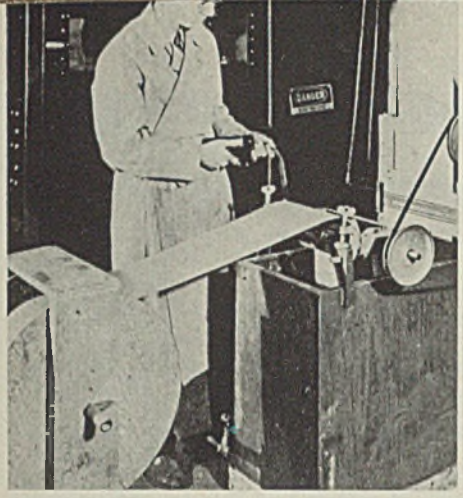


*Process of electrolytic deposition of tin on steel becomes necessary part of steel plant practice. Page 128*



# CONTENTS


Volume 111—No. 23 STEEL December 7, 1942


## NEWS


Knox Warns Industry "Be Prepared for Quick Shifts" 74
Engineer Asked To Contribute Ideas for Design Improvement 77
Ore Movement Near 92,000,000 Tons as Shipping Season Ends 78
Men of Industry 80
Obituaries 81
Europe Short on Supplies of Manganese, Chromium, Nickel 82
Priorities—Allocations—Prices 83
More than 3000 Attend Chicago Explanation of CMP Program 83
War Plant Construction in Chicago Area Nears Billion-Dollar Mark 88
Canadian Industry under Rigid Control; U. S. Aids Mineral Recovery 89
Army-Navy Awards 94
Steelworkers Purchase War Bonds at Rate of $100,000,000 Annually 95
Fair Labor Practices Committee To Hear Charges of Discrimination 100
Physically-Handicapped Men Contribute to War Effort 101
Formula for Adjusting Prices on War Materials Contracts Proposed 102
Need Critical Metals To Finish War Contract? Phone WPB's MRD 103
New Restrictions Imposed on Use of Zinc in Civilian Products 104
Steel Mills Using Household Scrap Rapidly as Possible 105


## FEATURES


Behind the Scenes with Steel 4
Highlighting This Issue 71
Editorial—The Score—After One Year 73
Windows of Washington 84
Mirrors of Motordom 91
Wing Tips 96
The Business Trend 107
Industrial Equipment 140
New Business 194
Construction and Enterprise 198


## TECHNICAL


Hot Strip Mills Double Plate Tonnage 110
Report on NE Alloy Steels as Roller Bearing Metal 112
Aircraft Electroplating 120
Reclaiming Tools Via Brazing (Part I) 122
Develops Processing Lines for Electrolytic Tinning 128
Oil Handling System (Concluding Article) 132
Women "Man" Britain's War Plants 138


## PRODUCTION


Steelworks Operations for Week 79


## MARKETS


Shift in War Needs Cuts Steel Mill Order Backlogs 179
Market Prices and Composites 180

*Index to Advertisers* 209
*Where-to-Buy Products Index carried quarterly*

Print the complete address in plain block letters in the panel below, and your return address in the space provided. Use typewriter, dark ink, or pencil. Write plainly. Very small writing is not suitable.

No. _____

(CENSOR'S STAMP)

PRIVATE JOE [redacted]
CO. [redacted]-ENG. DIV. [redacted]
% POSTMASTER
LOS ANGELES, CALIF.

J. H. Gleason
(Sender's name)
Graybar Elec. Co.
(Sender's address)
Chicago, Ill.
Nov. 15, 1942
(Date)

FOLD SIDES OVER AND THEN FOLD BOTTOM UP AND SEAL
NO OTHER ENVELOPE SHOULD BE USED

Dear Joe: I guess you're seeing enough action to make any story about what's going on back in Chicago seem tame × But we are still in there pitching, as you can judge by the emergency job your friend Dave Hannenberg put thru over the week-end ×

It seems that a shell plant up in Milwaukee had 32 new machines come in which they expected to be motor equipped × they actually arrived minus motors on Saturday, and it was an absolute necessity to get them into production on Monday A.M! Well, Milwaukee got Dave on the wire and said "We've got to deliver ×" Actually, we had just 10 motors of the required type in our Chicago stock ×

Dave got after one supplier and managed to round up another 12 motors there; but that left 10 still to go × Then he went into the shipment records and located a good Chicago customer who had received a shipment of suitable motors which had not yet gone on the line × By dint of a lot of telephoning, he finally got a hold of the President of this company on his Saturday P. M. golf game and obtained his permission to obtain 10 of these motors × A special truck picked them up, and by 7 that night all 32 were rolling to Milwaukee!

Dave and the rest of us are hoping that jobs like this can help a little to give you what you need to "finish the job"

J.H.G

V···–MAIL

16—29143-2

To the 275-odd GRAYBAR Men now serving in the armed services, the folks at home have this to say: "We know how lucky we are to have fellows like you safeguarding all our homes and families. We're trying to make our thankfulness count in terms of *faster production*, by getting electrical supplies where they're needed, when they're needed, day or night, no matter what the difficulties."

**GraybaR**

**IN OVER 80 PRINCIPAL CITIES**

***Executive Offices:*** **GRAYBAR BUILDING, NEW YORK, N. Y.**

Graybar — Everything Electrical . . . . THAT IT TAKES TO WIN!

# HIGHLIGHTING

## this issue of STEEL

**FIRST YEAR** Conferences of manufacturers and engineers in New York, Chicago, and other cities last week developed a multiplicity of opinions as to what should be done, and what should not be done, to win the war—one year almost to a day since our declaration of war. At the Congress of Industry, sponsored by the National Association of Manufacturers in New York (p. 74), Col. Knox spoke of the "stern and terrible year ahead," and counselled industrial management to be prepared "for shifts in production which may come overnight." Business spokesmen urged continued and complete co-operation with the government. The role that production men are playing in war was brought out at the meeting of the American Society of Mechanical Engineers (p. 77). Ordnance Department officials taking part in this forum urged designers and inventors to submit more ideas for mechanical devices.

**LABOR** Dollar-a-day strike penalty provision asked by a leading steel producer in its contract with the United Steelworkers was denied (p. 82) by the War Labor Board, which held the company must sign the same contract as has been accepted by other steelmakers. . . Hearings on employment practices in war industries, aimed particularly at eliminating discrimination for race, creed, color or national origin, are planned by the War Manpower Commission (p. 100). . . Christmas as the usual full holiday is recommended (p. 101) by WPB Chairman Donald M. Nelson. It will be the first full holiday this year. . . Physically handicapped men are being drawn into more metalworking plants to replace men called into the armed services (p. 101). . . Steelworkers are buying war bonds at the rate of $100,000,000 per year (p. 95).

**NEW FACILITIES** Suspension of construction work on the $45,000,000 expansion of the Continental Ordnance Plant, Hammond, Ind., has been ordered by WPB (p. 88). Other construction programs are scheduled to be cancelled to make materials available for direct military use and for the more strategic building programs. Meanwhile, a number of new expansions have been approved, developments in the Chicago district alone now amounting to nearly one billion dollars.

**MATERIALS** The critical zinc shortage has necessitated further limitations on the use of this material in a variety of products (p. 104). . . Unique "life-saving" service to war manufacturers needing critical metals to complete vital contracts is performed by the Materials Redistribution Department in the WPB regional office in New England (p. 103). Lists of such materials frozen or otherwise held in inventory are accumulated by the unit and in many cases deliveries of the needed scarce metal—often in exact form desired—have been arranged quickly. . . Certain Congressmen have developed a new technique (p. 84) of using committee hearings as sounding boards for pet schemes. Recent example was the sponge iron controversy in which competent engineers and metallurgists were subject to abuse for opposing senators' proposal for "a plant at the mouth of every mine."

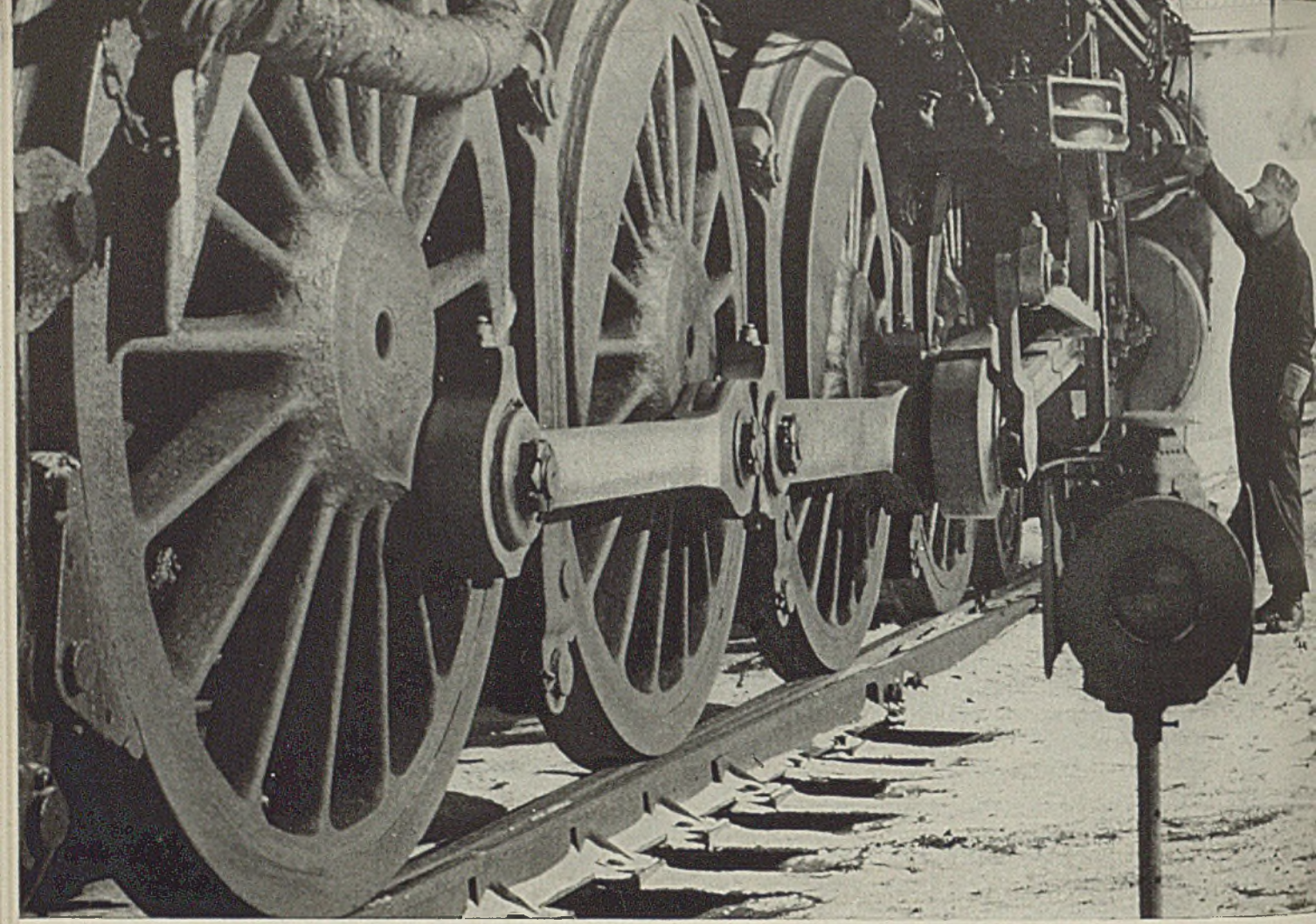
**SALVAGE** Controversy over the disposition of household scrap collected in the recent salvage campaign flared last week (p. 105) when E. C. Barringer, president, Institute of Scrap Iron and Steel, declared the mills were becoming extremely "choosey" about the grades of materials they would accept. R. W. Wolcott, chairman of the American Industries Salvage Committee, and president of Lukens Steel Co., replied that the mills were taking the household scrap as rapidly as conditions would permit. He referred to the collection as "a blood bank" to be drawn upon to augment the available supply of higher grade scrap.

**TECHNICAL** F. Felix tells how our continuous strip mills have been converted to rolling plate needed for our ship and tank production programs. Success of this type of operation is evident from fact that strip mills have doubled plate tonnage production in less than a year (p. 110).

A. S. Jameson details experience of International Harvester Co. with NE steels. He reports on tests and successful applications of the NE-8000 series, carburizing and medium carbon grades. This (p. 112) is the fourth in STEEL's new series on NE steels in which users are reporting their experiences with them.

Herbert E. Fleming describes special low-temperature brazing procedures utilized by a large machinery manufacturer to reclaim broken tools and to make new cutting tools from parts of old ones (p. 122). Methods put plant in position to handle any tool breakdowns or tool shortages that may develop. Detailed procedure for reclaiming 11 different classes of tools is included.

J. Raymond Erbe presents facts regarding the latest application of electric induction heating (p. 128) —a method that greatly facilitates operation of new electrolytic tinning lines which now work successfully at speeds up to 1000 feet per minute. Extremely thin layer of tin is flowed evenly on surface of strip by the induction heating setup.



*Credit is given the Great Northern Railway for the illustration and theme of this advertisement.*

# *More than ever before . . . It is* STEEL ON STEEL

Steel cars and locomotives, traveling swiftly and safely on steel rails, are moving the greatest volume of traffic in the history of our nation. This is the war job of the American railroads—a job already 60% greater than in World War I and handled by 39% fewer locomotives and 17% fewer freight cars.

This inspiring railroad performance is made possible by foresight of railroad management, alertness of railroad operators, cooperation of American shippers—*and by steel on steel.*

In the days before all-out war effort, Inland helped the railroads prepare for the present emergency by supplying large tonnages of sheets, plates and shapes—special low-alloy, high-strength steels—and rails made by the control-cooled process. These Inland products helped build more powerful locomotives; freight cars with less dead weight, higher payload capacity, and longer service; and tracks that are safer for higher speeds and heavier traffic.

Yes, it is *steel on steel* that is carrying more than two-thirds of the nation's traffic, the greatest of all time—the railroads' part in winning the war.

Let us all do our part in releasing cars quickly so the greatest possible use can be made of all railroad equipment.

*Dedicated to Victory*

# INLAND STEEL CO.

38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City

STEEL
December 7, 1942

# The Score—After One Year

*December 7 marks the first anniversary of Pearl Harbor. A White House statement announces that the President feels that it should be observed as a "day of silence in remembrance of a great infamy."*

*While Americans are vividly "remembering," they also will be weighing the significance of the train of exciting events which has ensued since Japan's stab in the back. How do our losses stack up with our gains?*

*The score against us is stupendous. No nation has ever even remotely approached the record of Japan in the damage inflicted upon us. Pearl Harbor, Manila, Bataan and Corregidor have no counterparts in our history. Never before have we been shut off from vital sources of rubber, tin and other essentials as the result of the acts of an enemy nation. Notwithstanding the brilliant feats of our armed forces, the score in the Pacific, after a year of war, remains top-heavily in favor of the enemy.*

*Fortunately, however, there have been compensating developments at home. Outstanding among these is the priceless service which Japan's infamy rendered us in our preparation for and participation in global war. Prior to Pearl Harbor we were getting ready for war in a leisurely fashion. If the Japanese had not attacked, thus inducing Berlin and Rome to declare war upon us, there is no telling how long it would have taken us to get down to brass tacks in our war effort.*

*As it turned out, Japan's infamy shocked us into action. Today we are thoroughly tooled up for big-scale production. Our output of war goods is at least four times what it was before Pearl Harbor. Our preparation has been speeded up sufficiently to enable us to strike hard in North Africa, at the same time we are dealing telling blows in many other strategic points all over the world.*

*Japan's infamy already has helped to make us strong. Perhaps history will show that it shortened World War II.*

E. L. Shaner

*Editor-in-Chief*

# Knox Warns Industry "Be Prepared for Quick Shifts"

*Production plans may change overnight in "stern and terrible 1943," secretary tells manufacturers. One-man control of war material, bulwarks to safeguard democracy, advised by other speakers*

*NEW YORK*

THE YEAR 1942 will be found by future historians to have been a fateful one for this country, in view of the vast accomplishment in girding for war, declared Col. Frank Knox, Secretary of the Navy, before the War Congress of American Industry in session here last week under sponsorship of the National Association of Manufacturers.

The job that has been done is proof of what a democracy can do, and it was done despite an enormous amount of clamor, discontent, criticism from armchair and typewriter strategists and politicians of all shades of opinion. All this is proper under our form of government, Col. Knox believed, but he was inclined to think that there will be less criticism as we go on, for the reason it must have become apparent to all by this time that "this is America's best-run war."

Quoting Winston Churchill, Col. Knox predicted that 1943 will be a "stern and terrible" year. The Navy is woefully short of certain items, such as escort vessels, and there is a very difficult time ahead in getting more troops and armed forces abroad, and in supplying the troops already abroad. While we have made a good start in North Africa, for example, we may have to pay a heavy price in the form of losses at sea in the coming months.

### Production "Torrent" in 1943

War expenditures next year will be in excess of seventy billion dollars, said Col. Knox, and by next December war production literally will be a "torrent." He counselled industrial management—"leaders of the shock troops of production"—to be prepared for shifts in production which may come overnight. This, he said, is a global war of rapid movement so that it suddenly will be found at various times that there is too much of this and not enough of that. Industry should realize that there can be no "constants" in this war, and thus be ready to shift quickly when the need arises.

Ferdinand Eberstadt, vice chairman of the War Production Board, spoke about the new Controlled Materials Plan. His remarks were of a general character and did not embrace the plan in detail. He pointed out, however, the provisions that have been made to acquaint all manufacturers with the plan and advised them to study it carefully to be prepared to function advantageously when the plan becomes fully operative.

"The plan cannot be a complete success and can not confer its full measure of benefit unless you yourselves have and express the fullest confidence in it, and the fullest assurance of its success—and see to it that it works," he said, adding that "we can lay down the rules but the game is played by you, and whether it is won or lost does not depend upon the rules but upon the skill and enthusiasm of the players."

Mr. Eberstadt admitted that there may be some rough spots in the introduction of the Controlled Materials Plan but gave assurance that the War Production Board is prepared to deal with them in a reasonable and constructive way.

### "Making America Strong"

"Making America Strong" was the subject of an address by W. P. Witherow, president, Blaw-Knox Co., and president of the National Association of Manufacturers. After citing the industrial miracles that have been accomplished in rounding out our war production program and in overcoming such handicaps as the loss of our normal tin and rubber sources, he gave some constructive advice.

"Patriotic managers of enterprise should continue to put themselves at the service of government," he said. "This is our government—the people's affair. If government machinery is not modernized to keep pace with the exacting demands of war, if governmental administration is outmoded and encumbered with red tape and paper work so as to slow up the best war we can fight, criticizing it won't help. Getting in, as business executives have already done in the War Production Board, and helping our government administration with some of the efficiency that has made industry's war record possible, is the answer. Waging war is an unerring test of worthiness; let's help make our government efficient or keep our mouth shut about its shortcomings.

"Labor's more definite responsibility in the war management picture should be in the field of its specialized ability. Labor leaders should be put in an official position to keep their no-strike pledge, to hold down the alarming growth of absenteeism, to put an end to the production delays of jurisdictional strikes. With labor leadership dedicated to these fine goals, management will work hand-in-hand. Management-labor co-operation is a worthy and essential goal. It should not be translated into that dangerous substitute, joint management-labor responsibility."

Mr. Witherow pointed out that in every other nation at war a War Cabinet undertakes regular and systematic coordination of the war effort.

### Urges One-Man Control

"One of the significant members of the War Cabinet should be the one man who has full authority over the production of war materiel," he started. "I cannot come down too hard, or with too much emphasis, on that word 'one.' I never, and you never, saw a winning football team with two quarterbacks on the same team on the field at once."

Mr. Witherow expressed his attitude toward labor in general.

"I am not afraid of labor-management committees—as long as the hyphen is left in the title. If they will encourage local management and local labor to establish better relationship more power to the idea. But, the idea of substituting these committees for responsible management or the creation of industry wide joint committees with national labor leaders in the saddle is unthinkable.

"Management has a sincere interest in the protection of genuine labor democracy in the ranks of labor. The record of war achievement of which we are so justly pound is not management's alone, it is similarly a record for the loyal, patriotic millions of American workers. Anything that gives labor a black eye with the public is a curb on production. We should help the workers to gain democratic control of their organizations, with regular elections, auditing of accounts, secret votes on strikes and the elimination of unabashed racketeering that has plagued both the public and labor alike."

Mr. Witherow urged earnest opposition to any moves aimed at changing our American free enterprise system, to any efforts to capitalize on the war to effect "reforms." As an example he

cited the $25,000 limitation on salaries, an idea borrowed from the public platform of the Communist party in 1928. He saw in this order a trend that ultimately would break the spirit of initiative.

An equally able address was that of H. W. Prentiss Jr., president, Armstrong Cork Co., Lancaster, Pa., on "The Way to Freedom." Hitler yet may be hailed, he said, as the savior of the American republic. "For his onslaught is forcing us once more to explore with fresh and prideful eyes the foundations of our freedom. We are discovering for ourselves what our forefathers knew from study and experience; namely, that the principles on which men can permanently associate themselves to enjoy the blessings of liberty are firmly ingrained in the roots of human nature and, as such, can be changed only as human nature itself is altered under the growth of conscience and character. The fiery furnace of war is consuming the dross of indifference to our priceless heritage of liberty, and may yet transform us into a nation of real citizen-soldiers whom Oliver Cromwell characterized as men who know what they fight for and love what they know."

Eugene E. Wilson, president, United Aircraft Corp., spoke on the spirit of initiative as "Our Secret Weapon." Citing the fact that the aircraft industry now is America's No. 1 industrial giant, he reviewed the public policy toward that industry since the last war. Aviation was singled out of all industry for legislative profit limitation and the only reason it was able to live and thrive was because it was able to develop aircraft of superior ability which it was able to sell to foreign customers.

### "Saved at the Count of Nine"

The arms embargo cut off the life blood of foreign trade and the work of a generation was threatened. "The repeal of the act saved us just at the count of nine," said Mr. Wilson. In view of past policy, he declared, it was only through this unconquerable spirit of initiative that the aircraft industry was able to build a foundation which otherwise would have been lacking when we got into this war. He cautioned against any future discouragements to the spirit of initiative.

Pre-war statistics indicate a possible steelmaking capacity of Germany and Italy, plus the supplies of ores and manufacturing facilities gained by conquest, amounting to 50,000,000 tons annually, said H. G. Batcheller, chief of the War Production Board's Iron and Steel Branch and president, Allegheny Ludlum Steel Corp.

"Later reliable estimates taking into consideration the problems of transportation, inadequacy of supplies of manganese and other factors, indicate a ceiling of 40,000,000 tons per year. Japan adds eight or nine million tons a year," he continued.

"Opposed to this, England has and presumably has maintained a supply of about 15,000,000 tons annually. Russia, with a pre-war capacity of about 22,000,000 tons, by heroic means has undoubtedly preserved the greater part of this, but the balance, before considering our production, is clearly in favor of the Axis, possibly by as much as 25 or 35 million tons annually. Obviously, the balance of power is in our hands."

Citing the various limitation orders and the Controlled Materials Plan as paving the way for fuller use of our steel in the war effort, Mr. Batcheller declared that far more will be required from all of us from here in.

"Our troops and those of our allies are now moving to the attack on all fronts, and the consumption of all types of material on a colossal scale is beginning in dead earnest," concluded Mr. Batcheller, in effect warning against any expectation of an easier steel situation in the near future.

Unless the railroads are permitted to purchase more new cars and locomotives than the War Production Board has authorized they cannot continue to serve both the fighting front and the home front, declared Ernest E. Norris, president, Southern Railway System.

"The time has come to be brutally frank about the ability of the railroads to take on load after load that has heretofore been handled by other agencies of transport. We must be realistic; we must be sure about the ability of our railroads to 'meet to the full' all the needs of a nation at war.

"Practical railroad men have carefully estimated the size of the transportation job that will have to be done next year. They have conscientiously figured what they will need to do that job as it must be done. They have asked those in authority to permit them to buy the cars and locomotives and rail and repair parts they know they will need. And the answer has been substantially less than they have asked for."

Mr. Norris emphasized the importance of making maximum use of existing transportation facilities, urging the manufacturers to devise means of packing more freight into every car, further speeding loading and unloading of cars. He urged them to hold their transportation

## MINING FORT KNOX RIFLE RANGE FOR BULLETS

FIRING range butts at Fort Knox, Ky., "Home of the Armored Force," are now yielding precious metal deposits, in the form of bullets containing lead, copper, antimony, zinc and nickel, that have been fired by thousands of soldiers there in the past 20 years. One method of reclamation is by sluicing; in another, the ground is dug up, placed in a tumbler of water, bullets being screened out from mud. By this latter method salvage has averaged 100 pounds of metal per cubic yard. NEA photo

demands down to a bare minimum.

This war cannot be won in Washington but it can be lost there, said J. Howard Pew, president, Sun Oil Co., Philadelphia. There are planners at Washington, he charged, who take it for granted that we are going to win the war, and are meanwhile conspiring, under the guise of emergency, to destroy our American way of life. Their activities are tending to destroy initiative. He had in mind such measures as the contracts renegotiation law, lack of an incentive feature in the tax law to encourage industry to be efficient and strong, schemes for placing floors under prices and for subsidies and cost-plus contracts, the elimination of brands and the pooling of goods in certain industries, the practice of coercing men into doing work they do not care to do, the $25,000 salary limitation, etc.

### Weighs Worth of Orders

"Every directive and restrictive order of the government should be challenged by two questions, namely: Is it clearly necessary for the war effort? Will the purpose of such orders be defeated by losses in initiative which must inevitably follow?"

Phillip Murray's demand for "share in the management" must be rejected, declared Wilfred Sykes, president, Inland Steel Co., Chicago, "not because it is the idea of one labor group but because management must remain management. The ultimate responsibility for decisions in any given business is an indivisible thing. To sovietize it by making every decision the subject of debate and discussion will destroy the whole system of free enterprise, because it will bring it to a point where management cannot function.

"To say that this concept is hostile to labor is to deny the whole history of American industry. Each individual workman may potentially become the one who makes the decisions, and the roster of this audience will show that management of most of the large industries of the country has been recruited from the men who started at the bottom rung of the ladder . . . Membership in an organization cannot be a substitute for knowledge, ability, hard work, and the initiative to create and manage a private enterprise.

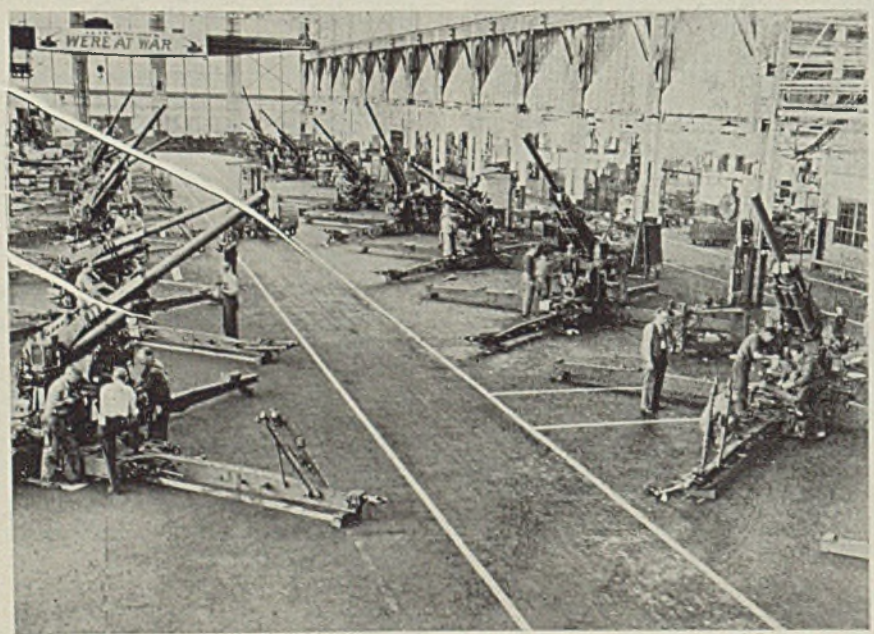
Speaking about our labor policy in general, Mr. Sykes held that the buffeting that management has received from the administration has certainly created a trend toward a feeling of "what is the use?"

"I have been seriously concerned for a long time," he said, "about the position of our foremen and superintendents. They have been largely stripped of the authority necessary to obtain efficient and maximum production, and a breakdown of the morale of this part of our organization would be disastrous. Some union leaders are endeavoring to bring this about as part of their sovietizing activities."

Without attempting to propose a detailed national labor policy, Mr. Sykes said a few simple things ought to be done quickly. Those elements that restrict output should be eliminated from all our policies. Government agencies should cease to assist the unions in levying tolls against American workers and coercing them. In other words, the present policy of expediency should be replaced by a policy that is fair to both workers and employers and which will play no favorites. In particular, he held, it is essential to have a policy that will put an end to class consciousness and hatred.

Dr. Victor Heiser, medical consultant of the National Association of Manufacturers, urged greater attention to maintaining the health of industrial workers through encouraging them to eat the proper foods in the right balance. Only recently has malnutrition been recognized as the saboteur it really is, he said. Deficiencies in the diet are now known definitely to lower a worker's efficiency, his morale and his capacity for doing good work.

## ANTI-AIRCRAFT GUNS IN VOLUME PRODUCTION




THIS unusual picture shows what a battery of powerful anti-aircraft guns might look like in action against a high-flying enemy bomber. These guns, among the most deadly weapons known, now are coming out of a Fisher Body plant "in great numbers"

## MEETINGS . . .

**Boron Symposium**—A meeting to discuss the detection of small amounts of boron by chemical and spectrographic methods will be held at the University of Pittsburgh, Pittsburgh, Dec. 21, under the direction of Dr. Warga, University of Pittsburgh, and J. A. Berger, research metallurgist, Molybdenum Corp. of America. Those interested in this subject are invited to contact the Molybdenum Corp., Grant building, Pittsburgh.

—o—

**American Foundrymen's Association** — Forty-seventh annual meeting will be held in hotels Jefferson and Statler, St. Louis, April 28-30, 1943. It will be a mobilization of management, technical and operating men to devise ways and means for extending the use of cast metals in the war effort. No commercial exhibit will be held.

—o—

**Illinois Manufacturers' Association** — Maj. Gen. Levin H. Campbell Jr., chief of ordnance, War Department, Washington, and Joseph C. Grew, Washington, former ambassador to Japan, will be speakers at the forty-ninth annual dinner meeting, Palmer House, Chicago, Dec. 8. General Campbell will speak on "Ordnance on World Battle Fronts", and Mr. Grew on "Our War Effort in Fighting Japan".

# Engineers Asked To Contribute Ideas for Design Improvement

WITH war production and manpower the dominating themes, more than 3000 engineers attended the sixty-third annual meeting of the American Society of Mechanical Engineers, Hotel Astor, New York, Nov. 30-Dec. 4. Despite difficulties in transportation and pressure of work at home for most members, attendance exceeded the number present a year ago.

Symposium on metals engineering, machine design, industrial training, management and topics of economic significance provided the principal drawing power. Many technical papers were presented by ranking men in their respective fields.

Considerable attention also was directed to post-war problems. James W. Parker, Detroit, retiring president of the society, highlighted this discussion in his address at the annual banquet on Wednesday evening. He believed the country is facing a trial of its faith in self-government, and declared that people are getting a better conception of their "duty to choose men of intellectual and moral capacity" and that "we can no longer afford to delegate leadership to our professionalized politicians and economists."

Engineers, he said, are giving heed to the changes that will inevitably arise after the war. "They are aware that the productive capacity of the country is being enhanced, and while there can be no doubt that the genius that made possible such a rapid conversion of product to the purposes of war will find means for shifting industry back to things needful in peacetime, engineers are nevertheless giving consideration to the kind of world economy we shall be living under."

Cost control came in for important consideration, with Wyman P. Fiske, president, National Association of Cost Accountants, declaring that cost control, a stringent necessity during depression periods, has been deteriorating under boom wartime conditions. Both the standard cost and budget techniques showed great progress during the 30's, but war introduced new conditions, he pointed out. Cost savings have not of late been a governing factor. Government requirements, he said, forced the adoption of job cost methods for war contracts, and process and operation cost methods have been discontinued in whole or in part.

HAROLD VINTON COES
*Elected president, American Society of Mechanical Engineers*

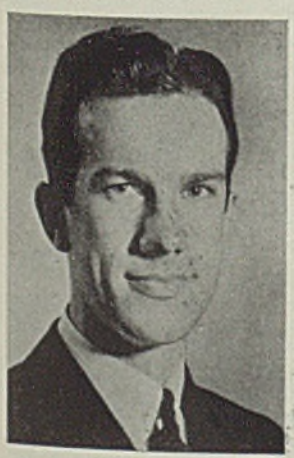
Many operating men will forget the methods and organization which kept down costs in the lean years. He warned, however, that when the country is able to return to peacetime competition, control of costs will again become vital to success. "This will be the case," he declared "even if depression volumes do not return, for the technological advances also made under war pressure will increase competition and further reduce margins."

While industrial progress in this country and high standards of living have usually been attributed to the country's national resources, people are too prone to overlook the contributions of inventors, according to A. A. Potter, dean of engineering, Purdue University, Lafayette, Ind. "Americans, more than any other people of the world, have been responsible for the epic-making inventions of the past century."

He praised the effectiveness of the country's patent system, which encourages and rewards creative talent, and said that the need for a good patent system is greater today than there ever was before.

"We must do everything in our power to increase recognition and reward for our inventors. They are entitled to every possible encouragement, opportunity and reward as their creative talent is our greatest asset in mechanical warfare as well as in making post-war adjustments for a more abundant and better living in a world of peace."

Thornton Lewis, deputy chief of the production service branch, Army Ordnance Department, asked the help of



JOHN T. RETTALIATA
*Allis-Chalmers Mfg. Co., received Pi Tau Sigma medal for outstanding achievement in mechanical engineering*

J. KENNETH SALISBURY
*General Electric Co., awarded Melville medal for paper, "The Steam-Turbine Regenerative Cycle —and Analytical Approach"*

ERNEST O. LAWRENCE
*Director of Radiation Laboratory, University of California, won Hally medal for originating the Cyclotron*

E. G. BAILEY
*Babcock & Wilcox Co., awarded ASME medal for achievement and leadership in steam and combustion engineering*

engineers to contribute ideas for design improvements.

As an example of savings of critical materials made possible by such suggestions he cited an improvement in the crating of fins for bombs. Deciding that too much steel was being used, the Ordnance Department called in five manufacturers and asked how a saving might be effected. As a result steel consumption for this purpose was reduced by 90 per cent.

Scores of similar savings were cited. He said more than 1100 suggestions have been received and studied by the Ordnance Department.

"About half of those we received were general in character and the remaining half covered some specific design. Of the half which covered specific designs, all have been thoroughly investigated and about 60 per cent put into use."

**Special Panel on Manpower**

Paul V. McNutt, chairman, War Manpower Commission, was a featured speaker on manpower, with others including Arthur C. Willard, president, University of Illinois, Urbana, Ill., Dorothy Sells, chief, personnel supply section of Defense Transportation, Washington, and Gen. Julian S. Hatcher, chief, Military Training Division, Washington.

In addition there was a special panel discussion on the manpower problem, with Harvey N. Davis, presiding. Mr. Davis is president of Stevens Institute of Technology, Hoboken, N. J., past president of the society and newly appointed director of the Office of Production Research and Development, WPB.

A feature of the discussion on management was a report on "Ten Years Progress in Management," presented by H. V. Coes, vice president, Ford Bacon & Davis Inc., New York, new president of the society.

At the annual dinner, E. G. Bailey, vice president, Babcock & Wilcox Co., New York, was awarded the ASME medal "for achievement and leadership in steam and combustion engineering." The Holly medal was won by Ernest O. Lawrence, director of radiation laboratory, University of California, Berkeley, Calif., for originating the cyclotron.

Worcester Reed Warner medal was presented to Fred H. Colvin, Washington, editor-emeritus, *American Machinist*, New York, "for his contributions to both technical advancement and improvement in management in the metalworking industries, as influenced by more than 50 years of articles and books—particularly, *American Machinists' Handbook*."

The Melville medal went to J. Kenneth

(*Please turn to Page* 191)

# Ore Movement Near 92,000,000 Tons as Shipping Season Ends

WITH 1942 iron ore shipments already totaling approximately 92,000,000 tons, the Great Lakes shipping season is practically ended. This is despite stories from Washington last week that the shipping season will be extended well into December and announcements that the government has assumed the additional insurance charges for post-season operations.

Vessel operators pointed out that the approximately 92,000,000 tons was sufficient for all anticipated needs. Post-season operations involve expensive delays in carriers waiting for loadings and in thawing ore both at the loading docks and at lower lake ports, and also involves great danger to vessels on down-lake trips.

Weather was exceptionally bad on the lakes last week and slowed both loadings and return trips. A number of vessels were tied up in refuge spots awaiting more favorable conditions for their return to lower lake ports.

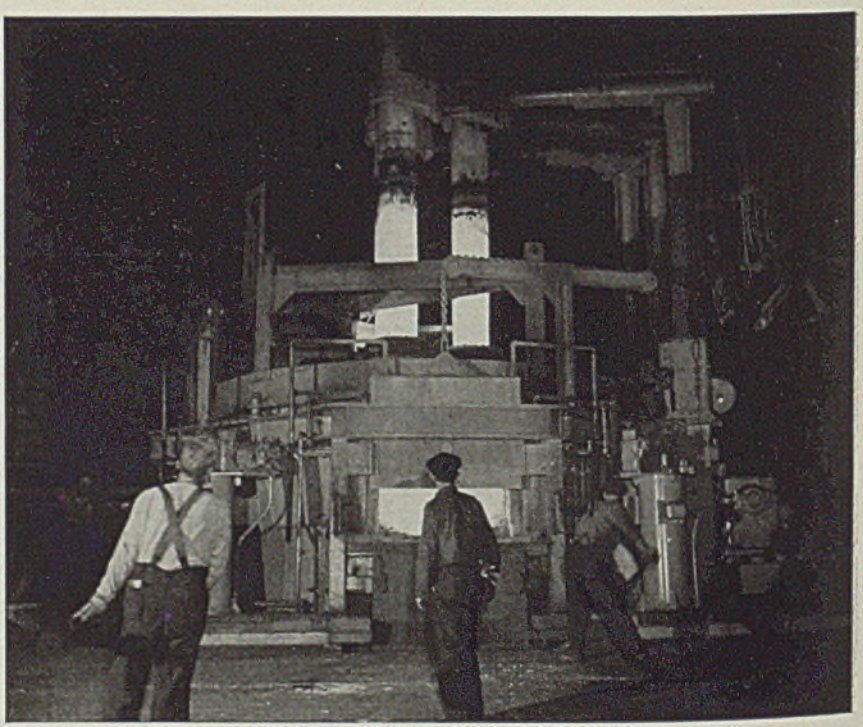
Ship operators pointed out the folly of post-season operations as follows: A vessel dispatched now might possibly bring down 9000 to 10,000 tons of ore; however, if lost, potential carrying capacity of 300,000 tons next season is lost; in addition there is possible loss of a crew of experienced seamen, now extremely scarce for lake service. Some of those persons sitting in comfortable chairs in Washington have no conception of the dangers on the lakes at this time of year.

Loading conditions at upper lake points last week were so difficult that shippers expected that some of the vessels there would not attempt to load but would be released for grain storage.

While the Washington office of Defense Transportation spoke of ice breakers being provided to enable carriers to operate through the winter, shippers said that such vessels could be used only to convoy carriers now on the lakes to their home ports.

Operating expenses soar greatly as schedules are lengthened due to ice conditions. Frequently vessels must wait at loading stations for several days, and storms and ice conditions on the return trip necessitate further delays. During

## NEW ELECTRIC FURNACE STARTS OPERATIONS



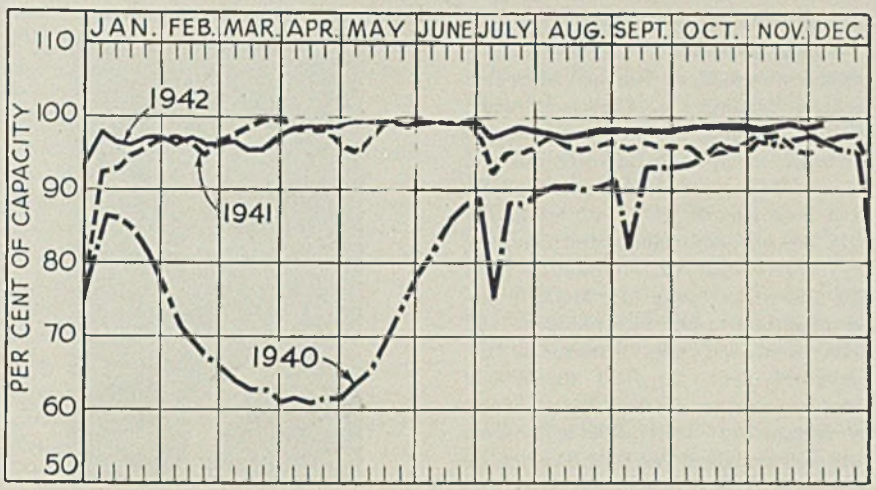
ELECTRODES of the first of three new electric furnaces of Carnegie-Illinois Steel Corp.'s Monongahela Valley expansion about to be lowered into position. The new furnace will produce vitally needed war steels (STEEL, Nov. 30, p. 45)

## DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

| | Week ended Dec. 5 | Change | Same week 1941 | Same week 1940 |
|---|---|---|---|---|
| Pittsburgh | 99 | +0.5 | 98 | 97 |
| Chicago | 100.5 | None | 100 | 99.5 |
| Eastern Pa. | 96 | None | 87 | 95 |
| Youngstown | 97 | None | 92 | 92 |
| Wheeling | 86 | +5 | 95 | 98.5 |
| Cleveland | 94 | +1.5 | 91.5 | 90.5 |
| Buffalo | 90.5 | None | 79 | 93 |
| Birmingham | 95 | None | 90 | 100 |
| New England | 92 | —3 | 92 | 75 |
| Cincinnati | 92 | +1 | 91 | 87 |
| St. Louis | 94 | None | 86 | 87.5 |
| Detroit | 95 | +4 | 85 | 90 |
| Average | 99.5 | +0.5 | °96.5 | °96.5 |

°Computed on basis of steelmaking capacity as of those dates.




## STEEL . . . . . UP

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week rose ½-point to 99½ per cent. Five districts advanced, one declined and six were unchanged. A year ago the rate was 96½ per cent; two years ago it was at the same level, both computed on the basis of capacity as of those dates.

these delays, crews must be paid and fed, other charges on vessel operation continue, and the shipper receives no more revenue on his cargo than if the vessel had been operated under normal conditions. In addition, he risks loss of the vessel.

## Weirton Reports New Ingot Production Record

For the second time this year, Weirton Steel Co. reports a new world's record for steel ingot production from 12 stationary open-hearth furnaces. Weirton's Joint Labor-Management Committee announced last week that in November production reached "an average of 5080 net tons per day, topping by 121 net tons a day the record established last March" by its plants.

**Pittsburgh** — Advanced ½-point to 99 per cent as additional open hearths were made available.

**Wheeling** — Gained 5 points to 86 per cent.

**Chicago** — Continued at 100½ per cent, furnace repairs being the only brake on production, scrap being adequate for current needs.

**Cincinnati** — Steelmaking is 1 point higher at 92 per cent. One day last week 97 per cent was reached for a short time but needed repairs brought reduction.

**Buffalo** — Repaired furnaces returned to service were balanced by others taken off and production remained at 90½ per cent for the fifth week.

**St. Louis** — For the third week production held at 94 per cent.

**Cleveland** — Larger production by one interest caused the district rate to advance 1½ points to 94 per cent.

**Detroit** — With 24 of 26 open hearths in production the rate averaged 95 per cent for the week, a gain of 4 points.

**New England** — Minor repairs caused a drop of 3 points to 92 per cent.

**Youngstown, O.** — Three bessemers and 77 open hearths in production held the rate unchanged at 97 per cent. Schedule for this week is at the same rate.

**Birmingham, Ala.** — For the third week production remained at 95 per cent, with 23 open hearths in service.

**Central eastern seaboard**—Steady at 96 per cent of capacity, with scrap supply adequate.

## RELEASE 1942 MONTHLY PIG IRON FIGURES

Pig iron production statistics for ten months of 1942 have been released by the American Iron and Steel Institute, after being held up temporarily at government's request. The industry operated 97.1 per cent of capacity in January to 101.6 per cent in October. The latter month, with production of 5,236,608 net tons, had the largest output of the year and set a new monthly record.

Total for ten months was 49,665,163 tons, compared with 46,191,610 tons in the corresponding period in 1941. The ten months' output exceeds all prior full years, excepting 1941, but including 1929 with 47,398 529 tons.

Some details relating to blast furnace capacities and production by grades and districts for 1942 were previously published in STEEL, Nov. 23, p. 35.

| Net Tons | Eastern | Pittsburgh-Youngstown | Cleveland-Detroit | Chicago | Southern | Western | Total | % Capacity |
|---|---|---|---|---|---|---|---|---|
| January | 985,534 | 2,023,590 | 500,365 | 1,072,668 | 349,360 | 51,712 | 4,983,229 | 97.1 |
| February | 899,095 | 1,828,110 | 435,635 | 976,101 | 307,595 | 53,943 | 4,500,478 | 97.4 |
| March | 971,159 | 2,079,370 | 491,765 | 1,098,446 | 339,713 | 75,445 | 5,055,898 | 98.8 |
| April | 932,948 | 2,002,848 | 499,177 | 1,058,390 | 330,855 | 72,591 | 4,896,809 | 98.8 |
| May | 966,555 | 2,065,594 | 531,071 | 1,081,505 | 354,548 | 74,311 | 5,073,620 | 99.1 |
| June | 951,284 | 1,988,835 | 507,297 | 1,064,534 | 349,389 | 74,572 | 4,935,911 | 99.6 |
| July | 946,885 | 2,049,173 | 532,493 | 1,079,620 | 373,753 | 69,225 | 5,051,149 | 98.2 |
| August | 935,930 | 2,026,413 | 528,139 | 1,061,989 | 383,407 | 73,206 | 5,009,084 | 97.2 |
| September | 947,984 | 2,029,460 | 508,355 | 1,037,279 | 346,235 | 68,137 | 4,937,450 | 99.1 |
| October | 989,585 | 2,161,266 | 562,980 | 1,073,759 | 370,831 | 78,187 | 5,236,608 | 101.6 |
| Total, 10 months | 9,514,754 | 20,254,000 | 5,097,568 | 10,601,790 | 3,505,722 | 691,329 | 49,665,163 | 98.7 |

## American Bridge Plant Has Highest Output in History

Production for ten months this year at the Gary, Ind., plant of American Bridge Co., has exceeded that of any like period since the plant was established in 1911. The record represents monthly output at full rated capacity with a peak of 111 per cent, reached in July. Production is practically 100 per cent for war, including plant extensions and large quantities of specialty and machinery parts entering into construction of gun mounts, shells, tanks, electric furnaces, naval and merchant craft.

# MEN of INDUSTRY

**Wilson H. Moriarty** has been named assistant to president, National Malleable & Steel Castings Co., Cleveland, while **Walton L. Woody** has been named assistant to president, in charge of the Sharon, Pa., and Melrose Park, Ill., plants. Both have long records with National Malleable, Mr. Woody joining the company 28 years ago and Mr. Moriarty 23 years ago. Since last June Mr. Moriarty has been assistant to first vice president, and before that was sales manager at the Cleveland plant. In 1926 Mr. Woody acted as manager of the Chicago plant, but returned to Cleveland later the same year and remained until 1938, when he was made plant manager at Sharon, Pa., his present headquarters.

—o—

**Thomas W. Howard,** the past five years assistant manager of the Department of Manufacture, Chamber of Commerce of the United States, Washington, has become manager of that department.

—o—

**James T. Buckley,** president, Philco Corp., Philadelphia, is celebrating the thirtieth anniversary of his association with the company. He joined Philco in November, 1912, at the age of 16.

—o—

**C. A. Babbitt** has been appointed field engineer for Norton Co., Worcester, Mass., in the territory comprising New York City, New Jersey and Philadelphia. He will make his headquarters at Norton's Philadelphia office.

—o—

**Robert I. Ingalls Jr.** has been elected president, Ingalls Iron Works Co., Birmingham, Ala. He succeeds his father, **Robert I. Ingalls Sr.,** who will continue as chairman of the board.

—o—

**Dr. Walter R. Meyer** has become associated with Enthone Co., New Haven, Conn., as technical director. The past four years he was editor of *Metal Finishing* and editor of four editions of *Plating and Finishing Guidebook.*

—o—

**Hudson W. Reed** has been appointed head of the safety program of American Welding & Mfg. Co., Warren, O. He will be responsible for carrying out an intensive safety program in the company's plant and among the employes.

—o—

**G. V. Bate** has been appointed superintendent and **L. E. G. Suiter** as supervisor of production at the Sunbury Works, a branch of the Westinghouse Radio Division, Westinghouse Electric & Mfg. Co., Baltimore. Mr. Bate joined Westinghouse Radio Division in 1929 and has served in both the engineering and works departments. Mr. Suiter was graduated from Carnegie Institute of Technology night school in 1928 while employed at the company's East Pittsburgh, Pa., works. He joined the Radio Division as a foreman in 1940.

WILSON H. MORIARTY

WALTON L. WOODY

ROBERT I. INGALLS JR.

**J. O. Walz** has been named assistant manager and **J. D. Miner,** manager of engineering, Westinghouse Small Motor Division, Lima, O. Mr. Walz formerly was manager of engineering, and Mr. Miner previously served as aviation section engineer.

—o—

**Raymond S. Livingstone** has been elected vice president in charge of personnel, Thompson Products Inc., Cleveland. Since 1934 he has been personnel director of the company and its subsidiaries. He will continue in charge of employment, industrial training, labor relations, employe publications and social and athletic activities.

—o—

**James F. Oates Jr.,** Chicago attorney, who for the last ten months has supervised the general office, traffic and property, contract service, and price adjustment divisions, Chicago Ordnance District, has been appointed chief of the purchase policy section of the Ordnance Department's legal division, Washington.

—o—

**Thomas J. Mulvey** has been appointed production manager of General Electric Co.'s River Works, Lynn, Mass. Associated with General Electric 36 years, Mr. Mulvey has been production manager at the Erie, Pa., plant since 1937. Before that he was associated with the general manufacturing department at Schenectady, N. Y.

—o—

**Cecil W. Guyatt,** formerly assistant chief industrial engineer, American Steel & Wire Co., Cleveland, has been promoted to chief industrial engineer. **John S. Conant** has been made priorities administrator, at the same time continuing as general supervisor of production planning. **Lloyd W. Hackley,** formerly supervisor of production planning in the cold rolled department, Cuyahoga Works, has been appointed assistant general supervisor of production planning for the entire company.

—o—

**Edwin G. Booz,** Booz, Allen & Hamilton, Chicago, was elected president, Association of Consulting Management Engineers, at its thirteenth annual meeting in New York, Nov. 20

Officers elected to serve in 1942-43 with Mr. Booz include **William S. Ford,** Trundle Engineering Co., Chicago; **Robert Heller,** Robert Heller & Associates Inc., Cleveland; and **D. J. Walsh Jr.,** Sanderson & Porter, New York, all vice presidents; **J. B. Lathrop,** Barrington Associates Inc., New York, treasurer; **Nathaniel W. Barnes,** executive secretary, with headquarters at 347 Madison avenue, New York.

Serving with Messrs. Booz, Ford, Heller and Walsh on the board of direc-

tors will be **George S. Armstrong**, George S. Armstrong & Co., New York, retiring president; **Wallace Clark**, Wallace Clark & Co., Washington; and **Robert W. Kent**, Bigelow, Kent, Willard & Co., Boston.

—o—

**Franz Wethly**, designer and builder of by-product coke ovens, has joined the Wilputte Coke Oven Corp., New York. Mr. Wethly, until recently vice president of the Otto Construction Co., came to this country in 1939 from The Hague, Netherlands, where he directed the Dutch operations of the Otto interests.

—o—

**H. J. Hoffman**, manager, Specialty Products Division, Westinghouse Electric & Mfg. Co., has been elected chairman, Electronics Section, National Electrical Manufacturers Association, New York. **D. V. Edwards**, president, Electrons Inc., has been named vice chairman of NEMA section.

—o—

**John A. Kienle**, vice president-director of sales, Mathieson Alkali Works Inc., New York, has retired. He joined Mathieson Alkali Works as manager of sales in 1920, and two years later was elected to the post from which he is retiring.

**Esse E. Routh** has been elected vice president-director of sales, succeeding Mr. Kienle. Mr. Routh has spent his entire business career with Mathieson, and since 1928 has been general manager of sales. **Robert J. Quinn**, heretofore assistant general manager of sales, becomes assistant to vice president-director of sales. **D. W. Drummond** has been appointed general manager of sales. Since 1941 he has been assistant general manager of sales.

—o—

**Karl F. Smith** has been named to the research staff of Battelle Memorial Institute, Columbus, O., and has been assigned to the Division of Industrial Physics. In addition to serving as a graduate assistant in the department of physics, Ohio State University, he has held positions with Owens-Illinois Glass Co., Newark, O., and Carl J. Kiefer Associates, Cincinnati.

—o—

**D. Wallace MacClay**, OCD chief for Division No. 4, Chicago metropolitan area, has been made employment manager, Howard Foundry Co., Chicago. **Harvey W. Johnson** has been made employment welfare promotion manager, and **George Wilson** as head of the department of employment and personnel.

—o—

**George A. Lennox**, assistant sales manager, Driver-Harris Co., Harrison, N. J., has been promoted to general sales manager. Mr. Lennox joined Driver-Harris in 1907, becoming Chicago district sales manager in 1917, and later assistant sales manager.

**Joseph B. Shelby**, heretofore manager of the foundry, succeeds Mr. Lennox as assistant sales manager. Mr. Shelby has been associated with the company since 1918.

—o—

**W. W. Hale**, associated with Southern Pacific railroad 41 years, the past four as general traffic manager, Chicago, has become vice president in charge of freight traffic with offices in San Francisco.

—o—

**Max Clairfield**, Sampson Machinery & Supply Co. Inc., Houston, Tex., has been elected president, Gulf Coast chapter, Institute of Scrap Iron and Steel Inc. **James Novey**, Austin Metal & Iron Co., Austin, Tex., has been elected vice president; and **Cyril M. Coguenhem**, Luria Bros. & Co. Inc., Houston, secretary-treasurer.

—o—

**C. R. Logan**, representative, Superior Valve & Fittings Co., Pittsburgh, has been elected president, American Society of Refrigerating Engineers. Other officers: Vice presidents, **A. B. Stickney**, engineer, Armour & Co., Chicago, and **J. F. Stone**, manager, refrigeration division, Johns-Manville Corp., New York; treasurer, **J. G. Bergdoll Jr.**, chief engineer, York Ice Machinery Corp.

## OBITUARIES . . .

**Dr. Frederick M. Becket**, 67, a pioneer in the electrometallurgical industry and a consultant to Union Carbide & Carbon Corp., New York, died in that city, Dec. 1. Born in Montreal, Que., Dr. Becket was graduated from McGill and Columbia universities. After a few years research work for early electrochemical and electrometallurgical industries, he with others organized Niagara Research Laboratories Inc., Niagara Falls, N. Y., later acquired by Electro Metallurgical Co., a unit of Union Carbide & Carbon. He served Electro Metallurgical Co. as vice president and chief metallurgist and was president of Union Carbide & Carbon Research Laboratories Inc., and vice president, Union Carbide Co. Dr. Becket was active in the Electrochemical Society Inc. and American Institute of Mining and Metallurgical Engineers.

—o—

**Edward J. Murray**, 71, who retired two years ago as Chicago district sales manager, Highland Iron & Steel Co., Terre Haute, Ind., died in Chicago, Nov. 29. He had been associated with the company 40 years.

—o—

**William Atwill**, 60, who retired in 1940 as vice president and general manager, Illinois Central railroad, Chicago, died in that city, Nov. 27.

—o—

**George W. Heald**, chief engineer, Ramtite Co., division of S. Obermayer Co., Chicago, died Nov. 16, in that city.

—o—

**Clayton O. Smith**, 72, since 1919 treasurer and general manager, O. S. Walker Co. Inc., Worcester, Mass., died Nov. 17, in that city.

—o—

**John J. Hebor**, 50, associated with Pratt & Whitney Co. 33 years, died in Cleveland, Dec. 2. He was employed at the Hartford, Conn., plant before going to Cleveland 26 years ago. Since that time he had been sales manager of the company's small tool division.

—o—

**Joseph V. Pauly**, 56, president, Ilsco Copper Tube & Products Co., Cincinnati, died Nov. 29, in Cincinnati. He had been associated with the company 25 years, assuming the presidency two years ago.

—o—

**Frederick Snare Jr.**, 50, secretary-treasurer and a director, Frederick Snare Corp., New York, died Nov. 27, at Englewood, N. J.

—o—

**L. A. Sorensen**, 52, manager, American Brass Co., Buffalo, died in that city, Nov. 24. He joined American Brass in 1905 as an office boy, and became manager at Buffalo in 1934.

—o—

**Thomas Santry**, 48, vice president, Peerless Machine Co., Racine, Wis., died Nov. 24, in that city. Prior to becoming vice president, Mr. Santry served as purchasing agent and assistant secretary.

—o—

**Horace H. Galbraith**, 70, died Nov. 19. He was resident manager of sales at Denver for Jones & Laughlin Steel Corp. Mr. Galbraith had a long career in the steel industry, having been employed by Colorado Iron Works, Colorado Fuel & Iron Corp., and Scully Steel Products Co. before joining Jones & Laughlin in 1919.

# Europe Short on Supplies of Manganese, Chromium, Nickel

WHILE plants in Axis Europe probably can obtain adequate supplies of iron ore and coal, stocks of alloy materials may be difficult to maintain in the face of intensified bombing of plants and transportation facilities.

A recent sudty by the American Iron and Steel Institute indicates Germany has available in Continental Europe only about one-third of the manganese, less than one-half of the chromium and a mere 10 per cent of nickel needed to keep pace with United States in producing alloy steels.

For the remainder, stockpiles must be tapped. Neither Germany itself nor any other European country within its orbit is on record as a major source of these alloys.

Turkey, a neutral, possesses, in Asia, high grade chrome ores and outranks all other producers except South Africa. Even if all Turkish chromite were available to Germany, however, the supply would be less than estimated demand.

## Institute Reports on Blended Hardeners

Report on special alloy addition agents, or blended hardeners, has just been issued by the American Iron and Steel Institute. The agents—five are listed—contain no critical material except aluminum. All five contain boron and one or more of the following: Calcium, manganese, silicon, titanium, zirconium and iron.

The study was made by the institute's technical committee on alloy steel at request of the WPB, in the interests of conserving alloying elements used in the production of steel.

The committee found:

1. Use of the special alloy addition agents will increase, with varying effect, the hardenability of all grades of steel studied, the degree being dependent on the base composition.

2. Most beneficial effect of the use of these agents on mechanical properties, especially ductility, is in steels heat-treated to high hardness levels.

3. To obtain maximum results for any property, the steels to which these agents have been added must be quenched and tempered.

4. The base composition and section as well as the ultimate hardness, strength, or depth of hardening are the major factors to be considered in determining those instances in which these agents can be used to maximum advantage.

5. Use of these agents will permit reduction of the amount of strategic alloying elements previously used to give the desired tensile and impact properties in similar section, thereby effecting savings in alloy use.

# LABOR . . .

## Strike Penalty Clause Disallowed In J. & L. Case by WLB

National War Labor Board has ordered Jones & Laughlin Steel Corp., Pittsburgh, to conform to the provisions of the board's United States Steel Corp. decision making its agreement with the United Steelworkers of America CIO. Four plants, with approximately 30,000 employes, are affected.

The maintenance-of-membership clause, permitting employes 15 days from Nov. 30 in which to withdraw from the union if they do not desire to be bound to remain members for the contract's duration, and have their dues checked off, was ordered included in the pact.

The general wage increase of 5½ cents an hour, similar to that granted in the other steel company cases, also was made retroactive to Feb. 15.

The board rejected a company proposal that a penalty clause be included in the contract, permitting the company to collect a fine of $1 from each union member for each day or part of a day he participated in a strike.

Order was passed by a four to two vote, employer members dissenting.

—o—

## PEACE! IT'S WONDERFUL

PEACE committees of the AFL and the CIO last week reported they had reached an agreement providing for arbitration of jurisdictional differences, "pending full reunion of the two organizations." Pact is subject to approval by executive committees of both unions. CIO President Philip Murray said it was the first agreement reached since the split in the organized labor movement in 1935.

In the group above are the principal negotiators, left to right: R. J. Thomas, Julius Emspak, Philip Murray, Harry C. Bates, William L. Hutcheson and Daniel J. Tobin. John L. Lewis was not there. NEA photo

# More Than 3000 Attend Chicago Explanation of New Program

*CHICAGO*

SO GREAT was the response of mid-western war goods manufacturers to WPB's invitation to attend a conference on the new Controlled Materials Plan, Dec. 1, that it was necessary to transfer the opening session from the Palmer House to the Civic Opera House. More than 3000 attended.

Co-operating with WPB in arrangements for the meeting were the Chicago Association of Commerce, Illinois Manufacturers' Association, Purchasing Agents' Association of Chicago, and the Trade Association Executives Forum. The program included a morning session at which WPB officials explained the purpose and operation of the CMP, a luncheon at the Palmer House with spokesmen from industry and the ordnance department, and an afternoon session conducted as a question and answer period.

### Says CMP Not Complicated

Speaking at the opening session, J. A. Krug, deputy director general, Priorities Control, WPB, Washington, outlined the history of priorities and PRP to their "breakdown," which forced the development of CMP as a more workable method for balancing war requirements of steel, copper and aluminum with available supplies. He stated that although the plan now appears complicated, it really is not, and with modifications with experience should constitute the ultimate plan between now and victory in the war.

Further elaboration on the purpose of CMP was given by Harold Boeschenstein, director, CMP, Washington. He said it had been reported that he had been appointed to his present post to sell the plan to manufacturers. This was erroneous, he explained. Rather, he considers his task that of selling manufacturers, "who have responded magnificently in the war effort," to the government. Mr. Boeschenstein felt confident that manufacturers would do their part in making the new plan work and thus achieve war victory at the earliest possible moment.

The assignment of explaining the detailed operation of CMP fell upon Stanley B. Adams, special assistant priorities director, WPB, Washington, but he did this convincingly with the use of many slides. He made every effort to reduce his explanation to ABC terms, but urged reading and rereading of the plan itself and the general instructions on bills of materials, both prepared and widely distributed by WPB.

In trying to differentiate between Class A and Class B products, Mr. Adams stated that the former are those that can be controlled best by vertical means, and the latter as controlled best horizontally.

He likened CMP to pig iron control, which has long been recognized as well stabilized. First, it is necessary to know how much iron is available, how much is required, and what it is to be used for. With this known, it is simply a matter of regulating its distribution.

Speakers at the luncheon, attended by 1500, were Brig. Gen. Thomas S. Hammond, chief, Chicago Ordnance District and E. L. Ryerson, chairman, Inland Steel Co., Chicago.

Mr. Ryerson spoke as a "controlled materials supplier,"—the definition which CMP assigns to producers of steel, copper and aluminum. He referred to recent reports that steel supplies are easier, but chose not to indicate whether this is or is not true. However, he declared that CMP, when placed in full operation, would provide a full and clear answer. After consumers have reported on their requirements and claimant agencies have checked on these in connection with the war program, it will be possible to compare the totals of steel, copper and aluminum with known quantities that may be available.

Mr. Ryerson stated the steel industry was in a large measure responsible for origination of CMP, for it was evident months ago that the priorities and PRP systems would not serve in the future. It is a simple matter, he asserted, for steelmakers to determine what they can produce, broken down by products. Although this is their principal responsibility, they also have the added responsibility of assisting manufacturers in becoming familiar with the plan and adjusting themselves to it.

## CMP Technical Details in Coming STEEL Supplement

Technical details of the Controlled Materials Plan and the steps that should be taken by industry and the governmental agencies handling materials and production programs and schedules was issued late last week by the War Production Board and will be carried in full in the revised Supplement on Priorities, Allocations, Prices, in STEEL, Dec. 14.

WPB says: "CMP gives a certainty which has been lacking in the present system of first setting production schedules and then attempting to get materials to meet those schedules. However, CMP is only good as industry makes it by accurate statement of requirements and rapid transmission of allotments. If the plan is to succeed, it is necessary that every producer establish records and organization capable of meeting the requirements of the plan, both as to scheduling within the plant and relations with claimant agencies and prime and secondary contractors."

# PRIORITIES–ALLOCATIONS–PRICES

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

## L ORDERS

**L-18-b (Amendment): Vacuum Cleaners, effective Nov. 26.** Prohibits production of attachments for domestic vacuum cleaners and extends ban on production of cleaners to those ordered by governmental agencies.

**L-30-b (Interpretation): Enameled Ware, issued Nov. 23.** Rules that restrictions on production of various types and sizes of enameled ware imposed by original order do not apply to military orders for use in the field or on shipboard.

**L-81 (Amendment): Toys and Games, effective Nov. 24.** Prohibits production of toys, games and repair or replacement parts containing certain critical materials, except joining hardware made out of iron or steel. Materials include: alloy steels, chromium plating, copper, cork, silk, urea and phenolic plastics, antimony, tin, zinc, rubber, silver, iron and steel.

**L-114 (Amendment): Safety Equipment, effective Nov. 27.** Permits use of nickel plating and nickel silver in certain specified parts of spectacle type safety goggles.

**L-123 (Amendment): Industrial Equipment, effective Dec. 1.** Provides that purchase orders for necessary repair and maintenance parts for many items must be accompanied by a certificate, reciting the nature of purchase.

**L-170 (Amendment): Farm Machinery, effective Nov. 30.** Requires WPB approval of production schedules for export in place of an export license or Lend-Lease authorization before manufacturing such equipment.

## M ORDERS

**M-11-b (Amendment): Zinc, effective Nov. 26.** Further restricts use of zinc for manufacture of variety of automotive parts, building and industrial materials. Places health supplies, various precision instruments and dies in non-restricted class. Permits use of 50 per cent

(*Please turn to Page* 192)

# WINDOWS of WASHINGTON

*Sponge iron controversy used by Congressmen in attempt to discredit authorities who opposed plan. Arguments "spurious." Sweden only country to develop product on commercial scale*

THE new Congressional technique of using committees, especially those of the Senate, as sounding boards to advance pet schemes seems to unbiased observers as directly in violation of the spirit of democracy. All too often the nature of the questions is such as to infer that witnesses are motivated by sinister purposes. Their testimony is discredited. The spirit of fair play is wholly lacking.

During the recent bitter sponge iron controversy a number of the country's best informed iron and steel metallurgists and engineers who opposed approval of the sponge iron research program of the Bureau of Mines got a taste of strong-arm procedure they will not soon forget.

It was their contention that a vast amount of research work had failed to produce commercially successful sponge iron processes whereas on the other hand the blast furnace is the only economic and effective means of converting iron ore into pig iron and thus putting it in a form from which steel can be produced. They recommended, therefore, an increase in the number of blast furnaces and did not believe a sponge iron experimentation program would be a good thing during the war emergency.

### Accused of Selfish Motives

In the Truman committee hearings, on the floors of the House and the Senate, over the radio, and in certain widely read columns, they were rewarded for their pains by being accused of being motivated by a desire to protect investments in blast furnaces—thus seeking to prevent development of unused iron deposits in certain states with a resulting depressing effect on the economy in those sections of the country.

During the campaign there was much talk about having "a sponge iron plant at the mouth of every mine." Statistics were compiled to show how much income could be earned by farmers and workers who would have a hand in the development. It appears to have been on this basis, backed by the avowed purpose of producing sponge iron to relieve the scrap shortage, that Congress in June appropriated $600,000 to finance the Bureau of Mines' experimental program.

Probably one of the principal reasons for the controversy over sponge iron was the fact that comparatively few people know just what sponge iron is. It is a subject for careful consideration rather than emotion. It seemed quite clear from the charges and the claims advanced by members of Congress during the campaign that they did not have too thorough a grasp of the subject they were discussing. Some of their speeches that probably sounded logical to the general public are regarded by competent authorities as plainly ridiculous. From these speeches it seemed that all that had to be done to relieve the steel shortage was to put a reduction furnace at the mouth of every mine, put in a natural gas pipeline and then reduce the ore to sponge which would serve as a substitute for scrap.

The subject is much more complex than that. It is not sufficient to define sponge iron as "metal in porous form, obtained by reduction through fusion." There is no such thing as a standard sponge iron which could be sold on a comparable basis with, for example, pig iron or No. 1 heavy melting steel. What actually is produced in the sponge iron process is special-purpose sinter whose characteristics depend on the type ore being handled, on the fuel that may or may not be available, and on the use to which the sinter is to be put.

DR. R. R. SAYERS

*Director, Bureau of Mines, "has high hopes but no definite promise"*

DR. R. S. DEAN

*Assistant director of the Bureau of Mines, in charge of sponge iron program*

The highest grade sponge iron in the world is that produced at Hoganas in Sweden. This is because Sweden has iron ore that is ideal for the process. It is reduced by placing it in a continuous stream of heated producer gas. The resulting cakes of sponge are pressed in order to make them sufficiently dense for furnace use. So pure is the product that it contains less than 0.50 per cent gangue. The Swedish sponge is guaranteed to contain 94 per cent minimum iron, 0.03 maximum sulphur, 0.014 maximum phosphorus while the remainder is iron oxide. Often the Swedish sponge contains up to 98.5 per cent iron.

### Only One Plant Operating

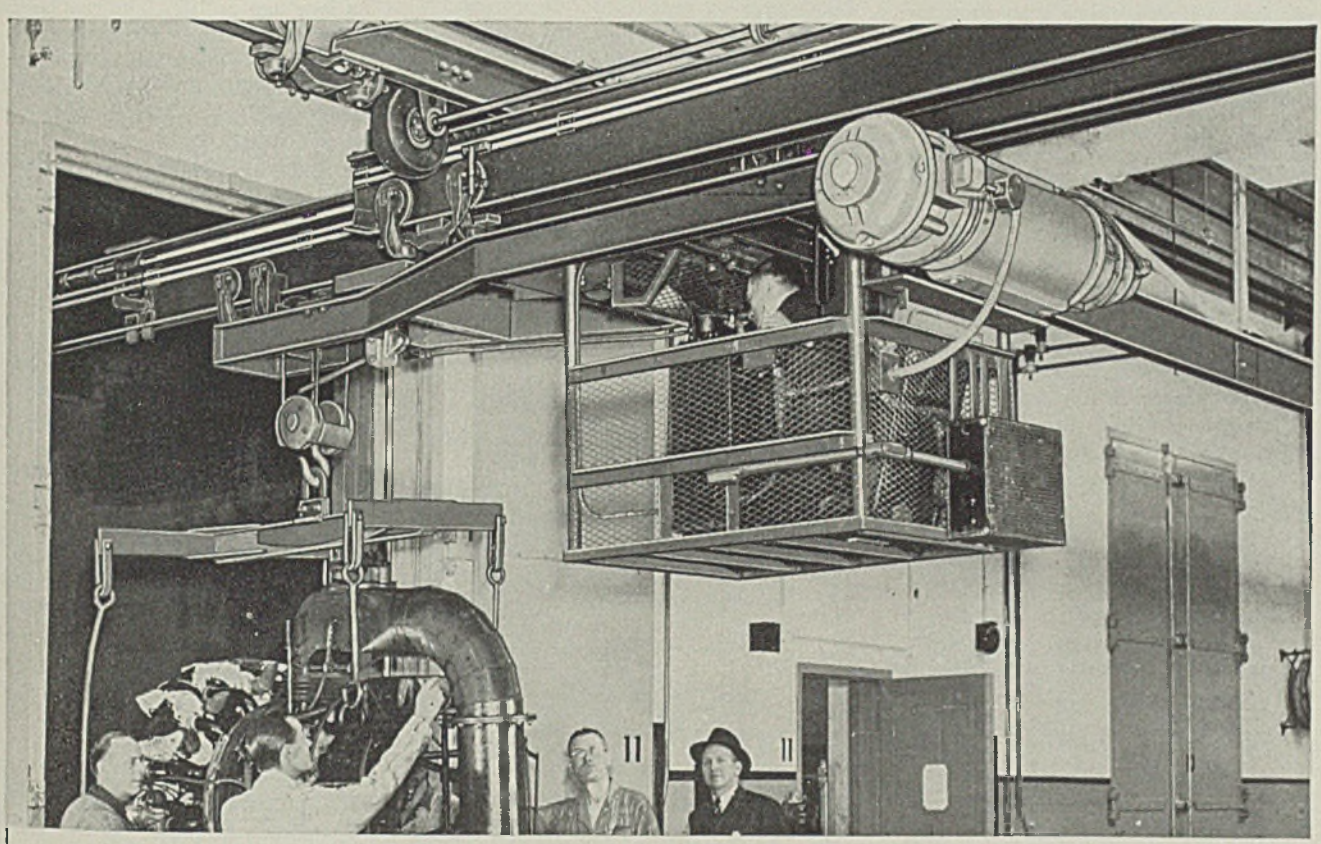
During the campaign much was said about the successful utilization of the sponge iron process in foreign countries. In these claims no consideration was given to the fact that these were special processes to enable certain nations to get along with the inferior iron ores on which they have to rely. One of the principal countries to develop methods of producing special-purpose sinters was Germany.

However, it is understood that the Swedish sponge iron plant is the only one operating in Europe today, and that despite an immense amount of work nothing in Germany advanced beyond the advanced pilot stage. Latest information available indicates that even this work in Germany has been stopped.

Japan has iron ore which contains around 60 per cent iron but which also contains 5 to 6 per cent titanium. For the Japanese the Germans developed a process by which this ore is converted to pig iron in a furnace resembling a cement kiln. During this reduction operation the titanium is slagged off. However, the pig iron bears a high sulphur content—1.50 to 3 per cent—so that the pig iron must be run through a blast furnace for desulphurization. On this basis Japan is able to maintain a steel industry.

Much publicity has been given to the sponge iron plant to be erected at Warren, O., by the Republic Steel Corp., to be financed to the extent of $450,000 by the Defense Plant Corp., at the recommendation of the War Production Board. It should be understood that the special-purpose sinter to be made in this plant is a wartime measure only, as now visualized. Republic has been having a hard

# "AIR CARGO" *in your plant, too!*



## Proven over the years by . . .

# AMERICAN MONORAIL EQUIPMENT

FROM raw materials to finished products, in every operation, American MonoRail Equipment is speeding up production in countless numbers of plants. There is no installation too large and none too small that will not increase production, reduce accidents, reduce employee fatigue, release skilled hands from handling jobs and result in savings of time and money.

American MonoRail Engineers will gladly show you how American MonoRail Equipment will do all these and more in your plant. Write today, no obligation.

WRITE FOR Blue Book illustrating hundreds of MonoRail installations.

