. (Noted Jan. 19).

TARBORO, N. C.—City council is considering extensions and improvements in municipal power plant, including installation of equipment. Cost about \$210,000.

Tennessee

DYERSBURG, TENN.—City, L. D. Hammer, mayor, will receive bids March 10 for waterworks improvements, including iron removal plant. Black & Veatch, 4706 Broadway, Kansas City, Mo., consulting engineers.

Virginia

WAYNESBORO, VA.—City may expend \$450,000 for sewage treatment plant, intercepting sewer line and incinerator. I. G. Vass, city manager.

Missouri

LEBANON, MO.—City has DPW grant of \$276,000 for sewers, sewer lines and disposal plant, and \$91,000 for waterworks improvements. Russell & Axon, engineers, 4903 Delmar boulevard, St. Louis.

Arkansas

LEWISVILLE, ARK.—Arkansas-Louisiana Gas Co., 300 West Capital street, Little Rock, Ark., will erect desulphurization plant here at cost of \$3,500,000.

MACEDONIA, ARK.—Arkansas-Louisiana Gas Co., 300 West Capitol street, Little Rock, Ark., will build natural gas cleaning plant here.

Wisconsin

MILWAUKEE—E. C. Roamer and John Underwood, formerly manager and assistant manager, respectively, Wisconsin Bearing Co., have organized their own company under the name of Badger Ball

& Roller Bearing Co., 1125 North Van Buren street.

Minnesota

ROCHESTER, MINN.—Rochester Dairy Co. plans installation of electric power equipment in proposed two and three-story plant, including erection of boiler house. Estimated cost \$100,000. Max O. Buetow, 1931 University avenue, St. Paul, architect.

Kansas

WICHITA, KANS.—Watkins Inc., care of Forsblom & Parks, Beacon building, architects, plans erection of steel foundry, costing \$200,000.

California

LONG BEACH, CALIF.—Acme Tool & Tester Co. has been incorporated with \$25,000 capital by L. R. Brown, Huntington Park, Calif.; B. R. McKinley and A. J. Delaney, both of Long Beach. The new corporation is represented by Milo W. Horn, Farmers and Merchants Bank building, Long Beach.

LOS ANGELES—National Aluminum & Bronze Co., 3671 Ninth avenue, has been organized by S. J. Horrell.

LOS ANGELES—Air Parts Mfg. Co., 618 North San Vicente boulevard, has been incorporated by Jerome Goldsmith and Walter Elsemann.

LOS ANGELES—A motor and electric repair shop is being erected at 733 Banning street for General Electric Co., to cost approximately \$70,000.

LOS ANGELES—Aero Tool Engineering Co. will erect plant, 80 x 196 feet, at 8711 Melrose avenue, costing approximately \$18,500.

RIVERSIDE, CALIF.—Food Machinery Corp. will build a factory, 126 x 330 feet at 3050 Twelfth street, here, at cost of about \$62,000.

Canada

BRANTFORD, ONT.—Massey-Harris Co. Ltd., Market street South, has received bids through Allward & Gouinlock, architects, 57 Bloor street West, Toronto, and awards will be made soon

for construction of ordnance plant, 100 x 400 feet, to cost about \$300,000.

HALEY STATION, ONT.—Dominion Magnesium Ltd., Banque National building, Ottawa, has awarded general contract to Foundation Co. of Ontario Ltd., 1158 Bay street, Toronto, for erection of plant here to cost about \$100,000, including briquetting plant, pre-heating and furnace building, casting shed, substation, etc.

LONDON, ONT.—James Carsons & Sons, 342 Ridout street, are having plans prepared by W. G. Murray, architect, Bank of Toronto building, York construction of machine shop at 54 York street, to cost about \$25,000, including equipment.

TORONTO, ONT.—Toronto Foundry Co., 1884 Davenport road, has had plans prepared and will call bids soon for construction of foundry addition to cost about \$40,000, equipment extra.

TORONTO, ONT.—Toronto Refrigeration Fixture Co., 12 Ossington avenue, has plans and will call bids soon for construction of factory at Queen and Massey streets, to cost about \$25,000, with equipment.

TORONTO, ONT.—W. D. Beath & Sons Ltd., 394 Symington avenue, has begun work on three additions to its plant here. J. Robert Page, 18 Toronto street, has general contract. Cost estimated at \$160,000, including equipment.

TORONTO, ONT.—Dundas Lumber Co. Ltd., 3466 Dundas street West, has started work on erection of sawmill to cost \$10,000, equipment extra. Plans by B. Swartz, architect, 139 Queen street West.

