Time lost in absences of war workers more costly than strikes. P. 48

CONTENTS

Volume 112—No. 7 STEEL February 15, 1943

NEWS

FEATURES

TECHNICAL

PRODUCTION

MARKETS

How INCO Technical Service helps you conserve critical materials

No matter whether newspaper headlines feature priorities, "PRP", or the Controlled Materials Plan, the need for conservation never lessens. The war must be fought and won. That means critical materials by the carload.

Perhaps you know that every pound of alloy must give maximum service if our far-flung fighting forces are to be supplied and maintained. Nickel, particularly, is needed to give wartime steels greater strength, toughness and resistance to impact.

INCO's technical staff is organized to serve users of metals and alloys—to help manufacturers find and adapt alternative materials without sacrificing desirable and essential characteristics in the finished product.

So if you have a problem involving the use of alloys—Nickel or otherwise—please write or wire for data or counsel from our technical staff.

NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

HIGHLIGHTING

this issue of STEEL

PRODUCTION Donald M. Nelson announces inception of a plan for organizing industry committees or "task forces" for the purpose of insuring adequate production of all "components." All contractors making one particular weapon will co-ordinate their programs so that production schedules may be maintained. It recently was found, for example, that claimant agencies, their prime contractors and subcontractors often had failed to place orders with manufacturers of critical components for 1943 use. A feature of the program is that extensive redistribution of orders is possible, with renewed opportunities to smaller plants (p. 54).

The 48-hour work-week order undoubtedly will stimulate total production since it will mean more output per worker (p. 51). . . However, a great deal more needs to be done to get full productivity from available workers. STEEL's investigation (p. 48) reveals that absenteeism now is at a much higher rate than the normal 2½ per cent which is due to sickness and unavoidable causes.

Manufacturers of military aircraft are striving to keep their production methods and equipment flexible so as to be able without delay to change designs to incorporate improvements suggested by airmen as a result of experience in combat (p. 74).

PRIORITIES Allotments of steel, copper and aluminum under the Controlled Materials Plan are to be made on a quarterly basis and the method of passing on allotment numbers from prime contractors to subcontractors has been greatly simplified. In addition, arrangements have been made for distribution of warehouse stocks under the plan (p. 64). . . Manufacturers of farm machinery are faring a little better in their attempts to get more steel during the first quarter (p. 56).

ARMY Industry in general has had many indications that our Army in this war is seeking for assistance wherever it can find it. Latest move is appointment of a group of industrial executives to study the Ordnance Department's warehousing distribution, supply, maintenance and salvage with the aim of recommendations for such improvements as seem warranted (p. 59).

POSTWAR PLANNING Those who advocate a government investment program as a means of controlling the national income after the war see the annual government outlay as the heart of the problem. The reasoning is set forth in Windows of Washington (p. 58). The fundamental concept is: "We must tax or borrow or do both as required to maintain full employment."

TECHNICAL In Section 13 of the series on conservation and substitution, Professor Macconochie details conservation measures being taken both by industry and the Ordnance Department to conserve tin (p. 86). Sources of virgin tin and beneficiation methods are also reviewed.

A new process for providing a wide variety of controlled closures for tube ends utilizes spinning to greatly increase production (p. 88). Its originator, Walter P. Hill, recently received one of the six merit citations awarded by WPB for the six major improvements helping war production.

B. S. Lement and W. B. Kennedy describe details of a method for making high-speed steel tipped tools that has been utilized successfully at Watertown Arsenal to conserve high-speed steel. Hardening and tempering operations are combined with brazing (p. 90).

Herbert S. Ingham tells how vital chromium and nickel formerly required for stainless steel annealing covers are being conserved by use of plain carbon steel protected against effects of high temperatures by a sprayed-on coating of aluminum (p. 94). About 30 pounds of aluminum saves 840 pounds of chromium and nickel.

OTHER NEWS Wing Tips this week is devoted to a description of a conveyorized assembly line for production of aircraft wings (p. 70).

War Production Board has appointed industry advisory committees to cover light power-driven machinery, gin and delinting machinery and jewel bearings (p. 65).

Bureau of Internal Revenue has issued regulations covering the tax on charges for transportation of property that became applicable last Dec. 1, (p. 65).

To aid in industrializing Latin America young men from those countries are beginning to come to the United States for technical training. The program is sponsored by the Co-ordinator of Inter-American Affairs (p. 62).

Formerly containing 75 per cent copper and 25 per cent nickel, the new 5-cent coin is to have 9 per cent manganese, 35 per cent silver and 56 per cent copper (p. 59).

A gun part formerly made as a forging now is formed from metal powder (p. 68).

Reporting on Current Steel Stocks

As you may know, the steel warehouse industry entered the war period with large and complete stocks. These reserve stocks of steel enabled industry to switch over quickly from peace to war production. However, in the process, stocks of steel in the warehouses of the country became seriously depleted. In fact, these great sources of emergency steel became almost non-existent.

No matter how carefully plants are maintained and production programs scheduled, there are always times, particularly under our heavy war load, that certain lots of steel must be secured immediately or production is imperiled. So companies working at top speed and embarrassed by their inability to secure steel quickly from warehouses, began reporting their problems. The War Production Board was quick to grasp the situation and assign special allotments to the warehouses. A bad situation is now gradually being improved and we are glad to report that our stocks are somewhat better assorted.

In order to eliminate the time required for many roll changes and so to permit increased overall production of steel, we are concentrating on the most generally used sizes. In spite of this curtailment of our usually very broad range of sizes we are now better able to serve than at any time in recent months.

When you need steel or have a problem of selection or fabrication, get in touch with your nearest Ryerson Steel-Service Plant. Our engineers and metallurgists will be glad to work with you. Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

STEEL
February 15, 1943

Plug the Manpower Leaks

Last week this nation moved several steps nearer to realities in connection with its serious problem of manpower.

James F. Byrnes, Director of Economic Stabilization, in a radio address Tuesday night spoke firmly on the necessity of adopting a "Spartan economy" and taking patriotic pride in doing so. He outlined more clearly than any previous government spokesman had the reasons why the people must devote more of their time, skill and energies to the war.

Concurrently the President issued an order which virtually establishes a 48-hour week for most important war activities. At the same time the War Manpower Commission took steps to handle the manpower problem more effectively.

All of these moves are in the right direction, but they are long-overdue and they only scratch the surface of the things which could be done to fully utilize the men and women available for service.

Manpower Commissioner McNutt put his finger on an effective approach to the problem when he told members of the American Management Association that WMC would establish an agency to "determine the extent to which manpower and womanpower are being utilized by analyzing such symptoms as absenteeism, labor turnover, production restrictions and stoppages, low morale, performance on the job, idleness, the use of women, physically handicapped, etc."

Almost everybody who is familiar with employment conditions knows that there is a tremendous waste of man hours in the inefficiencies and practices mentioned in the quoted portion of the preceding paragraph. Mr. McNutt is on the right track in seeking quantitative information on these wastes.

More important, however, will be the attitude of the government toward the manpower leaks that admittedly exist. Will our government continue to brush off featherbedding, jurisdictional strikes, slowdowns, managerial inefficiency and other known wastes as inconsequential? Or will it recognize them as realities which add up to a loss of millions of man-days daily?

E. C. Shaner

Editor-in-Chief

Costs War Industries More Time Than Strikes

Intelligent analysis of causes essential prelude to correctives. Health programs, rearrangement of working days, patriotic appeals, housing and transportation assistance help reduce number of AWOLs

MANPOWER in recent weeks has advanced in the ranks of the war's critical problems, elbowing materials, munitions plant construction and conversion, until now it is considered by many to be in No. 1 position.

Experienced personnel men report all first-class workers have been used, that heavy inroads have been made on the supply of second and third-class workers and that many who previously would have been considered unemployable are being placed in jobs.

Continued drain of workers into the armed services is making the problem increasingly perilous, and all concerned agree that effective utilization of the entire available labor force is essential if 1943 production goals are to be met.

In the face of this condition, millions of man-hours are being lost daily by absenteeism—workers who fail to report to the jobs because of illness, injury, fatigue or because they want to go shopping, fishing, house hunting, visiting friends, or just loafing.

Definite overall figures on the total time lost by absenteeism are not available. Surveys, however, have been made of groups of industries, of selected war plants in industrial districts and by many large individual plants which make possible fairly accurate estimates.

Reports from all shipyards in the United States to the Bureau of Labor Statistics showed an average absenteeism of 8.7 per cent in November.

Truancy Averages 6 Per Cent

Canvass of 181 plants by the Associated Industries of Cleveland revealed an average rate of 6.6 per cent on Nov. 16 and 4.8 per cent on Jan. 11.

Douglas Aircraft Co. Inc. found that absenteeism was averaging 5.2 per cent on an overall daily average, was 9 per cent on Saturdays (day after payday) and in one large and vital department exceeded 15 per cent. Douglas personnel men figured enough time was lost in a month to build 41 bombing planes.

Other war plants report absenteeism rates of from slightly under 3 per cent to more than 15 per cent. The overall average appears to be approximately 6 per cent.

Two to 2½ per cent generally is accepted as a normal rate for legitimate absences—sickness, injury, or unavoidable reasons.

On the basis of these figures, it appears 3½ per cent of this country's 17,500,000 war workers are absent from their jobs for unnecessary reasons, losing a total of 612,000 man-days each day or about 18,000,000 man-days a month. These figures do not give the whole picture as the absentees may be key workers and their absence affects the productivity of other employes.

In contrast, the greatest loss of time in war industries caused by strikes last year was 318,892 man-days in September, according to Department of Labor statistics. Time lost in October was only 167,865 man-days and in November, 91,925 days.

Until recently, when the shortage of manpower became acute, little research was conducted on absenteeism. When more man-hours were needed additional workers were employed. The large number of unemployed made this a simple solution.

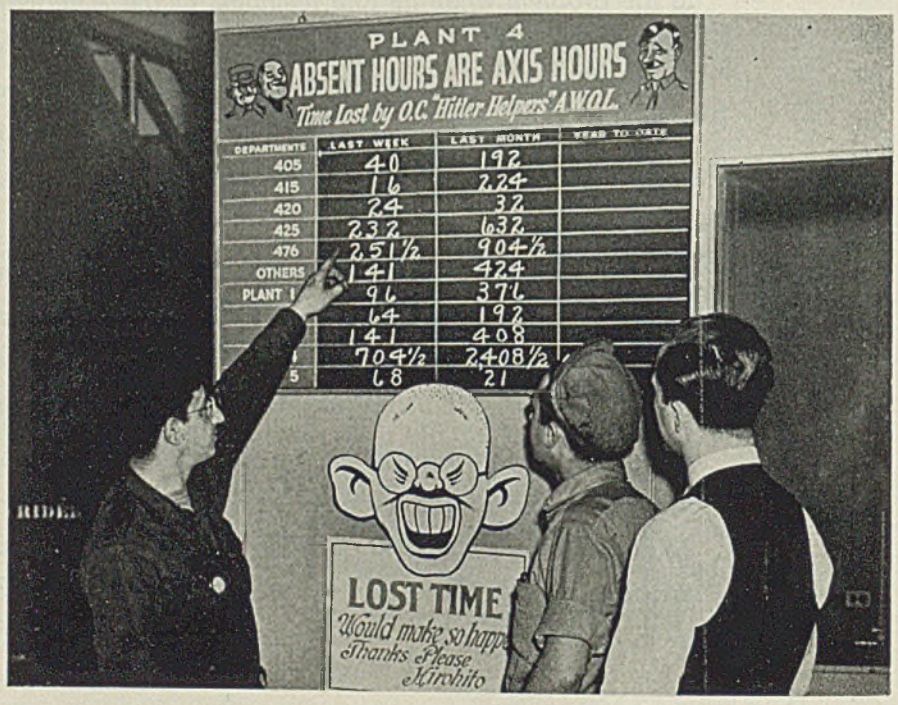
Too, when the work-weeks were shorter and pay envelopes lighter, absenteeism was no great problem. Many companies controlled it simply by dismissing workers who habitually failed to show up for work, and the fear of losing a job acted as a powerful deterrent to the employe who wanted to play hookey.

Today, that situation is changed. The causes for absenteeism have increased and the former remedies no longer are effective.

Consequently, many companies are analyzing the causes for the increased absences and are seeking effective means of reducing them.

These studies reveal certain characteristics about wartime absenteeism which suggest both causes and remedies.

Most obvious characteristics are that absenteeism is lightest on paydays and heavy on the day following payday; it is



Hours lost because of AWOL workers are recorded weekly on this "Absent Board", one of which is posted in each of the plants of Ohio Crankshaft Co., Cleveland. The board has contributed to the campaign to reduce AWOL absences which currently are less than 2 per cent. In company's Aviation Division, such absences are down to 1 per cent

heavy following holidays; it is more prevalent among women than men workers, a fact that is making it a more and more serious problem as additional women are drawn into war plants to replace men going into the armed services.

One large war plant's analysis revealed an absenteeism rate of 4.8 for men and 7.4 for women. Another showed 5.2 for men and 8.5 for women. The Associated Industries of Cleveland survey for Jan. 11 showed a rate of 4.4 for men and 6.3 for women. Various factors contribute to frequent absences of women workers. Their sickness rate is higher. Many have domestic duties—shopping, care of the home, care of children, etc.—which tend to keep them away from the factory. Many are new to factory work and find it difficult to adapt themselves to the plant time schedules.

Reasons for good attendance on paydays and poor showing the day following are obvious, and many companies have found that shifting the payday from Friday to the middle or beginning of the week has resulted in marked improvement. Absences weekends and days adjacent to holidays may be explained by desire to attend church on Sundays, to gather with friends and relatives who may be free on those days, and, as some employers insist, to hangovers from holiday or weekend celebrations.

Experience of one large war plant, where the workers have one day off in every seven, presents a fairly typical pattern of daily rates:

	Per Cent
Monday	8.2
Tuesday	7.8
Wednesday (payday)	6.4
Thursday	8.5
Friday	8.1
Saturday	9.0
Sunday	16.0

This plant's figures also illustrate the effect of a midweek payday. Although payday absenteeism was the lowest of all days, the increase on the day following was not as pronounced as in companies which pay on Fridays.

Longer Hours Raise Rate

Truancy is found generally to increase as work schedules are lengthened, due both to an increased fatigue factor and because the longer work-week allows the employe less time to attend to his personal affairs. The greater number of hours worked also results in larger pay checks encouraging the worker to think he can afford to take some time off.

Likewise the shortage of many civilian goods is aggravating the problem. Workers are not so eager to earn money if they can't spend it to satisfy their wants.

Absence-control programs in most plants still are in the formative stages. Some employers are only beginning to think of them. Those who have been studying the problem, however, have discovered certain means of dealing with it and in some cases are holding their absence rate down to around 3 per cent, which is believed to be a practical minimum.

By studying the causes for workers failing to report for work, they have been able to eliminate some of them. Moral suasion has aided in reducing willful truancy.

One of these, already mentioned, has been moving paydays to the beginning or middle of the week.

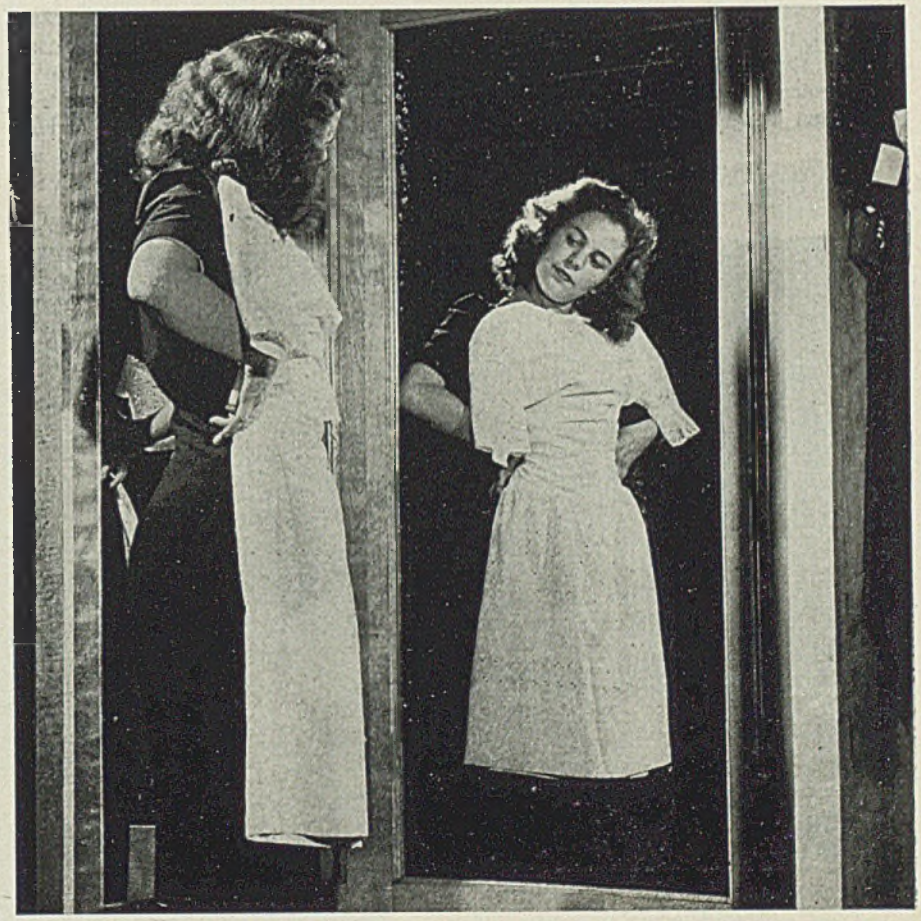
Every Seventh Day Off

In plants where work schedules were set up on a 7-day week basis, it often has been found advisable to rearrange schedules to allow workers one day off in every seven. Preferably days off should fall on different dates to give the worker time to attend to personal affairs during regular business hours and also to have an occasional weekend with his family. Days off, of course, relieve the fatigue resulting from the long work-week. Several months ago eight federal departments recommended the work-week be limited to six 8-hour days, except where a longer week was absolutely essential. Experience of many companies has indicated production efficiency decreases as the work-week is increased beyond a certain point.

Ohio Crankshaft Co., Cleveland, recently set up an alternating swing shift plan that requires 28 men for 24 jobs, gives each worker one day off in seven, while permitting continuous production. Four of the 28 workers in a unit are top operators and move from one job to another filling the spots left vacant by the men who are off. The plan resulted in a 75 per cent decrease in weekend absenteeism.

In addition to the swing shift, the company sends telegrams to the homes of AWOL absentees, calling their attention to the fact the war requires 100 per cent output. Personal calls by members of the personnel department provide a double check on excuses. The company also uses "Absent Hour" recording boards in all plants (see picture on page 48) and foremen make an effort to awaken the men to the seriousness of absences.

Effectiveness of this program is attested by the company's steadily declining



Canadian war industries find the work-day shopper one of the worst forms of absenteeism, according to the Wartime Information Board. This girl in slacks found the lure of new and more feminine apparel too strong to resist. NEA photo

rate of absenteeism. In the Aviation Division, for which most complete records are available, total absences in all of January was less than 2 per cent and AWOLs were only a small proportion of the total. Last August the total rate was about 5 per cent with AWOLs making up half the total.

In plants making component parts of war materials it has been found workers did not understand how the parts they made would help win the war. It was difficult for them to realize that the small pieces of metal they were machining might be vital parts of combat planes or tanks. At the beginning of the war, such information sometimes was withheld from employes under the exaggerated secrecy policies prevalent at the time. More recently, many companies have gone to some pains to graphically show the workers how vital their contributions are.

Douglas Aircraft pointed out to employes that workers AWOL caused a production loss of 41 bombers a month and that 41 bombers might have saved Corregidor or Bataan. The result was a sharp reduction in the absentee rate.

Other appeals to patriotism have been used with success. The armed services have co-operated by sending heroes of the early engagements on tours of war plants to explain the necessity for uninterrupted production. Posters and pay envelope stuffers have been widely used. Some companies have issued special recognition insignia for steady attendance.

Penalties intended to shame the absentees also have been found successful in some cases, although most personnel men insist this method must be used with care to avoid attaching stigma to workers legitimately absent and thus causing resentment. They point out that a worker returning to a plant after a death in his family, or after an illness, or perhaps after recuperating from an injury suffered in the plant is not going to feel very friendly toward the company if he finds his name posted under a red AWOL sign, or if he receives facsimile Axis money in his pay envelope for the time missed, or if he receives a spurious note of thanks from Hitler or Hirohito for delaying production. Use of these methods requires close investigation to determine the cause for absence before they are used.

Bonus Incentives Help

Bonuses for regular attendance and penalties in bonuses for unexcused absences also are being tried. Often the bonuses are in the form of War Bonds.

A fundamental part of any absence control system must be a system for keeping records of truancy and to acquaint workers with the fact that such records are kept. The mere knowledge that his absence does not pass unnoticed in itself helps to deter taking time off.

Prompt investigation of the causes for a worker failing to report aids in reducing the absenteeism rate. Several companies have found telephone calls to the absentee's home effective. Some use telegraphed queries as to the cause. At least one uses registered letters that the absentee himself must sign for on delivery.

This worker with a brother with the Marines checks time cards. Many companies remove the time cards of workers unexcusedly absent. When the absentees return, they must hunt up their foreman or a personnel man and explain the cause for being AWOL before starting to work

Personal interviews by the president or another high executive—where the size of the working force permits—after the absentee returns to work have a salutary effect. In large companies, of course, this task must be delegated to foremen, leadmen or personnel workers.

Often, the employe's time card is taken from the rack if he is unexcusedly absent for a certain period of time. When he returns, he cannot ring in until he has hunted up the foreman or personnel man and explained his absence.

"Absentee courts" conducted by the employes themselves have been tried in numerous plants, and fines of various types meted out to habitual offenders.

Labor-management committees have been successful in applying pressure for regular attendance.

Distribution of vitamin capsules and cold vaccines to employes have helped to prevent respiratory diseases and to reduce fatigue, two of the major causes for absenteeism. Community health programs are encouraged and supported by employers. A sick child at home is one of the more frequent causes for a working mother's absence.

Looking for housing facilities has kept many a worker away from his job, especially in areas where war plants have expanded rapidly. In many cases employers have given organized assistance to new employes in finding living quarters near the plant.

Aid in Transportation Problems

Employers often have done much to ease transportation difficulties. Many organized car-sharing plans. Starting and quitting times have been staggered to prevent congestion on public conveyances at rush hours. Some companies have purchased and operate buses where other transportation is inadequate. A Houston, Tex., shipbuilding company has purchased and renovated several score of old railroad cars to carry workers 15 miles from Houston to the isolated shipyards.

Representations have been made to stores, banks, barber and beauty shops in many communities to remain open a few evenings a week to accommodate war workers unable to patronize them during regular hours. Occasionally branch banks have been set up near plant gates on paydays and some plants even are running stores for the convenience of workers.

Absenteeism is not particularly an American problem but has been experienced by all the belligerent countries. These countries have gained considerable experience as to the causes and possible remedies.

England reports it still is a problem but no longer a very large problem. It reached its peak in the fall and winter of

1940-41, when hours of work were extraordinarily long and when German bombings frayed nerves and prevented sleep. As many of the causes as possible were removed and then the Ministry of Labour was given power to correct willful truancy under an Essential Work Order. This provides that employes receive wages for every day they present themselves for work whether work is available or not. If any worker in an essential industry is absent without reasonable excuse, or is persistently late for work, or fails to comply with any lawful or reasonable orders given to him (including any orders as to working day or night and a reasonable amount of overtime) he may be reported to a National Service Officer who directs him to work in the necessary manner. The case must be referred to a joint labor-management committee before action can be taken by the service office, and the committee may recommend prosecution in needful cases resulting in fines or imprisonment of the recalcitrant employe.

Australia forbids the absence of any person (including an employer) from his employment except for: Illness or incapacity; leave of absence to which the individual is entitled; domestic or other pressing emergency; or any reason considered by the Minister of Labor to be satisfactory.

The Commonwealth government is reluctant to impose penalties for absenteeism and is urging the unions to use their powers to discipline offenders. Hours of work have been limited to 56 hours a week for males over 18 years of age and to 48 hours for youths under 18.

In New Zealand, unexcused absence for more than 4hours during ordinary working hours, or persistent shorter absences such as tardiness or early leaving, must be reported by the employer to the district manpower officer, who may order a deduction from wages of up to two days' pay for such absences.

In Germany, the most effective means of combatting absenteeism is reported to be the firing squad.

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HUSKY-VOICED blues singer Mrs. Betty Hill Karr turned her back on a professional entertainer's career and sought a job in a munitions plant shortly before the war. In Atlanta, Ga., where she found employment as a welder before industry had made up its mind to accept women war workers, she helped organize a United Steelworkers of America-CIO local, recently was elected its president.
NEA photo

48-Hour Week Held Equivalent to Adding 1,000,000 to Labor Force

EXTENSION of the standard work-week to 48 hours, with retention of overtime provisions, in labor shortage areas will have mixed effects on the metalworking industries.

Many war plants in the districts initially affected by the President's order already are working 48 hours or more. In most of these plants the order will affect only office and clerical help now working five days who will shift to six and thus increase earnings by 30 per cent.

Average weekly hours worked in war industries slightly exceeded 48, in all areas, for November, according to the Labor Department. For all manufacturing industries the average was 44 and for nondurable goods industries, only 41.1.

The initial order did not include the important steel producing centers of Pittsburgh, Youngstown, Chicago and Cleveland, although Buffalo, Detroit and Baltimore are affected. It is expected, however, that most of the steel centers will be included eventually.

During December, last month for which industry figures are available, the average steel work-week was 40.2 hours, and the wage earner received an average of 109.4 cents an hour, indicating an average weekly wage of $43.98. If the average work-week were raised to 48 hours and the steel wage earner received time and a half for all in excess of 40, his indicated weekly wage would be $56.89, an increase of $12.91. Premium overtime payments for the hours in excess of 40 would be equivalent to an increase of 73 cents a day.

However, major steel production units now generally are scheduled on a 48-hour or longer work-week. The fact that the average is lower than this is due to light operations in various finishing departments, such as the tin plate and cold strip, structural, reinforcing bar and certain wire drawing divisions. Absenteeism also is a factor, amounting in some units to as much as 10 per cent.

Will It Cover Coal Miners?

The President's order requires that time and a half be paid for all hours in excess of 40 if the workers are covered by the wage-hour act. In activities not covered by the wage-hour act, the decision as to whether time and a half is to be paid is a matter for the employer and employe.

In effect, the order gives workers now on a 40-hour week a 30 per cent increase in weekly wages for a 20 per cent increase in working hours. This is held by many to be definitely inflationary, despite official and somewhat confusing assertions that the 48-hour week was intended to check such a trend.

Many interpretations of the order will be necessary before its complete effects can be accurately evaluated. One question that arises is whether or not it will be applied to the soft coal miners, most of whom now are working a 35-hour week.

The War Manpower Commission points out that the first areas designated include no important coal mining areas, but that efforts are being made to extend the work-week in these areas to meet war fuel needs. "Some hazardous occupations or industries may be exempted," WMC said.

While few statistics on the additional productive power that will be made available by the order are available, WMC estimated it would add the equivalent of 1,000,000 men to the labor force.

In Buffalo, officials of the large steel mills figured an additional 57,600 man-

UNION'S PRESIDENT

hours would be added to the production effort each week. Of the mills' 18,000 workers, only about 60 per cent now are on the 48-hour week. The steel mill officials point out, however, that in these calculations and in those issued by Washington officials, consideration must be given to a high rate of absenteeism. In Buffalo, they say, this has been running between 8 and 14 per cent where the workers are on a six-day schedule.

In addition to Baltimore, Buffalo and Detroit, cities affected by the order are: Bath, Me.; Bridgeport, Waterbury, Hartford and New Britain, Conn.; Portsmouth, N. H.; Springfield, Mass.; Somerville, N. J.; Elkton, Md.; Hampton Roads, Va.; Washington; Akron and Dayton, O.; Manitowoc, Wis.; Sterling, Ill.; Brunswick, Ga.; Charleston, S. C.; Macon, Ga.; Mobile, Ala.; Panama City, Fla.; Pascagoula, Miss.; Wichita, Kans.; Beaumont, Tex.; Cheyenne, Wyo.; Ogden, Utah; Las Vegas, Nev.; Portland, Oreg.; San Diego, Calif.; Seattle, Wash.

Control of Trade Unions Proposed in Ohio Bill

A bill which would regulate trade unions in public interest and would create an employment relations board of three members was introduced in the House of Representatives in Columbus, O., recently by Earl M. French, Delaware county Republican.

The bill provides for protection of those desiring to join labor unions and also to collective bargaining through their chosen representatives. But at the same time it provides also for protection of those refusing to join any union whatever. Expulsion from a union would require just cause and membership denial could not be made without showing a just reason.

Right of any member to examine union books and accounts is upheld Fees for working permits would be abolished and initiation fees would be limited to a maximum of $5 and monthly dues and assessments to $3.

Checkoff system would be illegal unless the employe in own handwriting requested his dues be deducted from his payroll. A 20-day strike notice would be required and boycotting and picketing would be forbidden unless employes voted to strike. Coercion and intimidation, slowdowns, sit-down strikes, secondary boycotts, and sympathetic strikes would be strictly prohibited.

Each officer of a union would be required to show proof of American citizenship and those claiming to represent employes in negotiation with employers would be required to register with the board. Names of officers of every union, compensation paid them, and income during the previous year are a few of the many provisions in the bill.