**THE AMERICAN MONORAIL CO.**

13102 ATHENS AVENUE ★ ★ CLEVELAND, OHIO

time obtaining uncontaminated scrap for its electric furnaces in Northern Ohio. It has gone to the length of bringing uncontaminated plate scrap all the way from Birmingham, Ala. The sinter to be made at Warren is to be used in lieu of uncontaminated scrap. It is expected to cost several dollars more a ton to produce this sinter than it costs to make pig iron. Hence no place is seen for this sinter after the emergency eases and uncontaminated scrap becomes more plentiful.

There are highly special conditions which make the venture possible. It is possible because, first, the company has high-grade magnetic ore in its Port Henry and Chateaugay mines. It is low in silica and is shipped in the form of concentrate containing 64 to 68 per cent iron. The other factor that makes Republic's venture possible is that at Warren it has available desulphurized coke oven gas containing the large amounts of hydrogen required to reduce the ore. The ore is to be charged into a furnace of the Herreshoff roaster type, 15 feet high and lined with inclined hearths. As the ore falls from hearth to hearth it will be in continual contact with a stream of gas heated to 1200 degrees Fahr. After losing part of its hydrogen content the gas will go back into the mains for use in the various steelmaking operations.

### May Analyze 85 Per Cent Iron

No attempt will be made to remove all the oxygen. Neither will any steps be taken to remove gangue. The sinter is expected to analyze around 85 per cent iron, 5 to 7 per cent gangue, with iron oxide as the remainder.

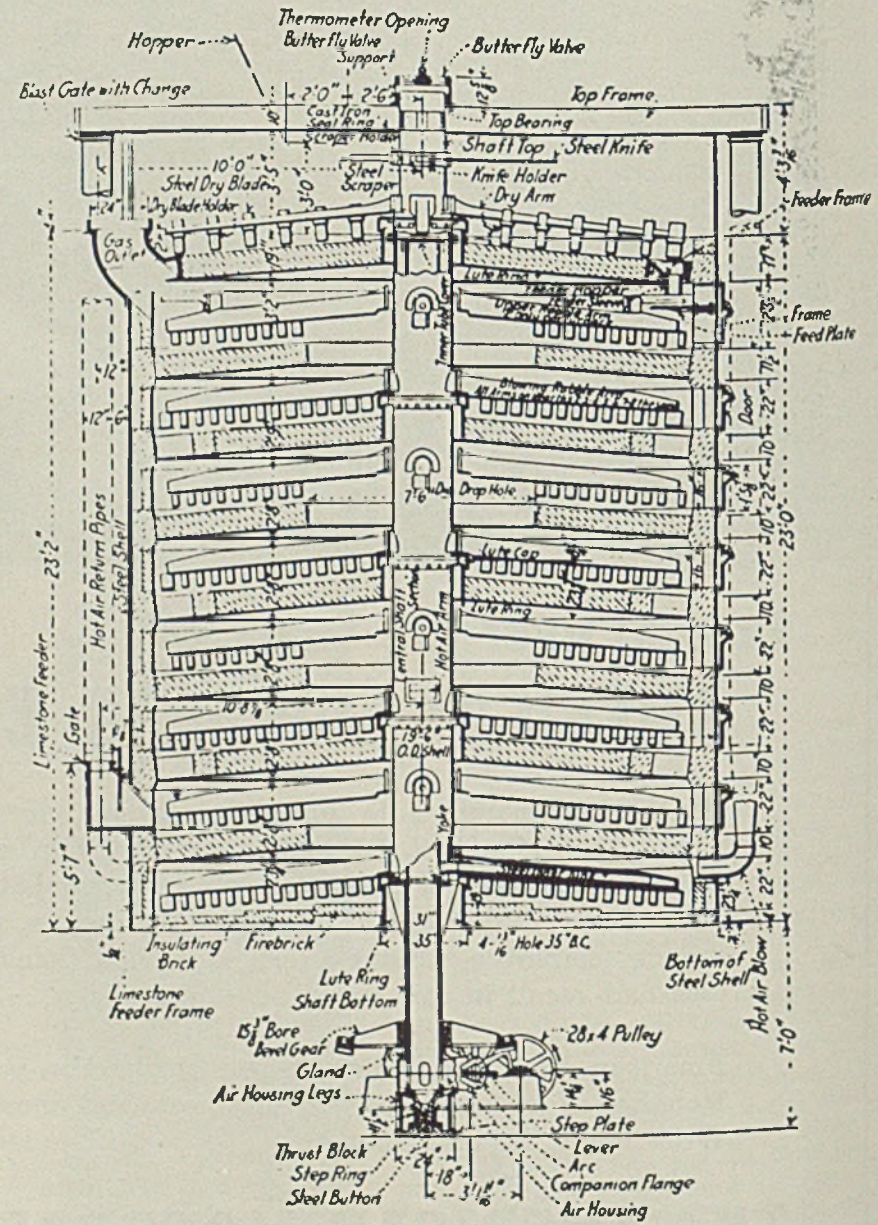
Herman Brassert and A. T. Cape, who developed the process to be used by Republic, already have used it experimentally to produce sinter from ore obtained from the Scrub Oaks mine in New Jersey so that although the practice at Warren remains to be refined, there are good grounds for expecting it to be satisfactory.

The product turned out by Messrs. Brassert and Cape took the form of nodules. Republic plans to discharge from the reducing unit while the sinter still is hot, through a pair of rolls. The product will be ½-inch flat cake which will be broken into convenient charging size. Output will be about 100 tons daily, equivalent to about 3 per cent of Republic's total requirement of uncontaminated scrap. If results are good with this initial unit, Republic could install some five or six more at its other plants where hydrogen-bearing coke oven gas is available.

After Congress in June appropriated $600,000 to finance the sponge iron research program of the Bureau of Mines, it became clear that what the bureau had in mind was not a by-passing of the blast furnace but, rather, the production of a product that would be an acceptable substitute for scrap. It proposed, as announced by the bureau's director, Dr. R. R. Sayers, on July 2, to "develop methods of utilizing untouched iron ore deposits in this country and to assist in alleviating a shortage of scrap iron now believed to be retarding steelmaking."

"Past experiments of the Bureau of Mines and of others have shown the feasibility of reducing iron ore directly with reformed natural gas or coal," Dr. Sayers stated, "and it is with these two processes that the bureau's initial work will be concerned in the emergency program. Any success would not tend to displace the existing industry but merely would supplement the present inadequate facilities in order to meet greatly increased demands for iron to manufacture steel for guns, tanks, ships and other war materials.

"As long ago as 1927," he continued, "the Bureau of Mines investigated the direct reduction of iron ores and in 1936 the bureau published a bulletin describing sponge iron experiments in California conducted by Charles G. Maier, an engineer of the metallurgical division, with reformed natural gas as the reducing agent. This is known as the 'gaseous




*Cross-section of Herreshoff roaster, in which low-grade iron ore dropping through a series of baffles and making intimate contact with desulphurized coke oven gas flowing in opposite direction is converted into a special iron. Capacity is about 100 tons per day*

reduction process'—which means reduction with carbon monoxide or hydrogen. The carbon monoxide passing over hot ore reacts with the oxygen in the iron ore to form carbon dioxide and produces metallic iron. Coal of the non-coking type—and therefore less expensive—can be used also in another direct reduction process.

"When the processes are proven and the bureau's equipment developed to a point where immediate commercial prodution could begin, the scrap situation in this country can be largely alleviated in a few months' time thereafter," he concluded.

In other words, the bureau is starting on its program with high hopes but without any definite promises.

On Aug. 28, Harold L. Ickes, secretary of the Department of the Interior, announced that a "commercial-size pilot plant" would be located at Laramie, Wyo., because of its proximity to iron ore, natural gas and coal.

(A majority of wartime construction projects of the Bureau of Mines, ordered suspended by the War Production Board Oct. 20, were given the "green light" Nov. 25, following a hearing before WPB's Facility Review committee. However, action on the sponge iron pilot plant at Laramie was deferred pending more information. A decision was expected "within the next several days.")

"Three of the processes to be investigated by the bureau in private plants are reported to have produced sponge iron successfully on pilot scale," said Mr. Ickes. "One of the private companies producing a similar material is known to have been in continuous production 24 hours a day for more than a year."

The sponge iron program is under the direction of Dr. R. S. Dean, assistant director, who is in overall charge of the work of the bureau.

As previously stated, the Republic project is considered to be a special case, and some metallurgists do not believe it should be used as a reason for going ahead with a general sponge iron program under wartime conditions.

In the early days of the iron industry in the United States, blooms and billets were produced directly from iron ore in Catalan forges. According to the 1908 annual statistical issue of the old American Iron and Steel Association the manufacture of blooms and billets in such forges came to an end in 1901, in which year the quantity produced by this method came to 2310 gross tons. By that time the forge process had become uneconomical. Iron and steel production has since been based on the blast furnace.

# Reduction in Wasteful Practices In Steel Hauling Sought by WPB

TO AID in the elimination of wasteful transportation practices in the steel industry, H. G. Batcheller, Director of the Steel Division, has established a Transportation Section within the division.

E. G. Plowman, traffic manager, Colorado Fuel & Iron Corp. is chief of the section. Mr. Plowman's home is in Denver.

"The steel industry is one of the larger users of rail, water and truck transportation, since it must move one-third of a billion tons of material annually," Mr. Batcheller said.

The Transportation Section will serve as the contact point of the division with the WPB Stockpiling and Transportation Division, and will work with steel producers to solve freight traffic problems.

Unnecessary cross-hauling, excessive long hauling and the loading of undesirably small quantities of material in freight cars are among the wasteful practices that the Transportation Section will attempt to eliminate.

Mr. Plowman will serve as government presiding officer at meetings of the Steel Transportation Industry Advisory Committee.

## Nonferrous Metals Commission Set Up by War Labor Board

Creation of a Nonferrous Metals Commission to stabilize pay and labor relations for approximately 85,000 workers in the nonferrous metals industry to obtain maximum production was announced last week by the National War Labor Board.

Acting as an agency of the WLB, the commission will handle both labor disputes and voluntary wage and salary adjustments in the mining, milling, melting and refining of nonferrous metals. Its functions will be similar to those of the board's West Coast Lumber Commission created Sept. 17. This is another phase of the WLB's program to decentralize its activities and speed up decisions.

Charles A. Graham, WLB acting regional director in the Denver area, was appointed chairman of the commission, with John Gorsuch, of Denver, as vice chairman and the other public representative.

Labor representatives are James F. O'Brien, president of the Butte, Mont., Metal Trades Council AFL, and A. E. Stevenson, secretary of the Cleveland Industrial Union Council CIO.

Industry representatives are Henry M. Hartman, Salt Lake City, Utah, and S. M. Thompson, president, Cap Rock Coal Co., Denver.

James M. Burns, former assistant to the president of Williams College, is executive secretary of the commission. Mr. Graham formerly was regional director for the National Labor Relations Board at Chicago.

A dollar-a-day wage increase was ordered by the WLB for 10,000 copper, lead and zinc workers in Idaho and Utah, Oct. 16, with provisions designed to insure continuity of work and standards of production.

## WPB Governmental Division Appoints Regional Assistants

Appointment of 12 assistants on the staffs of WPB regional directors who will be assigned to handle the business of the Governmental Division with public officials and public institutions in each area, were announced last week by Wade P. Childress, deputy director general for field operations.

Appointments follow:

Boston, Edward V. Hickey; New York, Donald K. Vanneman; Philadelphia, Thomas H. Healey; Atlanta, Ga., Frank G. Etheridge; Cleveland, George Ramsey; Chicago, Arthur C. Meyer; Kansas City, Mo., George D. Barnett; Dallas, Tex., A. W. Roberts; Denver, Fred W. Roberts; San Francisco, James A. Whiteside; Detroit, P. C. Duborg; Minneapolis, Thomas L. Lambert.

## Co-Chairmen for U. S.-Canadian Production Committee Named

Charles E. Wilson, WPB vice chairman, and Harry J. Carmichael, co-ordinator of production, Canada's Department of Munitions and Supply, have been appointed co-chairmen of a joint War Production Committee of United States and Canada. Mr. Wilson succeeds James S. Knowlson and Mr. Carmichael succeeds G. K. Sheils.

---

Large quantities of building material, including structural steel, is needed in Argentina for construction of grain elevators. According to the Department of Commerce these will be obtained from Spain in exchange for Argentine wheat.

# War Plant Construction in Chicago Area Nears Billion-Dollar Mark

INDUSTRIAL developments in the Chicago district amounting to $6,367,000 were announced during the past month. Foremost among these was the establishment in Chicago of a large plant for Bendix Aviation Corp. and an extensive expansion program of the plant of Ford Motor Co.

The Bendix corporation has purchased, through the Defense Plant Corp., a manufacturing plant which will be converted to an aircraft parts production unit, marking the return of Bendix to Chicago and another forward step in making this area a great production center for the aircraft industry. Ford is making alterations and additions to its Chicago assembly plant for production of war equipment.

Total of new construction and expansions in this area since the first of the year is $566,099,000, which compares with total for the first 11 months of last year of $303,601,000. New plant construction specifically for war contracts now stands at $924,437,000.

### Other Authorizations

Additional war plant facilities to be financed by Defense Plant Corp. were announced last week by Jesse Jones, secretary of commerce. In each case the facilities will be operated by private companies and title will be retained by Defense Plant. The additions include:

Increase in contract with General Motors Corp., Detroit, for additional plant plant facilities in New Jersey. The increase will be in excess of $200,000, making a total commitment of more than $6,000,000.

Increase in contract with General Motors, Detroit, for additional plant facilities in New Jersey. This increase will be in excess of $2,000,000, making total commitment in excess of $9,000,000.

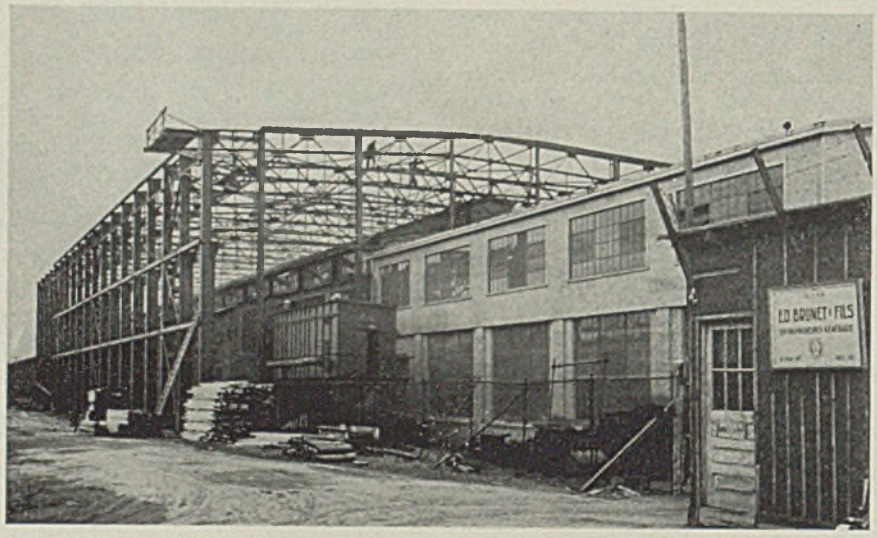
Increase in contract with Republic Aviation Corp., Farmingdale, Long Island, N. Y., for additional plant facilities in New York. The increase will be in excess of $5,000,000, making a total commitment of more than $16,000,000.

Increase in its contract with the Boeing Aircraft Co., Seattle, for additional plant facilities in Kansas. The increase will be in excess of $2,300,000, a total commitment in excess of $25,000,000.

Execution of a contract with the Sun Oil Co., Philadelphia, to provide for construction and equipment of a plant in Ohio. The cost is estimated to be in excess of $3,000,000.

Increase in a contract with General Motors Corp., Detroit, for additional plant facilities in Ohio. The increase will be in excess of $1,400,000 making a total commitment of more than $13,000,000.

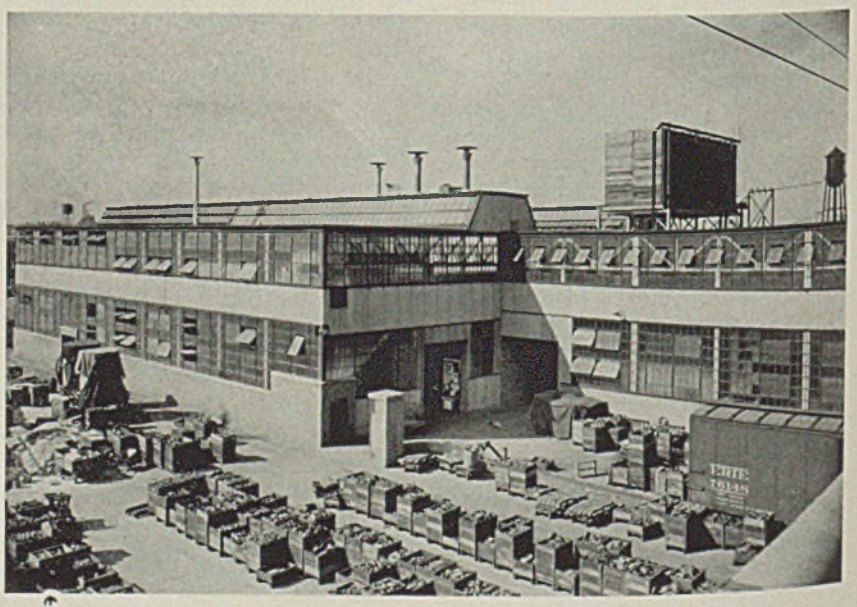
## OVER AND AROUND! EXPANSIONS CAUSED NO INTERRUPTIONS




## Work on $45,000,000 War Plant Suspended by WPB

Acting under the policy of curtailing use of materials for construction projects, WPB has ordered immediate stoppage of all work incidental to the construction

(*Please turn to Page* 176)



ONE method of enlarging capacity of existing plants without interrupting war production has been to erect the new building over the old. Above, a new "skin" is being put on the Hull Steel Foundries in Quebec, Canada, without interfering with fulltime output of cast steel tank treads. At right is a similar job recently completed at the heat treating building of the Caterpillar Tractor Co., Peoria, Ill. The new building, 133 feet wide and 211 feet long, was erected speedily over and around the old while employes continued their work

# Industry Put Under Rigid Control; U. S. Aids Strategic Mineral Recovery

*TORONTO, ONT.*

SWEEPING power over all industry in Canada has been conferred on the Wartime Prices and Trade Board by an order-in-council. The board now may prohibit the "formation, commencement, operation, amalgamation, merger, consolidation or transfer" of any business or undertaking. It may prescribe conditions under which projects may be formed, operated, merged or transferred. A person engaged in business may be required to discontinue or limit that business in whole or in part. Those engaged in any business may be required to pool or otherwise use any real or personal property in such way or on such terms as the board may order.

The board may approve suggestions from the operators of two or more businesses for the pooling or other disposition of the revenues or profits of their business, or the establishment of a fund for compensation for those required to discontinue or limit a business or undertaking in line with the board's regulations. Apart from such voluntary suggestions being accepted, the board may require establishment of funds to compensate persons required to discontinue or limit their business or undertaking.

It may require many persons to contribute to such funds on terms to be prescribed. Distribution of these funds will be made as the board sees fit, although the regulations are not deemed to require the board to provide compensation for anyone. By specific regulation, Finance Minister Ilsley must be kept informed of the principles the board is following in exercising the powers granted to it. It must refrain from doing such things as the minister in writing may direct.

### Mining Activity Increased

The amended regulations declare the board's control over the terms and conditions of all manufacture, sale, installation, delivery and use of goods and services may be prescribed by the board. Any person may be required to obtain a license or permit from the board. In cases where the board decides to take possession of goods or services, the price or compensation will be prescribed by the board with the approval of the finance minister.

Through financial assistance by Canadian and United States government agencies mining for strategic minerals is receiving much attention. Some 40 mining projects now are being given support. Metals Reserve Co. of the United States is assisting 17 properties and production plans call for recovery of 46,000 tons of copper, 74,000 tons of zinc and 7000 tons of lead. Projects wholly financed and operated by the Canadian government involve magnesium, chromite, molybdenite and tungsten. Canadian companies have responded to the call for increased output necessary for the war and this year nonferrous output will total more than 1,100,000 tons.

### "Largest in the World"

C. G. Bateman, metals controller, illustrates this expansion by that of the aluminum industry. When present plans are completed, probably in 1943, Canada will have the largest aluminum plant in the world, with capacity exceeding the world's output in 1937. To provide power a hydroelectric plant is being built, said to be the largest in the world, with capacity of 1,000,000 horsepower.

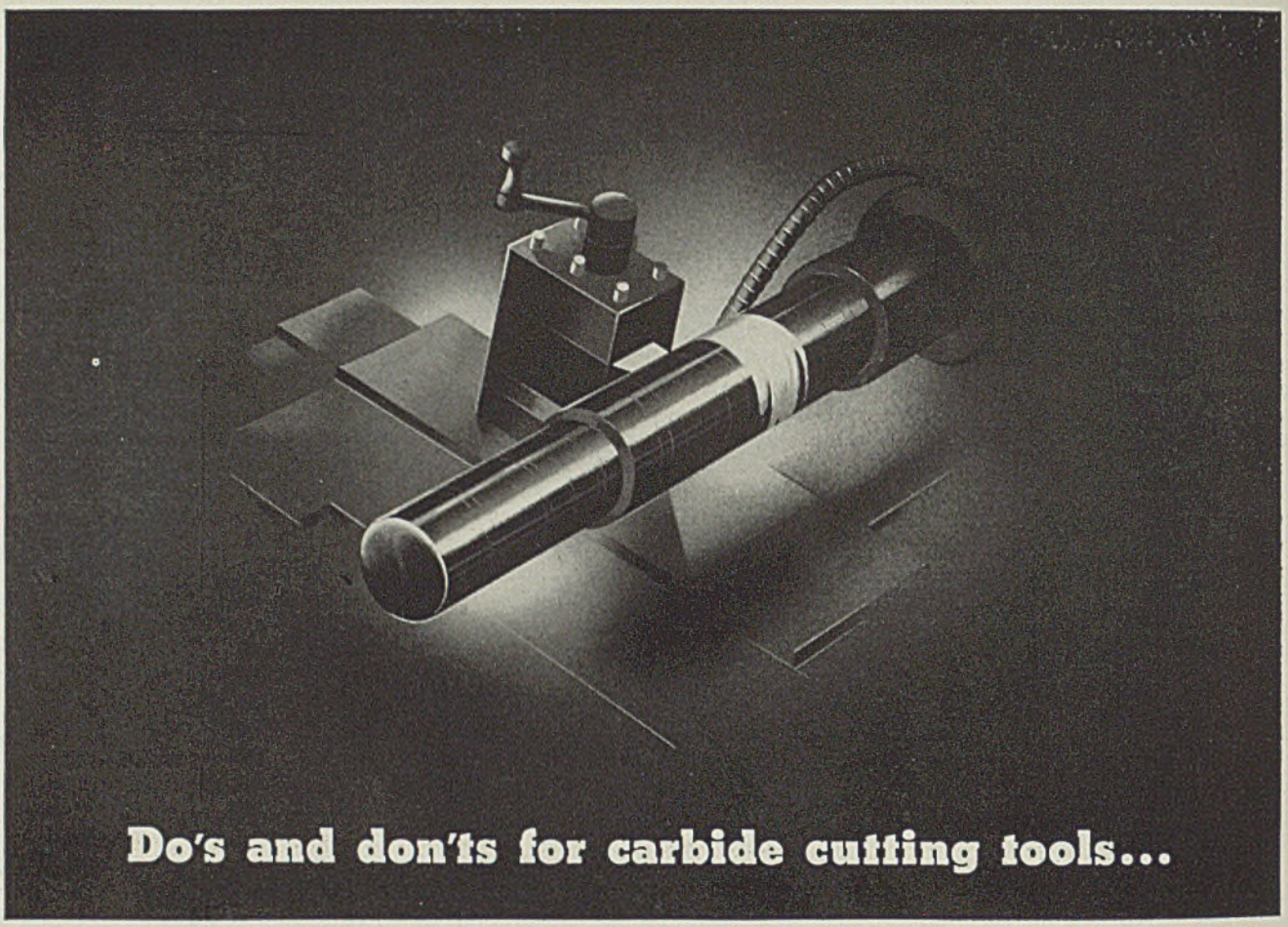
Canada in general consumes about 30 per cent of her output of aluminum, nickel, copper, lead and zinc, the remainder being exported. Manganese deposits are small and intensive search has failed to reveal any substantial supply. In chrome the situation is better. The government is opening up what formerly was known as the Belanger property in Quebec and building a 600-ton mill, which will be in operation early in 1943. There are perhaps 1000 known molybdenum showings in Canada but most offer no possibility of production except at prohibitive prices. The government is financing a molybdenite property in northern Quebec and another in Ontario and has made contracts with several companies for molybdenite, some being for as little as 100,000 pounds. Average cost of these operations will be approximately twice the selling price in the United States.

Department of Munitions and Supply reports that this year's war production will have a value of $2,500,000,000 and for 1943 will be substantially larger. It is expected that next year mechanized equipment alone will reach a value of $1,000,000,000. In addition to corvettes, minesweepers and other naval craft the department hopes soon to deliver a finished destroyer of 100 per cent Can-

(*Please turn to Page* 176)

## SOUTH AMERICA BUILDS GOODWILL

MRS. MARTA IDE DE RIOS, wife of the president of Chile, gives her autograph to Electrician Charles Singleton, left, after officiating at the launching of the S. S. CAPE ROMAIN at Consolidated Steel Corp. yards, Los Angeles. Center is Alden G. Roach, Consolidated president. NEA photo



# Do's and don'ts for carbide cutting tools...

*Information supplied by "Steel"*

## ALWAYS

Use flat, rigid base
Set tools approximately on horizontal plane
If necessary set tool short of desired length and adjust from rear
Back out tool when tightening clamp screws
Use dog-point or flat clamping screws
Cut overhang to minimum
Always allow tool to cool naturally
Use generous coolant flow. If possible, force coolant UNDER chip and against cutting edge
Always disengage feed before stopping spindle
Always use silicon carbide or diamond wheels for grinding tip
Sharpen carbide tools at regular intervals to get longest life
Keep tool moving across wheel when grinding to avoid localized overheating.

## NEVER

Never use rocker support under tool
Never set tools above or below center line
Never use hammer on cutting end of tool
Never use inclined tool holders
Never have tool against work when tightening clamping screws
Never use pointed clamping screws
Never leave excessive overhang
Never dip tool in any liquid while tool is hot
Never use weak stream of coolant
Never stop spindle before disengaging feed
Never use "any old wheel" for grinding carbide tip
Never run a carbide tool until it won't cut any more
In grinding carbide tips don't hold tool motionless too long against wheel.

By A. H. ALLEN Detroit Editor, STEEL

# MIRRORS of MOTORDOM

*Through field, wood, swamp and river with the amphibian tractor. . . Better design forthcoming shortly. . . Industry's dollar volume for 1942 is 75 per cent ahead of peacetime best*

DETROIT

A RIDE in the Roebling amphibian "swamp buggy" cannot be likened to the deluxe excursions which used to be provided correspondents at the time of new automobile model introductions, but the comparison is perhaps representative of the wartime conversion of the motor industry to production of battle wagons. By courtesy of Graham-Paige, one of the builders of these amphibian tractors, press representatives here were privileged to "get the feel" of the lumbering vehicles in action in a recent demonstration.

Built for the Navy Department, the amphibian weighs about 9 tons, light, and is supposed to carry a complement of 24 men with full packs on either land or water, making about 25 miles an hour on terra firma and 12 knots awash. Drive is furnished by a conventional truck motor of about 150-horsepower rating, propelling, through marine-type clutch and three-speed gearbox, tracks on either side. The latter are simply roller chains to which are bolted forged aluminum treads shaped with the proper curvature to give maximum traction in water.

Two of the amphibians were waiting at a location on the northern end of Grosse Ile, down-river from Detroit and in the middle of the Detroit river, providing a clear sweep for a cold northwest gale. The party climbed aboard and with a roar of the motors, the two mastodons lurched off across the field and into the underbrush. When a track-type vehicle starts or stops, the occupants have no doubt about what is happening, and if they are not holding to guard-rails they will likely wind up on the floor. Steering is of course accomplished simply by driving a little harder on one track than on the other, as in a tank.

### Fell 5-Inch Trees

Underbrush and small timber crumples like matchwood when these steel giants hit it. Even trees of 4 or 5-inch diameter are felled without noticeable impact. Passengers are carried in an open "well" or deck at the center of the vehicle, while the driver and a couple of assistants are stationed up front in a comfortable tonneau and behind a thick windshield. In traversing a woods, the effects of stray branches and brambles are apt to be annoying to back-seat drivers, but all is serene with the operators.

After traveling over various types of wooded terrain, ditches and fields, the drivers headed for the swamps and the open water. Tracks literally chew up the ground and whatever may be on it, and slither through marshy spots with seemingly little difficulty. The motor seldom "revved" up over 1500, the driver naturally preferring not to overwork a green motor before it could be handed over to the Navy. The heavy vehicles settle smoothly into the water and ride an even keel because of the buoyancy of the two steel pontoons at the sides, over which the tracks roll. They can be turned on their own length just by driving the track on one side.

### Designed for the Everglades

As may be known, these amphibians were originally built for emergency service in the Florida Everglades during floods. But like "Lucky Strike Green", they have now gone to war and already have seen extensive service in the Solomons where their amphibious qualities make them ideally suited, both for lighter service from large ships to shore and for cutting through jungle growths on land. Many reports have been relayed back to this country from this sector, telling all sorts of tales of how the vehicles are being put to use. One runs to the effect that they make perfect battering rams to shake Jap snipers down from tall trees!

Constructionwise, the amphibians might be called crude by Detroit engineers. They are simply a hull of welded carbon steel plates, to which a couple of airtight steel pontoons are welded, motor and transmission installed in the rear, driver's compartment in the front and off they go. They are noisy, and wear on track chain and treads must be severe, to say the least. But still they are something comparatively new and better than anything the enemy has shown of a similar character.

As a matter of fact, the present design has just about run its course, and the Navy is turning to something a little better, but based on the same general principles.

Not much can be said about the new type of amphibian which is now going into production except that it is heavier, will carry armor plate protection, will have a more powerful (probably radial) motor and will embody a number of improvements in the track mechanism.

The Graham plant here on West Warren avenue is a far cry from the days when Joe Graham was valiantly trying to get somewhere with a motor car—and that was not so many years ago, either. Mr. Graham now spends most of his time at his family home in Washington, Ind., though he does visit Detroit regularly, where it is probably a strange sight to him to see his old stamping ground turning out amphibian tractors, airplane engine connecting rods, cylinder block and crankcase assemblies for Sterling engines used in PT boats, breech blocks for aircraft cannon and antiaircraft guns and other armament parts. The plant is busy, employing about 2400 in its various divisions, although a good part of the structure has been turned over to the Central Air Corps Procurement office of the Army Air Forces.

It was here, incidentally, that the first steps were taken leading to the co-operative war manufacturing programs of the automotive and aviation industries, eventually incorporated into the Automotive Council for War Production, a co-operative group now representing 400 plants in the industry.

On the anniversary of the Pearl Harbor attack (today), the Council, speaking for the automotive industry, summarizes the colossal manufacturing achievement effected over the past 365 days. While the industry has never been one to let its praises go unsung, it may be pardoned the recitation of accomplishments in this brief period:

### Looking at the Record

Deliveries of aircraft, fuselage sections, engines, propellers and parts equal in dollar volume to 50 squadrons of warplanes, each consisting of 15 heavy bombers, 30 medium bombers and 90 fighters;

Output of tanks, military vehicles and parts equaling the cost of equipping 57 armored divisions of the army with their balanced complements of 3314 motorized units each (188,898 in all);

Automotive production of marine equipment equivalent in dollar value to 70 submarines plus 650 motor torpedo boats;

And, millions of dollars worth of guns and ammunition, range finders, helmets and hundreds of other automotive-produced armaments.

Altogether, this adds up to a total of nearly $20,000,000 worth of war goods a day, or an annual output 75 per cent ahead of the industry's best peacetime year.

While statistics related to "dollar value" are confusing and often subject to misinterpretation, mainly because war products have a much higher per-pound

value than any automotive product, still it should be remembered that war contracts are continually in process of renegotiation, so that actually output in units increases at a faster pace than does the dollar value of such output.

The industry's report is made public in the form of a 28-page booklet entitled, "Teamwork for Victory," available upon request either to STEEL or the Automotive Council for War Production. It is a dramatic representation of what Alvan Macauley, president of the ACWP, calls the "free American's ability to merge his individual talents with those of his fellow men whenever conditions demand the co-ordinated action of teamwork."

**Shifting Tides Revealed Needs**

Glancing ahead, the booklet's authors observe that "the unpredictable shifts of strategy already are making themselves felt along the automotive industry's assembly lines. Some plants are now operating below peaks previously attained. Others face immediate or future curtailment of production rates. Still others are being called upon to effect huge expansions of productive capacity. Such alterations of production rates were not unexpected. Because the nation was woefully unready for war, Pearl Harbor brought huge demands for arms of all kinds—weapons in unlimited quantities, as quickly as possible.

"While these emergency demands were being met, . . . shifting tides of global war revealed the shapes and dimensions of specific needs. To meet those needs, men and machines and materials undoubtedly will be diverted from one task to another. This trend is already manifesting itself in order to change schedules up or down.

"But war production has come a long way since America's peace was shattered in the Pacific on Sunday, Dec. 7, 1941. On that day, the automotive industry was still the world's greatest producer of civilian goods. Today it makes no cars except armored ones. Its trucks and its buses are all drenched in olive drab."

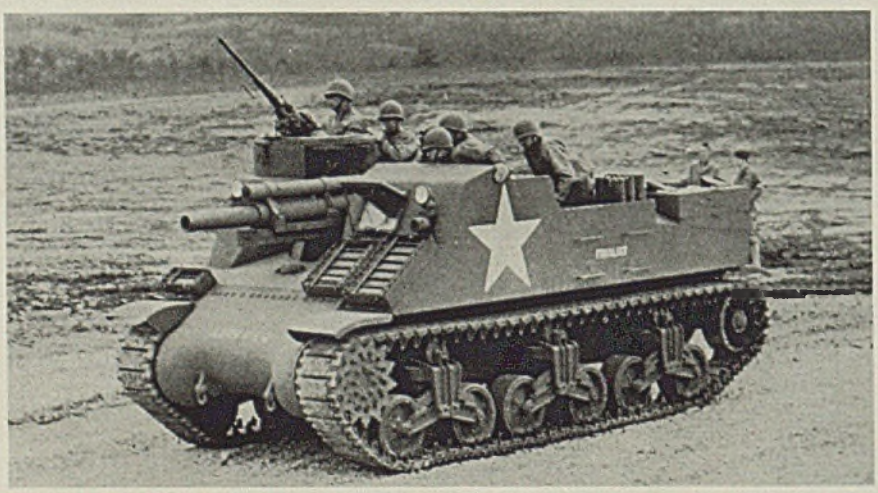
General Motors' share in production of war materials by the motor industry was announced Nov. 26 as better than $8,000,000 daily. This figures to 40 per cent of the $20,000,000 daily output figure mentioned above for the entire industry, the "normal" proportion of GM output to total output in the immediate prewar years. Whether this indicates GM is keeping up with the industry or the latter is keeping up with GM will have to be left to the reader's choice.

Total deliveries from GM plants in the U. S. and Canada in October were $248,405,560, an increase of $35,554,200 over September, and over three times the valuation of shipments in January of this year.

Asked about what the November total would show, C. E. Wilson, president, said it would reflect further increase from October, but that the "rate of acceleration had begun to slow down." Employment figures may be a partial indication of what November statistics will show when compiled in a few weeks. For the week ending Nov. 15, hourly rated employes totaled 273,112, better than 10,000 ahead of the total for the week ending Oct. 15. Total employment by the corporation, U. S. and Canada, is 356,705. Monthly losses to the armed services are running close to 4000. Peak of GM war production is not expected for another six months, because of large increases in aircraft and aircraft engine production which have been started but not yet brought to full production.

Some significant figures on employment trends in the Detroit area have been assembled by Willis H. Hall of the Board of Commerce to refute charges of discrimination against women and negroes. In June of this year, 164 employers had on their payrolls 406,000 persons, of whom 33,000 were women and 19,000 nonwhites. By October, or in four months, total employment of the same 164 had jumped to 480,000, with 57,000 women and 29,000 nonwhites. This represents overall increase of 18.2 per cent, with 72.8 per cent increase in women and 54.7 per cent increase in nonwhites. Unfortunately, however, what the nonwhites and their sponsors are plumping for is not more jobs but equality of jobs with whites—equality of pay and equality of technical skill requirements. That is something else.

## AMERICA'S LATEST TANK DESTROYER



PHOTOGRAPHED for the first time is this M-5 tank destroyer. Self-propelled, it mounts a 105-millimeter gun and an antiaircraft weapon. It already has seen action on enemy fronts. NEA photo

## Offers $6750 to Students In Welding Competition

The James F. Lincoln Arc Welding Foundation, Cleveland, sponsor of the 1937-1938 and 1940-42 nation-wide $200,000 arc welding award programs, last week announced its first award program in the field of undergraduate engineering study.

The foundation's new project is the "$6750 Annual Engineering Undergraduate Award and Scholarship Program". Its object is "to encourage engineering students to study arc welded construction so that their imagination, ability and vision may be given opportunity to extend knowledge of this method and thus aid the war effort and the economic reconstruction in the peace which is to follow".

The program offers $5000 in student awards and $1750 in scholarships for the departments of the institutions in which the award-winning students are registered. There are 77 student awards—a first award of $1000, second of $500, third of $250, four awards of $150, eight of $100, twelve of $50 and fifty of $25. There are seven scholarships of $250 each. The school of the first award winner will receive four scholarships totaling $1000; the school of the second winner will receive two scholarships totaling $500; and the school of the third winner will receive one scholarship of $250.

# in the HEAT OF BATTLE

# EXPERT STEEL TREATING PAYS!

In this grim business of war, scientific heat treating of steels pays off in something vastly more important than dollars and cents. The lives of our fighting men, the safety of our nation, freedom itself depends on the steels which go into our war equipment.

The Lakeside Steel Improvement Company has thrown its entire resources into the task of making fighting steel as nearly perfect as steel can be made. Our modern plant and complete equipment make it possible for us to treat steel for any conceivable use in the national war effort.

## Our Services

Flame Hardening • Annealing • Aerocasing • Heat Treating • Bar Stock Treating and Straightening Nitriding • Champanizing • Tempering • Cyaniding • Pack or Gas Carburizing • Sand Blasting • Hi-Speed Hardening

MTI MASTER CRAFTSMEN
METAL TREATING INSTITUTE

**THE LAKESIDE STEEL IMPROVEMENT CO.**

5418 Lakeside Avenue CLEVELAND, OHIO Phone Henderson 9100

*Taking only 25 minutes from production between shifts these men are some of the hundreds of men and women of the Summerill Tubing Co., Bridgeport, Montgomery County, Pa., to whom the Army-Navy "E" for excellence in seamless tube output was awarded Nov. 19. Production has been on a four-shift, 160-hour week since October, 1939. Production in December, 1941, rose 16 per cent without additional men or equipment. Output in October, 1939, was 3 per cent above the best previous record. About 10 per cent of the workers in the mill now are women*

*General Manager A. S. Shoffstall, International Nickel Co.'s Huntington, W. Va., plant, receives flag, right, with two stars added from Capt. T. J. Bay, U. S. Navy Bureau of Ships. The plant is engaged 100 per cent on war work*

—o—

*Bucyrus-Erie Co.'s South Milwaukee plant receives burgee, below. Holding pennant are, left to right: Louis Quarles, who presided at ceremonies; W. W. Coleman, Bucyrus-Erie president; Brig. Gen. G. M. Barnes who made the presentation; Robert Scott, employe representative; Capt. Dallas, U. S. Navy; N. R. Knox, Bucyrus-Erie vice president*



## Slogan on Machine Tools To Inspire Workers

"Hi, Buddy—Let's Get to Work for America" is the slogan being carried into many war factories within the United States on machine tools built by Gorton Machine Co., Racine, Wis. Designed to inspire all war workers who see it, this "Formula for Victory" is a prominently displayed red, white and blue decalcomania. Gorton officials say it is "a constant reminder and morale builder which helps to develop a feeling of partnership between man and machine."

---

Lukens Steel Co., By-Products Steel Corp., Lukenweld Inc., Coatesville, Pa., and their employes will be honored Monday evening, Dec. 7, in a special broadcast from Station WFIL, Philadelphia, for their accomplishments in increasing production of war materials.

*President Roosevelt buys the first $1000 bond of the Victory Loan series from Henry Morgenthau, secretary of the treasury, left, and Daniel W. Bell, treasury under-secretary, inaugurating the department's campaign to sell nine billion dollars' worth of government securities during December. The President's bond, purchased Nov. 25, bears 2½ per cent interest at maturity and is redeemable in full in 26 years*


# Heavy Purchases By Steelworkers

*More than 675,000 employes in the industry subscribing at rate of $100,000,000 annually*

MEN who make the nation's steel are buying war bonds at the rate of $100,000,000 worth a year through voluntary payroll deductions.

According to an industry-wide survey by American Iron and Steel Institute, New York, wage-earning and salaried employes of steel companies during September authorized deductions totaling $8,348,000 from their pay envelopes to buy bonds. The total does not include the amount invested in bonds by direct purchases at post offices or other issuing agencies outside steel plants.

A total of over 675,000 employes, including those in certain subsidiaries which do not produce iron or steel products, have authorized deductions from their pay. The number buying bonds is more than 80 per cent of the total number employed in companies reporting.

Deductions for bonds were equivalent to 5.2 per cent of the total reported payrolls for September, and indicated an average contribution of 12.30 per man per month.

An earlier survey revealed steel employes were contributing an average of about $9 per man per month towards the purchase of bonds.

Plans for voluntary payroll deductions for bond buying are in effect in 165 companies in the industry. Records of most companies show the number of bond-buying employes has been rising steadily.

## Federal Shipbuilding Employes Invest $5,000,000

Five million dollars worth of bonds have been bought by employes of Federal Shipbuilding & Dry Dock Co. at yards in Kearny and Port Newark, N. J., it was announced last week, as two more 10,000-ton cargo ships, SANTA CATALINA and SANTA BARBARA were launched at Kearny.

The twin launching was in line with the new pace set in sending destroyers into the water at this yard recently. This subsidiary of United States Steel Corp. by launching two destroyers at a time, had four such craft afloat in 28 minutes on Armistice Day.

Illustration, at left, shows bundles of paid-up bonds arriving at the yards for distribution to their new owners.

# WING TIPS

*Expanded steel mesh backing up thin sheets developed for aircraft fuselage construction. Provides adequate strength and meets requirements for weight limitation*

SUCCESSFUL application of flat-rolled steel to the fuselage, wings, tail surfaces and cowling of airplanes is a goal toward which numerous aircraft designers logically are working. Proved adaptability of steel in such transport equipment as railroad cars, automobiles, trucks, ships and the like obviously suggests its extension to aircraft, for two potent reasons.

First, because of the appreciable cost savings which steel offers over any other metal, pound for pound; and second the existence of a well-integrated and well-equipped pressed steel industry which is ready at a moment's notice to apply its talents to any product, whether it be a washing machine or a new automobile body. The "know-how" is extensive and thorough, as far as the forming and assembling of steel are concerned.

In wartime, the cost angle can be disregarded, but there arises the more important qualifying factor of available supply of critical materials, such as aluminum and magnesium, which immediately creates the necessity for development of substitutes if predetermined production goals in excess of available materials are to be met.

So, under the wartime incentive of developing substitute materials for airframes, and with perhaps at least an eye on the intriguing possibilities of post-war airplanes of steel, built at much lower cost, designers have been attacking the problem.

Some of their work already has been reported. Engineers of North American Aviation, for example, have made interesting progress in the use of low-alloy high-tensile steel sheets and plywood sections in North America's AT-6A advanced training plane (STEEL, April 13, p. 60).

Most recent activity in the field is the work being conducted by the manufacturing research department of Vultee Aircraft Inc., Detroit, with the co-operation of the Vultee production engineer depot under direction of Peter Altman, a former professor of aeronautical engineering at the University of Detroit, who for the past 18 months has been developing and testing a new type of composite steel construction for aircraft, known by the trade name Vultex Metal.

In starting his research, Mr. Altman dug right into the fundamentals. Conventional type of aluminum alloy sheet used in aircraft wing and fuselage construction is about 0.035-inch thick. To design a steel structure comparable on a weight basis, it becomes necessary to divide this figure by 2.8, since steel has a unit weight 2.8 times that of aluminum. This reduces the equivalent thickness to 0.0125-inch, or about 30-gage stock. A steel sheet, even assuming choice of a tough alloy like S.A.E. 4610, does not have sufficient rigidity to withstand the compressive and twisting stresses encountered in airplanes, so some means of reinforcement had to be devised.

Since steel sheet 0.008-inch thick is about as thin as it is practical to roll on present types of sheet-mill cold-rolling equipment, it was decided to start with a plain low-carbon steel sheet of this gage and to evolve some means of backing it up to provide the necessary resistance to compressive stresses and transverse loads. Various backing materials were tried by Altman and his associates and they finally conceived the idea of attaching an expanded steel mesh to the reverse side of the sheet.

### Mesh Helps Limit Weight

Since it is possible to produce a mesh in which only 10 per cent of a given area is represented by solid steel, the rest being interstices, it becomes immediately possible to multiply the thickness used by 10 and still stay within the weight limits imposed.

Thus, with a base sheet of 0.008-inch thickness, a margin of 0.0045-inch remains for a solid sheet, if the limit of 0.0125-inch for solid steel is to be observed. With the use of an expanded mesh, this margin can be multiplied by ten, permitting use of a mesh 0.045-inch thick, with its attendant increased ability to stiffen the structure. So, as far as unit weight is concerned, a composite construction equivalent to 0.0125-inch thickness is provided, but because of the greater thickness of mesh, the construction is equivalent, as a free column in resistance to compressive, to solid steel 0.033-inch thick, or aluminum alloy 0.042-inch thick. However, in aircraft structures, panel edges are usually "restrained" by framing members, so this margin is somewhat reduced. In general, it can be said that the composite sheet provides resistance to compressive stresses and transverse loads equivalent to a solid sheet of 0.024-inch thick, or to a half-hard aluminum alloy 0.035-inch thick.

The expanded metal mesh is supplied

*Peter Altman, director of the manufacturing research department of Vultee Aircraft Inc., inspects two different sample panels of the composite expanded steel sheet*

*O.W.I. by Palmer, in an Allegheny Ludlum Plant*

# GRAY... and Skilled...

## IN THE SERVICE OF STAINLESS STEEL

THE production of alloy steels is essentially a matter of technique. Many of them are complex, metallurgically; and all of them are compounded to a nicety and processed to specific requirements of surface finish and physical properties.

More often than not, the ability to produce these alloy steels successfully to such close limits, and the added ability to multiply the tonnage many times under the necessities of war, come as a result of having developed the *original* technique. The accumulated knowledge and experience of the mill technicians and men who developed an idea into a special steel, and shouldered the trials of pioneering it commercially, make all the difference.

For Allegheny Ludlum, that is true in the cases of stainless steel, gasoline engine valve steel, and many alloys for electrical purposes. It is true also of certain tool and die steels, notably the DBL High Speed Steel analysis, which has replaced "18-4-1" on the majority of the nation's production jobs.

These steels of our development are among the most vital of the war. We want to place our "know-how" completely at your disposal, to help you select them wisely and use them well, without waste. ● Call on us for technical and fabricating data in print, or for the personal assistance of our Technical Staff.

AL

STEEL FOR THE NATION'S WELFARE

**Allegheny Ludlum**

**STEEL CORPORATION**

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

A-8747 . . . W & D


*Vultee Valiant basic trainer on which the expanded steel panels are being employed*

by the U. S. Gypsum Co. In its production a solid sheet is partially slit or pierced in a guillotine shears. The steel sheet is advanced slightly for each succeeding row of "slits" and simultaneously stretched out laterally to form a mesh with diamond shaped openings and a web of narrow steel strip, uniform in width. Obviously, there is no scrap loss in production of such mesh. As a stiffening support for the 0.008-inch outer sheet, it has the ideal quality of providing almost the equivalent strength of a solid sheet of the same thickness, despite the fact 90 per cent is open space.

Numerous variations of the composite construction are possible. The mesh may be spot welded or seam welded to the backing sheet, or it may be attached with plastic cement. A sandwich type of construction is possible in which the mesh becomes a spacer between two solid sheets of steel, being preformed in a press to a type of cellular construction.

If desired the mesh may be covered with fabric to provide a strong structural member, possibly suited to use as control surfaces for airplanes, all of which are fabric covered in current practice.

Sample fuselage panels of the composite construction—mesh spot welded to 0.008-inch sheet—have been going through extensive tests in Vultee research laboratories over the past two years. In one static test, the panel successfully withstood 200 per cent of the design load, while under oscillating load the panel showed three times the normal expectancy. Fatigue tests encompassing 30,000,000 reversals of cycles have not produced failures in flat panels.

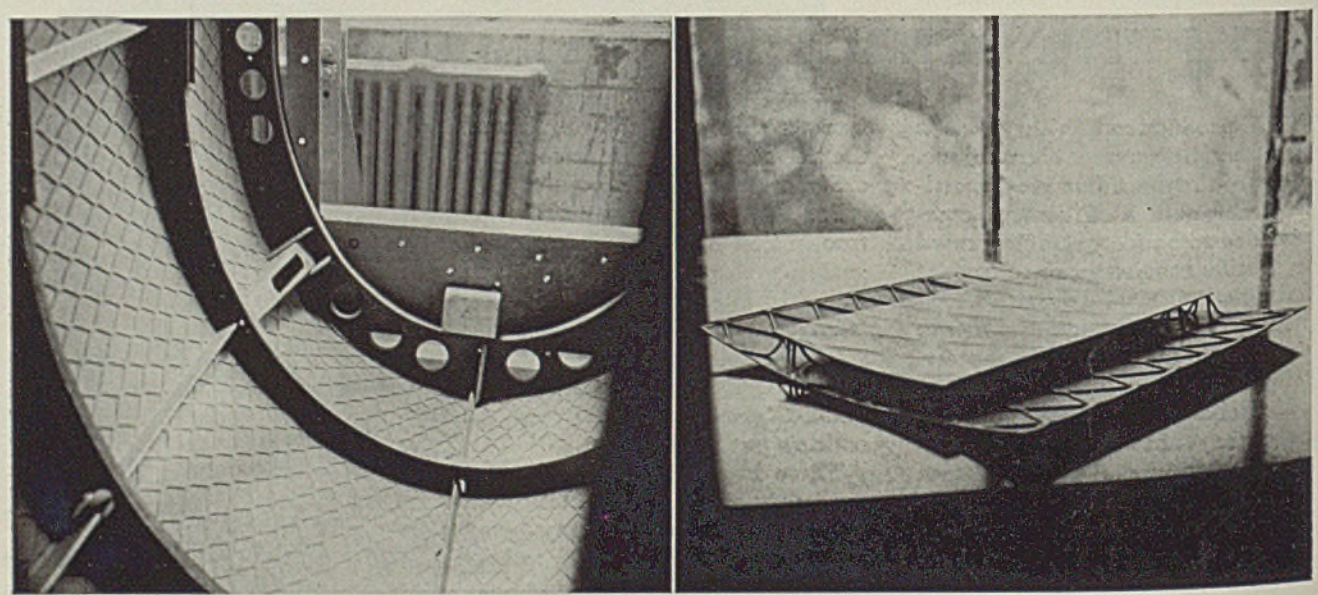
**Suited to Standard Welding**

Assembly of the panels in fuselages may be accomplished with all the facility of spot welding operations in railroad car or automotive plants. Panels are mounted smooth side out, and are fitted under the flange of a T-section stringer, also of steel. By means of conventional spot welding guns, the edges of the panels are welded to the stringer flanges in a fraction of the time it would take to rivet a similar size panel.

Vultee now has in production a number of training ships incorporating the new type of steel panel. It is reported to be the first use of low-carbon steel in airplanes.

Co-operation of Republic Steel Corp. and Carnegie-Illinois Steel Corp. assisted greatly in bringing the development work to the commercial stage. It is hoped now to set up plants to produce the composite panels in stock sizes, perhaps furnishing them to aircraft builders assembled and rustproofed. The panels can be formed to a certain degree in press equipment and are easily conformed to the rounded fuselage of a plane, if the mesh is placed so that the direction of slitting is longitudinal to the installation and not transverse. One promising method of rustproofing is elec-

(*Please turn to Page* 176)

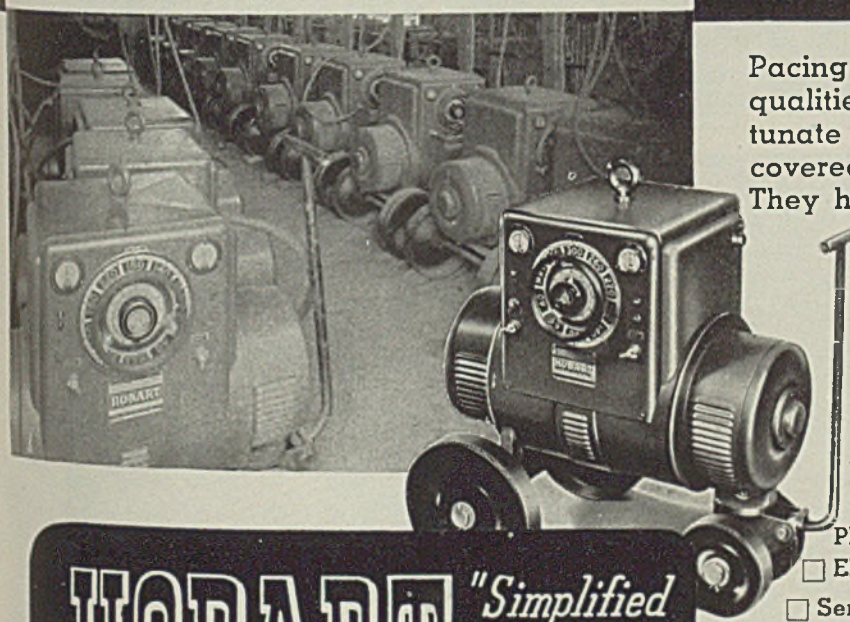


*Interior view of a fatigue test being made on a steel fuselage, left. A racking, eccentric motion imparted by the test apparatus twists and wrinkles the fuselage repeatedly, producing loads equivalent to those resulting from severe maneuvers or flight conditions. Right, sandwich type structure employing expanded steel in solid sheets of steel. A high bulk factor and high strength can be obtained by this method*

# Hobart's

# GREATER ARC WELDING SPEEDS are setting the pace for many a war production effort.

***Hobart Exclusive Remote Control Is a Time and Material Saver.*** Saves operator's time; eliminates attempt to get-by with improper "heat"; cuts down on costly rejects; saves valuable floor space.



Pacing horses and pacing cars are chosen for the qualities of leadership. And so it is in welders. Fortunate are those industries who have long ago discovered that Hobart was a thorobred pace-setter. They had the advantages in design and performance features offered by Hobart to aid the war effort. Add to these Hobart old-timers the hundreds of new users daily discovering Hobart's speed-up advantages, and you'll readily see that Hobart ranks high in value as an outstanding production tool.

**HOBART BROS. CO., Box ST-122 Troy, O**

Please send more information on:

☐ Electric Welders ☐ Gasoline Drive Welders

☐ Send____ copies of valuable new shop procedure manual on "Practical Arc Welding"

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____


**HOBART** "Simplified ARC WELDERS"

with the exclusive and original REMOTE control

"ONE OF THE WORLD'S LARGEST BUILDERS OF ARC WELDERS"

# Fair Labor Practices Committee To Hear Charges of Discrimination

PUBLIC hearings and examination of employment practices in war industries will be held in Detroit, St. Louis, Cleveland, Philadelphia and Baltimore, it was announced last week by the President's Committee on Fair Employment Practice, the operating unit in the War Manpower Commission concerned with the redressing grievances growing out of discrimination against war workers because of their race, creed, color, or national origin.

Because of insistent and increased complaints from the Detroit area, the first hearing is scheduled there in February or earlier if preparation can be completed, Lawrence W. Cramer, executive secretary of the committee, stated. The other hearings will be held at intervals of approximately six weeks.

The committee will investigate and check each of the complaints submitted to it through its field investigators and will take up the specific complaints with the industries and labor unions involved prior to the public hearing, Mr. Cramer said. It is possible that adjustments may be worked out during the course of investigations on these complaints, thus obviating the necessity of the public hearing for such concerns as take steps to correct discriminatory practices, he added.

Detroit, it was explained, represents both extremes of practice in the employment of minority groups, but at the present time the bulk of the grievances reported comes from Negro women who are being refused employment even by those firms which employ Negro men and have done so for some time. In certain cases, it is alleged that employers have agreed to employ the wives of workers inducted into the armed service, but have taken only white women and no Negro women in these circumstances.

"Last July the committee considered holding a hearing in the Detroit area, but deferred action to permit the local representatives of the War Manpower Commission to push their efforts to open employment opportunities to all women, without discriminatory barriers," Mr. Cramer explained.

"As long ago as last August, one of the largest employers of women committed himself to desist from refusing to receive applications of Negro women because of their race, but up to the present time it is frequently alleged that the same company continues its discriminatory employment practices, even though it has hired a few Negro women for token purposes."

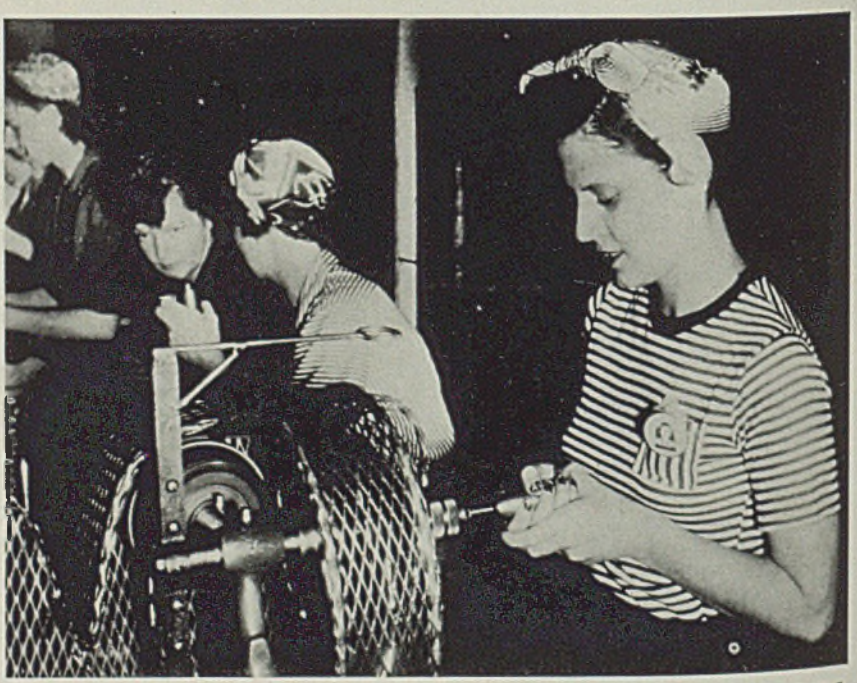
Three citizens' delegations from the Detroit area, including representatives of labor organizations, have made recent trips to Washington to submit complaints against those discriminatory practices.

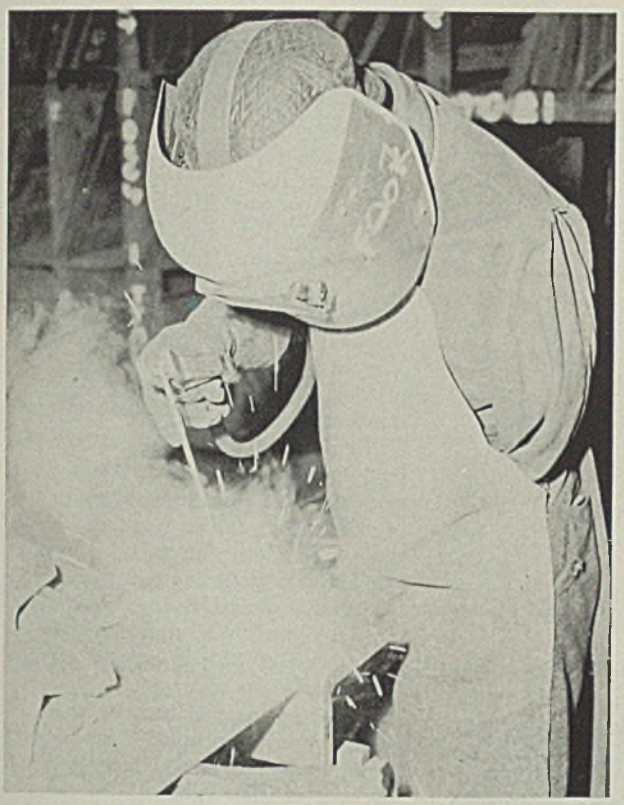
"The St. Louis-East St. Louis area is another center of war industry from which a large number of complaints have

—o—

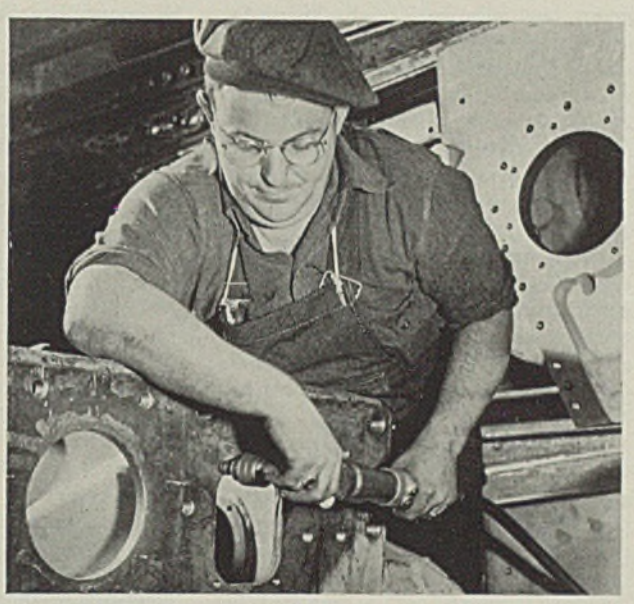
## SLACKS GIRLS, 1918 AND 1942

GIRLS taking over in industrial plants today have nothing on their sisters who served behind the machines of World War 1 when it comes to proper shop attire. Above are samples of approved 1918 styles worn by girls operating drill presses at one of General Electric's Works at that time. Below: prim, and sharply-schooled in technique of milling and threading shells, girls now are outnumbering men in shell department of Oil Well Supply Co., United States Steel Corp. subsidiary





# Physically-Handicapped Men Contribute to War Effort



*Physically handicapped men, eager to devote their energies toward winning the war, are being given opportunities in many war production plants. They are replacing men who have joined the armed forces and are releasing unhandicapped men for other jobs in war plants.*

—o—

*At left, above, Obie Bartlett, 25-year-old Negro who lost an arm when the Japs attacked Pearl Harbor, is working as a welder in the California Shipbuilding yards, Los Angeles.*

—o—

*At right, above, is Russell Thrasher who suffered an attack of infantile paralysis at the age of three and who must wear a brace on his right leg, is working daily on hand tapping, hand reaming and small air grinder burring operations at the Caterpillar Tractor Co., Peoria, Ill.*

—o—

*At left, George Clinch operates a mechanical burring tool at the Caterpillar Tractor plant despite the fact he lost his right foot 19 years ago and uses an artificial foot.*

reached the committee and where it is alleged that all efforts to date have failed to bring many of the largest holders of war contracts into line with the national policy of full utilization of manpower and of fair employment," Mr. Cramer said.

"In the Cleveland and Philadelphia area, while there is a great deal of token employment of minority groups, complainants charge that unfair practices are still being carried on in the utilization of workers according to their skill and in ungrading them in keeping with their ability to contribute the most to the productive effort."

Baltimore is similar to Detroit in that, while some employers hire their help without discrimination, several major holders of war contracts are charged with discrimination both as to hiring and upgrading according to skill, the committee observed.

## Observe Christmas as Full Holiday, WPB Chieftain Asks

Observance of Christmas as a full holiday was asked last week by Donald M. Nelson, chairman of the War Production Board. Pointing out that during the first year of the war there have been no full holidays in war production, Mr. Nelson said: "With patriotic zeal, management and workers in our mines and factories have made even such traditional holidays as Independence Day and Labor Day days of steady unbroken production. It has been necessary to do this, because of the overwhelming need to turn out munitions and essential equipment in the greatest possible volume without delays or interruption, and the country has recognized this need and has met it.

"Now we come to the Christmas holiday. I believe that this day should be the one exception to the rule which has been observed thus far.

"More than ever before in our lives I suppose, we need this year to pause from our labors on Christmas Day and think deeply and humbly about the faith by which we live, in order that from the

(*Please turn to Page* 176)

# Formula for Adjusting Prices on War Materials Contracts Proposed

EVEN at reasonable and normal prices, an unforeseen and abnormally high volume of business can so tremendously enlarge dollar earnings that profits will appear excessive when compared with a company's pre-war annual earnings. Added profits, of course, are simply the result of savings in unit overhead costs, it is pointed out by Eddy-Rucker-Nickels Co., Cambridge, Mass.

This fundamental consideration for companies asked by the government procurement agencies to renegotiate contracts is set forth by this company in a pamphlet, *Simplified Pricing Methods for Renegotiation of Government Contracts.*

In view of the growing demand for renegotiation of war contracts, the firm of management, sales and marketing counsellors recommends certain principles for companies faced with this problem. An essential background to the demand, it points out, is provided by two considerations, as follows:

"1. The existence of annual earnings far above normal peace-time earnings tends to pre-suppose unduly high prices on government contracts, and to lead to renegotiation of prices in particular instances if not as a general war-time policy;

"2. It is highly important that a firm be prepared to show clearly that its increased earnings (before taxes) are primarily traceable to unforeseeably large increases in volume—not to inflated prices or a desire to make large unit profits on war orders.

"Despite rigid adherence to the "principles of cost determination under government contracts outlined by the War Department and the Navy Department, your firm's earnings in 1941 and thus far in 1942 are far above the pre-war five-year average. Hence, in event of a demand for renegotiation of your contract prices, and in the negotiation of future prices, we think it will be helpful to be prepared to:

"First, show clearly in definite figures that earnings above your prewar annual average earnings are due to rapid and extraordinary increases in the volume of business, the extent of which could not possibly have been foreseen, and not to high prices.

"Second, provide a definite plan for reflecting the savings in unit overhead costs on larger-than-normal volume, in the form of lower prices.

"Both of these moves seem to us essential in definitely establishing the good faith and sincerity of the firm in the minds of government officials, a very important factor in effecting a fair basis for prices, past and future.

"With respect to the first move, it is desirable that we set out clearly the precise effect on earnings of increases in volume.

"Your pre-war five-year average of sales was 77 per cent of single-shift capacity. Necessarily, both costs and prices were based upon that fact. With proper segregation of variable and fixed costs, we find that your break-even point of sales at standard prices is 62 per cent of single-shift capacity. What is the significance of this fact?

"At standard prices, the total variable cost of goods sold comes to 69.8 per cent of sales values. That leaves 30.2 per cent of sales values as the "asset portion" of the sales dollar, i. e., the gross margin available for defraying factory and administrative overhead, fixed charges and other rigid costs. All such costs will just be covered at 62 per cent of capacity (the break-even sales point).

"At 77 per cent of capacity operation (normal prewar operation), annual profit before income taxes will amount to 5.8 per cent of sales values. Such earnings cannot be termed excessive.

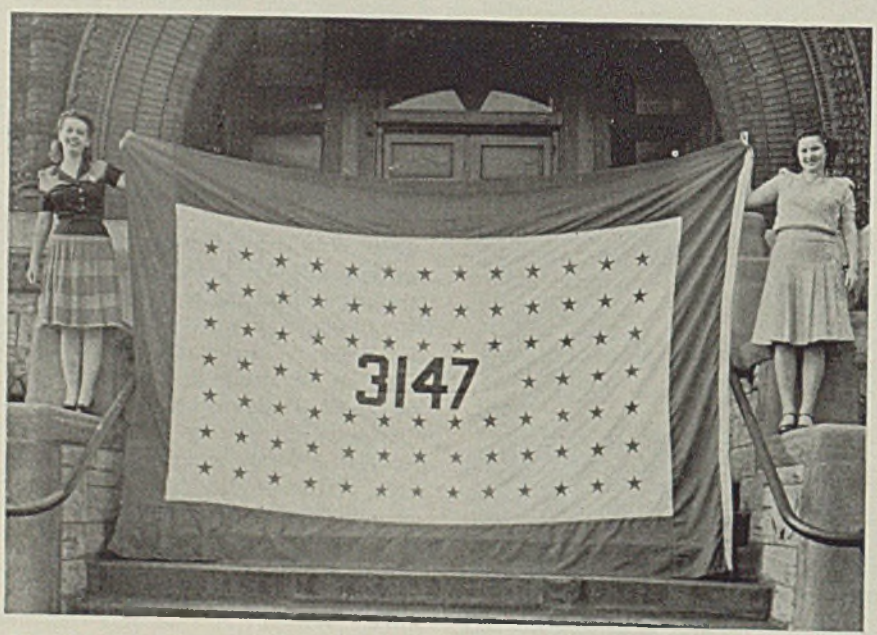
"With operations at full single-shift capacity earnings will amount to 11.4 per cent on sales values, and will be somewhat more than doubled in terms of dollar profits.

"However, operations are currently at 154 per cent of capacity. The gross margin is fairly constant at 30 per cent of sales values. The result is that profit on sales has risen to 17.9 per cent, three times the normal rate, and annual dollar earnings have soared to over 600 per cent above normal prewar earnings. This condition, more or less typical of war production plants, leads to growing pressure for contract re-negotiation.

"Nonetheless, it is an entirely natural development and is due, as in your case, wholly to the unforeseeable increases in volume above normal, and to the resulting reduction in unit overhead costs which of course have become additions to normal dollar earnings.

"It is well to establish this point in any renegotiation proceedings."

## SERVICE FLAG FOR STEELWORKERS




GIANT service flag dedicated to 3147 former employes at South Chicago Works of Carnegie-Illinois Steel Corp., who are now in the armed forces is displayed by two young women at the plant office

## Brazil's Bauxite

Brazil, with estimated reserves of 120,000,000 tons of bauxite, is fifteenth among world producers of this ore. Studies covering a large tonnage of reserves shows 60 to 65 per cent aluminum oxide. Principal supply is from the Pocos de Caldas plateau in the state of Minas Geraes, where two types of mineral are found, according to a report to the Department of Commerce.

# Need Critical Metals To Finish War Contract? Phone WPB's MRD

*BOSTON*

"SOMEWHERE in New England" a builder of submarines needed only a small quantity of bronze shafting for a conning tower mechanism. The sub was ready for launching except for that. With all normal sources of supply exhausted, the shafting was found in New Hampshire, delivered the next day, and one more of Uncle Sam's fighting craft was launched on time.

A southern Massachusetts war plant faced a stoppage in production of electrical switches urgently needed for Navy fighting craft, all for lack of 1300 pounds of brass sheets. Before the worst happened, the brass was found marking time in a New Hampshire shop. Delivery was made in three days; the Navy got its vital switches, and a layoff of war workers was averted.

A western Massachusetts ordnance plant needed only five pounds of spring temper brass rod for a vital gun-firing mechanism; and, though brass rod of the needed kind is as scarce as a downhearted Marine on Guadalcanal, it turned up in a small Connecticut warehouse.

Far up front in New England's battle of production is a small group of eight men and two girls whose motto is "Praise the Lord and pass the materials!" They are the Materials Redistribution Department of the New England regional office, War Production Board. Their job is to smash war plant bottlenecks arising from shortages of steel, copper, brass and other critical metals.

### Pattern of Jobs Is the Same

This unit is a typical one of 12 regional WPB field clearing houses that list the surplus of frozen stocks of manufacturers and then call on such inventories to fill the urgent needs of war plants which face imminent shut-downs or late deliveries for lack of relatively small amounts of metal.

In almost every case the pattern of an MRD crisis job is the same; a war plant nears the end of a job, runs smack into a shortage of only a few pounds of scarce, critical metal needed to complete a delivery or a launching, fails to locate the needed metal in all known sources of supply, and calls desperately on WPB's trouble-shooting MRD, which goes into action with files, phone calls, plant visits. In more than half the cases, they find exactly what's wanted, in the right quantity, and arrange for its transfer and sale. Frequently the search goes out of New England, and occasionally MRD is asked to carry on a search originating in some other WPB region. Here are a few more cases to illustrate this little known WPB service.

In Maine, a critical Maritime contract was filled on time solely because a patriotic New Haven manufacturer had taken the trouble to list with MRD his temporarily idle inventory of only 500 pounds of soft copper sheet which was all the Maine contractor needed. The job, by the way, was of vital importance in the battle of the Atlantic.

A New Hampshire maker of bomb hoists lacked only 20 bars of 16-foot mild steel to complete units urgently needed by the Army Air Corps. MRD found exactly the right material in a plant only 20 miles away.

MRD works closely with and for the ordnance and procurement units of the armed forces as well. For example, a Pennsylvania shipyard had an important fighting craft ready to launch but lacked only two 20-foot lengths of steel driving shaft before sending it down the ways. Even the Navy's efficient Bureau of Ships had searched the entire country without success before ringing in the Materials Redistribution unit, which located exactly what was wanted in Rhode Island and had it transferred in time to launch the vessel on schedule.

Some uncommon metals are urgently needed. A small machine shop in Connecticut, working frantically to meet Army deliveries of bomb nose mechanisms, ran "fresh out" of silver solder. MRD found the mere 25 pounds that was needed in the inventory submitted by a patriotic, war-hit Providence jewelry manufacturer.

And who would have thought that galvanized wire netting of the chicken wire variety would be on MRD's SOS list? Yet 30 rolls of it in specialized sizes had to be loaded aboard an Army transport bound for a port in Alaska soon due to be ice-locked. A week's delay would have risked nondelivery of a common but now scarce supply of something critical to our Alaska defense —chicken wire for camouflage! It was found in New England and shipped to San Francisco in time to meet the sailing date.

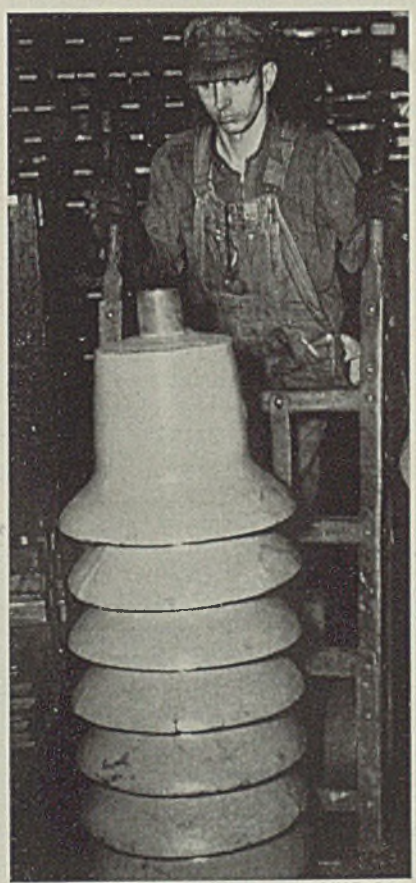
### Reaches into Nonmetals

As America's production pace steps up, and the Army-Navy requirements change swiftly with the tides and techniques of war, this trouble-shooting unit often steps out into nonmetal fields.