TORONTO, ONT.—Precision Dies & Castings Ltd., 228 St. Helens avenue, has received bids through T. Pringle & Sons Ltd., engineers, 36 Toronto street, and will award general contract soon for plant building at 158 St. Helens avenue, to cost about \$33,000.

HALIFAX, N. S.—Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, is receiving bids until Feb. 27, for construction of machine shop at H. M. C. Dockyards here, to cost about \$50,000, with equipment.

LIVERPOOL, N. S.—Thompson Bros. Machinery Co. has started preliminary work on plant addition, to cost about \$25,000.

ASBESTOS, QUE.—Canadian Johns-Manville Co. Ltd., 1155 Metcalfe street, Montreal, has awarded general contract to MacKinnon Steel Corp. Ltd., Industrial street, Sherbrooke, Que., for construction of repair shop in connection with plant expansion project to cost \$250,000.

HULL, QUE.—Hull Iron & Steel Foundries, Montcalm street, will build plant addition to cost, with equipment, about \$375,000, and has given general contract to R. Brunet & Fils, 35 Aylmer road.

ST. HILAIRE, QUE.—Richelleu Beet Sugar Co. Ltd., 112 St. James street West, Montreal, will call new bids for construction of initial unit of sugar factory to be erected at cost of \$75,000. Completed project will represent expenditure, with equipment, of about \$350,000. Plans prepared by G. Rene Richer, 242 Boulevard Grouard, St. Hyacinthe, Que.

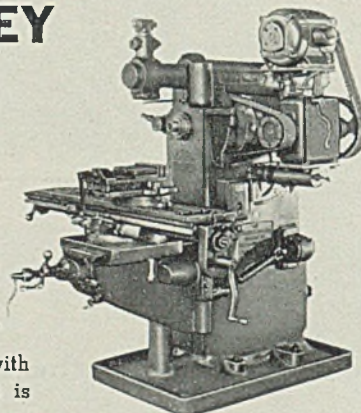
ST. LAURENT, QUE.—Canadian Gauge & Instrument Co., care of A. W. Pitt, 1822 St. Catharine street West, Montreal, has plans by L. N. Booth, 358 Carlyle avenue, Mount Royal, and is receiving bids for construction of instrument plant to cost about \$150,000, with equipment.

THEDFORD MINES, QUE.—Lynn MacLeod Foundry Co., 203 Notre Dame street, W. K. MacLeod, manager, will build foundry here to cost about \$25,000.

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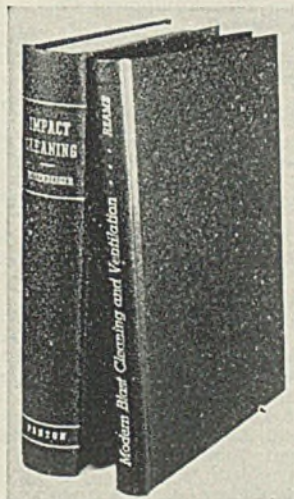
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◆ ◆ ADVERTISING INDEX ◆ ◆

Where-to-Buy Products Index carried in first issue of month.