STEEL Index Is Ready

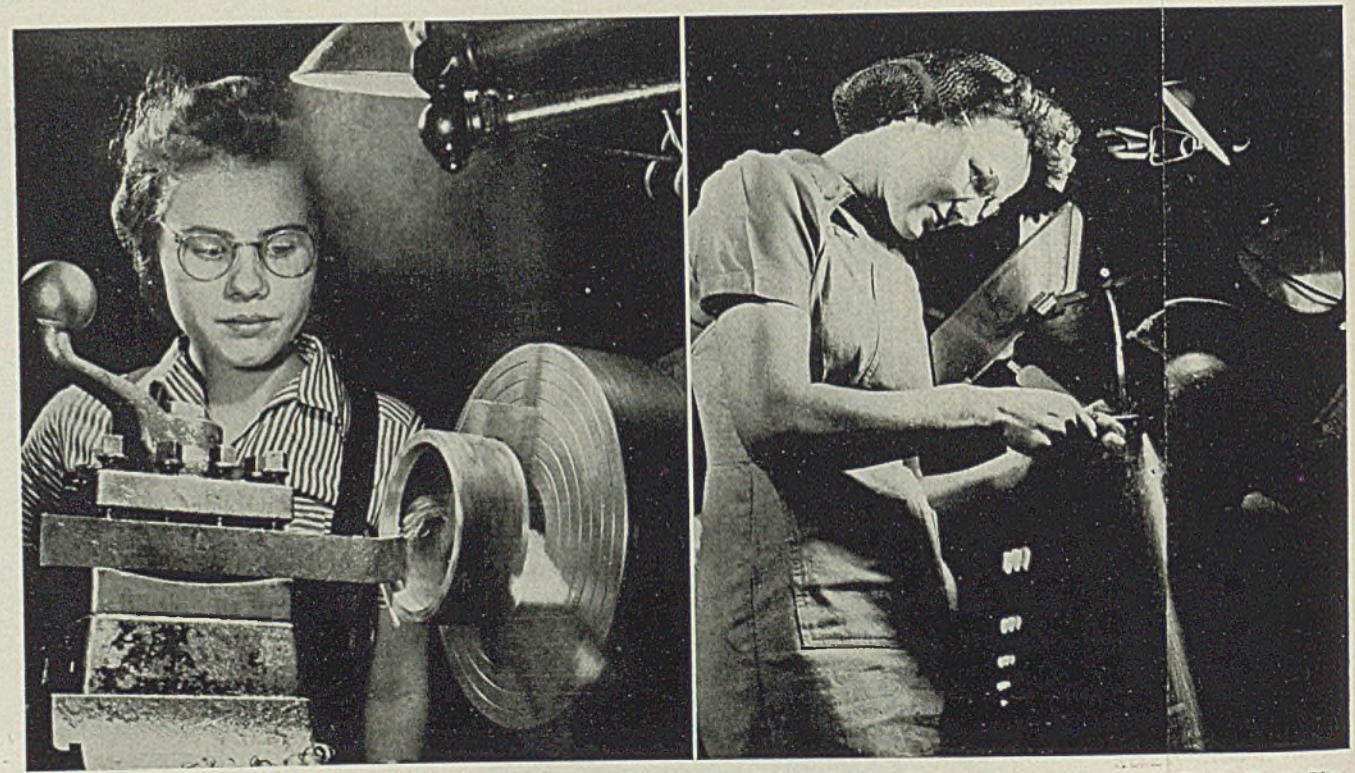
The index to Volume 111, STEEL, *for the last six months of* 1942, *now is ready for distribution. Copies will be sent to all subscribers requesting them.*

Workers' Ideas Save 1,250,000 GE Man-Hours in Year

Workers' production deas saved 1,250,000 man-hours in plans of General Electric Co. during 1942, while suggestions adopted conserved more than 1,000,000 pounds of steel, and arge quantities of aluminum, copper, sainless steel, tin, chromium and other ital metals.

Company also repors bonuses paid for ideas last year reacked $158,943, for 16,204 suggestions dopted from 53,945 submitted. Awars in 1942 totaled nearly twice the amant for 1929, the prior record year. Thee were two prize-winning suggestions orth $1200 each.

WOMEN MACHINE TOOL OPERATORS STUDY FOUR HOURS, WORK 36



WOMEN being trained for openings in the machine tool section of Westinghouse Electric & Mfg Co.'s East Pittsburgh, Pa., plant devote four hours a week to classroom study then spend the other 36 hours of eir 40-hour week on the war production line. The girl at the left performs a precision job requiring tolerance of onthousandth of an inch. A former gasoline station attendant, at the right, sharpens a boring tool for an engine lhe. NEA photos

Construction of New Detinning Plants Deferred by War Board

CONSTRUCTION of additional detinning plants in the United States was ordered deferred last week by the War Production Board, Chairman Donald M. Nelson announced.

Construction of detinning plants was deferred, Mr. Nelson said, because of the urgent demands for motors, boilers, tanks and other equipment used in them in other phases of the war effort.

"This does not mean that either the tin situation or the steel scrap supply has eased to the point where it is no longer a critical problem," he explained.

"The nationwide scrap drive has eased that situation temporarily and the electrolytic tinning process and other conservation measures have reduced the drain on tin, but we shall continue to need all the scrap we can get and all the tin we can recover.

"For the time being, however, fabricated equipment and machinery-manufacturing facilities are our No. 1 problem. The decision to defer construction of these new plants was taken for that reason. It is a part of our continuing effort to reduce new construction to the barest minimum.

"Tin can collection started from scratch less than a year ago. Although latest figures indicate a collection of 17,000 gross tons monthly, this is less than half of the capacity of detinning and shredding facilities now operating, and less than one quarter of the used cans discarded each month."

In connection with the shredding facilities now operating, Mr. Nelson called for an especially expanded and more vigorous collection of cans in the South West for use by the copper industry. Cans are needed in large quantities to fill the capacities of the shredding plants at Los Angeles, Kansas City, Dallas and Houston. Shredded cans are used for copper precipitation, the easiest and cheapest method, both in materials and manpower, to augment the supply of this critical material.

Mica Supply Adequate for War Use; Processing Problems Are Difficult

UNITED NATIONS are not suffering a shortage of mica, essential mineral for which no synthetic substitute has yet been developed, states the Coordinator of Inter-American affairs. But thus far the Western Hemisphere has not been able to find cheap, efficient labor to grade and split the raw mica.

"Block" or built-up mica is essential to manufacture radio equipment, airplane motors, and electric motors. It is a vital part for commutator segments in motors and generators; every DC motor and generator requires from 24 to 30 pieces. It is used for V-rings at ends of commutators, and in armature coils, slots, and collars and every radio tube employs from two to four pieces. It is an insulating material for transformers and a dielectric in condensers.

Mica is unaffected by fire, water, electricity, or acid, and its volume remains constant in extreme heat or cold. No other substance has these characteristics, it is said, nor have they been encompassed in any synthetic substitute.

For many years India provided a quality of mica grading and splitting unequaled anywhere. Efforts of Brazil and Argentina to increase mica sales have been hampered by failure to maintain exacting standards of classification.

Mica can be split to a thickness of .001 inch.

Concentration of Galvanized Sheet Production Ordered

Concentration of galvanized steel sheet production to avoid any interference with the output of steel plate and heavy hot-rolled sheets was ordered last week by Hiland G. Batcheller, director, WPB Steel Division.

Mr. Batcheller explained that the production of galvanized sheets has been halted in some of the principal producing areas, notably Chicago. However, the tonnage of galvanized sheets rolled will be about the same as has been produced by all mills in the past few months and will be sufficient to meet war and essential civilian demands.

Because production will be concentrated, buyers may find their usual suppliers unable to accept orders. They were advised by WPB to seek other suppliers located as near as possible to the delivery point.

Secondary Steel Jobber Prices To Be Considered

Dollar and cent prices for the resale of secondary steel products to be established shortly by the Office of Price Administration will be explained to warehouse jobbers and distributors at a series of meetings under the joint sponsorship of the Warehouse Branch of OPA and the Steel Products Warehouse Association Inc. E. L. Wyman, chief of the Warehouse Branch, will speak.

The first will be held in New York, Wednesday, Feb. 24, in Hotel Pennsylvania; the second in Cleveland, Feb. 26, in Hotel Statler, beginning at 9:30 a.m.

"The pricing system to be established shortly by OPA probably will determine prices for the duration," said C. M. Ballou, president of the association.

Among the products to be covered are cold and hot rolled sheets, galvanized sheets, galvannealed sheets, long terne sheets, hot rolled strips, cold rolled strips, sheared plate, universal mill plate, tin mill black plate and semifinished iron and steel products.

Reservations for the meetings should be made by writing to the national headquarters of the association, 1060 Union Commerce building, Cleveland. No reservations are necessary unless lunch is desired.

American Hot Dip Galvanizers Association Inc.—Representatives of the War Production Board, Price Adjustment Board and Manpower Commission will take part in the annual meeting to be held in William Penn hotel, Pittsburgh, Feb. 24-25. Attendance, except for regular members, will be by invitation.

Creates Profit-Sharing Trust for Employes

Steel Warehousing Corp., 350 West Root street, Chicago, has established a profit-sharing trust plan for employes, according to A. J. Kueber, president. It operates on the basis of a retirement fund with the company contributing a percentage of its profits. Employes with three or more years' service participate.

The corporation started in business in October, 1938, as a prime warehouse to handle a complete line of steel. From a start with 18 employes, personnel has grown to nearly 100. Company is a member of the American Steel Warehouse Association.

Bottlenecks in Critical Components To Be Cleared by WPB "Task Forces"

PLANS for forming special industry committees, or "task forces", to participate in the campaign for breaking bottlenecks in production of critical common components, have been announced by Donald M. Nelson.

This move represents an important step in the development of overall production scheduling, involving the cutting down of backlogs by redistribution of orders, increasing labor supply in short plants, and, in general, adapting the particular industry for more intensive production.

The plan is a simple emergency method of breaking industrial bottlenecks by the most intelligent utilization of all industrial facilities. All final decisions relating to matters such as redistribution of orders will be made within WPB. It is planned that smaller facilities will be brought into the picture through the Smaller War Plants Corp.

Critical common components which are causing trouble include parts and accessories of planes, ships, tanks, guns or other campaign material for which manufacturing facilities are limited; but which are needed in greater quantity.

Among items being studied are gears, valves, diesel and gasoline engines, crankshafts, compressors, pumps, heat exchangers, welding rods and electrodes, electric motors, starters and generators, boilers, vacuum tubes and control instruments.

Plans to break these bottlenecks originated in the office of Charles E. Wilson, WPB production vice chairman, and are being developed and carried out by Ralph J. Cordiner, director general for war production scheduling, who reports to Mr. Wilson.

Embraces All Productions Programs

The drive began on Jan. 20 when the production vice chairman directed letters to the heads of the 14 claimant agencies, such as the secretaries of War and Navy, lend-lease administrator, petroleum administrator, and rubber director.

This letter pointed out that the claimant agencies, their prime contractors and subcontractors often had not placed orders for 1943 requirements with the manufacturers of critical components.

The plan applies to all production programs. Prime contractors are being urged to act promptly, so that subcontractors will not be excluded.

Production scheduling of critical common components will be done within the industry divisions of the War Production Board, under Mr. Cordiner's supervision. When preliminary information forms are submitted, the orders of each contractor will be analyzed from the standpoint of material requirements and plant capacity. They will be approved by the industry division as submitted, or changed by the director general for war production scheduling.

"Task Force" for Each Division

Operating within each industry division concerned with the production of common critical components will be an advisory scheduling committee, or "task force", organized according to the customary War Production Board procedure for industry advisory committees.

The division director, after obtaining recommendations of the scheduling subcommittee, will select an industry expert as a War Production Board official; he will serve as the director's principal aide in working out with the industry and with the scheduling subcommittee detailed recommendations for action by the War Production Board. These recommendations and actions taken pursuant to them concerning items in question will be regularly reported to the industry advisory committee.

The committee will meet at regular intervals to make recommendations to the division director concerned with its operations, confer with the scheduling unit of the industry division, and keep the director general for war production scheduling posted as to its recommendations.

It will be the general function of the advisory scheduling committee to see that the resources of the industry are used to fullest extent. If one firm has too large a backlog of orders, while another has not enough to schedule work continuously for 1943, the committee will recommend transfer of work from one firm to the other. If a firm has excess capacity capable of turning out critical components, but insufficient labor supply, steps will be taken to see that it is provided with workers.

When re-scheduling or redistribution of orders appears important to expedite production, the Director General for Operations will inaugurate the necessary steps.

Steel Output in 1942 Concentrated In Six Major War Classifications

WAR demand for steel in 1942 was concentrated on six major finished products, and new production records were made in these as well as in steel ingots, the American Iron and Steel Institute reports. The most important items in tonnages were plates, shapes, hot-rolled carbon steel bars, alloy steel bars and tool steel bars. Production of barbed wire in 1942 may also have been at a new peak; comparable statistics extend back only through 1935.

Production for sale of 11,543,000 tons of steel plates in 1942 was 90 per cent above the record of 1941. Shape production for sale was 4,938,000 tons, 8 per cent more than the 1941 peak. Hot-rolled carbon steel bar output in 1942 totaled 6,589,000 tons, 2 per cent over 1941. Alloy steel bar production was 2,512,000 tons, almost 20 per cent above the best previous record. Tool steel bars and barbed wire production of 210,000 tons and 301,000 tons, respectively, were also above 1941 records.

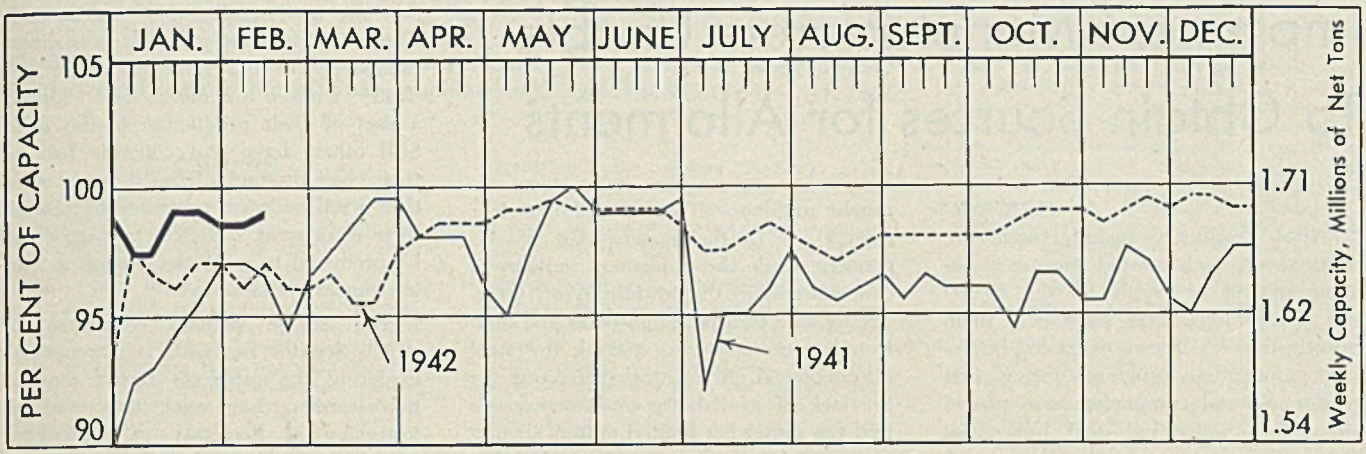
Output of concrete reinforcing bars and cold-finished carbon bars totaled 1,845,000 and 1,241,000 tons, respectively.

Chief among products in which output was substantially less than the record tonnages of 1941 were those which in peacetime were used largely for civilian purposes. Thus the 8,614,000 tons of sheet steel made for sale in 1942 was one-third less than the prior peak and strip steel production of 2,409,000 tons was off 28 per cent. Production of 2,658,000 tons of tin and terne plate in 1942 was 25 per cent below the peak.

Other production totals of 1942 were standard rails, 1,941,000 tons; drawn wire, 1,981,000 tons; pipe and tubular products, 5,080,000 tons.

Steel Corp.'s Shipments Down

Finished steel shipments by United States Steel Corp. subsidiaries in January were 1,685,993 net tons, second highest for that month in the Corporation's history, but 163,642 tons less than the total for December and 52,900 tons less than in January, 1942.



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,408	....	....	....	....	....	....	....	....	....	....	....
1942	7,124	6,521	7,392	7,122	7,386	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150

PIG IRON PRODUCTION

1943	....	....	....	....	....	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

Ingot Rate Advances ½-Point to 99 Per Cent

Production of open-hearth, bessemer and electric furnace ingots last week advanced ½-point to 99 per cent. Three districts gained, three declined and six were unchanged. A year ago the rate was 97 per cent; two years ago it was 96½ per cent, both based on capacity as of those dates.

Principal factor in the increase was a rise of 1½ points each at Pittsburgh and Cleveland, due to additional furnaces being lighted after repairs. Wheeling also made a slight gain. Lessened activity was noted at Detroit and Cincinnati and in eastern Pennsylvania. Scrap supply has ceased to be a limiting factor and only necessity for repair of open hearths prevents full capacity output.

Steel ingot and castings production in January was second highest on record, 7,408,744 net tons, exceeded only by 7,584,864 tons in October, 1942, according to the American Iron and Steel Institute. The January total compares with 7,303,179 tons in December and 7,124,922 tons in January, 1942.

Average weekly production in January was 1,672,403 tons, against 1,712,159 tons average in October, 1942. The December average was 1,652,303 tons and for January, 1942, it was 1,608,335 tons.

During January the industry operated at an average of 97.8 per cent of capacity. In the record month of October, 1942, the rate averaged 100.1 per cent. The rate in December averaged 96.6 per cent and in January, 1942, it was 94.7 per cent.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Feb. 13	Change	Same Week 1942	Same Week 1941
Pittsburgh	99	+1.5	96.5	96.5
Chicago	100	None	102.5	99.5
Eastern Pa.	93	—1	90	96
Youngstown	97	None	89	90
Wheeling	80	+0.5	90.5	100
Cleveland	93	+1.5	91	84
Buffalo	90.5	None	79.5	90.5
Birmingham	100	None	95	100
New England	95	None	100	100
Cincinnati	90	—5	84	95
St. Louis	93	None	78	93
Detroit	90	—3	91	92
Average	99	+0.5	°97	°96.5

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

STEEL INGOT STATISTICS

	Estimated Production—All Companies								Calculated weekly produc- tion, all companies Net tons	Number of weeks in month
	—Open Hearth— Net tons	Per cent of capacity	—Bessemer— Net tons	Per cent of capacity	—Electric— Net tons	Per cent of capacity	—Total— Net tons	Per cent of capacity		
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1943										
Jan. . .	6,563,317	98.7	478,058	83.7	367,369	102.3	7,408,744	97.8	1,672,403	4.43
Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production										
1942										
Jan. . .	6,328,128	95.4	490,864	86.0	305,930	96.3	7,124,922	94.7	1,608,335	4.43
Feb. .	5,791,813	96.7	453,543	88.0	275,700	96.2	6,521,056	96.0	1,630,264	4.00
Mar. .	6,574,701	99.1	493,294	86.4	324,916	102.3	7,392,911	98.2	1,668,829	4.43
1st quar	18,694,642	97.0	1,437,701	86.7	906,546	98.3	21,038,889	96.3	1,635,994	12.86
April .	6,346,707	98.8	454,583	82.2	321,023	104.4	7,122,313	97.7	1,660,213	4.29
May .	6,600,376	99.5	454,054	79.5	332,460	104.7	7,386,890	98.2	1,667,470	4.43
June .	6,247,302	97.2	452,518	81.8	322,335	104.8	7,022,155	96.4	1,636,866	4.29
2nd qtr	19,194,385	98.5	1,361,155	81.2	975,818	104.6	21,531,358	97.4	1,654,985	13.01
1st half	37,889,027	97.8	2,798,856	83.9	1,882,364	101.5	42,570,247	96.9	1,645,545	25.87
July . .	6,350,047	95.7	453,684	79.6	345,093	96.3	7,148,824	94.5	1,617,381	4.42
Aug. .	6,420,496	96.6	467,313	81.8	345,642	96.3	7,233,451	95.4	1,632,833	4.43
Sept. .	6,297,201	98.0	437,950	79.4	331,933	95.7	7,067,084	96.5	1,651,188	4.28
3rd qtr.	19,067,744	96.8	1,358,947	80.3	1,022,688	96.1	21,449,359	95.5	1,633,615	13.13
9 mos.	56,956,771	97.4	4,157,803	82.7	2,905,032	99.5	64,019,606	96.4	1,641,528	39.00
Oct. . .	6,757,696	101.6	461,895	80.9	365,273	101.7	7,584,864	100.1	1,712,159	4.43
Nov. . .	6,378,661	99.1	458,426	82.9	347,473	99.9	7,184,560	97.9	1,674,723	4.29
Dec. . .	6,471,465	97.6	475,124	83.4	356,590	99.5	7,303,179	96.6	1,652,303	4.42
4th qtr	19,607,822	99.4	1,395,455	82.4	1,069,336	100.4	22,072,603	98.2	1,679,802	13.14
2nd hlf	38,675,566	98.1	2,754,392	81.3	2,092,004	98.3	43,521,962	96.8	1,656,717	26.27
Total. .	76,564,593	97.9	5,553,248	82.6	3,974,368	99.8	86,092,209	96.9	1,651,174	52.14

The percentages of capacity operated in the first six months of 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942 as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, bessemer 6,721,400 net tons, electric 4,225,890 net tons.

Implement Manufacturers Unable To Obtain Sources for Allotments

CHICAGO

FARM machinery manufacturers are meeting with only partial success in locating sources of supply for the 50,000 tons of additional steel allotted to them recently by WPB for an expanded implement production program during first quarter. Several companies have placed orders for rerolled rail steel, but report little success in obtaining bessemer steel.

In setting up the revised steel quota of 187,000 tons, as compared with the original 137,000 tons, WPB specified that "bessemer and/or rerolled rail" steel was to comprise the additional allowance. It further stipulated that the industry is being required to purchase at least 25 per cent of its steel of these types to relieve pressure on open-hearth steel. The government clearly indicated that there is at present excess productive capacity for bessemer and rerolled rail.

Implement makers who canvassed bessemer producers failed to obtain supplies, thus it would appear that this grade of steel will not afford relief to their urgent problem. The bulk of bessemer capacity is in the eastern part of the country, while the implement industry is concentrated in the Middle West, introducing long transportation hauls and high freight rates and thus making the steel uneconomical. Among other reasons for the lack of availability of bessemer are that the somewhat limited output already is required for other products, also that bessemer converters frequently are utilized to make synthetic scrap for open hearths in view of the shortage of high-grade steelmaking scrap.

As for rerolled rail steel, the picture is considerably brighter, despite the fact that rerolling mills are limited by government order to a schedule of not to exceed 40 hours a week. Lifting of this restriction would increase production.

Little bessemer steel is used in farm machinery, although a number of manufacturers employ rail steel rather extensively for structural parts where the high strength and stiffness of this material offer advantages. The bulk of rerolling rails are high quality open-hearth steel. The output of some rail mills goes almost exclusively to the farm implement industry; while a few others have supplied a part of their production to this field. Still others have had concrete bars as their chief product. Thus it would seem that if rail mills are permitted to increase their work week sufficient tonnage could be produced to meet the expanded farm implement requirements.

The senate military committee, of which Senator Reynolds is chairman, is exploring the problems facing the nation's farmers. Last week it received the testimony of Secretary of Agriculture Claude R. Wickard that the 50,000 tons of steel allotted to the farm machinery industry is too brittle for use and further is of a type containing more impurities than open-hearth steel ordinarily used. This criticism may apply to bessemer steel, but it is much less true of rail steel, which is of open-hearth grade.

Considerable dissatisfaction continues to be expressed by farmers and implement manufacturers over the inadequacy of the machinery program, even as recently revised by WPB. Quotas are considerably below those recommended by the Department of Agriculture as the minimum if 1943 food production goal is to be attained. It may be wishful thinking, but the feeling persists that as the full facts indicate the seriousness of the situation, the machinery program will again be revised upward.

WELDING THE "BIG INCH" OVER PENNSYLVANIA HILLS

BAD weather doesn't delay laying of the "Big Inch" pipeline from Texas to the eastern seaboard. Above, welders tack the sections together in the Pennsylvania hill country. Shaped to conform to the contour of the countryside, the huge pipe rests on skids while being assembled. Shipments for the start of the line in Texas were begun last July. NEA photo

Report Chile Negotiating For Worth Steel Plant

Negotiations by the Chilean government are reported under way for purchase of Worth Steel Co.'s steel mill in Claymont, Del., which has not been in operation for more than three years and is at present partially dismantled.

If negotiations are completed and approved by Washington, it is expected the mill will be used for rolling sheet copper. It is a two-high, 72-inch unit, with annual rated capacity for hot rolling 24,000 gross tons of steel sheets.

There has been no confirmation of the report that Chile has purchased the Pawtucket, R. I., unit of the General Cable Corp. for production of copper products, particularly wire.

As much money as it costs to produce 13 bullets is wasted every time an American worker loses, destroys or mutilates his social security card. So states H. L. McCarthy, Chicago regional director of Social Security. Nearly 2,000,000 duplicate cards were issued in 1942, at a cost that could have provided 550 jeeps for the Army.

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, Dec. 14, 1942

L ORDERS

L-237: Woodworking Machinery, Light Machine Tools, effective Feb. 2. Places production and distribution of specified equipment under strict control. Limits production of tools listed in schedule A to a 60-day anticipated inventory for orders rated A-1-a or higher but output must not exceed 16 2/3 per cent of total 1941 sales by dollar volume for any 60-day period. Distributors' inventories limited to five in number for any specified size and type of tool listed on schedule A.

M ORDERS

M-11 (Amendment): Zinc, effective Feb. 9. Places remelt zinc under same control as that for six higher grades. Limits delivery by dealers to orders rated AA-5 or higher; regulates transfer and use of zinc scrap, permitting shipment only to dealers, producers and manufacturers for use in redistilled zinc, remelt zinc, brass, zinc dust, zinc oxide, chemicals or salt, except on special authorization by WPB.

M-29 (Amendment): Tungsten, effective Feb. 4. Exempts from allocation control tungsten contact points. Control maintained by allocation to manufacturers of the tungsten rod from which the points are made.

M-29-b (Amendment): Tungsten, effective Feb. 9. Eliminates many of the exemptions contained in the original order, including the following: orders rated A-1-j or higher; exemptions in favor of articles produced with tungsten to comply with safety regulations; blanket exemptions in favor of the Panama Canal, Coast and Geodetic Survey, Civil Aeronautics Authority, National Advisory Commission for Aeronautics, Office of Scientific Research and Development, and Lend-Lease countries.

M-239 (Amendment): Steatite Talc, effective Feb. 6. Removes restrictions on use in electrical and heat insulating products (not including refractories), electric light bulbs, and experimental work. Increases "practicable minimum working inventory" to six months' supply from 3 months' supply. Covers natural magnesium silicate suitable for use in steatite products and containing not more than 1½ per cent lime, 1½ per cent ferric oxide, or 4 per cent alumina.

M-261 (Amendment): Metal Strapping, effective Feb. 4. Removes restrictions on commercial use of metal strapping and wire on specified types of bundles. Permits the packing of such products as newspapers, metal pipe, shingles, wood box parts, and knocked-down wooden boxes, and similar commodities in light bundles fastened by metal strapping and wire.

CMP REGULATIONS

Regulation No. 1 (Amendment), issued Feb. 8. Directs that allotments of controlled materials are to be made on a quarterly instead of monthly basis. Simplifies method of passing on allotment numbers from prime contractors to subcontractors by permitting the grouping of allotment numbers under major program numbers.

Regulation No. 4, issued Feb. 6. Governs sales of aluminum, steel and copper by warehouses and distributors, effective Feb. 15 in the case of copper and March 31 for aluminum and steel. Permits a warehouse to fill an authorized CMP order or an order bearing a preference rating of AA-5 or higher for brass mill or wire mill products, if the order calls for delivery of 500 pounds or less of any item to any one destination at any one time. No more than 2000 pounds of any one item may be delivered to a customer in a calendar month.

PRICE REGULATIONS

No. 29 (Amendment): By-Product Foundry and By-Product Blast Furnace Coke, effective as of Dec. 1, 1942. Provides that consumers may be billed for the transportation tax of 4 cents per net ton imposed by the Revenue Act of 1942. Tax in billing must be stated separately from the price the consumer pays for the coke and may not be included in the computation of the maximum prices.

No. 230 (Revised): Reusable Iron and Steel Pipe and Used Structural Pipe, effective Feb. 9. Establishes uniform price of $35 per net ton for used structural pipe with provision of charges for extra service. Raises prices for reusable galvanized pipe to a level 20 per cent above that for black pipe for sizes one inch in diameter and smaller; 15 per cent for larger sizes. Establishes additional specific maximum prices for several standard sizes of pipe appearing in the reusable pipe market; odd or unusual sizes and weights of pipe are to be priced by means of an exact formula keyed to weight. Establishes pricing method for two grades of unusually strong oil country casing and tubing known as J-55 and N-80. On sales of pipe at premium prices a certified statement must be given by the sellers to the buyer stating the tests made and requirements met. Establishes specific prices for cutting and threading.

No. 236 (Amendment): Building Materials, effective Feb. 11. Establishes specific maximum prices for special combination grates, developed for installation in heating boilers being converted from use of oil to coal.

No. 315: Lead Arsenate, effective Feb. 8. Establishes maximum prices on sales by manufacturers and distributors to other manufacturers or distributors and to all other purchasers, respectively, as follow in cents per pound on a carlot basis: Standard lead arsenate powder, 3-lb. bags or larger 11.00 and 11.50; 1-lb. bags, 16.00 and 20.00; 1-lb. cartons 18.00 and 22.00; ½-lb. cartons, 21.00 and 25.50; Basic lead arsenate powder, 3 lb. bags or larger 11.50 and 12.00; 1-lb. cartons, 18.50 and 22.50; standard lead arsenate, 5.75 and 6.00. Less than carlot prices are ½-cent higher for lead arsenate and ¼-cent higher for lead arsenate paste.