The staff of eight men and two girls aim first to complete as many "impossible" metal searches as they can for the greatest number of war plants; and second, to secure as many inventories of surplus, frozen or idle materials as patriotic New England firms will report to WPB's district offices.

Samuel B. Jones Jr., former New England manager of American Rolling Mill Co., who heads the MRD, says that all that's needed is a telephone call to your nearest WPB office, advising what critical metals—steel, brass, copper, etc.—you now have idle whether because it's surplus stock, or frozen. No

## STEEL LOCOMOTIVE BELLS



STEEL bells weighing only 55 pounds each are replacing 131-pound brass bells used on Erie railroad locomotives. Larger but much thinner than its brass predecessor, the steel bell consists of a die-forged top piece and sheet metal skirt, welded and then pressed into shape. Trainmen are said to prefer the new bell because it is easier on their ears

forms or formalities are needed and Priority Regulation No. 13 simplifies and expedites the sale or transfer. By the same token, distressed war plants that have exhausted all other supply sources, should call on MRD for this service.

Since August, MRD had moved 1375 tons of critical metals, most of it varied, small-quantity stuff, processed and semi-processed. More than 600 "life-saving" transfers were involved, which is all the more remarkable when you know that the wanted metals are virtually on the "impossible" list, and that MRD is the last lingering hope of those who call upon it.

Mr. Jones points to two departmental slogans on tiny colorful posters affixed to his desk lamp. They read, "Save our soldiers—sell your steel!" and "Send your steel to WAR—or there won't be any PEACE!"

# New Restrictions Imposed on Use of Zinc in Civilian Products

AMERICA'S critical shortage of zinc has led to further curtailment of less essential uses in order to make more of the metal available for ammunition and other war products. Conservation Order M-11-b, as amended, issued by the Director General for Operations, further restricts use of zinc for manufacture of a variety of automobile parts, building materials, and industrial materials.

Health supplies, various precision instruments, and dies—all having been found necessary to war industry—are placed in the nonrestricted class by this amendment, and may be made with zinc. Prohibition on use of zinc in stoker repair and maintenance parts is eased to permit use of 50 per cent of the amount used in 1941 instead of being forbidden entirely. Likewise, restriction on use of zinc in functional and mechanical items for gasoline and diesel engines is eased.

The new restrictions on plating and protective coating (which includes galvanizing) says that no items on list "A" or "A-1" of the order may be made of metal coated with zinc, and that none of the scores of items on the lists may be coated with zinc. Paint is excepted. For all items not included on the lists, made for civilian purposes, not more zinc may be used than 75 per cent of prime western or 50 per cent of any other grade of the zinc used by any person in the corresponding calendar quarter of 1941.

A special reduction is made on use of zinc in automotive and tractor carburetors and fuel pumps for repair and maintenance purposes to one-half the amount used in 1942.

Among the products in which use of zinc is forbidden entirely by the new order are locking devices for auto wheels, tires, and gasoline tanks; barrel and drum plugs; a variety of building materials; and paper product dispensing machines not previously covered.

The new prohibitions on these items were ordered to take effect Nov. 30.

This tighter conservation of zinc is required because the supply is not great enough to meet essential needs. The metal is used in large quantities in cartridge brass, ship propellers, guns and tanks, and in a wide variety of essential military items. Shortage of the metal is partially attributable to labor shortage in the western mines, and partly to the development of military demands enormously greater than our accustomed production and consumption of zinc.

## Survey Shows Substantial Frozen Stainless Stocks

Early returns from the first product program covering all stainless steel inventories mailed recently by Steel Recovery Corp., Pittsburgh, show a substantial volume of stainless steel will be made available from frozen stocks.

The second product program to get under way will cover structural steel, and it is expected this will be mailed soon to companies reporting on Form 1663 that they hold some inventory of structural steel. In addition, a selected list of 10,000 plants known to have substantial inventories of various steel products will shortly receive questionnaires on the balance of the product list covering all 15 product programs.

Officials of Steel Recovery Corp. stress the fact that any steel over and above a 90-day supply is considered excess inventory, whether it is covered by war orders now on the books or not. This applies not only to raw steel but to all steel, whether fabricated or not.

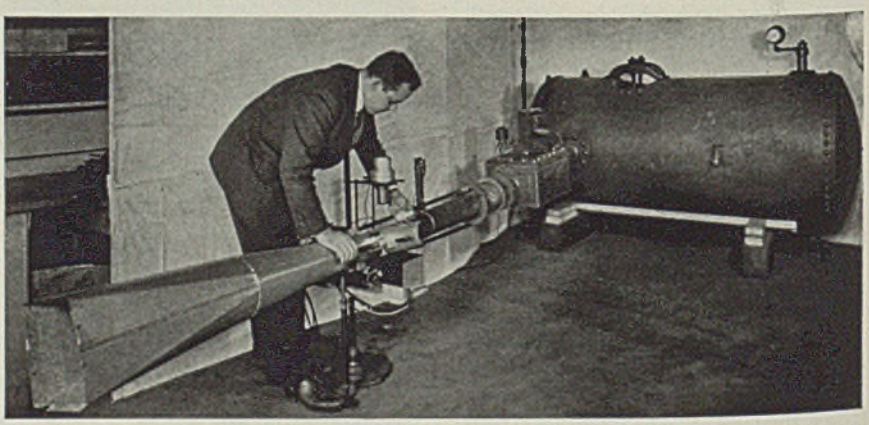
## Tungsten Supplies Placed Under Allocation Control

All supplies of tungsten wire, rod, sheet and powder have been placed under complete allocation control.

Formerly, unrestricted deliveries of up to 25 pounds of contained tungsten monthly were permitted. To further conserve the supply of the metal, this permission has been made inapplicable to the tungsten products mentioned above.

Tungsten is used principally in high-speed tool steels to impart hardness and toughness. Control over supply was first established in March, 1941.

## MEASURES FUSE ACTION OF FALLING BOMBS



SPEED of a bomb falling is simulated in testing bomb fuses at the East Springfield works of Westinghouse Electric & Mfg. Co. This operator is inserting a fuse in the constricted part of the tunnel, operated by compressed air to give an average wind velocity of 500 miles an hour. Tests at this velocity reveal the fuse action that takes place during actual bombing raids. Air in the tunnel is controlled by a reducing nozzle, is started and stopped by a quick-acting valve. An automatic timer measures the duration of the air flow and a pressure gage indicates pressure before and after operation

# Steel Mills Using Household Scrap Rapidly as Possible, Says Wolcott

SCRAP iron and steel collected in the recent salvage drives is being consumed by steel mills as rapidly as conditions permit, R. W. Wolcott, chairman of the American Industries Salvage Committee, and president, Lukens Steel Co., Coatesville, Pa., stated last week "in reply to charges that steel mills had virtually ceased to purchase the grades of scrap accumulated during the scrap drive."

"During the scrap drive," he said, "it was clearly stated that the problem was to collect the scrap before winter weather would make scrap collections difficult if not impossible. The immediate use of all scrap thus collected was neither contemplated nor possible.

"The household scrap as yet unconsumed represents what might be called a blood bank. Steel mills can draw upon it—and are consistently doing so—to augment the available flow of higher grade scrap.

"Because of its heterogeneous character, however, household scrap cannot be used to make steel for ordnance, armor, or any other steels which must be produced to exacting specifications. Even in making ordinary steels, household scrap must be used with extreme caution, and cannot represent more than a small proportion of the furnace charge.

"For these reasons, household scrap must be carefully prepared before it is suitable for steel plant use.

"Scrap dealers have strongly maintained the position that the sorting and grading of scrap is their own function. They have always objected to steel plants installing the necessary equipment to perform these operatio s themselves. Consequently, today the great majority of steel plants are not equipped to receive shipments direct from the salvage piles.

"In view of the apparent inability of the scrap yards to sort and grade the large tonnages of miscellaneous scrap now coming out, I intend to suggest to scrap committee of the steel industry at an early meeting that they investigate the possibility of equipping themselves for sorting, cutting up and grading scrap to help relieve what seems to be a bottleneck.

"Although some carloads of household scrap shipped to steel plants have had to be rejected, the number of rejections has not been excessive. The rejections have been caused mainly, if not entirely, because the scrap was not adequately prepared in accordance with government regulations. To have accepted ill-prepared scrap would have exposed the steel plants to public censure by the government, and possible court action.

"Furthermore, in a few instances, steel plants have contracted with dealers to accept quantities of household scrap, only to receive word from the War Production Board that they had been allocated enough scrap for their current needs, sometimes from the same dealers with whom the orders for household scrap had been placed.

"Under these circumstances, cancellation of the contracts for household scrap to the extent of the duplication caused by the allocations have necessarily followed.

"I have found no disposition on the part of steel companies in the East or elsewhere in the country to refuse to purchase and use household scrap as rapidly as conditions permit. As a steelmaker producing large tonnages of plates for the Navy program and other war uses, I want to express my deepest appreciation for the great amount of scrap contributed by householders all over the country in response to the appeal by the steel industry. This scrap is now serving the war effort in the best possible way—as a blood bank from which transfusions can be made as required to maintain our production of essential war materials."

## Steelmakers "Choosey", Scrap Institute President Charges

Steel mills which a few weeks ago were urging the public to donate scrap to the various salvage drives are now, in many instances, so comfortable in regard to supplies that they have become extremely "choosey," with the result that scrap dealers may be left "holding the bag," E. C. Barringer, president and executive secretary of the Institute of Scrap Iron and Steel Inc., Washington, said last week.

"A leading steel mill of eastern Pennsylvania has canceled some contracts for scrap with New York, New Jersey and New England dealers. Other mills in this area have suspended all shipments or have refused offers of tonnage or are taking advantage of technicalities in the OPA schedule to reject the kind of material they were accepting a month ago

"In small towns in the Middle West, notably Indiana and Ohio, dealers have been penalized $2.50 per ton because they have been attempting to market the lighter grades of salvage drive scrap with their heavier material, the alternative being to hold drive scrap in their yards indefinitely.

"Similar penalties have been imposed by some consumers upon scrap bundlers because the latter, short of labor, have not been able to hand-pick drive scrap.

"The net effect of these policies by certain steel mills and blast furnaces, as they feel more secure, is to discriminate against salvage drive scrap which the public generously donated," Mr. Barringer continued.

"Dealers realize that drive scrap is light and inferior and that steel mills must use it in small proportions with the preferred heavy grades, but the noncooperative attitude of these consumers is in sharp contrast to the spirit manifested by the public, the newspapers and the dealers.

"Salvage scrap is much more difficult to prepare than the ordinary run of material. Because of its nature, practically every piece must be sorted separately. Although confronted with a manpower problem, dealers have been pressed by the government to handle this material rapidly. They have no choice in the material coming to their yards.

"Although more industrial and general scrap is coming out and the flow of preferred grades has increased, it is not yet safe for mills to assume they are out of the woods so far as the supply of scrap is concerned.

"Cold weather which handicaps transportation and scrap yard operations can transform a long position to a short one speedily.

"Some dealers have lost up to $300 per car by the rejection of materials which the mills were hungry for a month ago."

## "Urgency Will Increase," Say WPB Officials

Statements concerning the inventory situation in scrap dealers' yards are being investigated by the government, it was stated last week by Lessing J. Rosenwald, director, Conservation Division, and H. G. Batcheller, director, Steel Division, WPB.

In the meantime, they added the urgency for iron and steel scrap and the difficulties of collecting it will be increasing and the wholehearted co-operation which has been accorded the government by the people in scrap collection must be continued.

Government stockpiles will be established if the time comes when scrap

dealers cannot handle the flow of salvage materials to the mills, these men declared. These stockpiles would be "insurance" against any scrap shortage which might develop.

Despite statements steel mills are "rest-easy" and that scrap dealers are overstocked, "the fact remains most of the nonrecurring scrap has gone into armament shipped abroad."

Consequently, the problem of getting required iron and steel scrap for next year's production will entail a deeper penetration than ever of the dormant scrap resources of industry, of the farm and of the heavier household metals.

"Current mill inventories of scrap are not large enough to satisfy probable future demands, and the situation could easily become acute again in less than a week," it was stated.

## September Scrap Stocks Up Five Per Cent Over August

Domestic iron and steel scrap stocks at consumers', suppliers' and producers' plants at the end of September were about 5,545,000 gross tons, an increase of 5 per cent over the 5,279,000 tons held Aug. 31, according to the Bureau of Mines. The larger tonnage was caused by 4 per cent larger consumer stocks and 8 per cent gain in supplier and producer stocks. Most of the increase was due to 5 per cent larger reserves of purchased and 4 per cent greater home scrap.

Consumption of scrap in September totaled 4,424,000 tons, a decline of 1 per cent from 4,478,000 tons used in August, and at an annual rate only slightly greater than in 1941.

## Pennsylvania Railroad Plan Saves Much Critical Material

Pennsylvania railroad is making large savings in steel, copper, tin, aluminum, rubber and other materials critically needed in the war effort. A plan started in 1940 has been expanded to cover all critical materials. Use of aluminum has been entirely eliminated, releasing for war industry in 1942 about 100,000 pounds, on the basis of the preceding year. Use of tin has been reduced from an average of 60,500 pounds to 14,000 pounds per month.

Substitute materials are being used largely in place of those needed for war production. Designs and specifications are being changed to permit use of non-alloy steels and many parts formerly cast now are being stamped from steel sheets. Worn parts are being built up by spraying a new metal surface or reforging. Scrap locomotive and car axles are rolled into billets from which many new parts are made. Recoverable parts of steel sides and floors of hopper and gondola cars are saved and cut into gusset plates, brackets and other parts. Battered ends of rails are cut off or built up by welding.

Tin is conserved by using bearing alloys not containing that metal and the tin content of solder has been reduced. Cast iron is replacing copper in many uses in passenger cars, from window curtain fittings to floor plate castings.

Net result of the program is added expense, which the road considers its contribution to the war effort.

## Auto Graveyards' Stocks of Jallopies Now Only 277,234

Replenishing of the country's automobile graveyards by autos which no longer supply transportation or cannot be fitted into the transportation system was urged last week by Merrill Stubbs, chief, Scrap Processors Branch, Conservation Division, WPB.

Auto graveyards, after converting 4,000,000 cars into scrap since Feb. 1, now have an inventory of only 277,234 cars. This conversion is at a rate substantially in excess of the rate of production of cars in 1929, the best manufacturing year, when 4,587,400 passenger cars were manufactured.

"Scrap from autos during the past nine months," Mr. Stubbs said, "has been responsible for 10 per cent to 15 per cent of the country's steel production."

---

Erection of a new alluminum plant in Australia, costing £750,000 is reported to the Department of Commerce. It is to be built by the Australian government to meet munitions and aircraft requirements.

## PROFIT OF 84 STEEL USERS DOWN 21 PER CENT

NET profit earned by 84 iron and steel consumers in the first nine months of 1942 totaled $178,092,878. This was nearly 21 per cent less than combined total of $225,200,699 reported by same companies in comparable period last year. The group's combined net income in the third quarter was $68,441,251, compared with $72,705,189 in 1941, a decrease of about 6 per cent.

Accompanying tabulation summarizes earnings statements of 33 consumers. Prior compilation, including 51 companies, appeared in STEEL, Nov. 16, p. 74.

| | Third Quarter 1942 | Third Quarter 1941 | Nine Months 1942 | Nine Months 1941 |
|---|---|---|---|---|
| Air Reduction Co. Inc., New York | $ 2,176,013 | $ 1,897,045 | $ 4,994,436 | $ 5,234,801 |
| American Bosch Corp., Springfield, Mass. | 377,804 | 244,708 | 581,328 | 633,931 |
| Briggs & Stratton Corp., Chicago | 547,585 | 308,007 | 1,079,163 | 959,094 |
| Borg-Warner Corp., Chicago | 2,075,738 | 1,038,870 | 6,062,104 | 6,350,930 |
| Campbell Wyant & Cannon Foundry Co., Muskegon, Mich. | 473,961 | 133,551 | 1,125,730 | 537,694 |
| Caterpillar Tractor Co., Peoria, Ill. | 1,807,215 | 1,575,156 | 4,275,868 | 5,873,696 |
| Electrolux Corp., New York | 8,366 | 453,838 | 254,049 | 1,347,260 |
| Florence Stove Co., Gardner, Mass. | 208,690 | 408,694 | 652,304 | 972,728 |
| Gabriel Co., Cleveland | 82,596 | 71,361 | 229,092 | 116,022 |
| General American Transportation Corp., Chicago | 1,148,003 | 898,392 | 2,403,551 | 3,304,683 |
| General Cable Corp., New York | 429,679 | 773,984 | 1,797,302 | 2,829,207 |
| General Time Instruments Corp., New York | 273,714† | 408,546† | 528,147* | 1,027,004§ |
| Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. | 349,245 | 220,142 | 846,287 | 548,191 |
| Holland Furnace Co., Holland, Mich. | 592,917 | 705,151 | 701,447 | 1,170,154 |
| Mack Trucks Inc., Long Island City, N. Y. | 539,658 | 1,207,810 | 1,812,462 | 2,715,967 |
| Maytag Co., Newton, Iowa | 320,137 | 512,203 | 424,041 | 1,368,593 |
| Midland Steel Products Co., Cleveland | 236,710 | 380,279 | 621,852 | 1,357,549 |
| Otis Elevator Co., New York | 662,081 | 402,529 | 2,237,588 | 1,892,948 |
| Pullman Inc., Wilmington, Del. | 2,975,485 | 2,171,916 | 12,352,407 | 7,853,401 |
| Reo Motors Inc., Lansing, Mich. | 400,857 | 237,176 | 810,115 | 385,170 |
| Richmond Radiator Co., Uniontown, Pa. | 7,676** | 23,144 | 34,695 | 134,485 |
| Simonds Saw & Steel Co., Fitchburg, Mass. | 446,219 | 799,012 | 1,179,633 | 1,987,716 |
| Stewart-Warner Corp., Chicago | 373,943 | 599,839 | 1,141,069 | 1,370,111 |
| Studebaker Corp., South Bend, Ind. | 376,868 | 702,303 | 1,279,697 | 2,016,180 |
| Square D Co., Detroit | 797,256 | 858,530 | 1,564,577 | 2,255,876 |
| Symington-Gould Corp., Rochester, N. Y. | 419,520 | 255,781 | 741,892 | 726,165 |
| TelAutograph Corp., New York | 35,383 | 34,249 | 97,035 | 79,057 |
| Twin Coach Co., Kent, O. | 144,082 | 128,013 | 522,235 | 511,326 |
| Van Norman Machine Tool Co., Springfield, Mass. | 331,109 | 109,118 | 650,622 | 595,223 |
| Walworth Co., New York | 828,315 | 402,000 | 1,428,760 | 1,311,820 |
| Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. | 2,884,027 | 4,291,851 | 9,615,728 | 15,860,252 |
| Yale & Towne Mfg. Co., Philadelphia | 272,017 | 138,759 | 844,608 | 1,095,753 |
| Yellow Truck & Coach Mfg. Co., Pontiac, Mich. | 1,611,553 | 2,714,959 | 4,258,347 | 6,615,282 |

**—Loss; †—17 weeks; ‡—16 weeks; *—41 weeks; §—40 weeks.

# Tooling Up Period Is Nearing Completion

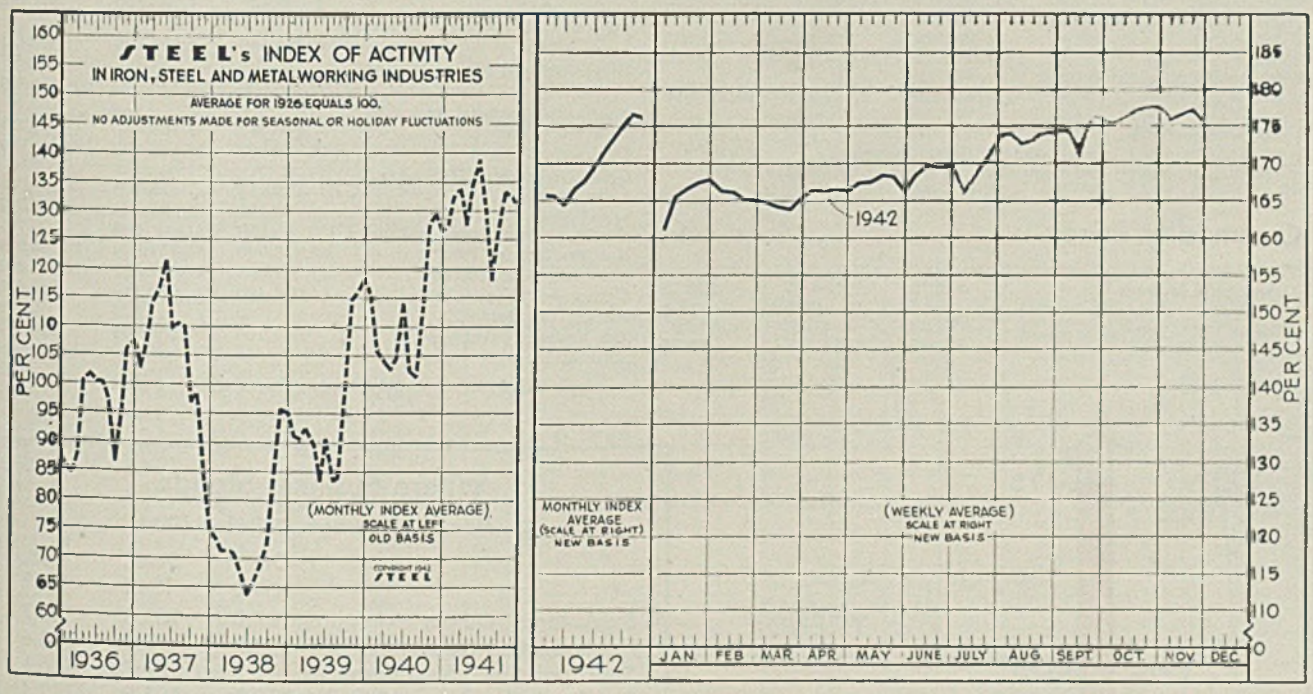
TOOLING up phase of our industrial war production effort appears to be nearing completion. Machine tool deliveries, currently estimated at about $130,000,000 monthly, are outstripping incoming orders. The war building program also is approaching estimated requirements, as indicated by the declining trend in fabricated structural steel shipments the past three months. Emphasis will be more upon production of materials for war.

Preliminary average of STEEL's weekly index of activity for November is 176.1. This represents a decline of 0.8 point from the October average of 176.9, the highest level recorded by the index on a monthly average basis. During the week ended Nov. 28 the index also declined, reflecting curtailment in electric power consumption, steel ingot production and revenue freight carloadings. For the latest week the index stood at 175.3, off 2 points from that recorded in the week ended Nov. 21.

The national steel rate eased one-half point in the week ended Nov. 28, but still exceeds the 95 per cent rate registered in the comparable week a year ago. Fluctuation in steelmaking operations over the past few weeks is due almost entirely to need for furnace repairs. Steel producers are confident that the scrap supply situation has improved to the point where present practical capacity operations can be maintained throughout winter months. A number of hold-ups and cancellations, which the army has issued to some war contractors in recent weeks, is reflected in the tapering of new steel orders booked by producers.

Revenue freight carloadings is estimated to have declined seasonally during the latest period to about 794,000 cars. In the comparable week last year, 866,189 cars were loaded. The highest total recorded this year in freight traffic amounted to 909,957 cars during the week ended Oct. 10.

Electric power consumption during the latest period




*STEEL's index of activity declined 2 points to 175.3 in the week ending Nov. 28:*

| Week Ended | 1942 | 1941 |
|---|---|---|
| Sept. 26 | 176.0 | 132.0 |
| Oct. 3 | 175.5 | 132.7 |
| Oct. 10 | 176.5 | 132.3 |
| Oct. 17 | 176.9 | 133.4 |
| Oct. 24 | 177.7 | 133.5 |
| Oct. 31 | 177.8 | 133.8 |
| Nov. 7 | 175.6 | 134.4 |
| Nov. 14 | 176.2 | 133.8 |
| Nov. 21 | 177.3 | 128.4 |
| Nov. 28 | 175.3† | 132.2 |

† Preliminary.

| Mo. Data | 1942 | 1941 | 1940 | 1939 | 1938 | 1937 | 1936 | 1935 | 1934 | 1933 | 1932 | 1931 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan. | 165.7 | 127.3 | 114.7 | 91.1 | 73.3 | 102.9 | 85.9 | 74.2 | 58.6 | 48.6 | 54.6 | 69.1 |
| Feb. | 165.6 | 132.3 | 105.8 | 90.8 | 71.1 | 106.3 | 84.3 | 82.0 | 73.9 | 48.2 | 55.3 | 75.5 |
| March | 164.6 | 133.9 | 104.1 | 92.6 | 71.2 | 114.4 | 87.7 | 83.1 | 78.9 | 44.5 | 54.2 | 80.4 |
| April | 166.7 | 127.2 | 102.7 | 89.8 | 70.8 | 116.6 | 100.8 | 85.0 | 83.6 | 52.4 | 52.8 | 81.0 |
| May | 167.7 | 134.8 | 104.6 | 83.4 | 67.4 | 121.7 | 101.8 | 81.8 | 83.7 | 63.3 | 54.8 | 78.6 |
| June | 169.4 | 138.7 | 114.1 | 90.9 | 63.4 | 109.9 | 100.3 | 77.4 | 80.6 | 70.3 | 51.4 | 72.1 |
| July | 171.0 | 128.7 | 102.4 | 83.3 | 66.2 | 110.4 | 100.1 | 75.3 | 63.7 | 77.1 | 47.1 | 67.3 |
| Aug. | 173.5 | 118.1 | 101.1 | 83.9 | 68.7 | 110.0 | 97.1 | 76.7 | 63.0 | 74.1 | 45.0 | 67.4 |
| Sept. | 174.8 | 126.4 | 113.5 | 98.0 | 72.5 | 96.8 | 86.7 | 69.7 | 56.9 | 68.0 | 46.5 | 64.3 |
| Oct. | 176.9 | 133.1 | 127.8 | 114.9 | 83.6 | 98.1 | 94.8 | 77.0 | 56.4 | 63.1 | 48.4 | 59.2 |
| Nov. | 176.1† | 132.2 | 129.5 | 116.2 | 95.9 | 84.1 | 106.4 | 88.1 | 54.9 | 52.8 | 47.5 | 54.4 |
| Dec. | .... | 130.2 | 126.3 | 118.9 | 93.1 | 74.7 | 107.6 | 88.2 | 58.9 | 54.0 | 46.2 | 51.3 |

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

totaled 3,766,381,000 kilowatts. This represents a moderate decline from the all-time record established in the preceding week, but still exceeds that reported in the like period of 1941 by 12.8 per cent.

The Foundry Equipment Manufacturers Association's index of new orders advanced during October to 540.6, compared with 446.4 in the preceding month and 403.8 in October, 1941.

Iron and steel scrap consumption broke all monthly records during October, the Institute of Scrap Iron and Steel Inc. reports. October consumption of home and purchased scrap was placed at 4,883,000 gross tons, compared with 4,556,000 in September, and 4,857,000 in May, 1942, the previous record. Scrap consumption in the first ten months this year aggregated 46,527,000 tons. Based on current rate of consumption it is probable that the 1941 record of 54,000,000 tons will be surpassed this year by at least 1,500,000 tons.

# BUSINESS BAROMETER

## Financial Indicators

| | Oct., 1942 | Sept., 1942 | Oct., 1941 |
|---|---|---|---|
| 30 Industrial Stocks† | 113.51 | 107.41 | 121.18 |
| 20 Rail Stocks† | 28.65 | 26.76 | 28.54 |
| 15 Utilities† | 13.35 | 11.76 | 17.65 |
| Average Price of all listed bonds (N.Y.S.E.) | $96.48 | $96.18 | $95.25 |
| Bank Clearings daily average (000 omitted) | $1,274,455 | $1,245,176 | $1,217,558 |
| Commercial Paper, interest rate (4-6 months) | 0.69 | 0.69 | 0.69 |
| Com'l loans (000 omitted)* | $10,320,000 | $10,361,000 | $11,203,000 |
| Federal Reserve ratio (per cent) | 81.5 | 85.6 | 91.0 |
| Capital flotations (000 omitted)‡ | | | |
| New Capital | $45,085,000 | $103,072,000 | $64,840,000 |
| Refunding | $55,893,000 | $58,573,000 | $209,122,000 |
| Federal gross debt, (millions of dollars) | $92,904 | $86,483 | $53,608 |
| Railroad earnings‡ | $154,631,717 | $135,264,075 | $104,357,836 |
| Stock sales, New York Stock Exchange | 15,932,595 | 9,449,934 | 13,151,616 |

†Dow Jones series.
*Leading member banks Federal Reserve System.
‡September, August and September respectively.

## Commodity Prices

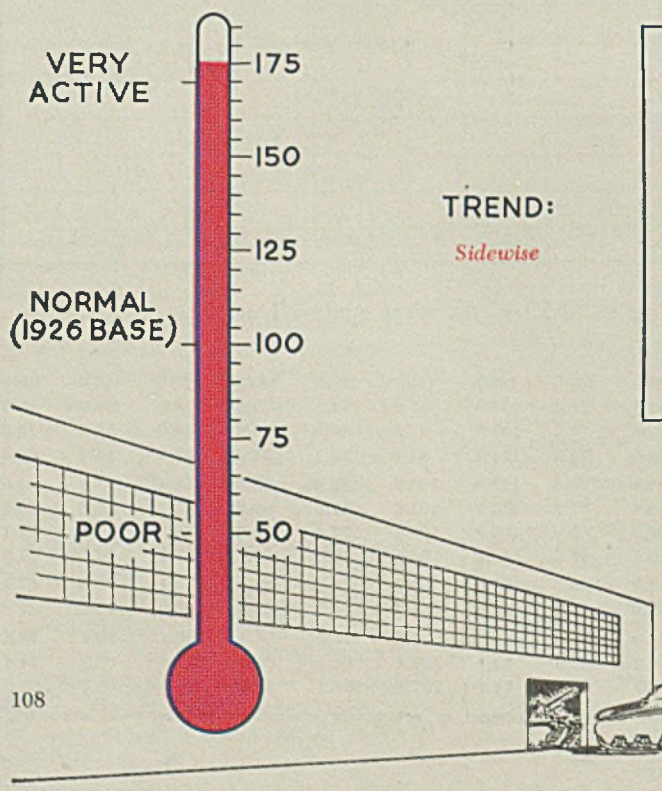
| | | | |
|---|---|---|---|
| STEEL's composite finished steel price average | $56.73 | $56.73 | $56.73 |
| U. S. Bureau of Labor's index | 99.7* | 99.6 | 92.4 |
| Wheat, cash (bushel) | $1.32 | $1.36 | $1.105 |
| Corn, cash (bushel) | $1.065 | $1.125 | $0.75 |

*Preliminary.

## Industrial Indicators

| | Oct., 1942 | Sept., 1942 | Oct., 1941 |
|---|---|---|---|
| Munitions Output Index (WPB)† | 381 | 357 | 83 |
| Commerce Dept.'s Mfgs. Index† | | | |
| Orders | 277.0 | 233.0 | 202.0 |
| Shipments | 224.0 | 212.0 | 185.0 |
| Inventories | 175.3 | 175.0 | 143.4 |
| Iron and Steel Scrap consumption (tons) | 4,883,000 | 4,556,000 | 4,649,000 |
| Gear Sales Index | 263 | 351 | 261 |
| Foundry equipment new order index | 540.6 | 446.4 | 403.8 |
| Machine Tool Output‡ | $120,118,000 | $117,343,000 | $68,400,000 |
| Finished steel shipments (Net tons) | 1,787,501 | 1,703,570 | 1,851,279 |
| Ingot output (average weekly; net tons) | 1,712,159 | 1,651,188 | 1,633,424 |
| Dodge bldg. awards in 37 states ($ Valuation) | $780,396,000 | $723,216,000 | $606,349,000 |
| Fabricated structural steel shipments (Tons) | 146,648 | 169,837 | 217,738 |
| Coal output, tons† | 48,780,000 | 47,160,000 | 47,505,000 |
| Coke Production (Daily Ave.) | | | |
| By-product | 172,211 | 172,110 | 160,500 |
| Beehive | 23,156 | 23,106 | 20,900 |
| Business failures number† | 556 | 698 | 735 |
| Business failures liabilities† | $5,473,000 | $6,781,000 | $9,393,000 |
| Cement production, bbls.† | 17,527,000 | 17,605,000 | 16,115,000 |
| Cotton consumption, bales | 972,490 | 966,149 | 955,657 |
| Freight Car Awards | 0 | 1,863 | 2,499 |
| Car loadings (weekly av.) | 901,109 | 882,253 | 914,000 |

‡September, August and September respectively.

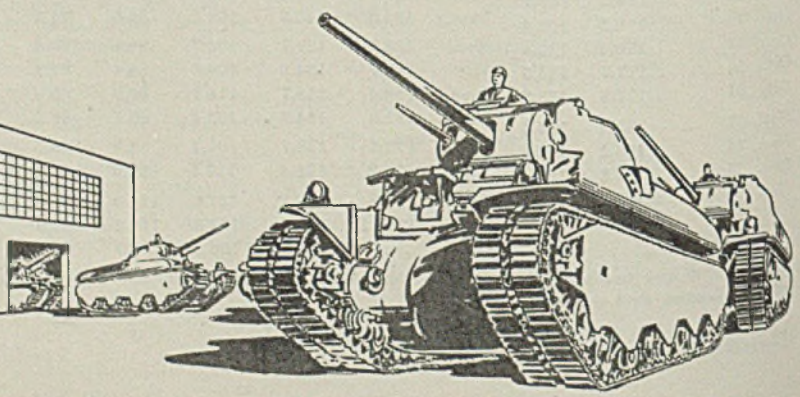



## Where Business Stands

Monthly Averages, 1941=100

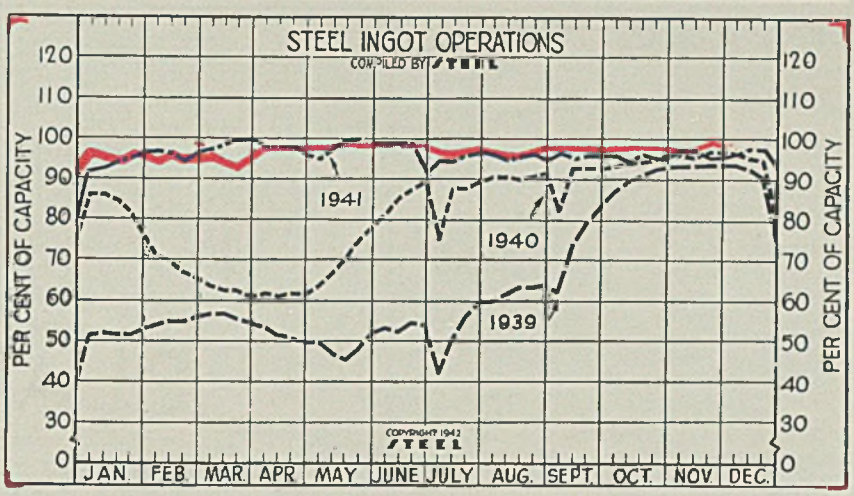
| | Oct., 1942 | Sept., 1942 | Oct., 1941 |
|---|---|---|---|
| Steel Ingot Output | 107.7 | 103.8 | 102.7 |
| Finished Steel Shipments | 104.9 | 99.9 | 108.6 |
| Structural Steel Shipments | 78.2 | 87.7 | 116.1 |
| Freight Carloadings | 110.8 | 108.5 | 112.4 |
| Building Construction | 155.9 | 144.5 | 121.1 |
| Wholesale Prices | 114.2* | 114.1 | 105.8 |

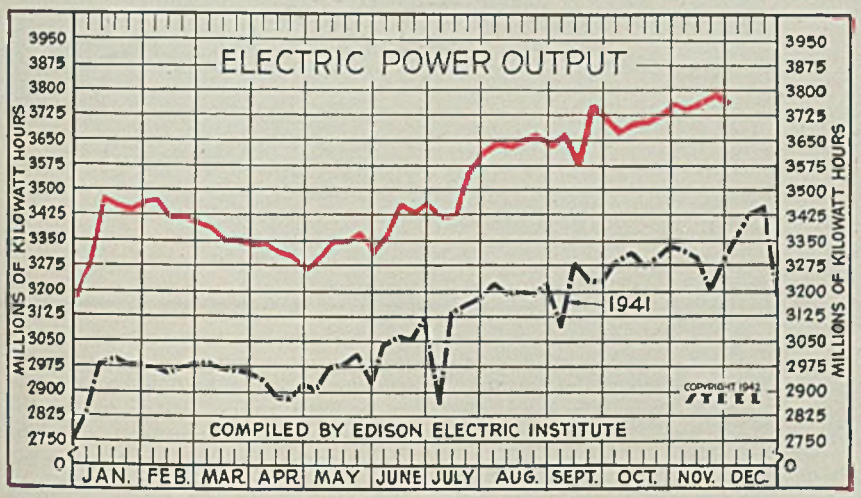
*Preliminary.



### Steel Ingot Operations
(Per Cent)

| Week ended | 1942 | 1941 | 1940 | 1939 |
|---|---|---|---|---|
| Nov. 28 | 99.0 | 95.0 | 97.0 | 93.5 |
| Nov. 21 | 99.5 | 95.5 | 97.0 | 93.5 |
| Nov. 14 | 99.0 | 97.0 | 96.0 | 93.5 |
| Nov. 7 | 98.5 | 97.5 | 96.5 | 93.0 |
| Oct. 31 | 99.0 | 95.5 | 96.5 | 93.0 |
| Oct. 24 | 99.0 | 95.5 | 95.5 | 92.0 |
| Oct. 17 | 99.0 | 96.5 | 95.0 | 91.0 |
| Oct. 10 | 98.5 | 94.5 | 94.5 | 89.5 |
| Oct. 3 | 98.0 | 96.0 | 93.5 | 87.5 |
| Sept. 26 | 98.0 | 96.0 | 93.0 | 84.0 |
| Sept. 19 | 98.0 | 96.0 | 93.0 | 79.5 |
| Sept. 12 | 98.0 | 96.5 | 93.0 | 74.0 |
| Sept. 5 | 98.0 | 95.5 | 82.0 | 62.0 |
| Aug. 29 | 98.0 | 96.5 | 91.5 | 64.0 |
| Aug. 22 | 97.5 | 96.0 | 90.5 | 63.5 |
| Aug. 15 | 97.0 | 95.5 | 90.0 | 63.5 |
| Aug. 8 | 97.5 | 96.5 | 90.5 | 62.0 |



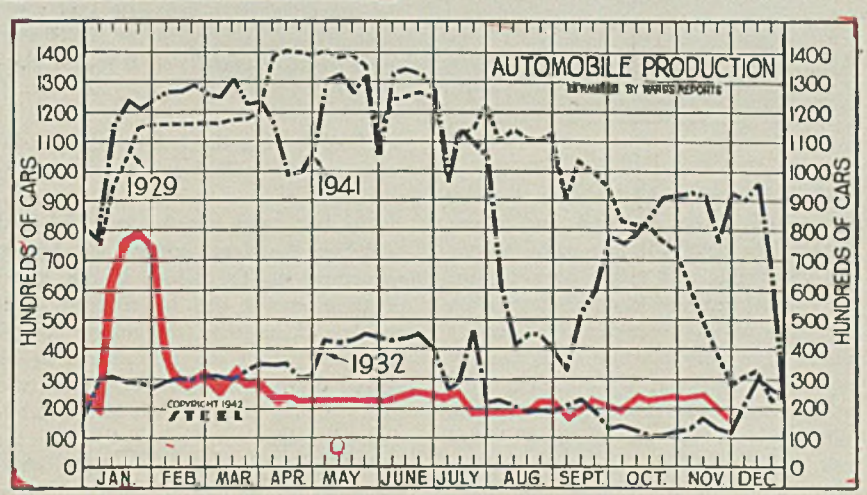

### Electric Power Output
(Million KWH)

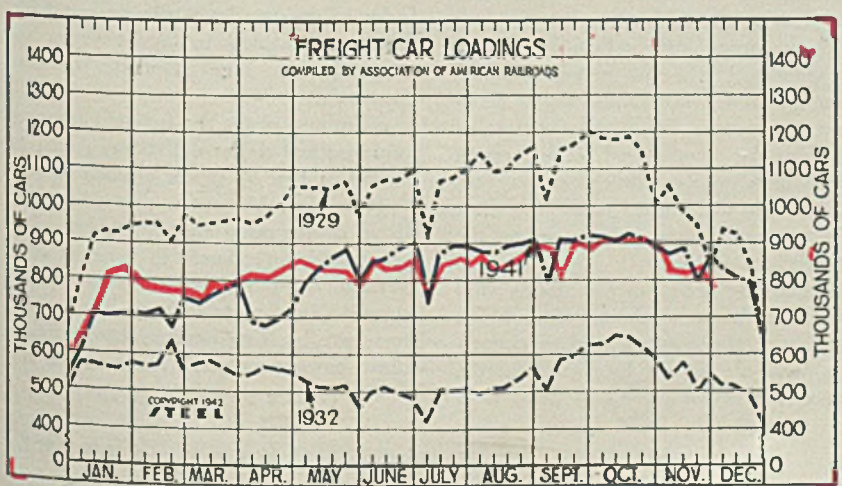
| Week ended | 1942 | 1941 | 1940 | 1939 |
|---|---|---|---|---|
| Nov. 28 | 3,766 | 3,295 | 2,932 | 2,605 |
| Nov. 21 | 3,795 | 3,205 | 2,839 | 2,561 |
| Nov. 14 | 3,776 | 3,305 | 2,890 | 2,587 |
| Nov. 7 | 3,762 | 3,326 | 2,858 | 2,589 |
| Oct. 31 | 3,775 | 3,339 | 2,882 | 2,609 |
| Oct. 24 | 3,753 | 3,299 | 2,867 | 2,622 |
| Oct. 17 | 3,717 | 3,273 | 2,838 | 2,576 |
| Oct. 10 | 3,702 | 3,315 | 2,817 | 2,583 |
| Oct. 3 | 3,683 | 3,290 | 2,792 | 2,554 |
| Sept. 26 | 3,720 | 3,233 | 2,816 | 2,559 |
| Sept. 19 | 3,757 | 3,232 | 2,769 | 2,538 |
| Sept. 12 | 3,571 | 3,281 | 2,773 | 2,532 |
| Sept. 5 | 3,673 | 3,096 | 2,592 | 2,376 |
| Aug. 29 | 3,640 | 3,224 | 2,736 | 2,442 |
| Aug. 22 | 3,674 | 3,193 | 2,714 | 2,434 |
| Aug. 15 | 3,655 | 3,201 | 2,746 | 2,454 |

### Auto Production
(1000 Units)

| Week ended | 1942 | 1941 | 1940 | 1939 |
|---|---|---|---|---|
| Nov. 28 | 14.6 | 93.5 | 128.8 | 72.5 |
| Nov. 21 | 18.3 | 76.8 | 102.3 | 72.5 |
| Nov. 14 | 20.2 | 93.0 | 121.9 | 86.7 |
| Nov. 7 | 20.2 | 93.6 | 120.9 | 86.2 |
| Oct. 31 | 20.9 | 92.9 | 118.1 | 82.7 |
| Oct. 24 | 20.8 | 91.9 | 117.1 | 78.2 |
| Oct. 17 | 20.2 | 85.6 | 114.7 | 70.1 |
| Oct. 10 | 20.3 | 79.1 | 108.0 | 75.9 |
| Oct. 3 | 19.9 | 76.8 | 105.2 | 76.1 |
| Sept. 26 | 20.9 | 78.5 | 96.0 | 62.8 |
| Sept. 19 | 21.0 | 60.6 | 78.8 | 54.0 |
| Sept. 12 | 19.6 | 53.2 | 66.6 | 41.2 |
| Sept. 5 | 16.9 | 32.9 | 39.7 | 26.9 |
| Aug. 29 | 21.1 | 40.0 | 27.6 | 25.2 |
| Aug. 22 | 20.2 | 45.5 | 23.7 | 17.5 |

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

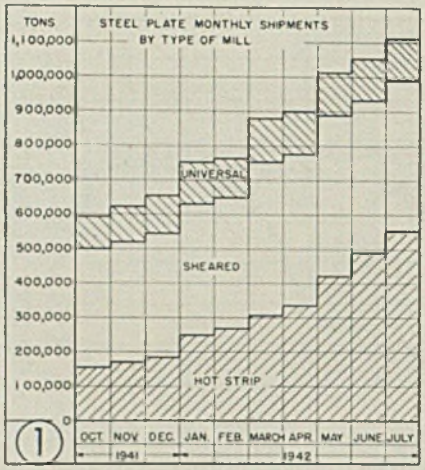


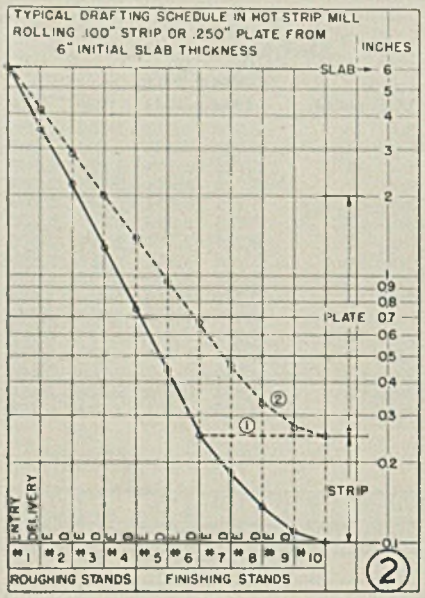




### Freight Car Loadings
(1000 Cars)

| Week ended | 1942 | 1941 | 1940 | 1939 |
|---|---|---|---|---|
| Nov. 28 | 794† | 866 | 729 | 689 |
| Nov. 21 | 836 | 799 | 733 | 677 |
| Nov. 14 | 827 | 884 | 745 | 771 |
| Nov. 7 | 839 | 874 | 778 | 786 |
| Oct. 31 | 891 | 895 | 795 | 806 |
| Oct. 24 | 903 | 914 | 838 | 834 |
| Oct. 17 | 901 | 923 | 814 | 861 |
| Oct. 10 | 910 | 904 | 812 | 845 |
| Oct. 3 | 908 | 918 | 806 | 835 |
| Sept. 26 | 898 | 920 | 822 | 835 |
| Sept. 19 | 903 | 908 | 813 | 815 |
| Sept. 12 | 815 | 914 | 804 | 806 |
| Sept. 5 | 888 | 798 | 695 | 667 |
| Aug. 29 | 899 | 913 | 769 | 722 |

†Preliminary




# Hot Strip Mills

# DOUBLE PLATE TONNAGE

By F. FELIX
Industrial Engineering Department
General Electric Co.
Schenectady, N. Y.

*Fig. 1—Steel plate shipments, monthly, by type of mill. From War Production Board*

*Fig. 2—Typical drafting schedule showing reductions in a hot strip mill when rolling 0.100-inch strip or 0.250-inch plate from an initial slab 6 inches thick*

THE SUDDEN shift in demand from automobile bodies to ship and armor plate might have left idle many of our hot strip mills and might have thrown the entire burden of plate production on our plate mills (sheared and universal) which have only 500,000 tons monthly capacity. However, by "drafting" the wide, continuous, hot-strip mills into rolling plate "for the duration", steel mill operators in the space of a year have doubled the plate production of our country as shown in Fig. 1.

*How is plate rolled in strip mills?* Sheared plates and universal plates are rolled in single-stand mills in a reversing process. Strip mill plates are rolled in a continuous process which will be apparent from Fig. 2, which shows the successive reductions of the thickness of the steel in a typical hot strip mill. This indicates two of the ways in which plates can be rolled in this type of mill:

First, by using the same reductions as for rolling strip on the successive stands and stopping the reducing process at the stand where the desired thickness is reached, leaving the last stands idle insofar as the reducing process is concerned.

The last stand can, however, be used to deliver the plate (without any further reduction) to the tables if the speed of these stands can be reduced sufficiently. If, however, the voltage control does not permit the last motors to be slowed down to the necessary level, the corresponding rolls are left idle and additionel rollers are installed, two for each idle stand (one at the entry side, the other at the delivery side) to carry the plate to the tables.

These intermediate rollers are driven by individual mill-type motors supplied from individual adjustable-voltage generators for proper matching of the roller speed to the stand speed. The loopers, which take up any slack that may occur between the finished stands in rolling strip, are removed to make room for the intermediate rollers.

Second, by using all the stands with smaller reductions throughout. *What changes to the equipment does conversion involve?* As can be seen from the above, the actual rolling of plate in a continuous hot strip mill involves relatively little or no change to the mill proper. However, starting at the delivery end of the last finishing stand, we find that steel plates call for new disposal and processing equipment.

To begin with, this product will be beyond the capacity of the flying shear which can seldom cut material thicker than ¼-inch. Plates thicker than ¼-inch will be decelerated and stopped on the mill table to be transferred to one or two new parallel lines of tables to be levelled, sheared or burned, and classified. In the Sept. 7, 1942, issue of STEEL (pages 72 and 73) will be found an excellent description with illustrations of the plate handling and processing in the converted 98-inch continuous strip mill of the Republic Steel Corp. in Cleveland.

*Run-out tables:* Instead of describing all the additional equipment, most of which is well standardized, we shall consider in greater detail the run-out table equipment which in recent years has reached new high standards of performance.

In rolling plate, the frequent stopping and starting of the mill tables (such as shown in Fig. 3) places a much heavier duty on the table motors than when they drive continuously running tables delivering strip to coilers. In a recent conversion, low-power squirrel cage motors supplied from variable-frequency generators have been replaced by higher rating direct-current motors. These motors are

(*Please turn to Page* 158)

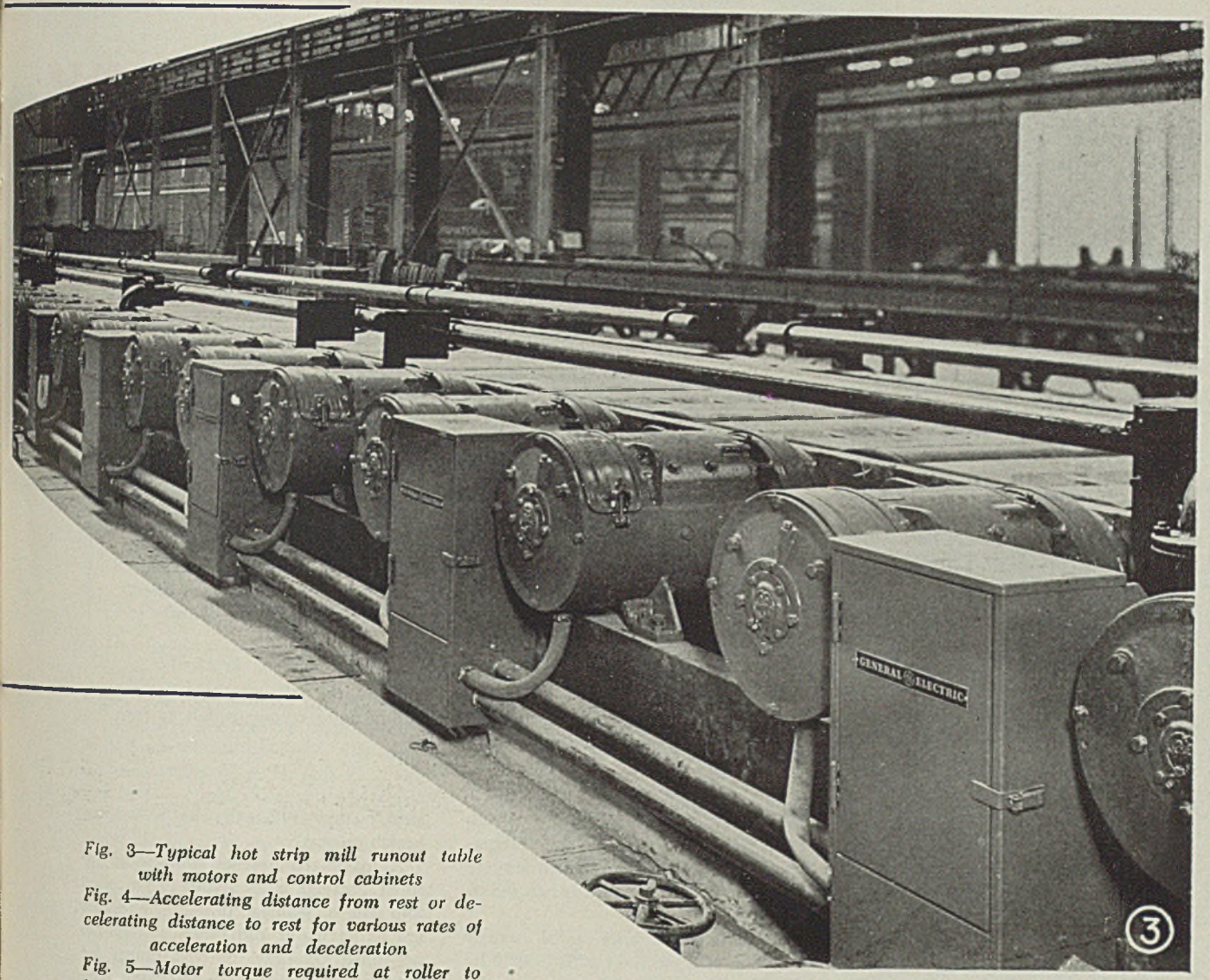
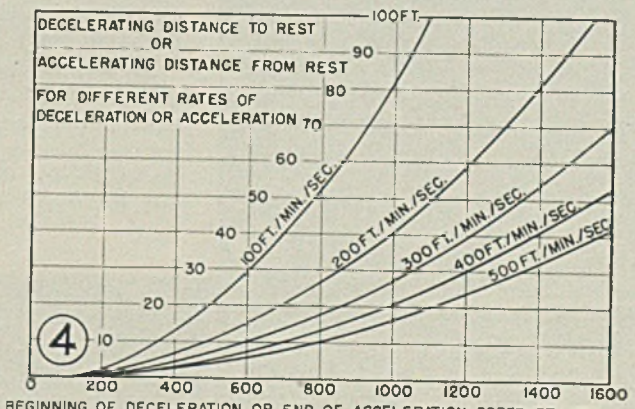


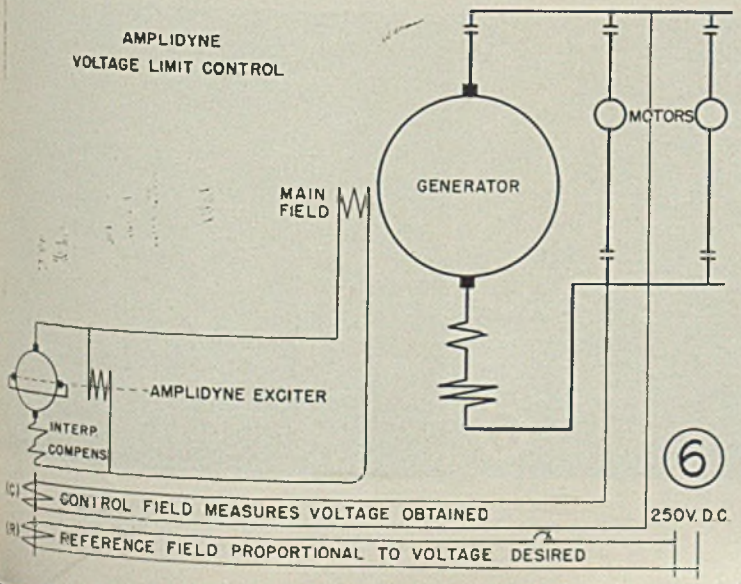

*Fig. 3—Typical hot strip mill runout table with motors and control cabinets*

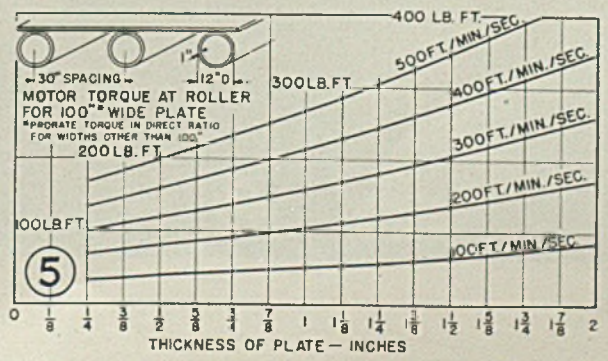
*Fig. 4—Accelerating distance from rest or decelerating distance to rest for various rates of acceleration and deceleration*

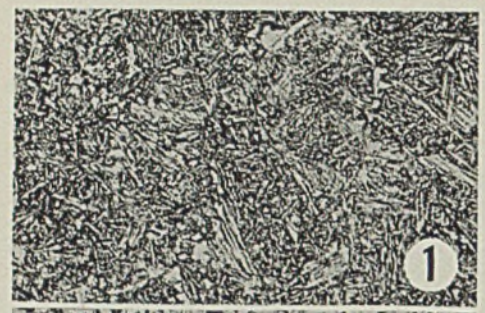
*Fig. 5—Motor torque required at roller to handle plate of various thicknesses shown at the different speeds, based on plate 100 inches wide*

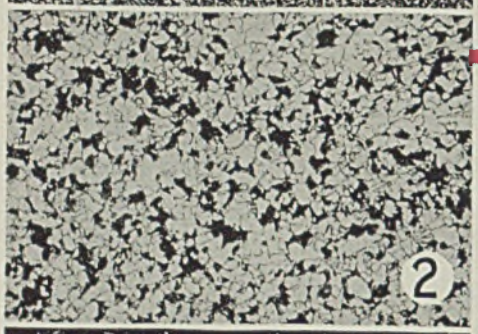
*Fig. 6—Schematic circuit diagram of amplidyne voltage limit control system. If voltage obtained is not equal to voltage desired, net difference in ampere-turns of fields C and R immediately releases output of amplidyne exciter to change generator field and restore desired voltage*

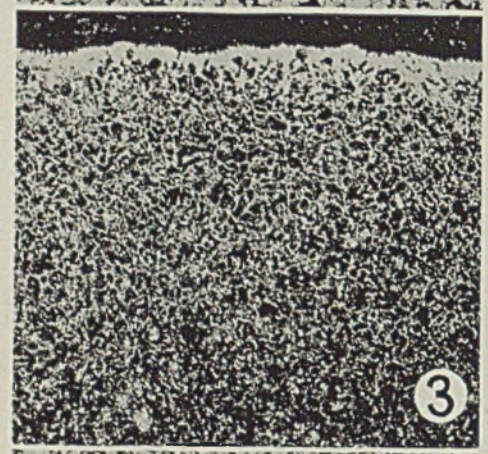


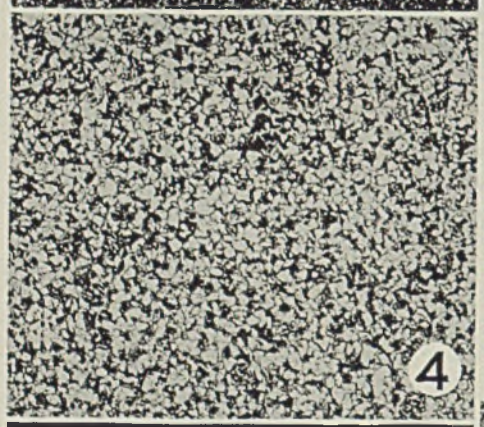



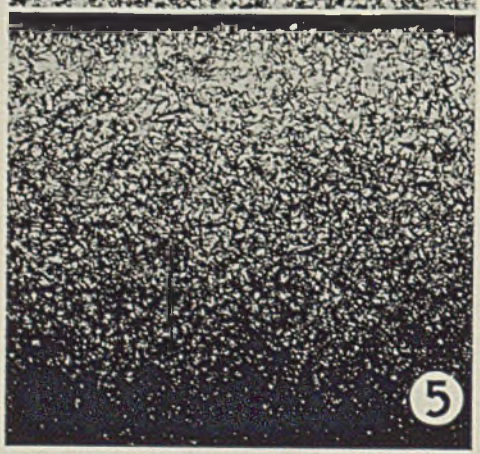






# NE (National Emergency) ALLOY

## Large user reports on successful applications of NE-8000 series steels—carburizing and medium carbon grades

*IT SHOULD be understood that the following material does not constitute a recommendation for the use of NE-8720 for roller bearings, nor should it be construed as meaning that NE-8720 is necessarily always satisfactory as a material for roller bearings within the size range covered. Rather, it is a presentation of results that we have obtained in our work. Others may not necessarily obtain the same results.*

*Too, note that NE-8720 differs from E-4620 in three characteristics, as is pointed out: First, it tends to have a higher surface carbon content; second, its hardenability in the carburized condition when direct quenched is higher; third, its hardenability in the carburized condition when direct quenched and reheated is lower. These can be a source of difficulty in manufacturing.*

*Test data on finished bearing parts are based on one heat only.*

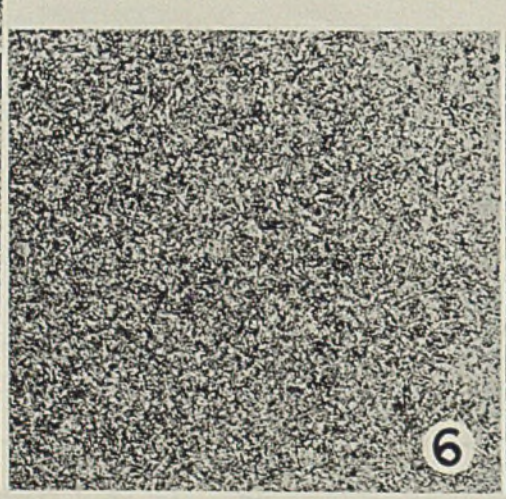
*With these points understood at the outset, the following information should be utilized as a guide rather than definite recommendations for steels and procedures.*

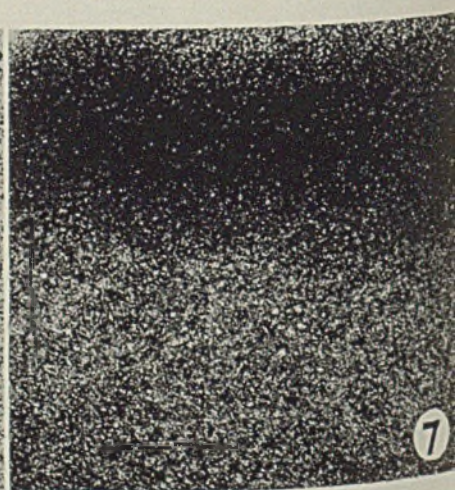
THE PERIOD of laboratory testing of the NE-8000 series steels at International Harvester has now given way to the period of their application to industrial parts.

The value of this series can be estimated by the replacement of AISI E-4620 by NE-8720 for roller bearings and by the substitution of NE-8339, NE-8442 and NE-8739 for bolts formerly made from SAE-3140, 4042 and 4140.

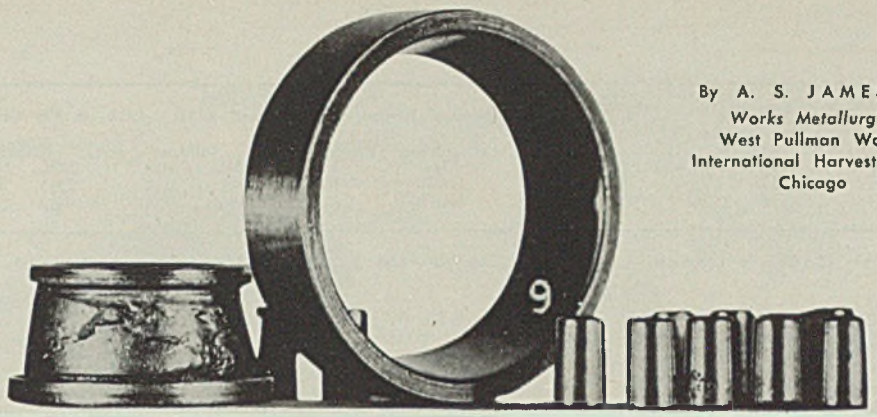
**NE-8720 for Roller Bearings:** The requirements of a steel for commercial taper roller bearings, Fig. 10; in sizes not over 8 inches in diameter, with wall thicknesses less than ¾-inch, have been met for many years by AISI E-4620 steel, made by either the electric or open-hearth process.

A major requirement for a steel for roller bearings is its ability to be rolled into bars or seamless tubes. These bars are either made into forgings from the hot-rolled condition or cold drawn for automatic screw-machine operations. The tubes are used in the hot-rolled, cold-drawn or turned condition for automatic screw machines. In the case of the roller component part, the steel is fabricated in small-diameter cold-drawn bars for automatic screw machines or drawn into coils for cold heading machines. Occasionally, race rings are cold pressed from hot-rolled strip steel. It will be



# STEELS




By A. S. JAMESON
*Works Metallurgist*
West Pullman Works
International Harvester Co.
Chicago

For information on development of NE steels and their properties, see STEEL, Feb. 9, 1942, p. 70; Mar. 16, p. 72; June 8, p. 66; June 15, p. 66; July 20, p. 36; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41, p. 76; Sept. 7, p. 78; Nov. 9, p. 96.

For reports from users of NE steels, see STEEL, Nov. 16, p. 106; Nov. 23, p. 90; Nov. 30, p. 62.

For latest revised list of NE steels, see STEEL, Nov. 23, p. 96.

noted from the foregoing that the manufacture of roller-bearing steel covers a wide range of mill products. Let it suffice to say that from the mill standpoint NE-8720 has proved capable of meeting all the requirements of AISI-4620 in its ability to be fabricated in raw products for the bearing manufacturer's use.

From the bearing manufacturer's point of view, the forgeability and machinability of the steel are important requirements, as well as the ability of the steel to be readily carburized and heat treated to produce a hard wear-resisting case and a tough, strong core.

Prior to the adoption of a new steel composition, it is customary to obtain physical properties of the steel as well as to run several thousand parts through production operations. A comparison of the physical properties of NE-8720 and AISI E-4620 steel follows.

Table I gives the chemical composition ranges of the two steels to be compared. The tensile properties in the heat-treated condition, listed in Table II, give useful information.

**Tensile Properties — Heat Treated:** These properties were obtained from 0.500-inch ASTM standard test bars, heat treated by water quenching at 50-degree intervals, temperatures from 1450 to 1650 degrees Fahr. and would represent the physical properties obtainable as cores of carburized parts.

Certain conclusions can be reached by studying the values shown in Table II. The E-4620 steel has a better ductility value for the same tensile strength, while NE-8720 must be quenched at a temperature of about 50 degrees higher to produce maximum core properties.

**Hardenability:** Determination of the comparative hardenability by the end quench test (see STEEL, Oct. 19, 1942, p. 95 for a description of the test) after end quenching in water from 1650 degrees Fahr. gave values as shown in Table III.

Using a cooling rate of 70 degrees Fahr. per second at 1300 degrees Fahr. for E-4620 and 55 degrees Fahr. per second for NE-8720, these tests indicated that a hardness of 32 rockwell C should be maintained throughout a ¾-inch round after oil quenching and throughout a 1 3/8-inch round after water quenching for both steels. A section quenching out to 32 rockwell C would not, of course, produce a tensile strength as high as is shown in Table II, where the lowest hardness is 40 rockwell C. However, 30 rockwell C is considered to be a satisfactory hardness for the core of a roller bearing race. From Table III, the hardenability of NE-8620 appears to be slightly better than that of E-4620 in the uncarburized condition. However, it is likely that this is due in this particular instance to a 5-point higher carbon content.

**Carburizing:** The carburizing properties of both steels as determined by carburizing 1-inch cylinders in a coke-charcoal compound analyzing barium, 7.8 per cent; sodium, 0.1; calcium, 0.4 and iron, 0.7, for 8 hours at 1700 degrees Fahr., followed by slow cooling, are shown in Table IV.

These data show that a higher surface carbon content would be obtained for NE-8720 and that the case depth after carburizing for a given cycle would be slightly deeper than for E-4620. Surface carbon content for NE-8620 is not too high for a satisfactory bearing surface.

The case depth is usually measured to 0.50 per cent carbon, and the surface carbon content is taken at 0.010-inch below the surface, which would be the bearing race surface after grinding.

**Hardenability—Carburized:** The hardenability of the steels as determined by the end quench test specimens carbur-

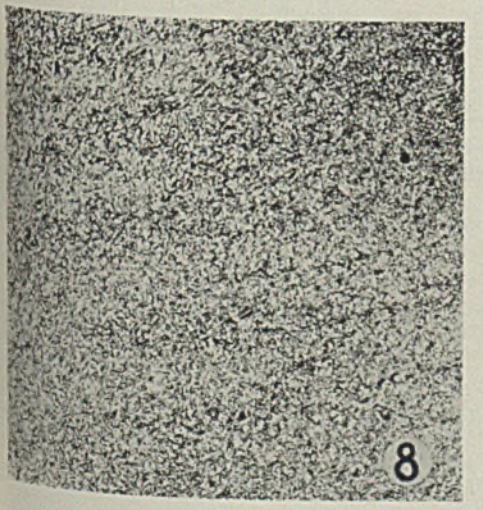



*Fig. 1—Microstructure of race forgings before annealing; hardness is 179 brinell. Etched in 2 per cent Nital. Shown at 100 diameters*

*Fig. 2—Microstructure of race forgings after anneal at 1650 degrees Fahr. Hardness is now 162 brinell. At 100 diameters; 2 per cent Nital etch*

*Fig. 3—Microstructure of case of carburized ring forging after slow cooling; 2 per cent Nital etch; at 100 diameters*

*Fig. 4—Microstructure of core of carburized ring forging after slow cooling; 2 per cent Nital etch; at 100 diameters*

*Fig. 5—Case of carburized ring forging after direct quenching from carburizing heat; 2 per cent Nital etch; at 100 diameters*

*Fig. 6—Core of carburized ring forging after direct quenching from carburizing heat; 2 per cent Nital etch; at 100 diameters*

*Fig. 7—Case of carburized ring forging after reheating, quenching and tempering; 2 per cent Nital etch; at 100 diameters*

*Fig. 8—Core of carburized ring forging after reheating, quenching and tempering; 2 per cent Nital etch; at 100 diameters*

*Fig. 9—Bearing failure occurs mainly in the inner race as shown here*

TABLE I—Chemical Ranges NE-8720 and AISI E-4620, in Per Cent

| Symbol | Carbon Min. | Carbon Max. | Manganese Min. | Manganese Max. | Phosphorus Max. | Sulphur Max. | Silicon Min. | Silicon Max. | Nickel Min. | Nickel Max. | Chromium Min. | Chromium Max. | Molybdenum Min. | Molybdenum Max. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E-4620 | 0.17 | 0.22 | 0.45 | 0.65 | 0.025 | 0.025 | 0.20 | 0.35 | 1.65 | 2.00 | . . . | . . . | 0.20 | 0.30 |
| NE-8720 | 0.18 | 0.23 | 0.70 | 0.90 | 0.025 | 0.025 | 0.20 | 0.35 | 0.40 | 0.60 | 0.40 | 0.60 | 0.20 | 0.30 |

TABLE II—Tensile Properties—AISI E-4620 and NE-8720 ASTM 0.500-Inch Test Bars—Treated in Test Bar Size by Water Quenching

| Heat Treament Quenching Temperature Deg. Fahr. | E-4620: C—0.20; Mn—0.56; Si—0.29; Ni—1.73; Mo—0.24 Austenitic Grain Size at 1700° Fahr., Fine — Yield Point, Psi | Tensile Strength, Psi | Elong. % in 2" | Red. Area % | Hardness R 'C' | Hardness Brinell | NE-8720: C—0.20; Mn—0.81; Si—0.30; Ni—0.58; Cr—0.46; Mo—0.23 Austenitic Grain Size at 1700° Fahr., Fine — Yield Point, Psi | Tensile Strength, Psi | Elong. % in 2" | Red. Area % | Hardness R 'C' | Hardness Brinell |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1450 | 182,000 | 212,000 | 14.0 | 41.0 | 43 | 404 | 170,000 | 189,000 | 9.0 | 24.5 | 40 | 372 |
| 1500 | 191,000 | 219,000 | 15.0 | 38.5 | 44 | 415 | 186,000 | 211,000 | 7.0 | 27.5 | 42 | 393 |
| 1550 | 183,000 | 214,000 | 14.5 | 41.0 | 43 | 404 | 194,000 | 215,000 | 9.5 | 33.5 | 43 | 404 |
| 1600 | 189,500 | 216,500 | 14.0 | 43.5 | 44 | 415 | 195,000 | 217,000 | 9.0 | 25.5 | 42 | 393 |
| 1650 | 179,500 | 201,000 | 13.5 | 42.2 | 42 | 393 | 194,000 | 218,000 | 10.0 | 40.0 | 42 | 393 |

ized for 8 hours at 1700 degrees Fahr. and direct end quenched in water gave NE-8720 a J-55 rating in excess of 48 as compared with 25 for several heats of fine-grained E-4620 with an average composition of 0.54 per cent manganese, 0.27 silicon, 1.70 nickel and 0.23 molybdenum. This indicates that for parts direct quenched from the carburizing heat, NE-8720 is different in behavior from E-4620 steel and that such a difference would require adjustment for size change in quenching.

Hardenability data shown in Table V were obtained from end quench specimens carburized for 8 hours at 1700 degrees Fahr. and quenched in oil, followed by reheating to 1480 degrees Fahr. and end quenching in water, this treatment being approximately the same as that given bearing parts, though of course bearing parts are quenched in oil.

It appears from Table V that NE-8720 has considerably less hardenability than E-4620 when quenched from 1480 degrees Fahr. However, a reheating temperature of 1480 degrees Fahr. is probably too low to develop full hardenability for NE-8720 steel.

In order to obtain complete information on the effect of the reheating temperature on specimens previously carburized and quenched in oil, a series of tests were run which are illustrated in Figs. 11 and 12. These charts show that in order to develop a hardenability for NE-8720 comparable with E-4620, a quenching temperature of 1500 degrees Fahr. should be used.

However, NE-8720 has enough hardenability at 1525 degrees Fahr. for the heat treatment of bearing races not over ¾-inch section.

**Impact Tests—Carburized Specimens:** Impact values obtained from a specimen shown in Fig. 15 indicate that NE-8720 is comparable with E-4620. This specimen is carburized at 1700 degrees Fahr. for a case depth of from 0.040 to 0.050-inch and given three different heat treatments. Information as to surface hardness, core hardness and fractured case grain size as well as impact values is obtained. The data are shown in Table VI.