	Page		Page	Page		
A						
Abrasive Co.	—	Bryant Chucking Grinder Co.	—	Eric Forge Co.	—	
Acheson Colloids Corp.	—	Bryant Machinery & Engineering Co.	—	Eric Foundry Co.	—	
Acme Galvanizing Corp.	—	Buffalo Galvanizing & Tinning Works	—	Euclid Crane & Hoist Co.	115	
Acme Steel & Malleable Iron Works	—	Bullard Co., The.	—	Eureka Fire Brick Works.	—	
Ahlberg Bearing Co.	—	Bundy Tubing Co.	—	Ex-Cell-O Corp.	18	
Air Reduction	86, 87	C				
Ajax Electrothermic Corp.	—	Cadman, A. W., Mfg. Co.	—	Fafnir Bearing Co., The.	—	
Alan Wood Steel Co.	—	Carboloy Co., Inc.	—	Fairbanks, Morse & Co.	16	
Allegheny Ludlum Steel Corp.	—	Carborundum Co., The.	—	Fanner Mfg. Co.	—	
Allen-Bradley Co.	—	Carey, Philip, Mfg. Co., The.	—	Farquhar, A. B., Co., Ltd.	—	
Allis-Chalmers Mfg. Co.	—	Carnegie-Illinois Steel Corp.	—	Farval Corp., The.	—	
Alloy Rods Co.	—	Carpenter Steel Co., The.	63	Ferracut Machine Co.	—	
Alrose Chemical Co.	—	Carter Hotel.	—	Fidelity Machine Co.	—	
American Agile Corp.	—	Cattie, Joseph P., & Bros., Inc.	133	Finn, John, Metal Works.	—	
American Brass Co., The.	—	Celcote Co., The.	—	Firth-Sterling Steel Co.	133	
American Bridge Co.	—	Central Screw Co.	127	Fitchburg Grinding Machine Corp.	—	
American Cable Division of American	—	Challenge Machinery Co., The.	—	Fitzsimons Co., The.	—	
Chain & Cable Co., Inc.	—	Chambersburg Engineering Co.	—	Ford Chain Block Division of Ameri-	—	
can Chain & Cable Co., Inc.,	—	Chandler Products Corp.	—	can Chain & Cable Co., Inc.	129	
American Cable Division.	—	Chicago Metal Hose Corp.	117	Foster, L. B., Co.	136	
American Chain & Cable Co., Inc.,	—	Chicago Perforating Co.	—	Four V Structural Steel Companies.	73	
American Chain & Cable Co., Inc.,	—	Chicago Rawhide Mfg. Co.	—	Foxboro Co., The.	—	
American Chain Division.	—	Cincinnati Grinders, Inc.	—	Frantz, S. G., Co., Inc.	—	
American Chain & Cable Co., Inc.,	—	Cincinnati Milling Machine Co.	—	Fuller Brush Co.	—	
Ford Chain Block Division.	129	Cincinnati Shaper Co., The.	2	G		
American Chain & Cable Co., Inc.,	—	Clark Controller Co.	—	Gage Structural Steel Co.	73	
Page Steel & Wire Division.	—	Cleereman Machine Tool Co.	—	Galland-Henning Mfg. Co.	—	
American Chain Division of American	—	Cleveland Automatic Machine Co.	83	Galvanizers, Inc.	—	
Chain & Cable Co., Inc.	—	Cleveland Cap Screw Co.	—	Garrett, Geo. K., Co.	—	
American Chemical Paint Co.	—	Cleveland-Cliffs Iron Co.	—	General American Transportation	—	
American Engineering Co.	—	Cleveland Crane & Engineering Co.	9	Corp.	—	
American Foundry Equipment Co.	102	Cleveland Hotel.	—	General Blower Co.	136	
American Gas Association.	140	Cleveland Punch & Shear Works Co.	—	General Electric Co.	—	
American Hollow Boring Co.	—	Cleveland Tramrail Division, Cleve-	—	Gisholt Machine Co.	12	
American Hot Dip Galvanizers Assoc-	—	land Crane & Engineering Co.	—	Globe Brick Co., The.	—	
iation.	—	Cleveland Twist Drill Co., The.	—	Goodyear Tire & Rubber Co., The.	—	
American Lanolin Corp.	135	Cleveland Worm & Gear Co., The.	—	Granite City Steel Co.	—	
American Metal Hose Branch of The	—	Climax Molybdenum Co.	—	Grant Gear Works.	—	
American Brass Co.	—	Clinton Bridge Works.	73	Graver Tank & Mfg. Co., Inc.	—	
American Metal Products Co.	100	Cold Metal Products Co.	—	Graybar Electric Co.	—	
American Monorail Co.	—	Colonial Broach Co.	—	Great Lakes Steel Corp.	8	
American Nickeloid Co.	133	Columbia Steel Co.	—	Greenfield Tap & Die Corp.	14	
American Pulverizer Co.	—	Columbus Die, Tool & Machine Co.	—	Gregory, Thomas, Galvanizing Works	—	
American Roller Bearing Co.	—	Commercial Metals Treating, Inc.	—	Grinnell Co., Inc.	—	
American Rolling Mill Co., The.	119	Cone Automatic Machine Co., Inc.	—	H		
American Screw Co.	—	Continental Machines, Inc.	—	Hagan, George J., Co.	—	
American Shear Knife Co.	—	Continental Roll & Steel Foundry Co.	—	Hallden Machine Co., The.	—	