No. 317: War Model Locks, effective Feb. 13. Establishes specific manufacturers' and jobbers' prices for war model locks and lock sets in which brass, zinc and bronze parts have been replaced by iron and steel. Retail sales remain under the general maximum price regulation. Removes price control of these items from revised price schedule No. 40 (Builders Hardware and Insect Screen Cloth) which continues to control prices for the brass models.

Idle Machine Tool Transfers to War Plants Authorized by WPB

TRANSFERS of idle machine tools to plants urgently needing them are authorized under a policy established by the War Production Board in consultation with the War and Navy departments and the Defense Plant Corp. This step was recommended by the Production Executive Committee, under the chairmanship of C. E. Wilson, production vice chairman.

The policy is expressed in a directive signed by Under Secretary of the Navy James V. Forrestal; Under Secretary of War Robert P. Patterson; Hans A. Klagsbrunn, vice president of the Defense Plant Corp., and Donald M. Nelson, WPB chairman.

The War Production Board, through its tools division, will direct the procurement agencies to transfer available tools when new tools cannot be delivered quickly enough to meet requirements. The directive points out that most machine tools purchased for war production have been financed by the government. It is primarily toward the use of these that the order is directed.

The swift transfer of machine tools to those who most need them, the directive indicated, will make it unnecessary for contractors to retain reserves against future needs.

The directive stated that the "guiding principle shall be that upon the issuance of such a direction the transfer of the machine tool in question shall be made promptly." Consequently, the directive continued, "every effort must be exerted by the government agency concerned to obtain the consent of the holder of the machine tool to its immediate transfer."

Negotiations to modify contracts under which the tools are used, or contracts covering production involving use of the tools, are to be conducted after the transfer as far as possible. If a voluntary transfer cannot be accomplished promptly, steps will be taken to requisition the machine tools.

Government procurement agencies concerned with machine tools are to collect lists of machine tools which are "available for transfer to fill other more urgent needs".

Orders for outstanding machine tools are to be reviewed "so that those not urgently needed may be canceled". On Dec. 31, officials pointed out, average time needed to complete outstanding orders was six and one-half months.

WINDOWS of WASHINGTON

National Planning Association envisages public postwar construction as captial activity rather than work-creating plan of WPA variety. . . Expect more money will be spent than in 1930s. . . Master schedule to be prepared

IN discussing postwar planning in this department last week, reference was made to a proposed system of government investments in rebuilding our cities, rebuilding our transportation systems, developing our rivers and rebuilding in rural areas. This information was briefed from a pamphlet entitled *Guides for Postwar Planning*, published by the National Planning Association for the purpose of stimulating thinking on the subject of postwar planning.

Continuing to digest this pamphlet, it appears that those who are thinking along lines of government investment believe there are important differences between the proposed government investment program and the work done from 1933 to 1940. In the first place, heavy or capital work activity would be involved, not the WPA kind of work that represented the largest part of New Deal spending. Too, the conditions of eligibility and the wage rates attached to WPA employment would be missing.

Expect Some Revenue

This group believes, also, that investment in urban rebuilding, transportation modernization, and river development would bring some direct financial returns; it is not suggested that the projects would have to be self-liquidating in the traditional sense, but there would be revenues accruing from the operation of such enterprises. In the third place, it is believed by this group that the kind of investment proposed would add especially to the productive facilities of the United States.

This group sees as the most important difference, however, the size of the financial outlay. It believes that in the 1930s we spent too little none too wisely. It points out the size of the defense and war outlays as indicating the road to full employment. It cites statistical evidence indicating that on the basis of a national income of 105 to 110 billions at 1940 prices a gross investment of about 25 billion dollars would be required in order to maintain the national income at that level. This 25 billions, the group holds, would include capital replacement, out of current expenditures, and capital additions, out of private or government savings.

During the 1930s, it is pointed out, the size of the expenditure outlay was a matter of political expedient that followed no consistent pattern; in the postwar period we shall have better guides if we but use them. The objects of expenditure must be selected with care in order not to throw the economy out of balance. Need for transportation investment must be met at a rate that will handle satisfactorily the increase in freight that will come as we reach higher levels of income. We must provide power as it is needed. Urban rebuilding, except for transport terminals, can perhaps proceed with greater flexibility.

Government investment planners hold it is possible with present statistical techniques and with data now available, if carefully modified from time to time, to prepare a master schedule that will show, on the one hand, funds available for investment at various levels of national income, and on the other hand, the types of goods and services we shall be producing and transporting. The capital plant required by private industry in order for it to carry its responsibility would have to be determined.

This group of planners regards the annual outlay as the heart of the fiscal aspect of a government investment program. Meeting the cost is a secondary aspect "although certainly not unimportant". The alternatives are two: Shall we tax or shall we borrow?

Quoting from the pamphlet, the government investment group answers this question as follows:

"Business enterprises and individuals often acquire property and even services by borrowing. The practice is recognized not only as legitimate but also as indispensable. In this way it is possible to gain the use of property that cannot be obtained by full payment from current income. Long ago was developed the practice of pooling a part of the income of a number of persons in order to build up productive property that would later increase their income. Of even more ancient lineage is the practice of supplementing current income used for current expenditures by borrowing from others. Such borrowing has been justified under the guise of extraordinary expenditure to be repaid from subsequent income. More recently we have witnessed the growth of installment purchasing as a means of obtaining goods, usually consumer durable goods, for immediate use while paying over a period of time.

"It is sometimes forgotten that for everyone who borrows there is a lender; one person's liability is another man's asset. Debt is also wealth. A growth of debt means also a growth of assets. The fact that as a whole we in the United States owe a great deal more per capita for all purposes now than in 1789 does not mean we are today a poorer people than when Washington became president. It is obvious that we are a far wealthier nation. To be sure, no debt is better than the value of the assets it represents. But this merely is another way of saying that debts should be judged in the light of the assets produced by the debt.

Debt May Be Wasteful or Desirable

"Can this general canon be applied equally to government and private debt? No unequivocal answer is possible. There can be wasteful government debt as well as wastetful private debt. Desirable debt policy for the federal government is not necessarily the desirable debt policy for state and local governments. Some highly qualified judgments are called for whenever we discuss debts of any kind.

"One factor, however, especially needs emphasis in considering debt. The limitation to the incurrence of debt over any period of time is a limitation imposed by the use of a nation's resources. Debt is a transfer of certain portions of income from one person's use to another's. The amount that can be so transferred, therefore, depends ultimately upon what can be spared from income. If income is generally lifted, more can be spared. The ultimate limit upon debt is set by the level of national income resulting from full use of manpower and resources. If a nation is not utilizing fully its resources, it can borrow until there is full

A SPECIAL REPORT TO INDUSTRY

POSTWAR PLANNING

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utilization. If it borrows more, there is inflation.

"Government can borrow at a time of under-utilization of resources, and bring about higher level of national income. Government can do this while private enterprise cannot because of government's power to create credit. It can resort to fiscal machinery in order to insure that we consume all we are capable of producing.

"Taxation cannot achieve this same result when taxes are paid from a shrinking national income following upon less than full use of resources. Taxation can make government borrowing unnecessary at a time of full employment, if such a policy is then desired. Government borrowing could be partially if not completely eliminated by a tax policy that places the heaviest burden upon those with a high propensity to save. This means a progressive tax structure—not one such as that of 1939 when about 75 per cent of all government federal, state and local income came from taxes on one form or another of consumption. Income taxation would have to be increased and tax exempt holdings gradually eliminated if debt creation (investment) on a large scale is not going to be required by our society.

"The growth of debt has been one of the factors that has led to unequal distribution of income within our society. For those who lend income receive interest subsequently—and interest is a continuing claim against subsequent production. Knowing this, we may desire to tax rather than borrow in order to support government activities at full employment levels[1]. On the other hand, we have in our society numerous institutions dependent upon the creation and maintenance of debt. For government and other debts are to endowed educational organizations, insurance companies, and savings banks, the assets that enable them to continue operation. If these institutions are to grow, there must be opportunities for them to invest their funds.

"The present day emphasis upon security in investment helps to explain why an increasing proposition of debt transactions are being reflected in the federal government budget. Small investors and institutions dependent upon the careful use of assets entrusted to them are tending to take government securities, while government in turn may lend the money to private enterprise, as it has been doing these past few years. The demand for security in investment has become so great that it is questionable whether this tendency can be altered.

"At least there is one certain guide for desirable government fiscal policy. We must tax or borrow or do both as required to maintain full employment. Our goal is full utilization of our resources, is consumption of all we are capable of producing. In a money economy this depends upon high levels of currency circulation, in other words high levels of expenditures. To the extent that private enterprise does not do so, government outlay (taxation and borrowing) must fill the gap required to bring total expenditures to the desired goal."

This space in the next issue will be devoted to further thinking about the postwar financial picture as sponsored by the National Resources Planning Board.

[1]The great increase in federal government debt since 1932, the pamphlet explains, has not aggravated the problem of unequal distribution of income in the United States because of the fall in interest rate.

Industrialists Undertake Ordnance System Study

Survey to determine how industrial experience may contribute to world-wide supply and maintenance of Army Ordnance equipment has been undertaken by seven outstanding business executives, the War Department announced last week.

The group is composed of Bernard M. Baruch of New York; Benjamin F. Fairless, president, United States Steel Corp.; K. T. Keller, president, Chrysler Corp.; Lewis H. Brown, president, Johns-Manville Corp.; Fowler McCormick, president, International Harvester Co.; General Robert E. Wood, chairman, Sears-Roebuck Co.; and B. E. Hutchinson, chairman, finance committee, Chrysler Corp.

The survey has been undertaken at the request of Major General Levin H. Campbell, Jr., Chief of Ordnance, Services of Supply. All members of the group or their representatives, who serve during the survey, will provide for their own expenses.

The group will conduct studies on specialized problems concerned and will assign experts of various American industries to go to the field to ascertain at close range where commercial practices may be applied to advantage.

General Campbell said the members of the survey group will give the Army the benefit of their experience by scrutinizing the Ordnance Department's field service making such suggestions and recommendations to the Chief of Ordnance as they believe will enhance the program of warehousing, distribution, supply, maintenance and salvage.

Administrative control of upwards of 60 Ordnance depots, arsenals and bases in the United States is decentralized into seven depot zones. The depots, arsenals and bases, together with equipment, are valued in excess of $650,000,000.

Ordnance items, nearly 2000 in number and comprised of more than 250,000 parts, including all of the Army's weapons, ammunition, tanks, automotive vehicles and fire control instruments, are being manufactured and developed under the Chief of Ordnance.

Manganese, Silver, Copper Used in New 5-Cent Pieces

More than 100,000 pounds of metallic manganese, recovered from low-grade domestic ores by an electrolytic method developed in Bureau of Mines laboratories, have been delivered to the Treasury Department for lend-lease and to the United States mint.

Several shipments of 99.9 per cent pure manganese from the Boulder City pilot plant have been sent to branches of the mint at Philadelphia and San Francisco. Bureau metallurgists determined that several alloys using manganese possess the physical and chemical properties required as a substitute for the 5-cent coin heretofore made of 75 per cent copper and 25 per cent nickel.

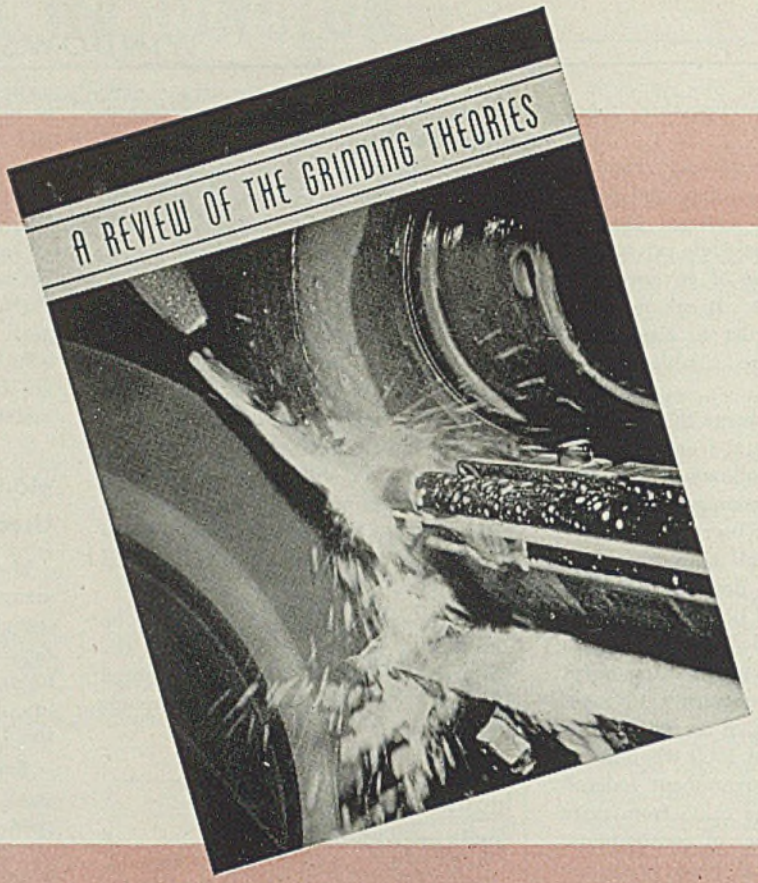
The new coin of 9 per cent manganese, 35 per cent silver, and 56 per cent copper closely approximates the old coin in hardness, appearance, and durability, and electrical resistance and is acceptable for use in coin-operated machines. Some attempts have been made to substitute less pure manganese but the results have been reported as unsatisfactory.

Permits Metal Strapping, Wire For Packing Light Bundles

Restrictions imposed by Conservation Order M-261 on commercial use of metal strapping and wire on specified types of bundles have been removed by amendment. No change is made in the restrictions on metal strapping on containers.

The order prohibited use of metal strapping and wire on light weight bundles. No one was allowed to use commercially any such material for bundles unless: The bundle weighed more than 90 pounds; net weight of the contents exceeded .058 pounds per cubic inch (100 pounds per cubic foot).

Letters and appeals from those affected indicate that these restrictions were too drastic. Amendment permits the packing of such products as newspapers, metal pipes, shingles, wood box parts, and knocked-down wooden boxes and similar commodities in light bundles fastened by metal strapping and wire.



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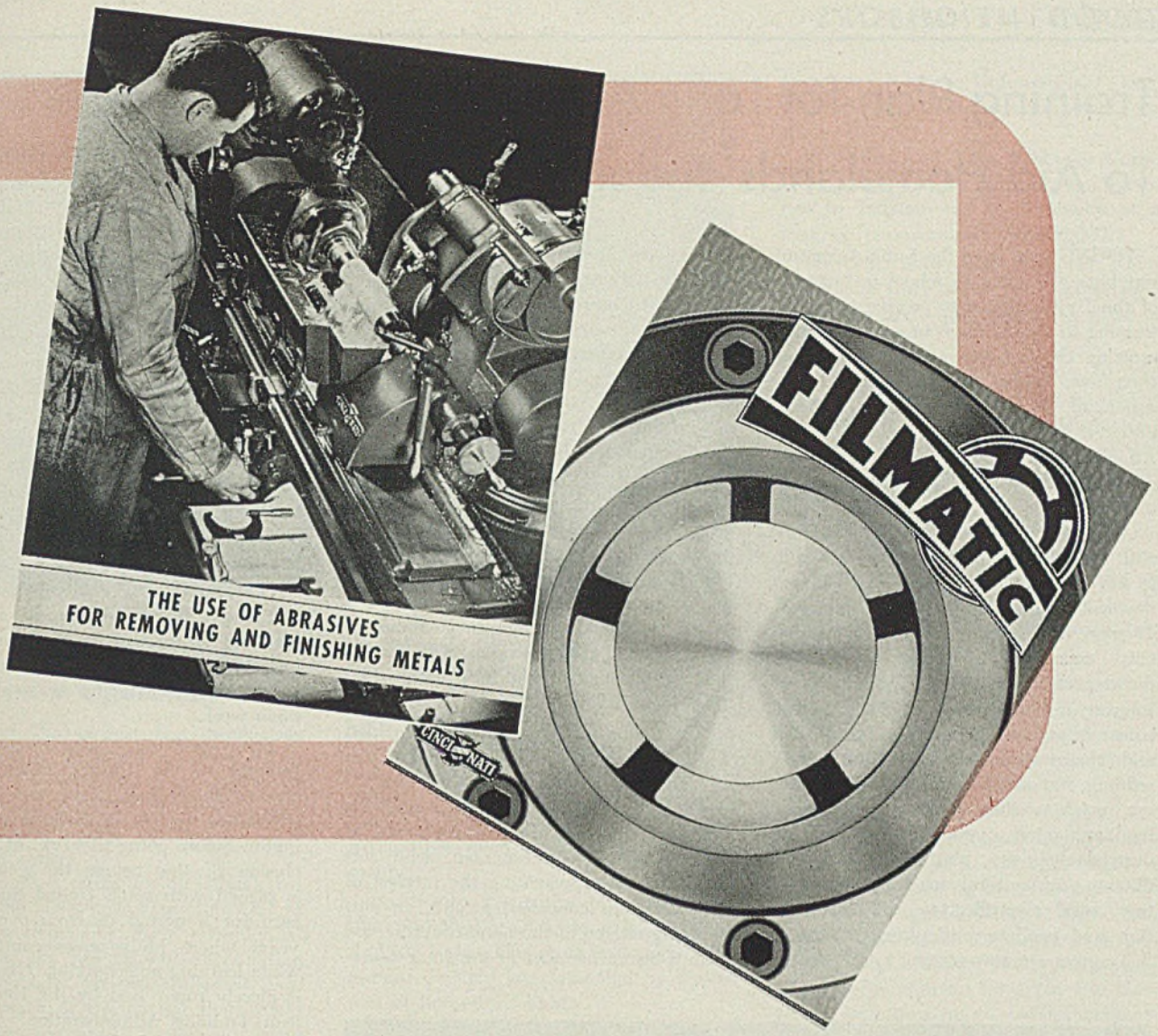

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Training Plan for Latin-Americans To Aid Homelands' Industrialization

YOUNG men from the Latin-American republics are going to school in factories of the United States to receive technical training to enable them to assist in modernizing the industry and agriculture of their own lands. As part of the Inter-American Trade Scholarship program, initiated by the Office of Inter-American Affairs, Washington, the trainees will earn while they learn and, with a better understanding of the "American Way."

Already scholarship awards for factory and technical training have been made to 22 young Mexicans, five of whom are now working in this country. A group of 17 more will arrive shortly from Mexico City, according to Elliott S. Hanson, director of the program. Their fields of interest and work include diesel engine construction and operation, generators and electrical transmission lines, sugar refining, industrial chemistry, road building, machine shop practice, commercial banking, mine operation, aviation, industrial chemistry, plastics, vitamin production, agricultural machine manufacture, rural electrification, soil conservation and modern agricultural methods.

Trainees are now coming to the United States from all the 20 American republics but the largest group is from Mexico because transportation facilities make it easier for groups of 12 to 15 to come from that country than from the republics farther south.

Committee Recommends Men

The term "trade scholarship" is something of a misnomer. What the young men actually receive is a period of apprenticeship training in the particular trade or career in which they may be interested. The precept of learning to do by doing is the principle on which the trade scholarship program is founded. Furthermore, the young men are made self supporting in that they earn while they learn.

The young men are first recommended by a Trainee Selection Committee, one of which is found in each of the 20 capitals of the other American Republics. This committee of three is composed of one American business man, who acts as chairman, representing the interest of United States concerns; second, an outstanding citizen of the nation represented who is also a member of the Inter-American Development Commission; and third, a representative of the technical institutions of the nation.

The objective of the program is to establish a uniform procedure through which worthy young men of the other Americas may come to the United States for the type of vocational training most needed in the economic development of their homeland.

Selection of the candidates is strictly on the basis of merit. The applicant must be between 18 and 28 years of age, be able to pass a physical examination and have good working knowledge of the English language. Preference is given to those who have had technical, engineering, scientific, economic, commercial or agricultural education or manifest aptitude in one of these fields.

The applicant is made to understand that the training will be of a strictly practical nature with much manual labor in actual operations on an equal basis with young Americans engaged in the same work.

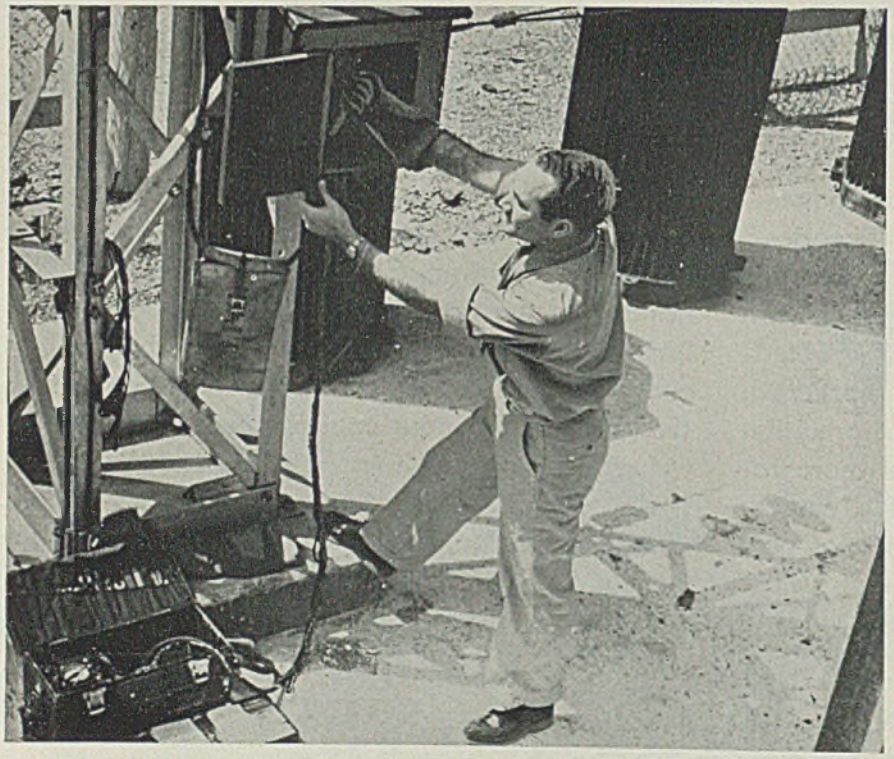
Those receiving scholarship awards are brought to the United States without cost to themselves. They are given an orientation course of training in Washington before going to work. At the conclusion of this course the young man is placed with some United States concern for a period of from one to two years where he receives compensation while learning and working. His progress is closely supervised by the Inter-American Training Administration.

Traveling Expenses Paid

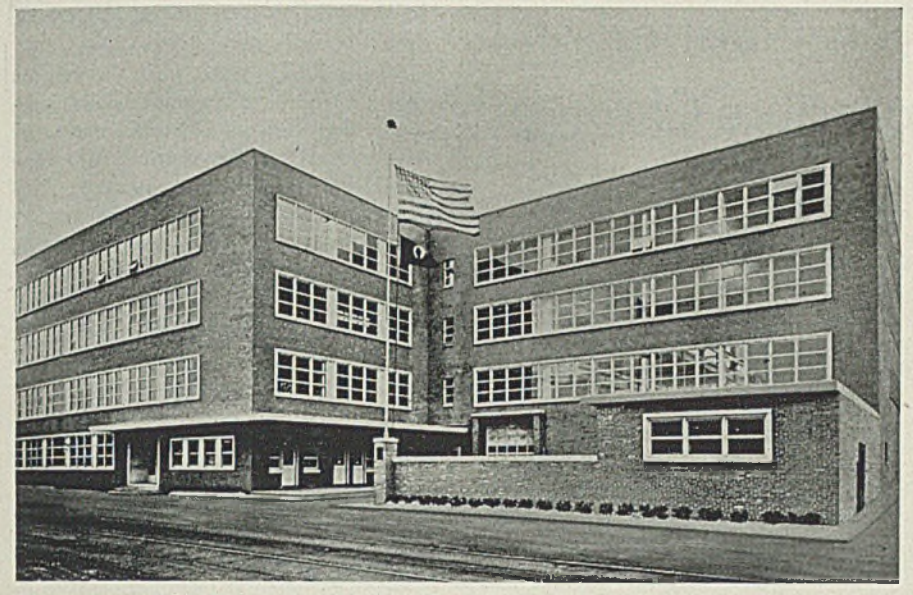
At the end of the training period the young man is returned to his country. His traveling expenses are paid as well as the cost of his stay in Washington during the orientation course. During his industrial training period, however, he is expected to live on the compensation he receives from the firm employing him.

Before departure for his home, he receives a certificate indicating the range of his accomplishments in his field.

Among the United States industries which are co-operating in the training program are mining, petroleum, tanning, industrial chemicals, rubber, air conditioning, road building machinery, hydraulic construction, telephones, communications, cheese making, textiles, vegetable oils, glass, railroad mechanics, banking and stock breeding. American industry is said to be giving the training program its enthusiastic support and many firms which have no direct interest in the Latin-American field are taking trainees into their organizations. The National Foreign Trade Council, Pan American Society, Y.M.C.A., Rotary International, and other groups endorsed the training program.



Students from Latin-America are putting to practical use in United States' factories vocational training they received at home. Inter-American Trade Scholarship Program finds them paying jobs in industries to round out their specialized education. A trainee is shown here at work in an electrical plant near Niagara Falls, N. Y.



Budd Induction Heating Plant Now Operating

One of the newest war production plants in Detroit, Budd Induction Heating Inc., now is in full production in its modern plant at 11811 Charlevoix, building induction heating equipment. Plant is shown above.

Built with a minimum of critical materials the four-story structure is of brick, concrete and glass. Throughout the plant, the use of 440-volt lighting and power lines has been followed, conserving much of the copper that would have been required if the customary lower voltage lines had been used.

A feature of the new plant is a large glass bay which houses the heat treating machine assembly floor. A railroad spur enters this wing so heavy machines can be loaded directly onto the cars. The bay is four stories high, three walls of which are of alternate corrugated glass panels and sash windows. A traveling crane with hook 40 feet above the floor moves equipment and machines as required. The crane can also lower subassemblies from a balcony along one side of the room for treatment or shipment.

Practically the entire fourth floor of the building is fitted up as an engineering drafting room. This room is flooded with natural daylight supplemented by a system of fluorescent lights.

War Plant Additions Authorized by DPC

New war plant expansions and equipment purchases authorized last week, all to be owned by the Defense Plant Corp. and operated by the contractors, include:

With Ken-Rad Tube & Lamp Corp., Owensboro, Ky., to provide plant facilities in Indiana and in Kentucky at a cost of approximately $1,300,000.

With St. Lawrence Corp. of Newfoundland Ltd., New York, to provide machinery and equipment for a plant in Newfoundland.

With Chrysler Corp., Detroit, to provide additional plant facilities in Illinois at a cost of approximately $16,900,000. This increase will result in an overall commitment for the project approximating $173,000,000.

With the Wellman Engineering Co., Cleveland, to provide additional equipment for a plant in Ohio at a cost of approximately $70,000, resulting in an overall commitment of approximately $530,000.

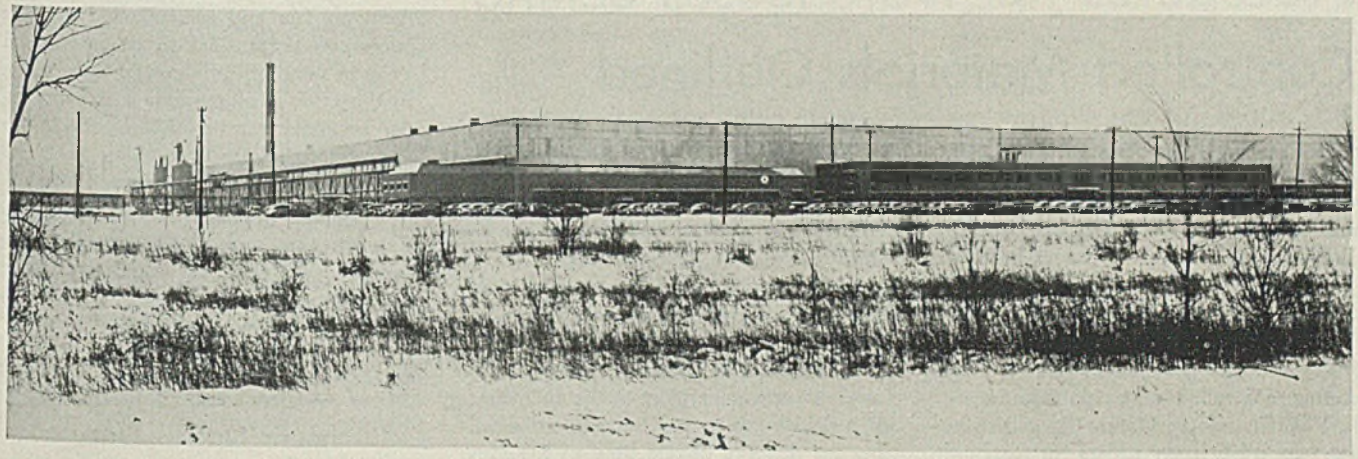
With Towmotor Corp., Cleveland, to provide additional equipment for a plant in Ohio at a cost of approximately $39,000, resulting in an overall commitment of approximately $288,000.