When interpreting the impact information, it should be understood that case hardness, case depth and case grain size are the major factors influencing this value. The higher the hardness, the lower is the impact value; the greater

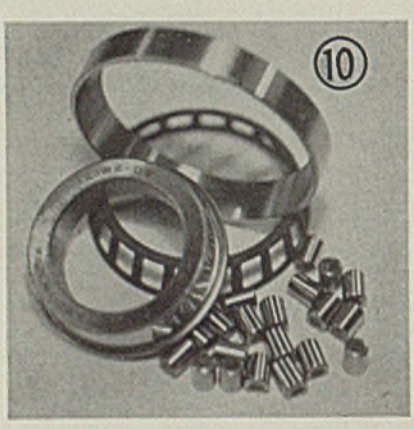
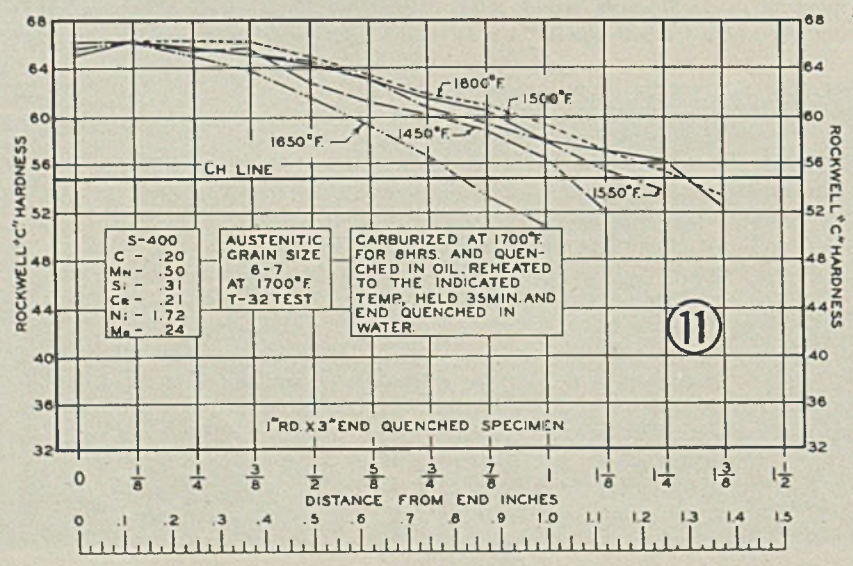
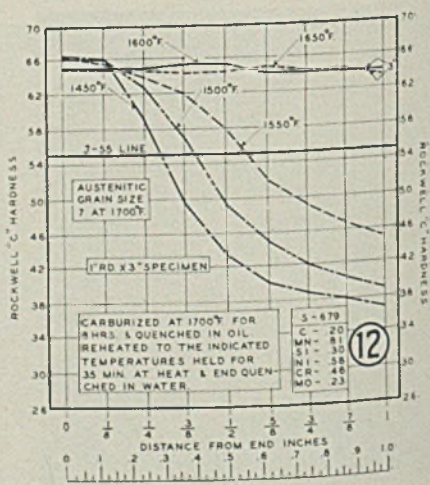



*Fig. 10—NE-8720 is being used successfully for roller bearings such as these*

*Fig. 11—Effect of temperature on the hardenability rating of a carburized low-carbon nickel-molybdenum steel as determined by the end-quench hardenability test*

*Fig. 12—Effect of temperature on the hardenability of nickel-chromium-molybdenum steel as determined by the end-quench hardenability test*



# Mrs. Parker's cooking utensils are making it hot for the Japs

Thanks to the kind of planning that wins wars, the finest of everything goes to the fighting forces. So thousands of women whose hearts were set on outfitting their kitchens with Revere Copper-Clad Stainless Steel utensils are now treasuring the pieces they were fortunate enough to get before the war.

Treasuring them but using them—hard. For the same fine materials and manufacturing techniques that are making our military machine so tough have fortified Revere Ware utensils against years of the severe usage enforced by war.

The Revere plant where these "Kitchen Jewels" were made was able to change over smoothly and quickly to implements of war. Like all other manufacturing plants, it could rely on the Revere Technical Advisory staff for skilled help in methods of processing the unfamiliar copper alloys of wartime.

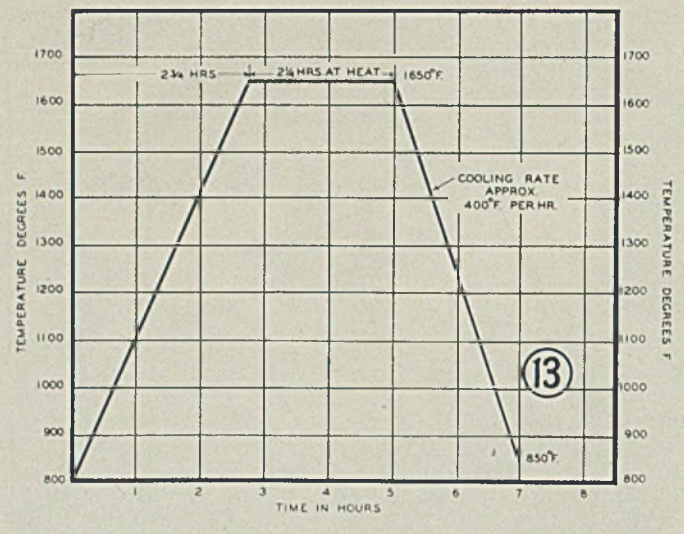
Every ounce of copper our country produces goes directly into the essentials of warfare. Fortunately, Revere is well equipped, with modern plants, improved machines, and advanced techniques to assume a heavy responsibility in the production of vital copper alloys. And Revere research is continually probing deeper into the secrets of copper to help develop still better, stouter arms for victory.

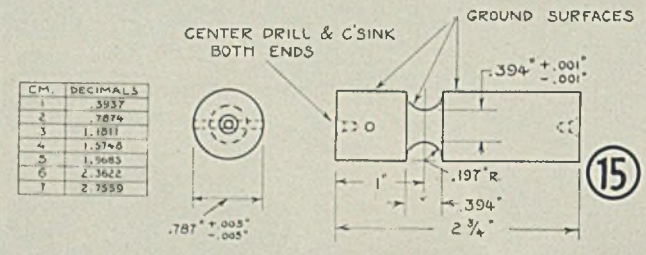
The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

REVERE COPPER AND BRASS INCORPORATED

*Founded by Paul Revere in 1801*

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK



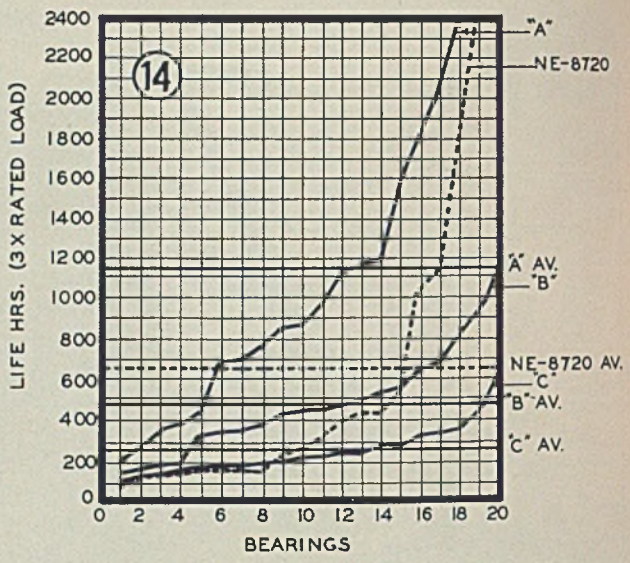




*Fig. 13—Heating and cooling rate of annealing charge of NE-8720 race forgings*

*Fig. 14—Results of accelerated life tests of roller bearings with NE-8720 rings and E-4620 rollers versus three makes of bearings with E-4620 rings and rollers. Note NE-8720 average is above that of two of the E-4620 bearings*

*Fig. 15—Impact and hardenability specimen for carburized steels, Type B. Groove is ground with a Radiac 9A-1501 grinding wheel. The 0.787-inch diameter is ground with a Norton 60 M grinding wheel. Finished ground specimen is shown*

the case depth, the lower is the impact value; the coarser the grain size, the lower is the impact value.

**Manufacture of Bearing Parts:** *From the foregoing information obtained from tests of NE-8720 steel and the comparison with E-4620 steel, which is regular steel for bearing parts, it can be seen that NE-8720 is a reasonable substitute.* Its fabrication into bearing parts is described in the following:

**Forging Rings:** Satisfactory rings were produced from NE-8720 bars made from a fine-grained electric-furnace heat analyzing carbon, 0.20 per cent; manganese, 0.81; sulphur, 0.014; phosphorus, 0.011; silicon, 0.30; nickel, 0.58; chromium, 0.46; molybdenum, 0.23; and upset forged at 2350 degrees Fahr. These forgings were annealed at 1650 degrees Fahr., using a cycle as illustrated in Fig. 13. A hardness of 162 brinell resulted.

The microstructure of the rings before and after annealing is shown in Figs. 1 and 2.

**Machining Forgings:** These annealed forgings machined as easily as E-4620 annealed forgings.

**Machining Tubes:** Seamless steel tubes made from a fine-grained heat analyzed carbon, 0.23 per cent; manganese, 0.83; sulphur, 0.014; phosphorus, 0.011; silicon, 0.30; chromium, 0.48; nickel, 0.58; molybdenum, 0.26, with hot-rolled structure. These were turned by machining the outside diameter at the same rate as E-4620 and with approximately the same surface finish.

**Heat Treatment of Rings Made from Forgings:** Rings were carburized at 1700 degrees Fahr. in rotary gas carburizing furnace, using a barium carbonate energized compound for a case depth of 0.040 to 0.060-inch and a direct quench in oil. They were reheated to 1525 degrees Fahr. in a rotary hardening furnace and quenched in oil, followed by tempering at 325 degrees Fahr.

Rings withdrawn from the furnace and slowly cooled had a case depth variation of from 0.051 to 0.063-inch measured microscopically to the original core, carbon content 0.20 per cent, with a hyper-

**TABLE III—Hardenability—End Quench Tests E-4620 and NE-8720**

| Steel Symbol | Chemical Composition C | Mn | Si | Ni | Cr | Mo | Austenitic Grain Size 1700° Fahr. | Distance from End to 32 Rockwell C in Sixteenths |
|---|---|---|---|---|---|---|---|---|
| E-4620 | 0.18 | 0.53 | 0.27 | 1.68 | 0.16 | 0.20 | Fine | 4 |
| NE-8720 | 0.23 | 0.81 | 0.30 | 0.58 | 0.46 | 0.23 | Fine | 5 |

**TABLE IV—Carburizing Properties, E-4620 and NE-8720**

| Distance from Surface, Inch | E-4620 C—0.20; Mn—0.53; Si—0.24; Ni—1.68; Mo—0.22 | NE-8720 C—0.20; Mn—0.81; Si—0.30; Ni—0.58; Cr—0.46; Mo—0.23 |
|---|---|---|
| 0.005 | 0.90 | 1.04 |
| 0.010 | 0.88 | 0.99 |
| 0.015 | 0.84 | 0.90 |
| 0.020 | 0.77 | 0.85 |
| 0.025 | 0.69 | 0.80 |
| 0.030 | 0.60 | 0.74 |
| 0.035 | 0.55 | 0.66 |
| 0.040 | 0.48 | 0.58 |
| 0.045 | 0.38 | 0.50 |
| 0.050 | 0.37 | 0.44 |

°Austenitic Grain Size, 1700°F., 7.

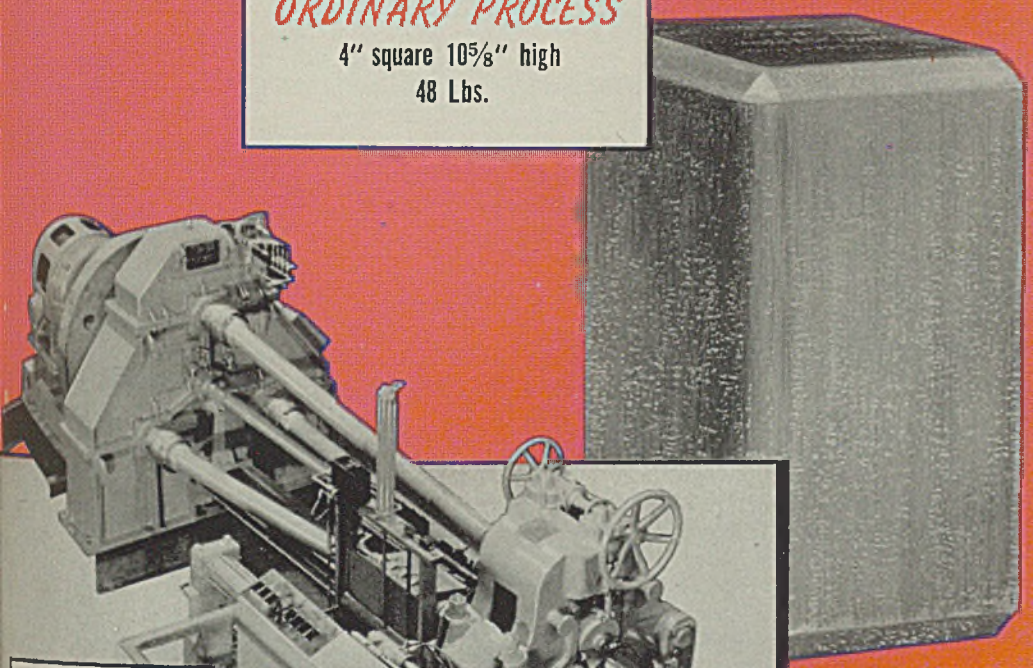
**TABLE V—Hardenability—End Quench Tests E-4620 and NE-8720**

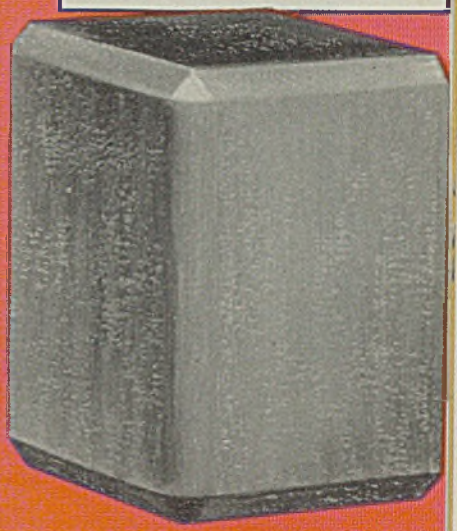
| Steel Symbol | Chemical Composition Mn | Si | Ni | Mo | Cr | Austenitic Grain Size at 1700° F. | J-55 Rating |
|---|---|---|---|---|---|---|---|
| E-4620 | 0.55 | 0.27 | 1.76 | 0.22 | 0.12 | Fine | 12 |
| NE-8720 | 0.81 | 0.30 | 0.58 | 0.23 | 0.46 | Fine | 6 |

# SAVES 20% IN MATERIALS WHILE IT TRIPLES SHELL FORGING PRODUCTION

**ORDINARY PROCESS**
4" square 10⅝" high
48 Lbs.

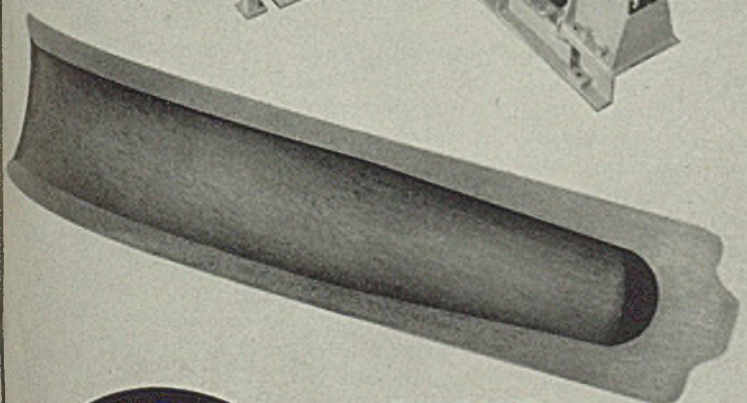
**WITTER PROCESS**
4½" square 6⅜" high
36 Lbs.





105 mm. Billets



*SALEM'S WITTER PROCESS*

*Illustrated above is an elongated forging as it leaves the Witter Mill. Note the smooth and uniform cavity.*

When the Witter process goes into operation, outstanding production schedules are bound to be maintained. This process starts with 20% smaller billets than those used for other methods, and they are heated in a rotary furnace to 2250°F. Next, the billets are pierced on an upsetter or press. And, without being reheated, these forgings are delivered to a Witter Mill which elongates and rolls the shells to finished forging dimensions. Since these measurements are closer to the size of the finished product than with other methods, far less material is cut away in the final machining operations. Hence, the Witter process saves many tons of steel as well as thousands of man hours. Write today.

SALEM ENGINEERING COMPANY

**SALEM ENGINEERING CO. . . SALEM, OHIO**

TABLE VI—Impact Hardness and Fractured-Grain-Size Data—E-4620 and NE-8720

| Treatment | E-4620: C—0.18; Mn—0.57; Si—0.29; Ni—171; Mo—0.22; Cr—0.13 Austen. Grain Siz at 1700° Fahr.—7 Energy Absorbed Ft.-Lbs. | Hardness R 'C' Core | Fractured Grain Size | Case Depth Inch | NE-8720: C—0.20; Mn—0.81; Si—0.30; Ni—0.58; Mo—0.23; Cr—0.46 Austen. Grain Size at 1700° Fahr.—7 Energy Absorbed Ft.-Lbs. | Hardness R 'C' Case | Core | Fractured Grain Size Sheppard Stds. | Case Depth Inch |
|---|---|---|---|---|---|---|---|---|---|
| Box cooled. Heated to 1575°F and quenched in oil. Reheated to 1500° for E-4620 and 1525° for NE-8720 and quenched in oil. Temp. at 325°. | 16 | 62 | 35 | 9.0 | 0.051 | 15 | 62 | 28 | 9.0 | 0.063 |
| Box quenched in oil. Tempered at 325° Fahr. | 12 | 61 | 35 | 8.0 | 0.047 | 10 | 60 | 28 | 8.5 | 0.063 |
| Box quenched in oil. Reheated to 1500° Fahr. for E-4620 and 1525° for NE-8720 and quenched in oil. Tempered at 325°. | 15 | 61 | 37 | 8.5 | 0.047 | 17 | 60 | 27 | 9.0 | 0.067 |

eutectoid zone 0.016 to 0.020-inch deep.

The microstructure of these slowly cooled rings is illustrated in Figs. 3 and 4. The rings after direct quenching from the carburizing heat had a microstructure as shown in Figs. 5 and 6. It will be noted that the case structure contains a considerable amount of austenite.

Rings reheated to 1525 degrees Fahr. and oil quenched, followed by tempering at 325 degrees Fahr., gave the following information after grinding about 0.010-inch from the bearing surfaces.

The case hardness ranged from 62 to 64 rockwell C with a core hardness of 34 to 39 rockwell C; a case hardness of 60 to 64 is usually specified. No grinding checks or other defects were visible after deep etching a large number of rings.

The fractured grain size of the rings was from 8.0 to 8.5.

The case depth of the finished ground rings ranged from 0.043 to 0.047-inch. This case depth was measured on a polished specimen using a brinell microscope and represents hardened case.

The microstructure of the case consisted of fine martensite and the core of fine-grained low-carbon martensite, see Figs. 7 and 8.

**Heat Treatment of Rings Made from Tubing:** The rings machined from tubing were carburized in boxes at 1700 degrees Fahr., using a barium carbonate energized compound for a case depth of 0.050 to 0.080-inch and slowly cooled in the boxes. In order to determine the carbon content of the case, cuts were taken from the outside bearing surface for carbon determinations. The first 0.005-inch cut was discarded. The results taken from three rings are given in Table VII.

It will be noted from Table VII that a carbon content of 1.10 per cent at 0.010-inch is rather high—higher than usually desired. It is suggested that steps be taken in carburizing of NE-8720 to reduce this content to about 0.95 per cent either by using a weaker carburizing agent or by gas carburizing and using a diffusion period at the end of the carburizing cycle in which the carburizing gas flow is reduced in volume.

Measured microscopically on the slowly cooled rings, the total case was 0.090 to 0.094-inch with the hypereutectoid zone of 0.028 to 0.031-inch. The microstructure was substantially the same as that of the rings made from forgings and previously illustrated in Figs. 3 and 4.

The slowly cooled rings were heated to 1575 degrees Fahr. in a rotary-hearth hardening furnace, using a cycle of 40 minutes, and subsequently were quenched in oil. They were then reheated to 1525 degrees Fahr. in the same type of furnace and quenched in oil, followed by tempering at 325 degrees Fahr.

Hardness tests of the finished ground rings showed a reading from 62 to 63 rockwell C on the face and 61 to 63 on the raceway, with a core hardness of 31 to 36.

No defects were found after deep etching numerous ground rings. The fractured grain size ranged from 8.5 to 9.0 and the case depth as visually measured on the fractured rings was from 1/16 to 5/64-inch. Case depth measurements of polished specimens, etched and measured with a brinell microscope, varied from 0.082 to 0.086-inch.

This heat treatment information indicates that no great difficulty is experienced in producing a uniform and satisfactory product. It is the usual practice of bearing manufacturers to make breakdown tests of finished bearings. The machines used for these tests are of various designs, but the idea of overloading the bearing to bring about failure in a relatively short period of time is the same.

Fig. 14 is a graphical representation of the life of 20 bearings with NE—8720 outer and inner rings but using standard E-4620 rollers, compared with bearings made from E-4620 steel by three manufacturers designated as A, B and C.

Due to the variables involved in the bearings, including dimensions, grinding finish, etc., and the fact that bearing failure follows the same line as a human mortality table, it is necessary to test at least 20 bearings and preferably 100 bearings before drawing any definite conclusions. Bearing failure occurs mainly in the inner race.

Turning to interpretation of the accelerated life test data, the only safe conclusion that can be drawn from these tests of 20 bearings is that making these rings from NE-8720 steel has no apparent effect on the life of the particular bearing tested.

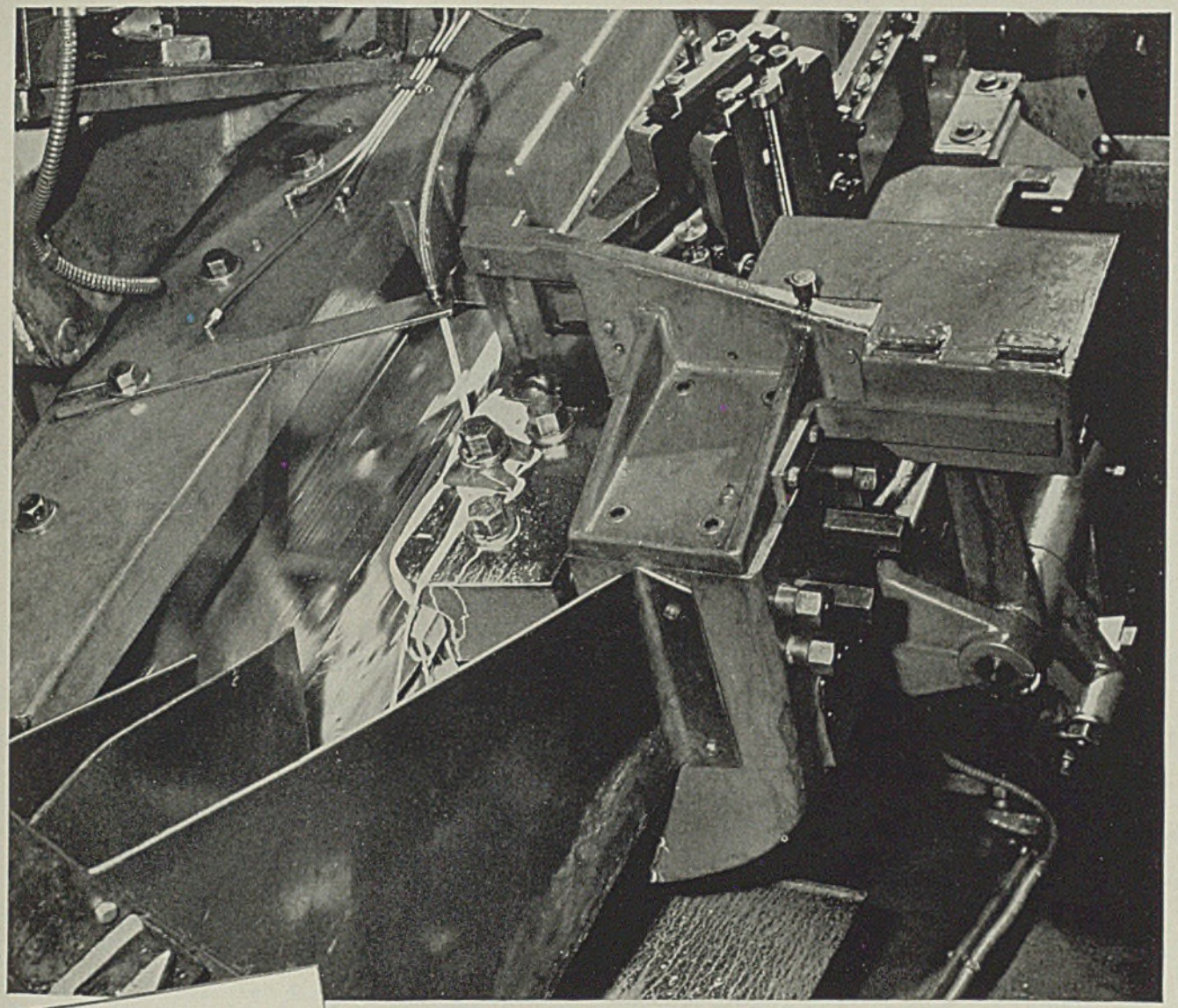
In conclusion, it can be said regarding the use of NE-8720 for E-4620 that the substitution is satisfactory as far as ability to be fabricated is concerned. However, the NE-8720 should be handled with greater care in cooling after rolling operations because of its higher hardenability on cooling from high temperature. Due to the same characteristic, it will require some adjustment when direct quenched after carburizing where size change is an important consideration. As noted before, it also tends to have a higher surface carbon than E-4620 but this can be overcome as previously indicated.

It should be borne in mind that the steel for bearings must meet very exacting requirements. If it meets these successfully, there should be no hesitancy in using it for the majority of carburized parts.

However, its use to replace E-4620 in gears should be the subject of a separate study.

TABLE VII—Carbon Gradient NE-8720

| Distance from Surface, Inch | Carbon Content, Per Cent 1 | 2 | 3 | Average |
|---|---|---|---|---|
| 0.010 | 1.10 | 1.09 | 1.13 | 1.10 |
| 0.015 | 1.06 | 0.98 | 1.08 | 1.04 |
| 0.020 | 1.05 | 0.92 | 1.06 | 1.01 |
| 0.025 | 0.98 | 0.88 | 0.98 | 0.93 |
| 0.030 | 0.90 | 0.82 | 0.94 | 0.89 |
| 0.035 | 0.83 | 0.76 | 0.90 | 0.83 |
| 0.040 | 0.78 | 0.71 | 0.85 | 0.78 |
| 0.045 | 0.72 | 0.66 | 0.78 | 0.72 |
| 0.050 | 0.68 | 0.58 | 0.74 | 0.67 |
| 0.055 | 0.60 | 0.52 | 0.65 | 0.59 |



*Cold forged full threads of R B & W bolts are clean and sharp, with accurate lead and pitch, giving uniform load distribution and preventing stripping. Nuts, faced or semi-finished, have the bearing face at right angles to the hole, assuring stud alignment . . . with lead end countered-bored, after tapping, for quick start.*

## How much hangar can a finger-flick build?

HOW IMPORTANT is a *single* bullet in a machine gun cartridge clip? How vital is *one* out of 2000 incendiary bombs dropping from a single Yankee plane over Tokio? How much faster can a hangar be built by *quick*-assembling bolts and nuts?

A nut with a cranky thread . . . a bolt with a badly-formed head . . . are like bullets that miss, bombs that are duds. War industries want nuts that run on smoothly with a flick of the fingers, bolts that take tightening without injury.

High on the list of suppliers to the builders of fighting equipment — the airports, the tanks, the battleships, tractors and big guns — is R B & W, whose service to America is one bolt, one nut multiplied by millions . . . tons . . . carloads.

The men who know what quick assembly means to war production specify "Empire" for bolts and nuts that are clean-threaded, accurate, and sturdy.

Our three great plants are strategically located for Industrial America's convenience — our workers are giving full energy to serving wartime America's fastening needs.

Russell, Burdsall & Ward Bolt and Nut Company. Factories at Port Chester, N.Y., Rock Falls, Ill., Coraopolis, Pa.; sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle.

**RB&W** **RUSSELL, BURDSALL & WARD**

*Making strong the things that make America strong*

BOLTS EMPIRE NUTS-RIVETS

AND ALLIED FASTENING PRODUCTS...SINCE 1845

# Aircraft Electroplating

By R. R. JANSSEN
Process Engineer
North American Aviation Inc.
Inglewood, Cal.

ELECTROPLATING is as essential to the airplane as the very rivets from which it is made. In fact, even those rivets are electroplated by anodizing for protection against corrosive attack. This, corrosion prevention, is the most important reason for electroplating on an airframe. The motor, which combines with the airframe to make an airplane, will not be discussed here.

The three principal uses of electroplating on an airframe then are to provide corrosion prevention; to provide a smooth, hard bearing surface, to provide a means of masking for selective hardening of steel parts.

The principal methods for plating to obtain corrosion prevention are anodizing for aluminum and cadmium plating for steel, brass or bronze. Those used more rarely are tin and zinc plating. In the manufacture of airframes, chromium plating is the principal method used to obtain bearing surfaces which are smooth and hard. Other types of plating, such as indium, have found some use in motor manufacture but as yet have not been found adaptable to airframe construction. Copper is the material used for masking prior to selective carburizing.

**Anodizing**, used almost exclusively on aluminum, is undoubtedly the most important single form of plating in aircraft construction. This process consists of forming aluminum oxide on the surface of aluminum alloys as a very thin but impervious film. This film prevents the further oxidation of the aluminum and forms an excellent base for paint.

It is interesting to note that anodizing represents practically 100 per cent throwing power. This is explained by the fact that aluminum oxide is not a good electrical conductor. Consequently, when the corners get anodized first they no longer are conductive. Those parts not yet affected still conduct current and hence will get anodized. This goes on until all areas are anodized.

It is the statement of some that anodizing is not an electroplating operation, but this idea is based on the definition of electroplating as the electrodeposition of metal. However, the American Standards Association defines electroplating as "the process of depositing, by means of an electric current, any metal or other substance on a given object or objects". Since in this case oxygen is deposited on the surface where it combines with the aluminum, anodizing can be interpreted as being an electroplating process.

The electrolyte used in anodic oxidation consists of 5 per cent (by weight) solution of chromic acid in tap water. It is necessary, however, to limit the amount of chlorides and sulphates in order to obtain a good anodic coat. The bath is operated at 95 degrees Fahr. and is controlled within plus or minus 4 degrees Fahr. Many organizations have varied these figures and claim better results. However, the above procedure is standard and has been shown to give satisfactory and reliable coatings. The voltage used is, unfortunately, 40 volts instead of the standard plating voltages. Normal current densities are of the order of 1½ to 2 amperes per square foot. Thirty minutes is the standard time for the anodizing treatment. These are the highlights of anodizing by the chromic acid method.

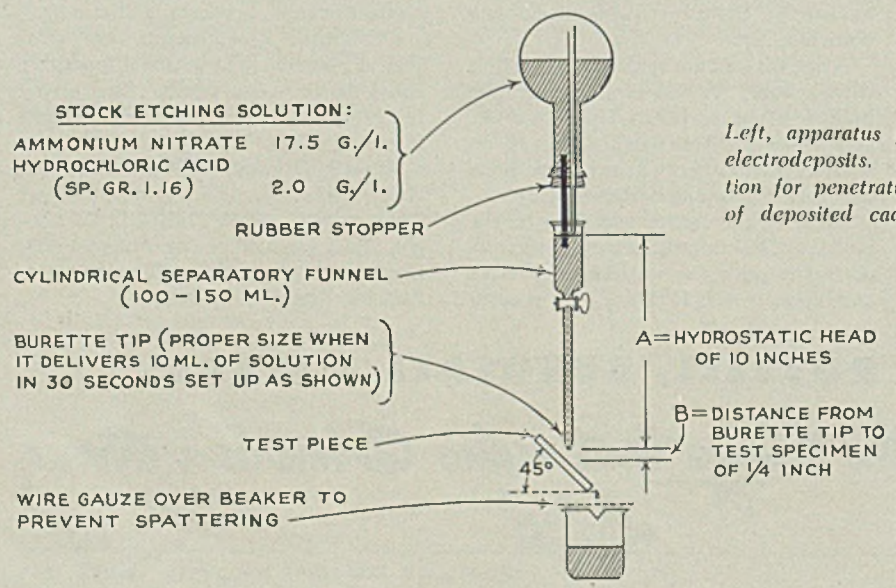
Sulphuric acid is also used as an electrolyte in the commercial process of "alumiliting". This process is limited in use due to the fact that it is a patented process. It is not allowed by Army - Navy specifications on completed assemblies but it may be used on detail parts. Alumiliting is used extensively in commercial practice as a method of coloring aluminum alloys.

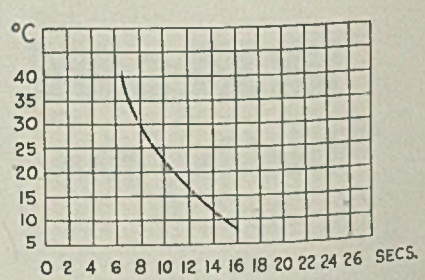
**Cleaning Before Anodizing:** Anodizing does not require the high standard of cleaning that most electroplating processes demand. However, parts which are excessively oily or greasy are usually cleaned in an alkaline cleaner especially designed for cleaning aluminum. Ordinary plating cleaners cannot be used on aluminum because of their tendency toward etching. Consequently, milder cleaners must be used. Occasionally precleaners of the solvent type are used to prevent excessive contamination of alkaline cleaning bath. This is usually not warranted, however, due to the low cost of cleaners of the alkaline type.

**Anodizing Substitutions:** In recent years the use of anodizing has decreased markedly, largely due to the more prevalent use of Alclad material and to the

(*Please turn to Page* 162)

From a paper presented to the American Electroplaters' Society, Los Angeles branch, March 21, 1942, and published in *The Monthly Review*.




*Left, apparatus for testing the thickness of cadmium electrodeposits. Right, below, time-temperature relation for penetration of 0.0001-inch (0.0025 millimeter) of deposited cadmium. Illustrations by Turco Products Inc.*

# HOW TO GET THE MOST OUT OF YOUR LATHES

*No. 3 in a series of suggestions made by the South Bend Lathe Works in the interest of more efficient war production*

## Keep Your Lathes Level

The leveling of a lathe can either perpetuate or destroy the best craftsmanship of the machine tool builder. A lathe that is not kept perfectly level cannot turn out the precision work for which it was built.

The lathe bed is comparable to a toolmaker's surface plate. Upon it rest the headstock, carriage and tailstock. Therefore, any twisting of the lathe bed will throw the headstock, tailstock and carriage out of alignment. This will cause the lathe to turn or bore a taper instead of taking a straight cut. It will also cause the alignment of the tailstock center point to shift as the tailstock is moved along the lathe bed, necessitating constant readjustment of the tailstock top set-over.

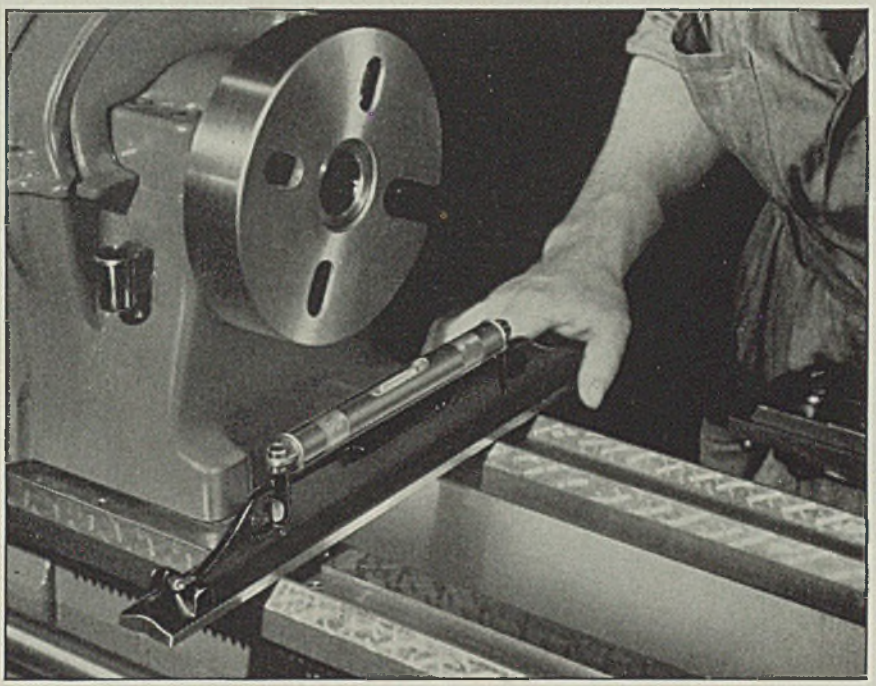
### Check Leveling Frequently

The major cause of distortion in lathe beds is the settling of the floor supporting the lathe. This is most commonly encountered in buildings that do not have solid foundations or that have wooden floors or columns. There are numerous other conditions which can cause this, such as the shifting of loads on the floor, swelling of wood flooring, deterioration of wooden shims, and atmospheric changes. For these reasons, every lathe should be checked periodically to see that it is level.

### How to Level a Lathe

The first requisite for accurate leveling is a precision level at least 12" long. One that is sufficiently sensitive to show a distinct movement of the bubble when a .003" shim is placed under one end of it. A carpenter's level, a combination square level, or an ordinary machinist's level cannot be used because they are not sufficiently sensitive.

The leveling of the lathe is tested by placing the level squarely across the lathe bed, immediately in front of the headstock, and also at the extreme right end of the bed. On lathes having long beds, tests should also be made at one or more intermediate positions. Be sure that the ways are wiped perfectly clean of all chips or dirt before using the level.



*Every lathe should be checked periodically to see that it is level*

Metal shims should be used under the lathe at the points indicated by the level as being low. Some lathes are equipped with leveling screws making it unnecessary to use shims.

After all adjustments have been made, bolt the lathe securely to the floor and repeat the tests to make sure that tightening the leg bolts has not affected the leveling of the lathe.

### Alignment Test

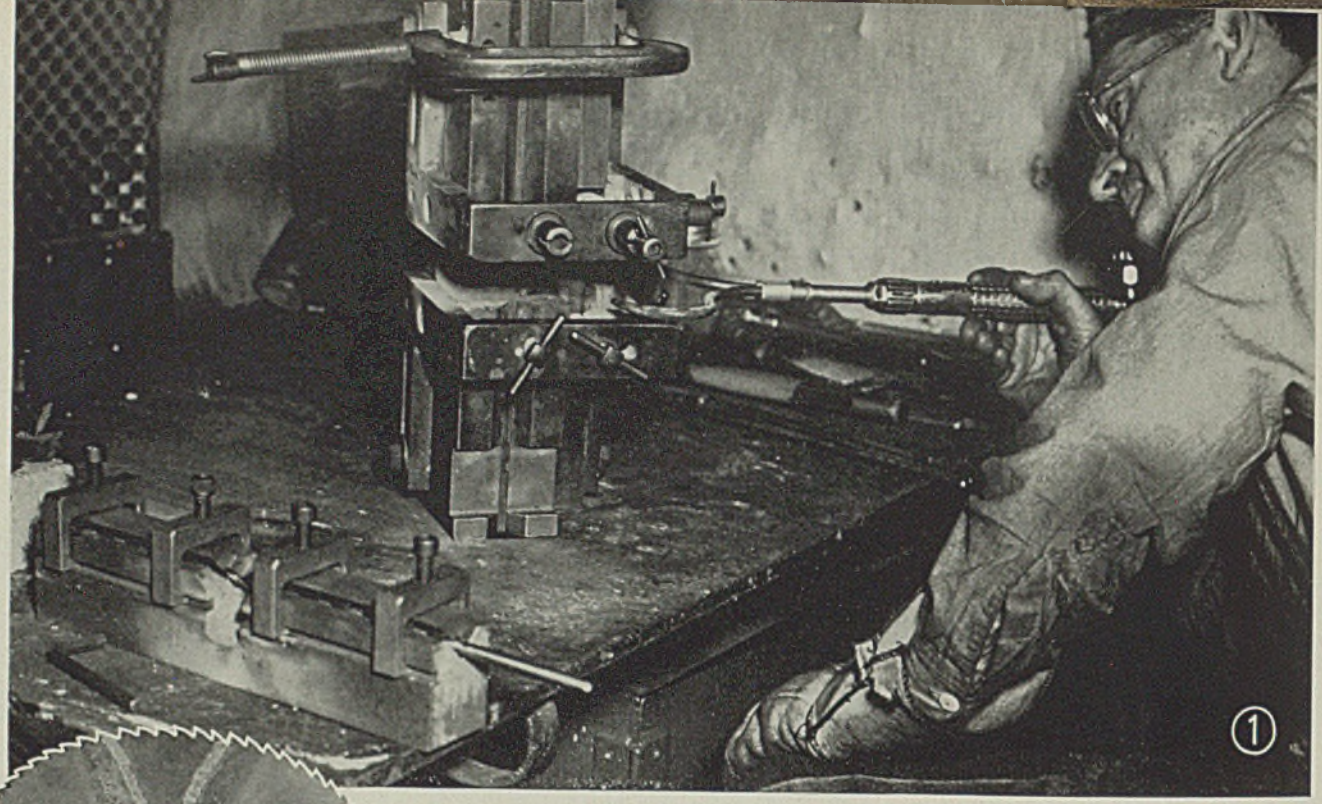
A simple alignment test can be used to check the leveling of a lathe. Place a bar of steel, one inch or larger in diameter, in the chuck and machine two collars of equal diameter three or four inches apart. Then, take a very light finishing cut across both collars without changing the setting of the cutter bit. Measure both collars with a micrometer. If the collars are not the same diameter, it is an indication that the lathe is not level. Adjust the leveling until, when a cut is taken, both collars are turned the same diameter.

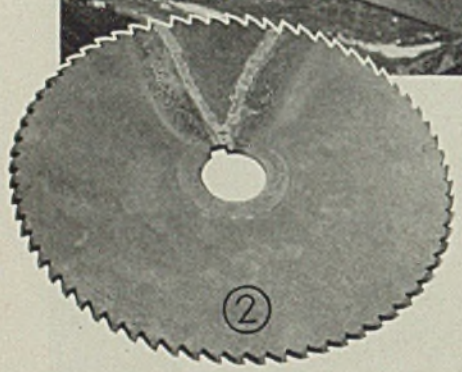
### Write for Bulletin H3

Bulletin H3 giving more detailed information on the installation and leveling of lathes will be supplied on request. Also reprints of this and other* advertisements and bulletins in this series. State quantity.

*Ad. No. 1, "Keep Your Lathe Clean"
Bulletin H1, "Keep Your Lathe Clean"

Ad. No. 2, "Oiling the Lathe"
Bulletin H2, "Oiling the Lathe"





# RECLAIMING TOOLS

*. . . . by low-temperature brazing works well at International Harvester plants; procedure details are given*

By HERBERT E. FLEMING

Here is what J. W. Phillips, superintendent, Tractor Works, International Harvester, Chicago, says about low-temperature brazing in tool reclamation:

"Continuous operation of this plant in producing parts to fill war contracts held by International Harvester Co. is being helped materially by putting back into service broken, worn out and obsolete cutting tools by the procedures described in this article.

"It is extremely gratifying to know that we ourselves are in a position to handle any tool breakdowns or tool shortages that may develop and to know that this phase of plant operation is not going to hold up needed war production. By the methods described, we not only are able to maintain a steadier production but also we are able to conserve vitally needed cutting tools—one of the important bottlenecks in the war production effort.

"In my opinion, widespread application of such tool reclamation work would be a major step toward victory on the war production front."

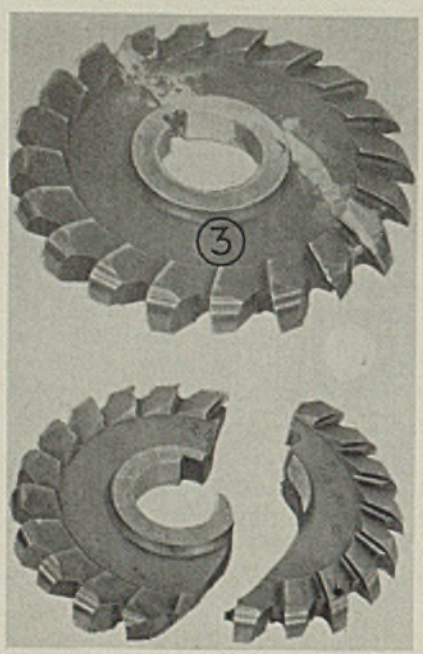


*Fig. 1—John Nolan, expert in low-temperature brazing, joins broken parts of a crankshaft form-turning tool, using a special torch with a double nozzle that helps control application of heat*

*Fig. 2—Broken slitting saw was repaired by brazing in a piece from another saw*

EARLY work in practical application of low-temperature brazing to the reclamation of milling cutters, broaches and other special tools by Tractor Works, one of the big Chicago plants of the International Harvester Co., has been the outstanding technical feature of that company's success with its program of small tool salvage.

Brazing at temperatures just below those harmful to the hardness of high-speed steel has yielded cutting tools which in many cases could not have been procured by purchase short of 22 weeks or even the standard 6 weeks. And this method of reclaiming tools at Tractor Works and others among Harvester's seventeen plants has enabled the company to go ahead on schedule under war production contracts for Army, Navy, and Lend-Lease uses.

*Fig. 3—Broken radius cutter as received by tool salvage department, and as repaired by low-temperature brazing*

The outstanding management feature of the Harvester tool salvage program initiated last August by F. H. Harrison, manager of manufacturing, after the company's purchasing department had warned him of the well-nigh hopeless situation about getting new cutting tools, was the establishment of a central tool

# It Takes a Beach-Head to Start an Invasion

*This welded steel amphibian tractor is the Marines' answer to tough "competition" that beat us to the offensive, then dug in.*

**ALTER EGO:** Those few Marines may not win the war by themselves, but they will establish a beach-head and that's a mighty vital prelude to dislodging Axis "competition".

*Yes, war is like that. Business now is somewhat like that. Business after the war will be just like that!*

**ALTER EGO:** Right. To win the Battle for Business after this war we're going to have to get on the offensive with welded steel products.

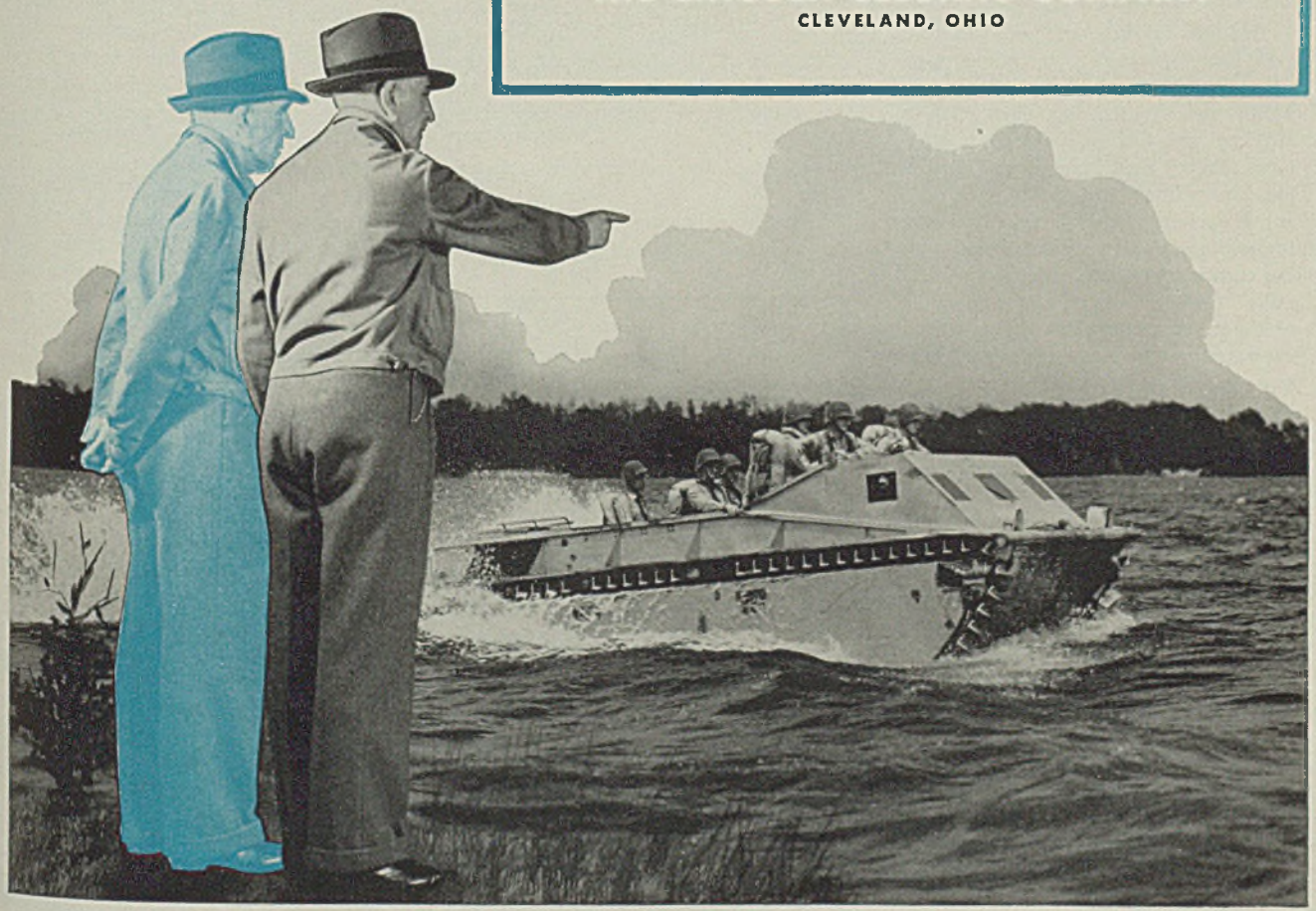
*Right. But first we must establish our beach-heads of welding knowledge. Let's start this prelude to invasion of the post-war market NOW.*

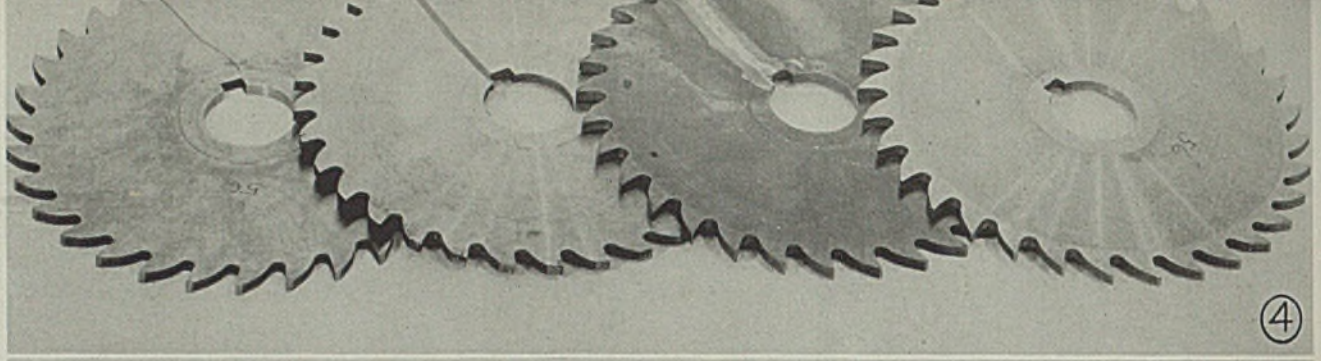
**Ask your inner self if a "beach-head" of welding knowledge shouldn't precede post-war market invasion.**

**THE LINCOLN ELECTRIC COMPANY**
CLEVELAND, OHIO

*then I said to myself—*

**MARINES and WELDING**
—the situation will be well in hand





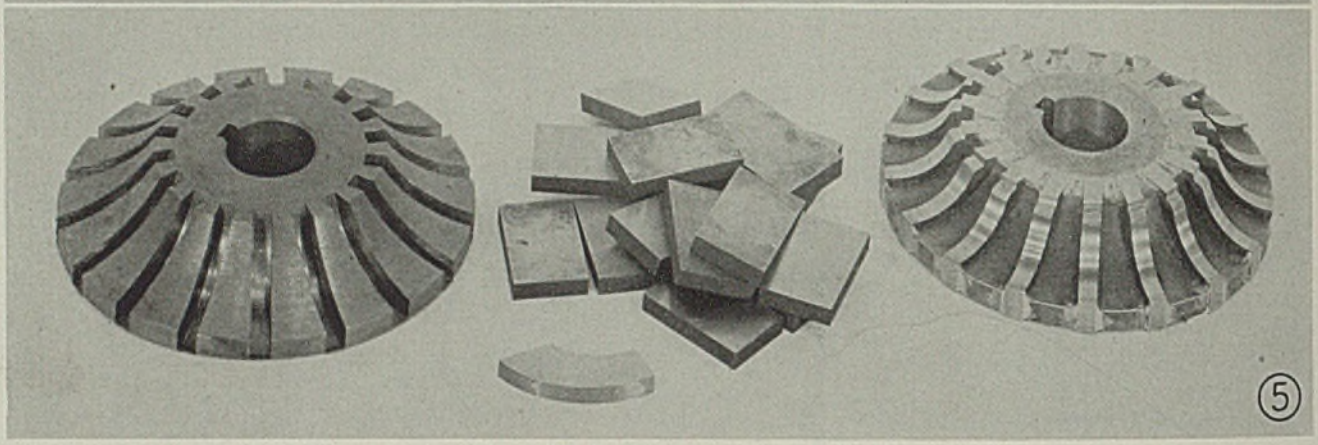


*Fig. 4—Stages in repair of cracked slitting saw. Broken, veed out, brazed, ground and polished*

*Fig. 5—Form milling cutter made from mild steel hub into which scrap cutter blades are fastened by low-temparture brazing*

salvage store for all the works, as described in STEEL, Feb. 23. But even though there were gathered into this central store all worn tools that the respective plants could not themselves use, it was left to each works superintendent to have his plant either to do its own reclaiming or to have it done by a salvage company in the neighborhood.

This management method proved a great spur to those in each works to adopt the most advanced technical method. There was a quickening of the use of ordinary grinding or welding methods in reclaiming shell reamers or slab milling cutters from worn out hobs. Undersize broaches were reclaimed by reducing to the next size smaller. Spiral milling cutters were made from scrap thread mills. Drills broken off at the beginning of the taper were reclaimed as well as short reamers and end mills from scrap taps.

But the greatest interest aroused was in the use of low-temperature brazing. This was evidenced at an all-day gathering last November of the 26 men in immediate charge of small tool salvage from 14 of the Harvester works. This conference was held at Tractor Works, Chicago, a plant that had done tool reclaiming for 20 years. It had been experimenting with and developing the use of low-temperature brazing for some two years.

At that meeting those present examined a display table of tools reclaimed by low-temperature brazing. These included, among others, a milling cutter with replaced teeth, a cutter made of stellite blades inserted in a cutter body of nickel steel treated to 30-35 rockwell, a cracked slitting saw reclaimed by grinding a V-slot along the crack and brazing, broken round broaches restored so as to be "good as new", flat broaches with fractures around tapped holes built up for fillister screws by brazing, and forming tools reclaimed by brazing pieces of stellite scrap at the cutting points. Also exhibited were old reamers reworked, and an extension reamer made out of two short ones.

Although salvaging broken broaches is rated at top place in this low-temperature brazing reclamation at Harvester's Tractor Works, the making of new milling cutters from scrap materials is a phase of special interest. Excellent results have been obtained. By low-temperature brazing worn out milling cutter blades into a hub blank of suitable mild steel, a milling cutter is secured with more blades than in a purchased cutter in conventional solid back-off form. Such a home-made milling cutter often contains one-fourth to one-third more blades. A limitation is that on such a cutter there will be a few grinds less than on one with conventional back-off. "But by getting more blades," said Mr. Johnson, "we get a smoother cut, as there is less chip load per tooth."

Recently at Tractor Works 11 different applications of low-temperature brazing to various kinds and conditions of tools were rated, and the procedure for each was outlined step by step. These procedure details will be found in Table I. They form an excellent guide in shop work.

In rating the importance of these various jobs from the over-all viewpoint, four factors are applied: Difficulty in obtaining a replacement tool; difficulties in reclaiming such a tool; savings involved by reclaiming in place of purchasing a new tool; importance to production line in having this tool available in the shortest possible time.

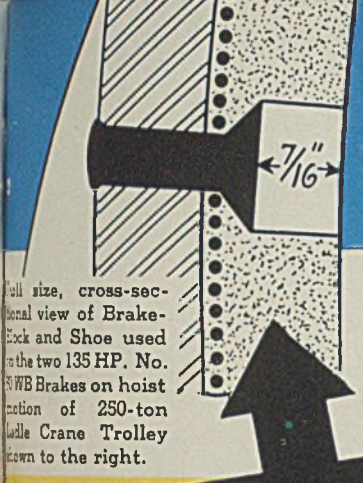
The resultant rating of reclaiming

(*Please turn to Page 157*)

ON GUARD

# Against Slippage

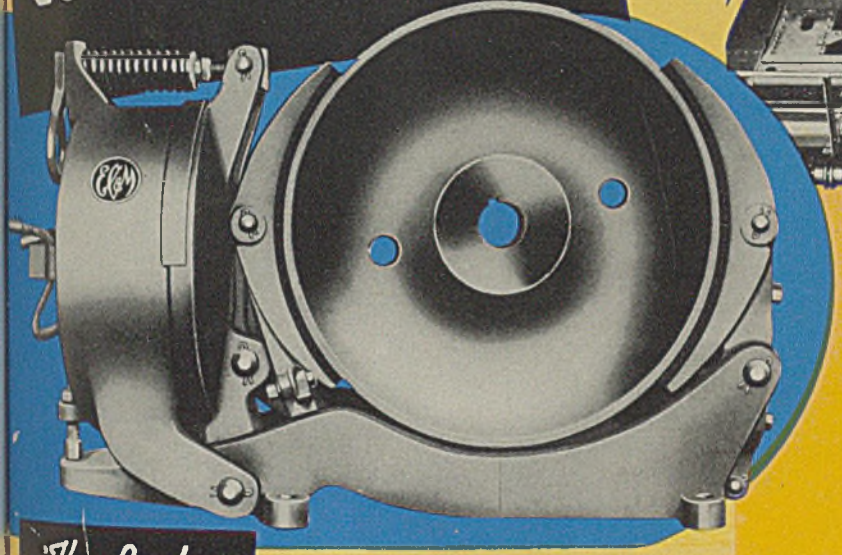
## ON CRANES, HOISTS, AND MILL MACHINERY

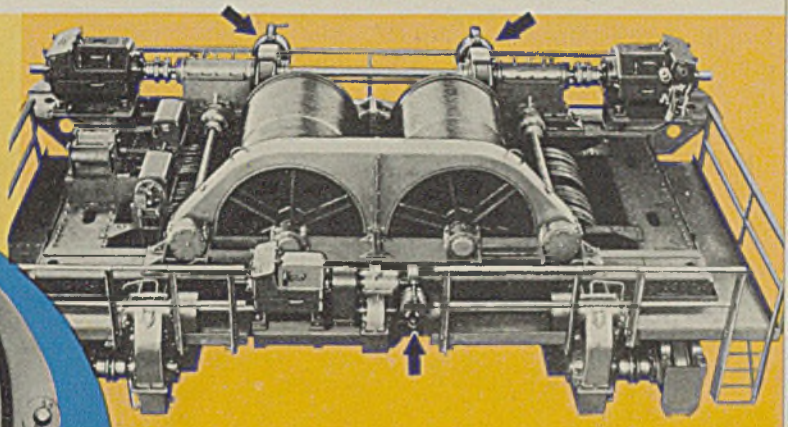



Full size, cross-sectional view of Brake-Block and Shoe used on the two 135 HP. No. 5 WB Brakes on hoist section of 250-ton Saddle Crane Trolley shown to the right.

# EC&M "WB" BRAKES

## They Give 2 to 6 times LONGER SERVICE





HERE are the facts why there are thousands of satisfied WB Brake users.

**FACT No. 1**—Modern brakes are *blocked* instead of lined. "WB" Brakes use blocks from 1/4" to 3/4" thick, permitting 1/8" wear per shoe on the smallest size to 7/16" on the largest size.

**Significance**—Automotive vehicles (cars, trucks, busses), for years, have been using blocks, accurately formed to fit the drum to give long-lived braking requiring infrequent adjustment with minimum upkeep.

**FACT No. 2**—In "WB" Brakes, the ratio of wear on brake-block and wheel to magnetic-air-gap-growth is unusually small.

**Significance**—For a given wear on block and wheel, the increase in air-gap between magnet and armature is small which means *infrequent adjustment* to compensate for wear.

**FACT No. 3**—When the "WB" Brake operates, the impact is equalized since both shoes strike simultaneously.

**Significance**—This eliminates shock on brake frame and bushings, and on motor bearings.

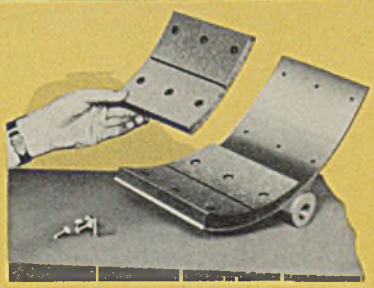
**FACT No. 4**—The trend is toward EC&M "WB" Brakes.

**Significance**—Plant managements recognize the improved performance and low maintenance cost of "WB" Brakes and specify this better brake whenever cranes, mill machinery, etc., are purchased.

Other outstanding advantages of EC&M "WB" Brakes are: Low contact-pressure per square inch and 50 per cent of the wheel covered by brake shoes, 50 per cent exposed to give heat radiation. Ask for Bulletin 1004-D describing these efficient, economical brakes for cranes and machinery. Write for your copy of this bulletin to-day.

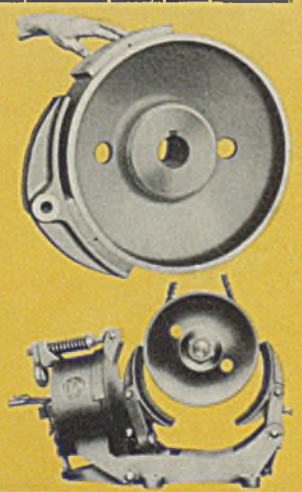
## "The Brake that's BLOCKED not Lined"

Blocks, exclusive with "WB's" are moulded, non-compressible, thick and tough. Constant frictional qualities throughout thickness permit complete wear—down to rivet heads. Accurate grinding on both sides to uniform thickness gives precision fit on shoe and on wheel—no "break-in" period when new—easy replacements, if and when needed.



### ARMATURES OR BRAKE SHOES QUICKLY CHANGED

There is no brake like the "WB." Motor armatures come out easily—no rods or levers on top to interfere — one operation compress torque-spring with hand-release)—shoes fold back as armature is lifted out. Insert new armature—back off hand-release and you're ready to go. Simple, mighty convenient, too!

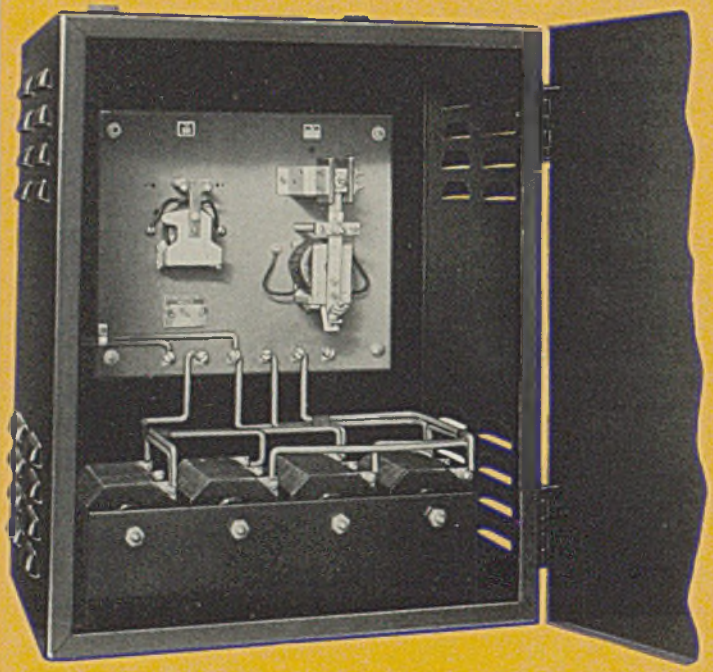


THE *Most Efficient* BRAKE FOR CRANES, HOISTS, MILL MACHINERY

# The Well Known "WB" BRAK

## NOW *Available* WITH RECTIFIE

## UNIT FOR A-C APPLICATIONS . . .



Compact rectifier-unit with brake contactor and resistor. Allows high current for fast release, reduced holding gives current fast brake setting. When used with magnetic control, this equipment is usually combined with the motor control panel.

THE "WB" Brake with Rectifier-unit is a perf solution to a difficult problem.

**ADVANTAGES**

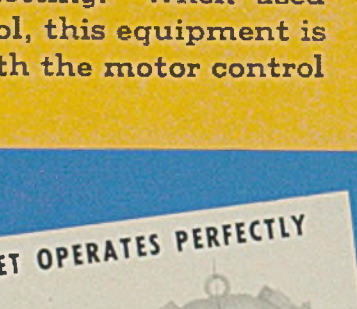
- **No** laminated magnets or plungers
- **No** destructive hammer-blow
- **No** A-c chatter
- **No** coil burn-out due to shoe-wear affecting air-gap
- **No** motors, gears or pumps
- **Has fast** release and set
- **Has** ability to permit accurate inching
- **Has** hand release
- **Has** solid cast-steel magnet and armature
- **Has** short armature-movement
- **Has** thick, moulded brake blocks
- **Has** all the advantages of the well known "WB" Brake—the leading brake for D-c applications since 1926.

This is a proven system of braking. Nearly 200 of th brakes and rectifier-units are already in service in t short time they have been available. Several score a on shipyard cranes, others giving highly success performance on many cranes in machine shops, pow plants, metal mills, etc.

New Bulletin 1006 gives complete facts. Write for yo copy to-day.

### MOUNTED OFF CENTER—YET OPERATES PERFECTLY

Slight inaccuracies in brake mounting often occur and the design of the EC&M "WB" Brake permits a quick, successful solution under these conditions. For example, the illustration at the right shows a "WB" Brake mounted off center—$\frac{1}{16}$" horizontally and $\frac{1}{4}$" vertically—yet, the "WB" Brake operates perfectly.

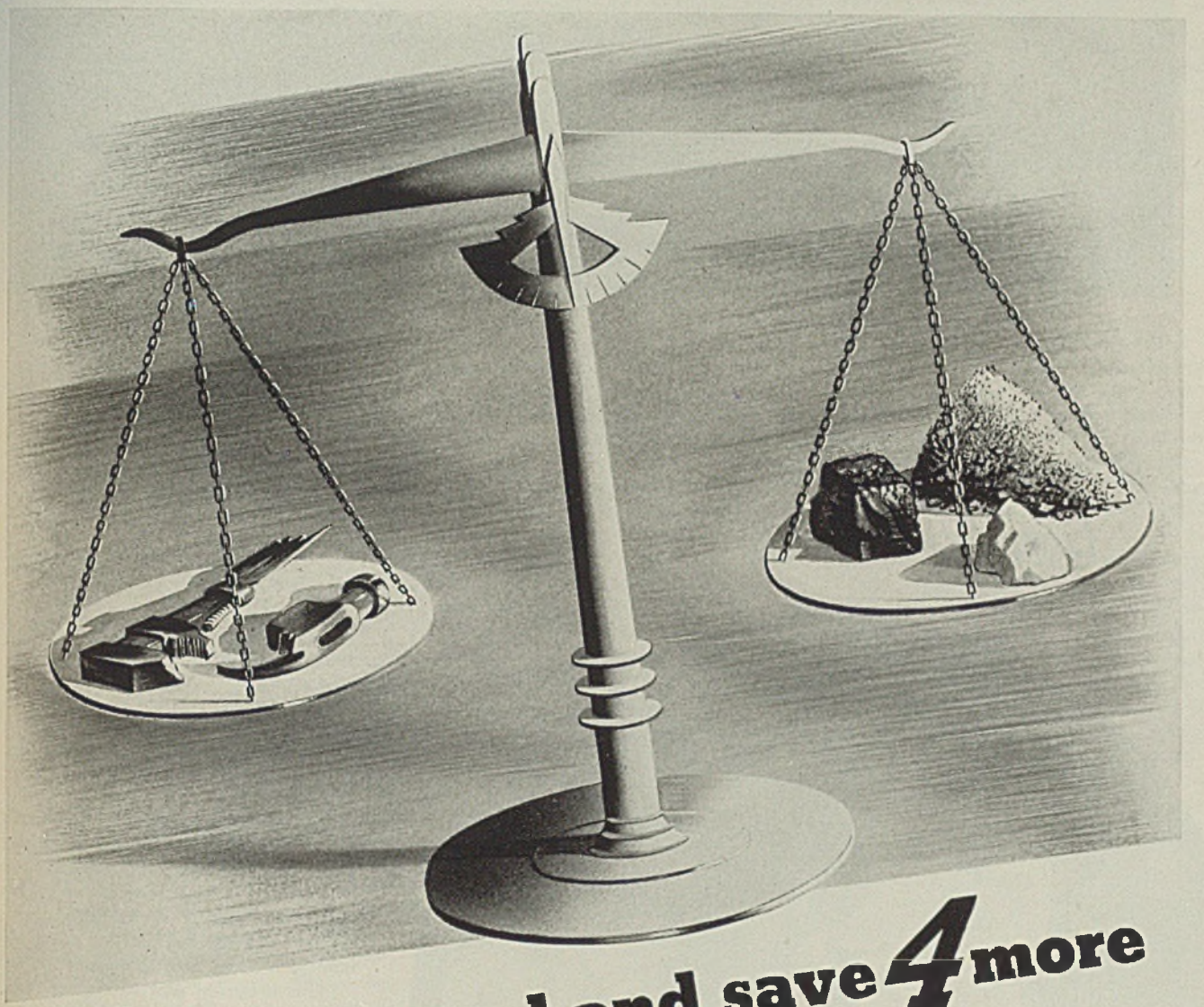


### INVESTIGATE BEFORE BUYING A-c BRA

### PUT YOUR A-c BRAKE PROBLEMS UP TO E

When buying new A-c cranes and machin or when revamping old installations, cons EC&M on your brake requirements. Compl information regarding brake-size, dimensio torque-rating, etc., will gladly be furnish without obligation, of course.

THE ELECTRIC CONTROLLER & MFG. CO. — CLEVELAND, OH



# Scrap a pound and save 4 more

EACH pound of scrap used in making war steel replaces a pound of pig iron.

To make one pound of iron requires nearly four pounds of ore, coal and limestone.

So when you turn in a pound of scrap you also conserve four pounds of vital raw materials. Translate this saving into terms of the 6,000,000 tons of steel scrap that the industry needs today. It is the equivalent of:

12,000,000 tons, or 240,000 carloads of iron ore,

7,200,000 tons, or 144,000 carloads of coal,

3,000,000 tons, or 60,000 carloads of limestone.

Think also of saving the millions of man hours of labor involved in mining, transporting and processing these 444,000 carloads of raw materials — enough to form a solid train stretching from Boston to San Francisco.

The more dormant scrap YOU salvage, the greater the amount of America's materials, machines and manpower is released for the all-important task of winning the war now.