American Solder & Flux Co.	—	Continental Screw Co.	—	Hanlon-Gregory Galvanizing Co.	90	
American Steel & Wire Co.	—	Cooper-Bessemer Corp.	—	Hanna Engineering Works.	—	
American Tinning & Galvanizing Co.	—	Copperweld Steel Co.	—	Hanna Furnace Corp.	132	
Ampeco Metal, Inc.	—	Corbin Screw Corp.	—	Hannifin Mfg. Co.	126	
Amsler-Morton Co., The.	—	C-O-Two Fire Equipment Co.	—	Harbison-Walker Refractories Co.	—	
Andrews Steel Co., The.	—	Cowles Tool Co.	—	Harnischfeger Corp.	121	
Apollo Steel Co.	—	Crane Co.	—	Harper, H. M., Co., The.	—	
Armstrong-Blum Mfg. Co.	122	Crawback, John D., Co.	—	Harrington & King Perforating Co.	129	
Atkins, E. C., & Co.	—	Crosby Co., The.	135	Hays Corp., The.	—	
Atlantic Stamping Co.	—	Cuban-American Manganese Corp.	—	Heald Machine Co.	—	
Atlantic Steel Co.	—	Cullen-Friedstedt Co.	—	Heppenstall Co.	—	
Atlas Car & Mfg. Co.	—	Culvert Division, Republic Steel Corp.	6, 7	Hevi Duty Electric Co.	—	
Atlas Drop Forge Co.	135	Cunningham, M. E., Co.	133	Hill, James, Mfg. Co.	—	
Atlas Lumnite Cement Co.	—	Curtis Manufacturing Co.	—	Hindley Mfg. Co.	131	
Axelsson Mfg. Co.	—	Cutler-Hammer, Inc.	—	Hobart Bros. Co.	131	
B						
Babcock & Wilcox Co.	—	D				
Balley, Wm. M., Co.	79	Darwin & Milner, Inc.	—	Homestead Valve Mfg. Co.	—	
Baker-Raulang Co.	13	Davis Brake Beam Co.	—	Horsburgh & Scott Co.	118	
Baldwin Southwark Division, The	—	Dearborn Gage Co.	—	Hubbard & Co.	—	
Baldwin Locomotive Works.	—	Denison Engineering Co., The.	—	Hubbard, M. D., Spring Co.	—	
Bantam Bearings Corp. ....	—	..... Inside Back Cover	—	Huther Bros. Saw Mfg. Co.	—
Barnes, Wallace, Co., Division of As-	—	DeSanno, A. P., & Son, Inc.	—	Hyatt Bearings Division, General Mo-	—	
sociated Spring Corporation.	—	Detroit Electric Furnace Division,	—	tors Corporation.	—	
Basic Refractories, Inc.	—	Kuhlman Electric Co.	—	Hyde Park Foundry & Machine Co.	—	
Bay City Forge Co.	—	Detroit Leland Hotel.	—	I		
Bay State Abrasive Products Co.	—	Diamond Expansion Bolt Co., Inc.	—	Ideal Commutator Dresser Co.	—	
Bellevue-Stratford Hotel.	—	Diamond Tool Co.,	—	Illinois Clay Products Co.	—	
Belmont Iron Works.	133	Dietert, Harry W., Co.	131	Independent Galvanizing Co.	—	
Berger Manufacturing Div., Republic	—	Disston, Henry, & Sons, Inc.	—	Industrial Brownhoist Corp.	—	
Steel Corp.	6, 7	Dow Chemical Co., The.	—	Ingersoll Steel & Disc Division, Borg	—	
Berkeley Equipment Co.	134	Downs Crane & Hoist Co.	—	Warner Corp.	—	
Bethlehem Steel Co.	1	Dravo Corp., Engineering Works Div.	—	Inland Steel Co.	98	
Birdsboro Steel Foundry & Machine	—	Dravo Corp., Machinery Div.	124	International Nickel Co., Inc.	106	
Co.	—	Duffin Iron Co.	73	International Screw Co.	—	
Bissett Steel Co., The.	128	E			International-Stacey Corp.	—
Blanchard Machine Co.	—	Easton Car & Construction Co.	—	Iron & Steel Products, Inc.	136	
Blaw-Knox Co.	81	Edison Storage Battery Div. of Thom-	—	Isaacson Iron Works.	—	
Blaw-Knox Division, Blaw-Knox Co.	—	as A. Edison, Inc.	—	J		
Bliss & Laughlin, Inc.	—	Electric Controller & Mfg. Co.	—	Jackson Iron & Steel Co., The.	133	
Bloom Engineering Co. ....	—	..... Inside Front Cover	—	James, D. O., Mfg. Co.	—
Bower Roller Bearing Co.	—	Electric Furnace Co., The.	—	J-B Engineering Sales Co.	—	
Bridgeport Brass Co.	—	Electric Storage Battery Co.	—	Jessop Steel Co.	—	
Bristol Co., The.	—	Electro Alloys Co., The.	—	Jessop, Wm., & Sons, Inc.	—	
Broderick & Bascom Rope Co.	—	Electro Metallurgical Co.	—	Johns-Manville Corp.	—	
Brooke, E. & G., Iron Co.	—	Elmes, Charles F., Engineering Works	—	Johnson Bronze Co.	—	
Brosius, Edgar E., Co.	—	Enterprise Galvanizing Co.	133	Jones & Lamson Machine Co.	34, 35	
Brown & Brown, Inc.	—	Equipment Steel Products Division of	—	Jones & Laughlin Steel Corp.	—	
Brown & Sharpe Mfg. Co.	—	Union Asbestos & Rubber Co.	—	Jones, W. A., Foundry & Machine Co.	—	
Brown Instrument Co., The.	—	Erdle Perforating Co., The.	—	Joslyn Co. of California.	—	
				Joslyn Mfg. & Supply Co.	—	