With the Republic Steel Corp., Cleveland, to provide additional facilities at a plant in Illinois at a cost approximating $23,000,000 resulting in an overall commitment of approximately $79,250,000.

With Lawrence Engineering & Research Corp., Linden, N. J., to provide additional equipment for a plant in New Jersey, resulting in an overall commitment of approximately $1,600,000.

With Unicast Corp., Toledo, O., for additional plant facilities at a plant in Ohio, at a cost of approximately $250,000, resulting in an overall commitment approximating $3,750,000.

PRODUCTION SPEEDS AHEAD AT NEW TURBINE PLANT



THE first completed turbine generator was on final test and ready for shipment nine months from the day that General Electric Co. laid plans for this new plant at Syracuse, N. Y. Covering an area of more than 600,000 square feet, the building is the second largest of all General Electric factories. The entire plant makes only one size and type of power plant. When in full production complete electric power plants for warships will be turned out at the rate of more than one a day. Over 1000 are employed at present and others are being added daily

Allotments Placed on Quarterly Basis; Grouping Procedure Changed

WPB has just issued an amended version of CMP Regulation No. 1.

The amendment of CMP's basic regulation effects two major simplifications. Allotments of controlled materials are to be made on a quarterly basis instead of monthly and the method of passing on allotment numbers from prime contractors to subcontractors has been greatly simplified by permitting the grouping of allotment numbers under major program numbers.

Although controlled materials consumers will now receive their allotments on a quarterly basis, the regulation includes a safeguard to assure that orders placed with mills will not be concentrated in the first part of the quarter. Subject to certain exceptions, persons who receive allotments must not call for delivery from the mills of more than a third of an allotment in the first month of the quarter, and an aggregate of two-thirds in the first and second months of the quarter.

Of particular interest to manufacturers of Class A products is the revision of procedures to govern grouping of allotments by a contractor when passing on to his secondaries authorizations to purchase controlled materials. The amendment greatly broadens these provisions, doing away entirely with the quantitative limitations formerly placed on totals which might be "basketed". Under an abbreviated identification number, a consumer of controlled materials operating under several authorized production schedules may combine in a single allotment to a secondary consumer the requirements for any number of schedules identified by the same major program number.

The abbreviated allotment number provided for by the amendments will serve to identify major programs by the use of the claimant agency letter symbol, followed only by the first digit of the program number and the number indicating the calendar quarter in which delivery is to be made.

For example, in the case of an allotment from a claimant agency to a prime consumer of controlled materials, designated W-2345-678-16, the allotments to the secondary consumer will be simply W-2-16, denoting an allotment for major program number 2 of the War Department for delivery of controlled materials in the second quarter of 1943. As the total number of programs for which accounting will be required has been reduced, by agreement with the claimant agencies, to substantially less than one hundred, internal bookkeeping of users of controlled materials will be greatly simplified.

Clarification of a number of minor provisions of the original regulation are included among today's amendments.

Procedures for Warehouses Selling Controlled Materials Outlined

CONTROLLED Materials Plan Regulation No. 4, to govern sales of aluminum copper and steel by warehouses and distributors, was issued last week by WPB. New controls become effective Feb. 15 for copper and March 31 for aluminum and steel.

Summary of procedures to be followed by warehouses and distributors in marketing controlled materials follows.

STEEL: After March 31, a distributor may fill delivery orders for steel only when the order is an authorized controlled materials order; an order in the amount of $10 or less; an order bearing a preference rating of AA-5 or higher, on which delivery is made prior to July 1, 1943; an order calling for delivery of carbon steel authorized under Food Production Order B of the Department of Agriculture; orders calling for delivery during any calendar quarter to the same customer in amounts not exceeding those listed in a table in the regulation.

Distributors must fill authorized controlled materials orders to the extent of available stocks, subject to the following:

A distributor must reject any order calling for delivery at one time to the same customer, at any one destination, of 40,000 pounds or more of steel, unless the order includes tin or more individual items none of which weighs more than 8000 pounds, or unless all items covered by the order consist of oil country tubing, casing or drill pipe.

A distributor who is of the opinion that the filling of any authorized order would deplete his stocks to a point where his function in the distribution system would be impaired, may apply to WPB for authority to reject the order.

COPPER: Commencing Feb. 15, a warehouse may fill an authorized controlled materials order, or an order bearing a preference rating of AA-5 or higher, for brass mill or wire mill products, if the order calls for the delivery of 500 pounds or less of any item to any one destination at any one time. No more than 2000 pounds of any one item may be delivered to a customer during a calendar month. All orders must be accompanied by a prescribed certificate, signed by the person placing them.

ALUMINUM: A distributor is required to fill authorized controlled materials orders, except that he must reject any order which calls for delivery of aluminum to any one person at any one time at the same destination, of more than the following amounts: 500 pounds of any gage, alloy and size of aluminum sheet; 300 pounds of any alloy shape and size of aluminum wire, rod or bar; 200 pounds of any alloy size and shape of aluminum tubing, extrusions or structural shapes.

If, however, a distributor has asked the mill supplying him to fill orders for larger amounts, and the mill has advised him to fill them from stock, he may deliver up to the following amounts: 2000 pounds of any gage, alloy and size of sheet; 1000 pounds of any gage, alloy and size of wire, rod or bar; 500 pounds of any alloy, size and shape of aluminum tubing, extrusions and structural shapes.

An authorized controlled materials order is defined as one so designated by any WPB reguation or order, or one endorsed with an allotment number and accompanied by three copies of Form CMP-6, in the case of brass or wire mill products, or two copies, in the case of aluminum. A delivery order for steel must be endorsed with the appropriate allotment number but need not be accompanied by Form CMP-6.

A special provision of the regulation requires that authorized controlled materials orders bearing AAA ratings be given preference over any other order, regardless of time to receipt.

New Method for Establishing Warehouse Quotas Proposed

A revised method for permanent establishment of quotas of prime steel products which may be purchased by warehouses also engaged in sale of seconds has been proposed by the Warehouse

Branch of the WPB Steel Division.

At present under Order M-21-b, warehouses which during 1940 purchased more than 25 per cent of their tonnage in grades invoiced as less than prime quality are not permitted to buy from any producer in one quarter a quantity of prime material greater than one-fourth the tonnage of primes bought from such producer during 1940. This provision would be continued.

In determining prime steel quotas to which warehouses may be eligible, it has been proposed that 1940 purchases, which, when ordered, specified definite quality and quantity may be included with prime steel purchases. However, steel bought in 1940 which was unassorted to size and gage would not be included with the prime tonnage.

Warehouses affected by this provision would be required by March 1 to submit to mills from whom they bought in 1940, a detailed list of their prime steel purchases. These would be verified by the mills and returned. Warehouses then would consolidate the verifications and notify WPB by letter how much prime material they were eligible to order each quarter under terms of the plan. This would establish once and for all a maximum prime tonnage figure for each warehouse affected by the seconds provision.

New Industry Advisory Committees Are Named

New industry advisory committees established by the War Production Board last week include:

Light Power-Driven Machinery

Harlow I. Snippen is government presiding officer. Committee members: E. Ballman, Baldor Electric Co., St. Louis; M. H. Buehrer, Boice-Crane Co., Toledo, O.; J. A. Carey, Walker-Turner Co., Plainfield, N. J.; L. H. Hamilton, The Dumore Co., Racine, Wis.; Roy Hedgepath, Duro Metal Products Co., Chicago; J. E. Penniman, Atlas Press Co., New York; D. J. Ridings, Porter-Cable Machine Co., Syracuse, N. Y.; James Tate, Delta Mfg. Co., Milwaukee; and J. D. Wallace, J. D. Wallace & Co., Chicago.

Gin and Delinting Machinery

W. K. Dana is government presiding officer. Committee members: H. Earl Altman, Hardwick Etter Co., Sherman, Tex.; A. S. Cartwright, Cullet Gin Co., Amite, La.; S. Kelly Dimon, Centennial Cotton Gin Co., Columbus, Ga.; J. E. McDonald, The Murray Co., Dallas, Tex.; John E. Mitchell, John E. Mitchell Co., Dallas, Tex.; Merrill E. Pratt, Continental Gin Co., Birmingham, Ala.; and F. Edward Lummus, Lummus Cotton Gin Co., Columbus, Ga.

Jewel Bearing Industry

R. I. Lund government presiding officer. Members: R. H. Bird, R. H. Bird & Co., Waltham, Mass.; Arda Bulova, Bulova Watch Co., New York; E. H. Cornely, Eastern Specialty Co., Philadelphia; Orville Gatti, A. M. Gatti Co., Trenton, N. J.; C. H. Kalquist, Moser Jewel Co., Perth Amboy, N. J.; Calvin M. Kendig, Hamilton Watch Co., Lancaster, Pa.; Jacob Kleinman, Mayer Koulish Co., New York; Adolf Meller, Adolf Meller Co., Providence, R. I.; T. Albert Potter, Elgin National Watch Co., Elgin, Ill.; and D. E. Worley, John Worley Co., Waltham, Mass.

Internal Revenue Bureau Issues Regulations Relating to Levy

REGULATIONS relating to the tax which became applicable last Dec. 1 on charges for transportation of property have been issued by the Bureau of Internal Revenue.

The tax is 3 per cent of the taxable payment, except that in the case of coal the rate of tax is 4 cents per net ton.

Several of the general provisions covered by the regulations follow:

Application of tax—(a) In general: The tax is payable by the person making the taxable transportation payment and is collectible by the person receiving such payment.

The tax applies to the total amount paid within the United States for transportation of property from one point in the United States to another even though while en route part of the transportation movement is through a foreign country.

The tax applies to any payment, not specifically exempted, for the transportation of property, made to a person engaged in the business of transporting property for hire, including a payment made by one such person to another, but not including an amount paid by a carrier, a freight forwarder, express company, or similar person for transportation with respect to which a tax is payable to such person.

The tax applies only to amounts paid after December 1, 1942, for transportation which originated on or after that date. No tax attaches to payments for transportation originating prior to the first moment of December 1, 1942. Payments made prior to December 2, 1942, are not taxable regardless of when the transportation occurs.

In the case of property transported from a point without the United States to a point within the United States the tax applies to any amount paid within the United States for that part of the transportation which takes place within the United States.

Where the amount paid in the United States covers the entire movement of property from point of origin in a foreign country to an inland point in the United States, the tax will apply to the pro rata part of such payment which represents transportation within the United States. However, in the case of shipments of foreign origin arriving by water, no tax will attach to transportation or services performed prior to the unloading of property at the port of first arrival.

The tax does not apply: (1) to an amount paid outside the United States for the transportation of property from a point without the United States to a point within the United States; (2) to an amount paid by a carrier, freight forwarder, express company or similar person for the transportation of property with respect to which a tax is payable to such carrier, freight forwarded, express company or similar person; (3) to an amount paid by or to the United States or any agency or instrumentality thereof for the transportation of property; (4) to an amount paid by a state, or political subdivision thereof, for the transportation of property; or (5) to an amount paid for the transportation of property in course of exportation or shipment to a possession of the United States and actually so exported or shipped.

(b) Coal: An amount paid after December 1, 1942, with respect to the first transportation for hire originating on or after that date if coal is subject to tax, except that if such payment covers a movement from the mine to a preparation plant, including a breaker, washery or tipple, the tax will apply to the first transportation for hire which occurs thereafter.

No Overlapping Taxation

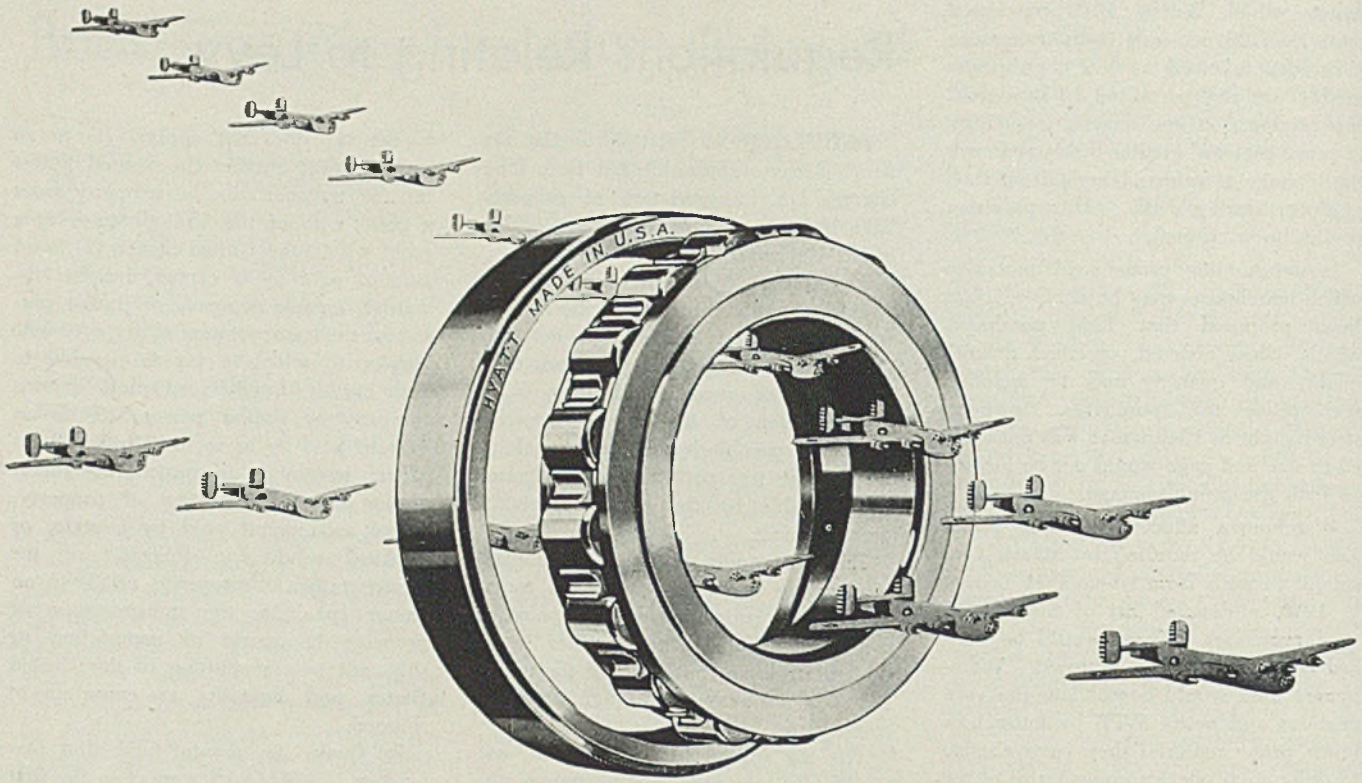
An amount paid for transportation of coal is not taxable if there has been a previous taxable transportation of such coal. However, as there was no "taxable transportation" of coal prior to December 1, 1942, the tax applies to the amount paid for the first movement for hire, originating on or after that date, of all prepared coal, or of coal which is to be consumed in its unprepared state, irrespective of the fact that there may have been one or more previous movements of such coal for hire.

No tax attaches with respect to the transportation of unprepared coal from the mine to a preparation plant, including a breaker, washery or tipple.

An amount paid for the transportation of coke or briquettes made from coal is not subject to tax: Provided, there has been a previous taxable transportation of the coal or coal dust from which such coke or briquettes were manufactured.

When a person delivers to a carrier a quantity of coal for a transportation movement, and the transportation tax

(*Please turn to Page* 140)



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This is the kind of bearing precision and performance which you have learned to associate with Hyatts in steel mill applications over the many years we've served, and will continue to serve, in the brighter years ahead.

Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

The "great boron mystery" lends zest to progress of NE steels. . . Tank maintenance staff moves to Detroit. . . M-4 costs $1.50 per pound. . . Bonanzas in war subcontracting

DETROIT

BASIC foundations for the present concept of wartime steel metallurgy were being shaped up unwittingly here in Detroit years before war cast the shadow over the conventional alloying elements in steel. As it started, the development did not envisage the effects of war on alloy supply, but rather was directed toward simple economic goals of perfecting better materials for less money. It is now considered most fortunate that this development work had progressed so far, for it greatly facilitated the speedy introduction of the whole series of so-called lean alloy steels.

Obviously, motor company metallurgists cannot take full credit for saving all industry from an alloy-famine, and in fact they would be the last to seek such credit, but it must be recognized that basic studies on the hardenability of steels, with the aftermath of turning to steels with higher manganese and silicon and molybdenum, to make up for the absence of chromium, nickel, vanadium, tungsten, etc., had their origin in laboratories close to the automobile industry. The pressure of war quickly turned this research to the perfection of the NE series of steels which are now gradually becoming accepted as satisfactory, and in some cases even better, alternates for the more highly alloyed heat treated steels.

Boron Increases Hardenability

On top of the perfection of NE steels has come the discovery of the salutary effect on hardenability of infinitesimal percentages of boron, mixed with various types of metallic carrier elements. In this field, too, the motor industry has played a prominent part, and not just in recent months. Several years ago, the metallurgical department of one of the leading builders was showing insiders some remarkable physical properties developed in heat treated steels prepared from heats processed with small quantities of Grainal—a titanium-aluminum-zirconium-vanadium ladle or ingot addition agent aimed to increase hardenability, toughness and resistance to impact of fine-grained steels.

Now it develops that the "oomph" supplied by Grainal may result from the small amount of boron contained therein, more than from the other deoxidizing elements. Concurrently a host of other addition agents has been introduced to the steel trade for similar purposes—Silcaz, Silvaz, ferroboron, Bortam, Borosil and a number of others all containing varying precentages of boron with other elements including iron, aluminum, calcium, manganese, silicon, titanium, vanadium and zirconium.

There is a heavy veil of secrecy being thrown around information dealing with boron treated steels, ostensibly on the grounds of military secrecy. This appears a little foolish, since metallurgists in alloy-hungry enemy nations must be fully aware of what the element will accomplish. Another widely suggested reason for secrecy concerns possible jealousies between the various companies that have great interests in the proprietary alloys.

At any rate, it was not so very long ago that a prominent metallurgist received a telegram from the FBI cautioning him to "keep his trap shut" about boron steels as far as public discussion was concerned. To date, he is still keeping his trap shut, despite the fact others are not.

A number of technical articles have appeared on the subject in recent months, and Dr. E. C. Bain, assistant to the vice president in charge of research, United States Steel Corp., speaking on alloy conservation before the local chapter of the American Society for Metals the other evening, showed data illustrating the effect of varying percentages of boron on the hardenability of steel. He observed that 0.003 per cent or about 0.06-pound per ton of boron produced the optimum effect on hardenability. However, the carrier elements, by means of which the boron is dispersed into the steel, have an added effect, Dr. Bain's data indicating clearly, for example, that doubling the amount of the carrier without increasing the percentage of boron further boosted hardenability of the steel.

Naturally, analysis of steel for such minute percentages of boron is not a simple task. Colorimetric or spectrographic methods would seem to be imperative instead of conventional chemical quantitative analysis. What the possible percentage of error might be even with these more exact methods is not clear, but it is evident that a precise measurement of boron content in the range of 0.001-0.005 per cent is difficult to say the least.

Boron owes its success to the recognition accorded hardenability as a measure of the quality of heat treated steel, which as stated before, is the basic ex-

GUN BARREL STARTS AS 443-POUND FORGING

BARREL of the 40-millimeter field piece produced by Pontiac Motor Division starts out as a 443-pound forged steel blank, shown here as it is being chucked for the initial machining operation

planation for the speed and precision with which the NE steels were developed. The mechanism of boron's action in raising the hardenability of a given steel, and thereby possibly permitting even further conservation of alloying elements in the steel, is not at all clearly defined in the minds of metallurgists, and extended research probably will be necessary to clarify the matter. The element itself probably has little effect as an alloy but more likely acts as a sort of cleansing agent, perhaps in some connection with the nitrogen content of the steel.

The question was asked Dr. Bain whether he considered an eventual preponderance of boron steel scrap any serious problem. He replied in the negative and gave as his opinion that properties of boron-treated steel would not be carried over from scrap.

From a practical standpoint, the application of NE steels continues to move ahead slowly and cautiously, particularly in such items as guns. It is realized that the adoption of any substitute steel for a standard S.A.E. alloy steel must be predicated first upon proof-testing of a complete gun in which such substitution has been made. Furthermore the NE steels demand close attention to heat treatment and require flexible and carefully controlled heating and quenching equipment.

It is understood there is now being drawn up a new list of "plain carbon" NE steels which are featured principally by a lowering of the manganese content in comparison with the NE 1300 series of carbon-manganese steels. What restrictions may be placed on "residual" contents of other elements remains to be seen, but the tonnage of unsegregated alloy steel scrap creeping into open-hearth heats is gradually building up all residuals and it may eventually become a difficult thing to produce a simple plain carbon steel.

Powdered Metal as Substitute

An interesting substitution made on one type of gun being produced in this district involves the use of compressed and sintered powdered metal in a 6-inch square gunsight, replacing a part formerly machined from a solid steel forging. Use of powdered metal permitted an appreciable saving in cost, and the alternate part proved satisfactory in corrosion and low-temperature tests.

There is also a trend toward the substitution of malleable iron castings for bronze in certain parts for gun mounts.

Enlargement of the Tank-Automotive Center here by a further transfer of activity from the office of the chief of ordnance in Washington has been announced. Maintenance branch of the T.A.C. with its chief, Col. S. E. Reimel, will take over control of 17 ordnance base shops for repair and maintenance, tools and equipment for repair shops both fixed and mobile, and the preparation of manuals of instruction on maintenance and repair—all activities previously centered in Washington. About 200 individuals will be transferred.

Brig.-Gen. A. R. Glancy, chief of the T.A.C., has stated that tank-automotive operations are now being performed at a saving of about 700 personnel as compared with those previously doing the same work in Washington. Considerable saving in rail travel of executives in plants producing automotive ordnance equipment between Detroit and Washington likewise has been achieved.

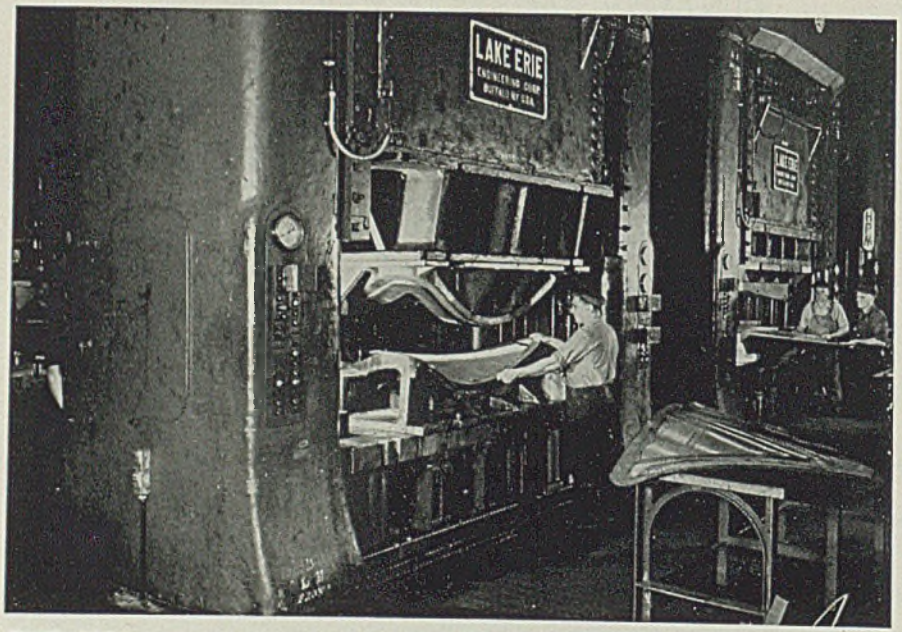
Workmen in Ford plants are reaping the benefits of a long-range dietetic program which the company has undertaken to provide better balanced meals in cafeterias and lunch wagons.

Under new schedules released by the Army Air Forces and the WPB, Buick will triple output of Pratt & Whitney bomber engines at its Flint, Mich., and Melrose Park, Ill., plants during the present year. Production in 1942 was more than four times the volume anticipated under original contracts. Approximately 50 per cent of production work on the engines, including nearly all steel parts as well as cylinder heads and pistons, is done at Flint, the balance of machining, final assembly, testing and shipping centered in the Chicago plant. There are 6266 parts in the 14-cylinder engine and 863 piece parts. Cost of producing the crankshaft is around $700.

Bohn Aluminum & Brass Corp. has organized a new division to specialize in the refining of aluminum scrap into aluminum alloy ingot, made necessary by the tremendous bulking of supplies of all types of aluminum scrap in its various production plants. Known as the Aluminum Refiners Division, the new plant will be managed by Ernest Bell and will be in operation by March 1.

A medium or M-4 tank costs the government about $1.50 a pound, according to the report of an OWI writer who recently visited Detroit. This would make a tank worth about $80,000 complete. It will be recalled that when Chrysler dealers decided to pay for the first M-3 tank off the line at the tank arsenal, their check was for something like $33,000. The difference doubtless is explained by the fact that the latter figure represented material bought and work done by Chrysler, with the balance being government furnished equipment.

AUTOMOTIVE-TYPE DIES USED IN WILLOW RUN PRESSES



TWO 1000-ton triple-action hydraulic presses operated in the Ford Willow Run bomber plant are drawing the upper fairing which forms part of an engine nacelle. Presses are set on cast steel sub-bases in concrete pits, with most of the hydraulic equipment below the floor level. Presses with automotive-type iron and steel dies are used throughout Willow Run for both blanking and forming operations on duralumin parts, a costly technique compared with methods used hitherto in airplane manufacturing plants, but nevertheless faster and more accurate

Turntable saves time in welding small assemblies

Information supplied by an Industrial Publication

Several means are being applied industrially to save time and reduce fatigue of welders working on heavy jobs. Positioning tables, rotating jigs and similar devices for handling heavy or bulky assemblies are quite generally used.

One aircraft manufacturer has adopted a similar idea for welders working on small sub-assemblies. The assemblies are light, and joints are usually quite accessible. But moving the assemblies by hand does occasion some delay.

This is obviated by mounting the work on a small turn table somewhat resembling an old style potter's wheel. The turn table is quite simple, consisting of two round plates mounted on a common shaft.

The upper plate carries the work, and is located at a convenient height above a work table. The lower plate is a few inches above the shop floor. It is positioned so that the operator's feet rest on it comfortably.

Thus, when the operator wishes to move the work, he simply "indexes" the lower table by foot power. The weight of his feet on the plate is, however, sufficient to hold the whole turn table steady while he is welding any particular joint.

WING TIPS

Conveyorized assembly line and vertical jigs save 40 per cent floor space and speed output of airplane wings at Murray Corp.'s plant. . . Engine production outstrips aircraft

ASSEMBLY of airplane wings on a conveyorized assembly line and in vertical jigs hung on the conveyor line is a relatively new aircraft assembly technique. It has been adopted by Murray Corp. of America, Detroit, currently producing wing sections for P-47 or Thunderbolt pursuit planes in large numbers. As developed by plant layout engineers, the system has saved approximately 40 per cent in floor space over conventional methods, and has speeded up operations. Essentially, the procedure is as follows:

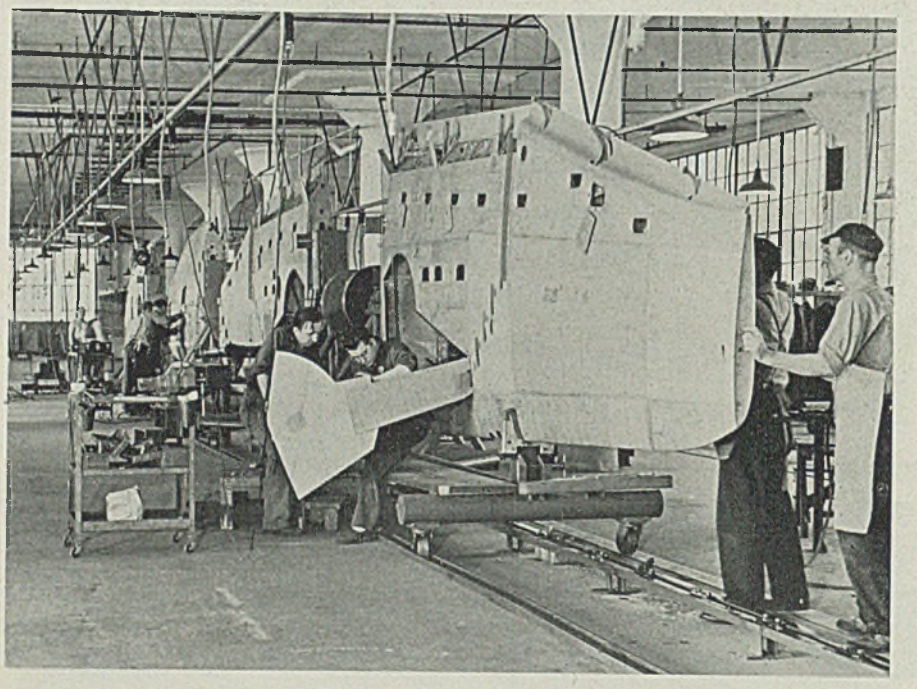
Two floors of the plant are used for assembly of small parts going into the wing, and another floor for final assembly in the jigs. To save on handling of heavier subassemblies these are stationed closer to the final assembly floor than the smaller parts. The subassemblies produced on the two floors are dispatched to the final assembly department where the first step is a rough "tie-in" of the various elements making up the wing structure. The wing is mounted in a vertical position on special dollies traveling in floor tracks.