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

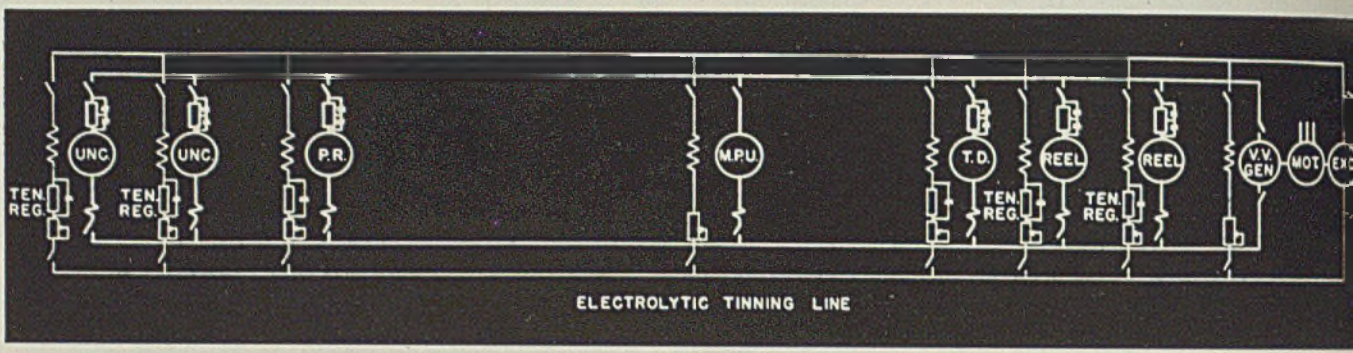
THROW YOUR SCRAP V YOUNGSTOWN INTO THE FIGHT

*THIS ADVERTISEMENT SPONSORED BY*

THE YOUNGSTOWN SHEET AND TUBE COMPANY

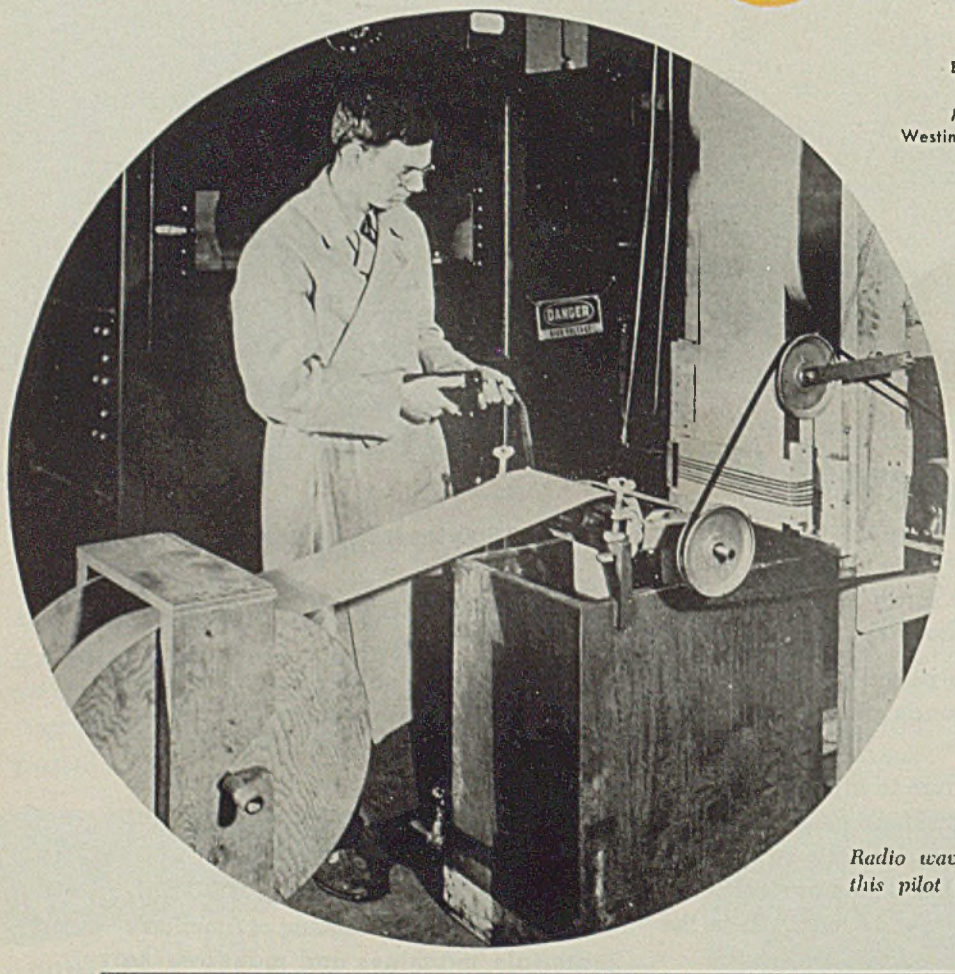
*Youngstown, Ohio*

25-43E



ELECTROLYTIC TINNING LINE

# Develops Processing Lines for . . . . . Electrolytic

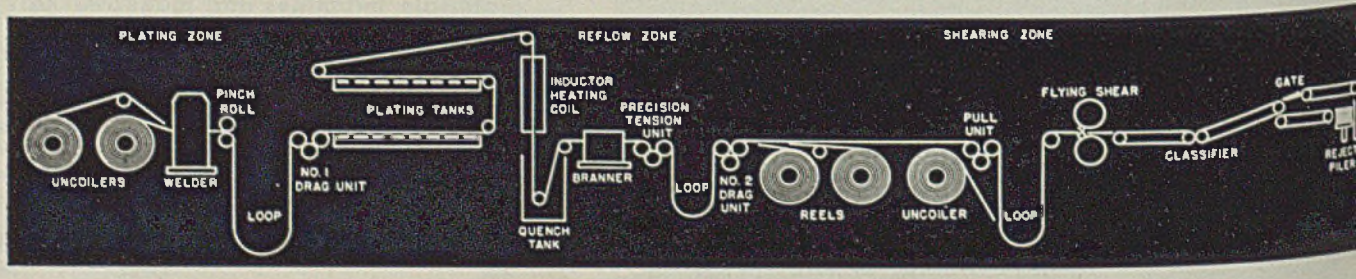



By J. RAYMOND ERBE
*Industrial Engineer*
Metal Working Section
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

TODAY'S tin shortage has accelerated the development of suitable processing lines for the electrolytic deposition of tin on steel. This process, which has been the object of considerable experimental work for the last few years, has now been taken from the laboratory and made a necessary part of modern steelmaking practice. Indicative of this progress are tinning lines which are capable of turning out a sheet, tinned on both sides, 3 feet wide, at the rate of 1000 feet per minute.

The several types of tinning lines thus far developed have two basic differences. One is whether the speed through the plating bath is held constant or allowed to decrease when a fresh coil of steel is entered into the line. The other principal difference is whether the plating

*Radio waves from 10 feet of coiled copper tubing on this pilot mill, left, imparts a shiny corrosion-resisting finish on tin plate*



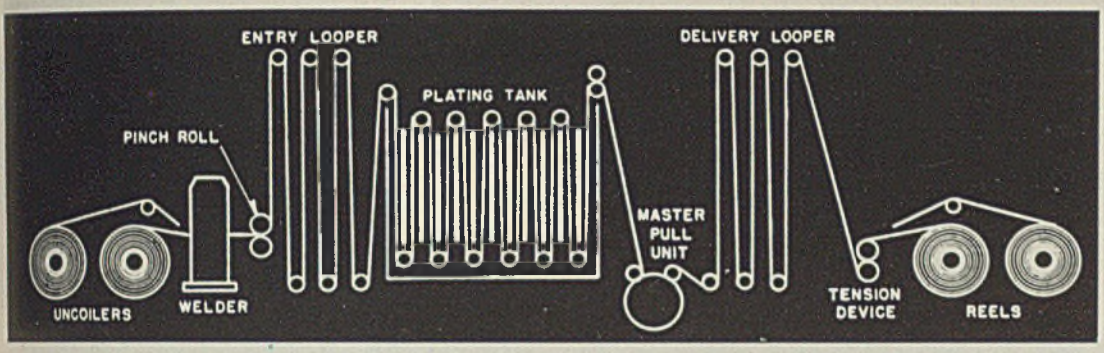



*Fig. 1—Schematic diagram of constant plating speed, vertical tank line. Coils can be handled up to 36 inches wide*

*Fig. 2—Circuit diagram, opposite page, left, of electrical control for constant-speed line*

# Tinning

tanks are vertical or horizontal. In one type of mill the steel moves through the plating tanks at constant speed, and means are provided for accumulating enough slack at the entry and to allow the end of a new strip to be welded on. The other scheme, which in general permits a faster speed of strip, allows the entire line to slow down when necessary to start a new coil. In the horizontal plating tank line the two sides of the sheet are tinned separately allowing variation in thickness and even in kind of metal deposited, if necessary. In the vertical tank line the sheet is tinned on both sides as one operation and hence exactly alike. To present a clear picture of the problem involved and the associated electrical requirements the two most dissimilar types of lines will be discussed.

Constant Speed, Vertical Tank Line: Consider first the constant plating speed, vertical tank line, as shown in Fig. 1. The steel to be electrically tinned comes to the tinning line in the form of a strip 0.005 to 0.015-inch thick, up to 36 inches wide and 3 miles long, wound into a tight coil. This coil weighs about 30,000 pounds and is about 5½ feet diameter. It is placed on one of the two uncoilers at the entry end of the line. After the end is squared in the shear, it is then threaded through the welder, the first pinch roll, and thence successively through the entry looper, the plating tank, the rinse tank, and the master pull unit. The strip is fed through the delivery looper, the tension device, the second shear, and entered on the receiving reel. The line is now completely threaded and ready for operation.

As a processing line of this type is operated from a variable-voltage system, the line is started by increasing the generator voltage until it overcomes the internal drop of the line motors so that the strip just starts to move. The fields of the plating generators are excited. The plating current and the line speed are simultaneously increased, until the desired operating speed is obtained, by properly manipulating the rheostats of the plating generator. A line of this type usually has a maximum running speed of 500 to 600 feet per minute because it does not seem advisable to have several strands of strip running faster than this through loopers whose top rolls are at times 30 to 35 feet above the bottom rolls.

### Maintains Back Pull on Strip

With the line running we can examine each individual unit to determine what it must do for satisfactory operation. The uncoiler motor now acts as a drag generator, the steel strip being pulled from the coil against the resistance of the drag generator by the entry pinch roll. To prevent the uncoiler from overrunning the pinch roll and allowing slack to accumulate which might cause a cobble or tangle, a tension regulator is used to maintain a light back pull on the strip. A regulator of this type operates on the field of the uncoiler drag generator to maintain a constant armature current. In so doing it also serves a second function, that of automatically compensating for the decreasing diameter, (i.e. increasing speed), of the uncoiler.

Both of the loopers, as shown, consist of several bottom rolls in a fixed support and several top rolls in a movable support. This movable support is counterweighted. The amount of tension in the strip while passing through the plating and rinse tanks is determined by the counterweights. The purpose of the looper is simply to provide a means of accumulating slack in the strip to be used when changing to a fresh roll. When the strip is first started through the line the field of the motor driving the entry pinch roll is weakened, so that the roll runs about one-fifth faster than the strip through the main compounds of the line. In this manner the entry looper accumulates surplus strip so that the top rolls are nearly at the top of their travel. When this has been accomplished the pinch roll is then driven in synchronism with the remainder of the line.

The plating current is manually adjusted to produce the desired coating weight. In this type of line the anodes of cast tin are supported vertically between the vertical passes of the strip. The negative bus of all plating generators is connected to the contact rolls shown at the top of the plating tank. The positive terminals of the plating generators are connected either to individual anodes or to several anodes in parallel. The plat-

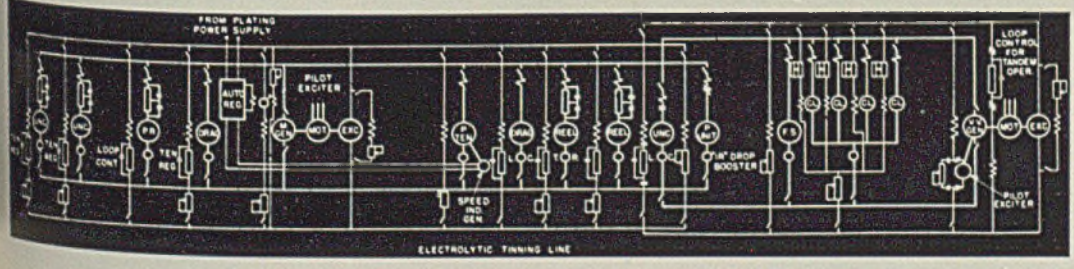



*Fig. 3—Schematic diagram, left, opposite page, of variable-speed horizontal tank line.*

*Fig. 4—Circuit diagram, immediate left, of electrical control for variable-speed line*

ing current can be supplied from either a low-voltage, high-current, direct-current generator or a dry-type rectifier such as the Rectox (copper oxide). Both methods are being used on lines now being built.

The thickness of the tin deposited or coating weight is a function of both time and speed. Hence, the plating power required is determined by the speed of the line at which a given coating weight is to be applied. Once these two factors have been decided the total plating power requirements can be determined, but this does not necessarily mean that heavier coatings cannot be put on or that the line cannot be run at a higher speed. Heavier coatings can be made at reduced speeds while lighter coatings can be deposited at higher speeds. It is essential only that the proper relationship between the total power and the speed be maintained for the desired coating weight.

The strip passes from the plating tank to the rinse to remove all plating solution that adheres to it. The strip then enters the master-pull unit. This roll is essentially the master unit of the entire line because the speeds of all the other drives are referred to it. This drive, therefore, fixes the speed at which the strip passes through the line. For this reason it always operates at full-field strength so that its speed is entirely dependent on the applied generator voltage.

From the pulling pinch roll the strip passes through the delivery looper into a tension device. This device operates as a drag generator to insure a tightly wound coil, so that the individual layers will not slip on each other when the coil is handled. Finally the strip is wound into a coil on the mandrel of the reel.

Another large problem remains for electrical control to solve. When only a few turns remain on the uncoiler the operator accumulates as much strip in the entry looper as possible by speeding up the entry pinch roll slightly. Then when the end of the coil approaches, the entry pinch roll is stopped, the end of the strip sheared off to square it, the end lapped on the new coil, which has been previously placed on the other uncoiler above it, and the two ends welded together. During this operation, which normally takes 30 to 40 seconds, the remainder of the line has been operating at normal speed, using the strip accumulated in the looper. On completing the weld, the entry pinch roll is started by a conventional magnetic controller and again operated from the variable-voltage bus. By a similar procedure the delivery end of the line can be stopped to change reels.

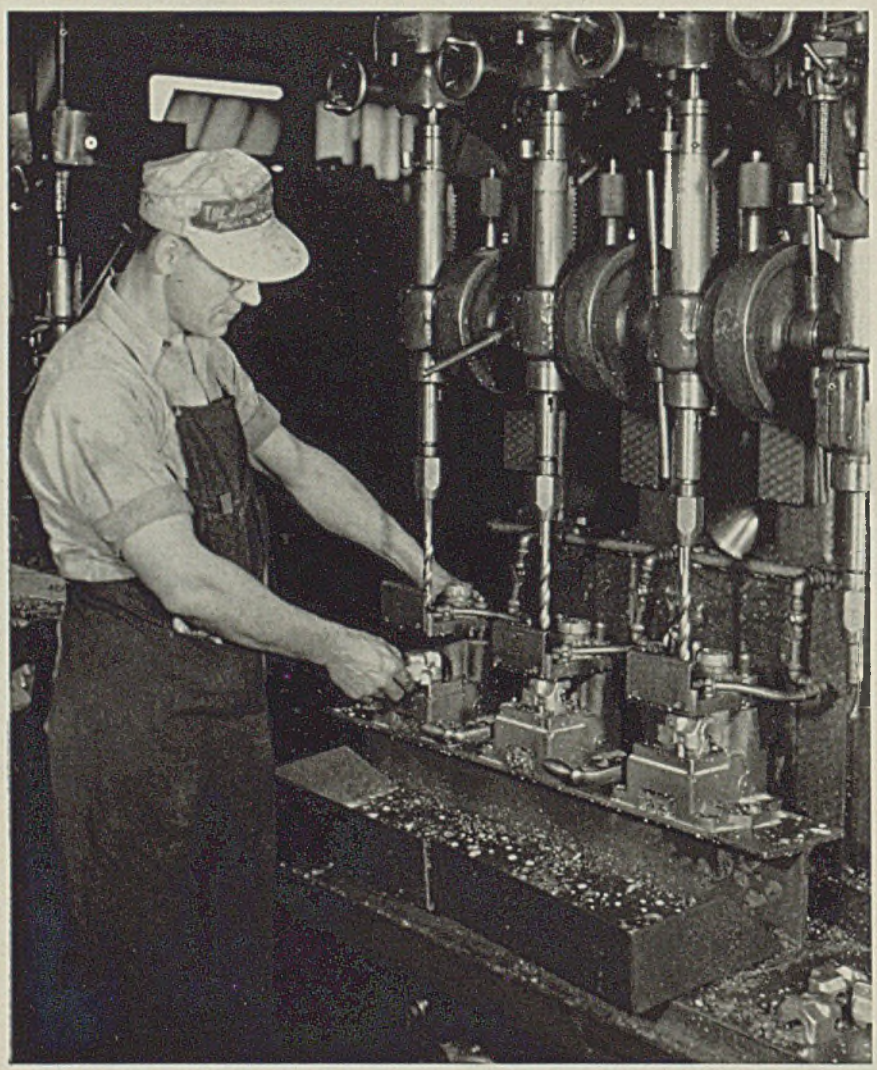
### Has Several Advantages

The principal advantages of a line of this type are its simplicity of control, the fact that motors of limited range of field control can be used, and relatively low strip speed requiring only a small amount of driving power. The control is simple, as the electrical schematic, Fig. 2 shows, because once the line is started the speed of the major part of the line remains constant even though at times either the entry or delivery ends are stopped briefly. Practically all the speed variation is obtained by control of the armature voltage. Therefore, it is possible to use motors provided with only a small amount of field control, which makes for a low-cost installation. Only the uncoilers and reels require any appreciable speed range. This is because of the coil changes in diameter.

VARIABLE-SPEED, HORIZONTAL TANK LINE The second basic type of line is shown schematically in Fig. 3, and is a high-speed line with horizontal plating tanks and variable-speed plating. This line essentially consists of three distinct units in tandem. These are: first, the plating unit with uncoilers, pinch roll, No. 1 drag roll, and the plating unit; second, the flow or fusion unit with the flow zone, branner, and precision tension unit; and third, the shearing unit consisting of a pull unit, loop, flying shear, classifier, and pilers. This line has been designed for operation at 650 feet per minute, with provision for making changes to obtain speeds as high as

(*Please turn to Page* 166)

## BOLTED DRILL JIGS FACILITATE PRODUCTION



FACILITATED production was achieved in illustrated operation at the Switch-gear Division of Westinghouse, East Pittsburgh, Pa., by bolting three drill jigs to the table of a 4-spindle drilling machine. This eliminates necessity of operator centering fixture under drilling spindle. Operator lifts drill jigs by raising hand crank with his left hand and replaces piece to be drilled with right hand. Drilling cycle permits operator to load and unload the three drill jigs. He performs burring operation, at right, during the time required for drilling.

# YOU HAVE NEED FOR MATERIAL WITH THESE PROPERTIES

Resistance to Severe Thermal Shock — No Spalling
No Deformation at High Temperature — Infusible
Not Wet by Molten Metals — No Sticking
Mechanical Strength Maintained at High Temperature
No Reaction with Most Acids, Alkalies and Solvents
High (or Low) Thermal Conductivity
Good Electrical Conductivity
Low Thermal Expansion
Available in Impervious Grades
Available in Highly Permeable Grades
Easily Machined and Fabricated
Low in Cost

# CARBON AND GRAPHITE

**ARE THE ONLY MATERIALS POSSESSING THIS ADVANTAGEOUS COMBINATION OF PHYSICAL AND CHEMICAL PROPERTIES**

### ★ FABRICATED PRODUCTS

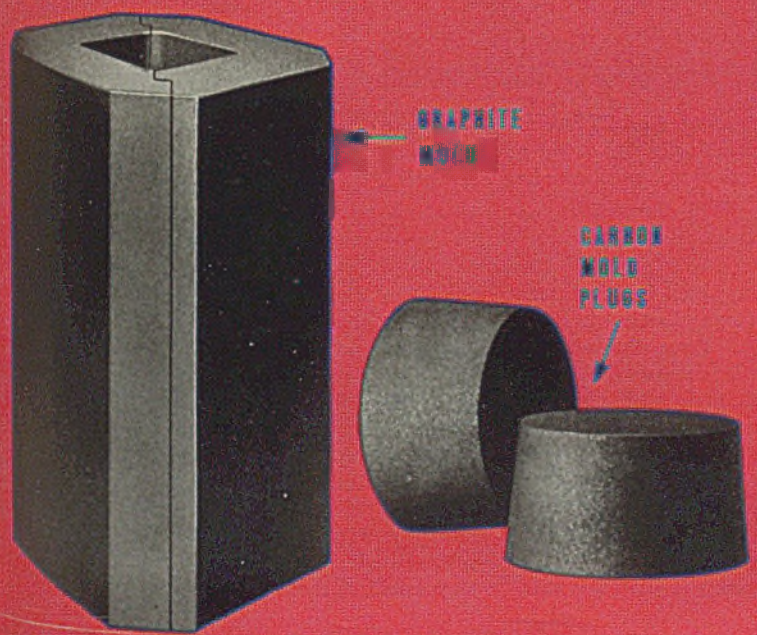
Practically any design can be machined or fabricated from stock materials.

### ★ STANDARD STOCK FORMS

BEAMS • BLOCKS • SLABS • PLATES • BRICK
RODS, ROUND AND RECTANGULAR • TUBES
CYLINDERS • PIPE • TOWER SECTIONS

### ★ MOLDED PRODUCTS

Carbon and graphite products are molded to form when quantity justifies.




**IMPROVED PRODUCTION AND REDUCED MAINTENANCE HAVE BEEN EFFECTED ON MANY METALLURGICAL APPLICATIONS BY USE OF**

## NATIONAL (TRADE-MARK) and KARBATE (TRADE-MARK) CARBON AND GRAPHITE PRODUCTS

SUCH AS

Carbon mold plugs, inserts and stools. Carbon and graphite molds, crucibles and cores. Impervious carbon tanks and tank linings. Carbon trough and furnace linings. Carbon rolls and graphite electrodes for pickling tanks. "Karbate" impervious pipe, valves, pumps and fittings. Porous carbon and graphite diffusers and filters.


**WRITE** for information on the use of carbon and graphite products for applications where a material with the properties listed above would be advantageous.

**NATIONAL CARBON COMPANY, INC.**
Unit of Union Carbide and Carbon Corporation
UCC
CARBON SALES DIVISION, CLEVELAND, OHIO
General Offices: 30 East 42nd St., New York, N. Y.
Branch Sales Offices: New York - Pittsburgh - Chicago - St. Louis - San Francisco

# Oil Handling System

*. . . . aids efficient utilization, avoids waste, assures uniform pressures, permits more effective filtering*

(*Conclusion*)

AT THE PLANT of the Union Drawn Steel Division of Republic Steel Corp., 11 oil distribution stations are provided along the railroad track loading zone. These outlets are used to supply spray gun equipment employed to apply oil to the finished steel. Oil and air outlets have been equipped with fast coupling connectors, consisting of a socket and plug, to speed attaching and removing the spray units.

Inasmuch as some finished steel is shipped by truck from the plant, a portable slushing outfit has also been provided. It consists of a small, mobile unit on which is mounted small, self-contained pumping and air compressor equipment. Separate 54-gallon drums are provided to carry either light or heavy slushing oil which is sprayed from this portable equipment under 32 pounds air pressure.

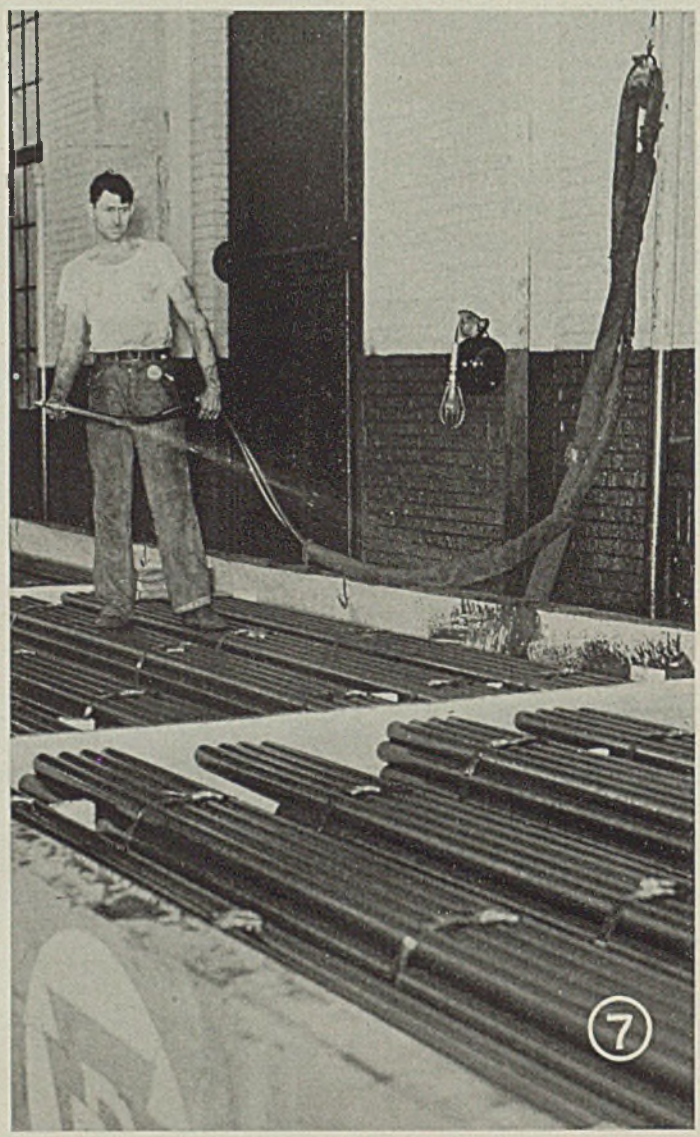


*Fig. 7—Regulation spray gun equipment on 25-foot lengths of hose is used for spraying finished steel with slushing oil for protection during shipment. Oil and air outlets have quick-coupling connectors, consisting of socket and plug*

**Soluble Oil Distribution System:** Lathes, grinders, cut-offs and saws require a quantity of soluble oil in their operation. To provide it, a self-contained and self-cleaning distribution system has been set up with supply and return lines to handle the soluble oil to and from all equipment of this nature in the plant.

Heart of the system is a 12-foot diameter open-type settling tank in the basement of the plant. The soluble oil is pumped from storage through 178 feet of 1¼-inch pipe to a small measuring tank immediately adjacent to and elevated above the settling tank. It is mixed for use as a coolant in proportions of 10 to 1 with water which is introduced into the settling tank directly from a plant water main. From the settling tank the coolant is pumped under 40 pounds pressure through a self-cleaning coolant filter to the machines on the floor above. It returns by gravity to the settling tank.

The abrasive particles which are picked up in the coolant oil would produce excessive wear on a gear pump, consequently a centrifugal pump is used for this assignment. The pump has a capacity of 225 gallons per minute and is driven by a 10-horsepower 220-volt, 60- cycle 3-phase explosion-proof motor.

The two cylindrical filtering units contained in the coolant filter are connected through gearing to a motor-driven speed-reduction unit. They turn only when cleaning is necessary and then at 6 revolutions per minute, thereby minimizing power consumption as well as wear and tear on equipment. The driving motor is controlled by a differential pressure switch which operates only when the differential pressure increases to a predetermined point. When the filtering units are cleaned, which usually requires only a fraction of a turn, the differential pressure drops and the drive motor is stopped automatically. A manually-operated switch is also provided to permit the motor to be started and stopped at will.

An exceptionally large sump is provided below the filtering units to permit lower filtration cycles without necessity of shutdowns for cleaning. The discharge line from the filter has been provided with a 3-inch relief valve, 10 to 300 pounds pressure range. This has been set at 45 pounds pressure and is connected so it can by-pass oil into the return line to the settling tank. Maximum capacity of the filter is 400 gallons per minute.

At each machine, whether grinder or lathe, there has been installed a primary settling basin, Fig. 8, to remove as many as possible of the metal particles, chips,

# Footsteps to Victory!

THESE are the real footsteps to Victory . . . the marching feet of fighting men, now heard across the embattled continents. Yet these men cannot fight unaided. Each step a soldier takes needs the fullest backing here at home. We must sacrifice, we must work, we must save.

Here, for example, are four very simple conservation steps which you can take on the march to final victory. Follow them and make your storage batteries last longer. Buy to last, and save to win!

**STEP No. 1** Keep adding approved water at regular intervals. Most kinds of local water are safe in an Exide Battery. Ask us if yours is safe.

**STEP No. 2** Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

**STEP No. 3** Keep the battery fully charged—but avoid excessive overcharge. There's always a right way to do any job, and a storage battery will last longer when charged at its proper voltage.

**STEP No. 4** Keep records of water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings. Know what's happening!

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for Booklet Form 1982.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
*The World's Largest Manufacturers of Storage Batteries for Every Purpose*
Exide Batteries of Canada, Limited, Toronto

**Exide**
**IRONCLAD**
**BATTERIES**

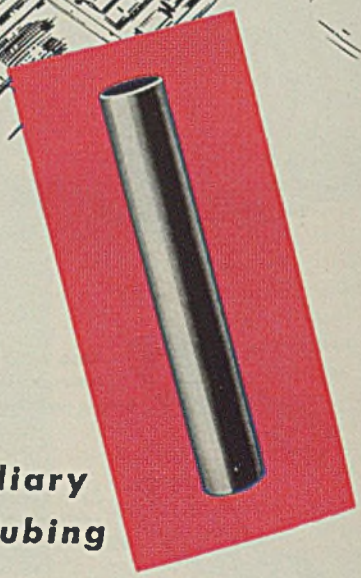
# THE EAGLE IS LAYING EGGS OF FIRE

THE gangster nations are getting a taste of the terror they are to know for provoking the American eagle's wrath. More and more, American bombers are laying "eggs of fire" on their factories and fortifications—in vivid demonstration of America's growing might.

The "eggs" are incendiary bombs. Many of them are made of WELDED STEEL TUBING. They typify another of the numerous ways in which WELDED TUBING has been adapted for uses of war.

We've made millions of WELDED TUBES for this purpose and we're daily turning out many other WELDED TUBING products for military uses, plus steel forgings for Army and Navy shells.

We have facilities for additional WELDED TUBING and forging work. Let us help you keep your production rolling. Write for information.



*Incendiary Bomb Tubing*

**THE STANDARD TUBE CO.**

Detroit STANCO Michigan

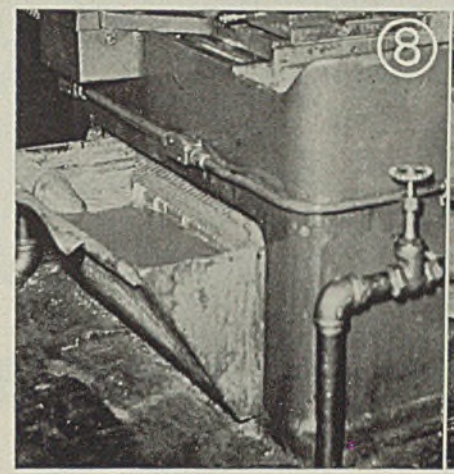
*Welded Tubing* *Steel Forgings*

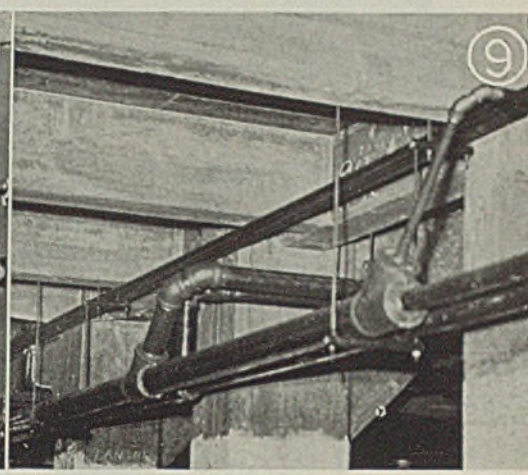
★ *Complete Tube Stocks Maintained by* ★

STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N. Y.
LAPHAM-HICKEY COMPANY, 3333 West 47th Place, Chicago, Ill.
UNION HARDWARE & METAL CO., 411 East First Street, Los Angeles, Calif.

*Fig. 8—At each grinder and lathe, primary settling basins similar to the one shown here have been installed to catch as much as possible of the metal chips, particles, etc., which otherwise would be returned through piping to the main settling tank*

*Fig. 9—All pipe bends are made at 45 degrees in the direction of flow in order to minimize clogging of return pipe lines. All photos from Republic Steel Corp.*




etc., which would otherwise be returned through the piping to the main settling tank. The carborundum bonding cement or sizing used in the composition of grinder wheels, for example, would quickly stop up even a good-sized pipe if permitted to pass through in any quantity. The individual settling basins at each machine, therefore, consist of a wire basket suspended in a sheet metal basin, Fig. 8. The coolant is discharged from the machine into the metal basket which holds back most if not all of the objectionable foreign matter from entering the return line to the settling tank.

At all junction points in the return lines from these basins, 45-degree Y-bends in the direction of flow, Fig. 9, are used to minimize further any possible clogging of the lines. Likewise, all return lines have a minimum number of bends and fittings and have been kept as nearly as possible in a straight line.

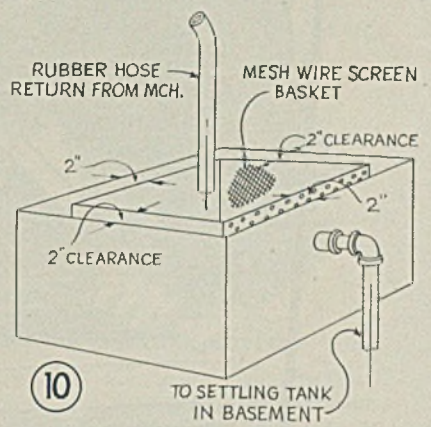
At the settling tank the return line empties into a screen basket of 100 x 100 mesh welded to and reinforced on the outside by a perforated shell having 1-inch holes on 11-16-inch centers or the equivalent of 48 per cent open area. This basket is 16 inches in diameter and 3 feet in overall depth. The design, Fig. 10, permits the oil to dissipate its initial turbulence before overflowing into the settling tank proper.

So that the settling tank can be cleaned at frequent intervals without interrupting operations, the bottom has been divided into three sections by 3-foot-high baffles. Since the depth of the coolant in the tank is generally carried at about 30 inches, this permits discharging the returning coolant into one section of the tank while cleaning another.

The longest and most extensive of the oil circulating arrangements in the plant, the delivery side for the soluble oil involves 680 feet of pipe, graduated in size from 3 inches to ¾-inch. On the return side, 630 feet of pipe from 4 inches to 1 inch in size have been used. For identification all soluble oil lines are painted white.

**Drawing Oil Distribution System:** Basically the same elements are required in the distribution system handling the drawing oil as are needed for the distribution of the soluble oil. The character of foreign matter picked up in the oil, however, has made some innovations necessary to insure the proper functioning of the system.

*Fig. 10—Settling basin for grinders and other machine tools has inner chamber made up of 100 x 100 wire mesh screen welded to and reinforced on outside by a perforated shell having 1-inch diameter holes on 11/16-inch centers, No. 16 gage steel, providing 48 per cent open area*




Three sections are employed—a 260-foot section of 1-inch as a makeup line from oil storage vault to two settling tanks; a 130-foot supply line, divided almost equally between 1-inch and ¾-inch pipe, which delivers the oil to the drawbenches; and a 125-foot return line, much of it 1½-inch pipe, the balance 1-inch, which deposits the drawing oil in either one of two settling tanks in the plant basement.

All piping in this system is painted green for identification.

The number of machines to be served and the length of travel of the drawing oil are much less than in the soluble oil setup. At the same time the quantity of oil to be kept in circulation is sizable. To facilitate cleaning operations, it has been found convenient to use two settling tanks, rather than one. While one tank is being used, the other can be cleaned, and vice versa. A gear pump of 10-gallon per minute capacity is equipped with a relief valve on the head and driven by a 1-horsepower 220-volt 3-phase 60-cycle explosion-proof motor. It operates continuously to maintain approximately 40 pounds pressure. The relief valve on the head of the pump has been found sufficient to hold the oil pressure steady at this value.

The discharge line from the pump passes all the oil through a pressure filter using an absorbent type of filter cartridge. However, steel wool has been substituted as the filtering medium in place of the usual cotton waste, wool, excelsior or asbestos.

Steel bars in the manufacturing process are pickled to remove scale, then dipped into wash water to remove acid. From the wash water they are put through a lime solution at 220 degrees Fahr. This leaves a fine coat of lime deposit on the bars which was picked up in the drawing oil and quickly filled a cotton waste filter. No. 3 steel wool was substituted as a filtering medium and has been found to be more satisfactory. It permits the lime particles to pass through, but this is permissible since lime itself is a lubricant and need not be removed from the oil as it does not damage the drawing dies in any way.

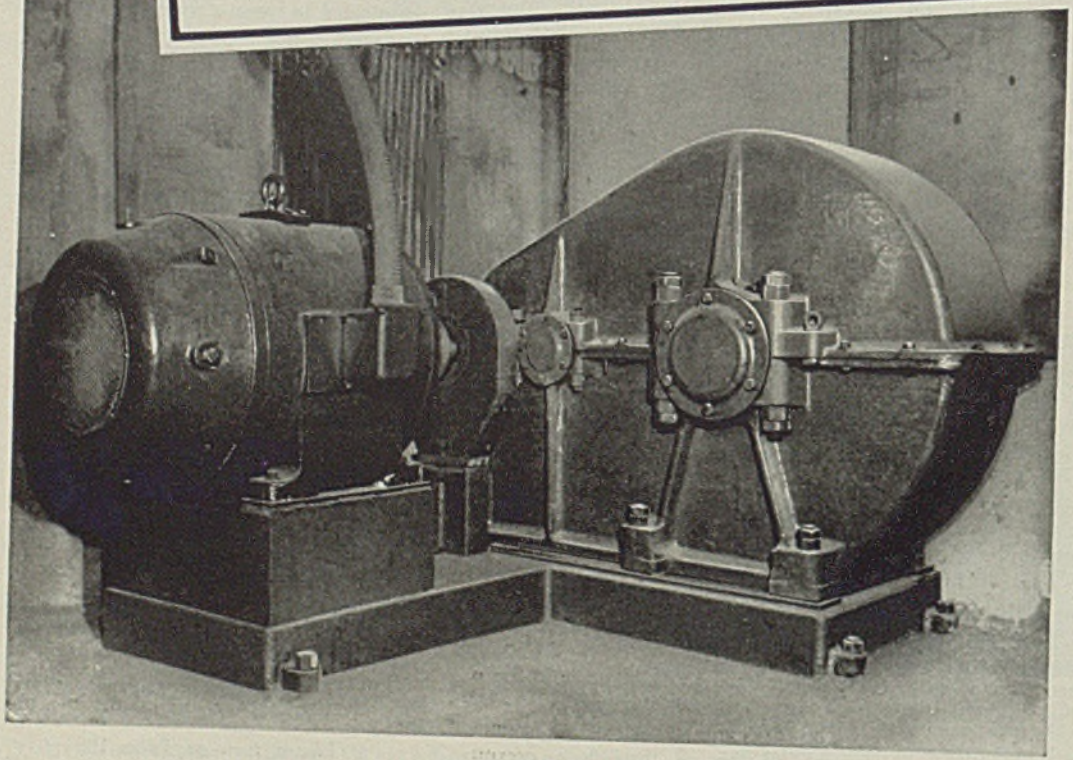
As in the piping circuit for the soluble oil distribution, the discharge line from the drawing oil filter is equipped with a 1-inch relief valve, 10 to 300 pounds pressure range, and by-passes into the return line to the two settling tanks.

All of the oil distribution circuits in the new system have been functioning most satisfactorily from their inception a few months ago. The centralizing of all oil handling has introduced a number of advantages over and above the ob-

(*Please turn to Page* 169)

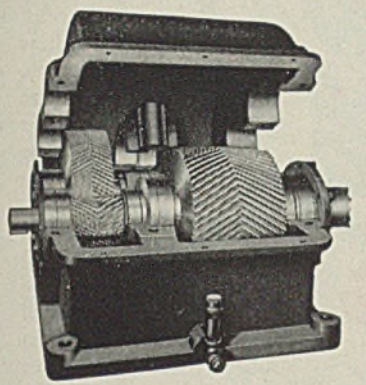
# Don't Worry Over SPEED REDUCER Problems

# —Call In *LINK-BELT*



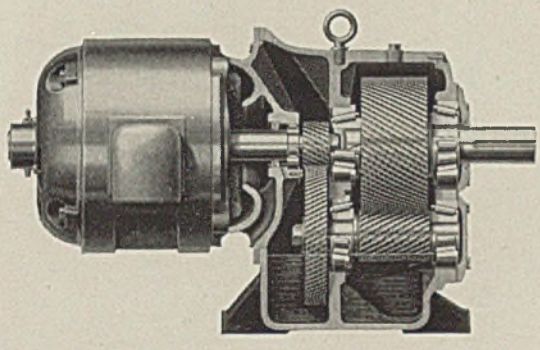
The 3 main elevator legs at the Farmers Union Grain Terminal Association elevator, Superior, Wisc., are operated from 200-HP electric motors through Link-Belt herringbone gear speed reducers, one of which is illustrated. These reducers are compact, quiet-running and automatically lubricated. They are equipped with anti-friction bearings, pinions cut integrally with shafts, and continuous herringbone tooth gears lapped on centers; totally enclosed in a substantial iron housing. Each unit is also equipped with a Link-Belt differential back-stop of the automatic band brake type, to prevent backward movement of elevator should the power fail.

# LINK-BELT Offers unbiased technical counsel on SPEED REDUCERS



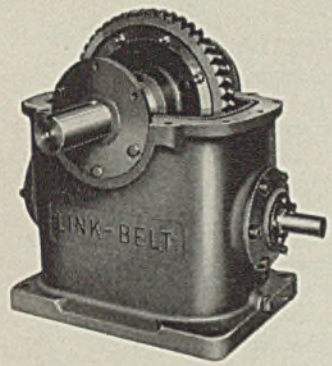
**HERRINGBONE GEAR REDUCERS**

Link-Belt herringbone gear reducers are made for all-around ruggedness, efficient high speed operation and ability to withstand shock loads, with quiet operation and complete protection against dust, dirt and fumes. Especially well suited for large reductions or increases in speed where space is limited. Single, double and triple reductions up to 1000 H. P. Ratios 10:1 to 318:1.



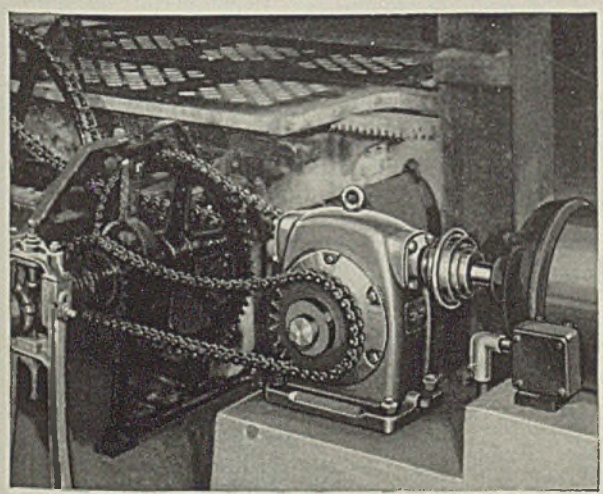
**MOTORIZED HELICAL GEAR REDUCERS**

Link-Belt motorized helical gear reducers provide unusual compactness, simplicity and economy in first cost, with high efficiency and durability. Available in 8 standard sizes, double and triple reduction types—up to 75 H.P., with standard A.G.M.A. output speeds, for mounting on wall, ceiling or floor.

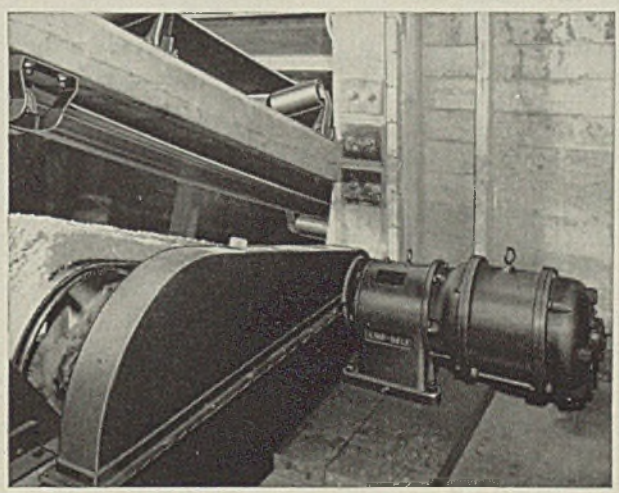



**WORM GEAR REDUCERS**

Link-Belt worm gear reducers for large ratios and flexibility of arrangement and where drives of right-angle type or other shaft combinations in single and double reductions are required. Horizontal and vertical types—adaptable to almost any form of speed reduction from 1100 to 115,000-inch pounds torque. Ratios 3⅝ to 8000 to 1.



This Link-Belt type WT-50 worm gear reducer connected to 5-HP motor is one of 3 units which recently replaced other types of drives at an eastern plant. Ratio 40:1 with a double output shaft to Link-Belt Silverlink roller chain drives.



Helping to handle gold ore is the job of this Link-Belt motorized speed reducer which is connected to a conveyor head shaft through a Silverlink roller chain drive. Note the compactness of the driving arrangement.

It's important in choosing a speed reducer to have an experienced organization to call on for engineering advice. Because Link-Belt does have the experience and because the Link-Belt line of speed reducers is so complete, you can be certain of unbiased recommendations as to type and size and complete performance satisfaction when you use Link-Belt speed reducers. Send for Engineering Data Books on any or all of the three types of speed reducers shown above.

LET'S GO! U.S.A. · KEEP 'EM FLYING!

8912-A

**LINK-BELT COMPANY** Philadelphia Plant, 2045 W. Hunting Park Ave.; Chicago, Indianapolis, Atlanta, Dallas, San Francisco, Toronto, Pittsburgh, Cleveland, Detroit

Branch offices, warehouses and distributors in principal cities

Leading Manufacturer of Mechanical Transmission Equipment—Silent and Roller Chains . . Speed Reducers . . Speed Variators . . Roller, Ball and Babbitted Bearings . . Collars . . Couplings . . Base Plates . . Take-ups . . Clutches . . Gears . . Sprockets . Hangers . . Shafting . . Pulleys, etc.

# Women

# "Man" Britain's War Plants

By DENYS VAL BAKER
London
England

*Women make particularly good operators on all types of light machine work and have been utilized for such operations for some time. But in Britain, they also do heavy work in steel mills—work formerly thought only suitable for men.*
*General Electric photo*

EFFECTIVE use of women labor is the keynote to successful total war production. The Germans realized this many years before war broke out and planned accordingly. In Britain we were appallingly slow to learn and it was not until the disastrous summer of 1940 that we shook off our traditional impressions about the "weakness of the opposite sex" as regards industrial work, and began planning to utilize some of the many millions of women workers available. During the past two years, however, we really have made some amazing progress in this direction.

In the first place, we have completely revised our ideas about labor and the manning of war factories in the light of recent experiences. No longer do we regard it as inevitable that huge quantities of fit manpower must be left in the factories and other industrial services. Some time ago the Ministry of Labor wiped out the old system of deferment of men in age groups and introduced a new system whereby men are only reserved by merit: furthermore, the idea behind this system is to release every available man from the factories for the services and to replace him with a woman.

The significant point of this is that the Ministry is now quite confident that most semi-skilled and even highly skilled men can be replaced by women.

Two years ago this was regarded as a Utopian idea, but thanks to the imagination of the Ministry in launching a series of specialized technical training courses for women, there is now available, in increasing quantities, a pool of women who are ready-made skilled production workers.

In countries such as Germany and Russia, this substitution of women for men has been developed to a high degree as is generally known, but I doubt whether it is quite realized to what extent Britain has now imitated this progress.

### "Weaker Sex" Takes Over

A simple fact which will illustrate this is that many of our aircraft production factories are already employing staffs of which between 50 and 60 per cent are women—with many sections and departments (i e. fabric painting, draftsmanship) staffed entirely by women. Similarly, many engineering firms report that departments such as stores, jigging, inspection, finishing and so on, are staffed 100 per cent by women, possibly in some cases under a man foreman.

Today it is estimated that more than 4,000,000 of our women have registered for war industrial work—quite apart from about 1,000,000 who have registered for the services. Of these 4,000,000 more than 1,000,000 have already been drafted into war work, and the process has been speeded up enormously in the past few months so that at least 50,000 women are being interviewed and posted each week. The rapidity of this changeover can best be realized by a comparison with the figures of the last great war, when after 3½ years of war, less than 750,000 women had been put into war industrial work.

Indeed, taking a comparison period by period, it has been estimated by Ernest Bevin, our Minister of Labor, that nearly a million more women are already in war work than the total in war work after 2½ years of the great war. In the last war 52,000 women went into local utility services; 429,000 into commercial occupations, 69,000 into professional occupations, 81,000 into railways, docks and other transport, and 391,000 into government services—apart from the 750,000 who went into munitions, etc. Publication of figures about particular industrial labor absorptions is naturally not encouraged at this stage, but I can safely say that all these figures have been achieved and passed and it can be mentioned that our five railway companies have taken on 63,000 new women since 1940.

(*Please turn to Page* 169)

70-137

WAR DEPARTMENT
ARMY AIR FORCES
MATERIEL CENTER
OFFICE OF THE DISTRICT SUPERVISOR
CENTRAL PROCUREMENT DISTRICT
8505 W. WARREN AVE.
DETROIT, MICH.

July 13, 1942

PRODUCTION SECTION
CENTRAL PROCUREMENT DISTRICT
MANUFACTURERS' LETTER NO. 10
CHICAGO AREA OFFICE

SUBJECT: Cemented Tungsten Carbide for Cutting Tools

1. The following is quoted from memorandum, dated June 19, 1942, from the War Department, Headquarters, Services of Supply, Washington, D.C.:

"In the interest of conservation of critical alloys and of increased production, attention is directed to the following stated advantages of cemented tungsten carbide tools . . .

"a. One pound of tungsten in the form of cemented tungsten carbide for cutting tools will do the work of 70 to 100 pounds of tungsten in high speed tool steel. Furthermore, its use eliminates substantial amounts of chromium and vanadium which are considered necessary components of practically all high speed tool steel.

"b. Cemented tungsten carbide functions satisfactorily on almost all types of lathes and boring machines, particularly those of the sturdier construction. This is said to include all such machine tools manufactured in the last five years.

"c. Cemented tungsten carbide works efficiently on all steels above approximately .30 carbon and is effective up to 500 brinell or more.

"d. Cemented tungsten carbide will give two or three times the production of high speed tool steel in those operations to which its use is adapted and over a given run will require about one-fifth the number of grinds that standard high speed tool steel will require."

2. This information is forwarded by direction, Wright Field letter, EAZ-ar-72-2, (July 3, 1942).

3. Any requests for further information should be directed to the AAF Chicago Area Office, 20 N. Wacker Drive, Chicago, Illinois, Attention: Production Section.

For the District Supervisor:

HARLEY S. JONES
Lt. Colonel, Army Air Forces
Technical Executive

CENTRAL AIR CORPS PROCUREMENT DIST. OFFICIAL WAR DEPT.

Distribution: 1-A
Manufacturers in CPD

**NOTE:** In the reproduction of the above letter by Firth-Sterling, it is to be understood that it does not ... WAR DEPARTMENT'S indorsement ... products.

## Parkerizer Unit

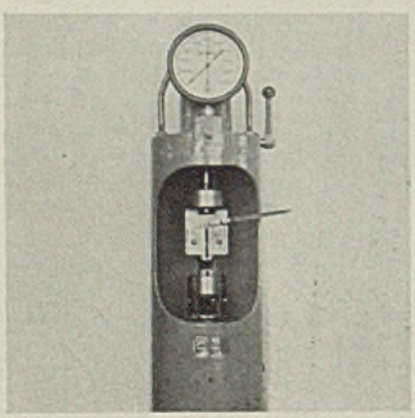
N. Ransohoff Inc., Cincinnati, has developed a continuous parkerizer which eliminates manual labor in putting work


through parkerizing, rinsing, chromic acid rinsing, blow-off, oil dipping and drying. The drum type body of the unit is built so that it holds a level of liquid within approximately 3 inches of the center, insuring complete submersion of the work. It also permits continuous circulation of the parkerizing solution without agitation between the drum and the heating tank to maintain constant temperature of the liquid in the drum. The machine also can be arranged for steam or gas heating, it is claimed.

## Testing Machine

Baldwin Southwark division, Baldwin Locomotive Works, Philadelphia, has developed a spot weld testing machine for checking the strength of spot-welded samples in the factory.

The machine is equipped with specially designed, self-aligning lever-operated



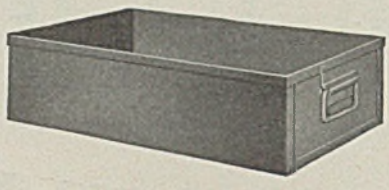
open-face grips with renewable hard file faces. The grips accommodate offsets in welded specimens from the smallest gage to ¼-inch thick. No backing plates or liners are needed. Top and bottom handling levers are set at right angles for convenient operation.

An 18-inch diameter steel base, and low center of gravity, facilitate hand moving of machine. Hoisting hood is at the top for crane handling. An 8-inch precision dial set on top of the machine indicates load. Cylinders with a 2-inch stroke are also located in the top section. The machine has an overall height of 70 inches and a total weight of approximately 800 pounds.

## Shop Box

American Metal Works, 1417 Germantown avenue, Philadelphia, announces the addition of a new standard style 200 shop box to its line. Offered as a straight-side type, it is being offered for immediate shipment to war plants in two standard sizes.

These have drop handles at each



end and come in sizes of 6 x 9 x 3½ inches and 8 x 12 x 4 inches, both being in 20 gage metal. According to the company, the boxes are light in weight and easy to handle. Also boxes can be made in any size or gage metal if the standard sizes are not suitable.

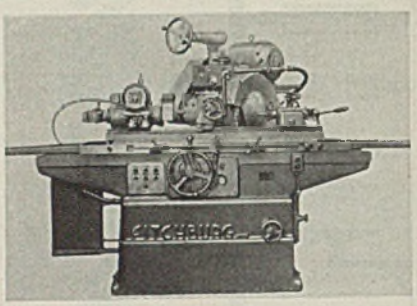
## Grinding Machine

Fitchburg Grinding Machine Corp., Fitchburg, Mass., is offering a new type C adjustable angular head grinding machine for handling a wide range and a number of types of jobs. It features a standard wheelhead unit mounted so it may be located to grind up to a 45-degree angle.

The Bowgage head on this machine is adjustable and can be swiveled to various positions for plain grinding. It goes through a completely automatic cycle—rapid traverse to work, correct feed, grinding dwell and rapid return. The workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds.

The truing device is hand operated and mounted on the work table. Wheelhead and table run on large V and flat ways. A spring tension method of wheel feed completely eliminates feed screws, bearings and joints. It gives a vertical to horizontal ratio of approximately 250:1, assuring extreme delicacy of control, enabling accuracy to 0.0001-inch. The swivel wheelhead table is adjusted for angular grinding by a hand knob running on a worm and rack, swiveling from a large central stud.

All controls are located at the operator's finger tips. The machine is equipped with individual motor drives for the Bowgage wheelhead unit, table traverse, work spindle and coolant pump. Each of

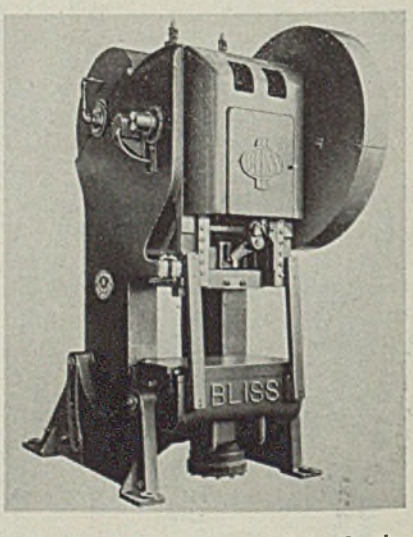



these motors is located so adjustments can readily be made. A motor-driven pump delivers ample coolant from a reservoir in the base to the wheel and work. Unit's range of work speeds is 64 to 327 revolutions per minute. Range of table speeds is infinite from 28 inches to 188 inches per minute.

## Inclinable Press

E. W. Bliss Co., Fifty-third street and Second avenue, Brooklyn, N. Y., announces a new Bliss-Consolidated No. 9 inclinable press equipped with a Marquette pneumatic cushion. As illustrated, it is of the geared type with main working parts either enclosed within the housing of the press or in guards which are designed for the safety of the operator.

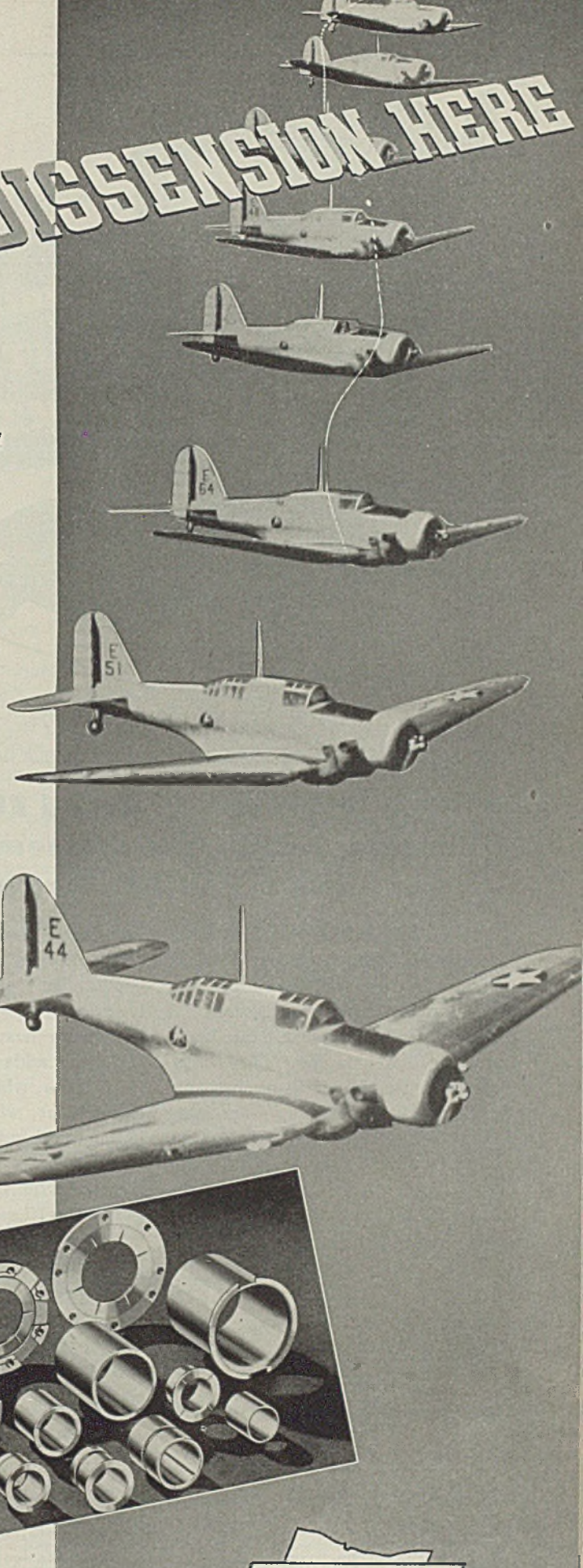
The press is driven by a 15-horsepow-




er motor which is mounted inside the frame. Heavy removable tie bars are used in front of the frame to keep deflection at a minimum. All heavily loaded parts are of a special high strength alloy material. The press can be inclined 39 degrees to allow the completed work to fall by gravity to the rear of the machine.

Features of this design are the smooth-

# NO INTERNAL DISSENSION HERE



## *Clutch and Valve "Harmony" Is Machined from OHIO SEAMLESS TUBING*

● Even in quiet flight formation every part of the operating mechanism must do its intended duty surely and continuously. At some of the most vital spots in many types of fighting aircraft, this wear-and-tear responsibility is shouldered by a partnership between OSTUCO Tubing and accurate machining and finishing.

Two such vital parts are valve rocker shaft bushings and high ratio clutch gear bearings. Beyond meeting strict Army and Navy specifications, special care is taken in drawing and treating the tubing to provide properties which help in later operations. For this reason Ohio Seamless Tubing has earned a remarkably consistent record of low rejection percentages over a long period of years.

OSTUCO is acquiring brand-new experience through its manufacture of seamless tubing from new steels, to new specifications, for never-before applications in machines designed for offensive action on land, sea and in the air. If this experience can help you with present problems or long-range planning, be sure to call on us.



MACHINED AIRCRAFT PARTS FINISHED FROM OHIO SEAMLESS TUBING. (PHOTO COURTESY OF CLEVELAND GRAPHITE BRONZE CO.)

***THE OHIO SEAMLESS TUBE COMPANY***

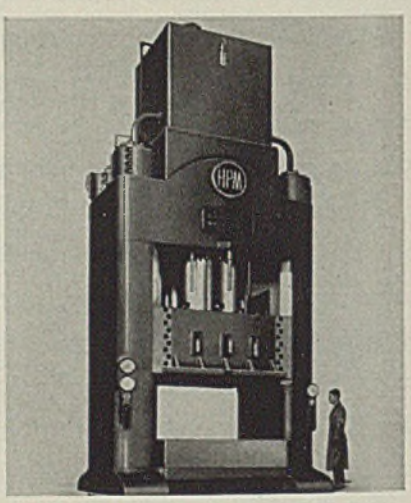
SHELBY OHIO OSTUCO

faced frame, the enclosed operating mechanism, together with a spring counter balance for the slide which are mounted inside the frame. The press has an open-back gap frame allowing feeding strip stock either right to left or front to back. A new type lever and cam-operated knock-out slide with single adjustment at the front of the press eliminates necessity for setting correct knock-out position at the rear of the press.

## Drawing Press

Hydraulic Press Mfg. Co., Mount Gilead, O., announces a huge self-contained deep metal drawing press featuring two hydraulic actions—3500-ton downward acting die platen; 1000-ton hydraulic die cushion in the press bed.

Press frame consists of a cast steel head and bed spaced by a pair of cast uprights. Two preloaded tie rods, passing through each upright, lock the assembly together as one solid unit. The head incorporates the hydraulic cylinder with power ram which actuates the main slide. Latter is guided by beveled ways on the four inner corners of the uprights through adjustable gibs, so positioned as to oppose any twisting of the slide.




The press is capable of deep drawing heavy steel plate to a depth of 18 inches. The die cushion may be effectively operated on varied lengths of stroke and at full pressure capacity for any distance. Also, with die cushion idle, the press can be used for single action pressing such as coining, sizing, straightening, etc.

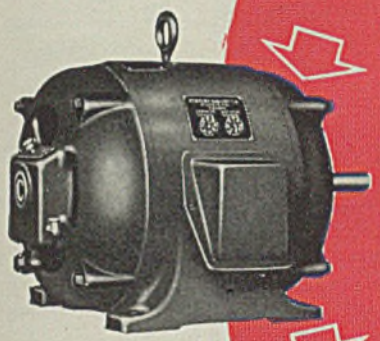
Only one hydraulic pump is required to operate. Oil trapped in the die cushion cylinder is intensified by the downward acting movement of the main press slide. This intensified pressure produces the resistance force necessary for holding the blank. No compressed air or other outside pressure source is required to operate the die cushion.

Unit's closed-circuit operating system

# Because Your Motors May Have to Serve for the Duration

*Send for*

## These New Century Bulletins on Proper Motor INSTALLATION, CARE, and ADJUSTMENT



To help all Century Motor users get longer life from motors now in service, Century offers, free, the following helpful, informative bulletins on motor Care — Installation — Adjustment:

- Squirrel Cage Polyphase Motors, 1/6 to 400 HP
- Integral HP Direct Current Motors
- Fractional HP Direct Current Motors
- Direct Current Generators
- Repulsion Start Induction Motors
- Capacitor Motors — Fractional HP
- Split Phase Motors

Because all Century Motors and Generators now being produced must go to the War Effort, proper motor care and protection is now more essential than ever before. Century Motors are working 'round the clock, often on continuous, 24-hour production — three times normal peace-time use.

To get the most out of your Century Motors, to assure longest, most economical operating life, ask your Century Application and Service Engineer for copies of these new Bulletins, or write direct today.

**CENTURY ELECTRIC COMPANY**
1806 Pine Street — St. Louis, Missouri

*One of the Largest EXCLUSIVE Motor and Generator Manufacturers in the World. — Offices and Stock Points in Principal Cities.*

*Whenever Possible— Order Standard Motors*

Constant speed, continuous duty, open rated 40° C. sleeve bearing, 60 cycle, 3-phase motors are produced in larger quantities than other types and therefore can usually be shipped faster.


300

**CENTURY ELECTRIC COMPANY—1806 Pine Street - St. Louis, Mo.**

Please send me "Installation—Care—Adjustment" booklets on the following types of Century Motors:

- ☐ Split Phase
- ☐ Repulsion Start Induction
- ☐ Capacitor
- ☐ Squirrel Cage
- ☐ Direct Current Motors
- ☐ Generators—Alternating Current
- ☐ Generators—Direct Current

Name.....

Company.....

Address.....

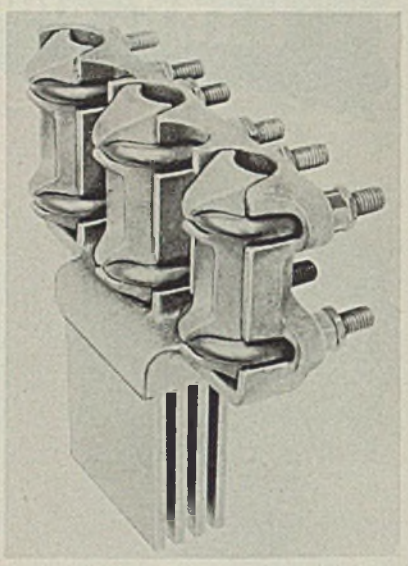
City.....State.....

provides complete control of all press ram movements without an operating valve.

Instead, the press ram itself is reversed by reversing the delivery of the Hydro-Power radial pump. Means also are provided for operating the press in any one of three different ways—manual, semiautomatic or full automatic.

## Cable Fittings

Delta-Star Electric Co., Chicago, announces a new line of solderless fittings for multiple cables. It includes T's, straight connectors, lugs and strain



clamps. Unit illustrated is a heavy-duty high compression solderless lug for use with three 1,000,000 CM cables and for connecting to a flat bar equipment terminal.

## Four-Way Valve

Hydraulic Hi-Speed Co., 5438 Tireman avenue, Detroit, is offering an improved 4-way valve which features either closed or open center operation by a slight mechanical adjustment. It can be used on a machine tool, or production oven, and permits a change to a different type of operation without replacing the valve.

The valve is available in three models, 10, 18, or 28 gallons per minute capacity, with a maximum recommended working pressure of 2000 pounds per square inch. It is furnished complete with sub-plate and solenoids in a choice of voltage and current characteristics.

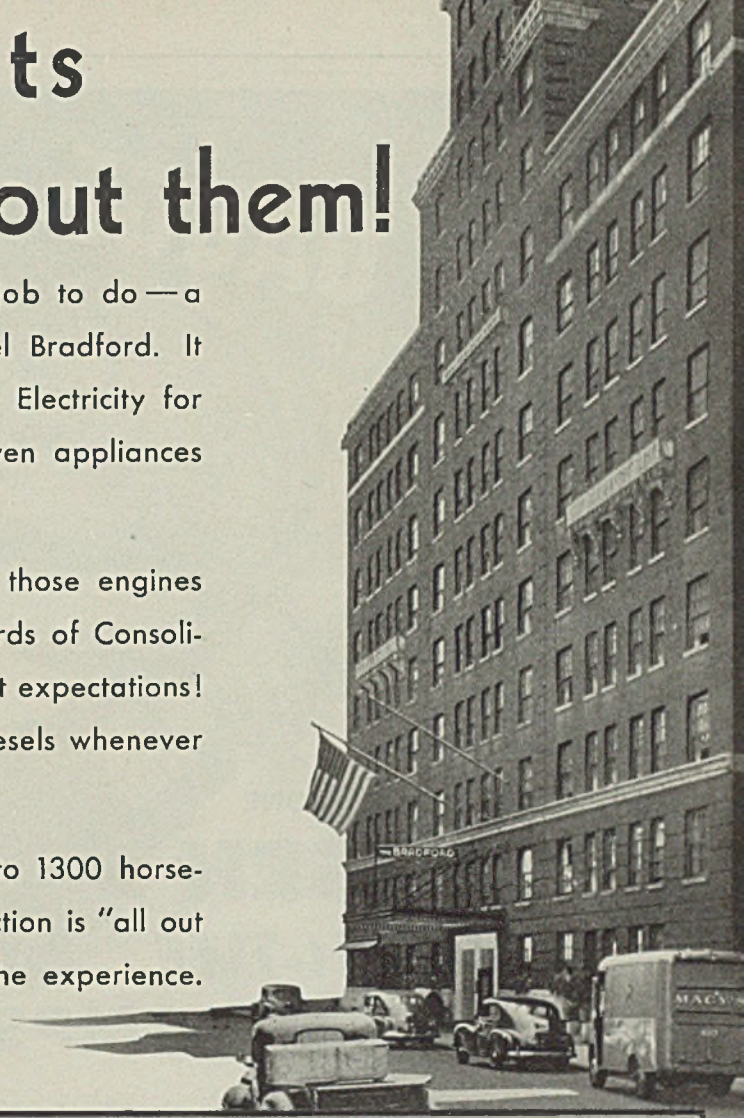
The main valve spool is operated hydraulically by pilot valves. These in turn are activated by the solenoids to produce a full range of 4-way valve operation. In addition, when adjusted for closed center, de-energizing the sole-

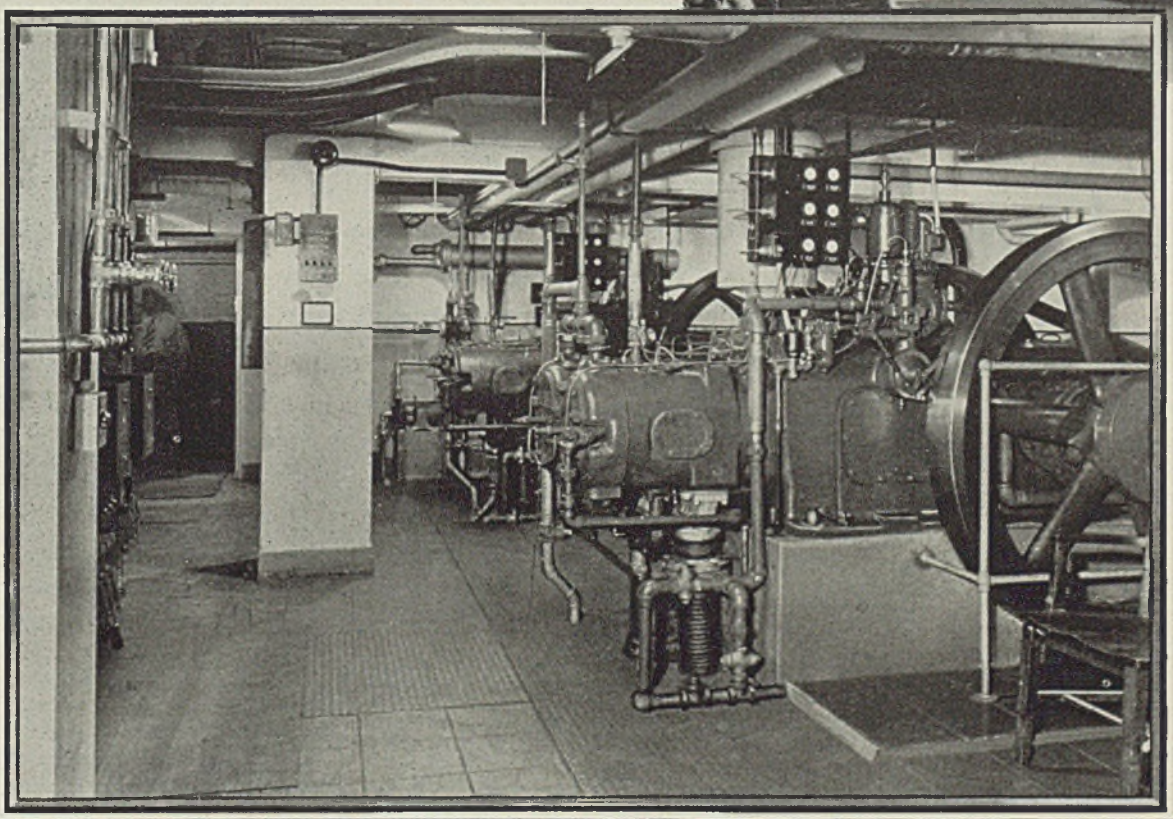
# And the Guests Never think About them!

Consolidated Diesel Electric Company had a job to do—a diesel-electric power plant for New York's Hotel Bradford. It must be absolutely dependable and economical. Electricity for lights, elevators, radios and countless motor-driven appliances must never fail—must be low-cost.

Cooper-Bessemer diesels were chosen. How well those engines met all requirements, can best be told in the words of Consolidated engineers—"Performing beyond our fondest expectations! Excellent in every way. We will use the same diesels whenever and wherever we can!"

There are Cooper-Bessemer Diesels of from 100 to 1300 horsepower, for every power purpose. Present production is "all out for Victory", but they will be better Diesels for the experience.





Three Cooper-Bessemer twin cylinder, horizontal Diesel engines rated 110 hp at 327 rpm, driving 75 kw generators to supply electric power at the Hotel Bradford in New York.

COOPER BESSEMER EST. 1833

THE COOPER-BESSEMER CORPORATION

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York — Washington — Bradford, Pa. — Parkersburg, W. Va.

Houston, Dallas, Greggton, Pampa, and Odessa, Texas

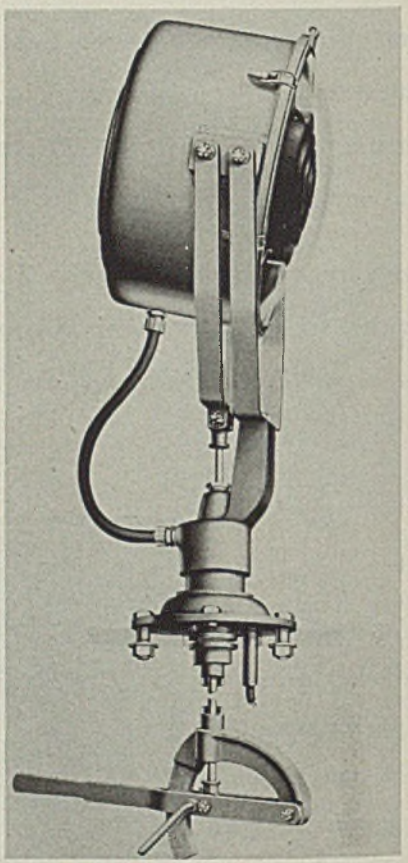
noids blocks all ports; while, when adjusted for open center, de-energizing the solenoids blocks the cylinder ports but leaves pressure open to tank.

## Searchlight

Revere Electric Mfg. Co., Chicago, announces a new dust, bug and weather-tight incandescent searchlight for varied industrial use.

It is specifically designed for protective lighting at ordnance plants, industrial plants, bridges, oil storage yards, public utilities, aboaord ships or other patrol lighting needs.