◆ ◆ ADVERTISING INDEX ◆ ◆

Where-to-Buy Products Index carried in first issue of month.

	Page		Page		Page
K					
Kardong Brothers, Inc.	—	New Departure, Division General Motors Corp.	—	SKF Industries, Inc.	—
Keagley Brick Co., The	—	New England Screw Co.	—	Smith Oil & Refining Co.	—
Kearney & Trecker Corp.	—	New Jersey Zinc Co.	67	Snyder, W. P., & Co.	—
Kemp, C. M., Mfg. Co.	—	New York & New Jersey Lubricant Co.	—	Socony-Vacuum Oil Co., Inc.	—
Kester Solder Co.	—	Niagara Machine & Tool Works	—	South Bend Lathe Works	—
Kidde, Walter, & Co., Inc.	—	Niles Steel Products Div., Republic Steel Corp.	6, 7	Southington Hardware Mfg. Co.	—
King Fifth Wheel Co.	—	Nilson, A. H., Machine Co.	137	Standard Galvanizing Co.	—
Kinnear Mfg. Co.	—	Nitralloy Corp., The	—	Standard Steel Works	—
Kirk & Blum Mfg. Co.	137	Norma-Hoffmann Bearings Corp.	—	Stanley Works, The	—
Koppers Co.	—	Northwest Engineering Co.	—	Steel & Tubes Division, Republic Steel Corp.	6, 7
Koven, L. O., & Brother, Inc.	—	Norton Co., The	—	Steel Founders' Society of America	—
Kron Co., The	—	O			
L					
Laclede Steel Co.	—	Ohio Crankshaft Co.	42	Steelweld Machinery Division, Cleveland Crane & Engineering Co.	9
Lake City Malleable Co.	—	Ohio Electric Mfg. Co.	—	Sterling Grinding Wheel Div. of The Cleveland Quarries Co.	—
Lakeside Steel Improvement Co., The	130	Ohio Galvanizing & Mfg. Co.	—	Stewart Furnace Division, Chicago Flexible Shaft Co.	—
Lamson & Sessions Co., The	—	Ohio Knife Co., The	—	Strom Steel Ball Co.	—
Lands Machine Co.	—	Ohio Locomotive Crane Co., The	131	Strong Steel Foundry Co.	—
Lang Machinery Co.	136	Ohio Seamless Tube Co., The	—	Stuart, D. A., Oil Co.	—
La Salle Steel Co.	—	Ohio Steel Foundry Co., The	—	Sturtevant, B. F., Co.	10, 11
Latrobe Electric Steel Co.	—	Oliver Iron & Steel Corp.	123	Sun Oil Co.	—
Lawrence Copper & Bronze	—	Oster Mfg. Co., The	—	Superior Steel Corp.	—
Layne & Bowler, Inc.	—	P			
LeBlond, R. K., Machine Tool Co., The	—	Page Steel & Wire Division American Chain & Cable Co., Inc.	—	Surface Combustion Corp.	—
Lee Spring Co., Inc.	—	Pangborn Corp.	—	Sutton Engineering Co.	—
Lehigh Structural Steel Co.	—	Parker, Charles, Co.	—	Swindell-Dressler Corp.	—
Leschen, A., & Sons Rope Co.	132	Parker-Kalon Corp.	—	T	
Levinson Steel Co., The	—	Parker Rust Proof Co.	—	Taylor-Wilson Mfg. Co.	129
Levinson Steel Sales Co.	—	Parkin, William M., Co.	—	Tennessee Coal, Iron & Railroad Co.	—
Lewin-Mathes Co.	—	Pawtucket Screw Co.	—	Thomas Machine Mfg. Co.	126
Lewis Bolt & Nut Co.	—	Penn Galvanizing Co.	—	Thomas Steel Co., The	—
Lewis Foundry & Machine Division of Blaw-Knox Co.	—	Pennsylvania Industrial Engineers	—	Thompson-Bremer & Co.	84
Lewis Machine Co., The	—	Pennsylvania Salt Mfg. Co.	69	Tide Water Associated Oil Co.	—
Lincoln Electric Co., The	—	Perkins, B. F., & Son, Inc.	—	Timken Roller Bearing Co.	—
Lincoln Engineering Co.	—	Pheoil Mfg. Co.	—	Timken Steel & Tube Division, The	—
Lincoln Hotel	—	Philadelphia Gear Works	—	Timken Roller Bearing Co.	—
Linde Air Products Co., The	—	Pittsburgh Crushed Steel Co.	135	Tinnerman Products, Inc.	—
Link-Belt Co.	—	Pittsburgh Gear & Machine Co.	—	Titanium Alloy Manufacturing Co.	103
Logemann Bros. Co.	—	Pittsburgh Lectromelt Furnace Corp.	—	Toledo Stamping & Mfg. Co.	—
Lovejoy Flexible Coupling Co.	—	Pittsburgh Rolls Division of Blaw-Knox Co.	81	Tomkins-Johnson Co., The	—
Lubriplate Division Fiske Brothers Refining Co.	—	Pittsburgh Steel Co.	—	Torrington Co., The	—