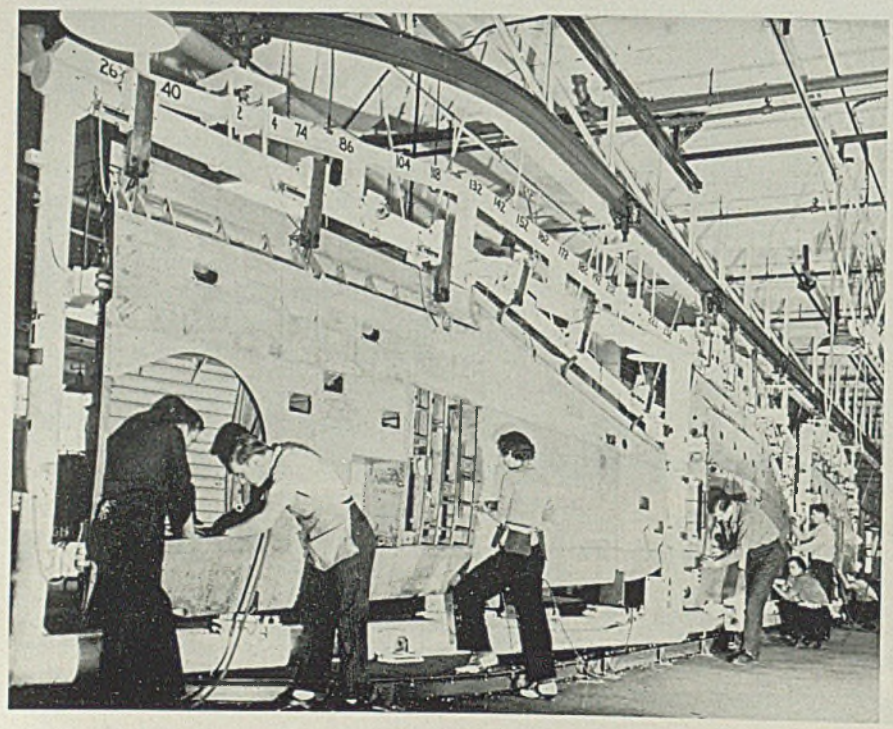
A hoist then picks up the wing and transfers it to the rigid welded pipe jigs suspended from an overhead monorail. These jigs are mounted on closed loop tracks, and a wing makes a complete circuit of the track while most of the riveting is completed and other parts installed. Two of these assembly tracks adjoin each other in this department, as shown in an accompanying illustration.

Completing this phase of assembly, another hoist transfers the wing to flat jigs moved along by a conveyor chain in the floor. Here the wing is completed, piping and wiring installed, hydraulic lines tested, the outside surface painted and over 100 markings applied.

The latter step, involving the use of flat jigs, is typical of practice followed in wing assembly at many airplane plants, but it hitherto has reportedly been difficult to hold a wing section firmly in a vertical jig such as those used by the Murray Corp. for the intermediate assembly operations. Riveting and hammering tend to spring the piece out of line. But this difficulty has been overcome by the use of heavy, rigid jigs built of welded steel pipe into which the wing is locked tightly around its outer edges. In this position it is easier for crews of men and women to get at the inner structure and to work on the outer skin. To keep the jig from swinging as it moves down the line, fingers from the lower edge travel along a channel mounted on the floor exactly under the overhead monorail. Power for the line is supplied by a chain traveling in this channel and engaging the fingers.

The jig is carried on two four-wheel trucks, one at the front and one at the rear, which roll along the lower web of

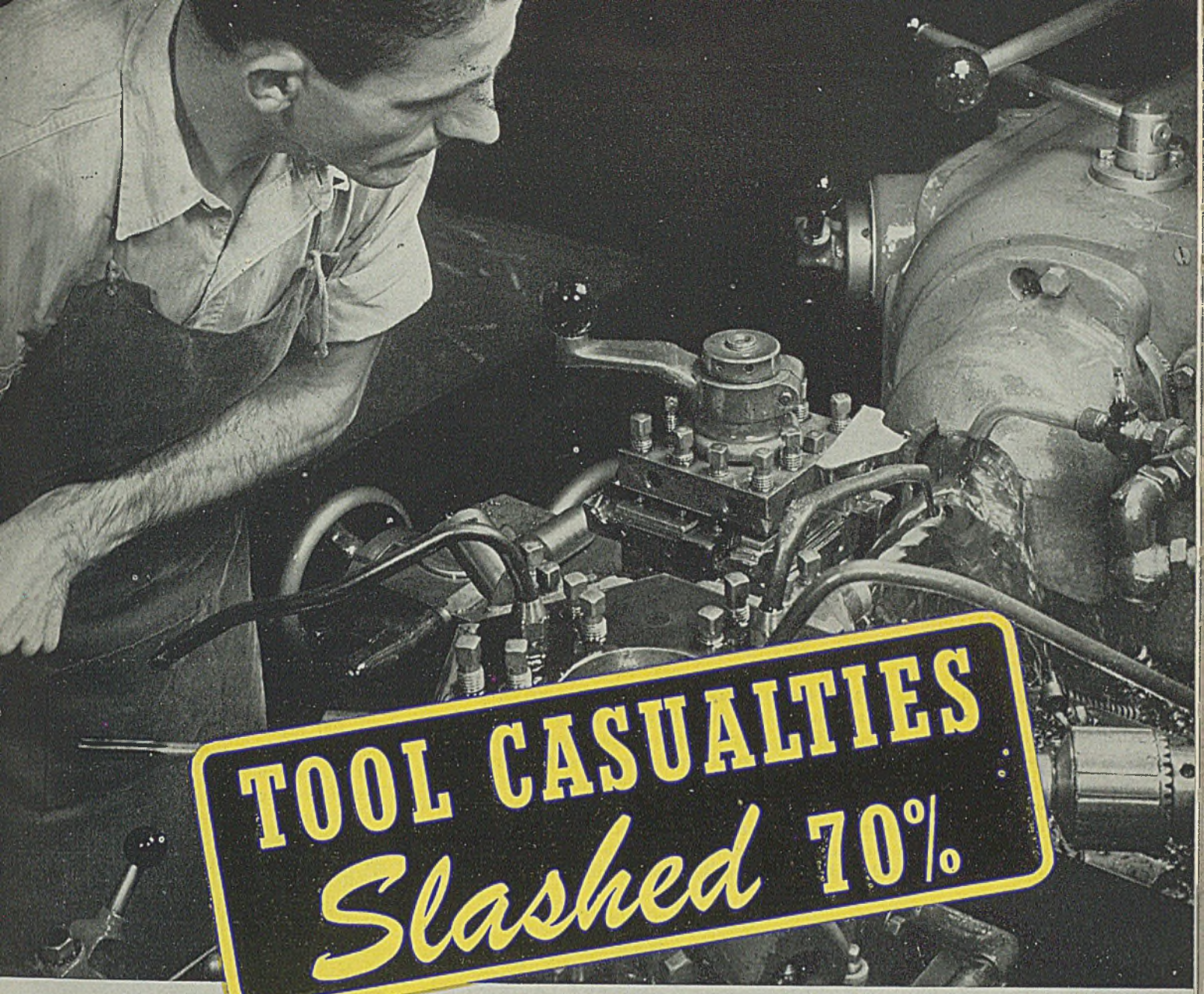




—o—

Before wings are mounted in jigs, component parts and subassemblies are tied together in this department

Closeup of one of the massive wing jigs suspended from overhead monorail and propelled by conveyor chain in floor track. Markings on top cross members are reference stations opposite various wing ribs



SUNICUT

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Wings travel in jigs around these two adjoining closed tracks, one for right and one for left wings, before being transferred to flat jigs for final installations and painting

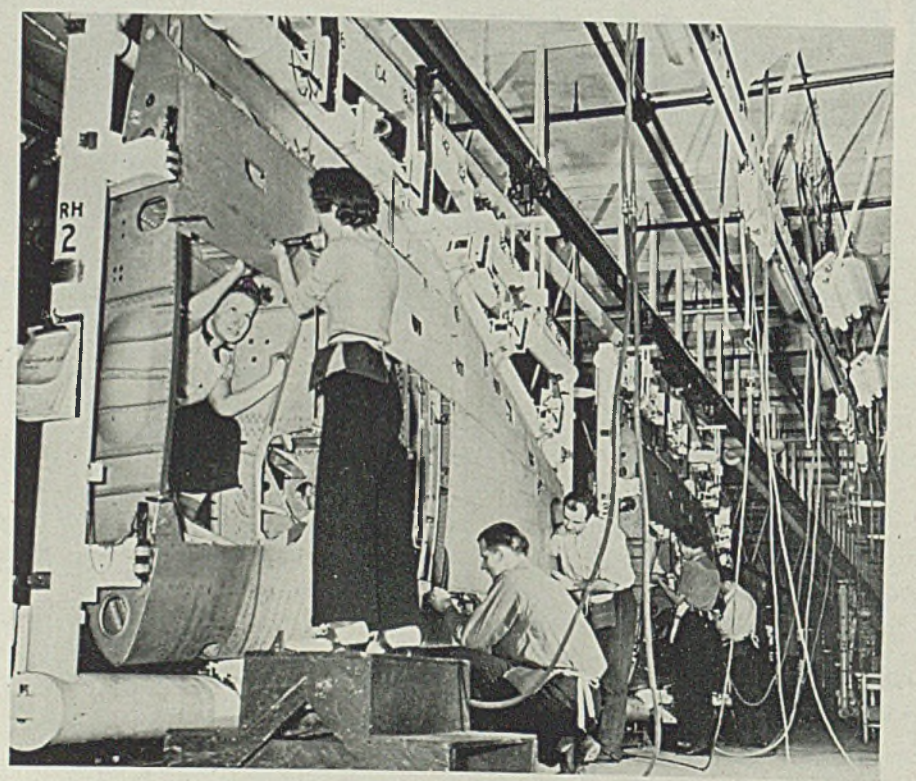
the I-beam monorail section. Two U-shaped straps form a sling to carry the upper cross member of the jig, and these straps are bolted to a steel plate which in turn is suspended from the wheel unit.

Emerging from the flat jigs, the wing is transferred to a nearby elevator and lowered a few floors to a balcony overhanging a spur track, where a crane lowers the wing to box car level, and it is stowed away for shipment to the plane assembly plant.

Advantages of the conveyorized system include the fact that it is possible to train production workers in single skills rather than the entire cycle of operations; also the conveyor line provides a uniform production flow, and gears attendant functions—inspection, materials handling, maintenance—into the cardinal production operation itself.

If sufficient space on a single floor were available it might be possible to assemble these wing sections in a single jig, but the limitations on plant space and the multitudinous construction of the Murray plant dictated the transfer from one system to another as the most expedient method.

It might be noted, too, that the suspended jigs are all painted white and would not be readily usable in operations involving spray painting. Along the top beam of the jig are painted figures denoting in inches the distance of that point from the left end of the jig. These points correspond with the vertical rows of rivets in the wing or with the wing ribs and thus provide reference stations for workmen, inspectors, etc.



Vertical jigs, built up from heavy sections of welded steel pipe, provide better accessibility for men and women assemblers, and also require less floor space to handle a given volume of production

5489 Planes in December; Engine Schedules May Be Reduced

Recent disclosures by WPB Chief Nelson that December output of all types of aircraft totaled 5489 was high tribute to the 100 plants assembling airplanes in this country, and their 20,000 suppliers, but it also brought to light the difficulties of keeping the aircraft program in balance as it grows to ever larger proportions. One month it will be a shortage of propellers, or a shortage of government furnished components; the next month it may be a shortage of engines, and the next month a shortage of airframes—wings and fuselages.

Mr. Nelson pointed out that at the moment the engine picture appears out of balance; that is, too many engines for the number of planes being scheduled. This was hinted at here recently in an analysis of projected engine production which is heading toward a figure of 75,000,000 horsepower a month by the end of the year.

If the December production figure of 5500 planes is related to engine requirements by taking 3000 horsepower as the average unit requirement—and this is probably high because of the large proportion of trainer planes in total production—and if on top of this is added a 100 per cent replacement figure, an indicated monthly horsepower requirement of 33,000,000 is obtained. On this basis we could be producing 10,000 planes a month, and projected engine horsepower production would still be far in excess of requirements, with 100 per cent replacements figured in as well.

The suggestion was inferred at Washington that there may be some temporary cutbacks in engine schedules shortly, because the problem of storing these power plants, awaiting installation in assembled

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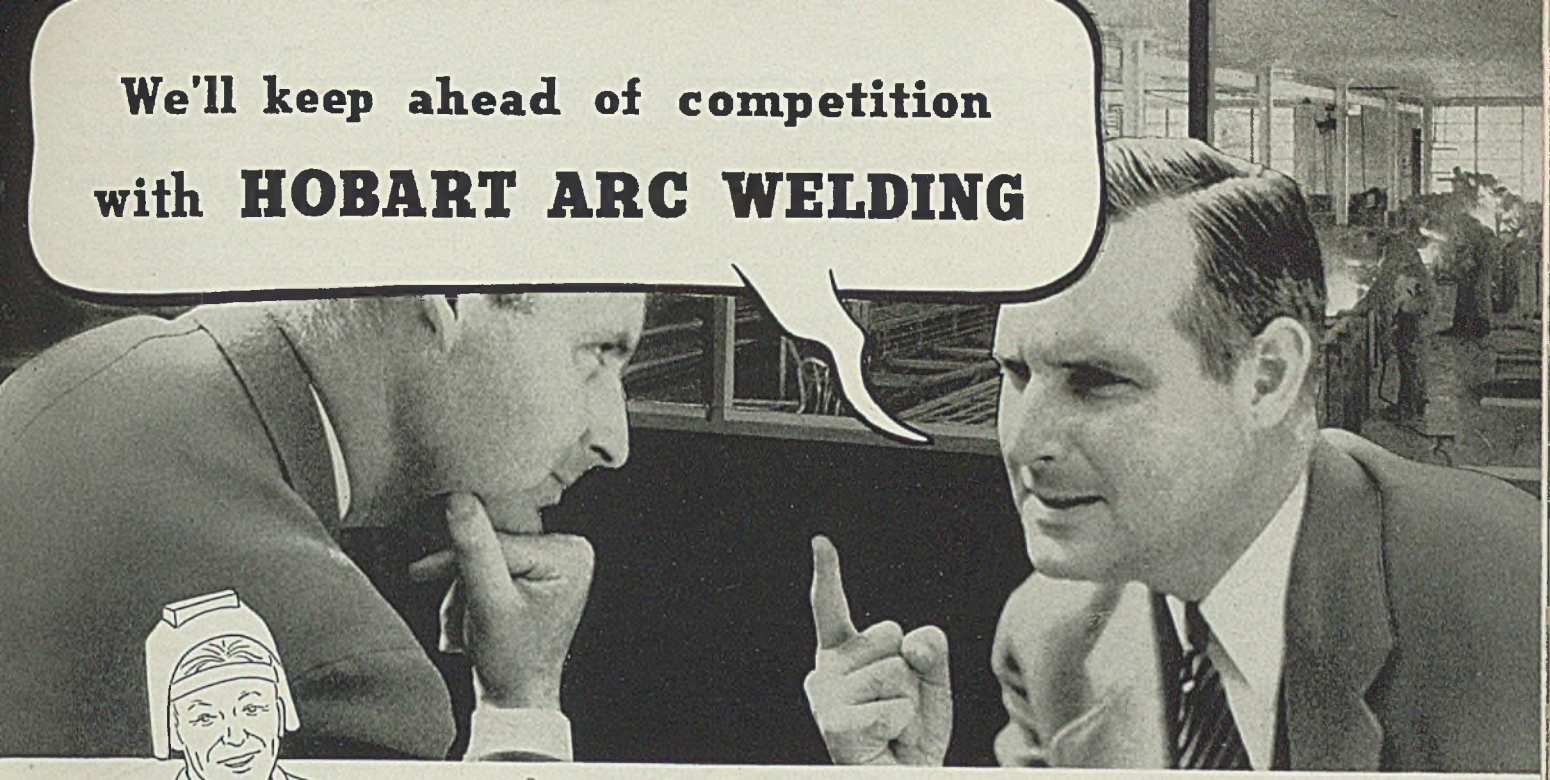

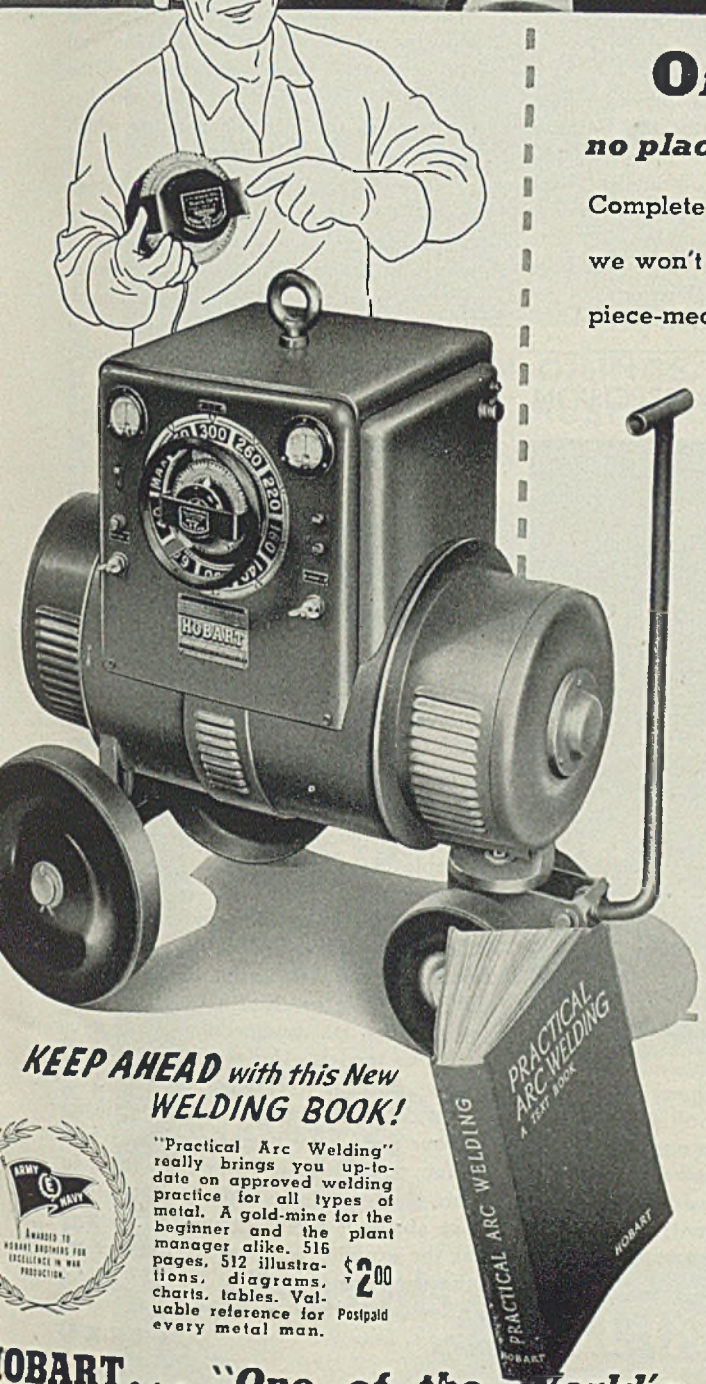

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planes, is a critical one, as in fact is the storage of a hundred and one other items of airplane and ordnance production at the moment.

Hi-Shear Rivet Shows Triple Strength of Regular Type

Just announced by North American Aviation Inc., Inglewood, Calif., is a new type of superhard rivet, said to be strong enough to replace bolts on aircraft and other structures, which already has resulted in considerably lightening the weight of the "laminar flow" wings going into North American P-51 Mustang fighter planes.

Use of the new rivets is claimed to effect a 60 per cent weight reduction in relation to equivalent bolts and rivets previously used, and they show a shear strength of 75,000 pounds per square inch, compared with shear strength of 25,000 pounds per square inch for a normal rivet. Nearly 1000 of the new rivets, installed five times faster than bolts, are used in the Mustang wing.

The secret of the rivet is in the method of installation. Too hard to be driven in the usual manner, the Hi-Shear rivet is forced into place by a special tool which presses a small aluminum alloy collar into the notched end of the rivet stud, leaving a modified conical head. Excess length of the collar is sheared off automatically by the tool.

Curiously, the rivet was developed by a North American engineer named George Wing, who also designed the tool used to set it. It is made with two styles of heads, in several diameters and in lengths to suit all conditions.

Here is one to clip for your "future reference" file: Engineers of Consolidated Aircraft Corp., according to T. M. Girdler, chairman of the board, are now working on a new large plane that can carry 400 passengers across the Atlantic at "fantastic" speeds and also can make nonstop trips as a bomber to Europe and return. This one will have to be saved for the next war, presumably, for it is unlikely such an air leviathan could come even remotely close to being built and test flown inside of five years.

No "Deadheads" on Return Flights for Ferry Command

On return flights from delivering personnel and material to the fighting fronts, Army and Navy planes of the Ferry Command are bringing back strategic materials—limited in amounts but nevertheless vital supplies. To date not one pound of such cargo has been lost, according to official reports.

From China, these planes are bringing in cargoes of such commodities as bristles, tungsten, silk and tin, in that order of priority.

Recently on sale in this country have been supplies of rubber overshoes, made in Rio de Janeiro, and vulcanized pure para gum rubber. Despite a price of about twice that of United States made overshoes, produced from reclaim rubber stocks, the Brazilian product has had wide acceptance.

GMC Aircraft Manager Says Fluid Production Is Necessary

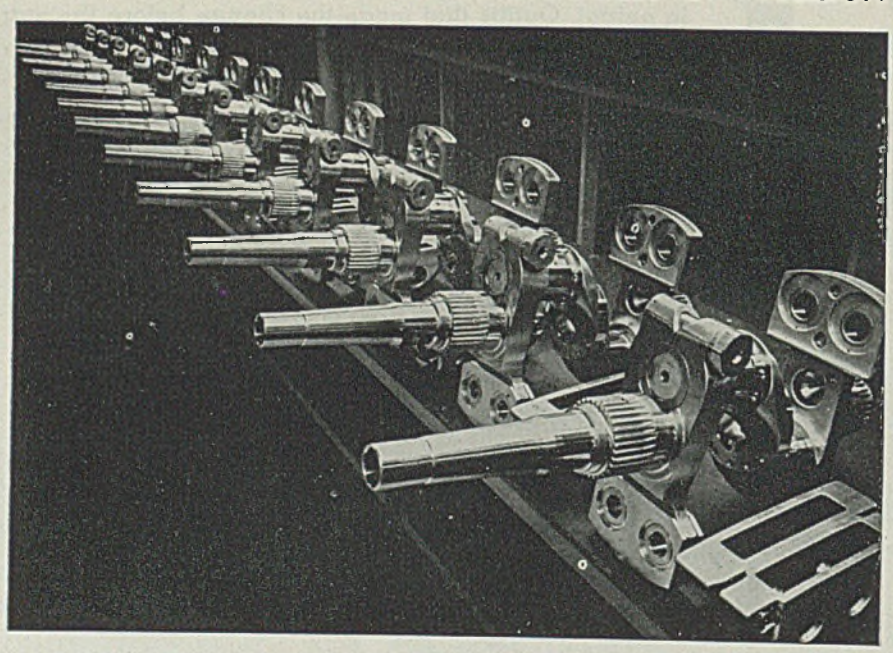
Here is some factual comment on aircraft production by L. C. Goad, general manager of the Eastern Aircraft Division of General Motors, who formerly operated an AC Spark Plug plant: "The problems of fluid design in aircraft are, I believe, one point where the automobile industry in the beginning had no real appreciation of what was involved in the manufacture of airplanes. Therein lies the basis of the misunderstanding which at one time existed so strongly.

"Jake Swirbul of Grumman warned me at the start to be careful that we didn't overtool and gave me the reason why. As sound as his reasoning seemed, it was a great temptation not to go ahead. Everything we touched, everything we looked at, seemed so easy to improve.

"Our first real shock came with a change notice from the Navy requesting the removal of two of six items in one of the major components of the ship (a dive bomber). The difference in the cost of the finished airplane, with and without these two items, amounted to about $10—certainly an innocent looking change notice. Further analyses brought to light the fact that more than 50 per cent of the tools and jigs required in the manufacture of that major component would necessitate major reworking or which have to be scrapped entirely. Some 4000 production operations would be affected by the change.

"We received this notice before we had completed our first plant and the change had to become effective on the tenth ship . . . Actually we picked up that change, corrected our tools and jigs, and never lost a day on our production schedule. We have received and incorporated more than 100 engineering changes in our two models (this was a month ago; some of them retroactive to ships long since delivered to the Navy. A great many of our parts have been tooled twice and a fair percentage of them three times in this short period. This condition will not abate; it will continue just so long as the experience of our airmen dictates the need for change."

AVIATION CRANKSHAFTS ARE MASTERPIECES OF PRECISION



TWO-THROW aviation crankshafts for 14-cylinder radial engines await final inspection on benches at Ohio Crankshaft Co., Cleveland, a small portion of a day's output. In each unit more than 100 dimensions are held to one-thousandth of an inch or less. Bearing surfaces have a finished smoothness of four micro (millionths) inches. More than 600 machine operations are necessary in producing each shaft. Each is composed of three major sections: Front, middle and rear. Note "floating" counterweights—to dampen engine vibration—shown dismounted beside each shaft

HOW TO SOLVE

Operating Problems with *Correct Lubrication*

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

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PROBLEM: That red film of oil you see on the journal above is ample—at the time the bearing is oiled. But before the next application, the oil will drain off. Just a tissue-thin film — boundary lubrication — will remain. If you use ordinary mineral oil the film may not stand up. Metal-to-metal contacts between journal and bearing may result. Bearings fail. Important machines stop producing.

ANSWER: There is an oil specially made to meet this problem. It is called Gargoyle Vactra Oil. It has an extremely tenacious, persistent film that resists wiping action and rupture even when a film of microscopic thickness remains. Wear, temperature rise and power consumption are minimized with an extremely small supply of this oil. You are assured dependable operation and economy, too.

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H. E. Bakken
C. H. Benedict
W. R. Brode
H. W. Gillett
R. P. Heuer
J. H. Romann
C. H. Schneider
A. E. Schuh
G. E. Seil
R. K. Waring
F. W. Willard
A. J. Williamson

E. C. Bain
G. L. Craig
Howard C. Cross
J. H. Humberstone
A. B. Kinzel
Clarence H. Lorig
H. S. Lukens
G. S. Mikhalapov
Chas. S. Pearce
V. H. Schnee
A. E. Schuh
Cyril Stanley Smith
Jerome Strauss

Conservation & Substitution Group
Zay Jeffries, Chm.

Ferrous Minerals & Ferro Alloys Group
G. E. Seil, Chm.

Non-Metallic Minerals Group
R. P. Heuer, Chm.

Tin Smelting & Reclamation Group
F. W. Willard, Chm.

Alumina Group
J. D. Sullivan, Chm.

This chart, prepared by the War Metallurgy Committee, National Academy of Sciences, outlines the organization set up to aid the War Production Board by means of research and metallurgical knowledge. *See article on the following page*

War Metallurgy Group Completes 150 Reports on Technical Problems

MORE than 150 research reports on technical and production problems related to the war effort have been completed so far by the War Metallurgy Committee of the National Research Council, National Academy of Sciences.

The chart, opposite page, shows the organization of the committee and its close connection with other organizations having to do with war production.

Following is a list of the membership of the committee, and also the personnel of its Advisory Committee on Metals and Minerals:

WAR METALLURGY COMMITTEE

Clyde Williams, chairman; director, Battelle Memorial Institute Columbus, O.
Zay Jeffries, vice chairman; technical director General Electric Co., Cleveland.
Louis Jordan, executive secretary; War Metallurgy Committee, 2101 Constitution avenue, Washington.
Carl Breer, vice president, Chrysler Corp., Detroit.
Lyman J. Briggs, director, Bureau of Standards, Washington.
James H. Critchett, vice president, Union Carbide & Carbon Research Labs., New York.
Col. R. S. A. Dougherty, manager research and development, Bethlehem Steel Co., Bethlehem, Pa.
Rudolph Furrer, vice president, A. O. Smith Corp., Milwaukee.
H. W. Gillett, Chief technical advisor, Battelle Memorial Institute, Columbus, O.
S. D. Heron, Ethyl Gasoline Corp., Detroit.
R. P. Heuer, vice president, General Refractories Co., Philadelphia.
Col. G. F. Jenks, Taylor Winfield Corp., Warren, O.
J. B. Johnson, chief, materials laboratory, Army Air Forces, Wright Feld, Dayton, O.
John Johnston, director research laboratory U. S. Steel Corp., Kearny, N. J.
T. L. Joseph, head department of metallurgy, University of Minnesota, Minneapolis.
Vsevolod N. Krivobok, director of research, Lockheed Aircraft Corp., Burbank, Calif.
Frederick Laist, vice president, Anaconda Copper Mining Co., New York.
W. K. Lewis, head, department chemical engineering, Massachusetts Institute of Technology, Cambridge, Mass.
C. E. MacQuigg, dean, College of Engineering, Ohio State University, Columbus, O.
C. E. McCuen, vice president, General Motors Corp., Detroit.
Robert F. Mehl, director, metals research laboratory, Carnegie Institute of Technology, Pittsburgh.
Paul D. Merica, vice president, The International Nickel Co. Inc., New York.
Col. S. B. Ritchie, office of chief of ordnance, War Department, Washington.
Gilbert E. Seil, technical director, E. J. Lavino & Co., Norristown, Pa.
Captain Lybrand Smith, office of Co-ordinator of Research & Development, Navy Department, Washington.
Col. A. E. White, director of engineering research and professor of metallurgy, University of Michigan, Ann Arbor, Mich.
F. W. Willard, president, Nassau Smelting & Refining Co., New York.
Robert S. Williams, head, dept. of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.
Col. H. H. Zornig, ordnance department, Watertown Arsenal, Watertown, Mass.