The unit is offered with either 12 or

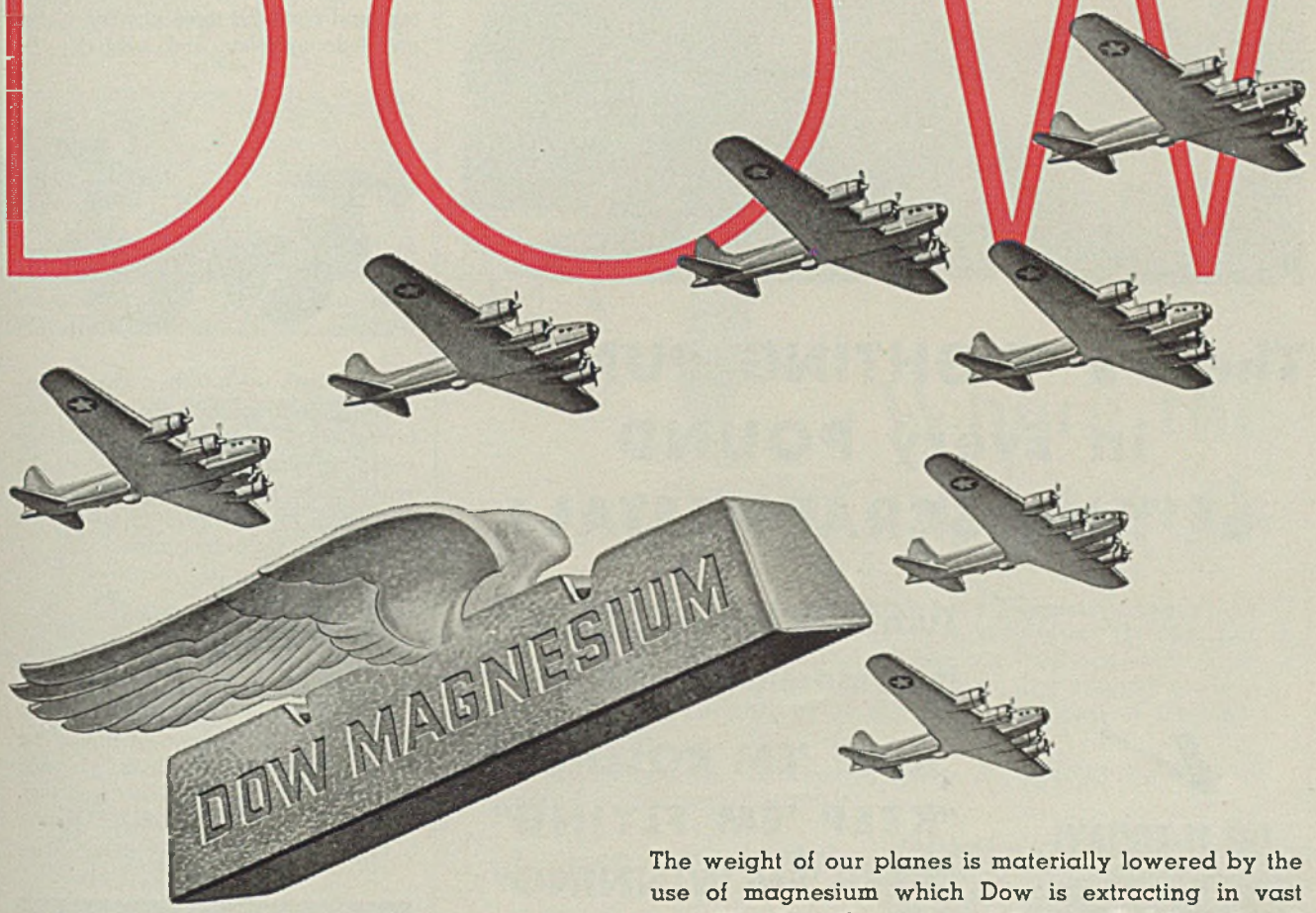


18-inch lenses and offers a multiplicity of mounting arrangements to suit any condition, including pilot house control. It is designed for continuous operation with 1500-watt lamps in the 18-inch size and up to 600 watts in the 12-inch size. Wattages of 2000 and 1000 can be used in the 18-inch and 12-inch searchlights respectively if used intermittently.

Standard socket equipment is a Mogul pre-focus socket. The housing is formed of sheet steel designed to provide a rigid enclosure. It is supported in a steel yoke attached to the mounting base.

When used in a pilot house, the unit comes equipped with a friction clutch and rotation stop. Elevating quadrant

# DOW




The weight of our planes is materially lowered by the use of magnesium which Dow is extracting in vast quantities from the waters of the sea. Fighting aircraft fly faster and farther by virtue of this strategic weight-saving metal. The social effect of wide-scale applications of magnesium will be fully realized only when Victory releases it for unrestricted peacetime uses.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

TRADE DOWMETAL MARK

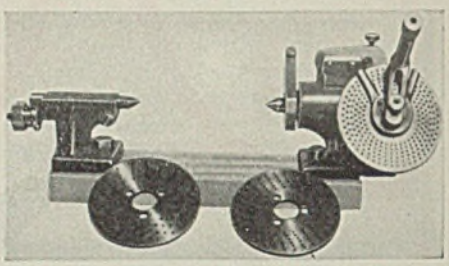
# MAGNESIUM

**The Lightest Structural Metal . . . A Full Third Lighter Than Any Other in Common Use**

is furnished with degree markings for setting at any predetermined angle.

## Dividing Head

Jefferson Machine Tool Co., Cincinnati, is now offering a new plain dividing head featuring three dividing plates, one indexing plate and tailstock. Its

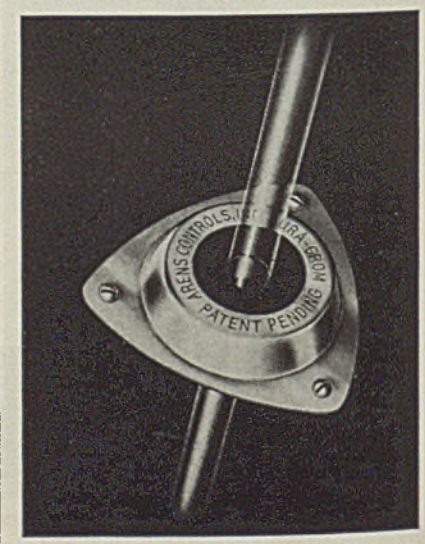


overall length is 6¾ inches. The unit has a swing of 6 inches. Its spindle features a No. 7 B. & S. taper and take-up collar for end thrust. Threaded, the spindle nose measures 1 1/8 inches in diameter. It is adapted to take either a chuck or work fixture.

## New Type Grommet

Arens Controls Inc., 2253 South Halsted street, Chicago, has developed a new Dura-Grom grommet which affords a fume and water-tight support for air, oil and hydraulic lines, electrical cables, flexible remote control casings, etc., through a firewall or bulkhead.

Eliminating many quick disconnect



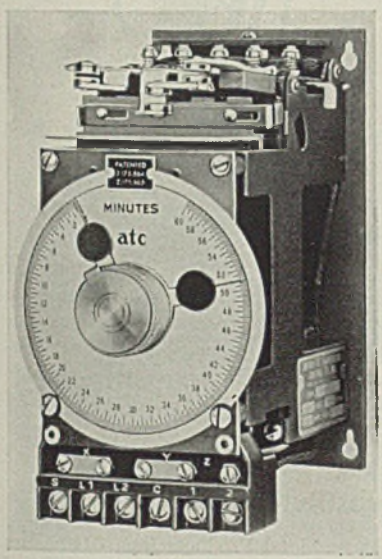

and firewall fittings, the grommet slips over a line, cable or tube and fits snugly against wall. It consists of two parts, an oil-resisting synthetic rubber disk, and a cadmium plated steel cup retainer for securely attaching grommet to wall.

Multiple lines can be supported by a single grommet. Individual openings

are provided in rubber disk for each line. Bolts or screws hold the grommet snugly against the supporting wall. A complete tube assembly may be slipped through a firewall and grommet retainer and permanently fastened at the ends. The split rubber disk is then installed by slipping it over the line, sliding the retainer in place and bolting it to the firewall.

## Cycle Timer

ATC Co. Inc., 34 East Logan street, Philadelphia, announces an improved series 2800 Cycle-Progress timer for use where it is desired to have an indication of the "time elapse" or "time to end of cycle" in connection with machines or operations such as automatic




quenching, soaking, automatic mixing, etc.

Improvements include a changed contact rating, new terminal block, addition of a leaf-spring contact and several new dial ranges. Telechron-motor driven and equipped with a simple "no-locking" knob, the unit is offered for operation from 110 or 220 volts, 25, 50 or 60 cycles. It is mounted in a sheet-steel case.

## Solderless Flag Terminal

Aircraft-Marine Products Inc., Dept. J, 286 North Broad street, Elizabeth, N. J., announces a new solderless flag type terminal for stacking a series of parallel terminal connections on a single stud block without loss of space or electrical conductivity.

Because the terminal barrel is symmetrically located with respect to the plane of the tongue, these terminals may be used for right or left hand application. This eliminates distinguishing between and stacking two different ter-

minals. For wire sizes 22 and 10 these terminals are supplied in copper of maximum conductivity and hot electro-tinned for maximum corrosion resistance. Terminals are crimped on wires with hand, foot or power tools.

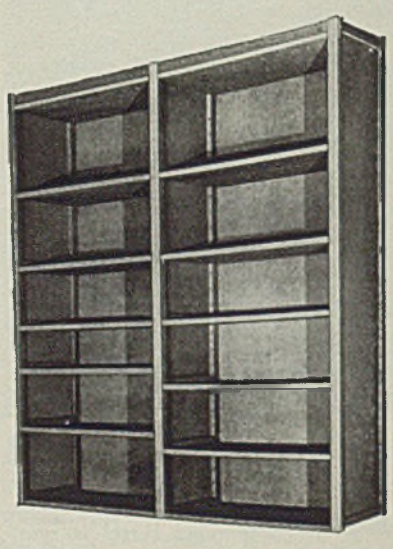
## Induction Pump

Lincoln Engineering Co., 5701 Natural Bridge avenue, St. Louis, is offering a new portable forced-induction pump, 50 series, which pumps directly from original container to the point of appli-

cation such materials as sealing compounds, sound deadeners, insulating materials, putty, viscous grease, heavy lubricants, etc. It represents a portable junior edition of the company's 100 and 400 series.

## Substitute Shelving

Lyon Metal Products Inc., 3119 Clark street, Aurora, Ill., is substituting wood shelving for steel to conserve for the



war effort. Like the steel units these include dividers, bin fronts, adjustable shelves and shelf boxes. The shelving is made in open and closed types. Sec-

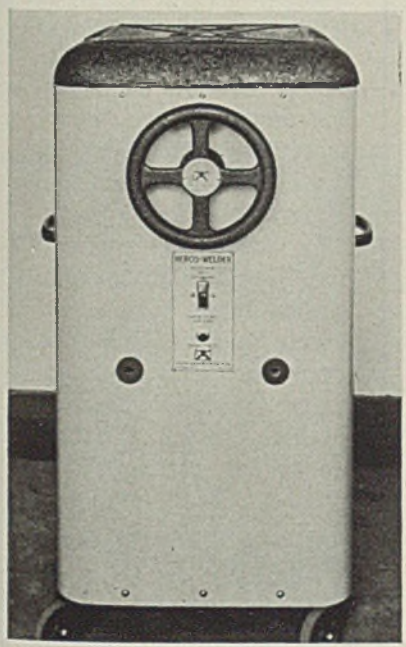
tions measure 36 x 84 x 96 inches, and may be had in 12, 18 or 24-inch depths.

## Arc Welder

Hercules Electric & Mfg. Co. Inc., 2416 Atlantic avenue, Brooklyn, N. Y., announces a new variable core Herco arc welder which features a precision heat control that enables the operator to obtain minute adjustments over the entire transformer range. It also is constructed for continuous 24-hour production.

According to the manufacturer the relative absence of "arc blow" in the unit also permits use of large diameter electrodes. A natural cooling setup which allows the unit to run cold without forced draft, fans or other artificial cooling devices, a magic eye pilot that tells when machine is operating are among other features of the welder.

Unit is portable running on heavy-



duty castors attached to its heavy sheet-steel housing. It is insulated by double-woven spun glass and transite resisting temperatures as high as 500 degrees Fahr.

## Phone Switch

American Radio Hardware Co., 476 Broadway, New York, is offering a new SW-141 phone switch for use as a connecting link between air and ground communications. It is a double-circuit microphone switch designed for use by an operator wearing heavy mittens and constructed to permit easy on and off switching.

The unit remains in open position normally and can be locked into closed position. It is 4-15/32 inches in length

by ¾-inch thick by 1¾-inch wide. It is mounted on sturdy brass brackets with blades of phosphor bronze material. It also is heavily nickel plated. Cordage clamps for taking up cable strain are provided as an integral part of the housing.

## Cable Splicing Holder

Patrick-McDermott & Co., 2704 South Hill street, Los Angeles, announces a new universal quick-adjusting cable splicing holder for handling cable sizes from 1/16 to 7/32-inch without use of adapters. The thimble or bushing and


cable are held in a firm position by using two adjusting screws, a thimble holder adjusting screw which gives direct contact to the self-seating thimble socket and a turning thumb screw which places the splicing holder in a rotating or rigid position.

## Secondary Protector

General Electric Co., Schenectady, N. Y., is marketing a new Thyrite secondary protector for use on current transformers to provide protection against high open-secondary circuit voltages. It consists of a disk of Thyrite connected across the transformer secondary terminals, together with a thermostatically operated short-circuiting switch.

In operation, when the external secondary circuit becomes accidentally opened, the secondary current will pass through the Thyrite disk. When temperature of the disk reaches approximately 100 Cent., the thermostat operates the switch to short-circuit the Thyrite and prevent damage caused by overheating. When the temperature of the disk drops to approximately 80 de-

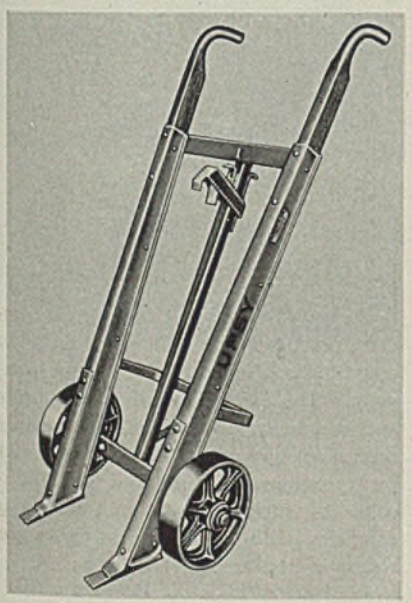
grees Cent., the switch opens.

This operation is repeated until normal conditions are restored to the secondary circuit, at which time the switch will remain open. Since the protector is always parallel with the transformer secondary winding, a small amount of current will pass through the protector under normal operating conditions. This by-pass current is of such small magnitude that the error introduced by it is negligble. The protector can be used on current transformers which operate meters or relays, it is reported.

## Drum-Loading Truck

American Pulley Co., 4200 Wissahickon avenue, Philadelphia, has added a new truck to its line of pressed steel hand trucks. Known as the Upsy truck, it permits safe, easy and quick handling of drums, barrels, kegs—any container having a chime or bead.

Handling up to a 1000 pounds, it loads a drum without first moving it away from adjacent drums. A sliding hook



on the truck's center rail catches the top bead or chime of drum or barrel. The trucker pulls down on the handles, tilting the drum towards him. This allows nose prongs to slide under bottom bead of drum. As truck handles are lowered to trucking position the nose prong lifts the drum off the floor placing it in position to be moved. Range of the adjustable hook is from 16 to 40 inches.

## Gear Shaving Machine

National Broach & Machine Co., Detroit, announces development of a small gear shaving machine especially for instrument gears used in navigation in-

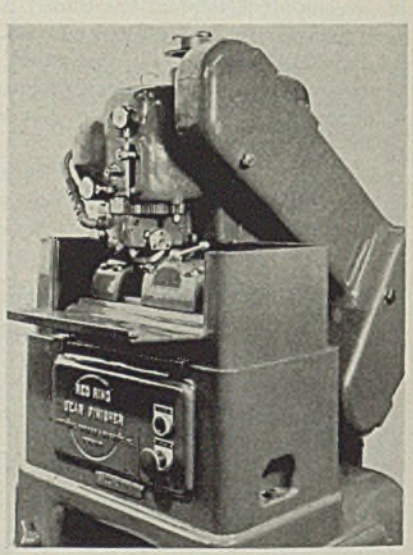
struments, range finders, gun sighting mechanisms, sound detection equipment and bomb sights. It is said to produce these gears in 8 to 48 seconds per gear.

Known as the Red Ring model GCL 3-inch gear shaving machine, it handles gears with diametral pitches of from 20 to 48 and even finer. The unit is essentially a bench type machine; however, it is usually furnished with a base which contains a coolant system and an electric control panel. According to the company, it is possible to mount a battery of these machines on a long bench with one central coolant system.

The machine uses the principle of rotary crossed axis shaving, using a gashed helical cutter which drives the work gear as it is being cut. The cutter of this machine rotates only in one direction. Functional parts of the machine, in addition to the cutter spindle drive, consist of two slides both operated automatically. The vertical slide on which is mounted the cutter head is advanced and retracted to properly size and finish the product and to return to the loading position. The horizontal slide carrying the work centers reciprocates the work parallel with its axis across the face of the cutter. Operation of the two is synchronized so in one cycle of the cutter head slide the work slide will make 4.6 or 8 strokes as desired.

Automatic pressure lubrication is provided to both slides by a pump mounted in the column. The cutter head is adjustable about a vertical axis to obtain the correct angular relationship between the axes of the work gear and cutter. Cutter spindle is driven by V-belt from the same motor that reciprocates the table.

Three speeds of table reciprocation are available. These, in addition to the three cutter spindle speeds and



cycles of 4, 6 and 8 table strokes, provide practically an unlimited range of operation control, according to the company. The electric panel is completely enclosed in its own recess and is easily accessible through a door locked shut by a combination lock and safety disconnect switch. The coolant system is complete with a motor, pump, ample reservoir and screened chip basket.

## Superfinishing Machine

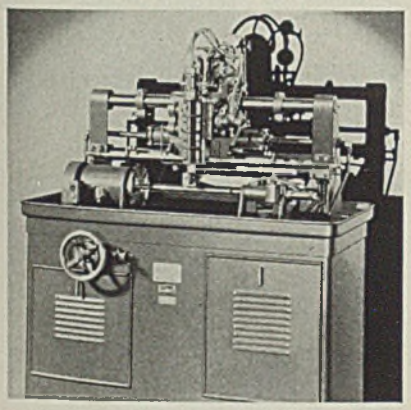
Foster Division, International Machine Tool Corp., Elkhart, Ind., announces new improvements on its 4 x 18-inch general purpose superfinishing machine in addition to a new and longer 4 x 36-inch model. Both are suited for superfinishing miscellaneous or production work.

Units are capable of developing an extremely accurate and fine finish of 2-5 micro-inches on cylindrical work. They are arranged with a manually controlled variable-speed drive to the spindle, and a variable-speed drive to the oscillating head. The oscillating head also is provided with a longitudinal hydraulic

traverse, speed of which may be varied to 30 inches per minute through use of a traverse rate control valve. All controls are conveniently located for rapid operation. Bed casting of each is heavy cast-iron to eliminate possibility of vibration. Drive for the head, hydraulic pressure pump and reservoir, and cutting fluid pump and reservoir are located within the bed.

The headstock, of cast-iron, supports a heavy, antifriction bearing-mounted spindle which is arranged with a multi-V-belt drive. Spindle nose is provided with a No. 5 Morse taper, and work-holding centers having a No. 3 Morse taper are mounted in a sleeve or adapter. The spindle nose is arranged with large heavy threads permitting the use of a face plate, 3 or 4-jaw chuck, or special work-holding fixtures. The headstock is tongued and grooved to the table, to insure alignment of spindle with tailstock. Lubrication is provided by a slinger ring operating in an oil reservoir located within the headstock proper.

An enclosed ball-bearing motor drives



the variable speed transmission. This provides an unlimited number of spindle speeds ranging from 25 to 690 revolutions per minute. The oscillating head carriage is longitudinally traversed by a double-end hydraulic cylinder bolted to the back side of the head carriage. The oscillating head, which is mounted on two rigid guide bars, is arranged with an off-center drive, which provides an oscillating longitudinal traverse of approximately ⅜ inch.

The stone-holding unit is mounted in V-type ways, and may be moved toward or away from the work by an oil-operated piston controlled by a directio al valve. Speed changes are accomplished by changing the distance between pulley centers, which changes the pitch diameter of the motor sheave wheel. The oscillating head drive spindle is antifriction bearing mounted.

## Tapping Machine

Detroit Tap & Tool Co., 8432 Butler street, Detroit, announces a new line

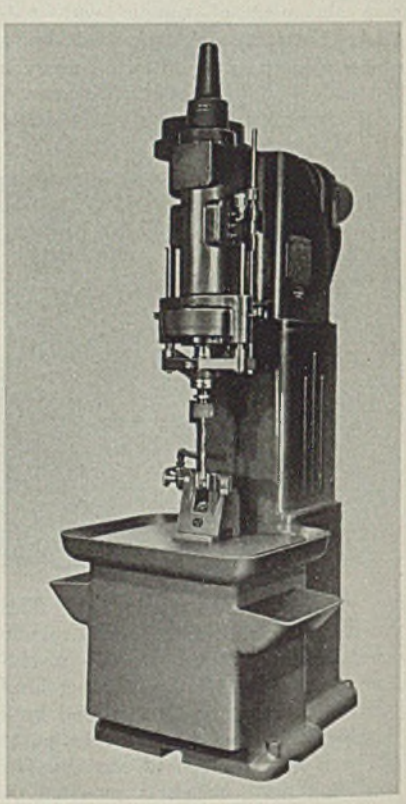
of special high-production precision tapping machines which may be utilized with either single or multiple tapping heads and may be used for oil grooving or long lead tapping. Both a light and heavy duty machine are included in the line.

The light-duty machine is provided with a sturdy base and a 4-inch steel column on which is mounted the motorized tapping head. The design enables the tapping mechanism to be raised on the column through a worm and a rachet-and-pinion mechanism to adjust height to the individual operation for which the machine is being used. Maximum stroke of the machine is 6 inches, controlled by adjustable trip dogs and limit switches. These, combined with a reversible-type motor, provide automatic operation through the tapping and return-stroke cycle.

The machine may be equipped with a multiple tapping head and the heads also may be swiveled horizontally through an arc of 90 degrees. A cone pulley and double V-belt drive provide three spindle speeds, ranging from 100 to 400 revolutions per minute. The drive also includes a spring-loaded adjustable safety clutch. Enclosed in the base of the machine is an 8-gallon coolant tank, motor starter, and gear-type coolant pump. The top of the base is provided with a large opening for mounting of fixtures and to permit "through" tapping in low fixtures, with the tap dipping into the coolant tank, if desired.

The heavy-duty unit, illustrated, is provided with pick-off change gears between the spindle and the cone-drive-gear first reduction, to enable changing of spindle speed to suit requirements. It is of unit design and construction, comprising a self-contained head, a welded steel base and a riser between the two. Machine height can be varied by the selection of proper riser height in accordance with the clearance required between spindle and work table.

The spindle is mounted top and bottom in oversize radial and thrust ball bearings. Positive drive is provided from a direct-coupled reversing motor of up to 15-horsepower capacity, while a shear pin and a flexible coupling protect the machine against motor vibration, tap breakage and work spoilage. Maximum stroke is 8 inches, permitting the machine to be used for long taper lead tapping, for cutting oil grooves, etc.



Operation is controlled by adjustable trip dogs and limit switches. In operation, the machine completes the tapping stroke, reverses, and returns to starting position before stopping. As in the lighter machine, the coolant pump and coolant tank, as well as the motor starter, are mounted in the base.

## Reclaiming Tools

(*Continued from Page* 124)

used cutting tools and producing usable cutting tools from scrap materials and worn out materials of other types by means of low-temperature brazing was as follows:

1st—Broken broaches.

2nd—Milling cutters from scrap materials.

3rd—Milling cutters: Slitting saws.

4th—Milling cutters: Side or plain mills.

5th—Used-up form tools.

6th—Extension reamers from standard reamers.

7th—Undersize flat broaches built up to original size.

8th—Used-up tool bits.

9th—Drills broken through flutes or cutting end.

10th—Form tools broken through dovetail section.

11th—Form tools broken by complete fracture.

The detailed steps followed with each of these eleven classes of tool reclaiming are shown in Table I. Steps common to them are: First, grinding surfaces to be joined, except where they fit perfectly; second, cleaning those surfaces thoroughly with carbon tetrachloride, using a soft bristle brush, thus removing any oils or greases and other dirt; third, coating with flux the surfaces to be brazed, and at the same time applying an oxyacetylene torch; fourth, applying brazing material, using the same torch, thus melting flux and brazing material until the latter flows freely throughout the joint; fifth, grinding for removal of excess material and for sharpening.

Table I—Low-Temperature Brazing Procedures

BROKEN BROACHES:
—Square ends, if necessary.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends by coating with flux and brazing material.
—Clamp all pieces in alignment fixture.
—Butt braze.
—Remove flash by filing or grinding.
—Sharpen if necessary.

MILLING CUTTERS FROM SCRAP MATERIALS:
—Select suitable mild steel, to be used for hub blank, and also select worn-out milling cutter blades, to be used for teeth.
—Machine hub blank to correct proportions.
—Cut slots on milling machine to suit.
—Chamfer outside edges of slots in blank.
—Press blades in blank slots.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Coat joints of teeth in slots with flux and braze.
—Grind entire cutter.

MILLING CUTTERS—SLITTING SAWS:
—Grind V-slot, on hand grinder, along fracture.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Preheat base plate and cutter.
—Clamp cutter flat on plate.
—Prepare joints by coating with flux.
—Fill in V-slot with braze.
—Grind both sides completely.
—Resharpen.

MILLING CUTTERS—SIDE OR PLAIN MILLS:
—Chamfer edges of fracture.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Preheat plate and cutter.
—Prepare joints by coating with flux.
—Clamp broken piece in place in cutter on flash.
—Fill in V-slot with braze. Remove excessive flash.
—Resharpen.

USED-UP FORM TOOLS:
—Shape up shank ends.
—Grind joint-end of tool and shank-end square and smooth for brazing.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends by coating with flux and brazing material.
—Clamp in alignment fixture.
—Butt braze.
—Remove flash by filing or grinding.
—Resharpen.

EXTENSION REAMERS FROM STANDARD REAMERS:
—Select two scrap standard reamers of proper size.
—Cut off desired piece of one reamer.
—Grind joint-ends square and smooth.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends by coating with flux and brazing material.
—Clamp in alignment fixture.
—Butt braze.
—Remove flash by filing or grinding.
—Grind O. D. to proper size.
—Back off.
—Sharpen.

UNDER SIZE FLAT BROACHES BUILT UP TO ORIGINAL SIZE:

—Select suitable mild steel filler block and machine to proper height.
—Chamfer edges of filler block and also the under side of broach.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joints by coating with flux.
—Clamp both pieces together.
—Spot-braze at intervals along chamfered edges. (Too much heat would cause annealing).
—Drill mounting holes in proper place.
—Re-grind broach.

USED-UP TOOL BITS:

—Select used tool bit and mild steel shank.
—Grind joint-ends square and smooth for brazing.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends by coating with flux and brazing material.
—Clamp on alignment fixture.
—Butt braze.
—Remove flash by filing or grinding.
—Re-grind.

DRILLS BROKEN THROUGH FLUTES OR CUTTING END:

—Square broken ends by grinding.
—Grind a straight V-slot across end of one piece.
—Taper end of other piece to fit the above V-slot.
—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends with flux and brazing material.
—Clamp in alignment fixture.
—Braze.
—Remove flash by filing.
—Sharpen if necessary.

FORM TOOLS BROKEN THROUGH DOVETAIL SECTION:

—Clean broken surface on large portion of tool with carbon tetrachloride, using a soft bristle brush.
—Prepare by coating with flux.
—Build up by brazing to sufficient size to allow machining.
—Machine dovetail to original size.

FORM TOOLS BROKEN BY COMPLETE FRACTURE:

—Clean joints thoroughly with carbon tetrachloride, using a soft bristle brush.
—Prepare joint-ends by coating with flux and brazing material.
—Clamp in alignment fixture.
—Braze.
—Remove flash by filing or grinding.
—Sharpen.



## Double Plate Production

(*Continued from Page* 111)

supplied from adjustable-voltage direct-current generators excited by amplidyne sets.

*Why is improved run-out table equipment important for maximum tonnage?* For maximum tonnage production, mill tables must deliver maximum rates of acceleration and deceleration without abrupt changes which would result in slipping of the plate. It is obvious that this maximum utilization of the tables will be obtained if the run-out table motor current is maintained at the highest value permitted by the over-load capacity of the motor and by the normal friction between the plate and the rollers.

General practice is to figure on a coefficient of friction of about 25 per cent as the maximum which can be counted upon. If 100 per cent friction were available, a rate of acceleration or deceleration of 32.2 feet per second per second, corresponding to the acceleration of a falling body could be obtained. A 25 per cent friction will, therefore, make possible a rate of acceleration or deceleration of 8.05 feet per second per second, or approximately 480 feet per minute per second.

*Calculation of run-out table power requirements:* Fig. 4 provides a convenient means of calculating the rate of deceleration required for any stopping distance and for various initial speeds.

Fig. 5 takes into account the thickness of plate and gives the torque required from the run-out table motors to make possible the necessary rate of deceleration.

*What do amplidyne exciters add to run-out table performance?* With the necessary motor peak capacity thus calculated and provided, the second step is to insure that during this extremely short period (2 or 3 seconds) of acceleration or deceleration, the equipment is used at its maximum output for maximum production.

In the manner explained in Fig. 6, amplidyne voltage limit and current-

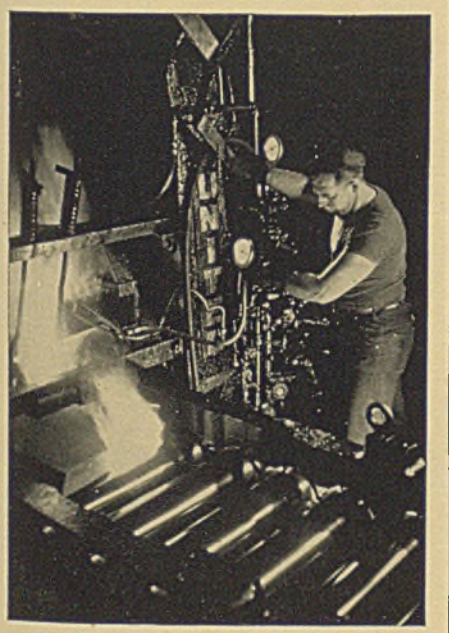
# COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

*Prepared Each Month by the Bridgeport Brass Co.* "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*


## *Memos on Brass—No. 33*

The corrosion resistance, ductility, ease of fabrication and great strength which characterizes brass has made this alloy so vital to the nation's war effort that every possible step should be taken to conserve it. War Production Drive technicians estimate that one man, by neglecting to save his brass chips after a lathe job, can throw away fifty pounds of brass in a month—the equivalent of 950 .30-calibre cartridge cases.



Typical of Bridgeport's modern equipment is the gigantic hot roll shown above that transforms glowing metal billets into long slender strips from which the highest quality cartridge brass and copper sheet are produced for America's war machines. Today such up-to-date equipment coupled with exacting laboratory control and thorough testing methods are maintaining Bridgeport quality in an all-out effort for Victory.



# Hard Drawn Duronze V Alloy Offers Improved Cold Heading Results

### *High Strength, Remarkable Malleability of Copper Silicon Aids Fabrication of Nuts, Bolts, and Airplane Tubing*

Duronze V, an alloy of 98% copper and 2% silicon, is playing an increasingly important part in the war effort because it facilitates the fast production of cold headed parts and assures a product that will stand up under the severest service conditions.

This alloy was especially developed for the cold heading of high strength bolts with large heads. Moderately strong in the annealed condition, Duronze V attains a very high tensile strength after severe reduction by cold drawing. Yet its Percent Reduction of Area (see graphs below) remains virtually unchanged, which serves to explain the unusual malleability of this alloy in the hard drawn condition—an important factor in the fabrication of cold headed parts. Unlike many other high copper silicon bronzes which are difficult to process, Duronze V is more ductile than drawn brass wire.

### Heat Treatment Unnecessary

Duronze V is supplied in the form of hard drawn wire with a tensile strength between 90,000 and 100,000 pounds per square inch. This wire can be formed by cold heading and roll threading into bolts that average as high as 120,000 pounds per square inch. No intermediate or relief anneals are required. Further, such bolts are not weakened by shearing stresses and do not have to be given a final heat treatment if properly headed.

Another important advantage of Duronze V is that it is not subject to season or corrosion cracking. For this reason, parts made from it are excellent for outdoor construction. Duronze V, for example, is widely used in the manufacture of wire and cable connectors, pole-line and marine hardware, upset nuts, bolts, caps, machine and wood screws.

### Airplane Tubing

Duronze V is also supplied in the form of tubing which is used for oil lines on airplanes and for tubular rivets in overhead catenary construction. Because of its strength and corrosion resistance, it is also recommended for automatic heaters, conduit and other conditions requiring a corrosion-resistant material stronger than copper.

**CHEMICAL COMPOSITION OF DURONZE V**

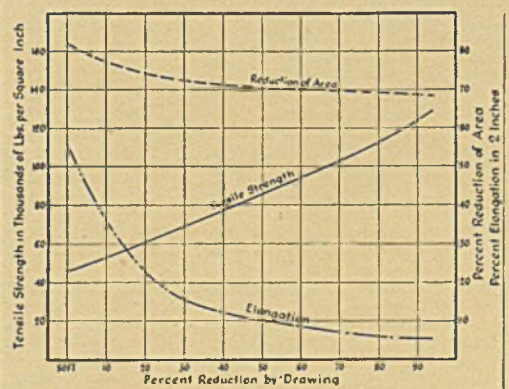
| | |
|---|---|
| Copper | 98% |
| Silicon | 2% |

**PROPERTIES OF DURONZE V**

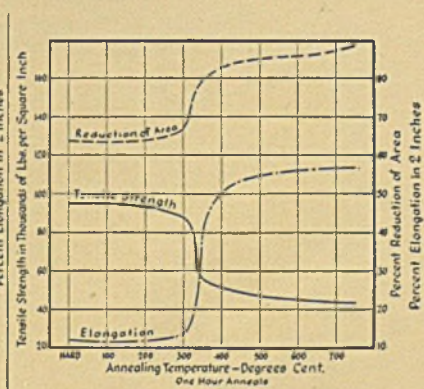
| | |
|---|---|
| Electrical Conductivity | 9.0% |
| Density—Lbs. Per Cubic Inch | .313 |
| Modulus of Elasticity | 15,000,000 |
| Coefficient of Thermal Expansion per Degree F. | 0.0000093 |

Duronze V wire meets the following specifications: Federal QQ-C591—Copper Silicon Alloy Rods, Class B; A.S.T.M. B98-41—Copper Silicon Alloy Rods, Type B; and A.S.T.M. B99-41—Type B Wire.

Any questions on the properties or fabrication of Duronze V will be gladly answered by the Bridgeport Brass Company.




Drawing Characteristics of Duronze V




Annealing Characteristics of Duronze V

## CAUSES OF CORROSION

### ELECTROCHEMICAL THEORY OF CORROSION

*This is the second of a series of articles by C. L. Bulow, research chemist at Bridgeport Brass Company, discussing some of the fundamentals of corrosion as applied to numerous common failures occurring in service.*

The rate of the reactions discussed in this column last month is determined by the slowest of the reactions under a given set of conditions. For example, the reaction $M + H_2O \rightarrow MOH + H$ for iron is the fastest and the reaction $2H + O \rightarrow HOH$ is the slowest under many commonly occurring conditions.

Several investigations have shown that the rate of corrosion in natural water is almost directly proportional to the oxygen content. In a closed system such as a hot water heating system in a home, the corrosion becomes negligible after the oxygen has been gradually removed. The rate at which the reaction proceeds also depends upon the character of the metal, hydrogen ion concentration (called pH), temperature, etc.

The detection of the corrosion products (metal hydroxide, hydrogen or water) resulting from these reactions varies with the corroding metal or alloy and corrosive solution. The hydroxides of the active metals, for example sodium and potassium, are very soluble in water and will not reveal their presence for some time, but the evolution of hydrogen is very rapid and the reaction is violent. The hydroxides of the less active metal, such as iron, are only slightly soluble in water and quickly reveal their presence as white or reddish brown ferrous and ferric hydroxides. The removal of metal ions from the solution by the formation of an insoluble or soluble corrosion product permits the reaction $M \rightarrow M^+ + e$ to go forward. Sometimes other materials present in the water coprecipitate with the slightly soluble hydroxides and form a more or less protective coating on the surface of the metal. A small quantity of dissolved carbon dioxide in water takes part in the formation of a practically insoluble green basic copper carbonate, such as is found in copper piping in service for some time, which greatly retards or stops the corrosive reaction.

In the presence of salts, such as sodium chloride, (5) becomes more complicated:

(9) $M + H_2O + NaCl \rightarrow MCl + NaOH + H$

(10) $MCl + NaOH \rightarrow MOH + NaCl$

(11) $M + HOH \rightarrow MOH + H$

*(Continued in column 2)*

## Hot Forging Process Aids War Production

Where intricate parts with excellent physical properties must be produced rapidly in large quantities, such as in many war plants today, the hot forging process offers special advantages.

Forgings, for example, are stronger, less porous, and more accurate in dimensions than sand castings. In addition, their surfaces are smoother and cleaner, thus facilitating the process of polishing and plating.

A valuable aid to the speedy, economical production of forgings is Bridgeport Forging Rod. Being highly plastic when hot, it fills the die easily and, in addition, is free machining.

## Zinc Content Linked To Brass Corrosion

Recent reports of the soil-corrosion investigation being conducted by the National Bureau of Standards with specimens of various materials suggested for underground use substantiate previous findings on the low corrosion rate of copper, and point out that there is a fairly definite relation between corrosion and the zinc content of a series of brasses.

"Except in a tidal marsh soil, the corrosion rate of the copper-zinc alloys increased generally with the zinc content," the report, which covers six varieties of copper and four copper alloys, states. "The copper, however, corroded in a soil high in chlorides, but this soil had relatively little effect on the Admiralty metal and the 70:30 copper-nickel alloy, as would have been predicted from the resistance of these materials to corrosion by sea water. The behavior of the brasses in the tidal marsh containing sulfides was unique in that the corrosion rate decreased with increasing zinc content, the reverse of the normal order."

### CAUSES OF CORROSION

*(Continued from column 1)*

However, these reactions (9 and 10) overlap so that a mixture or compound of metal hydroxide and chloride called a metal oxychloride is formed on the metal surface. In this instance, the reaction $2H + O \rightarrow H_2O$, still remains the controlling factor as already described.

## NEW DEVELOPMENTS

**An automatic chute feed** has been put on the market which is claimed to increase production of two-spindle profiling machines as much as 30 per cent, when added to the air chuck. The maker says that this attachment is being used for feeding such items as brass and copper and copper primer tubes for boring and tapping operations on both ends at the same time. **(No. 390)**

**A pneumatic vise** has been designed with foot control. As many as 1200 operations per hour are said to have been made in it. The vise is operated by multiple-type diaphragm. A movable jaw has a maximum travel of ½ inch, gripping with a force of 15 times air line pressure. An adjustment screw enables the jaw to be set with an opening up to 3 inches. The vise can be used on pressures up to 150 pounds per square inch. **(No. 391)**

**An angle protractor** has been developed which, it is said, can be used to measure any large or small surface angle to provide a direct reading on the angle and its component. The maker says it can be used to measure taper in shallow blind holes. Graduations on the sliding scale permit taking depth measurements. **(No. 392)**

**A chuck** is offered for gears from 3 to 36 inches in diameter which is said to be suited for use with single or cluster spur or helical gears. It employs a number of hardened pins that hold the gear at its pitch line. The pins are backed up by cams assembled on a ring that is turned to grip or release the work. Tightening is against the normal direction of rotation. **(No. 393)**

**A hand-operated marking unit** has been put on the market for cylindrical parts such as shell noses. The part to be marked is placed over a mandrel in front of a slide carrying an engraved die. A lever rotates the mandrel and slides the die laterally at the same time. The depth of impression is adjustable and mandrels of various sizes are interchangeable. **(No. 394)**

**A steel wool** is announced to remove burrs from sides and edges of non-ferrous metals. In ribbon form four inches wide, it is wound on a spindle that mounts in the chuck of a drilling machine. The pad is said to be resilient, to reach into irregular openings, and to return to its original form after the part has been removed. The wool and spindle are available as a unit, or the wool alone can be supplied. **(No. 395)**

**A cleaning liquid** is offered for removing grease and dirt from metal parts. Mixed with water, it is applied at 130 to 160° F. It is said to remove heavy coatings of mineral oil and to leave a minute film on the surface which acts as a rust preventitive. **(No. 396)**

**A non-metallic mallet** with a plastic head has been introduced for use on soft metals such as copper, brass, aluminum and sheet steel. The maker claims it resists wear, does not deteriorate, and is rodent-proof. **(No. 397)**

*This column lists items manufactured or developed by many different sources. Further information on any of them may be obtained by writing Bridgeport Brass Company, which will gladly refer readers to the manufacturer or other source.*

limit control will impress the maximum current which can be maintained without slipping the metal. And it will hold this current up to the present voltage over the full speed range of the tables.

The current limit feature is operative at all times so that no current peak, whether due to load, acceleration or deceleration conditions, can exceed the desired value which is itself adjustable to meet operating requirements.

The fastest means of stopping the tables is by normal stop which is made on regenerative braking. Emergency stopping is provided to protect the equipment and operates by disconnecting the generators from the motors and allowing the rollers to coast to rest.

*Other Processing Equipment:* In addition to the run-out table changes, new plate transfer, run-out table, leveller, pinch-roll, cutting and piler equipment will be required if not already available. These auxiliary drives are powered by 230-volt direct-current mill-type motors of 15 to 50 horsepower rating with reversing, dynamic braking and plugging magnetic control providing for wide speed range by field control to handle various thicknesses of plate at speeds ranging from 50 to 200 feet per minute.

*Summary:* The magnitude of the plate tonnage increase obtained by the relatively small conversion changes indicated above is a tribute to the foresight and resourcefulness of the steel mill industry and to the wide flexibility built into the mechanical and electrical equipment of hot strip mills. That this most vitally needed increase in our steel plate production has been obtained so rapidly from mills, most of which had never rolled a ton of plate, is indeed a subject for thanksgiving and may well prove to be one of the most important factors in speeding the day of victory.

## New Electrodes Build up Tool Shanks

American Agile Corp., 5806 Hough avenue, Cleveland, announces new silver electrodes for welding. These are said to be especially suitable in rebuilding worn tool shanks.

After the weld deposit is made, the tool being repaired can be reground and put back into use, according to the company. The Silver series, in which these electrodes fall, also includes a chisel steel electrode that forms a chisel cutting edge that will withstand hard impacts. The series covers a range from 40-70 rockwell C.

Uses of the electrodes are varied and flexible—they can be applied with the usual welding technique with alternating or direct-current welding machines.

## Tin-Base Bearing Metals Discussed in Publication

A comprehensive study of factors governing adhesion of tin-base bearing alloys to various backing metals, including steel, bronze, copper, brass and cast iron is included in publication No. 111, recently issued by the Tin Research Institute, Fraser road, Greenford, Middlesex, England.

In the study, conditions for obtaining efficient bonds are considered, and the many factors affecting these conditions in manufacturing operations are examined.

A large number of tests are described in the publication which indicate the most suitable methods of preparing and tinning bearing shell, and of casting and cooling the lining.

Results of these tests show the effects of variations in alloy composition, mold design, temperature of metal and mold, and rate and direction of cooling, in relation to both hand pouring and die-casting and also to centrifugal methods of production.

## Aircraft Electroplating

(*Continued from Page* 120)

development of substitute methods such as "chromadizing" and the Alrok process. Alclad consists of a high-strength aluminum alloy sandwiched between two layers of commercially pure aluminum. These outside layers, each about 5 per cent of the total thickness of the sheet, protect the stronger alloy electrochemically.

**Chromadizing (or chromatizing)** is essentially anodizing without electric current with the exception that a higher temperature (140 degrees Fahr.) and a shorter time (5 minutes) are used. Parts must be considerably cleaner when they are to be chromatized than if they are to be anodized. However, the same type of cleaner is used. Chromatizing, while forming a good base for paint, is of little value when not painted. Chromatizing, like most substitutes, is not as good as anodizing but on land-based airplanes is usually adequate. It represents a considerably cheaper and quicker method where the demands are not too critical.

The "Alrok" process consists of an oxidation process giving results similar to chromatizing. The procedure involves immersion in a near-boiling solution of sodium carbonate and potassium dichromate for a period of 30 minutes followed by a sealing treatment in a hot 5 per cent potassium dichromate solution. Alrok is a patented process and has not found any great acceptance in aircraft work.

**Inspection of Anodized Coatings:** An anodized coat, when obtained by the chromic acid process, is a gray color and shows the grain structure of the base metal. It is nonconductive to electricity, which provides a quick method for determining whether or not a part has been anodized by making an electrical conductivity check using an ordinary light bulb in series with the aluminum alloy under test and the source of electric light power.

To determine whether a satisfactory coating has been applied, the standard test is 20 per cent salt spray solution operating at 95 degrees Fahr. for 250 hours. For the material to be satisfactory it must not show more than a 5 per cent reduction in tensile strength or a 10 per cent reduction in elongation at the end of this period.

**Inspection by Anodizing:** The ability of anodizing to accentuate cracks in the base metal is used as a method for the inspection of aluminum forgings. A large amount of work has been done to find a simpler and easier method, and while some of these have been adopted, none seems to work quite so well as anodizing. This is largely due to the fact that the chromic acid solution tends to permeate into the crack.

When the part is subsequently ground to remove this crack it is possible to see the indication until it has been completely removed. This is a great advantage since otherwise the part would have to be retreated at least once during the grinding operation in order to be certain that all cracks were completely ground out.

**Size of Parts.** Parts to be anodized may vary from very small detail parts to large subassemblies. Normally aircraft anodizing tanks vary from 20 to 35 feet long and are 5 to 6 feet deep with a width of 3 to 5 feet.

**Cadmium Plating:** Steel is protected almost universally in aircraft construction by means of cadmium plating. Cadmium was chosen after many tests had been run to determine the material most satisfactory for corrosion resistance. There has been much discussion from time to time as to the relative protective powers of cadmium and zinc plate. Cadmium was found to have a higher resistance to corrosion by salt spray water than zinc coatings

could provide. This is largely due to the fact that zinc chloride forms very readily from the bare zinc. In other atmospheres zinc has often been found superior to cadmium, probably for the reason that zinc will provide electrolytic protection over a larger area.

One very neat method for showing this is to take two ordinary steel washers and put into the hole of one a zinc plug and into the hole of the other a cadmium plug. Under normal conditions it will be found that both the cadmium and the zinc will corrode away leaving the steel relatively unaffected. Now, if the size of the washer is increased until the edges are no longer protected by the plug, it will be found that zinc will protect a larger washer than will cadmium.

The principal advantage of cadmium is that it forms a relatively impervious coating which is not much subject to atmospheric attack whereas the zinc is quite active and tends to corrode away, particularly on seashore exposures, finally leaving the base metal unprotected. Cadmium is applied in the aircraft industry in a standard cyanide bath employing a standard procedure.

Commercial practice has shown that coatings of 0.0004 to 0.0005-inch are the most economical for outside exposure. Both the Army and Navy specify the lower limit of 0.0005-inch for all parts inside or outside the airplane except for externally threaded parts, for which 0.0002-inch is specified since undercutting of threads is not allowed.

**Testing:** Normal procedure for testing the thickness of the plate is by the drop test. See accompanying illustration. In this test the solution is allowed to drip onto the part at a specified rate and at a specified angle. By timing the period it takes for the test solution to eat through the plate, the thickness can be determined. This test provides a quick and relatively accurate method for determining the thickness because a 0.0002-inch plate will be eaten away in 20 seconds, each second representing 0.00001-inch.

**Objections to this method are twofold:** First, it destroys the plate. Second, the end point is somewhat difficult to determine. The only important cause for rejection of cadmium plated parts is on the basis of inadequate thickness of plate. Each batch of material is checked for thickness, by the drop test previously mentioned, upon arrival at the aircraft manufacturer's plant so that it behooves the subcontractor to make sure of his plating thickness before submitting his parts to the purchaser.

Army-Navy specifications require that no undercoating of any kind be used before cadmium plating. This is usually well understood by the plater and does not provide more than an isolated case of trouble. Occasional cases have recently been found where the copper plate used for selective casehardening was not removed before cadmium plating. This was discovered when the parts began to corrode. It is important that no undercoats be used.

Ordinarily steel fittings of relatively small size contribute most of the cadmium plating requirements although some welded assemblies, including entire fuselage frames, are cadmium plated by some manufacturers. Tanks are usually 6 to 8 feet long, 4 to 5 feet deep. Of course for larger welded assemblies, larger tanks must be used.

**Hard Chromium Plating:** Chromium plating is much more of a problem than is cadmium. In this case thickness of plate is relatively inconsequential since it is not applied for the purpose of corrosion prevention but for the purpose of obtaining a hard smooth surface. Practically 100 per cent of all aircraft chromium plating is "hard" rather than "decorative" chromium plate. In general, chromium plating done outside of the aircraft plant has not been satis-

factory for two reasons—misunderstanding of plating problems by the aircraft designer and those responsible for preparing the base part for the plater; and lack of understanding on the part of the plater of the rigid requirements demanded by airplane hydraulic parts.

Critical aircraft hydraulic parts in general consist of a cylinder with a chromium plated operating piston and piston rod. The hydraulic fluid is prevented from leaking around the piston by means of rubber or synthetic rubber packings. These packings have a disgustingly short life, particularly if the piston which rubs back and forth across them is the least bit rough. The rubber packings have to hold in pressures varying from 750 pounds per square inch to a ton and a half per square inch. With these pressures the packing is forced very tightly against the piston rod in order to prevent leakage. This means that any slight irregularity in the piston, going back and forth over the surface of the packing, will result in excessive wear to the packing.

This condition requires frequent replacement of packing and constitutes a serious hazard as many critical controls in the airplane, such as wingflaps and retractable landing gears are hydraulically operated. The need immediately becomes apparent for having a perfectly smooth plating job with no variation in diameter from spot to spot along the piston. Now all this makes it rather hard on the plater because the raw parts coming to him from the aircraft manufacturer will probably *not* be ready for plate. This condition is something which the industry has been trying to improve.

**Before Plating:** Nearly all hydraulic pistons are centerless ground before being delivered to the plater. Often the wheels used will be quite coarse and the machining marks are quite apparent, especially after plating. Consequently, a large amount of polishing is necessary before plating takes place. These hydraulic parts, by the way, are usually "size" plating jobs.

The general procedure in preparation is to use an abrasive wheel to take out the machining marks. Frequently it is advisable to use a 180-grit wheel followed by a 220-grit wheel. This is usually followed by a sewed buff using a cutting compound and then by a loose buff to give a high color. It is not anticipated that the aircraft company will ever provide the parts in such good condition that the last two steps can be avoided. By proper selection of centerless grinding wheels however, the use of the abrasive wheels can be eliminated.

Often parts may come to the plater with nicks which were caused by rough handling. If the nicks are not deep they may be taken out. However, since everything is done by the airplane designer to reduce weight, often these parts may be stressed to the legal limit. Therefore, before removing deep nicks the plater should get the approval of the aircraft manufacturer. Part drawings give the lower dimensional limits before plating. These should not be exceeded in removing nicks. Unless approval to remove the nicks be obtained, such parts should be rejected by the plater.

A good test for determining whether a part is sufficiently smooth for plating is to run your fingernail along it. Extremely minute scratches can be detected. If you can feel these scratches the part is not smooth enough.

**Plating Procedure:** Hard chromium plating as done in aircraft usually employs a standard 33-ounce-per-gallon solution of chromic acid with a chromic-acid sulphuric-acid ratio of 100:1. Of course, being hard chromium plate, no undercoats are allowed. Normal thickness of plate runs from 0.0015 to 0.0020-inch per surface or 0.003 to 0.004-inch on the diameter. For special applications this may run as high as 0.007-inch.

The actual thickness of plate depends on whether the unplated part is on the high or the low side of its tolerance.

Aircraft drawings specify the size before and after plating rather than specifying the thickness directly. Ordinary plating tolerances are in the order of plus or minus 0.001-inch on the diameter of the part. Special applications of course require much closer tolerances. Details of bath and actual plating procedure are standard.

**After Plating:** Usually engineers will put on drawings simply "polish" or "light buff". Actually what they mean in almost all cases is polish, buff, and then give a high color. This source of confusion is being corrected by an educational program for the engineers. An attempt is being made to standardize for all future drawings on "buff and color" for very smooth parts such as the hydraulic ones previously mentioned. The fingernail test applies to smoothness after plating, also.

Aircraft parts to be chromium plated are usually cylinders which are plated on the outside only. The diameter of these tubes normally ranges from a fraction of an inch to 2 or 3 inches in diameter. They may be as long as 6 feet.

**Selective Casehardening:** Often it is desirable to have a part which provides a hard wearing surface over only part of the material while the remainder is kept soft for increased toughness. This may be accomplished by "selective hardening" the surface by carburizing or similar means. The "stop-off" for this purpose is a good dense copper plate a few thousandths of an inch thick.

This copper plate prevents the carbon from penetrating the surface of the steel at the plated areas, thereby keeping them soft. This method is in general use in industry including phases outside of aircraft.

**Other Forms of Plating:** Tin is used to a limited extent in the protection of steel rivets. Its principal advantage in that usage is its great flexibility, which allows the rivet to be driven without destroying the plate.

Zinc plating has not been used to any extent as yet in airframe construction, but during these war conditions its use will probably increase due to difficulty in obtaining cadmium. The fact that zinc plating is relatively cheap also is in its favor.

## Record Creep Test of 100,000 Hours Ends at GE

A 100,000-hour high-temperature creep test—longest on record—for four rods of high-strength alloy steel was recently completed at the Schenectady Works of the General Electric Co.

The four specimen rods, which were imprisoned in a thermostatically controlled electric furnace when Herbert Hoover was in the White House, 11 years ago, represents one of the best known alloy steels for high strength forgings and bolts required in the manufacture of steam turbines.

The test was made to determine what stresses could be used at temperatures where all materials are plastic, without causing deformations larger than the minute value tolerable in high-speed machines. It also provided a means for studying changes in the characteristics of the metal under prolonged conditions of high temperature and stress.

Rods tested were each 4-foot specimens of nickel-chromium-moly steel (SAE 4340), 0.505-inch in diameter. A 12-inch portion at the center of each rod constituted the test area.

Temperature of the furnace was maintained at 842 degrees Fahr. and the four rods were subjected to constant stresses of 13,000, 17,000, 21,000 and 25,000 pounds per square inch respectively.

## Electrolytic Tinning

(*Continued from Page* 130)

1300 feet per minute. Because a shearing line cannot be operated faster than about 700 feet per minute without excessive buckling of the sheets, provision has been made for coiling the finished strip and then shearing it into sheets as a separate operation when the line is operated faster.

Tension is automatically maintained between the pinch roll and the uncoiler to keep the slack out of the strip. With any slack the whipping action would probably break the strip. This same tension regulator also automatically compensates for the change in the diameter of the coil as strip is paid out. The loop is automatically controlled by photoelectric devices that speed up or slow down the entry end of the line as required.

Tension automatically is maintained in the plating unit by having the precision tension unit pull the strip through the tank against the drag produced by the No. 1 drag unit acting as a belt-driven generator. Tension must be maintained accurately to insure a good contact between the strip and conducting rolls, through which the plating current enters the strip; also there must be no chance for the strip to touch the anodes, thereby short circuiting the plating cell and burning the strip.

From the plating tank the strip passes through the reflow unit into the quench tank, from the quench tank through the branner, and into the precision tension unit. In the reflow unit the electrolytic deposited tin is heated just to the temperature where it will flow and produce the mirror-like finish expected of tin-plate. The strip then is quenched to harden and preserve this surface. Next, it is oiled and the excess oil is removed in the branning machine. It is important that the tension be accurately controlled through this sequence also.

### Coiling Operations Identical

The reeling operation for this line and the one previously discussed are the same. The strip passes from the No. 2 drag unit to the pull unit, through the pull unit into a loop, and from this loop into the flying shear. Thence it goes to the classifier where it automatically is sorted, and finally delivered to one of two pilers. To obtain accurate lengths of sheet it is essential that there be no tension in the strip as it enters the shear because tension might cause some slippage of the strip on the feed rolls that pull the strip into the shear. For this reason the strip always must enter the shear from a loop. Just before the strip enters the shear it usually is passed through such devices as a pinhole detector and a flying micrometer. These function to pick out the sheets with pinholes and those that are too thick or too thin. A suitable device with either the pinhole detector or the flying micrometer, operates a gate, 10 to 15 feet beyond the shear in the classifier, to shunt the rejects into the off-gage piler.

It is not practical to have more than about 80 feet of strip accumulated in the entry loop. With the strip traveling 15 to 20 feet per second, this is only four or five seconds worth of strip. Because the welding operation requires approximately 30 seconds the line must be slowed down to weld on a new coil. These various drives, therefore, must operate in synchronism not only at the normal running speed, but also at a much lower "threading speed" and the retarding and accelerating periods attendant with this operation.

For this reason all of the driving motors must have a flat speed characteristic over their entire operating range. As the "threading speed" may be at a generator voltage lower than the internal resistance drop of some of these motors it is necessary to use "IR" drop boosters so that drives do not stall at this low speed.

As this particular line uses Rectox copper oxide rectifiers to supply the plating current, the control will be discussed on that basis.

Inasmuch as the coating thickness is proportional to the current and speed an electronic regulator is used that operates from both a current and speed impulse to adjust automatically the speed of the entire line. This regulator is set for the desired coating weight; then, plating current is applied. This regulator adjusts the main generator voltage to operate the entire line at the speed to give this weight. To change the line speed it is necessary only to increase or decrease the total plating current accordingly.

To reflow the tin in the reflowing zone, a photoelectric regulator is used. This regulator scans the strip as it passes and regulates the heating medium accordingly. Such a regulator is possible, because tin, fortunately, is a solid at one temperature and just a few degrees hotter becomes molten so that the actual reflowing occurs in a narrow temperature zone. This regulator operates essentially as a position indicator and automatically compensates for any change in the line speed.

When the shearing unit is operating separately the photoelectric loop control operates in the field circuit of the uncoiler to maintain the loop, which is standard practice. However, when this unit is in tandem with the other two units this method of operation is obviously impossible. Instead, the photoelectric loop control operates in the field circuit of the main generator, used to operate the entire shearing unit. In this way the entire unit is speeded up or slowed down to maintain the proper loop.

This second type of line, Fig. 4, requires the largest power input, which is natural because of its higher spill. The line uses about 25 direct-current motors of from 1 to 125 horsepower and approximately 75 alternating-current motors ranging from ½ to 60 horsepower. The plating unit requires approximately 60,000 amperes at 12 volts or 720 kilowatts, direct current. A total of approximately 600 kilowatts, direct current, is required from the generators to supply the variable-voltage power. This means, therefore, that the total power for this line at rated load and speed is about 2700 kilowatts or 3600 horsepower.

Because the tin plate produced on one of these electrolytic lines has a gray matte surface it is desired to reflow the tin coating to obtain the smooth, polished surface to which we are accustomed. This flowing is necessary not only to improve the appearance, but to reduce the porosity of the coating and improve its corrosion resistance.

Several methods have been proposed for this flowing operation. The most important of these are: passing the tinned strip through a hot oil bath, passing the strip through a radiant-tube or some other type of furnace, or using the electrical resistivity of the strip itself to heat it conductively, or to pass it through a high-frequency inductor heater coil, or a combination of these methods.

Hot-Oil Bath: This can be used successively on low-speed lines. Because the differential between the melting point of tin (450 degrees Fahr.) and the temperature at which the oil can safely be heated is low the speed is limited. Further, because this reservoir of heat can be generated only at a relatively low rate, and the temperature cannot be altered quickly, the strip must be passed through the bath at constant speed.

Furnace Method: This is satisfactory for low-speed work, but becomes bulky as the speed of the strip is increased. The furnace must be from about 1/3 to ½-foot long for each foot per minute that the strip travels; a practical limit of 200 to 300 feet per minute is set for the radiant furnace method. Here again, the heat neither can be generated nor dissipated at a high rate, which re-

stricts its use to a constant-speed operation. Both the hot oil and the furnace methods do not lend themselves readily to incorporation in the electrolytic-tinning line itself, but make flowing a separate operation. This, of course, entails additional handling of the strip during processing.

CONDUCTION HEATING: Melting the tin by the heating effect of current flowing through the tin-plate itself does not have the speed limitations of the hot-oil or furnace method. Neither does it restrict the process to a constant speed inasmuch as the current can be readily controlled as the speed is changed.

With this method, however, there is the problem of getting the power into the strip at high speeds without arcing and burning at the contact rolls where the power is introduced into the strip. Because the strip with the coating heated is in actual contact with the current-collecting rolls, there is a possibility of marring the tin surface. By this method it is necessary to heat a section of the strip while at the same time attempting to quench it.

INDUCTION METHOD: The tinned surface is brought to the melting point of tin by the same methods now extensively employed by industry in electromagnetic heating except that the frequency and power involved are much greater. In fact, the equipment is a broadcasting set of enormous power. Based on a strip speed of 1000 feet per minute an oscillator of 1200 kilowatts output is required for most commercial strip. It is interesting to note that just one of these induction heating units has a radio frequency output of 24 radio broadcasting stations of 50 kilowatt capacity. This equipment requires approximately 2300 kilowatts of power input and covers a floor space of about 650 square feet.

In the induction system there is no physical contact between the strip and any stationary or rotating member. Thus, there can be no marking of the strip either by electrical or mechanical action. The heating is done in a short space even at high speeds, the space required being in the order of 10 to 12 feet at a speed of 1000 feet per minute. No heating is done at the time that the strip is being quenched.

Inasmuch as flowing of tin is a relatively new operation, practical experience may indicate the wisdom of using some combination of these flowing methods. Such a combination might be to use both electric conduction and induction, in which the tin is preheated by current carried through the strip and the final heating to the reflowing temperature accomplished by induced current.

The complete process now can be performed in one line instead of several operations, each requiring additional handling of the steel. The coating applied has been reduced to approximately one-third, by weight, of its former value.



## Publishes Data on Nonferrous Oxidation

Research paper RP1470 entitled, "Rate of Oxidation of Typical Nonferrous Metals as Determined by Interference Colors of Oxide Films" is announced by the United States Department of Commerce, National Bureau of Standards, Washington. It contains research data compiled by Dunlap J. McAdam Jr., and Glenn W. Geil in determining rates of oxidation, by means of interference colors, of 18 nonferrous metals compared with those for typical steels.

The paper covers the electrochemical theory of the dry oxidation of metals, influence of temperature on oxidation time for constant film thickness, variation of film thickness with time at constant temperature, variation of film thickness with temperature, for constant oxidation time, and factors affecting the form and position of the three-dimensional diagram representing the oxidation of a metal.

## Oil Handling System

(*Concluded from Page* 135)

vious ones. This is particularly true in connection with the distribution of soluble oil. Previously soluble oil was distributed around the plant in individual barrels. Used as a coolant for the metal saws, lathes, and grinders, the oil was mixed with water as needed. Any one of several individuals handled these mixing operations with the result that the supply varied widely in consistency and was frequently not so satisfactorily proportioned as was wanted. Distributing the soluble oil from a centralized system, on the other hand, has made it possible to put the mixing into the hands of one man. This makes for absolute uniformity of results and for proper consistency at all times.

The establishment of a large reservoir of soluble oil has also eliminated one of the problems always present with small self-contained systems. The many times larger quantity of soluble oil in circulation in the new system gives the oil a chance to cool off before being returned to the machines. In the small self-contained systems of individual machines there is always a chance of the coolant getting too hot and permitting the tools, the machine, or the work itself to be damaged through the development of excessive temperatures.

Likewise, with centralized control of the supplies of coolant and drawing oils the pressure at which these oils are delivered to the point of use can be kept more uniform. Generally, too, the oils are returned to service much cleaner because of the effective filtering they now receive—treatment not practicable when they were handled by former methods.

## Women "Man" War Plants

(*Continued from Page* 138)

The procedure for drafting women into war industries is a comprehensive one. In the first place an order was issued making all single women between 20 and 30 liable; subsequently, these women were called up, month by month, in age groups. The process of calling up single women of no occupation was quickly completed; next came the transferring of women between 20 and 30 from unessential jobs (i.e. shopgirls, office clerks, cinema attendants) to war work. Now even young girls on comparatively essential work such as food production and distribution, governmental work (clerical) and so on are being taken into industrial factories and replaced by older women.

The same principles as applied to men are also being applied to women—firstly, that all young women must go on to active war work, and that fullest use must be made of the older women. Perhaps the position is best understood by visualizing a sort of general "all-change", with everybody moving along in one direction—towards total efficient production and with the most unessential industries quietly evaporating (as have done many sports and entertainments and, to a large extent, such trades as cosmetics, confectionery, men's and women's hair oil and similar accessories, etc.).

Incidentally, it might be of interest to mention here that the trades which the government regards as coming under the category of war work are agriculture, forestry, canteens, hotels, civil defense, cotton, munitions, timber production, aircraft production, shipbuilding, engineering and allied industries, public utilities, transport, teaching, medical and nursing and hospital work, and certain government and local municipal work.

In regard to calling up the women, the Ministry of Labor recognizes two main classes—mobile and immobile. All single women are regarded as mobile, and available for transfer to war work (in many cases this involves moving from one part of the country to another). Married

TABLE I—Typical Wage Rates in British Industries

| Industry | 1938 Men | 1938 Women | (Increase since October, 1938 in Per Cent) Men | Women |
|---|---|---|---|---|
| Bricks, etc. | 88s 7d ($17.12) | 38s 8d ($6.73) | 40.2 | 38.9 |
| Chemical, etc. | 97s 9d (19.55) | 44s 3d ( 8.85) | 41.5 | 35.8 |
| Metal engineering and shipbuilding | 111s 5d (22.28) | 48s 2d ( 9.63) | 48.7 | 47.4 |
| Textile | 81s 8d (16.33) | 41s 10d ( 8.36) | 42.5 | 32.3 |
| Clothing | 84s 11d (16.93) | 41s 6d ( 8.30) | 30.5 | 25.8 |
| Food, etc. | 87s 8d (17.53) | 40s 4d ( 8.06) | 33.0 | 21.0 |
| Woodworking | 87s 8d (17.53) | 42s 9d ( 8.55) | 31.5 | 28.3 |
| Transport | 92s 8d (18.53) | 59s 11d (11.98) | 29.8 | 67.6 |
| Government work | 110s 10d (22.36) | 54s 0d (10.80) | 47.3 | 20.7 |

Conversion based on pound sterling equal to $4.00 (as of August 1942).

women are regarded as immobile, and those with children have so far been exempted from war work, but childless married women between 20 and 30 are all being drafted into local war work. Since nearly all single women and childless married women have now been drafted, however, the Ministry of Labor now extends its demands on married women with children. As soon as widespread plans for the provision of national nurseries are completed, most young married women with childeren will also be taken on to war work.

Naturally, these married women are not expected to work quite such long hours as the single ones, who have less commitments, hence the introduction of a big part-time working scheme for which many married women have already votunteered before it becomes compulsory. Under this part-time scheme, large numbers of women are going into engineering factories and munitions works for periods totaling up to 30 hours a week (usually it is a daily afternoon or morning shift). In this way married women are able to carry on their housework, shopping, etc. and will still do some useful work.

### Concessions Promote Harmony

In order to attract married women, however, the Ministry has found it necessary—and it is only fair, anyway—to provide special facilities and safeguards. Thus, part-time married women workers are exempted from having to pay any unemployment insurance (so are the employers, of course). They are also exempted from the various Essential Works Orders, under which ordinary workers are prohibited from leaving their work. Furthermore, married women with husbands in the forces are allowed to take up to a fortnight's leave at short notice, to co-incide with their husband's leave. All these concessions are quite reasonable, and employers realize that they are necessary if harmonious working arrangements are to be achieved—just as certain welfare arrangements are essential, as I will show later.

**How do we train our women for war industries?** The Ministry of Labor controls a very thorough system of training, worked in conjunction with technical colleges and employers and also through the Ministry's own training centers. The courses provided cover drafting, fitting, instrument making, machine operating, panel beating and sheet metal working, electric and acetylene welding, inspecting and wing and motor vehicle fitting. Normal length of the courses is four months (except drafting, for which nine months are allowed).

There are, however, special short courses about eight weeks. These are intended to provide trainees with a preliminary basis of knowledge, and they are able to finish off the training at the factories to which they are then drafted. Employers engaging trainees are not required to pay any of the cost of training. Wages and allowances are paid to the women on a standard scale—starting at 38s ($7.60) per week for women

over 21 with opportunities (through proficiency tests each month) of rising to 47s ($9.40) per week. Girls of 16-18 are also trained, but are only allowed to take work locally. The allowances granted cover fares, lodging, meals, household removal facilities after training, and so on.

One of the most interesting features of these courses is the provision of special up-grading training, by which semi-skilled workers are made into skilled workers, raw workers into semi-skilled workers. A typical example is the training of women capstan operators in capstan setting. These special courses last a few weeks, varying according to the type of training given. The workers afterward return to the same place of employment—their firms paying wages during training, the Ministry of Labor meeting expenses.

### Trained To Be Supervisors

The extent to which women are being trained for highly skilled industrial and engineering work can be seen from these particulars of a new course introduced by the Ministry of Labor. In conjunction with the Board of Education they are organizing a series of lectures at technical colleges for training of women supervisors. The lectures cover general principles of workshop supervision, factory organization, method of timekeeping and payment, elementary workshop practice, factory legislation (including special wartime measures). It is appreciated that both personality and industrial experience are required to make an efficient woman supervisor, and therefore only women who have had six months' training in industry are accepted for the course. At the end of the course the women take a stiff examination and then are drafted to suitable factories. Already women have been taken for supervising jobs in ordnance and munitions factories.

All the initiative does not come from the Ministry of Labor, of course. Many of our more progressive industrial employers have their own intensive employment schemes and training courses. Thus, at one North London aircraft components factory there is a workshop school for full and part time women workers. This consists of a light factory building with dummy machines and a set of demonstration tools and charts. Blackboard lectures show the women the processes which they must work and they pass on to their jobs knowing the technical terms and purposes of the machines.

Another interesting example comes from a big ordnance factory engaged on gun production. Here all women workers are given a special training which equips them to tackle not only one type of job, but several. In this way, according to demands of production, they can be switched from job to job; so that there are never any delays in production owing to shortages of suitable staff. The women are given a long theoretical training, covering caliper sizing, micrometer use, conversion of fractions into decimals, vernier instruction, clock gages, clamping of fixtures to machines, reading of working drawings and operation sketches.

Women are also given practical training at a school, equipped with work tables at which four women can work at a time. Instruction is given in tool handling and working and so on. The experience at this factory has been that 10 per cent of the girls are good enough to be put on inspection work, some 80 per cent make very capable machine hands, about 10 per cent are below average and therefore are put to sweeping up, cleaning, crane driving, etc.

The scope of the industrial work, light and heavy, now done by British women is quite surprising. Apart from the obvious light duties, such as drafting, machining, clerical, filing, fitting and jigging, we now have large numbers of

women on truck driving and maintenance, crane driving, railway shed work, boiler work, fixture work, general and specialized assembling, aircraft detail fitting and many forms of electrical work. Women are also being trained in large quantities in arc and gas welding of all types—high tensile, stainless, mild and other commercial alloy steels, and of nonferrous sheet and plate (aluminum, copper, monel, brass, etc.).

### Woman Personnel Officer Essential

Here it may be interesting to give in brief the recommendations made by our Ministry of Labor to all industrial heads and works managers on the employment of women in war work. Every firm, it is stated, should have a suitable woman personnel officer who should be given full knowledge of all operations to be undertaken by women. She should be responsible for interviewing, selecting and engaging staffs, and for the organization and supervision of all health and welfare matters. Before women are taken into factories, there should be full consultation with foremen and with trade union officials and shop stewards, so as to avoid internal friction. New women employes should, if possible, be shown around the works, and should be formally introduced to their foremen or forewomen.

Personnel officers are advised to interview new workers once a week for the first month, so as to help to get them settled down quickly. Employers are particularly advised not to work women for too long a period—it is pointed out that there is a satisfactory working time in which the best output will be given (between 48 and 56 hours a week) and that, if this is exceeded, output will suffer. Employers are also urged to arrange for time-off during daytime for women to do their shopping.

On the welfare side, it is laid down as essential that adequate canteens be provided—in fact, apart from this, most of our big firms do their women workers royal, providing not only clubs, dance halls and other social amenities, but also (those factories in isolated districts) with luxurious hotels equipped with hot water, electric fires, radio, lounges, common-rooms, private cinemas, etc. Most factories arrange regular weekly concerts and musical intervals, apart from gramophone music which is played throughout the day in work rooms. In some factories, works nurseries have already been built.

Mothers leave their children there before the clocking-in, and call for them at the end of the shift. The nurseries are staffed with qualified matrons and nurses, and there are special playrooms and bathrooms.

Finally there is the question of wages.

For some time women war worker's wages were considerably below those of men. However, now that it is being proved that women can do most men's jobs just as efficiently as the men, they are beginning to earn almost the same money.

In any event, there has been quite a steady rise in wages—estimated at 42 per cent since 1938 for all classes of women industrial workers. Average earnings in a typical week this year are shown in Table I.

Since these figures have been issued, women have had even bigger raises. For instance, 40,000 women workers in Royal Ordnance factories have had raises up to 10s ($2.00) a week, plus war allowances which bring their weekly salaries from 43s ($8.60) a week to 62s ($12.40) a week.

Those women on dangerous explosives work now receive 82s ($16.40) a week instead of 41s $8.20) a week, a raise of about 50 per cent.

## Surface Conditioner For Brightening Steel

A steel surface conditioner, called Surbrite, for addition to hydrochloric acid and sulphuric acid pickles, is reported by Hanson-Van Winkle-Munning Co., Matawan, N. J. Its use is said to reduce acid consumption and metal loss.

The product is being offered in two types—Surbrite H and S. The first is used to avoid smut formation and excessive etching during hydrochloric acid pickling. The second is used to give bright surfaces during sulfuric acid pickling.

Both forms of Surbrite, it is stated, are fully comparable with the best of existing inhibitors in acid and metal saving. However, the bright surface produced is the outstanding advantage of the surface conditioner.

## Latest Edition on Coal Standards Offered by ASTM

American Society for Testing Materials announces its 1942 edition of standards on coal and coke covering all of the twenty-seven methods, specifications, and definitions of terms developed through its committee in which leading consumers and producers are active. It includes a number of changes as compared with the previous 1940 edition including modifications in standard methods of laboratory sampling and analysis of coal and coke.

Copies of this 130-page publication may be obtained from the association headquarters, 260 South Broad street, Philadelphia.

## New Calculator Gives Data Blue-Print Style

Dimensions such as threads per inch, basic pitch diameter, decimal equivalents to fractions are included in a new calculating instrument, the Elemoto, recently developed by Elemoto Sales Co., Teaneck, N. J. Working on the slide principle, it is of heavy paper board with drawings and figures appearing in white against a blue background—blue print style.

The front side of the calculator gives U. S. standard dimensions for coarse and fine thread series besides decimal equivalents of fractions and a table of standard gages for sheet, plate iron and steel.

The other side can be used to obtain dimensions for Woodruff Keys. The lower section of this side is used to determine standard pipe dimensions. Also included on this same side is a table for changing millimeters to inches.

## New Dictionaries of Industrial Terms

*Dictionary of Technical Terms*, by F. S. Crispin; cloth, 373 pages, 5½ x 7½ inches; published by Bruce Publishing Co., Milwaukee, for $2.50

*National Paint Dictionary*, second edition, by Jeffrey R. Stewart; cloth, 224 pages, 9 x 12 inches; published by Stewart Research Laboratory, 1340 New York avenue, Washington, for $7.50.

The first of these two reference books contains definitions of commonly used expressions in aeronautics, architecture, woodworking and building trades, electrical and metalworking trades, printing, chemistry and other industries. It is designed for use by students, draftsmen, mechanics, builders, electricians, and workmen generally, to give an understanding of the technical terms with which they come in daily contact. Many handbooks assume more familiarity with such terms and proceed with descriptions of their application, without definitions.