Lyon Metal Products, Inc.	—	Plymouth Locomotive Works Division of The Fate-Root-Heath Co.	—	Truscon Steel Co.	6, 7
Mc					
McKay Machine Co.	3	Poole Foundry & Machine Co.	—	U	
McKee, Arthur G., Co.	—	Porter, H. K., Co., Inc.	—	Udylite Corp., The	—
McKenna Metals Co.	—	Pressed Steel Car Co., Inc.	—	Union Carbide & Carbon Corp.	—
M					
MacDermid, Inc.	—	Pressed Steel Tank Co.	120	Union Drawn Steel Div., Republic Steel Corp.	6, 7
Mackintosh-Hemphill Co.	89	Progressive Welder Co.	—	United Chromium, Inc.	93
Macklin Co.	—	R			
Macwhyte Co.	—	Racine Tool & Machine Co.	—	United Engineering & Foundry Co.	—
Maehler, Paul, Co., The	—	Ransohoff, N., Inc.	—	United States Graphite Co.	—
Mahr Manufacturing Co.	—	Raymond Mfg. Co., Division of Associated Spring Corp.	—	United States Steel Corp., Subsidiaries	—
Mallory, P. R., & Co., Inc.	—	Reading Chain & Block Corp.	104	United States Steel Export Co.	—
Mathews Conveyer Co.	—	Ready-Power Co.	—	V	
Maurath, Inc.	101	Reliance Electric & Engineering Co.	—	Valley Mould & Iron Corp.	—
Mercury Mfg. Co.	125	Republic Steel Corp.	6, 7	Vanadium-Alloys Steel Co.	—
Mesta Machine Co.	—	Revere Copper and Brass, Inc.	—	Vanadium Corporation of America	76, 77
Metal & Thermit Corporation	105	Rhoades, R. W., Metaline Co., Inc.	—	Van Dorn Iron Works Co., The	—
Michigan Tool Co.	—	Riverside Foundry & Galvanizing Co.	—	Vaughn Machinery Co., The	—
Micromatic Hone Corp.	—	Robertson, H. H., Co.	—	Veeder-Root, Inc.	—
Midland Structural Steel Co.	73	Roebbling's John A., Sons Co.	—	W	
Midvale Co., The	—	Rollway Bearing Co., Inc.	—	Waldron, John, Corp.	131
Milwaukee Foundry Equipment Co.	—	Roosevelt Hotel	—	Walker-Turner Co., Inc.	99
Missouri Rolling Mill Corp.	—	Roper, George D., Corp.	95	Wall-Colmonoy Corp.	—
Moltrup Steel Products Co.	—	Ruemelin Mfg. Co.	—	Warner & Swasey Co.	5
Molybdenum Corporation of America	97	Russell, Burdshall & Ward Bolt & Nut Co.	—	Washburn Wire Co.	—
Monarch Machine Tool Co., The	—	Ryerson, Joseph T., & Son, Inc.	20	Watson-Stillman Co., The	—
Monarch Steel Co.	—	S			
Morgan Construction Co.	—	Sadonia Ltd.	133	Wayne Chemical Products Co.	128
Morgan Engineering Co.	—	Saïem Engineering Co.	—	Wean Engineering Co., Inc.	—
Morrison Metalweld Process, Inc.	—	Samuel, Frank, & Co., Inc.	—	Weinman Pump & Supply Co., The	—
Morton Salt Co.	—	San Francisco Galvanizing Works	—	Weirton Steel Co.	—
Motch & Merryweather Machinery Co.	—	Sanitary Tinning Co., The	—	Wellman Bronze & Aluminum Co.	127
Motor Repair & Mfg. Co.	136	Sealco Co.	116	Wellman Engineering Co.	129
N					
National Bearing Metals Corp.	—	Schloemann Engineering Corp.	—	Westinghouse Electric & Mfg. Co.	15
National Broach & Machine Co.	—	Scovill Mfg. Co.	—	West Penn Machinery Co.	—
National Carbon Co., Inc., Carbon Sales Division	—	Scully Steel Products Co.	—	West Steel Casting Co.	135
National Cylinder Gas Co.	—	Sellers, Wm., & Co., Inc.	—	Wheeling Steel Corporation	—
National-Erie Corp.	—	Shakeproof, Inc.	—	Whitcomb Locomotive Co., The	—
National Forge & Ordnance Co.	—	Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc.	—	Whitehead Stamping Co.	135
National Lead Co.	—	Sheffield Corp., The	—	Whitney Screw Corp.	—
National Roll & Foundry Co.	—	Shell Oil Co., Inc.	70	Wickwire Brothers, Inc.	—
National Screw & Mfg. Co.	—	Shenango Furnace Co., The	—	Wilcox, Crittenden & Co., Inc.	—
National Steel Corp.	8, 132	Shenango-Penn Mold Co.	131	Williams, J. H., & Co.	—
National Telephone Supply Co., Inc.	—	Shepard Niles Crane & Hoist Corp.	—	Wilson, Lee, Engineering Co.	—