ADVISORY COMMITTEE ON METALS AND MINERALS

Ferrous Minerals and Ferroalloys Group

Gilbert E. Seil, chairman, E. J. Lavino Co., Norristown, Pa.
Ralph Bowman, Republic Steel Corp., Cleveland.
Frederick G. Cottrell, Washington.
James Critchett, Union Carbide & Carbon Research Laboratories, New York.
John V. N. Dorr, The Dorr Co., New York.
Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.
Donnell F. Hewitt, U. S. geological survey, Washington.
John Johnston, U. S. Steel Corp., Kearney, N. J.
Frederick Laist, Anaconda Copper Co., New York.
Enoch Perkins, Mutual Chemical Co. of America, New York.

Metals Conservation and Substitution Group

Zay Jeffries, chairman, General Electric Co., Cleveland.
Paul D. Merica, vice chairman, International Nickel Co., New York.
W. H. Eisenman, secretary, American Society for Metals, Cleveland.
Robert S. Archer, Republic Steel Corp., Chicago.
E. W. Bennett, Dow Chemical Co., Midland, Mich.
A. L. Boegehold, General Motors Corp., Detroit.
S. K. Colby, Aluminum Co. of America, Pittsburgh.
Lieut.-Col. G. L. Cox, ordnance department, Watertown Arsenal, Watertown, Mass.
D. K. Crampton, Chase Brass & Copper Co., Waterbury, Conn.
Lieut.-Col. L. S. Fletcher, Frankford Arsenal, Philadelphia.
John R. Freeman Jr., American Brass Co., Waterbury, Conn.
James P. Gill, Vanadium-Alloys Steel Co., Latrobe, Pa.
H. W. Gillett, Battelle Memorial Institute, Columbus, O.
W. C. Hamilton, American Steel Foundries, East Chicago, Ind.
Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.
John Johnston, U. S. Steel Corp., Kearny, N. J.
T. L. Joseph, head, department of metallurgy, University of Minnesota, Minneapolis.
Robert H. Leach, Handy & Harman, Bridgeport, Conn.
Robert F. Mehl, Carnegie Institute of Technology, Pittsburgh.
W. M. Peirce, New Jersey Zinc Co., Palmerton, Pa.
Albert J. Phillips, American Smelting & Refining Co., Barber, N. J.
William B. Price, Scovill Mfg. Co., Waterbury, Conn.
H. S. Rawdon, Bureau of Standards, Washington.
Walter C. Smith, Cerro de Pasco Copper Co., New York.
Jerome Strauss, Vanadium Corp. of America, New York.
W. P. Woodside, Climax Molybdenum Corp., Detroit.
F. W. Willard, Nassau Smelting & Refining Co., New York.

Non-Metallic Minerals Group

R. P. Heuer, chairman, General Refractories Co., Philadelphia.
Paul Tyler, secretary, Board of Economic Warfare, Washington.
L. E. Barringer, General Electric Co., Schenectady, N. Y.
G. A. Bole, Orton Ceramic Foundation, Columbus, O.
B. C. Burgess, United Feldspar & Minerals Corp., Spruce Pine, N. C.
W. S. Landis, American Cyanamid Co., New York.
M. M. Leighton, State Geological Survey Div., University of Illinois Campus, Urbana, Ill.
G. R. Mansfield, U. S. Geological Survey, Washington.
Oliver C. Ralston, U. S. Bureau of Mines, College Park, Md.
Robert B. Sosman, U. S. Steel Corp., Kearny, N. J.
John D. Sullivan, Battelle Memorial Institute, Columbus, O.
Frank J. Tone, Carborundum Co., Niagara Falls, N. Y.
William M. Weigel, Missouri Pacific railroad, St. Louis.
P. B. Wittenberg, International Agriculture Corp., 61 Broadway, New York.

Tin Smelting and Reclamation Group

F. W. Willard, chairman, Nassau Smelting & Refining Co., New York.
P. M. Ambrose, secretary, U. S. Bureau of Mines, Washington.
W. K. Lewis, Massachusetts Institute of Technology, Cambridge, Mass.
M. F. McConnell, Carnegie-Illinois Steel Corp., Pittsburgh.
Walter C. Smith, Cerro de Pasco Copper Co., New York.
John F. Thompson, International Nickel Co., New York.

Alumina Group

John D. Sullivan, chairman, Battelle Memorial Institute, Columbus, O.
F. H. Archibald, American Nephelines Corp., Beverly, Mass.
H. M. Burkey, American Metals Co., New York.
Dr. Arthur Fleischer, Kalunite Co., Salt Lake City, Utah.
Francis C. Frary, Aluminum Co. of America, New Kensington, Pa.
Frederick Laist, Anaconda Copper Co., New York.
Wm. H. Osborne, Phelps Dodge Co., Laurel Hill, N. Y.
Oliver C. Ralston, U. S. Bureau of Mines, College Park, Md.
R. S. Sherwin, Reynolds Metals Co., Sheffield, Ala.

"Postwar Construction To Be Done with Steel"

Structural steel will resume its former role in industrial building just as soon as material shortages permit, Harold K. Ferguson, president of H. K. Ferguson Co., industrial engineers and builders of Cleveland and New York, predicted last week.

"Use of timber in war construction is an emergency expedient, and in most instances is highly successful, as well as economical, because of the temporary nature of many of the structures being erected," he said.

"However, I believe engineers and builders will return to steel frame construction when they begin on permanent, postwar facilities for American manufacturers. In fact, we likely will use it in just about the same ratio as we did in the days before the war."

MEN of INDUSTRY

I. H. ANDERSON

G. M. BUTLER JR.

W. R. HAMILTON

A. C. MOORE

I. H. Anderson has been named district manager of sales, Steel and Tubes Division of Republic Steel Corp. in New York, succeeding **L. M. Hogan**, resigned. Mr. Anderson joined the Cleveland plant of Steel and Tubes as a sales apprentice. Following graduation from sales apprentice school, he entered the general sales office and since then has been associated with the offices at Detroit, Hartford, Conn., Philadelphia, and for the past six years in New York.

D. A. Shardelow, associated with Republic's office at Dayton, O., since 1936, has been transferred to Indianapolis as district sales manager. Prior to joining Republic he was purchasing agent, Dayton Malleable Iron Co.

—o—

Edna G. Swift has been elected president, Ohio Machine Tool Co., Kenton, O., succeeding her husband, the late Charles C. Swift.

—o—

Herman Franck, general superintendent at the Dunkirk, N. Y., plant of American Locomotive Co., has been made plant manager. **Eugene Murphy**, superintendent of the plate shop, succeeds Mr. Franck as general superintendent.

—o—

James H. Deaderick, since February, 1941, assistant general parts manager, Caterpillar Tractor Co., Peoria, Ill., has been named a vice president, with administrative direction of the parts, service and traffic departments.

—o—

William G. Roby, vice president and general manager, Cinch Mfg. Corp., Chicago, has been elected president, succeeding **Arthur W. Kimbell**, resigned. He has been associated with the company 32 years. **Joseph J. Steffen** succeeds Mr. Roby as vice president and general manager. Since 1928 the company has been a wholly-owned subsidiary of United-Carr Fastener Corp., Cambridge, Mass., of which Mr. Kimbell is president.

—o—

Dr. G. M. Butler Jr., formerly research engineer in Dunkirk, N. Y., laboratories of Allegheny Ludlum Steel Corp., has been named chief metallurgist in charge of technical control and research. **R. T. Eakin** has been appointed assistant metallurgist at the Dunkirk plant. Before becoming a research engineer on internal combustion engine valve steels at Allegheny Ludlum, Mr. Butler was associated with the United States Bureau of Mines and Climax Molybdenum Co.

—o—

E. R. Coyle, purchasing agent, Diamond Magnesium Co., Painesville, O., has been promoted to secretary and assistant treasurer. **S. C. Nicholls**, auditor, has become treasurer and assistant secretary, and **Frank J. Blazina**, personnel director.

—o—

Harvey H. Brown Jr. has been elected president and treasurer, Cleveland Hobbing Machine Co., Cleveland. **George C. Johnson**, president, Enamel Products Corp., who accepted the added responsibilities of president of Cleveland Hobbing Machine last October, has been elevated to chairman of the board.

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F. Emery Garriott, formerly research engineer in charge of research and development of arc-welding electrodes for A. O. Smith Corp., Milwaukee, has been transferred to the company's Houston, Tex., works as divisional superintendent of the Weldrod plant.

—o—

Richard Calvert, sales representative in eastern and central Pennsylvania for Carpenter Steel Co., Reading, Pa., has retired after 30 years' service with the company. **Avard Taylor**, who has been working with Mr. Calvert, will continue in the territory.

—o—

W. R. Hamilton has been promoted to plant manager of Northern Aircraft Products Division of Aviation Corp., at Toledo, O., and **A. C. Moore** has been advanced to plant manager of Republic Aircraft Products at Detroit. Mr. Hamilton, heretofore plant manager of Republic Aircraft Products at Detroit, will direct final tooling and initiate large-scale production at the new Northern Aircraft Products plant at Toledo. Mr. Moore, who replaces Mr. Hamilton at Detroit, was formerly production manager at American Propeller Corp., Toledo, O., subsidiary of Aviation Corp.

—o—

Ernest Jones has been named head of the steel melting department of No. 2 plant, Isaacson Iron Works, Seattle. He formerly was associated with a large plant directing steel production for making field and antiaircraft guns.

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William MacMurtrie has been named assistant general purchasing agent, Philco Corp., Philadelphia. Associated with Philco eight years, Mr. MacMurtrie has recently been serving as purchasing coordinator for subcontracts.

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Richard A. Hutchinson, vice president Studebaker Corp., has been elected a director, Visible Index Corp., New York.

—o—

J. T. Schless, president, Schless Construction Co. Inc., Chicago, has been elected executive vice president and general manager, Dachel-Carter Shipbuilding Corp., Benton Harbor, Mich.

—o—

John W. Rogers has been appointed sales manager, Glass Refractories Division, Laclede-Christy Clay Products

Co., St. Louis, succeeding the late John H. McKelvey. Mr. Rogers has been in the Glass Refractories Division since February, 1926, and for several years had been Mr. McKelvey's assistant. All sales divisions of the company are under direction of **A. H. Killinger**, vice president.

—o—

Capt. Nelson W. Pickering, USNR, has resigned as president, Farrel-Birmingham Co. Inc., Ansonia, Conn., to reenter active service in the United States Navy. He will be attached to the Third Naval District at New York, in charge of operations of district patrol vessels.

—o—

Commander R. E. W. Harrison, U.S.N., who returned in July, 1942, to Chambersburg Engineering Co., Chambersburg, Pa., in temporary inactive duty status, has been recalled to active duty and will be in the office of the Under-

COMMANDER R. E. W. HARRISON

Secretary of the Navy, serving directly under **Admiral H. G. Bowen**. Commander Harrison has been associated with Chambersburg Engineering as vice president since 1934 and also has been a member of Clarke-Harrison Inc., Philadelphia, management engineers.

—o—

Dan R. Rankin has been appointed acting chief engineer, Peerless Pump Division, Food Machinery Corp., Los Angeles. He has been associated with Peerless the past five years and previously was assistant to the chief engineer.

—o—

Dr. Richard J. Bennett Jr. has been appointed chief surgeon, Chicago district, Carnegie-Illinois Steel Corp., succeeding **Dr. Philip H. Kreuscher**, who is retiring to devote his time to private interests. Dr. Bennett has been

CAPT. N. W. PICKERING

associated with Carnegie-Illinois since January, 1937, when he was named associate chief surgeon.

—o—

Murray Ireland has been elected vice president in charge of production, Toastmaster Products Division of McGraw Electric Co., Elgin Ill. He joined the organization in 1925 as designing engineer.

—o—

Chester F. Conner, manager of distributor sales, Industrial Products Division, B. F. Goodrich Co., has been appointed to the staff of advisers on mechanical rubber goods in the Office of Rubber Director, War Production Board, Washington.

—o—

Thomas R. Vaughan has been elected assistant secretary, Freeport Sulphur Co., New York, and its subsidiaries, Cuban-American Manganese Corp. and

CHARLES H. EISENHARDT

Who has been elected assistant manager, Electrical, Wire Rope and Construction Materials Sales Division, American Steel & Wire Co., Cleveland, as noted in STEEL, Feb. 1, p. 81

Nicaro Nickel Co. He was assistant counsel and later regional attorney for the former National Recovery Administration. He has been regional attorney also for the Department of Agriculture.

—o—

Edward E. McGinley has been appointed chief metallurgist at the Youngstown district works of Carnegie-Illinois Steel Corp., while **William F. McGarrity** and **A. T. Reichenbach** have been appointed chief metallurgists at Edgar Thomson and Irvin works, respectively.

—o—

Hoy O. McIntire has joined the research staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in metallurgical research and development. He formerly was associated with Carnegie-Illinois Steel Corp. in its Gary, Ind., sheet and tin mills.

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Henry S. Deichert, assistant to the manager in charge of plant facilities, Consolidated Aircraft Corp., Fort Worth, Tex., has been named factory manager for the Eastern Division of Vultee Aircraft at Allentown, Pa.

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Carl J. Meister, formerly field sales manager for Allen Mfg. Co., Hartford, Conn., has been appointed manager of sales of the Atlas Metal Stamping Co. and Atlas Tool & Designing Co., Philadelphia. Well known to the machine tool and industrial manufacturing fields which he has served 18 years, Mr. Meister will now contact the aviation, machine tool, instrument and metal industries.

—o—

Roger Lewis has been named director of materiel, Materiel office, Lockheed Aircraft Corp., Burbank, Calif. Procurement activities within the Materiel Office will be under direction of **James E. Blaine**, chief of procurement, who will have as his assistants, **H. G. Howard**, purchasing agent, and **C. I. Sweet**, manager of outside production.

—o—

Arthur Hjortsberg, assistant division superintendent, central mills, Gary works of Carnegie-Illinois Steel Corp., has been appointed division superintendent of these mills, succeeding **R. F. Campbell**, retired. **Edwin H. Gott**, heretofore assistant division superintendent of maintenance, has been made assistant division superintendent, central mills. **Leroy J. Eddy**, assistant chief engineer, has become assistant division superintendent of maintenance, and **J. Donald Rollins**, project engineer, has been advanced to assistant chief engineer.

George Chacharis, appropriation con-

trol and project engineer, has been named project engineer; **George P. Burks**, second assistant superintendent of blast furnaces, has been made first assistant superintendent of blast furnaces, succeeding the late C. V. Lauer; **Raymond W. Sundquist**, assistant to superintendent of blast furnaces, has become second assistant superintendent of blast furnaces.

—o—

Fred J. Robbins, metallurgical engineer, Bliss & Laughlin Inc., Harvey, Ill., has been elected vice chairman, Chicago chapter, American Society for Metals, succeeding **Fred C. Smith**, resigned. Mr. Smith, formerly field metallurgist, Carnegie-Illinois Steel Corp., Chicago, recently became chief metallurgist, Tube Turns Inc., Louisville, Ky.

—o—

Arthur I. Wallace, member of the field staff, Industrial Salvage Division, WPB, Chicago, has been made regional director, succeeding **Harvey T. Hill**, resigned. **William N. Mitchell**, manager of materials redistribution, has been appointed assistant regional director of WPB. **Paul Jenkins**, former assistant to Mr. Hill, will succeed Mr. Mitchell as Chicago district manager and acting regional manager of redistribution. **H. E. Blanchette**, formerly on the industrial salvage field staff, has become Illinois district director of industrial salvage, and **D. W. Walters** formerly district manager of WPB at Eau Claire, Wis., has been named assistant regional deputy for the division of production services and smaller war plants.

—o—

Howard Kellogg Jr. has been elected executive vice president, Spencer Kellogg & Sons Inc., Buffalo. He joined the company in 1928 as a helper in the Buffalo plant's maintenance department.

—o—

Fred W. Climer has returned to the Goodyear Tire & Rubber Co., Akron, O., as assistant to the president, after three and a half months with the War Production Board, Washington, where he was in charge of WPB staff assigned to joint labor-management production drives. In his new position, Mr. Climer will direct all personnel activities of Goodyear Tire & Rubber and Goodyear Aircraft Corp. **R. S. Pope** will remain as director of personnel for Goodyear Tire & Rubber.

—o—

C. V. Briner has become associated with Pipe Machinery Co., Cleveland, in an executive position in the precision gage and tool division. Educated at Ohio State University and a lieutenant in the Army in the first World War, Mr. Briner was with Pratt & Whitney for 20 years. He is a national director, American Society of Tool Engineers.

—o—

Nevin E. Funk, vice president in charge of engineering, Philadelphia Electric Co., Philadelphia, has been nominated for the presidency of American Institute of Electrical Engineers, New York. Other nominees for the offices becoming vacant Aug. 1 are: Vice presidents, middle eastern district, **W. E. Wickenden**, president, Case School of Applied Science, Cleveland; southern district, **C. W. Ricker**, professor and head of School of Electrical Engineering, Tulane University, New Orleans; north central district, **L. A. Bingham**, assistant professor of electrical engineering, University of Nebraska, Lincoln, Nebr.; Pacific district, **J. M. Gaylord**, chief electrical engineer, metropolitan water district of southern California, Los Angeles; Canada, **W. J. Gilson**, general manager, Eastern Power Devices Ltd., Toronto, Ont.

Directors: **C. M. Laffoon**, engineering manager, A. C. generator engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; **C. W. Mier**, engineer, Southwestern Bell Telephone Co., Dallas, Tex.; **S. H. Mortensen**, chief electrical engineer, Allis-Chalmers Mfg. Co., Milwaukee. National treasurer, **W. I. Slichter**, professor emeritus of electrical engineering, Columbia University, New York.

OBITUARIES . . .

Harry D. Siegele, for 40 years associated with the Belmont Iron Works, Philadelphia, as structural engineer, salesman, and the past three years as director of the company, died Jan. 31.

—o—

Samuel G. McCausland, 42, construction engineer, Inland Steel Co., Chicago, was killed Feb. 2 while working inside a new blast furnace which the company is building at its Indiana Harbor works for Defense Plant Corp.

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P. C. McLachlan, 68, comptroller and treasurer, Canadian Car & Foundry Co., died in Montreal, Que., Feb. 1.

—o—

J. Willis Gardner, 79, chairman of the board, Gardner-Denver Co., Quincy, Ill., died in that city, Feb. 1.

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William Jordan, 74, inventor of metal tubing machines and organizer and head of Jordan Welding & Mfg. Co., Cleveland, died recently.

—o—

Mason Hulett died in Washington, Feb. 7. He had been in Washington the past several weeks as chief, industrial gear and speed reducer unit, Material Handling Equipment Branch, War Production Board. Mr. Hulett was well known throughout the industry, having been for a number of years with the Falk Corp. and more recently with the New York office of Farrel-Birmingham Co.

—o—

Theodore A. Willard, 80, inventor of storage batteries, and founder of the Willard Storage Battery Co., Cleveland, died Feb. 3 at his home in Beverley Hills, Calif., where he had lived in retirement the past 15 years.

—o—

DeWitt C. Morrow, 62, Buffalo resident salesman for Carnegie-Illinois Steel Corp., died Feb. 8. He joined American Sheet & Tin Plate Co. in 1904 and in 1911 was sent to Buffalo as district resident salesman. When the company was absorbed by Carnegie-Illinois he continued in that position.

—o—

Samuel Byron Fortenbaugh, 73, retired General Electric Co. engineer, died Feb. 6, in Glens Falls, N. Y. Except for a brief period he had been continuously associated with General Electric from 1906 until his retirement in 1932.

—o—

Gustave R. Fernlund, 51, foundry engineer, Forest City Foundry Co., Cleveland, died in that city, Feb. 7. He had been associated with the industry 21 years.

—o—

S. P. Larsen, 44, southern California district sales engineer for Hubbard & Co., Oakland, Calif., the past nine years, died in an automobile accident Jan. 2.

—o—

Earl F. Hauserman, 58, president, E. F. Hauserman Co., Cleveland, died Feb. 8, in that city.

—o—

William J. Harris, 68, vice president in charge of purchases, American Car & Foundry Co., New York, and its subsidiaries, since June, 1933, died recently at his home in East Orange, N. J. He hade been associated with the company and its predecessors more than 50 years.

For doing its part in helping keep America's tanks and tank destroyers moving, Bryant Heater Co., Cleveland, receives the "E" award, right

Col. H. W. Schmid, U. S. Army, pins "E" button on Johnnie Bell, employe of Babcock & Wilcox Co.'s Augusta, Ga., works, below

Three plants of Fairbanks, Morse & Co. received the production pennant during the past month. Pictured above are officials at the presentation in the Beloit, Wis., works

Employes' wives were invited when Cleereman Machine Tool Co., Green Bay, Wis., received the award. Photo, at left, shows employes lined up to receive "E" pins

Dominion Provides Billion-Dollar Lend-Lease for United Nations

TORONTO, ONT.

CANADA will enter upon a lend-lease program and will finance to the extent of $1,000,000,000 the war needs, armaments, war materials, clothing and food, of the United Nations during the fiscal year beginning April 1, 1943. The gift or loan of materials to this amount will be made available through the Canadian War Supplies Association Board, composed of five cabinet ministers, J. L. Ilsley, finance minister, announced in the House of Commons. "No financial impediment should be allowed to interfere with this sensible sharing of our war production," Mr. Ilsley stated.

In addition, Canada will provide the United Kingdom with hundreds of millions of dollars for the purchase of essentials in this country. This is the new financial policy adopted by the government to make the fullest possible use of the Dominion's production, now 70 per cent greater than the requirements of the Canadian armed forces. It replaces the billion dollar gift of last year, described as a gift to Britain but which actually provided materials in large quantities for Russia, China, Australia, India and other allied countries which shared in the redistribution of Britain's purchases in Canada.

Will Buy War Plants

Mr. Ilsley stated that the Canadian government will purchase Britain's interests in war plants in Canada to a value of more than $200,000,000. These purchases, he explained, will give Canada complete ownership and control of all capital assets provided for under the capital assistance program of the Department of Munitions and Supply.

"It is hoped that as a part of the program of co-ordinated war production in the United States and Canada, and the mutual co-operation which has existed between the two countries, it will be possible to transfer some of our supplies to the United States in order to meet our minimum United States dollar requirements," Mr. Ilsley stated.

Important developments are under way to increase output of iron ore in Canada, adding to the Dominion's mineral production, which last year aggregated almost $565,000,000 in value. New Helen mine, controlled by Algoma Steel Corp., is producing about 500,000 tons of sintered iron ore per year. Steep Rock Iron Mines Co. has completed financial arrangements, mainly with Metals Reserve Co., and other United States interests for developing its ore deposits.

Michipicoten Iron Mines Ltd., owned jointly by Sherritt-Gordon Mines Ltd. and Frobisher Exploration Co. Ltd., is considering concentration and sintering facilities. The company owns Josephine and Ruth mines and the Lucy property which has not been drilled. The properties are about ten miles from the New Helen Mine in the Michipicoten area of Ontario. Plans are being made for mining and milling 750 tons of ore daily, to yield 500 tons of sinter, containing over 60 per cent iron and 9 per cent silica.

Tests by Atlas Steels Ltd., Welland, Ont., and Dominion Foundries & Steel Ltd., Hamilton, Ont., of magnetite ore from eastern Ontario mines of Tomahawk Iron Mines Ltd. indicate it is suitable for electric and open-hearth furnaces.

Prime Minister W. L. Mackenzie King, in an address to Parliament, said Canada's war production is greater than that of any other country in proportion to population. He stated that in 1942 Canada spent $2,100,000,000 on war production, an increase of 159 per cent over 1941.

C. D. Howe, minister of munitions and supply, has announced that war production this year will reach a total of $3,700,000,000. Orders with Canadian shipbuilders now amount to about $1,000,000,000, distributed among 19 major yards and 58 smaller boat works. Small arms ammunition production last year was nearly 1,500,000,000 rounds, more than double 1941 output and production this year is expected to double this.

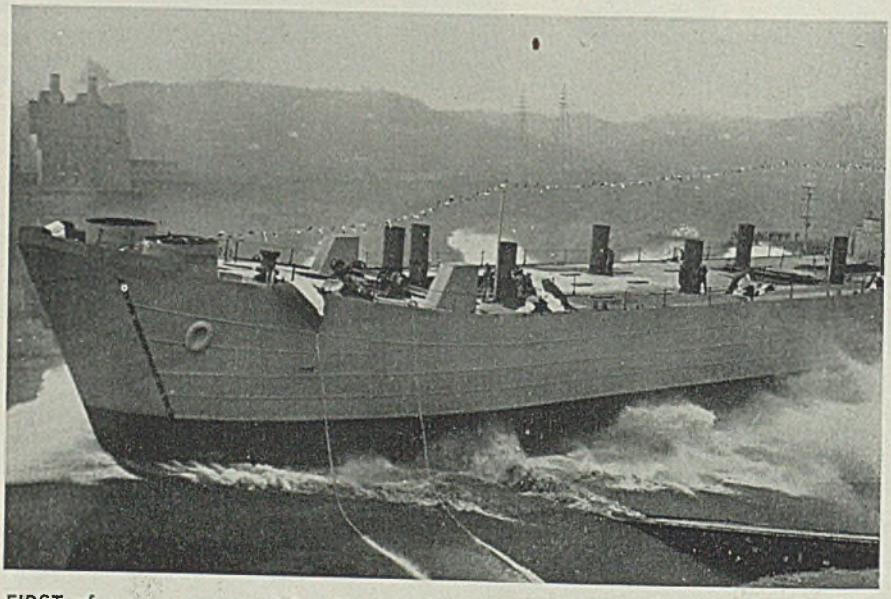
Aluminum Co. of Canada Ltd. has abandoned plans for an aluminum plant in the Kirkland Lake district of Ontario. It has been found the plant would require 100,000 horsepower of electric current, which existing power systems could not supply without seriously interfering with the mining industry of northern Ontario and northwestern Quebec.

United Steel Workers of America employed by the Steel Co. of Canada Ltd., Hamilton, Ont., have applied to the Federal Department of Labor for a board of conciliation to arbitrate its dispute with the company over an election bargaining agent.

A committee of the Independent Majority of the Steel Workers of the Steel Co. of Canada, opposed to the United Steel Workers of America, are carrying on an advertising campaign in the press, setting forth their views on the effort to unionize the plant. According to the Steel Co. of Canada its wage payments are as follows:

Hourly rate	Number employes	Percent
55c and under	410	9.3
55½ to 65c	1,115	25.3
65½ to 75c	869	19.8
75½ to 85c	865	19.8
85½ to $1.00	522	11.9
$1.00½ and over	609	13.9

NEW TANK LANDING CRAFT LAUNCHED IN OHIO RIVER



FIRST of a new type tank-landing ship was launched recently in the Navy shipyard in Ambridge, Pa., operated by American Bridge Co., United States Steel Corp. subsidiary. The craft was completed nine months after construction was started on the shipbuilding plant

Inflationary Influences Threaten War Effort

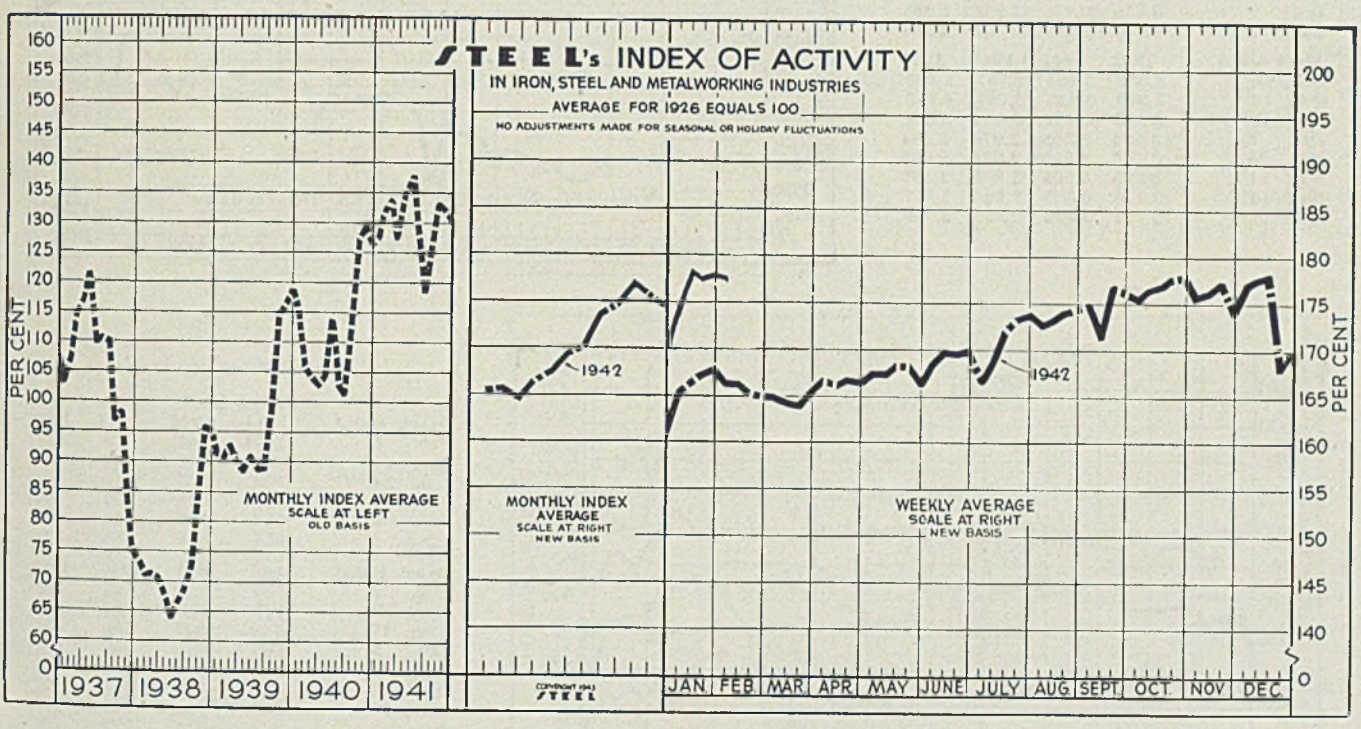
ON a number of home fronts federal stabilization agencies are engaged in a struggle to head off the forces of inflation. A measure of success has attended this effort, although concessions to pressure for greatly expanded war output in the form of wage adjustments, price subsidies for sub-amrginal producers and further upward revisions in general ceiling prices to remove inequalities leave the issue in doubt.