The paint directory is designed to keep the industry abreast of new materials and methods in an era when they are appearing in large numbers. The present revision, which will not be the last, covers the expansion in the paint industry, with exact definitions, aiming to give the universally accepted meaning to the several terms.

## Extends Effective Date of Drill Fittings Standard

Effective date for new production of diamond core drill fittings, commercial standard CS17-42, has been extended from Jan. 1, 1943, to six months after official announcement of cessation of ac-

tual hostilities, or to such earlier date, as may be recommended by the standing committee, according to the National Bureau of Standards, United States Department of Commerce, Washington.

This move is in accordance with the approval of the standards bureau and the wishes of the Diamond Core Drill Manufacturers Association it is reported.

It is felt the new standards do not so much result in the simplification of the present standards as specified in CS17-32, as to set up new standards of thinner wall bits. These thin wall bits are not greatly used in the United States at the present time. It is expected, however, that eventually CS17-42 will completely replace CS17-32, but from the nature of the art, it will take months to effect this replacement.

## Chapter on Gaging Policy Added to Sheffield Book

Supplementing the first edition of its textbook, "Dimensional Control", Sheffield Corp., Dayton, O., now has available a new chapter on gaging policy. This is in the form of a pamphlet to all who have copies of the original textbook—through direct application to the company or through its representatives.

Subjects covered in this supplement include: Factors of gaging policy; gage makers' tolerances; allocation of gage tolerance; wear allowance; army ordnance practice; thread gages; and how best to order gages. Many illustrations and charts are included, besides two pages dealing with wear allowances on inspection gages.

This pamphlet, as was the case of the book which it supplements, is the work of experts at the Sheffield Corp., collaborating with W. Wilson Burden of Detroit.

## New Standard on Screw Threads Effective 1943

Commercial standard for screw threads and tap drill sizes. CS24-43, (revision and consolidation of CS24-30 and CS25-30) will be effective for new production Feb. 10, 1943, according to the Division of Trade Standards, National Bureau of Standards, Washington.

This revised standard was circulated for written acceptance in accordance with the action of the standing committee, July 27 of this year.

Signed acceptances from a number of manufacturers, distributors and users, estimated to represent a satisfactory majority, have been received by the Division of Trade Standards since that time.

Printed copies of the standard will be mailed to nonacceptors only on specific request.

## Wing Tips

(*Concluded from Page* 98)

trogalvanizing followed by phosphate treatment or "bonderizing". Spot welds can be made through a surface so treated without difficulty.

On panels not assembled permanently in position in the fuselage of a plane (those screwed in place or held by camlock fasteners) special means have been devised to strengthen the edges. One system involves curling back the exposed sheet edge. Another is simply wrapping the edge around a small wire extending along the edge, a technique familiar to press shops which have supplied automotive requirements of this sort.

## Wickwire Spencer To Produce Variable-Pitch Propellers

New automatic variable-pitch propeller for aircraft, in process of development for two years, is going into production at Wickwire Spencer Steel Co., New York, according to announcement by E. C. Bowers, Wickwire president.

Full details of the propeller are restricted, but it is said to require no auxiliary power, equipment, circuits or manual or governor controls. From takeoff, through the climb, at all air speeds, at all altitudes and under any flight conditions, the pitch is said to adjust itself automatically, instantaneously and smoothly. Blades are of a special wood construction, a desirable feature in the present conservation of critical metals, also making the assembly lighter in weight, simpler in structure and less expensive to produce.

Wickwire Spencer supplies other aviation products, including wire rope, conveyor belts, perforated metals, welded fabrics for reinforcing concrete runways, airplane target cloths, airplane landing mats, control cables and various types of springs and formed wire shapes.

## Manpower

(*Concluded from Page* 101)

profound promise of this day we may draw the hope and the vision which we must have. On the birthday of the Prince of Peace we can and should rest from the production of the weapons of war.

"Therefore, except for such maintenance and stand-by operations as are necessary for best productive efficiency, I hope that in all war plants where it can possibly be done, Christmas Day this year will be observed as a full holiday. After the holiday, we must drive ahead with renewed energy for the increased production job of 1943—a bigger job than we have ever faced before."

## NAM Urges Upgrading of Workers To Spur Output

Providing all workers wiht wide opportunities for personal advancement to improve employe morale and thus gain increased production was advocated last week by the National Association of Manufacturers, New York, in a bulletin to members. Demand for war production will practically double with the opening of the African front, NAM declared, but with no "doubling" of the supply of workers in sight management must improve its methods of supervision and training.

Stating that "intelligent upgrading of workers means greater efficiency," the association advised that plant instructors help employes to qualify for promotions. If supervisory and training programs are improved sufficiently, accidents in plants —a tremendous factor in time losses— can be reduced, "learning time" can be cut as much as 50 per cent for new workers, and production can be increased in some cases "as much as 75 per cent," the NAM said.

## Canada

(*Concluded from Page* 89)

adian manufacture. To date 85 merchant ships of 10,000 tons capacity have been launched in addition to several of 5000 tons deadweight, which brings output of merchant ships in Canada to about the same number as in Great Britain. Cost has been decreasing and Canada soon will be building ships more cheaply than any other country, the department reports.

Production of motorized vehicles has increased tenfold since the outbreak of the war. Production of Valentine tanks is three per day and Canadian deliveries have reached more than 1000 Ram tanks.

### Foreign Trade at Peak

Foreign trade of Canada in the first ten months this year attained the highest record in the history of the Dominion, with imports of steel from the United States and exports of finished war materials the dominating features. Export trade for ten months totaled $1,900,000,000, which is more than double exports for all of 1939 and $250,000,000 more than for the full year, 1941. Imports for the same period were nearly double those for all of 1939 and nearly equal to the full year, 1941.

Total foreign trade for ten months was $3,285,649,264, against $3,089,246,191 for 12 months in 1941 and $1,636,977,247 for 1939. The favorable balance of trade for Canada so far this year is $525,000,000.

Canadian defense construction contracts awarded by the Department of Munitions and Supply in the first ten months this year numbered 1434 with value of $140,000,000, exceeding by $20,000,000 the value of all buildings erected in 1939.

## Britain May Shift Industrial Plants for Greater Efficiency

Under new plans recently put forward by the British minister of production, Oliver Lyttelton, for the reorganization of British war industry, many firms, large and small, may face further governmental control which may, in some cases, involve their bodily removal to new areas. In heavily congested districts firms not tied necessarily to the district may have to move machinery and a few key workers and start operating in a less congested area.

Small firms may have to undergo new "groupings of affiliations" to bring about a larger and more economical unit of production. Other small firms whose "resources or technical ability are too meager to permit the productivity needed" may have to close, releasing their labor for more efficient firms.

These new plans are symbols of Britain's full mobilization. In the period after Dunkirk it was vital to use any productive unit, large or small, that lay to hand.

## New Facilities

(*Concluded from Page* 88)

and equipment of the $45,000,000 expansion for the Continental Ordnance Plant, Hammond, Ind.

The project, designed to produce and machine heavy steel castings, was authorized Aug. 12 and work was begun immediately by the Continental Ordnance Corp., East Chicago, Ind. Value of construction in place is approximately $1,000,000.

The Army, which sponsored the project, has concurred with WPB on the stoppage order.

WPB Chairman Donald M. Nelson Oct. 21 announced the policy of drastically curtailing construction programs to make materials available for direct military use and for such essential programs as the rubber, high-octane gasoline, aviation, aluminum and alloy steel expansion programs.

All construction programs, under the policy, must balance with production programs and the proposed expansion at Hammond would not be completed in sufficient time to justify the large expenditure of critical materials.

# Shift in War Needs Cuts Steel Mill Order Backlogs

*Government cancels some tonnage as production exceeds estimates. . . Long-range bookings being removed in advance of Controlled Materials Plan. . . War needs still absorb output*

**DEMAND**
*War work takes all steel.*

**PRODUCTION**
*Up ½-point to 99½ per cent.*

**PRICES**
*Unchanged at ceilings.*

CANCELLATION of orders for war supplies by the government, reflecting the changed picture in the military program, has caused substantial decline in order backlogs of steelmakers.

This condition results from altered armament requirements, certain items being in less demand than previously planned, and from the fact that industrial production has been far above expected output, providing larger supply than scheduled.

Some of the cancellations may have an immediate effect on mill schedules but most are included in the long range program, destined for delivery in future months. The latter would be eliminated from mill books by the Controlled Materials Plan when it gets into operation. Considerable tonnage of this character remains on books, to be dropped later. Peak of order backlogs apparently has been passed, as under CMP no necessity will exist for accumulation of such future orders.

A significant feature in government orders now being placed is inclusion of a cancellation clause, providing for remuneration and damages if the government terminates a contract before completion. This provision can be extended from prime to subcontractors and material suppliers.

• • •

Despite the easier situation implied by this reduction in backlogs, war requirements continue to take practically all available steel and Washington officials warn against expectation that material will be available for civilian use in larger measure than at present. When the present shift in character of war equipment is completed demand will be found to absorb output, they say, with the Controlled Materials Plan functioning to match demand to supply and eliminate need to place orders for deferred delivery.

Steel warehouses are in better position under the new directive plan and shipments have been sufficient that some distributors have received full fourth quarter quotas. Demand is somewhat lighter, attributed to government contract cancellations and uncertainties under the changing picture of armament requirements. Cold-finished and alloy steel receipts are still scarce but better supplies of hot-rolled NE steels are being received. Under the Controlled Materials Plan warehouses will not be given allotment numbers but will be supplied by directives based on quantities normally supplied to the districts they serve.

January pig iron applications are being made on the revised forms which regroup preference designations and provide for end-use explanations. In December distribution about 95 per cent was included in AA to A-1-k priority group, with relatively little tonnage in lower priorities. Under the allocation plan New England melters, who normally take in sufficient iron in advance for full winter requirements, are held to monthly deliveries, which are made by rail after navigation closes, adding to cost of iron coming from outside the district.

• • •

Continuing to hold as close to capacity as necessity for furnace repairs will permit steelworks production last week rose ½-point to 99½ per cent. Principal contribution to this increase was a rise of ½-point at Pittsburgh, aided by a 5-point gain at Wheeling to 86 per cent, Cincinnati 1 point to 92, Cleveland 1½ points to 94 and Detroit 4 points to 95. New England furnished the only loss, 3 points to 92 per cent. Rates were unchanged as follows: Chicago, 101½ per cent; Buffalo, 90½; St. Louis, 94; Birmingham, 95; Youngstown, 97; eastern Pennsylvania, 96.

Scrap supply in general is easier than for several months and efforts of various agencies to bring out dormant supplies from industrial and other sources are being pushed successfully, resulting in considerable additions to tonnage. While the current situation is satisfactory a shortage might recur late in the winter if vigorous campaigning for further supply were allowed to lag. Considerable reserves have been accumulated and melters are becoming more particular as to grades, some rejections being made. OPA is seeking to minimize these as the lower grade scrap will be needed later. In a few instances steelmakers are holding back shipments. On the other hand direct allocations are in force for districts where supply is less satisfactory.

Composite steel and iron prices are steady at OPA ceilings, finished steel at $56.73, semifinished steel at $36, steelmaking pig iron at $23.05 and steelmaking scrap at $19.17.

# COMPOSITE MARKET AVERAGES

| | Dec. 5 | Nov. 28 | Nov. 21 | One Month Ago Nov., 1942 | Three Months Ago Sept., 1942 | One Year Ago Dec., 1941 | Five Years Ago Dec., 1937 |
|---|---|---|---|---|---|---|---|
| Finished Steel | $56.73 | $56.73 | $56.73 | $56.73 | $56.73 | $56.73 | $62.18 |
| Semifinished Steel | 36.00 | 36.00 | 36.00 | 36.00 | 36.00 | 36.00 | 40.00 |
| Steelmaking Pig Iron | 23.05 | 23.05 | 23.05 | 23.05 | 23.05 | 23.05 | 22.90 |
| Steelmaking Scrap | 19.17 | 19.17 | 19.17 | 19.17 | 19.17 | 19.17 | 13.40 |

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

| | Dec. 5, 1942 | Nov. 1942 | Sept. 1942 | Dec. 1941 |
|---|---|---|---|---|
| Steel bars, Pittsburgh | 2.15c | 2.15c | 2.15c | 2.15c |
| Steel bars, Chicago | 2.15 | 2.15 | 2.15 | 2.15 |
| Steel bars, Philadelphia | 2.49 | 2.49 | 2.49 | 2.47 |
| Shapes, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.10 |
| Shapes, Philadelphia | 2.22 | 2.22 | 2.22 | 2.22 |
| Shapes, Chicago | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, Philadelphia | 2.15 | 2.15 | 2.15 | 2.15 |
| Plates, Chicago | 2.10 | 2.10 | 2.10 | 2.10 |
| Sheets, hot-rolled, Pittsburgh | 2.10 | 2.10 | 2.10 | 2.10 |
| Sheets, cold-rolled, Pittsburgh | 3.05 | 3.05 | 3.05 | 3.05 |
| Sheets, No. 24 galv., Pittsburgh | 3.50 | 3.50 | 3.50 | 3.50 |
| Sheets, hot-rolled, Gary | 2.10 | 2.10 | 2.10 | 2.10 |
| Sheets, cold-rolled, Gary | 3.05 | 3.05 | 3.05 | 3.05 |
| Sheets, No. 24 galv., Gary | 3.50 | 3.50 | 3.50 | 3.50 |
| Bright bess., basic wire, Pittsburgh | 2.60 | 2.60 | 2.60 | 2.60 |
| Tin plate, per base box, Pittsburgh | $5.00 | $5.00 | $5.00 | $5.00 |
| Wire nails, Pittsburgh | 2.55 | 2.55 | 2.55 | 2.55 |

## Semifinished Material

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

## Pig Iron

| | Dec. 5, 1942 | Nov. 1942 | Sept. 1942 | Dec. 1941 |
|---|---|---|---|---|
| Bessemer, del. Pittsburgh | $25.19 | $25.19 | $25.19 | $25.34 |
| Basic, Valley | 23.50 | 23.50 | 23.50 | 23.50 |
| Basic, eastern, del. Philadelphia | 25.39 | 25.39 | 25.39 | 25.34 |
| No. 2 fdry., del. Pgh., N.&S. Sides | 24.69 | 24.69 | 24.69 | 24.69 |
| No. 2 foundry, Chicago | 24.00 | 24.00 | 24.00 | 24.00 |
| Southern No. 2 Birmingham | 20.38 | 20.38 | 20.38 | 20.38 |
| Southern No. 2, del. Cincinnati | 24.30 | 24.30 | 24.30 | 24.06 |
| No. 2X, del. Phila. (differ. av.) | 26.265 | 26.265 | 26.265 | 26.215 |
| Malleable, Valley | 24.00 | 24.00 | 24.00 | 24.00 |
| Malleable, Chicago | 24.00 | 24.00 | 24.00 | 24.00 |
| Lake Sup., charcoal, del. Chicago | 31.54 | 31.54 | 31.54 | 31.34 |
| Gray forge, del. Pittsburgh | 24.19 | 24.19 | 24.19 | 24.19 |
| Ferromanganese, del. Pittsburgh | 140.65 | 140.65 | 140.65 | 125.33 |

## Scrap

| | | | | |
|---|---|---|---|---|
| Heavy melting steel, Pitts. | $20.00 | $20.00 | $20.00 | $20.00 |
| Heavy melt. steel, No. 2, E. Pa. | 18.75 | 18.75 | 18.75 | 18.00 |
| Heavy melting steel, Chicago | 18.75 | 18.75 | 18.75 | 18.75 |
| Rails for rolling, Chicago | 22.25 | 22.25 | 22.25 | 22.25 |
| No. 1 cast, Chicago | 20.00 | 20.00 | 20.00 | 21.215 |

## Coke

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

## STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

### Semifinished Steel

**Gross ton basis except wire rods, skelp.**

**Carbon Steel Ingots:** F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

**Alloy Steel Ingots:** Pittsburgh base, uncropped, $45.00.

**Rerolling Billets, Slabs:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

**Forging Quality Billets:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

**Open Hearth Shell Steel:** Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

**Alloy Billets, Slabs, Blooms:** Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

**Sheet Bars:** Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

**Skelp:** Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

**Wire Rods:** Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

### Bars

**Hot-Rolled Carbon Bars:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

**Rail Steel Bars:** Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

**Hot-Rolled Alloy Bars:** Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethhlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

| AISI Series | (*Basic O-H) | AISI Series | (*Basic O-H) |
|---|---|---|---|
| 1300 | $0.10 | 4100 (.15-.25 Mo) | 0.55 |
| | | (.20-.30 Mo) | 0.60 |
| 2300 | 1.70 | 4340 | 1.70 |
| 2500 | 2.55 | 4600 | 1.20 |
| 3000 | 0.50 | 4800 | 2.15 |
| 3100 | 0.70 | 5100 | 0.35 |
| 3200 | 1.35 | 5130 or 5152 | 0.45 |
| 3400 | 3.20 | 6120 or 6152 | 0.95 |
| 4000 | 0.45-0.55 | 6145 or 6150 | 1.20 |

*Add 0.25 for acid open-hearth; 0.50 electric.

**Cold-Finished Carbon Bars:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

**Cold-Finished Alloy Bars:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

**Turned, Ground Shafting:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

**Reinforcing Bars (New Billet):** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

**Reinforcing Bars (Rail Steel):** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

**Iron Bars:** Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

### Sheets, Strip

**Hot-Rolled Sheets:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

**Cold-Rolled Sheets:** Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del 3.39c; Pacific ports 3.70c.

**Galvanized Sheets, No. 24:** Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

**Corrugated Galv. Sheets:** Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

**Culvert Sheets:** Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

**Enameling Sheets:** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

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

**Electrical Sheets, No. 24:**

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

**Hot-Rolled Strip:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)
**Cold Rolled Strip:** Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.
**Commodity C. R. Strip:** Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.
**Cold-Finished Spring Steel:** Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

## Tin, Terne Plate

**Tin Plate:** Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.
**Tin Mill Black Plate:** Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.
**Long Ternes:** Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.
**Manufacturing Ternes: (Special Coated)** Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
**Roofing Ternes:** Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

## Plates

**Carbon Steel Plates:** Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
**Floor Plates:** Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
**Open-Hearth Alloy Plates:** Pittsburgh, Chicago, Coatesville, 3.50c.
**Wrought Iron Plates:** Pittsburgh, 3.80c.

## Shapes

**Structural shapes:** Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)
**Steel Sheet Piling:** Pittsburgh, Chicago, Buffalo, 2.40c.

## Wire Products, Nails

**Wire:** Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

| | |
|---|---|
| Bright basic, bessemer wire | 2.60c |
| Galvanized wire | 2.60c |
| Spring wire | 3.20c |

**Wire Products to the Trade:**

| | |
|---|---|
| Standard and cement-coated wire nails, polished and staples, 100-lb. keg | $2.55 |
| Annealed fence wire, 100 lb. | 3.05 |
| Galvanized fence wire, 100 lb. | 3.40 |
| Woven fence, 12½ gage and lighter, per base column | 67 |
| Do., 11 gage and heavier | 70 |
| Barbed wire, 80-rod spool, col. | 70 |
| Twisted barbless wire, col. | 70 |
| Single loop bale ties, col. | 59 |
| Fence posts, carloads, col. | 69 |
| Cut nails, Pittsburgh, carloads | $3.85 |

## Pipe, Tubes

**Welded Pipe:** Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

| In. | Steel Blk. | Steel Galv. | In. | Iron Blk. | Iron Galv. |
|---|---|---|---|---|---|
| ⅛ | 56 | 33 | ⅛ | 24 | 3½ |
| ¼ & ⅜ | 59 | 40½ | ¾ | 30 | 10 |
| ½ | 63½ | 51 | 1-1¼ | 34 | 16 |
| ¾ | 66½ | 55 | 1½ | 38 | 18½ |
| 1-3 | 68½ | 57½ | 2 | 37½ | 18 |

Lap Weld

| In. | Steel Blk. | Steel Galv. | In. | Iron Blk. | Iron Galv. |
|---|---|---|---|---|---|
| 2 | 61 | 49½ | 1¼ | 23 | 3½ |
| 2½-3 | 64 | 52½ | 1½ | 28½ | 10 |
| 3½-6 | 66 | 54½ | 2 | 30½ | 12 |
| 7-8 | 65 | 52½ | 2½, 3½ | 31½ | 14¼ |
| 9-10 | 64½ | 52 | 4 | 33½ | 18 |
| 11-12 | 63½ | 51 | 4½-8 | 32½ | 17 |
| | | | 9-12 | 28½ | 12 |

**Boiler Tubes:** Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

| O. D. Sizes | B.W.G. | —Seamless— Hot Rolled | Cold Drawn | —Lap Weld— Steel | Charcoal Iron |
|---|---|---|---|---|---|
| 1" | 13 | $ 7.82 | $ 9.01 | ..... | ..... |
| 1¼" | 13 | 9.26 | 10.67 | ..... | ..... |
| 1½" | 13 | 10.23 | 11.72 | $ 9.72 | $23.71 |
| 1¾" | 13 | 11.64 | 13.42 | 11.06 | 22.93 |
| 2" | 13 | 13.04 | 15.03 | 12.38 | 19.35 |
| 2¼" | 13 | 14.54 | 16.76 | 13.79 | 21.63 |
| 2½" | 12 | 16.01 | 18.45 | 15.16 | ..... |
| 2½" | 12 | 17.54 | 20.21 | 16.58 | 26.57 |
| 2¾" | 12 | 18.59 | 21.42 | 17.54 | 29.00 |
| 3" | 12 | 19.50 | 22.48 | 18.35 | 31.38 |
| 3½" | 11 | 24.63 | 28.37 | 23.15 | 39.81 |
| 4" | 10 | 30.54 | 35.20 | 28.66 | 49.90 |
| 4½" | 10 | 37.35 | 43.04 | 35.22 | ..... |
| 5" | 9 | 46.87 | 54.01 | 44.25 | 73.93 |
| 6" | 7 | 71.96 | 82.93 | 68.14 | ..... |

## Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

## Tool Steels

**Tool Steels:** Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.
**High Speed Tool Steels:**

| Tung. | Chr. | Van. | Moly. | Pitts. base, per lb. |
|---|---|---|---|---|
| 18.00 | 4 | 1 | .. | 67.00c |
| 18.00 | 4 | 2 | 1 | 77.00c |
| 18.00 | 4 | 3 | 1 | 87.00c |
| 1.5 | 4 | 1 | 8.5 | 54.00c |
| .... | 4 | 2 | 8 | 54.00c |
| 5.50 | 4 | 1.50 | 4 | 57.50c |
| 5.50 | 4.50 | 4 | 4.50 | 70.00c |

## Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

| Type | Bars | Plates | Sheets | H. R. Strip | C. R. Strip |
|---|---|---|---|---|---|
| **CHROMIUM NICKEL STEEL** | | | | | |
| 302 | 24.00c | 27.00c | 34.00c | 21.50c | 28.00c |
| 303 | 26.00 | 29.00 | 36.00 | 27.00 | 33.00 |
| 304 | 25.00 | 29.00 | 36.00 | 23.50 | 30.00 |
| 308 | 29.00 | 34.00 | 41.00 | 28.50 | 35.00 |
| 309 | 36.00 | 40.00 | 47.00 | 37.00 | 47.00 |
| 310 | 49.00 | 52.00 | 53.00 | 48.75 | 56.00 |
| 311 | 49.00 | 52.00 | 53.00 | 48.75 | 56.00 |
| 312 | 36.00 | 40.00 | 49.00 | ..... | ..... |
| *316 | 40.00 | 44.00 | 48.00 | 40.00 | 48.00 |
| *317 | 50.00 | 54.00 | 58.00 | 50.00 | 58.00 |
| ‡321 | 29.00 | 34.00 | 41.00 | 29.25 | 38.00 |
| ‡347 | 33.00 | 38.00 | 45.00 | 33.00 | 42.00 |
| 431 | 19.00 | 22.00 | 29.00 | 17.50 | 22.50 |
| **STRAIGHT CHROMIUM STEEL** | | | | | |
| 403 | 21.50 | 24.50 | 29.50 | 21.25 | 27.00 |
| **410 | 18.50 | 21.50 | 26.50 | 17.00 | 22.00 |
| 416 | 19.00 | 22.00 | 27.00 | 18.25 | 23.50 |
| ††420 | 24.00 | 28.50 | 33.50 | 23.75 | 36.50 |
| 430 | 19.00 | 22.00 | 29.00 | 17.50 | 22.50 |
| ‡‡430F | 19.50 | 22.50 | 29.50 | 18.75 | 24.50 |
| 442 | 22.50 | 25.50 | 32.50 | 24.00 | 32.00 |
| 446 | 27.50 | 30.50 | 36.50 | 35.00 | 52.00 |
| 501 | 8.00 | 12.00 | 15.75 | 12.00 | 17.00 |
| 502 | 9.00 | 13.00 | 16.75 | 13.00 | 18.00 |
| **STAINLESS CLAD STEEL (20%)** | | | | | |
| 304 | ..... | §118.00 | 19.00 | ..... | ..... |

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

**Basing Point Prices** are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.
**Extras** mean additions or deductions from base prices in effect April 16, 1941.
**Delivered prices** applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.
**Domestic Ceiling prices** are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.
**Seconds,** maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.
**Export ceiling prices** may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

## Bolts, Nuts

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

**Carriage and Machine**

| | |
|---|---|
| ½ x 6 and smaller | 63½ off |
| Do., ⅝ and ¾ x 6-in. and shorter | 63½ off |
| Do., ⅞ to 1 x 6-in. and shorter | 61 off |
| 1⅛ and larger, all lengths | 59 off |
| All diameters, over 6-in. long | 59 off |
| Tire bolts | 50 off |
| Step bolts | 56 off |
| Plow bolts | 65 off |

**Stove Bolts**

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

**Nuts**

| Semifinished hex. | U.S.S. | S.A.E. |
|---|---|---|
| ⅜-inch and less | 62 | 64 |
| ½-1-inch | 59 | 60 |
| 1⅛-1¼-inch | 57 | 58 |
| 1⅜ and larger | 56 | .. |

**Hexagon Cap Screws**

| | |
|---|---|
| Upset 1-in., smaller | 64 off |
| Milled 1-in., smaller | 60 off |

**Square Head Set Screws**

| | |
|---|---|
| Upset, 1-in., smaller | 71 off |
| Headless, ¼-in., larger | 60 off |
| No. 10, smaller | 70 off |

## Piling

| | |
|---|---|
| Pittsburgh, Chicago, Buffalo | 2.40c |

## Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

| | |
|---|---|
| Structural | 3.75c |
| ⅜-inch and under | 65-5 off |
| Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. | $2.75-3.00 off |

## Metallurgical Coke

Price Per Net Ton

**Beehive Ovens**

| | |
|---|---|
| Connellsville, furnace | *$6.00 |
| Connellsville, foundry | 7.00- 7.50 |
| Connellsville prem. fdry. | 7.25- 7.60 |
| New River, foundry | 8.00- 8.25 |
| Wise county, foundry | 7.50 |
| Wise county, furnace | 6.50 |

**By-Product Foundry**

| | |
|---|---|
| Kearny, N. J., ovens | 12.15 |
| Chicago, outside delivered | 11.50 |
| Chicago, delivered | 12.25 |
| Terre Haute, delivered | 12.00 |
| Milwaukee, ovens | 12.25 |
| New England, delivered | 13.75 |
| St. Louis, delivered | †12.25 |
| Birmingham, ovens | 8.50 |
| Indianapolis, delivered | 12.00 |
| Cincinnati, delivered | 11.75 |
| Cleveland, delivered | 12.30 |
| Buffalo, delivered | 12.50 |
| Detroit, delivered | 12.25 |
| Philadelphia, delivered | 12.38 |

*Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942.
† $12.75 from other than Ala., Mo., Tenn.

## Coke By-Products

Spot, gal., freight allowed east of Omaha

| | |
|---|---|
| Pure and 90% benzol | 15.00c |
| Toluol, two degree | 28.00c |
| Solvent naphtha | 27.00c |
| Industrial xylol | 27.00c |
| Per lb. f.o.b. works | |
| Phenol (car lots, returnable drums) | 12.50c |
| Do. less than car lots | 13.25c |
| Do. tank cars | 11.50c |
| Eastern Plants, per lb. | |
| Naphthalene flakes, balls, bbls. to jobbers | 8.00c |
| Per ton, bulk, f.o.b. port | |
| Sulphate of ammonia | $29.20 |

## Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

| | No. 2 Foundry | Basic | Bessemer | Malleable |
|---|---|---|---|---|
| **Bethlehem, Pa.,** base | $25.00 | $24.50 | $26.00 | $25.50 |
| Newark, N. J., del. | 26.62 | 26.12 | 27.62 | 27.12 |
| Brooklyn, N. Y., del. | 27.63 | ..... | ..... | 28.15 |
| **Birdsboro, Pa.,** del. | 25.00 | 24.50 | 26.00 | 25.50 |
| **Birmingham,** base | †20.38 | †19.00 | ..... | ..... |
| Baltimore, del. | 25.67 | ..... | ..... | ..... |
| Boston, del. | 25.12 | ..... | ..... | ..... |
| Chicago, del. | ‡24.47 | ..... | ..... | ..... |
| Cincinnati, del. | 24.30 | 22.92 | ..... | ..... |
| Cleveland, del. | 24.12 | 23.24 | ..... | ..... |
| Newark, N. J., del. | 26.24 | ..... | ..... | ..... |
| Philadelphia, del. | 25.51 | 25.01 | ..... | ..... |
| St. Louis, del. | ‡24.12 | 23.24 | ..... | ..... |
| **Buffalo,** base | 24.00 | 23.00 | 25.00 | 24.50 |
| Boston, del. | 25.50 | 25.00 | 26.50 | 26.00 |
| Rochester, del. | 25.53 | ..... | 26.53 | 26.03 |
| Syracuse, del. | 26.08 | ..... | 27.08 | 26.58 |
| **Chicago,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| Milwaukee, del. | 25.17 | 24.67 | 25.67 | 25.17 |
| Muskegon, Mich., del. | 27.38 | ..... | ..... | 27.38 |
| **Cleveland,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| Akron, Canton, O., del. | 25.47 | 24.97 | 25.97 | 25.47 |
| **Detroit,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| Saginaw, Mich., del. | 26.45 | 25.95 | 26.95 | 26.45 |
| **Duluth,** base | 24.50 | 24.00 | 25.00 | 24.50 |
| St. Paul, del. | 26.76 | 26.26 | 27.26 | 26.76 |
| **Erie, Pa.,** base | 24.00 | 23.50 | 25.00 | 24.50 |
| **Everett, Mass.,** base | 25.00 | 24.50 | 26.00 | 25.50 |
| Boston | 25.50 | 25.00 | 26.50 | 26.00 |
| **Granite City, Ill.,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| St. Louis, del. | 24.50 | 24.00 | ..... | 24.50 |
| **Hamilton, O.,** base | 24.00 | 23.50 | ..... | 24.00 |
| Cincinnati, del. | 24.68 | 24.68 | ..... | 25.35 |
| **Neville Island, Pa.,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| §Pittsburgh, del., No. & So. sides | 24.69 | 24.19 | 25.19 | 24.69 |
| **Provo, Utah,** base | 22.00 | ..... | ..... | ..... |
| **Sharpsville, Pa.,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| **Sparrows Point, Md.,** base | 25.00 | 24.50 | ..... | ..... |
| Baltimore, del. | 26.05 | ..... | ..... | ..... |
| **Steelton, Pa.,** base | ..... | 24.50 | ..... | 25.50 |
| **Swedeland, Pa.,** base | 25.00 | 24.50 | 26.00 | 25.50 |
| Philadelphia, del. | 25.89 | 25.39 | ..... | 26.39 |
| **Toledo, O.,** base | 24.00 | 23.50 | 24.50 | 24.00 |
| Mansfield, O., del. | 26.06 | 25.56 | 26.56 | 26.06 |
| **Youngstown, O.,** base | 24.00 | 23.50 | 24.50 | 24.00 |

*Basic silicon grades (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

**High Silicon, Silvery**

| | | | |
|---|---|---|---|
| 6.00-6.50 per cent (base) | $29.50 | | |
| 6.51-7.00 | $30.50 | 9.01- 9.50 | $35.50 |
| 7.01-7.50 | 31.50 | 9.51-10.00 | 36.50 |
| 7.51-8.00 | 32.50 | 10.01-10.50 | 37.50 |
| 8.01-8.50 | 33.50 | 10.51-11.00 | 38.50 |
| 8.51-9.00 | 34.50 | 11.01-11.50 | 39.50 |

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

**Bessemer Ferrosilicon**

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

**Charcoal Pig Iron**

Northern

| | |
|---|---|
| Lake Superior Furn. | $28.00 |
| Chicago, del. | 31.54 |

Southern

| | |
|---|---|
| Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. | $28.50 |
| Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. | 33.00 |

**Gray Forge**

| | |
|---|---|
| Neville Island, Pa. | $23.50 |
| Valley, base | 23.50 |

**Low Phosphorus**

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

**Switching Charges:** Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

**Silicon Differentials:** Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

**Phosphorous Differential:** Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

**Manganese Differentials:** Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

**Ceiling prices** are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

**Exceptions to Ceiling Prices:** Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

**Refractories**

## Refractories

Per 1000 f.o.b. Works, Net Prices

| | |
|---|---|
| **Fire Clay Brick** | |
| Super Quality | |
| Pa., Mo., Ky. | $64.60 |
| First Quality | |
| Pa., Ill., Md., Mo., Ky. | 51.30 |
| Alabama, Georgia | 51.30 |
| New Jersey | 56.00 |
| Ohio | 43.00 |
| Second Quality | |
| Pa., Ill., Md., Mo., Ky. | 46.55 |
| Alabama, Georgia | 38.00 |
| New Jersey | 49.00 |
| Ohio | 36.00 |
| **Malleable Bung Brick** | |
| All bases | $59.85 |
| **Silica Brick** | |
| Pennsylvania | $51.30 |
| Joliet, E. Chicago | 58.90 |
| Birmingham, Ala. | 51.30 |
| **Ladle Brick** | |
| (Pa., O., W. Va., Mo.) | |
| Dry press | $31.00 |
| Wire cut | 29.00 |
| **Magnesite** | |
| Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk | 22.00 |
| net ton, bags | 26.00 |
| **Basic Brick** | |
| Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa. | |
| Chrome brick | $54.00 |
| Chem. bonded chrome | 54.00 |
| Magnesite brick | 76.00 |
| Chem. bonded magnesite | 65.00 |
| Fluorspar | |

## Fluorspar

| | |
|---|---|
| Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail | $25.00-28.00 |
| Do., barge | 25.00-28.00 |
| No. 2 lump | 25.00-28.00 |

(Prices effective Nov. 23, 1942)

## Ferroalloy Prices

**Ferromanganese:** 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

**Spiegeleisen:** 19-21%, carlots per gross ton, Palmerton, Pa. $36.

**Electrolytic manganese:** 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

**Chromium Metal:** Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

**Ferrocolumbium:** 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

**Ferrochrome:** 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

| | Car loads | Ton lots | Less ton | Less 200 lbs. |
|---|---|---|---|---|
| 2% C. | 19.50c | 20.25c | 20.75c | 21.00c |
| 1% C. | 20.50c | 21.25c | 21.75c | 22.00c |
| 0.20% C. | 21.50c | 22.25c | 22.75c | 23.00c |
| 0.10% C. | 22.50c | 23.25c | 23.75c | 24.00c |

Spot is ¼c higher

**Chromium briquets:** Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

**Ferromolybdenum:** 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

**Calcium Molybdate (Molyte):** 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

**Molybdic Oxide Briquets:** 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

**Molybdenum Oxide:** 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

**Molybdenum Powder:** 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

**Ferrophosphorus:** 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

**Ferrophosphorus:** 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

**Ferrosilicon:** Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

| | Carloads | Ton lots |
|---|---|---|
| 50% | $ 74.50 | $ 87.00 |
| Unitage | 1.50 | 1.75 |
| 75% | 135.00 | 151.00 |
| Unitage | 1.80 | 2.00 |
| 85% | 170.00 | 188.00 |
| Unitage | 2.00 | 2.20 |
| 90-95% | 10.25c | 11.25c |

Spot prices ¼-cent higher.

**Silicon Metal:** Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

**Silicon Metal:** Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

**Silicon Briquets:** Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

**Silicomanganese:** Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

**Silico-manganese Briquets:** Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

**Ferrotungsten:** Carlots, per lb. contained tungsten, $1.90.

**Tungsten Metal Powder:** 98-99%, per lb. any quantity $2.55-2.65.

**Ferrotitanium:** 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

**Ferrotitanium:** 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

**High-Carbon Ferrotitanium:** 15-20%. Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

**Ferrovanadium:** 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

**Vanadium Pentoxide:** Technical grade, 88-92 per cent $V_2O_5$; contracts, any quantity, $1.10 per pound $V_2O_5$ contained; spot 5 cents per pound higher.

**Zirconium Alloys:** 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

**Zirconium alloy:** 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

**Alsifer:** (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

**Simanal:** (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

# WAREHOUSE STEEL PRICES

*Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941*

| | Soft Bars | Hot-Rolled Strip Bands | Hot-Rolled Strip Hoops | Plates ¼-in. & Over | Structural Shapes | Floor Plates | Sheets: Hot Rolled | Sheets: Cold Rolled | Sheets: Galv. No. 24 | Cold Rolled Strip | Cold Drawn Bars: Carbon | Cold Drawn Bars: S.A.E. 2300 | Cold Drawn Bars: S.A.E. 3100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Boston | 3.98 | 4.06 | 5.06 | 3.85 | 3.85 | 5.66 | 3.71 | 4.68 | 5.11 | 3.46 | 4.13 | 8.88 | 7.23 |
| New York (Met.) | 3.84 | 3.96 | 3.96 | 3.76 | 3.75 | 5.56 | 3.58 | 4.60 | 5.00 | 3.51 | 4.09 | 8.84 | 7.19 |
| Philadelphia | 3.85 | 3.95 | 4.45 | 3.55 | 3.55 | 5.25 | 3.55 | 4.05 | 4.65 | 3.31 | 4.06 | 8.56 | 7.16 |
| Baltimore | 3.85 | 4.00 | 4.35 | 3.70 | 3.70 | 5.25 | 3.50 | .... | 5.05 | .... | 4.04 | .... | .... |
| 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 |
| Washington, D. C. | 3.95 | 4.10 | 4.45 | 3.80 | 3.80 | 5.35 | 3.60 | .... | .... | .... | 4.03 | .... | .... |
| Pittsburgh | 3.35 | 3.60 | 3.60 | 3.40 | 3.40 | 5.00 | 3.35 | .... | 4.65 | .... | 3.65 | 8.40 | 6.75 |
| Cleveland | 3.25 | 3.50 | 3.50 | 3.40 | 3.58 | 5.18 | 3.35 | 4.05 | 4.62 | 3.20 | 3.75 | 8.40 | 6.75 |
| Detroit | 3.43 | 3.43 | 3.68 | 3.60 | 3.65 | 5.27 | 3.43 | 4.30 | 4.84 | 3.40 | 3.80 | 8.70 | 7.05 |
| Omaha | 4.10 | 4.20 | 4.20 | 4.15 | 4.15 | 5.75 | 3.85 | 5.32 | 5.50 | .... | 4.42 | .... | .... |
| Cincinnati | 3.60 | 3.67 | 3.67 | 3.65 | 3.68 | 5.28 | 3.42 | 4.37 | 4.92 | 3.45 | 4.00 | 8.75 | 7.10 |
| Chicago | 3.50 | 3.60 | 3.60 | 3.55 | 3.55 | 5.15 | 3.25 | 4.10 | 4.85 | 3.50 | 3.75 | 8.40 | 6.75 |
| Twin Cities | 3.75 | 3.85 | 3.85 | 3.80 | 3.80 | 5.40 | 3.50 | 4.35 | 5.00 | 3.83 | 4.34 | 9.09 | 7.44 |
| Milwaukee | 3.63 | 3.53 | 3.53 | 3.68 | 3.68 | 5.28 | 3.38 | 4.23 | 4.98 | 3.54 | 3.88 | 8.38 | 6.98 |
| St. Louis | 3.64 | 3.74 | 3.74 | 3.69 | 3.69 | 5.29 | 3.39 | 4.24 | 4.99 | 3.61 | 4.02 | 8.77 | 7.12 |
| Indianapolis | 3.60 | 3.75 | 3.75 | 3.70 | 3.70 | 5.30 | 3.45 | .... | 5.01 | .... | 3.97 | .... | .... |
| Chattanooga* | 3.80 | 4.00 | 4.00 | 3.85 | 3.85 | 5.80 | 3.75 | .... | 4.50 | .... | 4.39 | .... | .... |
| 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 | 4.20 | 4.25 | 5.45 | 4.75 | 4.45 | 6.50 | 4.65 | 7.60 | 5.70 | .... | 5.75 | .... | .... |
| Los Angeles | 4.35 | 4.90 | 6.70 | 4.90 | 4.60 | 7.15 | 4.95 | 7.15 | 5.95 | .... | 6.10 | 10.55 | 9.55 |
| San Francisco | 3.95 | 4.50 | 6.25 | 4.65 | 4.35 | 6.35 | 4.55 | 6.40 | 6.10 | .... | 6.80 | 10.80 | 9.80 |

*Not named in OPA price order.

| | S.A.E. Hot-rolled Bars (Unannealed): 1035-1050 | 2300 Series | 3100 Series | 4100 Series | 6100 Series |
|---|---|---|---|---|---|
| Boston | 4.28 | 7.75 | 6.05 | 5.80 | 7.90 |
| New York (Met.) | 4.04 | 7.60 | 5.90 | 5.65 | .... |
| Philadelphia | 4.10 | 7.56 | 5.86 | 5.61 | 8.56 |
| Baltimore | 4.45 | .... | .... | .... | .... |
| 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 | - | 8.00 | 7.85 | 8.65 |
| Los Angeles | 4.60 | 9.55 | 8.55 | 8.40 | 8.80 |
| San Francisco | 5.45 | 9.80 | 8.80 | 8.65 | 9.05 |

**BASE QUANTITIES**

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham, Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco; 1 to 99, Los Angeles; 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

## Ores

**Lake Superior Iron Ore**

*Gross ton, 51½%*

*Lower Lake Ports*

| | |
|---|---|
| Old range bessemer | $4.75 |
| Mesabi nonbessemer | 4.45 |
| High phosphorus | 4.35 |
| Mesabi bessemer | 4.60 |
| Old range nonbessemer | 4.60 |

**Eastern Local Ore**

*Cents, unit, del. E. Pa.*

| | |
|---|---|
| Foundry and basic 56-63%, contract | 13.00 |

**Foreign Ore**

*Cents per unit, c.i.f. Atlantic ports*

| | |
|---|---|
| Manganiferous ore, 45-55% Fe., 6-10% Mang. | Nom |
| N. African low phos. | Nom. |
| Spanish, No. African basic, 50 to 60% | Nom. |
| Brazil iron ore, 68-69% f.o.b. Rio de Janeiro | 7.50-8.00c |

**Tungsten Ore**

| | |
|---|---|
| Chinese wolframite, per short ton unit, duty paid | $24.00 |

**Chrome Ore**

(Equivalent OPA schedules):

*Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.*

*(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)*

| | |
|---|---|
| Indian and African | |
| 48% 2.8:1 | 41.00 |
| 48% 3:1 | 43.50 |
| 48% no ratio | 31.00 |
| South African (Transvaal) | |
| 44% no ratio | 27.40 |
| 45% no ratio | 28.30 |
| 48% no ratio | 31.00 |
| 50% no ratio | 32.80 |
| Brazilian—nominal | |
| 44% 2.5:1 lump | 33.65 |
| 48% 3:1 lump | 43.50 |
| Rhodesian | |
| 45% no ratio | 28.30 |
| 48% no ratio | 31.00 |
| 48% 3:1 lump | 43.50 |
| Domestic (f.o.b. Columbus, Mont.) | |
| 48% 3:1 | 43.50 |
| less $7 freight allowance | |

**Manganese Ore**

*Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)*

| | |
|---|---|
| Brazilian, 48% | 73.8c |
| Brazilian, 46% | 71.8c |
| Caucasian, 51% | 75.3c |
| Caucasian, 50% | 74.8c |
| Chilean, 48% | 73.8c |
| Indian, 50% | 74.8c |
| Indian, 48% | 73.8c |
| South African, 48% | 73.8c |
| South African, 46% | 71.8c |
| (Duty Free) | |
| Cuban, 51% | 86.5c |
| Cuban, 48% | 85.0c |
| Cuban, 45% | 82.0c |
| Philippine, 50% | 85.0c |
| Domestic, 48%, f.o.b. mines | 96.0c |

**Molybdenum**

| | |
|---|---|
| Sulphide conc., lb., Mo. cont., mines | $0.75 |

## NATIONAL EMERGENCY STEELS (Hot Rolled)

*Extras for Alloy Content*

| Designation | Chemical Composition Limits, Per Cent: Carbon | Mn. | Si. | Cr. | Ni. | Mo. | Basic open-hearth Bars per 100 lb. | Basic open-hearth Billets per G T | Electric furnace Bars per 100 lb. | Electric furnace Billets per G T |
|---|---|---|---|---|---|---|---|---|---|---|
| NE 1330 | .28-.33 | 1.60-1.90 | .20-.35 | | | | $ .10 | $2.00 | | |
| NE 8020 | .18-.23 | 1.00-1.30 | .20-.35 | | | .10-.20 | .45 | 9.00 | $.95 | $19.00 |
| NE 8339 | .35-.42 | 1.30-1.60 | .20-.35 | | | .20-.30 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8442 | .40-.45 | 1.30-1.60 | .20-.35 | | | .30-.40 | .90 | 18.00 | 1.40 | 28.00 |
| NE 8613 | .12-.17 | .70- .90 | .20-.35 | .40-.60 | .40-.60 | .15-.25 | .75 | 15.00 | 1.25 | 25.00 |
| NE 8715 | .13-.18 | .70- .90 | .20-.35 | .40-.60 | .40-.60 | .20-.30 | .80 | 16.00 | 1.30 | 26.00 |
| NE 8949 | .45-.50 | 1.00-1.30 | .20-.35 | .40-.60 | .40-.60 | .30-.40 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9255 | .50-.60 | .75-1.00 | 1.80-2.20 | | | | .40 | 8.00 | | |
| NE 9262 | .55-.65 | .75-1.00 | 1.80-2.20 | .20-.40 | | | .65 | 13.00 | | |
| NE 9415 | .13-.18 | .80-1.10 | .40-.60 | .20-.40 | .20-.40 | .08-.15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9442 | .40-.45 | 1.00-1.30 | .40-.60 | .20-.40 | .20-.40 | .08-.15 | .85 | 17.00 | 1.35 | 27.00 |
| NE 9537 | .35-.40 | 1.20-1.50 | .40-.60 | .40-.60 | .40-.60 | .15-.25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9630 | .28-.33 | 1.20-1.50 | .40-.60 | .40-.60 | | | .80 | 16.00 | 1.30 | 26.00 |
| NE 9642 | .40-.45 | 1.30-1.60 | .40-.60 | .40-.60 | | | .85 | 17.00 | 1.35 | 27.00 |

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

# MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

## PRICES FOR OTHER THAN RAILROAD SCRAP

| | | | | Low Phos. Grades | | | | | ELECTRIC FURNACE AND FOUNDRY GRADES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Heavy Structural, Plate | | | Cut Auto Scrap | | | | | |
| | OPEN HEARTH GRADES* | Machine Shop Turnings | BLAST FURNACE GRADES* | Billet, Bloom Forge Crops | Bar Crops and smaller; Punchings, 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 | Electric Furnace Bundles |
| Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren | $20.00 | $16.00 | $16.00 | $25.00 | $22.50 | $21.00 | $21.50 | $22.00 | $20.00 | $20.50 | $21.00 | $18.00 | $19.50 | $21.00 |
| Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville | 18.75 | 14.75 | 14.75 | 23.75 | 21.25 | 19.75 | 20.25 | 20.75 | 18.75 | 19.25 | 19.75 | 16.75 | 18.25 | 19.75 |
| Bethlehem | 18.25 | 14.25 | 14.25 | 23.25 | 20.75 | 19.25 | 19.75 | 20.25 | 18.25 | 18.75 | 19.25 | 16.25 | 17.75 | 19.25 |
| Buffalo | 19.25 | 15.25 | 15.25 | 24.25 | 21.75 | 20.25 | 20.75 | 21.25 | 19.25 | 19.75 | 20.25 | 17.25 | 18.75 | 20.25 |
| Cleveland, Middletown, Cincinnati, Portsmouth, Ashland | 19.50 | 15.50 | 15.50 | 24.50 | 22.00 | 20.50 | 21.00 | 21.50 | 19.50 | 20.00 | 20.50 | 17.50 | 19.00 | 20.50 |
| Detroit | 17.85 | 13.85 | 13.85 | 22.85 | 20.35 | 18.85 | 19.35 | 19.85 | 17.85 | 18.35 | 18.85 | 15.85 | 17.35 | 18.85 |
| Toledo | . | 13.85 | 13.85 | . | . | . | . | . | . | . | . | . | . | . |
| Chicago | 18.75 | 14.75 | 14.75 | 23.75 | 21.25 | 19.75 | 20.25 | 20.75 | 18.75 | 19.25 | 19.75 | 16.75 | 18.25 | 19.75 |
| Kokomo | 18.25 | 14.25 | 14.25 | 23.25 | 20.75 | 19.25 | 19.75 | 20.25 | 18.25 | 18.75 | 19.25 | 16.25 | 17.75 | 19.25 |
| Duluth | 18.00 | 14.00 | 14.00 | 23.00 | 20.50 | 19.00 | 19.50 | 20.00 | 18.00 | 18.50 | 19.00 | 16.00 | 17.50 | 19.00 |
| St. Louis | 17.50 | 13.50 | 13.50 | 22.50 | 20.00 | 18.50 | 19.00 | 19.50 | 17.50 | 18.00 | 18.50 | 15.50 | 17.00 | 18.50 |
| Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif. | 17.00 | 13.00 | 13.00 | 22.00 | 19.50 | 18.00 | 18.50 | 19.00 | 17.00 | 17.50 | 18.00 | 15.00 | 16.50 | 18.00 |
| Minnequa, Colo. | 16.50 | 12.50 | 12.50 | 21.50 | 19.00 | 17.50 | 18.00 | 18.50 | 16.50 | 17.00 | 17.50 | 14.50 | 16.00 | 17.50 |
| Seattle | 14.50 | 10.50 | 10.50 | 19.50 | 17.00 | 15.50 | 16.00 | 16.50 | 14.50 | 15.00 | 15.50 | 12.50 | 14.00 | 15.50 |

## RAILROAD SCRAP

| | Heavy Melting Steel | Scrap Rails | Rails for Rolling | Scrap Rails 3 ft. and under | Scrap Rails 2 ft. and under | Scrap Rails 18 in. and under |
|---|---|---|---|---|---|---|
| Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton | $21.00 | $22.00 | $23.50 | $24.00 | $24.25 | $24.50 |
| Philadelphia, Wilmington, Sparrows Point | 19.75 | 20.75 | 22.25 | 22.75 | 23.00 | 23.25 |
| Cleveland, Cincinnati, Middletown, Ashland, Portsmouth | 20.50 | 21.50 | 23.00 | 23.50 | 23.75 | 24.00 |
| Chicago | 19.75 | 20.75 | 22.25 | 22.75 | 23.00 | 23.25 |
| Buffalo | 20.25 | 21.25 | 22.75 | 23.25 | 23.50 | 23.75 |
| Detroit | 18.85 | 19.85 | 21.35 | 21.85 | 22.10 | 22.35 |
| Kokomo | 19.25 | 20.25 | 21.75 | 22.25 | 22.50 | 22.75 |
| Duluth | 19.00 | 20.00 | 21.50 | 22.00 | 22.25 | 22.50 |
| Kansas City, Mo. | 17.00 | 18.00 | 19.50 | 20.00 | 20.25 | 20.50 |
| St. Louis | 18.50 | 19.50 | 21.00 | 21.50 | 21.75 | 22.00 |
| Birmingham | 18.00 | 19.00 | 20.50 | 21.00 | 21.25 | 21.50 |
| Los Angeles, San Francisco | 18.00 | 19.00 | 20.50 | 21.00 | 21.25 | 21.50 |
| Seattle | 15.50 | 16.50 | 18.00 | 18.50 | 18.75 | 19.00 |

## 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 | 15.50 | 16.50 | 17.50 |
| 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.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** prices refer to mixed borings and turnings, shoveling turnings, and cast iron borings.

**A basing point** includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, 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, bloom 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. Commissions must be shown as separate item on invoice.

**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, $6.65 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 carload 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 $3 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) 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; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

**Unprepared Scrap:** Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less; material from which Nos. 1, 2 and 3 bundles made is $4 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 grades of prepared scrap." Graveyard autos not considered unprepared scrap.

**Remote Scrap:** Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, 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. Colorado scrap is remote scrap for Colorado consumers only.

## Sheets, Strip . . .

Sheet & Strip Prices, Page 180

There is a notable lag in sheet demand, more pronounced with each succeeding week for the past month. Sellers attribute this in part to long term contracts which still have some time to go and also in increasing measure to cancellations of certain munition contracts by the government now being felt by metal fabricators. These cancellations may not continue long, however, once the government gets its program again in balance.

Uncertainty as to PRP allocations for next quarter and also temporary confusion as to the effect of CMP, are having a bearing, too. Incidentally, while there may be confusion over CMP during the interim period of the next few weeks, the trade generally believes that once the new program is definitely set up it will prove to have many advances.

Mill backlogs are not being extended as rapidly as a short while ago. The general delivery situation is unquestionably easier with some mills. For instance, where some only a fortnight ago were quoting around eight weeks shipment on hot and cold-rolled sheets, they are now quoting six to seven weeks.

Sheet production is off somewhat, due to increased demand for plates and black plate for timing. Increase in the plate program has taken capacity which had been allotted to sheet production, and cold mills have started running on stock for cold-reduced tin plate to be produced in January. It is expected that substantial increases in tin mill output will come as a result of higher quotas in January, and sheet mills are building up a backlog of material in anticipation.

Most sheet producers are inclined to agree there will be little change until after the Controlled Materials Plan goes into effect. There is some possibility that sheet mills will be able to produce more under the Controlled Materials Plan as a result of a more equitable distribution of sheet bars, among both integrated and nonintegrated producers of sheets.

Narrow cold strip quotas have been booked by most producers; on high carbon and alloys orders are sufficient to fill expected allotments through first quarter, after which production schedules will be tied to the Controlled Materials Plan. While there are some lags, supplies of hot strip under directive-quotas are satisfactory, rerollers specifying tonnage required one month ahead. With most cold finishers December quotas are unchanged, with production schedules heavy on some finishes and light on others. While some orders range down to AA-5, production is largely on AA-2 or better; lower rated tonnage will be rerated upward, depending on urgency of use as delivered needs approach. Large orders for ammunition clips are in backlogs. Frozen stock lists include substantial lots of stainless strip.

## Plates . . .

Plate Prices, Page 181

Demand for plate has slacked considerably and productive capacity of plate mills is now above actual demand. Some programs for expansion of plate facilities have been cancelled while practically completed. Most of these were for new mills, although some were conversion jobs.

Temporary stop orders have been issued by Defense Plant Corp. on construction work at several mills. There is no indication whether these mills will be converted to other products, whether the construction will be completed to produce plate, or whether the whole thing will be held in abeyance until new developments in the war indicate to a greater extent what the best disposition will be. The order does not affect all facilities now under construction, and a considerable portion are being continued.

## Pipe . . .

Pipe Prices, Page 181

Deliveries on smaller diameters of cast iron pipe are improving, pit cast being available in two to three weeks on higher priorities and centrifugal in four to five. Demand, almost entirely for government installations, has slackened. Municipal and utility buying is restricted to maintenance and repairs. Pig iron allocations to pipe foundries are ample to cover AA orders; while some volume below AA-4 is taken, at least that priority is required to get on schedules and remain. No pig iron is available for building foundry stocks of pipe. Purchases include 700 tons, mostly 20-inch for a submarine line at Newport, R. I.

## Bars . . .

Bar Prices, Page 180

Slowly broadening improvement in steel bar deliveries is confined mostly to small diameter carbon rounds, 1½-inch and under, on directives to warehouses. Larger rounds and flats are tight, cold-finished and alloys especially, but on directives deliveries are heavier in spots; cold-finished flats are frequently moved to consumers by jobbers as soon as received. With some producers of electric furnace NE bars, both hot and cold-rolled, shipping promises are more definite while additional aircraft alloys for earmarked stocks are expected to be available early next year. Order backlogs for cold-finished are large, but with hot bars moving to cold-drawers on better schedule, headway in supplying accumulated requirements is imminent. In alloys, specification changes and substitutions continue a retarding factor. Bessemer deliveries, notably on 1 5/16-inch and under, are available early next quarter with some mills.

Cold drawers express increasing satisfaction over the allocation program which was finally put into effect Oct. 1 on hot carbon bar shipments and Nov. 1 on alloy shipments. One eastern cold drawer received all the carbon bar tonnage that was due him from mills in November and all but about five per cent of the alloy bar tonnage, and this is expected to be shipped within a few days.

Cold drawers are now engaged in making out specifications for January. The quotas were set up by Washington at the beginning of the program and continue until further notice, so that total tonnage is not a factor. It is specifications against these quotas that the cold drawers are now engaged in making out.

Meanwhile, they report a little easing in new demand, due in part, they claim, to adjustments now being made in ordnance program.

It is uncertain how much additional bar production can be obtained by diversion of semifinished steel formerly used for products now in lighter demand or restricted by WPB, as bar mills already are operating at capacity. Efforts continue by structural producers to adapt their mills to large rounds to relieve pressure for this class of bars. Meeting tolerances is the problem.

Alloy bars probably are the tightest item in the steel market. While all alloy products are difficult to obtain the bar situation is doubly so because of demand for carbon bars close to bar mill capacity.

## Wire . . .

Wire Prices, Page 181

Orders for wire continue heavy, notably for fine high carbon; on some products mills are booked up to quotas and beyond. Incoming volume, however, is unevenly spread, large backlags piling up on a few items while some, including low carbon coarse wires, are inclined to lag. This makes for an unbalanced production schedule at most mills. Rods are somewhat easier and wider distributed, non-integrated mills getting slightly more semifinished under directives for finishing high-rated war material. Demand for aircraft is heavy and mounting, also barrage cable. On some classes of rope wire orders extend into the second quarter and beyond, to be applied against monthly quotas. Most barbed wire production is for the armies, but slightly more tonnage is likely to be set aside for the farm trade. Barbed wire, fencing and poultry netting are standardized on one or two types for the duration. No let-down in nail requirements has appeared. Screw manufacturers are supplied sufficiently to meet high ratings, many operating almost exclusively on war equipment requirements. Most wire mill production is against AA-1 volume.

## Rails, Cars . . .

Track Material Prices, Page 181

Slackening in demand for structural steel and some cancellations of shell rounds give hope to railroads that larger supplies of steel rails may be available in 1943 than present allocations provide. Much will depend on whether sufficient raw steel will be available. Indications now are that mill capacity will be larger than expected.

Chicago, Rock Island & Pacific is inquiring for 400 seventy-ton gondolas, the fourth moderate sized inquiry in the past few weeks. Final action in all these is subject to approval by the War Production Board. Actual buying recently has been negligible.

## Structural Shapes . . .

Structural Shape Prices, Page 181

Demand for plain and fabricated structural steel is confined mainly to shipbuilding. Shops are without backlogs for construction work but some have subcontracts for ships and miscellaneous assemblies. Lighter sections are required for this type of current fabrication. Work has been held up on two bridges in Connecticut, the New London-

Groton and Hartford-Easton spans. The former, a 15,000-ton project is practically completed with all material fabricated, erected or on the job; 10 days of riveting and installation of 800 feet of railing would finish the contract, which may be allowed. The Hartford main span is already carrying traffic, the stop order applying to an approach section requiring beams. Equipment was being removed from the New London job when the order was promulgated.

Structural steel contracts closed in October totaled 46,811 net tons, compared with 68,520 tons in September and 128,658 tons in October, 1941, according to statistics of the American Institute of Steel Construction. For ten months total bookings were 1,641,081 tons, 16.5 per cent less than 1,966,532 tons booked in the comparable period in 1941. Total shipments for ten months were 1,758,001 tons, a 7 per cent decline from 1,892,370 tons in ten months last year. Totals for both bookings and shipments this year to Nov. 1 were larger than in the same period in 1940.

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 181

While scattered deliveries against old contracts continue, new demand for concrete reinforcing bars is meager, with price shading cropping out on the limited volume. Improvement in shipment by both distributors and mills is indicated by promises of one to 30 days delivery f.o.b. on 2825 tons for Panama. Laclede Steel Co., St. Louis, is low on 1250 tons at $52,250, Madison, Ill. Distributor inventories are in much better balance; allocations for tonnage are sharply reduced in some instances, but supplies are sufficient to meet slackened buying. Mill production schedules are reduced and more off-heat material usually rolled into reinforcing bars is going into scrap.

## Pig Iron . . .

Pig Iron Prices, Page 182

Pig iron consumers are filling out January applications on revised PD 69 forms, which for the first time include priority ratings at higher than AA. As the ratings are now set up they range from directive certificates and AAA down through AA-2-x for the top group; AA-3 and AA-4 for the next highest; AA-5 the next; then A-1-a through A-1-k for the next and A-2 down to including A-10 in the final group, although in this latter each rating is listed in sequence. Pattern also is revised for explanation of end use. Revisions of the PD-70 forms also have been received by the trade in time for application on January requirements.

Pig iron sellers declare allocations for December, the last to be made out on the old forms, fall about 95 per cent in the AA down to A-1-k group and that despite the fact there is relatively little tonnage in the lower classifications, few consumers have had to suspend operations recently. In other words, most foundries are getting at least enough work to keep them going to a certain extent and the work they are getting is high rated tonnage.

One seller reports a substantial percentage of his customers failed to get tonnage for December, even where ratings were high, due principally, it is assumed, to inventory position.

Larger melters of basic pig iron in New England are operating with stocks for a month to six weeks, compared with normal practice of accumulating a full winter supply before water transport ended. Under allocations iron shipments are made monthly and by rail, freight charges increasing cost to the consumer above shipments from the stack at Everett, Mass. Supply is sufficient but inventories are held close to melt.

Office of Price Administration has established a price of $24.00 per gross ton for basic pig iron at Duluth, at the usual differential of 50 cents per ton below that of No. 2 foundry. American Steel & Wire Co. has moved a blast furnace stack from Joliet, Ill., to Duluth at the request of Defense Plant Corp. and is operating it as lessee of the latter. It will produce foundry and malleable iron as its principal output but will make basic iron when requested by the War Production Board, necessitating establishment of a base price.

Delta Chemical & Iron Co., Delta Mich., has been authorized by OPA to increase its price from $28 to $30, Delta, on charcoal iron.

## Scrap . . .

Scrap Prices, Page 184

Onset of winter, with near-zero temperatures, will curtail scrap handling to some extent and slow shipment to con-

sumers. Various salvage drives have brought large supplies to dealers' yards and these form a reservoir from which shipments will be made as fast as preparation is completed. Most consumers have accumulated reserves for several weeks, though some directives are in force to supply districts which are not yet fully served from local sources.

With supply easier consumers are more selective and some rejections are encountered on grade recently taken in freely. Supply of better grades is larger and the light scrap probably will be absorbed in due proportion as time goes on.

The WPB region, including Illinois, Iowa, Indiana and Wisconsin, ranked first among the 13 areas in the recent drive, with 966,820 tons, 113.7 pounds per capita.

New England wire mills complain of quality of heavy melting steel available for production of fine wire. Contamination by copper and other metals is an adverse factor. Recovery of steel rails in that area has slackened and some projects planned for fall will go over until after the winter. Dormant scrap of better grade is coming out in larger tonnage and is being handled by yards ahead of lighter household material. Foundries generally have built up inventory and many are not buying except No. 1 machinery cast, which still is scarce.

With heavy tonnage of scrap offered melters in the St. Louis area grades formerly accepted gladly are being rejected, leaving them in the hands of dealers. OPA is said to be exerting pressure to limit this practice on the ground the material will be needed later when better grades are less plentiful. Heavy supply of cast grades continues to exceed demand.

Buffalo dealers and consumers feel secure for winter supplies and one leading buyer is holding back shipments. Yards continue to receive heavy supplies but preparation is slow, ranging from 25 to 50 per cent of normal capacity, due to lack of labor. A shipload of scrap from the Duluth area destined for Buffalo was diverted to an Ohio port, one of several cargoes thus lost to Buffalo users. No more upper lakes shipments are expected this season.

Pittsburgh district scrap users have relatively smaller reserves than in many other areas and some mills continue to receive material on directives. No mill has sufficient reserves to prevent constant buying but their position is much better than a month ago and stocks are being increased steadily. Foundry scrap supply is sufficient though most melters are in the market for further cast scrap.

Scrap in the New York and adjacent districts is reaching consumers in ample volume and deliveries are being held up in more cases, including allocated tonnages, both locally and at a distance, consumers balking at higher delivered prices due to increase in freight charges, which include a 3 per cent tax which is passed on to the consumer, as in the case of the prior increase of 6 per cent.



## Warehouse . . .

Warehouse Prices, Page 183

Warehouses are in better position and stocks are larger, some even refusing further shipments because their fourth quarter quotas have been satisfied. Demand is somewhat lighter, attributed to government contract cancellations and uncertainties as to final adjustments under the changing picture of war requirements. In general all demand for structurals are being met but there is scarcity of plates from one inch downward.

Improvement in receipts of cold-finished and alloys is slight, but jobbers are encouraged by more definite mill promises for heavier deliveries before the end of the year; meanwhile buying and inquiry for cold-finished and alloys is heavy and sustained. Warehouses are getting hot-rolled NE steels in slightly better volume. While distributors are still picking up frozen and idle stocks, miscellaneous steel which may fit requirements for some sizes and finish, prospect of better mill replacements has slowed down buying of this material. Easing of demand for hot-rolled products is due in part to restrictions on anticipatory buying, inventories and more direct mill shipments than usual to some consumers.

Steel warehouses will not be given allotment numbers under the Controlled Materials Plan but will be supplied through directives, which will vary according to quantities normally supplied to their districts, depending on type and importance of consumers served. Allotment numbers of consumers in the warehouse area against which jobber sales

will largely be made will be a determining factor in volume and type of steel likely to be allocated. Some stocks will be supplied under earmarking for specific war industries, such as aircraft construction.

## Pacific Coast . . .

Seattle—Demand for shapes and reinforcing bars has dropped sharply and there is a possibility that some of the larger fabricating plants in this area may be idle during first quarter. Backlogs of these items will be completed by Dec. 31, it is stated. Rolling mills, however, are running to capacity with heavy business in merchant bars required in shipbuilding. The policy of Army and Navy to conserve steel by using wood wherever possible has reduced the market for steel, accounting in some degree for the present situation. Until recently plants here were swamped with orders for structurals and reinforcing bars.

Columbia Steel Co. has been awarded a contract at $82,000 for furnishing Tacoma more than 1000 tons of plates and other items required in the second Nisqually power project. Bids for fabricating penstocks, outlets, etc., will be called soon.

Bremerton, Wash., has awarded 500 tons of 16-inch cast iron water supply pipe to Hugh G. Purcell, Seattle. Demand for cast iron pipe is slow, due to priorities and the diversion to wood and transite pipe by public agencies in an effort to conserve steel. Cast pipe is moving out of stocks in small lots but no important inquiries are pending.

Northwest contractors are following developments with reference to possible construction of a military railway from Prince George, B. C., to a point on the Alaska railroad near Fairbanks Alaska. Army engineers have completed a survey, which is said to recommend the trench route between the Rockies and the Coast range, offering few difficult problems and available the year around. The distance is about 1400 miles. No definite information as to decision is available at present.

Samples of iron ore from Columbia county, Oregon, are being tested in local and Colorado smelters. A pilot plant for manufacturing sponge iron has been installed at Cascade Locks, Oreg.

Reports from Bandon, Oreg., report that preliminarly tests with the electrostatic separation process for extracting chrome ore from beach sands are encouraging and may result in establishing plants. A pilot plans is in operation and a larger plant is being designed. Herbert B. Johnson, Rochester, N. Y., manufacturer, is said to be interested. The Krome Corp. will have its plant in operation next month.

Milton, Wash., has called bids Dec. 10 for reservoir and water distributing system, estimated at $23,000, by Parker & Hill, Seattle, engineers.

## Canada . . .

Toronto, Ont. — Brisk demand for all lines of finished and semifinished steel continues, with prospects for further curtailment in civilian use indicated by recent staatements by C. D. Howe, minister of munitions and supply. F. B. Kilbourn, steel controller, has issued a new regulation, S.C. 22, which limits inventories of steel in warehouses to 30 days' supply and for manufacturers to 90 days. It also is stated that changes are pending in connection with the Canadian allocation system as the result of increased steel imports from the United States. A swing over to the United States system of supplying steel to the various consumers soon may be adopted in this country.

As the result of curtailed production of structural steel, reinforcing bars and some other materials recently, steel supply for more essential rolled products has improved. Plate mills are receiving steel to the limit of productive capacity and output of plates continues, in some mills, at about 75 per cent above normal rated capacity. Demand for plates and sheets continues on an increasing scale and about three-quarters of domestic output is going into shipbuilding, the remainder being available to other essential users, including boiler makers, rolling stock builders, and essential civilian needs. However, deliveries of both sheets and plates are under direct supervision of the steel controller and only orders approved by his department are being filled. While some armor plate for tank construction is produced in this country, it is necessary to import substantial tonnages from the United States.

Carbon and alloy bars received spe-

cial attention during the past week when a new outpouring of small orders appeared. Bar demand continue well ahead of supply, and while there has been some improvement in supply of steel for bar mills recently, these mills are not being fully served and are producing at around 60 per cent of capacity.

Structural steel lettings rose to about 5000 tons during the week, as the results of awards for new war plants in Ontario. Several large war construction projects have been announced for the Montreal area, which will require some 15,000 tons of shapes. However, new construction undertakings are definitely slowing down and most new work calls for only small quantities of steel.

Merchant pig iron sales showed some improvement during the week, reaching a total of approximately 8000 tons. This betterment was almost entirely due to the fact that a number of melters had run out of supplies. Of the above total about 4500 tons was for malleable iron, 2700 tons foundry iron and some 800 tons basic.

Scrap iron and steel receipts slumped sharp during the week, following heavy snow in southeastern Ontario and suspended salvage collections in the rural districts. This salvage drive, started at the beginning of November and to be continued to Dec. 15, already has resulted in substantial tonnage of scrap and most dealers have been swamped with incoming materials. Local yards are heavily stocked for future sorting. Deliveries from local sources of supply are holding at a steady level. Consumers' deliveries are going forward without interruption, and deliveries on this account are in excess of consumption.



## Iron Ore . . .

Iron Ore Prices, Page 183

Difficult weather conditions, freezing ore in cars and docks and slowing loading, caused November shipments of Lake Superior iron ore to fall 78,562 tons under the total moved in November, 1941. The figure for November, 1942, was 7,582,425 gross tons, according to the Lake Superior Iron Ore Association Cleveland. Details are as follows:

| | Nov., 1942 | Nov., 1941 |
|---|---|---|
| Escanaba | 619,886 | 385,314 |
| Marquette | 493,607 | 699,300 |
| Ashland | 393,037 | 536,633 |
| Superior | 2,002,496 | 2,119,654 |
| Duluth | 2,261,922 | 2,230,155 |
| Two Harbors | 1,767,021 | 1,636,151 |
| Total U. S. | 7,537,969 | 7,607,207 |
| Michipicoten | 44,456 | 53,780 |
| Grand total | 7,582,425 | 7,660,987 |
| Decrease from year ago | 78,562 | |

Shipments to Dec. 1, 1942, totaled 91,440,952 tons, an increase of 12,159,673 tons over the movement to the corresponding date a year ago. Details are as follows:

| | To Dec. 1, 1942 | To Dec. 1, 1941 |
|---|---|---|
| Escanaba | 6,192,669 | 4,513,079 |
| Marquette | 4,806,439 | 5,606,527 |
| Ashland | 6,158,427 | 6,219,158 |
| Superior | 31,421,276 | 27,566,213 |
| Duluth | 23,740,082 | 20,115,431 |
| Two Harbors | 18,649,188 | 14,811,381 |
| Total U. S. | 90,968,081 | 78,831,787 |
| Michipicoten | 472,871 | 449,492 |
| Grand total | 91,440,952 | 79,281,279 |
| Increase from year ago | 12,159,673 | |

## Metallurgical Coke . . .

Coke Prices, Page 181

Beehive coke production appears to have reached a peak and November registered a slight decline, the first in many months, a steady upward movement having been in effect without interruption. Three fewer ovens were active than a month earlier. One battery listed as available has been removed from that classification as reconditioning and supplying it with coal now seems out of the question. Ceiling prices offer too little profit to tempt operators and substantial increase in active ovens seems unlikely.

In the western Pennsylvania district approximately 10,000 beehive ovens are in production with about 1000 available when needed.

Department of the Interior reports daily average output of beehive fuel in October was 23,156 tons, a gain of 0.2 per cent over the September daily average, in spite of the fewer ovens in service. By-product coke production in October averaged 172,211 tons daily, compared with 172,110 tons in September. Stocks at by-product coke plants Nov. 1 were 1,605,531 tons, 0.5 lower than on Oct. 1. This was sufficient for 45.2 days' requirements at the October rate of consumption.