National Tube Co.	—	Shuster, F. B., Co., The	—	Witt Cornice Co., The	—
O					
Ohio Crankshaft Co.	42	Silent Hoist Winch & Crane Co.	—	Wood, R. D., Co.	—
Ohio Electric Mfg. Co.	—	Simonds Gear & Mfg. Co.	129	Worth Steel Co.	—
Ohio Galvanizing & Mfg. Co.	—	Simonds Saw & Steel Co.	—	Wyckoff Drawn Steel Co.	Front Cover
Ohio Knife Co., The	—	SisalKraft Co., The	65	Y	
Ohio Locomotive Crane Co., The	131	Z			
Ohio Seamless Tube Co., The	—	Zeh & Hahnemann Co.			
Ohio Steel Foundry Co., The	—	—			
Oliver Iron & Steel Corp.	123	—			
Oster Mfg. Co., The	—	—			
P					
Page Steel & Wire Division American Chain & Cable Co., Inc.	—	—			
Pangborn Corp.	—	—			
Parker, Charles, Co.	—	—			
Parker-Kalon Corp.	—	—			
Parker Rust Proof Co.	—	—			
Parkin, William M., Co.	—	—			
Pawtucket Screw Co.	—	—			
Penn Galvanizing Co.	—	—			
Pennsylvania Industrial Engineers	—	—			
Pennsylvania Salt Mfg. Co.	69	—			
Perkins, B. F., & Son, Inc.	—	—			
Pheoil Mfg. Co.	—	—			
Philadelphia Gear Works	—	—			
Pittsburgh Crushed Steel Co.	135	—			
Pittsburgh Gear & Machine Co.	—	—			
Pittsburgh Lectromelt Furnace Corp.	—	—			
Pittsburgh Rolls Division of Blaw-Knox Co.	81	—			
Pittsburgh Steel Co.	—	—			
Plymouth Locomotive Works Division of The Fate-Root-Heath Co.	—	—			
Poole Foundry & Machine Co.	—	—			
Porter, H. K., Co., Inc.	—	—			
Pressed Steel Car Co., Inc.	—	—			
Pressed Steel Tank Co.	120	—			
Progressive Welder Co.	—	—			
R					
Racine Tool & Machine Co.	—	—			
Ransohoff, N., Inc.	—	—			
Raymond Mfg. Co., Division of Associated Spring Corp.	—	—			
Reading Chain & Block Corp.	104	—			
Ready-Power Co.	—	—			
Reliance Electric & Engineering Co.	—	—			
Republic Steel Corp.	6, 7	—			
Revere Copper and Brass, Inc.	—	—			
Rhoades, R. W., Metaline Co., Inc.	—	—			
Riverside Foundry & Galvanizing Co.	—	—			
Robertson, H. H., Co.	—	—			
Roebbling's John A., Sons Co.	—	—			
Rollway Bearing Co., Inc.	—	—			
Roosevelt Hotel	—	—			
Roper, George D., Corp.	95	—			
Ruemelin Mfg. Co.	—	—			
Russell, Burdshall & Ward Bolt & Nut Co.	—	—			
Ryerson, Joseph T., & Son, Inc.	20	—			
S					
Sadonia Ltd.	133	—			
Saïem Engineering Co.	—	—			
Samuel, Frank, & Co., Inc.	—	—			
San Francisco Galvanizing Works	—	—			
Sanitary Tinning Co., The	—	—			
Sealco Co.	116	—			
Schloemann Engineering Corp.	—	—			
Scovill Mfg. Co.	—	—			
Scully Steel Products Co.	—	—			
Sellers, Wm., & Co., Inc.	—	—			
Shakeproof, Inc.	—	—			
Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc.	—	—			
Sheffield Corp., The	—	—			
Shell Oil Co., Inc.	70	—			
Shenango Furnace Co., The	—	—			
Shenango-Penn Mold Co.	131	—			
Shepard Niles Crane & Hoist Corp.	—	—			
Shuster, F. B., Co., The	—	—			
Silent Hoist Winch & Crane Co.	—	—			
Simonds Gear & Mfg. Co.	129	—			
Simonds Saw & Steel Co.	—	—			
SisalKraft Co., The	65	—			
T					
Taylor-Wilson Mfg. Co.	129	—			
Tennessee Coal, Iron & Railroad Co.	—	—			
Thomas Machine Mfg. Co.	126	—			
Thomas Steel Co., The	—	—			
Thompson-Bremer & Co.	84	—			
Tide Water Associated Oil Co.	—	—			
Timken Roller Bearing Co.	—	—			
Timken Steel & Tube Division, The	—	—			
Timken Roller Bearing Co.	—	—			
Tinnerman Products, Inc.	—	—			
Titanium Alloy Manufacturing Co.	103	—			
Toledo Stamping & Mfg. Co.	—	—			
Tomkins-Johnson Co., The	—	—			
Torrington Co., The	—	—			
Truscon Steel Co.	6, 7	—			
U					
Udylite Corp., The	—	—			
Union Carbide & Carbon Corp.	—	—			
Union Drawn Steel Div., Republic Steel Corp.	6, 7	—			
United Chromium, Inc.	93				