The restraining influence of price controls has been apparent in the moderate gain of 7 per cent throughout 1942 of the Bureau of Labor's wholesale price index and the advance, since Pearl Harbor, of 35 per cent in the general level—less than half the rise in the corresponding period of World War I. Contrary to labor's claim of a 30 per cent increase in the cost of living during the period on which the "Little Steel" wage formula was based, the bureau's index rose only 15 per cent.

Employment figures for December show the steel industry had an average of 633,000 workers and total payroll of $129,368,000, exceeding the former monthly peak of $126,627,000 paid to 635,000 employes in October. For the year, steel's payroll set a new record of $1,467,059,000, 12 per cent over 1941. From December, 1941, to December, 1942, average earnings of employes stepped up from 99.9 cents an hour to 109.4 cents.

STEEL's index of activity in the week ended Feb. 6 stood at 177.5, off fractionally from the previous week. Electric power output during the latest week totaled 3,960,242,000 kilowatts, representing a decrease of approximately 16,000,000 kilowatt hours from the week closed Jan. 30.

Steel ingot production was unchanged at 98.5 per cent of capacity, against 96 per cent a year ago.



STEEL'S index of activity declined fractionally to 177.5 in the week ending Feb. 6:

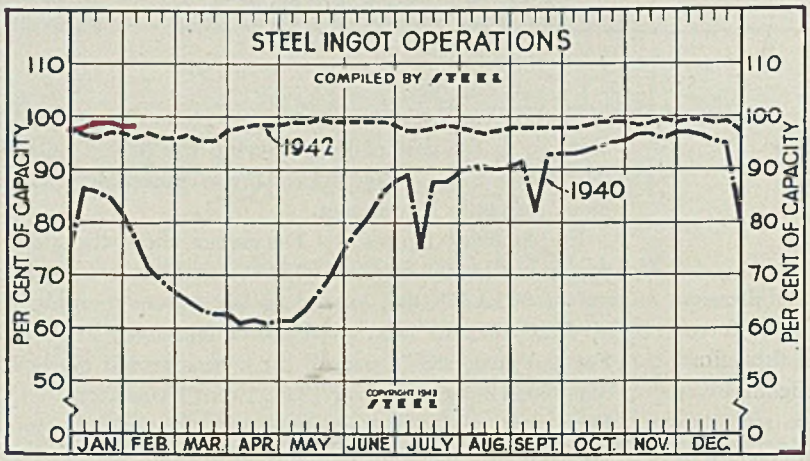
Week Ended	1943	1942
Feb. 6	177.5†	166.3
Jan. 30	177.6	167.9
Jan. 23	177.2	167.4
Jan. 16	177.9	166.6
Jan. 9	175.7	165.6
Jan. 2	170.0	161.0

Week Ended	1942	1941
Dec. 26	167.8	120.5
Dec. 19	178.6	132.9
Dec. 12	177.6	134.0

†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	58.8	48.6	54.6	69.1
Feb.	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	164.6	153.9	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	63.5	54.8	78.6
June	169.4	158.7	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	83.5	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.	175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	174.1	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.8

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production



Steel Ingot Operations

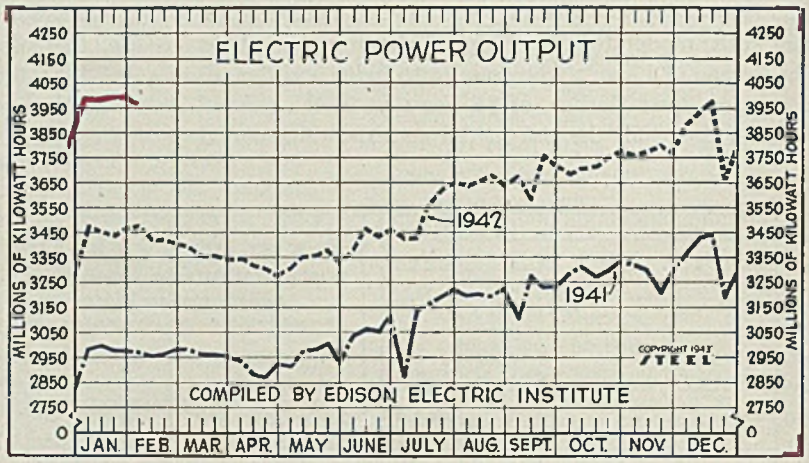
(Per Cent)

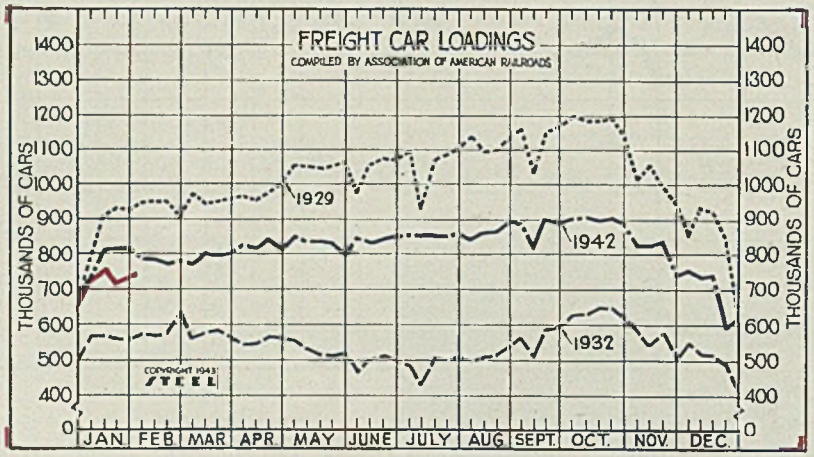
Week ended	1943	1942	1941	1940
Feb. 6	98.5	96.0	97.0	71.0
Jan. 30	98.5	97.0	97.0	76.5
Jan. 23	99.0	97.0	95.5	81.5
Jan. 16	99.0	96.0	94.5	84.5
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5
Dec. 5	99.5	96.5	96.5	94.0
Nov. 28	99.0	95.0	97.0	94.0
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

Electric Power Output

(Million KWH)

Week ended	1943	1942	1941	1940
Feb. 6	3,960	3,475	2,824	2,523
Jan. 30	3,977	3,468	2,830	2,541
Jan. 23	3,974	3,440	2,980	2,661
Jan. 16	3,952	3,450	2,996	2,674
Jan. 9	3,953	3,473	2,985	2,688
Jan. 2	3,780	3,289	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,234	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,938	3,431	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654
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





Freight Car Loadings

(1000 Cars)

Week ended	1943	1942	1941	1940
Feb. 6	747†	784	710	627
Jan. 30	735	816	714	657
Jan. 23	709	818	711	649
Jan. 16	755	811	703	646
Jan. 9	716	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655
Dec. 12	740	807	736	681
Dec. 5	760	833	739	687
Nov. 28	844	866	729	689
Nov. 21	836	799	733	677
Nov. 14	827	884	745	771
Nov. 7	829	874	778	786

†Preliminary.

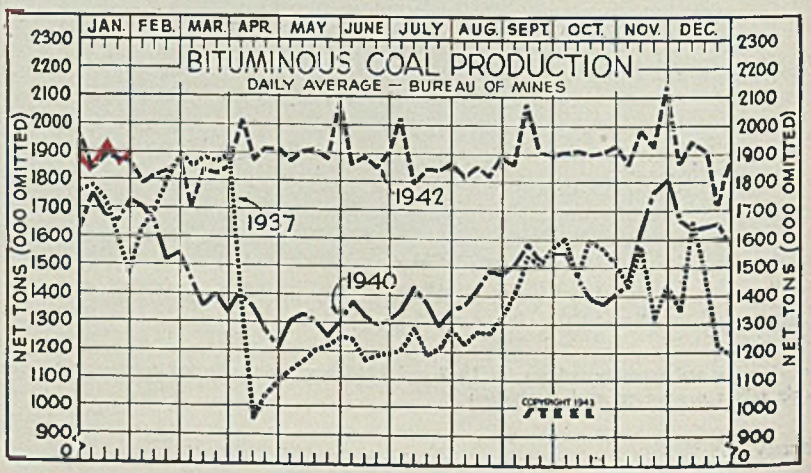
Bituminous Coal Production

Daily Average

Net Tons (000 omitted)

Week ended	1943	1942	1941	1937
Jan. 30	1,887†	1,866	1,684	1,466
Jan. 23	1,867	1,886	1,656	1,605
Jan. 16	1,929	1,883	1,609	1,731
Jan. 9	1,833	1,842	1,691	1,780
Jan. 2	1,860	1,960	1,762	1,764
Week ended	**1942**	**1941**	**1940**	**1937**
Dec. 26	1,714	1,632	1,591	1,230
Dec. 19	1,913	1,792	1,656	1,477
Dec. 12	1,944	1,817	1,645	1,669
Dec. 5	1,853	1,813	1,636	1,347
Nov. 28	2,149	1,958	1,674	1,444
Nov. 21	1,925	1,615	1,815	1,318

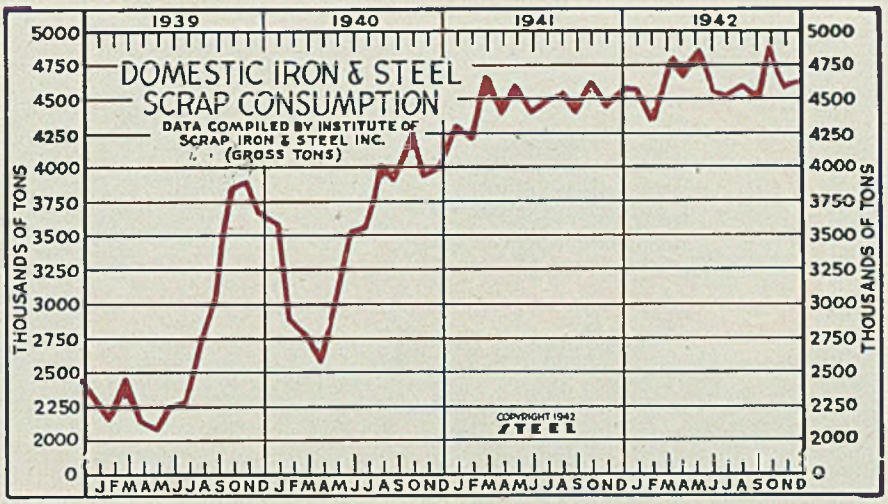
†Preliminary.

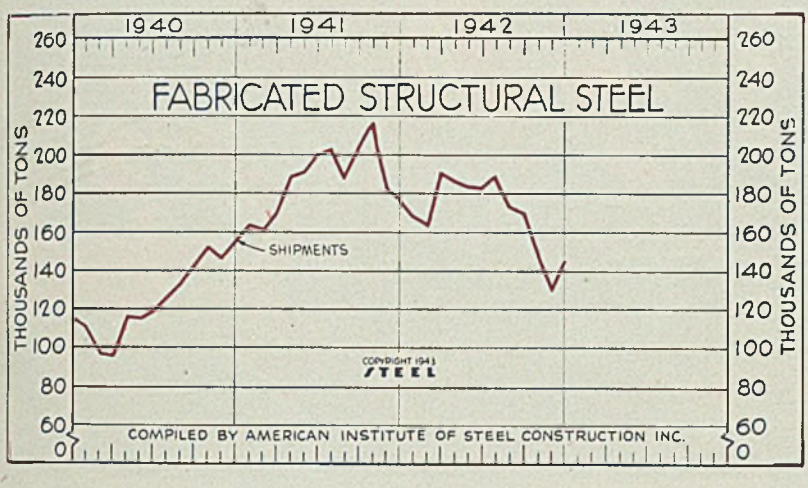


Iron and Steel Scrap Consumption

(Gross Tons)

	1942	1941	1940	1939
	(000 omitted)			
Jan.	4,590	4,278	3,581	2,257
Feb.	4,276	4,172	2,812	2,124
Mar.	4,840	4,662	2,728	2,419
Apr.	4,672	4,406	2,548	2,114
May	4,857	4,609	3,061	2,079
June	4,608	4,406	3,482	2,221
July	4,600	4,415	3,526	2,247
Aug.	4,645	4,518	3,968	2,675
Sept.	4,556	4,392	3,876	3,018
Oct.	4,883	4,649	4,233	3,809
Nov.	4,621	4,482	3,922	3,858
Dec.	4,693	4,634	3,950	3,613
Total	55,841	53,623	41,687	32,434
Mo. Av.	4,653	4,468	3,474	2,703





Fabricated Structural Steel

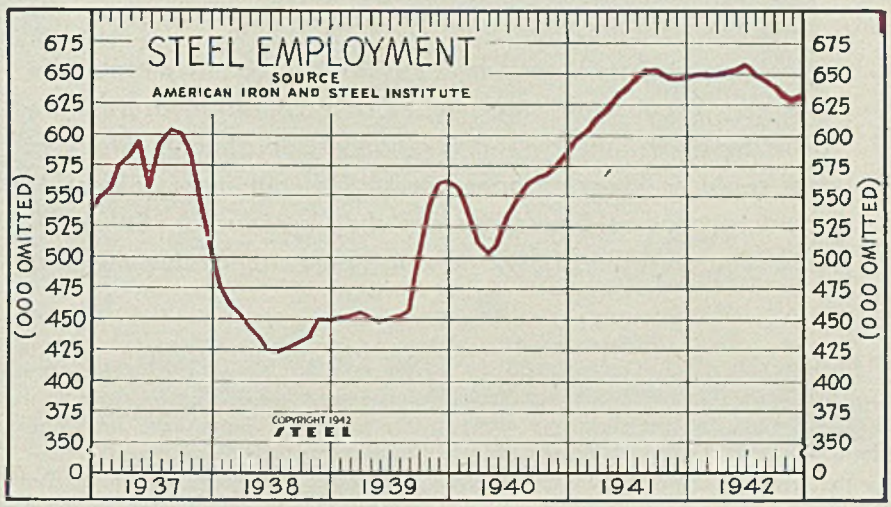
(1000 tons)

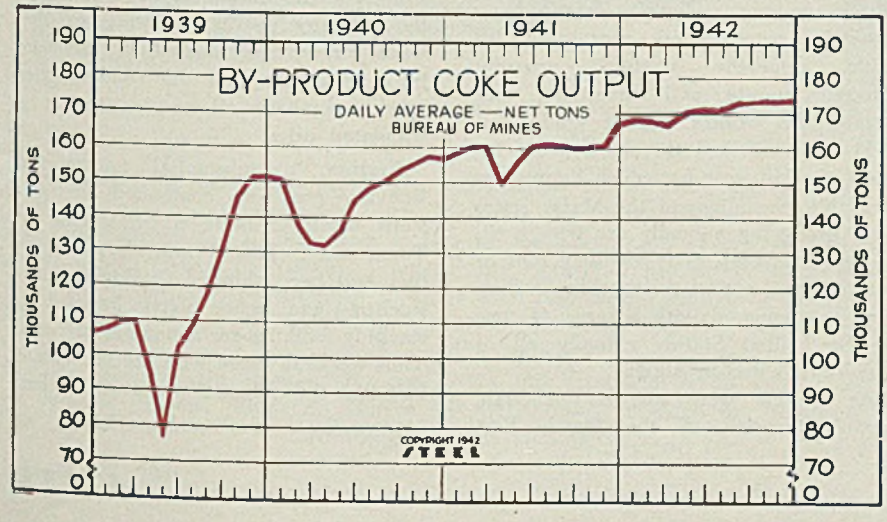
	Shipments			Bookings		
	1942	1941	1940	1942	1941	1940
Jan.	167.8	164.6	110.9	183.4	281.2	81.7
Feb.	164.6	161.4	97.2	228.7	173.6	98.9
Mar.	191.3	170.2	95.9	248.3	206.1	128.3
Apr.	187.2	189.8	116.3	314.0	218.0	73.8
May	184.2	191.9	115.6	161.0	179.9	126.8
June	182.7	200.5	119.1	184.5	246.9	109.7
July	189.9	203.0	127.1	125.2	214.8	194.9
Aug.	173.9	189.3	134.9	80.6	158.7	122.5
Sept.	169.8	204.1	142.8	68.5	158.8	225.5
Oct.	152.9	217.7	153.2	50.9	128.7	233.1
Nov.	130.4	182.6	147.0	49.6	184.0	141.9
Dec.	145.3	176.1	155.5	67.6	146.4	203.1
Tot.	2031.1	2251.1	1515.5	1755.8	2297.0	1748.1

Steel Employment

(000 omitted)

	1942	1941	1940	1939	1938
Jan.	651	598	556	451	475
Feb.	651	603	538	453	461
Mar.	653	613	514	455	455
Apr.	654	621	503	452	445
May	656	632	510	448	436
June	659	638	535	451	425
July	655	648	549	453	424
Aug.	647	654	560	458	427
Sept.	641	652	565	502	431
Oct.	635	646	568	545	436
Nov.	632	645	577	561	450
Dec.	633	646	585	563	449

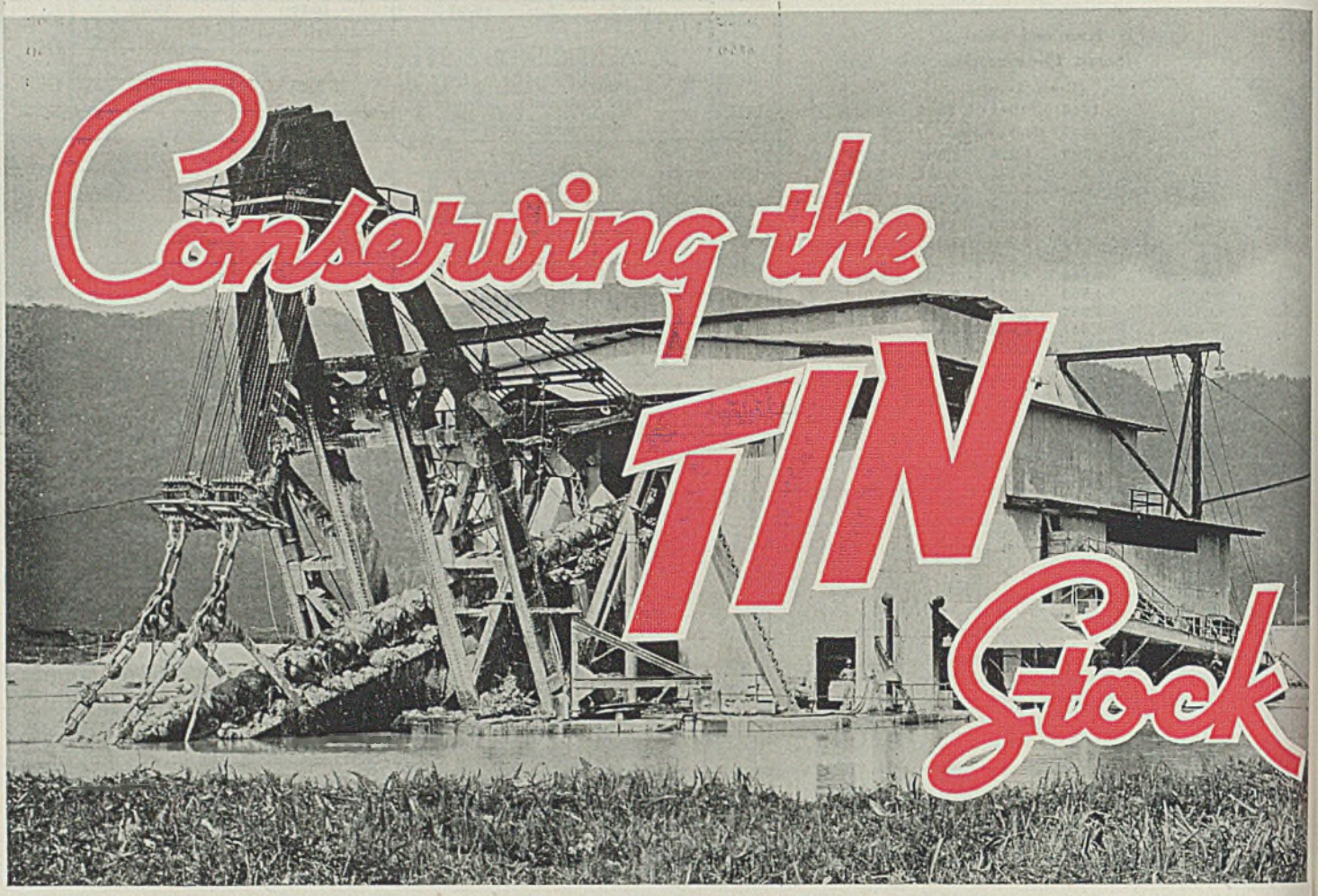




By-Product Coke Output

(Daily Average)

	1942	1941	1940	1939
Jan.	168,508	159,129	151,841	108,611
Feb.	168,414	160,789	138,508	109,923
March	167,733	161,268	133,056	110,921
April	168,960	149,144	132,812	97,155
May	170,187	156,318	136,897	77,304
June	170,593	161,201	145,821	102,991
July	170,244	161,731	149,005	108,542
Aug.	171,443	161,709	151,035	118,260
Sept.	172,110	160,193	154,247	130,144
Oct.	172,211	160,344	156,118	146,019
Nov.	173,029	161,116	158,331	152,219
Dec.	173,163	167,304	157,743	152,200
Total	170,549	160,037	147.157	117,892



Conserving the TIN Stock

Tin resumes its ancient status as a precious metal. We build a 100,000-ton stockpile. Conservation measures are taken by both industry and Ordnance Department. Stainless steel replaces tinned copper liners. Tin content of solder for mounting caps of armor-piercing shot is reduced. Other efforts. Sources of virgin tin. Mining and beneficiation methods

Section 13 in a Series on Conservation and Substitution

FROM ANCIENT Carthage in the Gulf of Tunis, ships went out more than 2000 years ago to beat their way along the coasts of Portugal and France as far as the remote Cassiterides Insulae seeking the tin of Cornwall. For tin was of prime importance then, even before steel became king. But though the tin mines of England have long since fallen into a decline and the nations have sought new sources elsewhere, tin has remained an essential, although oftimes disregarded, member of that group of metals without which our modern mechanized civilization cannot function.

Since that memorable day when Japanese bombers struck at the American fleet in Pearl Harbor, tin has once more assumed its ancient status, for the world's greatest tin mines are now in enemy hands, and save for what we can get from the poorer ores of Bolivia and the considerable salvage operations now in progress, *we will get no more tin* until the legions of Japan have been obliged to disgorge their ill-gotten gains.

Along the western side of ex-British Malaya there runs a strip of territory where age-long geologic processes have gradually concentrated crystals of tin oxide, originally scattered sparsely through granite and limestone, and formed the world's highest grade and most easily worked tin ore deposit. By 1940, the last year for which figures are available, the mines of the Malay states were producing annually ore with a tin content in excess of 85,000 long tons or over 36 per cent of the world's production, as compared with a sorry 44 tons in the United States, virtually all of which originated in Alaska.

As if this were not bad enough, Japan's invasion of the Dutch East Indies, Thailand, Burma and Indo-China cut off another annual supply of 69,000 tons, making a grand total of 154,000 tons or about two-thirds of the world's total. If we pause to reflect that our annual consumption of tin in 1940 was 76,000 tons or 45 per cent of the world demand, we have one cogent reason, among several others, why Japan and all her military works must be relegated to the limbo of destruction.

In 1939, our vulnerable position with regard to supplies of tin being recognized, a stock-piling program was initiated under the Strategic Materials act and greatly expanded by direct negotiation between the Reconstruction Finance Corp. and the International Tin Committee whereby restrictions on production were virtually eliminated in exchange for a guarantee that the United States would purchase all surplus tin at a stipulated price.

Further, a substantial tonnage of Bolivian ore was contracted for and steps taken to build a tin smelter in Texas City, Tex. Previously, Bolivian ores had been shipped to England and smelted there; hence Bolivia has had no smelting facilities for a number of years. Thus we were faced with the unpleasant fact that the only tin ores available had

(*Please turn to Page* 124)

By ARTHUR F. MACCONOCHIE
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University of Virginia
University Station, Va.
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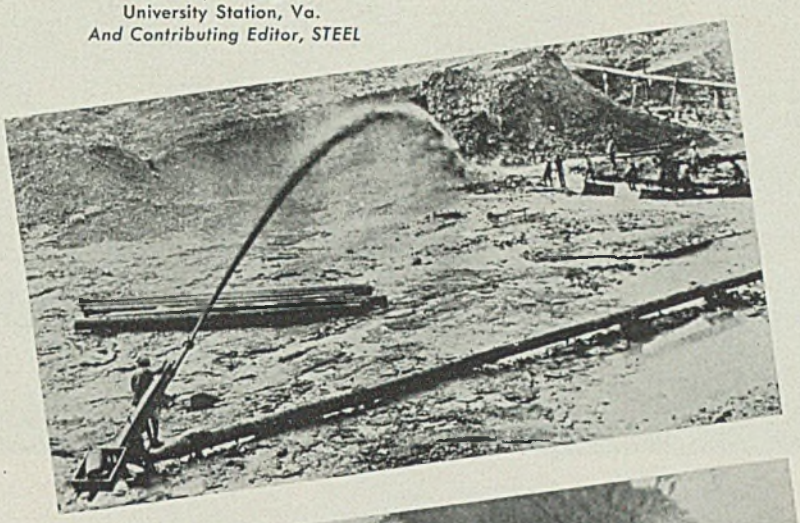
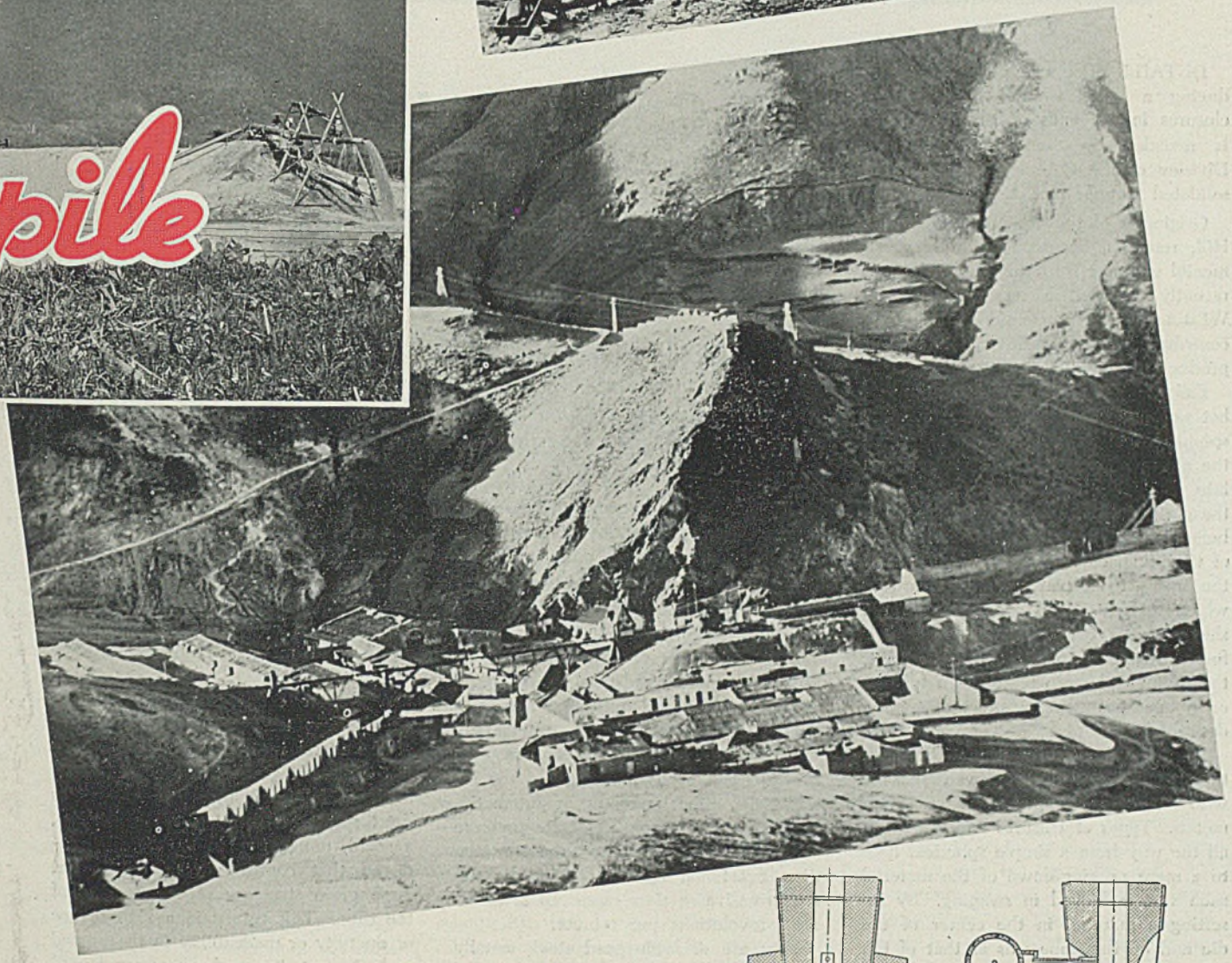
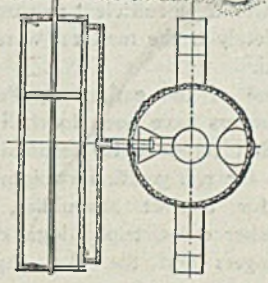




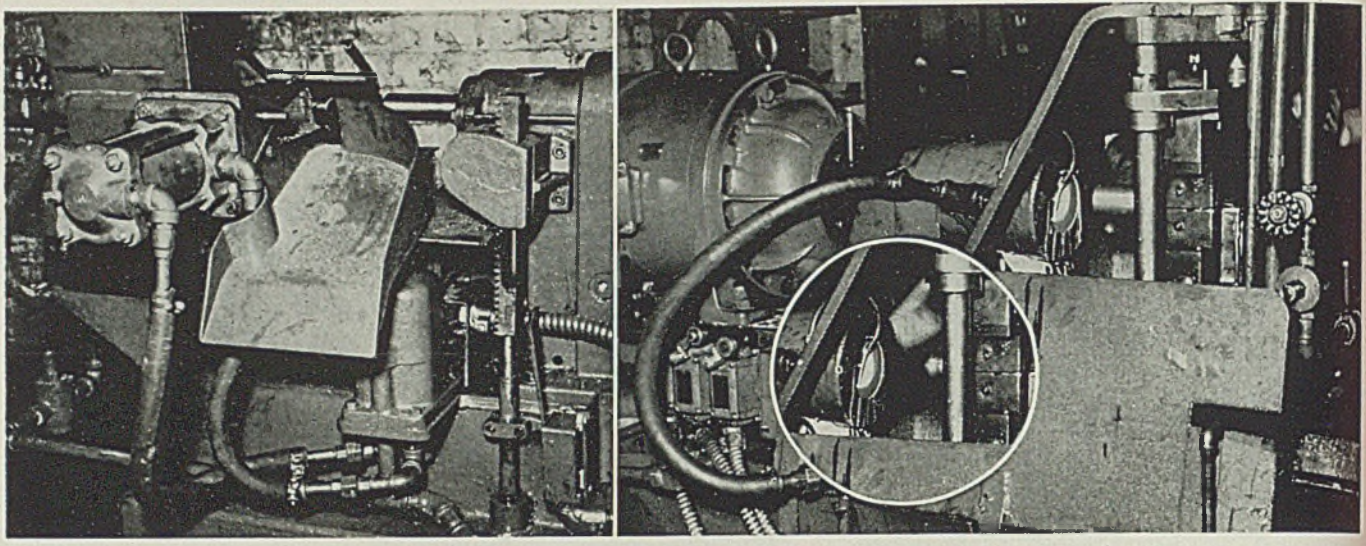


Huge dredge, opposite page, working in production of tin on property of Pacific Tin Consolidated Corp. Mining & Metallurgy *photo*

Top right—Monitors breaking down a face of tin-bearing soil at one of the big mines on the Bauchi Plateau of Nigeria. Whatever the method of production, water is necessary to facilitate extraction of tin-stone from tin-bearing soil. Acme photo

Directly above—View of the Union Tin Mine of Bolivia and the rugged mountainous country around it. Acme photo

Right—A Chinese tin smelting furnace. Note the extremely crude method of blowing air into the furnace. From An Outline of Metallurgical Practice *by Hayward; D. Van Nostrand Co. Inc., publishers*



Controlled TUBE-CLOSURE Process

. . . . has important possibilities in connection with production of many shapes from tubing. Tool costs are extremely low; intermediate anneals are unnecessary; closure requires only a fraction of a second; complete shape made in one operation without intermediate stages

DETAILS of a new process for producing a wide variety of controlled closures in the ends of tubular shapes is revealed by the Wolverine Tube Division of the Calumet & Hecla Consolidated Copper Co., Detroit.