## Nonferrous Metal Prices

| Nov. | Copper Electro, del. Conn. | Copper Lake, del. Midwest | Copper Casting, refinery | Straits Tin, New York Spot | Straits Tin, New York Futures | Lead N. Y. | Lead East St. L. | Zinc St. L. | Aluminum 99% | Antimony Amer. Spot, N.Y. | Nickel Cathodes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-28 | 12.00 | 12.12½ | 11.75 | 52.00 | 52.00 | 6.50 | 6.35 | 8.25 | 15.00 | 14.50 | 35.00 |
| Dec. 1-3 | 12.00 | 12.12½ | 11.75 | 52.00 | 52.00 | 6.50 | 6.35 | 8.25 | 15.00 | 14.50 | 35.00 |

*F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper*

**Sheets**

| | |
|---|---|
| Yellow brass (high) | 19.48 |
| Copper, hot rolled | 20.87 |
| Lead, cut to jobbers | 9.75 |
| Zinc, l.c.l. | 13.15 |

**Tubes**

| | |
|---|---|
| High yellow brass | 22.23 |
| Seamless copper | 21.37 |

**Rods**

| | |
|---|---|
| High yellow brass | 15.01 |
| Copper, hot rolled | 17.37 |

**Anodes**

| | |
|---|---|
| Copper, untrimmed | 18.12 |

**Wire**

| | |
|---|---|
| Yellow brass (high) | 19.73 |

**OLD METALS**

*Dealers' Buying Prices*
(In cents per pound, carlots)

**Copper**

| | |
|---|---|
| No. 1 heavy | 9.25-10.00 |
| Light | 7.25- 8.00 |

**Brass**

| | |
|---|---|
| No. 1 composition | 8.50- 9.00 |
| Yellow brass castings | 5.50- 6.00 |
| Auto radiators | 6.12½-6.62½ |
| Red brass, borings & turnings | 8.00- 8.50 |

**Zinc**

| | |
|---|---|
| Old | 4.75- 5.00 |
| New clippings | 6.00- 6.50 |

**Aluminum**

| | |
|---|---|
| Clippings | 9.75-10.25 |
| Cast | 8.75- 9.25 |
| Pistons | 8.50- 8.75 |
| Sheet | 8.75- 9.25 |

**Lead**

| | |
|---|---|
| Heavy | 4.75- 5.25 |
| Mixed babbitt | 5.85- 5.50 |
| Electrotype shells | 5.00- 5.50 |
| Stereotype, Linotype | 6.00- 6.75 |

**Tin and Alloys**

| | |
|---|---|
| Block tin pipe | 44.00-46.00 |
| No. 1 pewter | 32.00-36.00 |
| Solder joints | 7.75- 8.50 |

**SECONDARY METALS**

| | |
|---|---|
| Brass ingot, 85-5-5-5, l.c.l. | 12.50 |
| Standard No. 12 aluminum | 14.50 |

**MAGNESIUM**
(12 pound rod, 4 in. diam.)

| | |
|---|---|
| 99.8% ingot, carlots | 22.50 |
| 100 lb. to carlots | 24.50 |
| Extruded sticks, ¼ to 2 lb. | |
| Carlots | 32.00 |
| 100 lb. to carlots | 34.00 |

## Nonferrous Metals . . .

New York — Additional restrictions have been placed on the use of copper, zinc and other critical materials.

Zinc — Demand continues to exceed supply. Electrolytic zinc capacity has not come into production as quickly as expected, due mainly because materials needed for construction have been needed more urgently for other uses. When this new capacity is available, the total will show an increase of about 25 per cent in about one and one-half years.

Copper—A tighter supply situation is expected to develop in copper as new brass mills swing into full production. Up to the present time producers have been able to supply the munitions plants with adequate raw material. WPB is restricting further the use of copper alloy ingots, specifying on some authorizations that no ingot may be melted against orders with ratings lower than AA-5.

## Mechanical Engineers

(*Concluded from Page* 78)

Salisbury, turbine engineering department, General Electric Co., Schenectady, N. Y., for his paper "The Steam-Turbine Regenerative Cycle—and Analytical Approach." Winston M. Dudley, assistant professor, Case School of Applied Science, Cleveland, received the junior award for his paper, "Analysis of Longitudinal Motions in Trains of Several Cars." John T. Rettaliata, engineer, turbine division, Allis-Chalmers Mfg. Co., Milwaukee, Wis., in charge of calculation and development, received the Pi Tau Sigma medal, for outstanding achievement in mechanical engineering

Arno C. Fieldner, chief of the fuels and explosives service, Bureau of Mines, Washington, D. C., was presented with the Melchett medal of the Institute of Fuel.

New vice presidents are: J. W. Eshel-

man, Eshelman & Potter, sales engineers, Birmingham, Ala.; G. T. Shoemaker, vice president, Kansas City Power & Light Co., Kansas City, Mo.; W. J. Wohlenberg, Sterling professor of mechanical engineering, Sheffield Scientific School, Yale University, New Haven, Conn.; and Thomas E. Purcell, general superintendent of power stations, Duquesne Light Co. and also general superintendent, Allegheny County Steam Heating Co., Pittsburgh.

Three new members were named to the Board of Managers: Roscoe W. Morton, professor of mechanical engineering, University of Tennessee, Knoxville, Tenn., A. E. White, professor of metallurgy, University of Michigan, Ann Arbor, Mich.; and A. R. Stevenson Jr., staff assistant to the vice president, General Electric Co., Schenectady, N. Y.

## Priorities-Allocations

(*Concluded from Page 83*)

of amount used in 1941 in stoker repair and maintenance parts as well as in functional and mechanical items for gasoline and diesel engines. Prohibits manufacture of specified items with metal coated with zinc. For all items not mentioned and made for civilian purposes, not more zinc may be used than 75 per cent of prime western or 50 per cent of any other grade of zinc used by any person in corresponding calendar quarter of 1941.

**M-29** (Amendment): **Tungsten,** effective Nov. 27. Places all supplies of tungsten wire, rod, sheet, and powder under complete allocations. Deliveries of other tungsten products are unrestricted up to 25 pounds of contained tungsten monthly.

**M-43-a** (Amendment): **Tin,** effective Nov. 24. Prohibits manufacture and use of tin oxide for any purpose, including use on orders bearing preference rating of A-1-k or higher as previously permitted. Limits amount of tin which may be used in coating for foundry chaplets to 5 per cent or less.

**M-126** (Amendment): **Iron and Steel,** effective Dec. 1. Permits use of stainless steel in production of following items for the armed forces: ammunition boxes and chutes; boiler casings; cable terminals, fittings and turnbuckles; chains and cables; control levers; hot water heaters, tanks and coils; military identification tags and badges; radio antennas; powder boxes; stock pots; and canteens. Exempts also Army-Navy-Maritime orders for stainless steel which have been approved by WPB on form PD-391 for melting and delivery during the fourth quarter.

**M-212** (Amendment): **Petroleum Coke,** effective Nov. 25. Prohibits export without written authorization of the director general for operations, WPB.

## PRICE REGULATIONS

**General Maximum Price Regulation** (Amendments): Effective Nov. 16, exempts gilding metal clad steel scrap from price control by OPA. Effective Dec. 1, exempts metallurgical manganese ore with a manganese content of 40 per cent or less by weight from price control by OPA. Effective Nov. 23, exempts fluorspar ores from price control by OPA.

**No. 121** (Amendment): **Miscellaneous Solid Fuels,** effective Nov. 25. Increases maximum price of first grade coke from beehive ovens of the Utah Fuel Co. plant at Sunnyside, Utah, from $6.50 to $7.50 a ton.

**No. 136** (Amendments): **Machines and Parts,** effective Nov. 25, revises regulations designed to simplify calculation of maximum prices for used machines and parts, and extensions of provisions governing pricing of new machines, parts, and machinery services. Retroactively effective to July 22, 1942, provides that manufacturers of aircraft and aircraft engines need not file with the OPA their prices for repair parts or specially designed airplane servicing and repair tools for which maximum prices are established in price regulation No. 136.

**No. 272** (Amendment): **Cast Iron Boilers,** effective Nov. 30. Allows independent jobbers' maximum prices to manufacturers of cast iron boilers and radiators who maintain jobbing outlets performing the same function.

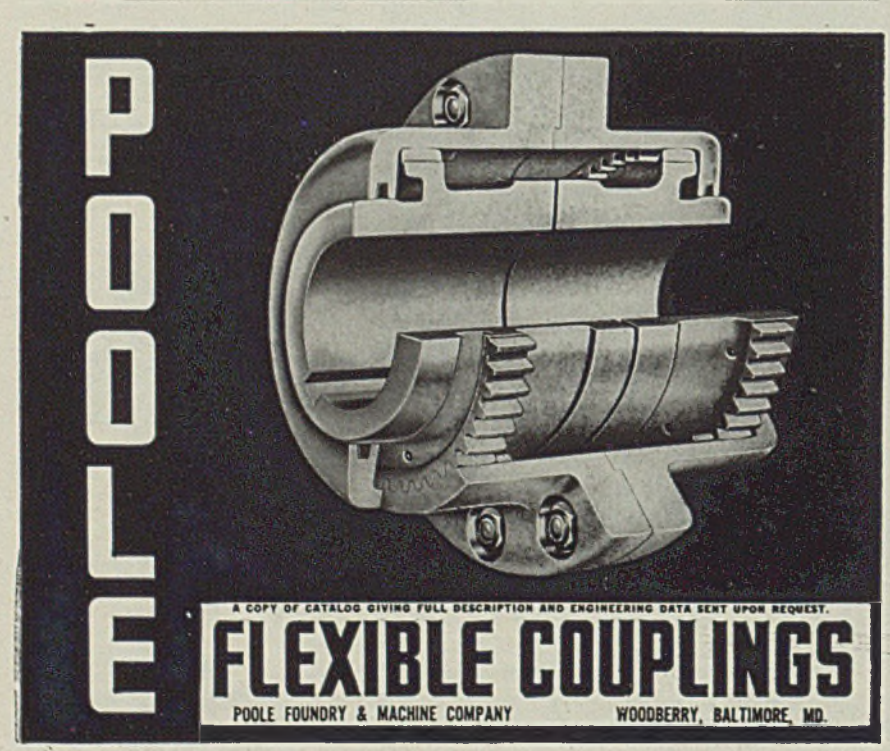
## Semifinished . . .

Semifinished Prices, Page 180

Semifinished steel production is holding unchanged, with the tightest spots now slabs and large rounds. Heaviest demand remains for hot-topped ingots, and there is a critical shortage of these, though ordinary ingots are in fairly good supply.

A stock of ingots for export is building up at some points, awaiting release for shipment by the Lend-Lease Administration. Stocks being laid down are not excessive, however, and some mills which had been producing semifinished for export have transferred their output to the domestic market.





# NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

## SUB-CONTRACT OPPORTUNITIES

**Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.**

**Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:**

**S.O. No. 291:** Part, stud, 2.16 x ½-inch. Equipment, automatic screw machine ½-inch or larger. Quantity, 2,000,000 monthly for duration. Tolerance, .01. Spherical washer, ¾ x 1/5-inch. Equipment, automatic screw machine ¾-inch or larger. Quantity, 2,000,000 monthly for duration. Tolerance, .01. Tappet valve, .816 x 5-inch. Equipment, screw machine or turret lathe, grinder, centerless preferred, miller, drilling, lapping. Quantity, 6000 daily for duration. Material, tool steel. Tolerance, plus or minus .001. Flywheel, 3½ x 20 inches. Equipment, large lathe or vertical boring mill. Quantity, 1000 to 5000 monthly for duration. Material class 4 steel casting, furnished. Tolerance, .001. Drawings at Minneapolis office.

**S.O. No. 283:** Forging five parts for 5-ton snatch block, from one to eight pounds. Material, 1025 or 1030 steel. Quantity, 50,000. Also forging of hub, dimensions approximately 6½ inches long at hub by nine inches largest diameter of flange. Quantity 100,000. Drawings at Minneapolis office.

**S.O. No. 277:** Several small machine screw parts required in quantities from 2000 to 50,000. Material, brass. Closest tolerance, .001. Sizes vary from .09-inch to .75-inch diameter. Prints and sample parts at Minneapolis office.

**S.O. No. 288:** Machining of 580 turret slides complete. Quantity, 75 per month. Operations, planing, gear cutting, milling, etc. Requires high class shop experienced in work of this type.

**S.O. No. 260:** Sources needed for aircraft engine parts, valves, tappets, studs, piston pins, bushings, etc. Grinding operations on most parts. Close tolerances. Samples at Minneapolis office.

**S.O. No. 273:** Sources urgently required to manufacture various ring and plug gages to 2½-inch.

**S.O. No. 261:** Eastern manufacturer wants to sublet considerable automatic screw machine work on commutator parts from ¼ to 2⅝ inches. Prints at Minneapolis office.

**S.O. No. 297:** Part, spacer ring, 5 inches diameter by 1 inch. Facilities required, engine lathe 12 inches or larger. Operations, turning and facing. Quantities, 9000 at 1500 per month, starting Dec. 15. Tolerance, .001. Material, magnesium alloy AN-QQ-M-56 comp. Drawings at Minneapolis office.

**S.O. No. 204:** Complete machining of diesel cylinder heads. Approximate dimensions, 5 x 10 x 34 inches. Iron castings furnished. Quantities 600 to 1000. Drawings at Minneapolis office.

**S.O. No. 298:** Jack screw, 7 inches long .375 O.D. Facilities, thread grinding. Quantity, 6000 per week. Tolerance .0001. Material furnished. Worm gear, three parts, 48 pitch, .375 O.D. Facilities, thread grinding. Quantities, 5000 to 10,000. Tolerance, .0004. Material furnished. Miter gear. Facilities required, bevel gear cutter. Quantities, 5000 to 10,000. Tolerance, .0005. Material furnished, drawings at Minneapolis office.

**S.O. No. 300:** Plug pin, five sizes. Facilities required, ¼-inch automatic screw machine. Quantity, 100,000 of each size. Orders will be repeated. Deliveries, as soon as possible. Tolerance, .004. Material, half-hard brass, furnished by subcontractor. Price set by prime contractor. Drawings at Minneapolis office.

**S.O. No. 285:** Machining of three parts. Two are aluminum castings furnished by prime contractor. Approximately 5-inch diameter by 2½ inches. Third part is machined from 5-inch seamless tubing and is 6 inches long. Operations, turning.

Packard Motor Car Co., Detroit, Mich., attention S. W. Stevenson, purchasing department, seeks concern having capacity for manufacture of screw machine parts. Material is SAE 4640. Requires screw machines, all sizes; heat treatment; centerless grinding; threading, class 3; cadmium plating.

**New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:**

**S-74-5579:** Long Island concern is seeking facilities to make 1000 pair spur gears, 11 teeth on 12-tooth blank, using 14½-inch involute cutter. Gear surface must be true and parallel with axis bore within .0005 full indicator reading and ground all over. Rockwell C 60 to C 67 carburized and hardened a 20 minimum depth all over. O.D. 1.7495, thickness 1.199.

**S-74-5904:** New York City manufacturer seeks full-time facilities of a linear dividing machine, 36 to 48-inch range; 24-inch would be acceptable.

**S-74-5907:** New York City engine company seeks facilities for machining steel crank shafts. Equipment, three 72-inch swing, 12 feet center to center.

**Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:**

**Roystuart-57-6:** A government agency requires large quantities of conduit couplings, adapters and connectors. Equipment required, automatic screw machines, spindles from ⅞-inch up; turret lathes, spindle size up to 4 inches; hand screw machines or bench lathes. Material, aluminum alloy, hex bar stock, specification AA-A-351, cond.T, specification QQ-A-601, class 4; specification AN-QQ-A-366. Overall dimensions, O.D. from 1½ to 3⅜-inch; length ¾ to 1⅞-inch. Material not supplied to contractor.

**Roystuart-57-7:** A government agency requires up to 1600 recoil spring housing assemblies per month for the duration. Equipment required, engine lathe, 14-inch swing; butt welder for tubing O.D. .366-inch, .50-inch wall; swedging machine to reduce ¾-inch end of tube to 2.612 O.D.; heat treating; Pull test 10 tons. Tolerance, .005. Material, seamless steel tubing, SAE 4640 and drop forgings, SAE 4640. Forgings will be furnished. Overall dimensions, 6½ x 14⅝-inch.

**Roystuart-57-8:** A government agency requires 37,570 engine control rod terminals. Equipment required, turret lathe, Warner & Swasey No. 3 or equivalent; bench drill press; milling machine; minimum 300-pound forging hammer; cadmium plating. Tolerance, .002. Materials, SAE 1035 steel forgings. Overall size 1⅞ x ½-inch. Material not supplied to contractor.

**Roystuart-57-9:** A government agency requires large quantity of turnbuckle eyes. Equipment required, screw machines from ⅜ to 1½-inch spindles; bench milling machine; drill press, ½-inch chuck. Tolerance, .006. Material, nickel steel navy specification 12-T-7. Overall dimensions ⅜ to 1.188-inch wide, 1.697 to 4.219-inch long. Material not furnished to contractor.

**Roystuart-57-10:** A government agency requires 69,000 shackles. Equipment required, 300 to 500-pound drop forge hammer; drill press, ½-inch chuck. Tolerance, .010. Material, nickel steel navy specification 12-S-13, grade 1. Overall dimensions, .500 to 1.250-inch wide, 1.266 to 3.188 long. Material not furnished to contractor.

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

**Job No. 3513:** Slack adjuster worm gear, machining operations only. SAE 1330 steel. 2⅛-inch diameter, is furnished. Equipment, screw machine or turret lathe. Order is for 6000, production schedule 250 to 400 or more per day. Priority is A-1-a. Print and sample at Detroit office.

**Job No. 3512:** Bolt for turret gun camera. SAE No. 2330 steel, ½ x 1.219. Equipment, hand screw machine, mill, cadmium plate. Order is for 6400 and priorities run from AA-1 to A-1-a.

**Jobs No. 3494 to 3499:** Forging sources only on open and closed sockets, ½ to ⅞-inch. Material, SAE 1033 steel, which is furnished. Quantity, 6000 to 20,000 on each order. Samples at Detroit office.

**Job No. 3472:** Driven clutch gear, R. H. Material, SAE No. 4145 or hyten B4 or B3x steel, 3¼-inch O.D. Equipment, hand screw machine, gear shaper, hobber, sensitive drill, tapper, lathe, heat treat, internal grinder. Order is for 3000 on A-1-a priority.

**Job No. 3473:** Driven clutch gear, L.H. Material and equipment same as for job No. 3472.

**Job No. 3242:** Propeller shaft thrust bearing spacer, AMS 6470 steel, which is furnished. Equipment, turret lathe, 4¾-inch swing; lathe, sensitive drill; internal and external grinders; tin plate; nitriding. Order is for 1000 per month on AA-1 priority.

**Job No. 3243:** Crankshaft oil seal ring spacer. AMS 6290 steel, which is furnished. Equipment, turret lathe, 5⅛-inch O.D.; lathe, sensitive drill; tapper, heat treating; internal and external grinder. Order is for 1000 per month on A-1-a priority.

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

**Display No. 234:** Fuse body and holder booster. Material, chrome-moly WD 4140 steel furnished by prime contractor. Equipment, Gridley automatic screw machines requested,

turret lathe 1-inch bar capacity. Quantity, 135,000. Dimensions, 1⅛ x 2½-inch. Tropic-Aire Inc., 4501 West Augusta boulevard, Chicago, attention F. G. Schminder.

**Display No. 272:** Disc rotating. Material, cartridge brass, furnished by prime. Quantity, 100,000. Dimensions, ½ x 4 inches. Equipment, four-spindle automatic chucking lathe, 6½-inch capacity; turret lathe, 4½-inch capacity; plain horizontal milling machine, No. 3; cone-head engine lathe, 12 x 30 inches. Hardwicke-Etter Co., Sherman Texas, attention J. F. Etter.

**Display No. 306:** Outer and inner ball race, Material, No. 52100 steel forging, furnished by sub. Priority, AA-1. Production, 300 per month, two items, 3000 each. Dimensions 2 x 25 and 2 x 34 inches. Equipment, vertical boring mill, 36-inch; rotary surface grinder, No. 18; ball race grinder. Miehle Printing Press & Mfg. Co., Fourteenth street and South Damen avenue, Chicago, attention J. R. Zullo.

**Display No. 121:** Gears and mounting members. Material, SAE 4640 steel forgings, furnished by prime. Production, 40 per week on each of three items, 1000 each. Equipment, eight-inch bar capacity turret lathe; six-inch universal gear hobber; No. 2 single-spindle sensitive drill; 36-inch vertical turret lathe with side head and threading facilities; 5 x 18-inch spur shaper gear generator; ½-inch diameter capacity 15-spindle drilling machine; No. 3 vertical milling machine; No. 2 and No. 3 single-spindle sensitive drills. Buckeye Traction Ditcher Co., Findley, O., attention H. Holloman.

**Display No. 318:** Centerline screw. Material, cold-rolled steel, furnished at cost to sub. Prime desires one or more sources to produce 10,000 to 80,000 daily. Equipment, six-spindle automatic screw machine, Gridley requested. A. C. Spark Plug Corp., Flint, Mich., attention A. S. Fuhrman.

**Display No. 315:** Hex nut. Material, SAE 315 cold-rolled steel, furnished by prime. No tapping required. Order is for 500,000. Equipment, six-spindle automatic screw machine. Elastic Stop Nut Corp., 2330 Vauxhall road, Union, N. J., attention W. E. Kelcey.

**Display No. 314:** Wheel hub. Material, SAE 1020 tubing, furnished by prime. Quantity, 90,000 at 15,000 per month. Dimensions, 1¼ x 5 inches. Equipment, 1¼-inch single-spindle automatic screw machine; 1½-inch bar capacity turret lathe; ⅞-inch drill capacity single-spindle bench drill. Budd Wheel Co., Detroit, Mich., attention W. R. Davis.

**Display No. 302:** Quantity, 11 items, 20,000 each. Material, WD 2340 steel, furnished by prime. Equipment, milling machines, sensitive drills, bench drills, turret lathe, thread mills, hydraulic broach presses, vertical die sinkers, horizontal shapes. Universal Crusher Co., Cedar Rapids, Iowa, attention H. F. Rickhoff.



## STRUCTURAL SHAPES . . .

### SHAPE CONTRACTS PLACED

5000 tons, suspension bridge, Alaskan highway, to John A. Roebling's Sons Co., Trenton, N. J.; Belmont Iron Works, Philadelphia, and Bethlehem Steel Co., Bethlehem, Pa., to fabricate structural steel.

3000 tons, plant, Aluminum Co. of America, Phoenix, Ariz., to Duffin Iron Co., Chicago; for fabrication by Four-V Structural Steel Companies, Chicago.

1000 tons, Leonard avenue bridge and repairs to two small bridges, Columbus, O., for Pennsylvania railroad, to American Bridge Co., Pittsburgh.

## PLATES . . .

### PLATE CONTRACTS PLACED

1000 tons or more, penstock, intake pipes, etc. for second Nisqually project, awarded by Tacoma, Wash., to Columbia Steel Co., low at $82,000.

## PIPE . . .

### CAST PIPE PLACED

500 tons, 16-inch water supply line for Bremerton, Wash., to Hugh G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

## RAILS, CARS . . .

### CAR ORDERS PENDING

Chicago, Rock Island and Pacific, 400 seventy-ton gondolas, pending.

## Equipment . . .

Boston—Machine tool builders are rescheduling much production to meet the accelerated aircraft building program, expanding already high output by enlarging facilities and broadening subcontracting. While this is accompanied by some confusion, steel supply situation is slightly easier on some grades with substitutions more orderly. This despite rerating machine builders to AA-2x below directives and AAA ratings with direct suppliers. Fourth quarter certificates under PRP approved most pur-

chases requested and under PD-25E needs anticipated for first and second quarters are being placed up to 70 per cent. Due to heavier aircraft demand, however, these estimates will be revised and supplemented in some cases.

The machine tool industry, buying controlled materials, steel, copper and aluminum, under Controlled Materials Plan, is also a consumer of B products, bearings, motors, bolts and nuts among numerous others, and under CMP elastic provisions allow liberal extensions under PD-25 forms, which are necessarily flexible to meet fluctuating schedules arising from revised war program production. Certain retained provisions of the PRP, preference ratings and PD-25A forms tie in with the CMP, effective April 1, which for the most part require a minimum of changes in purchasing procedure.

**Seattle**—WPB agencies continue active campaign to list used machinery and equipment in this area and Alaska with the view of reconditioning and use in war projects. Contractors report their equipment constantly in operation, which prevents them in some instances from bidding on new business. It is expected that equipment from idle gold properties in Alaska and release of equipment on the Alaska highway may ease the situation in some degree. Dealers are probing every possible source for any type of machinery that can be placed in use, as it is impossible to obtain new equipment.

# CONSTRUCTION AND ENTERPRISE

## OHIO

AKRON, O.—Hamlin Metal Products Co., 58 West Exchange street, plans two $20,000 additions to the present factory building. Walter A. Jesse, 204 Parkway, is contractor.

AKRON, O.—Portage Machine Co., 549 Miami avenue, is putting in a foundation for a structure 31 x 116 feet.

AKRON, O.—Goodyear Aircraft Co., B. J. Beitman, resident engineer, is to take over portion of plant of the Burke Golf Co. at Newark, O., to manufacture parts for airplanes. Remodeling of plant and installation of machinery is to start soon.

AKRON, O.—R. H. Freitag Mfg. Co., 1017-19 Bellows street, will extend machine shop with one-story addition if project is approved by Board of Zoning Appeals.

CLEVELAND—Weatherhead Co., 300 East 131st street, has purchased the adjacent property formerly held by Tremco Mfg. Co., covering a 10,000 square foot building and five acres of land. Albert J. Weatherhead Jr. is president.

CLEVELAND—Wangen, Pal-Vin Engineering Corp. is being incorporated as an enterprise separate from Pal-Vin Machine & Mfg. Co., whose plant was recently reported as being expanded. The new corporation will occupy a portion of the plant. Paul D. Reece, 1009 Williamson building, is counsel for the new firm.

CLEVELAND—Accurate Plating Co., 10609 Hanford avenue, is expanding production facilities with new factory building at 10611 Harvard avenue.

CLEVELAND—Aluminum Co. of America, 2210 Harvard avenue, has leased a one-story industrial building of 12,000 square feet at West Thirty-fourth street and Theurer avenue.

TOLEDO, O.—Industrial company has let general contract for factory alterations and additions to George Lathrop & Son, 1510 Montcalm avenue, Toledo. Estimated cost $90,000. H. E. Beyster Corp., General Motors building, Detroit, architect.

WOOSTER, O.—Gerstenslager Truck Mfg. Co., East Bowman street, has been allotted over $150,000 to provide additional equipment.



## MASSACHUSETTS

WEST SPRINGFIELD, MASS.—Gilbert & Barker Mfg. Co., Cold Spring avenue, has let contract for shop unit, and altering factory to Ernest F. Carlson Inc., 1694 Main street, Springfield, Mass. Estimated cost $40,000.

## CONNECTICUT

WATERBURY, CONN.—Benrus Watch Co. Inc., 30 Cherry avenue, has asked bids for two-story plant addition. L. F. Caproni, 1221 Chapel street, New Haven, Conn., engineer.

## PENNSYLVANIA

CANONSBURG, PA.—Aluminum Co. of America, Gulf building, Pittsburgh, is having plans prepared for alterations and additions and a new building for manufacturing plant here. Project No. 1148-F-6.

WEST HOMESTEAD, PA.—Contract for foundations and concrete floors for extensions to steel mill here was awarded to Trimble Co., 1719 Pennsylvania avenue, Pittsburgh. Owner, United States government, Navy Department, care of Mesta Machine Co., operator and lessee, East Eighth avenue, Homestead, Pa.

## MICHIGAN

ECORSE, MICH.—Majestic Aircraft Parts Corp., 3965 West Jefferson, has been incorporated with $50,000 capital to deal in aircraft parts, tools, etc. Representative, John W. Parker, 2950 East Woodbridge, Detroit.

MUSKEGON, MICH.—Peter J. Ramberg, Muskegon, has been awarded contract for one-story aircraft camshaft plant here for Muskegon Motor Specialties.

## ILLINOIS

CHICAGO—Bendix Aviation Corp. has acquired through Defense Plant Corp. a large manufacturing plant here which will be converted for use in aircraft parts production.

CHICAGO—Ford Motor Co., 12600 South Torrence avenue, is making extensive alterations and outside additions to its assembly plant for production of war equipment.

CHICAGO—Roy L. Jones Steel Co., 5035 South Kedzie avenue, soon will move into new plant now under construction at a site near present location.

CHICAGO—Chicago Flexible Shaft Co., 5600 West Roosevelt road, has purchased a building which will be used for materials storage.

CHICAGO—J. P. Hansen Foundry Co. Inc., 1745 North St. Louis avenue, is constructing building for additional storage space.

CHICAGO—Masterform Tool Co., 216 North Clinton street, has purchased and remodeled a building somewhat removed from its old location.

CHICAGO—Oscar W. Hedstrom Corp., 4836 West Division street, is constructing additional manufacturing space in which to make wood and metal patterns.

CHICAGO—Eagle Grinding Wheel Co., 2519 West Fulton street, is erecting a one-story addition to its present facilities.

CHICAGO—Air Castle Inc., 1134 North Kilbourn avenue, has purchased a building in the Chicago area.

CHICAGO—Gordon Varney, 1134 North Hoyne avenue, screw machine products, has purchased a manufacturing building and after completion of extensive alterations will move his facilities to the new location.

## MARYLAND

BALTIMORE—Morrow Bros. Inc., 14 East Eager street, has contract for service building at Scott and McHenry streets, for Bartlett-Hayward Division, Koppers Co. Cost

$40,000. James R. Edmunds Jr., Calvert building, architect.

BALTIMORE — American Hammered Piston Ring Division, Koppers Co., has awarded contract to Morrow Bros. Inc., 14 East Eager street, for $21,000 extension to warehouse and $19,000 addition to service building at Bush and Hamburg streets.

## ALABAMA

BIRMINGHAM—Alabama Metal Lath Co., Frank D. Horton, president, 1631 Vanderbilt road North, is converting plant for manufacture of war products.

## MISSISSIPPI

BILOXI, MISS.—FWA, Candler building, Atlanta, Ga., plans expenditure of $870,000 for waterworks system here.

PASCAGOULA, MISS.—FWA, Candler building, Atlanta, Ga., will spend $508,000 for waterworks system here.



## FLORIDA

WEST PALM BEACH, FLA.—Cleary Bros. Construction Co., 1008 Comeau building, West Palm Beach, has contract for pump station and appurtenant structures for United States Engineer office, P.O. Box 4970, Jacksonville, Fla. Cost under $500,000.

## MISSOURI

ST. LOUIS—Century Electric Co., 1806 Pine street, is taking bids for factory addition at Eighteenth and Nineteenth streets. L. Baylor Pendleton and William B. Ittner Inc., 408 Board of Trade building, associated architects.

## WISCONSIN

LA CROSSE, WIS.—Northern Engraving & Mfg. Co. has let general contract to Peter Nelson & Son for one-story factory.

MILWAUKEE—Ampco Metal Inc. has awarded contracts for one-story foundry addition.

MILWAUKEE—Murphy Diesel Co. will build an addition to its shop building.

MILWAUKEE—Nordberg Mfg. Co. has given general contract to Selzer-Ornst Co., 6222 West State street, for one-story factory and one-story storage building. Company has also given general contract to Peters Construction Co., 2901 North Thirty-eighth street, for one-story cistern and heat treating building, and another contract has been let to Meredith Bros. Inc., 121 East Wisconsin avenue, for one-story factory addition.

MILWAUKEE—H. E. Bremer Mfg. Co. has let contract to Peters Construction Co., 2901 North Thirty-eighth street, for one-story factory addition.

RACINE, WIS.—George Gorton Machine Co. has given general contract to Johnson & Henrickson for one-story factory addition.

WEST ALLIS, WIS.—North End Foundry Co. has given contract to W. O. Krahn, 4811 West Washington boulevard, for one-story foundry addition.

## MINNESOTA

MINNEAPOLIS—C & S Tool Co., Theron Castner, president, has begun construction of one-story factory addition. Long & Thorshov Inc., 1200 Second avenue South, architects.

MINNEAPOLIS—V. A. Boker & Sons Inc., V. A. Boker, president, has let general contract to W. A. South Co., 126 South Tenth street, for one-story factory at 3104 Snelling avenue.

MINNEAPOLIS—Getchell Steel Treating Co., William S. Getchell, president, has given general contract to W. A. South Co. for one-story factory addition at 1106 Tenth avenue Southeast.

MINNEAPOLIS—G. H. Tennant Co., E. C. Pennock, president, has let general contract to Field-Martin Co., 720 South Sixth street, for one-story factory addition.

ST. PAUL—Atlas Mfg. Co., Eustis and Robbins streets, has given general contract to Den Boer Construction Co. for one-story addition. Charles A. Hausler, 1593 University avenue, architect.

## TEXAS

HOUSTON, TEX.—Industrial company has let contract for plant, boiler houses, etc., to William A. Brunet, Shell building, Houston. Estimated cost over $86,000.

VELASCO, TEX.—Austin Co., Cleveland, has contract for thiokol plant being built near here for Defense Plant Corp. Inquiries are being sent out through Austin Co. purchasing department for materials and equipment.

## NEBRASKA

OMAHA, NEBR.—Inland Mfg. Co. has been incorporated with capital stock of $25,000 to manufacture metal parts, by G. E. Carpenter, Daniel Langfeld and W. C. Fraser.

## IOWA

DAVENPORT, IOWA—Uehtorff Co., 201 North Howell street, has given general contract to John Soller Construction Co. for one-story machine shop addition.

DES MOINES, IOWA—Ford Motor Co. has given general contract to A. H. Neumann & Bros. Inc., Hubbell building, for remodeling assembly building at Eighteenth and Grand, which is to be occupied by Solar Aircraft Co. Kenneth R. Brown, Valley Bank building, engineer.

## CALIFORNIA

LOS ANGELES—An addition to plant of Bethlehem Steel Co. is being built at 3396 East Slauson avenue.

LOS ANGELES—A mezzanine floor is being added to plant of Axelson Mfg. Co., 6160 South Boyle avenue.

LOS ANGELES—Contract has been awarded for factory storage building at plant of Automatic Screw Machine Co., 6900 Stanford avenue. Estimated cost $23,000.

## CANADA

HALIFAX, N. S.—Halifax Shipyards Ltd., Barrington street, has plans for further extension to plant to cost about $30,000 with equipment.

LEASIDE, ONT.—Canada Wire & Cable Co. Ltd., Laird drive, has had plans prepared and will start work immediately on plant addition to cost about $25,000.

OTTAWA, ONT.—Ottawa Car & Aircraft Ltd., 301 Slater street, in association with Department of Munitions and Supply, H. H. Turnbull, secretary, has had plans prepared for further plant addition and installation of equipment to cost about $20,000.

RENFREW, ONT.—Renfrew Machinery Co. Ltd., has had plans prepared for plant addition and repairs estimated to cost $15,000 with equipment.

RIDGETOWN, ONT.—Bates Metal Stamping Co., York street, has had plans prepared for plant addition to cost about $8000.

THOROLD, ONT.—Exolon Co. Ltd., has given general contract to Standard Steel Construction Co. Ltd., Port Robinson, and work will start soon on addition to furnace room and silicon carbide furnace plant, to cost about $15,000.

TORONTO, ONT.—Teleflex Ltd., 54 Bloor street West, has given general contract to Gratton Construction Co., 486 Clinton street, for plant addition and installation of equipment to cost about $25,000.

WALKERVILLE, ONT.—Canadian Bridge Co. Ltd., 1219 Walker road, has given general contract to Hein Construction Co., 172 Aylmer avenue, for machine shop addition to cost $35,000, equipment extra.

SAINT JOHN, N. B.—Canada Veneers Ltd., Wall street, has plans for plant addition to cost about $150,000 with equipment.

MONTREAL, QUE.—Canadian Pratt & Whitney Co. Ltd., in association with Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has given general contract to Sutherland Construction Co. Ltd., 1440 St. Catharine street West, for construction of extension to aircraft manufacturing plant, estimated to cost about $250,000 with equipment.

THREE RIVERS, QUE.—Miller Brass Foundry, 791 Hertel street, will start work immediately on erection of plant addition to cost about $20,000 with equipment.

# USED and REBUILT EQUIPMENT

## MATERIALS

### THE MORECO BARGAIN CORNER

**Multi-Speed Motors 3 Phase 60 Cycle**

| | | |
|---|---|---|
| 75/50/37½/5½ | Gen. Elec. | 880/585/440/290 |
| 15/5 | Howell | 900/450 |
| 15/5 | Westinghouse | 1150/565 |
| 7 | Gen. Elec. | 1800/1200/900/600 |
| 6 | Gen. Elec. | 1800/1200/800/600 |
| 3½ | Gen. Elec. | 1800/1200/900/600 |
| 2-1½-1½ | Louis Allis | 1200/ 900/600/450 |
| 2-1 1/3-1 2/3 | Fair Morse | 1800/1200/900/600 |

**THE MOTOR REPAIR & MFG. CO.**
1158 Hamilton Ave. Cleveland, Ohio

---

### FOR SALE

NO. 4 D. & K. ALL STEEL

### ALLIGATOR SHEAR

with

35 H. P. Motor—Starter—Switch
In Perfect Condition

**THE L. J. WORKUM COMPANY**
P. O. Box 538 Cincinnati, O.

---

**For Sale**

### PLATE CROP ENDS

from 3/16 to 5/8" thick assorted to thickness unassorted to size. Proper priority required.

**GLENDALE STEEL CORPORATION**
Clara Place near Central Ave.
Glendale, L. I., N. Y.
Telephone HAvemeyer 8-1100

---

### RAILS

**AND ACCESSORIES**

**RELAYING RAILS** — Super-quality machine-reconditioned—not ordinary Relayers.
**NEW RAILS**, Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates, and all other Track Accessories.

Although our tonnages are not as large as heretofore, most sizes are usually available from warehouse stocks.
Every effort made to take care of emergency requirements. *Phone, Write or Wire . . .*

**L. B. FOSTER COMPANY, Inc.**
PITTSBURGH NEW YORK CHICAGO

---

### WANTED

STEEL BUILDINGS
With or Without Crane
RUNWAYS AND CRANES
STEEL TANKS
Of All Kinds
PIPE AND TUBES

*Can Make Immediate Inspection*

**JOS. GREENSPON'S SON PIPE CORP.**
National Stock Yards
(St. Clair Co.) Illinois

---

### FOR SALE

EQUIPMENT FOR BLACK OXIDE FINISHING (Houghtoblack, etc.) consisting of Gas-Fired Tanks, Heaters, Controls, Dipping Baskets, Vapor Suction System all practically new, available immediately. Reply Box 804, STEEL, Penton Bldg., Cleveland.

---

### AT BIG SAVINGS

We can furnish rails; spikes; bolts; tie-plates; angle bars, and other track accessories. Steel equipment of all kinds. Write, wire or phone for prices.

**SONKEN-GALAMBA CORP.**
108 N. 2nd St. Kansas City, Kans.

---

**FOR SALE**
**RAILROAD SCALES, CRANES, ETC.**

One—BUDA 80 ton railroad scale, 46 ft.; One—Fairbanks-Morse type E 150 ton railroad scale, 50 ft.; one 15 ton Brownhoist locomotive crane. Also several overhead electric travelling cranes; railroad steam locomotives; relaying rails; spikes and bolts. Write for complete information.

**SONKEN-GALAMBA CORP.**
108 N. 2d Street Kansas City, Kansas

---

*More for Your Dollar!*

**IRON & STEEL PRODUCTS, INC.**

"ANYTHING containing IRON or STEEL"
37 Years' Experience
13462 S. Brainard Ave., Chicago, Illinois
"HVAD SOM HELST som indeholder JERN eller STAAL"
SELLERS — BUYERS — TRADERS

---

Grinder, Roll 30" x 76" Farrel, M.D.
Lathe, 64" x 21' Niles, M.D.
Keyseaters, No. 2 M. & M. & No. 2 Baker.
Shear, Rotary 3/4" Newbold, 50" gap.
Shears, Alligator, 1"-4"
Slotter, 12" Putnam, 33" table, B.D.
Straightener, 48"—17 rolls—4" dia.
Straightener, 54"—17 rolls—4-1/4" dia.
Straightener, No. 2 Sutton, 3-1/2", M.D.
Testing Machine, 400,000 lb. Riehle, B.D.

**WEST PENN MACHINERY COMPANY**
1208 House Bldg. Pittsburgh, Pa.

---

GEAR CUTTERS, Spur 30", 36" & 40", M.D.
GEAR PLANERS, Bevel, 36" & 54" Gleason, M.D.
GRINDER, Cyl. 18"x30"x96" Norton, M.D.
HAMMER, Forging, 2000 lb. Morgan
SHEAR, Squaring 8'x10 gauge Streine, M.D.
SHEARS, Squaring, 48" & 40" x 1/4", M.D.
STRAIGHTENER, 12-roll Kane & Roach, M.D.
STRAIGHTENER, Wire Shuster, cap. 5/8".
STRAIGHTENER, No. 1 Sutton-Abramson, M.D.

**LANG MACHINERY COMPANY**
28th Street & A.V.R.R. Pittsburgh, Pa.

---

### ROLLING MILLS and EQUIPMENT

**FRANK B. FOSTER**
829 OLIVER BUILDING PITTSBURGH, PA.
*Cable Address "FOSTER" Pittsburgh*

---

### WANT TO PURCHASE

4 inch O.D. Boiler tubes; steel pipe of all sizes; Valves; Fittings; Industrial plants; Mills; railroads; trackage, etc.
Write, wire or phone

**SONKEN-GALAMBA CORP.**
108 N. 2d St. Kansas City, Kans.
*We buy and sell.* *Get our quotations.*

---

### —REBUILT—

**BLOWERS - FANS - EXHAUSTERS**

Connersville-Roots positive blowers.
Centrifugals for gas and oil burning.
Sand blast, grinder and dust exhausters.
Ventilating fans and roof ventilators.

**GENERAL BLOWER CO.**
404 North Peoria St. Chicago, Ill.

---

## STEEL CAN HELP YOU BUY OR SELL

Used or Surplus Machinery and Equipment. Send in your copy instructions for an advertisement in this column. Your ad will reach the important men in the metalworking and metal-producing industry. Write to STEEL, Penton Bldg., Cleveland.

# CLASSIFIED

## Help Wanted

**WANTED**
**SALES MANAGER**
**by**

Machine Tool Builder with well-known, medium size organization, designing and building special and standard machinery, firmly established for many years, location Detroit. Excellent opportunity for a permanent position.

Reply Box 809, STEEL,
Penton Bldg., Cleveland, O.

GRADUATE MECHANICAL ENGINEER. Thoroughly familiar with nonferrous metallurgy as applied to machine design and other industrial applications. Should know modern foundry practice and be up-to-date on machine shop procedure. Must be capable correspondent and able to meet and work with executives. Good future assured to right man. Please give full details in regard to education, experience, age, salary desired. Draft status should be at least 3A. If now employed in War Industry, please do not apply. Ampco Metal, Inc., 1745 South 38th Street, Milwaukee, Wisconsin.

**WANTED**
CHEMISTS FOR BOTH SUPERVISORY AND ROUTINE ANALYTICAL WORK in control laboratory of leading aircraft engine manufacturer in East. Applications sought from both men and women but not from persons employed in war production. Reply Box 797, STEEL, Penton Bldg., Cleveland.

WANTED: MAN WITH GENERAL OFFICE or field sales experience by large reputable manufacturer of seamless and electric welded tubing, alloy and carbon steels. Please apply giving full information, experience, etc., to Box 771, STEEL, Penton Bldg., Cleveland.

WANTED: FOUNDRYMAN TO ACT AS SUperintendent or foreman, experienced in Gray Iron. Give references, education and training. Good opportunity for advancement for the right man. Reply Box 806, STEEL, Penton Bldg., Cleveland.

INDUSTRIAL SERVICE ENGINEER FAMILiar with foundry and metal cleaning equipment, to assist established supplier in Detroit area, servicing Michigan and Northern Ohio. Address replies to Box 808, STEEL, Penton Bldg., Cleveland.

WANTED—TWO MEN, AGES 25 TO 40, with either engineering, metallurgical, or gray iron foundry sales experience. Give full particulars in reply. Address Box 810, STEEL, Penton Bldg., Cleveland.

WANTED: CONSTRUCTION SUPERINTENDent and Engineers experienced in blast furnace construction. Write Austin Bridge Company, Daingerfield, Texas.

WANTED — BLAST FURNACE CHEMIST — State Age and Experience. Reply Box 811, STEEL, Penton Bldg., Cleveland.

## General Contractors

WOOD ENGINEERING SPECIALISTS
STEEL • REINFORCED CONCRETE • MASONRY

KLING - SAUSE - ROUSSEAU & ASSOCIATES
ARCHITECTS & ENGINEERS

144 W. Wood Street (Phone 6-3252) Youngstown, Ohio

Specializing in : : : : : : : : : : : :
Planning : Designing : Engineering : : :
Electrical : Plumbing : Heating : : : :
Consultants : Production Planning : : : :

INDUSTRIAL BUILDINGS

MANUFACTURING PLANTS : WORKSHOPS : OFFICE BUILDINGS : HOUSING

## Bids Wanted

Emergency Operations Unit, Public Buildings Administration, Federal Works Agency, Washington, D. C., Nov. 23, 1942.—Sealed proposals in duplicate will be publicly opened in this office at 10 A. M., Dec. 15, 1942, for the construction of an Elementary School Building at Roseville, Mich. Upon application, two sets of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

## Employment Service

SALARIED POSITIONS—$2,500 to $25,000. This advertising service of 33 years' recognized standing negotiates for positions of calibre indicated. Procedure individualized to your personal requirements. Retaining fee protected by refund provision. Identity covered. If salary has been $2,500 or more send for details. R. W. Bixby, Inc., 110 Delward Bldg., Buffalo, N. Y.

## Positions Wanted

STRUCTURAL AND PLATE FABRICATING shop superintendent desires to make a change. Thoroughly experienced and draft exempt. References. Address Box 813, STEEL, Penton Bldg., Cleveland.

SALES EXECUTIVE SEEKS TO REPRESENT mill or plant. Excellent contacts, New York Metropolitan Area. References gilt edge. Address Box 812, STEEL, Penton Bldg., Cleveland.


**THE NORLIPP COMPANY**
ENGINEERS . . . MANUFACTURERS
Sub-contract facilities for Die Castings and Metal Stampings
556 West Congress Street Chicago, Illinois

**HOT DIP GALVANIZING**
"A Material Difference"
GALVANIZED PRODUCTS
PRODUCTION HEAT TREATING
COMMERCIAL METALS TREATING INC.
TOLEDO, OHIO

**KIRK & BLUM**
WELDED MACHINE BASES, PEDESTALS and FRAMES
LATHE PANS
GEAR and BELT GUARDS
Pressed Steel Louver Panels and Cover Plates
THE KIRK & BLUM MFG. CO.
2822 Spring Grove Ave., Cincinnati, Ohio

## Castings

KING FOUNDRIES, INC., NORTH WALES, Pa. Grey Iron and Semi Steel Castings, also alloyed with Nickel, Chrome, and Molybdenum. Wood, Iron, Brass, and Aluminum Pattern work.

Send your inquiries for
SPECIAL ENGINEERING WORK
to the
A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.
designers and builders of wire and ribbon stock forming machines.
*We also solicit your bids for cam milling*

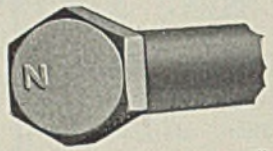
WHERE TO GET

# *Very Tough Cap Screws*

## FOR YOUR MOST EXACTING NEEDS

## Cleveland Heat-Treated Alloy Steel Cap Screws

● For those critical fastening jobs where you want the extra toughness obtainable in alloy steel, Cleveland has the capacity to make, and the equipment to properly heat treat the screws you need. Headed and threaded by the Kaufman Process, of course. Special quotations on request for quantity runs in standard cap screw and special dimensions. Write us for prices and deliveries.




"N" ordinarily for "Nickle Alloy"—
now for "National Emergency" steel.

**THE CLEVELAND CAP SCREW COMPANY**
2917 EAST 79th STREET, CLEVELAND, OHIO

Modern Electric
Heat Treating

# Cleveland Cap Screws

## Set Screws and Special Upset Parts

**Made by the Originators of the Kaufman Process for Greater Strength and Accuracy**

**Specialists for 26 years in Headed and Threaded Products**

**WAREHOUSES**

**CHICAGO:** 726 W. Washington Blvd. . . **HAY**market 1392
**PHILADELPHIA:** 12th & Olive Sts.. . . **POP**lar 7530
**NEW YORK:** 47 Murray St. . . . . **BARC**lay 7-5088
**LOS ANGELES:** 1015 E. 16th St. . . **PROS**pect 8326

# ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.


| | Page |
|---|---|
| **A** | |
| Abrasive Co. | * |
| Abrasive Products, Inc. | * |
| Acheson Colloids Corp. | * |
| Acme Galvanizing, Inc. | * |
| Acme Steel & Malleable Iron Works | * |
| Aetna-Standard Engineering Co., The | * |
| Ahlberg Bearing Co. | 189 |
| Air Reduction | * |
| Ajax Electrothermic Corp. | * |
| Alan Wood Steel Co. | * |
| Aldrich Pump Co., The | * |
| Allegheny Ludlum Steel Corp. | 97 |
| Allen-Bradley Co. | 177, 178 |
| Alliance Machine Co. | * |
| Allis-Chalmers Mfg. Co. | 14, 15 |
| Alloy Metal Abrasive Co. | * |
| All-Steel-Equip Co. | * |
| Alrose Chemical Co. | * |
| American Agile Corp. | 153 |
| American Air Filter Co., Inc. | * |
| American Brass Co. | 33, 34, 35, 36, 67 |
| American Bridge Co. | * |
| American Broach & Machine Co. | * |
| American Cable Division of American Chain & Cable Co., Inc. | * |
| American Chain & Cable Co., Inc., American Cable Division | * |
| American Chain & Cable Co., Inc., American Chain Division | * |
| American Chain & Cable Co., Inc., Ford Chain Block Division | * |
| American Chain & Cable Co., Inc., Page Steel & Wire Division | * |
| American Chain Division of American Chain & Cable Co., Inc. | * |
| American Chemical Paint Co. | * |
| American Crayon Co., The | * |
| American Engineering Co. | 191 |
| American Foundry Equipment Co. | * |
| American Gas Association | * |
| American Gas Furnace Co. | * |
| American Hard Rubber Co. | * |
| American Hot Dip Galvanizers Association | * |
| American Metal Hose Branch of the American Brass Co. | 67 |
| American Metal Products Co. | * |
| American MonoRail Co. | 85 |
| American Nickeloid Co. | 205 |
| American Pulverizer Co. | * |
| American Roller Bearing Co. | * |
| American Rolling Mill Co., The | * |
| American Screw Co. | 22, 23, 142 |
| American Shear Knife Co. | 172 |
| American Steel & Wire Co. | * |
| American Tinning & Galvanizing Co. | * |
| Ampco Metal Inc. | 163 |
| Amsler-Morton Co., The | * |
| Andrews Steel Co., The | 150 |
| Anker-Holth Mfg. Co. | * |
| Apollo Steel Co. | * |
| Armstrong-Blum Mfg. Co. | * |
| Atkins, E. C., & Co. | * |
| Atlantic Stamping Co. | * |
| Atlantic Steel Co. | * |
| Atlas Car & Mfg. Co. | * |
| Atlas Drop Forge Co. | * |
| Atlas Lumnite Cement Co. | * |
| Automatic Alarms Inc. | * |
| Avery Adhesives | * |
| **B** | |
| Babcock & Wilcox Co. | * |
| Bailey, Wm. M., Co. | 7, 8, 9, 10, 11, 12 |
| Baker-Raulang Co. | * |
| Baldwin-Southwark Division, The Baldwin Locomotive Works | * |
| Bantam Bearings Corp. | 62 |
| Barnes, Wallace, Co., Division of Associated Spring Corporation | 28 |
| Bartlett, C. O., & Snow Co. | 25 |
| Basic Refractories Inc. | * |
| Bayard, M. L., & Co., Inc. | * |
| Bay City Forge Co. | * |
| Bay State Abrasive Products Co. | * |
| Beatty Machine & Mfg. Co. | * |
| Bellis Heat Treating Co. | * |
| Belmont Iron Works | 205 |
| Berger Manufacturing Div., Republic Steel Corp. | * |
| Bethlehem Steel Co. | 1 |
| Birdsboro Steel Foundry & Machine Co. | * |
| Bissett Steel Co., The | * |
| Bixby, R. W., Inc. | 207 |
| Blanchard Machine Co. | * |
| Blaw-Knox Co. | 164 |
| Blaw-Knox Division, Blaw-Knox Co. | 164 |
| Bliss, E. W., Co. | * |
| Bliss & Laughlin, Inc. | * |
| Bloom Engineering Co. | * |
| Bridgeport Brass Co. | 159, 160 |
| Bristol Brass Co., The | * |
| Bristol Co., The | 142 |
| Brooke, E. & G., Iron Co. | 205 |
| Brosius, Edgar E., Co. | 188 |
| Brown & Sharpe Mfg. Co. | 61 |
| Brown Instrument Co., The | * |
| Brush Development Co., The | * |
| Bryant Chucking Grinder Co. | * |
| Bryant Machinery & Engineering Co. | * |
| Buda Co., The | * |
| Buffalo Galvanizing & Tinning Works, Inc. | * |
| Bullard Co., The | * |
| Bundy Tubing Co. | 50 |
| Bushwick Iron & Steel Co., Inc. | * |
| **C** | |
| Cadman, A. W., Mfg. Co. | * |
| Carborundum Co., The | 46 |
| Cardox Corp. | * |
| Carnegie-Illinois Steel Corp. | 26, 27 |
| Carpenter Steel Co., The | * |
| Cattie, Joseph P., & Bros., Inc. | * |
| Ceilcote Co., The | 205 |
| Central Screw Co. | 142 |
| Century Electric Co. | 143 |
| Chambersburg Engineering Co. | * |
| Chandler Products Corp. | 142 |
| Chicago Metal Hose Corp. | 151 |
| Chicago Perforating Co. | 204 |
| Chicago Rawhide Mfg. Co. | * |
| Chicago Tramrail Co. | * |
| Chicago Wheel & Mfg. Co. | * |
| Cincinnati Grinders Inc. | 5 |
| Cincinnati Milling Machine Co. | 5 |
| Cincinnati Shaper Co., The | * |
| Cities Service Oil Co. | * |
| Clark Tructractor Div. of Clark Equipment Co. | * |
| Cleereman Machine Tool Co. | * |
| Cleveland Automatic Machine Co. | * |
| Cleveland Cap Screw Co. | 208 |
| Cleveland-Cliffs Iron Co. | * |
| Cleveland Crane & Engineering Co. | 47 |
| Cleveland Hotel | * |
| Cleveland Punch & Shear Works Co. | * |
| Cleveland Tool Engineering Co. | 165 |
| Cleveland Tramrail Division, Cleveland Crane & Engineering Co. | 47 |
| Cleveland Twist Drill Co., The | 30 |
| Cleveland Worm & Gear Co., The | * |
| Climax Molybdenum Co. | 90 |
| Cold Metal Products Co. | 197 |
| Colonial Broach Co. | * |
| Columbia Steel Co. | 26, 27 |
| Columbus Die, Tool & Machine Co. | 204 |
| Commercial Metals Treating, Inc. | 207 |
| Cone Automatic Machine Co., Inc. | * |
| Continental Machines, Inc. | * |
| Continental Roll & Steel Foundry Co. | * |
| Continental Screw Co. | 142 |
| Continental Steel Corp. | * |
| Cooper-Bessemer Corp. | 145 |
| Copperweld Steel Co. | * |
| Corbin Screw Corp. | 142 |
| Cowles Tool Co. | 204 |
| Crane Co. | * |
| Crawbuck, John D., Co. | * |
| Crosby Co., The | 205 |
| Cuban-American Manganese Corp. | * |
| Cullen-Friestedt Co. | * |
| Culvert Division Republic Steel Corp. | * |
| Cunningham, M. E., Co. | * |
| Curtis Pneumatic Machinery Division of Curtis Manufacturing Company | 155 |
| Cutler-Hammer, Inc. | * |
| **D** | |
| Darwin & Milner, Inc. | 205 |
| Davenport Besler Corp. | * |
| Davis Brake Beam Co. | 205 |
| Denison Engineering Co., The | * |
| DeSanno, A. P., & Son, Inc. | * |
| Despatch Oven Co. | * |
| Detroit Electric Furnace Division, Kuhlman Electric Co. | * |
| Detroit-Leland Hotel | 200 |
| Detroit Rex Products Co. | * |
| Diamond Expansion Bolt Co., Inc. | * |
| Diamond Tool Co. | 195 |
| Dietert, Harry W., Co. | * |
| Disston, Henry, & Sons, Inc. | * |
| Dodge Manufacturing Corp. | * |
| Dow Chemical Co., The | 147 |
| Downs Crane & Hoist Co. | 199 |
| Dravo Corp., Engineering Works Div. | * |
| Dravo Corp., Machinery Div. | 170 |
| **E** | |
| Easton Car & Construction Co. | * |
| Economy Engineering Co. | * |
| Edison, Thomas A., Inc. | * |
| Elastic Stop Nut Corp. | * |
| Electric Controller & Mfg. Co. | 125, 126 |
| Electric Furnace Co., The | * |
| Electric Storage Battery Co. | 133 |
| Electro Alloys Co., The | * |
| Electro Metallurgical Co. | * |
| Elmes, Charles F., Engineering Works | * |
| Enterprise Galvanizing Co. | * |
| Equipment Steel Products Division of Union Asbestos & Rubber Co. | * |
| Erdle Perforating Co., The | 202 |
| Erie Forge Co. | * |
| Erie Foundry Co. | 20 |
| Etna Machine Co. | * |
| Euclid Crane & Hoist Co. | * |
| Eureka Fire Brick Works | 205 |
| Eutectic Welding Alloys Co. | * |
| Ex-Cell-O Corp. | * |
| Executone, Inc. | * |
| **F** | |
| Fafnir Bearing Co., The | 18 |
| Fairbanks, Morse & Co. | * |
| Fairfield Mfg. Co. | * |
| Fanner Mfg. Co. | * |
| Farquhar, A. B., Co., Ltd. | 48 |
| Farval Corp., The | Inside Back Cover |
| Ferracute Machine Co. | * |
| Fidelity Machine Co. | 158 |
| Finn, John, Metal Works | * |
| Firth-Sterling Steel Co. | 139 |
| Fitchburg Grinding Machine Corp. | * |
| Fitzsimons Co., The | * |
| Flori Pipe Co., The | * |
| Foote Bros. Gear & Machine Corp. | * |
| Ford Chain Block Division of American Chain & Cable Co., Inc. | * |
| Foster, Frank B. | 206 |
| Foster, L. B., Co., Inc. | 206 |
| Foxboro Co., The | * |
| Frantz, S. G., Co. | * |
| Fuller Brush Co. | * |
| **G** | |
| Galvanizers, Inc. | * |
| Galland-Henning Mfg. Co. | 31 |
| Garrett, Geo. K., Co. | * |
| General Abrasive Co., Inc. | * |
| General American Transportation Corp. | 152 |
| General Blower Co. | 206 |
| General Electric Co. | 66 |
| Gisholt Machine Co. | * |
| Globe Brick Co., The | * |
| Granite City Steel Co. | * |
| Grant Gear Works | 173 |
| Graver Tank & Mfg. Co., Inc. | * |
| Graybar Electric Co. | 70 |
| Great Lakes Steel Corp. | 24 |
| Greenfield Tap & Die Corp. | * |
| Greenlee Brothers & Co. | * |
| Greenspon's, Jos., Son Pipe Corp. | 206 |
| Gregory, Thomas, Galvanizing Works | * |
| Grinnell Co., Inc. | * |
| Gruendler Crusher & Pulverizer Co. | * |
| Guth, Edwin F., Co., The | * |
| **H** | |
| Hagan, George J., Co. | 63 |
| Hallden Machine Co., The | * |
| Hanlon-Gregory Galvanizing Co. | * |
| Hanna Engineering Works | * |
| Hanna Furnace Corp. | * |
| Hannifin Mfg. Co. | * |
| Hansen Mfg. Co. | 146 |
| Harbison-Walker Refractories Co. | * |
| Harnischfeger Corp. | * |
| Harper, H. M., Co., The | 51 |
| Harrington & King Perforating Co. | 196 |
| Harrison Sheet Steel Co. | * |
| Hassal, John, Inc. | * |
| Hays Corp., The | 171 |
| Heald Machine Co. | Inside Front Cover |
| Helmer-Staley, Inc. | * |
| Hendrick Manufacturing Co. | 202 |
| Hepburn American Co., Engineers | * |
| Heppenstall Co. | * |
| Hevi-Duty Electric Co. | * |
| Hill, James, Mfg. Co. | * |
| Hindley Mfg. Co. | * |
| Hobart Bros. Co. | 99 |
| Holden, A. F., Co. | Front Cover |
| Homestead Valve Mfg. Co. | * |
| Horsburgh & Scott Co. | * |
| Houghton, E. F., & Co. | * |
| Hubbard & Co. | * |
| Hubbard, M. D., Spring Co. | 202 |
| Hyatt Bearings Division, General Motors Corporation | * |
| Hyde Park Foundry & Machine Co. | * |
| Hydropress, Inc. | * |
| **I** | |
| Illinois Clay Products Co. | * |
| Independent Galvanizing Co. | * |
| Industrial Brownhoist Corp. | 193 |
| Ingersoll Steel & Disc Division, Borg-Warner Corp. | 148 |
| Inland Steel Co. | 72 |
| International Nickel Co., Inc. | 13 |
| International Rustproof Corp. | * |
| International Screw Co. | 142 |
| International-Stacey Corp. | * |
| Iron & Steel Products, Inc. | 206 |
| Irwin, H. G., Lumber Co. | * |
| Isaacson Iron Works | * |
| **J** | |
| Jackson Iron & Steel Co., The | * |
| James, D. O., Mfg. Co. | * |
| J-B Engineering Sales Co. | * |
| Jessop Steel Co. | 17 |
| Jessop, Wm., & Sons, Inc. | * |
| Johns-Manville Corp. | * |
| Johnson Bronze Co. | 168 |
| Johnson Steel & Wire Co., Inc. | 174 |
| Jones & Lamson Machine Co. | * |
| Jones & Laughlin Steel Corp. | * |
| Jones, W. A., Foundry & Machine Co. | * |
| Jorgensen, Earle M., Co. | * |
| Joslyn Co. of California | * |
| Joslyn Mfg. & Supply Co. | * |
| **K** | |
| Kardong Brothers, Inc. | 195 |
| Kearney & Trecker Corp. | * |


(Continued on next page)

# ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.

(Continued from preceding page)


| | Page |
|---|---|
| Kemp, C. M., Mfg. Co. | * |
| Kempsmith Machine Co. | * |
| Kester Solder Co. | 203 |
| Keystone Steel & Wire Co. | * |
| Kidde, Walter, & Co., Inc. | * |
| King Fifth Wheel Co. | * |
| King Foundries, Inc. | 207 |
| Kinnear Mfg. Co. | * |
| Kirk & Blum Mfg. Co. | 207 |
| Kold-Hold Manufacturing Co. | * |
| Koppers Co. | * |
| Koven, L. O., & Brother, Inc. | * |
| Kropp Forge Co. | * |
| **L** | |
| Lake City Malleable Co. | * |
| Lakeside Steel Improvement Co., The | 93 |
| Laminated Shim Co., Inc. | * |
| Lamson & Sessions Co., The | 142 |
| Landis Machine Co. | * |
| Lang Machinery Co. | 206 |
| Latrobe Electric Steel Co. | * |
| Laughlin, Thomas, Co., The | * |
| Layne & Bowler, Inc. | 152 |
| Lebanon Steel Foundry | * |
| LeBlond, R. K., Machine Tool Co., The | * |
| Leeds & Northrup Co. | * |
| Lee Spring Co., Inc. | * |
| Lehigh Structural Steel Co. | * |
| Lempco Products, Inc. | * |
| Lepel High Frequency Laboratories, Inc. | 195 |
| Leschen, A., & Sons Rope Co. | * |
| Lewin-Mathes Co. | 19 |
| Lewis Bolt & Nut Co. | * |
| Lewis Foundry & Machine Division of Blaw-Knox Co. | * |
| Lewis Machine Co., The | * |
| Lincoln Electric Co., The | 123 |
| Lincoln Hotel | 195 |
| Linde Air Products Co., The | * |
| Link-Belt Co. | 136, 137 |
| Lintern Corp., The | * |
| Logemann Bros. Co. | * |
| Lord Baltimore Hotel | 202 |
| Lovejoy Flexible Coupling Co. | * |
| Luers, J. Milton | 204 |
| Lyon-Raymond Corp. | * |
| **Mc** | |
| McKay Co., The | * |
| McKay Machine Co. | * |
| McKee, Arthur G., Co. | * |
| McKenna Metals Co. | 40 |
| **M** | |
| MacDermid, Inc. | * |
| Mackintosh-Hemphill Co. | * |
| Macklin Co. | * |
| Macwhyte Co. | * |
| Maehler, Paul, Co., The | 165 |
| Magnus Chemical Co. | * |
| Mahr Manufacturing Co. | 21 |
| Mallory, P. R., & Co., Inc. | 52 |
| Mathews Conveyer Co. | * |
| Matthews, Jas. H., & Co. | 203 |
| Mercury Mfg. Co. | * |
| Mesta Machine Co. | * |
| Metal & Thermit Corporation | 157 |
| Michiana Products Corp. | * |
| Michigan Tool Co. | * |
| Micromatic Hone Corp. | * |
| Midvale Co., The | * |
| Minnesota Mining & Mfg. Co. | * |
| Mississippi Valley Structural Steel Co. | 199 |
| Missouri Rolling Mill Corp. | * |
| Moltrup Steel Products Co. | * |
| Molybdenum Corporation of America | 56 |
| Monarch Machine Tool Co., The | 68 |
| Monarch Steel Co. | * |
| Morgan Construction Co. | * |
| Morgan Engineering Co. | * |
| Motch & Merryweather Machinery Co. | * |
| Motor Repair & Mfg. Co. | 206 |
| **N** | |
| National Acme Co. | * |
| National Bearing Metals Corp. | 39 |
| National Broach & Machine Co. | * |
| National Carbon Co., Inc., Carbon Sales Division | 131 |
| National Cylinder Gas Co. | * |
| National-Erie Corp. | * |
| National Fireproofing Corp. | 204 |
| National Lead Co. | * |
| National Lock Washer Co. | * |
| National Machinery Co., The | * |
| National Roll & Foundry Co. | * |
| National Screw & Mfg. Co. | 142 |
| National Steel Corp. | 24 |
| National Telephone Supply Co. | * |
| National Tube Co. | * |
| New Departure Division General Motors Corp. | * |
| New England Screw Co. | 142 |
| New Jersey Zinc Co. | * |
| Newport Rolling Mill Co., The | 150 |
| New York & New Jersey Lubricant Co. | 37 |
| Niagara Machine & Tool Works | 59 |
| Niles Steel Products Div., Republic Steel Corp. | * |
| Nilson, A. H., Machine Co. | 207 |
| Nitralloy Corp., The | * |
| Norlipp Co., The | 207 |
| Norma-Hoffmann Bearings Corp. | * |
| Northwest Engineering Co. | * |
| Norton Co., The | * |
| **O** | |
| Ohio Crankshaft Co. | * |
| Ohio Electric Mfg. Co. | 204 |
| Ohio Galvanizing & Mfg. Co. | 204 |
| Ohio Knife Co., The | * |
| Ohio Locomotive Crane Co., The | 204 |
| Ohio Machine Tool Co., The | * |
| Ohio Seamless Tube Co., The | 141 |
| Ohio Steel Foundry Co., The | * |
| Oliver Iron & Steel Corp. | * |
| O'Neil-Irwin Mfg. Co. | 193 |
| Oster Mfg. Co., The | * |
| **P** | |
| Page Steel & Wire Division American Chain & Cable Co., Inc. | * |
| Pangborn Corp. | * |
| Park Chemical Corp. | * |
| Parker, Charles, Co. | 142 |
| Parker-Kalon Corp. | 38, 142 |
| Parkin, William M., Co. | 196 |
| Pawtucket Screw Co. | 142 |
| Penn Galvanizing Co. | * |
| Pennsylvania Industrial Engineers | * |
| Pennsylvania Salt Mfg. Co. | * |
| Perkins, B. F., & Son, Inc. | * |
| Pheoll Mfg. Co. | 142 |
| Philadelphia Gear Works | * |
| Philadelphian Hotel | 204 |
| Phillips Screw Manufacturers | 142 |
| Phoenix Mfg. Co. | * |
| Pittsburgh Crushed Steel Co. | * |
| Pittsburgh Gear & Machine Co. | * |
| Pittsburgh Lectromelt Furnace Corp. | * |
| Pittsburgh Plate Glass Co. | * |
| Pittsburgh Rolls Division of Blaw-Knox Co. | * |
| Plymouth Locomotive Works Division of The Fate-Root-Heath Co. | 57 |
| Pollock, William B., Co., The | * |
| Poole Foundry & Machine Co. | 192 |
| Porter, H. K., Co., Inc. | * |
| Pressed Steel Tank Co. | 190 |
| Protected Steel Products Co. | 58 |
| Purdy, A. R., Co., Inc. | 49 |
| **Q** | |
| Quigley Company, Inc. | 29 |
| **R** | |
| Racine Tool & Machine Co. | * |
| Ramtite Co., The, Division of the S. Obermayer Co. | 55 |
| Ransohoff, N., Inc. | 154 |
| Ransome Machinery Co. | 173 |
| Raymond Mfg. Co., Division of Associated Spring Corp. | * |
| Reading Chain & Block Corp. | * |
| Ready-Power Co. | * |
| Reliance Electric & Engineering Co. | * |
| Republic Steel Corp. | * |
| Revere Copper & Brass, Inc. | 115 |
| Rhoades, R. W., Metaline Co., Inc. | * |
| Riverside Foundry & Galvanizing Co. | * |
| Robertson, H. H., & Co. | * |
| Roebling's, John A., Sons Co. | * |
| Rollway Bearing Co., Inc. | 64 |
| Roosevelt Hotel | 175 |
| Roper, George D., Corp. | * |
| R-S Products Corporation | * |
| Ruemelin Mfg. Co. | * |
| Russell, Burdsall & Ward Bolt & Nut Co. | 119, 142 |
| Ryerson, Joseph T., & Son, Inc. | 205 |
| **S** | |
| Salem Engineering Co. | 117 |
| Samuel, Frank, & Co., Inc. | * |
| San Francisco Galvanizing Works | * |
| Sanitary Tinning Co., The | * |
| Scaife Co. | * |
| Scherr, George, Company | 201 |
| Schloemann Engineering Corp. | * |
| Scovill Mfg. Co. | 142 |
| Scully Steel Products Co. | 26, 27 |
| Sellers, Wm., & Co., Inc. | * |
| Seneca Wire & Mfg. Co., The | * |
| Seymour Manufacturing Co. | * |
| Shakeproof, Inc. | 142 |
| Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc. | 149 |
| Sheffield Corp., The | * |
| Shell Oil Co., Inc. | * |
| Shenango Furnace Co., The | * |
| Shenango-Penn Mold Co. | 199 |
| Shepard Niles Crane & Hoist Corp. | 162 |
| Shuster, F. B., Co., The | 202 |
| Silent Hoist Winch & Crane Co. | 174 |
| Simonds Gear & Mfg. Co. | 204 |
| Simonds Saw & Steel Co. | * |
| Sinclair Refining Co. | * |
| SKF Industries, Inc. | 60 |
| Smith Oil & Refining Co. | * |
| Smith Tool & Engineering Co. | 195 |
| Snyder, W. P., & Co. | * |
| Socony-Vacuum Oil Co., Inc. | * |
| Sonken-Galamba Corp. | 206 |
| South Bend Lathe Works | 121 |
| Southern Ferro Alloys Co. | * |
| Southern Galvanizing Co. | * |
| Southington Hardware Mfg. Co. | 142 |
| Spriesch Tool & Manufacturing Co. | * |
| Standard Galvanizing Co. | * |
| Standard Steel Works | * |
| Standard Tube Co., The | 134 |
| Stanley Works, The | * |
| Steel & Tubes Division, Republic Steel Corp. | * |
| Steel Founder's Society of America | * |
| Steelweld Machinery Division, Cleveland Crane & Engineering Co. | * |
| Sterling Grinding Wheel Div. of The Cleveland Quarries Co. | 185 |
| Streine Tool & Mfg. Co. | * |
| Strom Steel Ball Co. | * |
| Strong Steel Foundry Co. | * |
| Struthers Wells Corp. | 65 |
| Stuart, D. A., Oil Co. | * |
| Sturtevant, B. F., Co. | * |
| Sun Oil Co. | * |
| Superior Steel Corp. | 192 |
| Surface Combustion Corp. | 41 |
| Sutton Engineering Co. | * |
| Swindell-Dressler Corp. | * |
| **T** | |
| Taylor-Wilson Mfg. Co. | 195 |
| Tennessee Coal, Iron & Railroad Co. | 26, 27 |
| Thomas Machine Mfg. Co. | * |
| Thomas Steel Co., The | * |
| Tide Water Associated Oil Co. | * |
| Timken Roller Bearing Co. | Back Cover |
| Timkan Steel & Tube Division, The Timken Roller Bearing Co. | * |
| Tinnerman Products, Inc. | * |
| Titanium Alloy Manufacturing Co. | 54 |
| Toledo Stamping & Mfg. Co. | * |
| Tomkins-Johnson Co., The | 156 |
| Torrington Co., The | 32 |
| Towmotor Company | * |
| Truscon Steel Co. | * |
| Tubular Service Corp. | * |
| Tuff-Hard Corp. | * |
| Turco Products Inc. | * |
| Turner Gauge Grinding Co. | 169 |
| **U** | |
| Udylite Corp., The | * |
| Union Carbide & Carbon Corp. | 131 |
| Union Drawn Steel Div., Republic Steel Corp. | * |
| United Chromium, Inc. | * |
| United Engineering & Foundry Co. | 2, 3 |
| United States Graphite Co. | 187 |
| United States Steel Corp., Subsidiaries | 26, 27 |
| United States Steel Export Co. | 26, 27 |
| **V** | |
| Valley Mould & Iron Corp. | * |
| Vanadium-Alloys Steel Co. | 53 |
| Vanadium Corporation of America | * |
| Van Dorn Iron Works Co., The | * |
| Vapor Blast Mfg. Co. | * |
| Vaughn Machinery Co., The | * |
| Visible Index Corp. | * |
| **W** | |
| Waldron, John, Corp. | 204 |
| Walker-Turner Co., Inc. | * |
| Wall-Colmonoy Corp. | 193 |
| Warner & Swasey Co. | * |
| Washburn Wire Co. | 44 |
| Watson-Stillman Co., The | * |
| Wean Engineering Co., Inc. | * |
| Weatherhead Co., The | * |
| Webb Corporation, The | 193 |
| Weinman Pump & Supply Co., The | 204 |
| Weirton Steel Corp. | * |
| Welding Equipment & Supply Co. | 167 |
| Wellman Bronze & Aluminum Co. | 175 |
| Wellman Engineering Co. | * |
| Wells Manufacturing Corp. | * |
| Westinghouse Electric & Mfg. Co. | 172 |
| West Penn Machinery Co. | 206 |
| West Steel Casting Co. | 205 |
| Wheeling Steel Corporation | 205 |
| Whitcomb Locomotive Co., The | 45 |
| Whitehead Stamping Co. | * |
| Whitney Screw Corp. | 142 |
| Wickes Brothers | * |
| Wickwire Brothers, Inc. | 201 |
| Wilcox, Crittenden & Co., Inc. | * |
| Williams, J. H., & Co. | 205 |
| Wilson, Lee, Engineering Co. | * |
| Wilson Welder and Metals Co., Inc. | 42, 43 |
| Witt Cornice Co., The | * |
| Wood, R. D., Co. | * |
| Worthington Pump & Machinery Corp. | * |
| Worth Steel Co. | * |
| Wyckoff Drawn Steel Co. | * |
| **Y** | |
| Yoder Co., The | * |
| Youngstown Alloy Casting Corp. | * |
| Youngstown Sheet & Tube Co., The | 127 |
| **Z** | |
| Zagar Tool, Inc. | 161 |
| Zeh & Hahnemann Co. | * |