The reason
we can help you
today?



We got ready yesterday

Ever since World War I the Gas industry's scientists and Industrial Gas Engineers have been developing new and more efficient ways to apply industrial heat to your process. No wonder, when Defense sprang up, the Gas industry was ready to help speed production, lower unit costs, reduce spoilage and of course turn out better, more uniform products.

The speed-up called immediately upon Gas for new applications of industrial heating, for use of Gas in atmosphere furnaces, even for the use of Gas as a chemical. The applications were new—but the research and engineering were not; they were simply the accumulated result of five, ten, twenty years' work to develop Gas

equipment to its highest efficiencies.

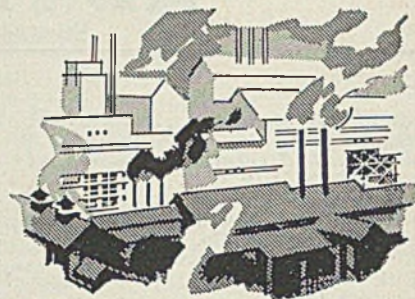
One of these days the war will end . . . and then, as industries change back to peacetime production, the ability of Gas and Gas equipment to lower unit costs and maintain quality will be important in widening markets.

Right now Gas can help you speed production and hold costs down in your plant. Why not investigate? Telephone your Gas company for information on how heating problems such as yours have been solved in other plants.

AMERICAN GAS ASSOCIATION
INDUSTRIAL and COMMERCIAL
GAS SECTION
420 LEXINGTON AVE., NEW YORK

THE TREND IS TO GAS

FOR ALL
INDUSTRIAL HEATING



Modern manufacturing is organized on a highly efficient and closely controlled basis—as is being brought out daily by the present war emergency. This has been particularly true in the metals industry.

The demands of the metals industry for closely controlled processes in production, necessary to meet the tolerances under which they are working, require the best in fuel application and machinery.



A Precision Fuel

These rigid requirements have brought about the wide acceptance of gas as a modern precision fuel by manufacturers in the metals field. The fine qualities of this fuel give the manufacturer benefits that mean much in the growing pressure for faster output, lower unit costs and always exact uniformity of product quality.

Those qualities are that Gas is quick heating, accurately controllable, flexible, clean and economical.

The makers of equipment using industrial Gas have played their full share in developing, improving, re-designing—all to make Gas do the job in a thousand plants which are making different products and need heat for entirely *different* processing reasons.

Gas Is Ready

One thing is sure: Gas engineering and research have marched step for step with the speeded metals industries and are ready—now that this country has been attacked—to accelerate the pace just as fast as industry's needs call for.

Summed up, this just about expresses it: If it's done with heat, you can do it better with Gas.