Originator of the process is Walter P. Hill, research, development and experimental engineer for Wolverine, who was recently awarded a merit citation by WPB as one of six engineers who had contributed major improvements to war production activity.

Essentially the process is a type of hot working by spinning, except that the spinning tool is a steel die in which the shape of the closure is formed and into which the tube is forced. Usually, the die is rotated against the tube, both being mounted coaxially. The friction of the initial contact is sufficient to heat the metal to a plastic state, following which it is made to conform with the shape of the die cavity as the end is forced further into the die. Of course, the tube can be pre-heated in a furnace or by open gas flames where that may be desirable.

First developed for use with brass, the process since has proved feasible with aluminum, copper, steel and other metals. Types of closures effected range all the way from a simple spherical type to a mere necking-down of the material such as is achieved in swaging. By inserting a mandrel in the center of the die and on the same axis as that of the tube, a hole may be retained in the worked piece, even though the pressure used would be sufficient to close the end completely if the mandrel were not employed.

Some of the earliest applications of the process have been in shell and ammunition components, accumulators and driers for refrigeration equipment, clevises for aircraft assemblies, fire extinguisher cases, tripod legs, small heat exchangers and the like. Appreciable savings in cost over conventional manufacturing and assembly methods are possible. For example, one part comprising an assembly of a piece of tubing and a machined forging is made in one piece by the controlled-closure method.

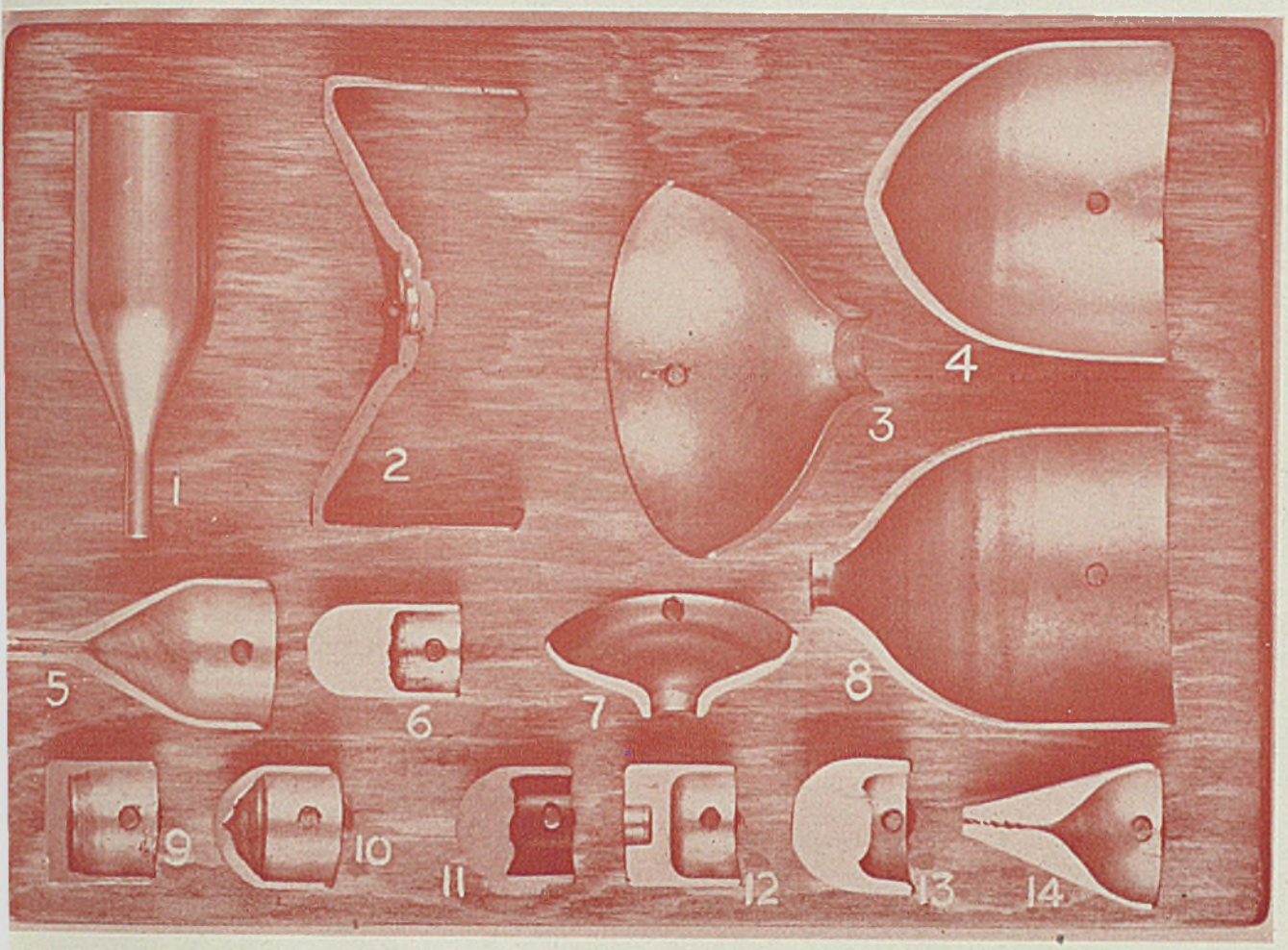
Standard types of machines may be used and quickly adapted to handling the new process. Lathes, screw machines, drill presses, in fact any machine with a head in which the tube may be clamped and brought up against the rotating die, either manually or automatically, is suitable. Only moderate pressure is needed in forcing the tube into the die. Rotational speeds of the die are not excessive as they range up to about 1500 revolutions per minute.

Dies are of high-speed steel, usually normalized to withstand the effects of repeated heating and cooling. They are mounted in retainers and show exceptionally good wear, the principal deterioration being from heat checking and cracking. However, a die may still be used without spoiling the surface of the formed closure, even after it has cracked.

Advantages of this simple method of closing the end of a tube are obvious when consideration is given to the tooling costs involved in forming a closed cylinder by conventional drawing methods from a flat blank. Tool cost is only a fraction of that required in the drawing method, intermediate anneals are unnecessary, and the closure may often be spun in a fraction of a second, compared with minutes required to draw the part.

A further effect resulting from the die-spinning treatment is the softening of the metal in the worked area. Due to the annealing effect of the heat generated, a full-hard brass tube becomes dead soft after forming the end. Too, a small, uniform grain structure is produced that contracts with the coarse, large grain structure of the balance of the tube. This results in a high degree of ductility or malleability in the formed end. In fact, it may be hammered until it is completely flattened out without showing any splits or cracks, while a few light blows on the full-hard tube will split it open.

A similar method of spinning has been applied to closing steel tubes for manifolds in gas ranges. See STEEL, June 6, 1938, p. 60. The range of possibilities for application of this forming method is quite large. Thus, it may prove feasible to use the closure method on SAE-



Left, opposite page—This machine was rigged up for fully automatic loading, forming and ejecting small tubes, one of which is visible at top of the chute at left. The end-forming die is just to the right of the top of the chute

Right, opposite page—In this setup, the die is spun by the motor at the right. The tube to be formed is seen extending from the chuck at the right. Operator loads, unloads machine from opposite side. Die is in cavity into which coolant is shown spilling. In insert, formed tube end can be seen

Above—Cross sections show typical closures effected by the die-spinning process. Note that in pieces 1, 3, 5, 7, 8 the end is kept open, while in the others it is closed tightly. Piece 2 is of special interest since the metal (brass) is bent back upon itself

1040 steel tubing which, because of its relatively high carbon content, is not readily susceptible to deep drawing cold. This may help solve many difficult drawing problems such as those involved in producing steel cartridge cases in the smaller calibers.

The method is covered by process patents and is being licensed to other manufacturers for their use on a royalty basis. Most of the suppliers of brass primer tubes for shells have adopted the method. In this work it has greatly speeded production, practically eliminated all the scrap encountered in the screw machine method, and reduced costs markedly.

The sponsor of the process, Walter P. Hill, is a young man still in his thirties who received his practical training in his father's machine shop in Morceni, Mich. Going to Detroit, he became associated with a manufacturer of fire extinguishers, and six years ago transferred to Wolverine Tube. It was only a year ago, after extensive experiments both at his home and in the shop, that he perfected his "spinning" method which at that time appeared to be a "natural" for fabrication of refrigerator accumulators and driers.

The war changed all this and in recent months Mr. Hill has spent his time with ordnance officials in the various ordnance districts and with ordnance manufacturers, helping them to equip machines and build dies for using the method on a variety of ordnance *materiel*.

The beauty of the process is its utter simplicity. It may be set up either horizontally or vertically, and involves nothing more than a means for gripping the tube and advancing it into the rotating die. This may be accomplished by means of a hand lever, with head and die mounted on the same ways, or by hydraulic pressure. A hopper may be arranged to drop pieces one at a time into an automatically operated chuck which advances the end into the die, retracts, opens to permit the piece to descend into a chute or to be ejected automatically. The equipment is then ready for the next piece.

Tubing ranging from the smallest diameters up to several inches in diameter is processed equally well, the larger diameters merely requiring a little more time to spin down.

Naturally, the pressure of forcing a hot tube into a spinning die means that the metal in the end must flow somewhere, so the wall thickness at the end builds up as the pressure increases. This is another variable which may be controlled by the pressure on the tube, and this pressure may be made uniform for succeeding pieces by placing a stop on the machine against which the moving head or chuck bears as the tube advances into the die.

By proper shaping of the die, it is quite possible to double the end of the tube back on itself. In fact, a number of parts have been produced experimentally with this end design. If the closed end must be pressure tight, it is the practice on some brass parts to put a drop of solder at the apex of the formed tip as an added precaution against leaks.

High Speed Steel Tipped Tools

. . . . made by braze-hardening and braze-tempering methods

By B. S. LEMENT, Metallurgist
And
W. B. KENNEDY,
Production Superintendent, Watertown Arsenal
Watertown, N. Y.

THE PRESENT emergency has focussed attention on the problem of conserving high-speed steel because it contains relatively large percentages of strategic tungsten, molybdenum, chromium, vanadium and cobalt (in special types). High-speed steels containing 18 per cent of tungsten are now being replaced by molybdenum high-speed steels in which the tungsten content has been substantially reduced. Despite this important advance, much more remains to be done since the content of the other strategic elements is the same and there is a great demand for both tungsten and molybdenum for other uses besides high-speed steel.

One method of conserving high-speed steel is to increase tool efficiency by devoting proper attention to such factors as tool design, heat treatment, grinding procedure and cutting conditions. However, there still remains the problem of waste due to the fact that only a very small amount of a tool is actually used up in cutting. To minimize this condition, the possibility of making tools by joining high-speed steel tips to low-alloy steel shanks was investigated at Watertown Arsenal by the authors.

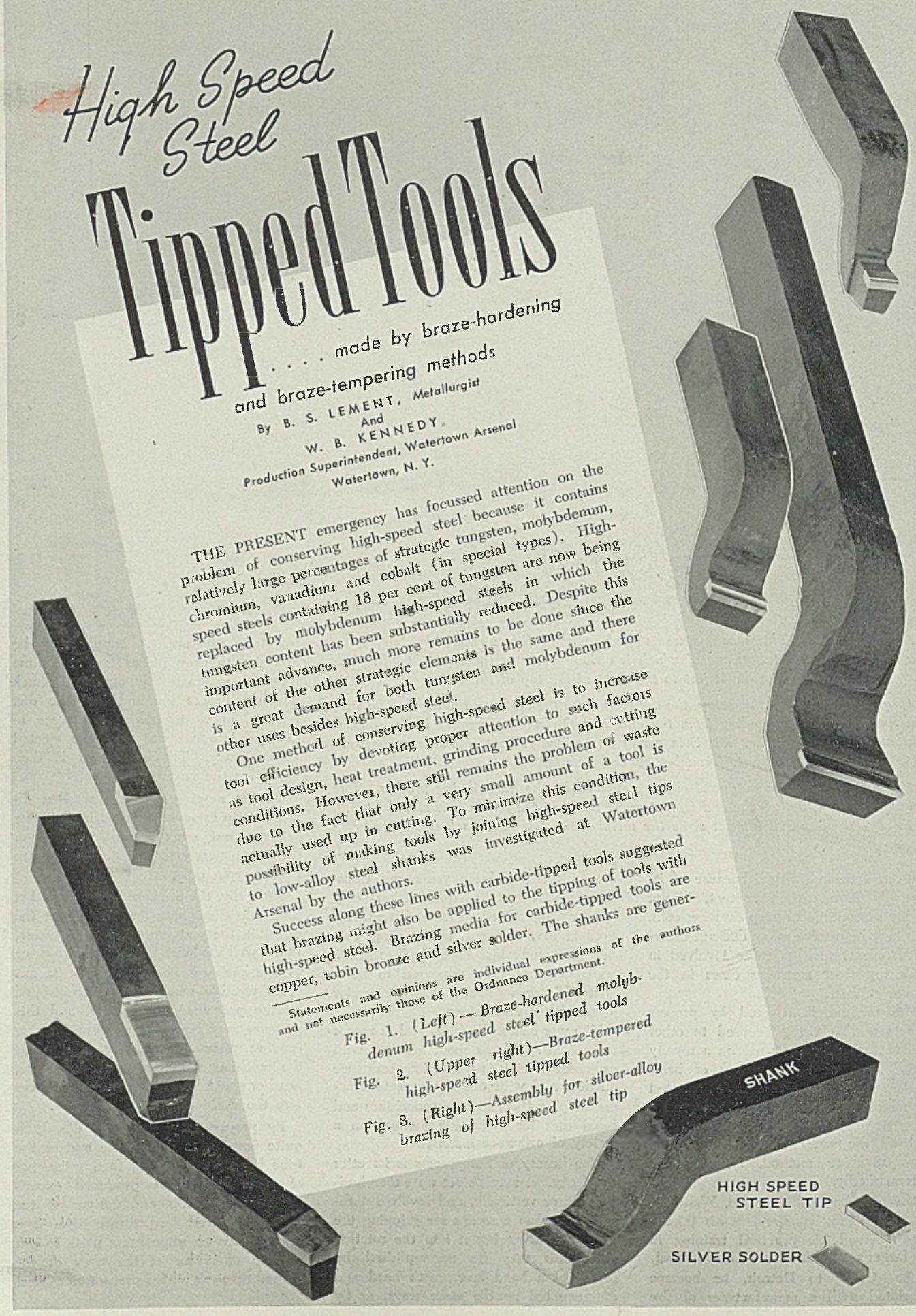
Success along these lines with carbide-tipped tools suggested that brazing might also be applied to the tipping of tools with high-speed steel. Brazing media for carbide-tipped tools are copper, tobin bronze and silver solder. The shanks are gener-

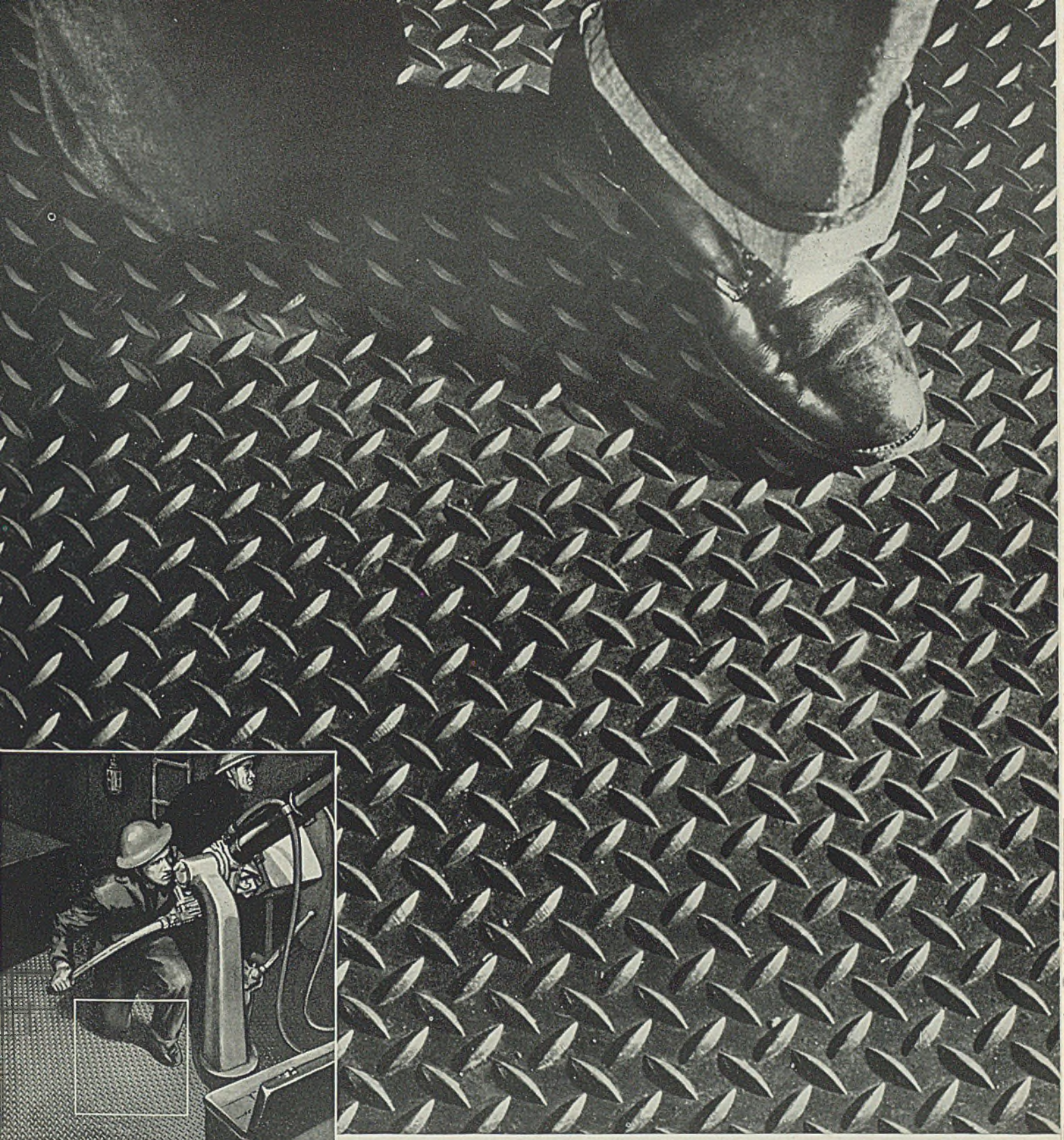
Statements and opinions are individual expressions of the authors and not necessarily those of the Ordnance Department.

Fig. 1. (*Left*) — *Braze-hardened molybdenum high-speed steel tipped tools*

Fig. 2. (*Upper right*)—*Braze-tempered high-speed steel tipped tools*

Fig. 3. (*Right*)—*Assembly for silver-alloy brazing of high-speed steel tip*





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SILICON — MANGANESE TOOL STEEL SHANK													MOLYBDENUM HIGH SPEED STEEL TIP			
17.0	16.5	16.5	15.5	16.0	16.5	17.5	16.5	29.5	42.0	45.5	47.5	46.5	46.5	55.5	65.0	65.5	65.0
13.5	13.0	14.5	14.5	14.5	13.5	14.5	14.0	24.5	40.5	44.5	47.0	47.0	48.5	47.5	46.5	46.5	45.5
13.5	14.5	14.0	14.0	14.5	14.0	16.5	16.0	23.5	39.0	44.0	46.5	46.5	48.5	47.0	47.0	46.5	45.5
14.5	11.5	13.5	13.5	15.0	15.0	14.5	14.5	21.5	40.5	44.5	46.5	46.5	47.0	47.5	48.5	46.5	46.5
16.5	16.0	16.5	16.5	15.5	18.5	17.0	17.0	24.5	40.5	43.5	45.5	45.0	48.0	46.5	47.5	45.5	45.5

SILICON — MANGANESE TOOL STEEL SHANK													HIGH SPEED STEEL TIP			
8.5	12.0	15.0	13.5	16.5	16.0	15.0	14.5	16.0	16.5	16.0	14.5	14.5	16.0	54.5	65.0	65.5	65.0
13.0	14.5	16.0	15.5	15.0	19.0	18.5	15.0	16.0	16.0	14.0	16.5	16.5	14.5	15.0	15.0	15.5	16.0
13.5	14.0	16.5	15.5	15.0	15.0	12.5	16.0	16.0	18.0	17.5	15.5	15.5	17.5	23.0	20.5	16.5	17.5
14.5	15.5	13.5	16.5	16.5	15.5	16.0	16.5	17.5	17.5	16.0	18.0	31.0	35.0	34.5	33.5	29.5	17.5
13.0	13.5	14.5	14.5	17.5	15.0	16.0	16.0	13.5	14.0	18.5	29.5	48.5	42.5	43.5	44.0	43.5	38.0

Fig. 4. (Upper view)—Rockwell C hardness survey of braze-hardened molybdenum high-speed steel tipped tool tempered for 2 hours at 1050 degrees Fahr.

Fig. 5. (Lower view)—Rockwell C hardness survey of braze-tempered high-speed steel tipped tool

ally made of low-alloy steels having carbon contents between 0.40 and 0.60 per cent. A wide variety of steels can be used, but a silicon-manganese steel of the chisel-steel type has been found to possess the best all-around properties. Carbide tips are usually copper brazed in a furnace having a suitable reducing atmosphere, although an oxyhydrogen torch with excess hydrogen is occasionally used. Silver brazing of carbide tips is mainly accomplished by means of an oxyacetylene torch.

To apply copper brazing to the tipping of tools with high-speed steel, it is necessary that the brazing operations be carried out at a temperature that will permit satisfactory hardening of the tip. Molybdenum high-speed steels are suitable since they have a hardening range of 2150 to 2250 degrees Fahr., or 170 to 270 degrees Fahr. above the melting point of copper. By soaking the tip in this temperature range, allowing the copper to set by cooling in air, and finally quenching in oil, the tip will be brazed to the shank and also be in the hardened condition. This method has been named braze-hardening.

Braze-hardening can be carried out in a commercial furnace designed for the copper brazing of carbide tips. At Watertown Arsenal an electric furnace provided with a semicircular muffle made of heat-resisting alloy is used. The furnace is designed to apply localized heat only to the portion of the tool to be brazed. A hydrogen atmosphere is maintained inside the muffle to prevent oxidation.

The procedure found satisfactory for tipping lathe tools with molybdenum high-speed steel involves several steps. The joining surfaces of the unhardened tip and shank are first cleaned by immersion in carbon tetrachloride. The end of the shank to be tipped is covered with a commercial powdered copper-brazing flux, and the tool is pushed partly into the muffle of the brazing furnace. When the flux has melted and spread over the surface, the shank is withdrawn from the muffle. The tip and shank are fitted together with strips of copper in between and on top of the tip and additional flux is applied. The assembled tool is then moved partly into the muffle in order to preheat the tips.

When the tip has attained a temperature of approximately 1500 degrees Fahr., the tipped end is moved into the high-heat portion of the brazing furnace operating at 225 degrees Fahr.

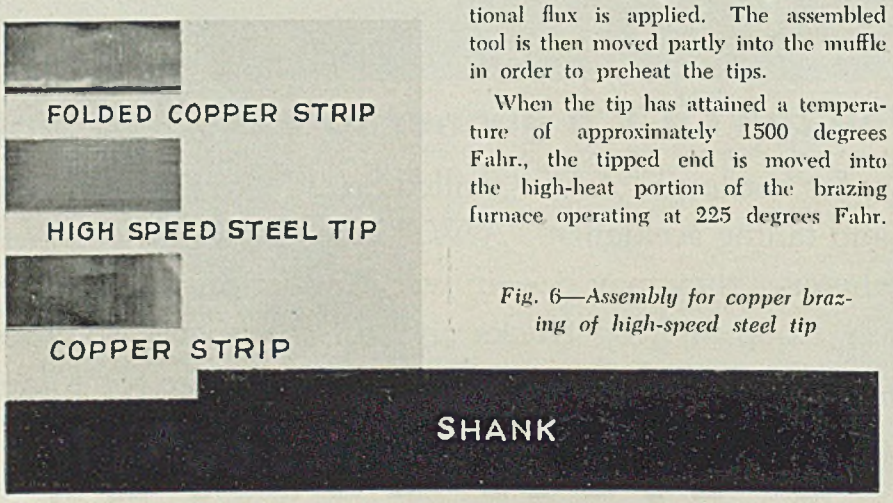

Fig. 6—Assembly for copper brazing of high-speed steel tip

In coming up to this temperature, the melting point of the copper (1980 degrees Fahr.) is exceeded and brazing occurs, the copper on top of the tip melting and actually flowing in between the tip and shank. After allowing the tip to soak for a sufficient time at 2225 degrees Fahr. to insure satisfactory hardening, the tool is withdrawn from the muffle, and the tip is pressed firmly in place either by tongs or in a press in order to squeeze out any excess copper or flux. When the copper sets, the tipped end is quenched in oil to below 200 degrees Fahr. The result of this procedure, which takes less than 20 minutes for each tool, is a tip in the hardened condition and brazed firmly to the shank. It is necessary to temper the tipped tool at 1050 degrees Fahr., as is done with a hardened solid high-speed steel tool, in order to develop secondary hardness.

Three molybdenum high-speed steel tipped tools are shown in Fig. 1. In Fig. 6 is illustrated the assembly used in copper brazing a tool 9 inches long, 1¼ inches high and ⅝-inch wide. A folded copper strip of 0.01-inch total thickness is placed on the tip, and a single strip 0.002-inch in thickness is placed between the tip and shank. After braze-hardening and tempering at 1050 degrees Fahr. for 2 hours, a hardness survey was made on this tool, as shown in Fig. 4. The tip attained a uniform hardness of about 65 rockwell C, while hardening of the shank occurred for a distance of about 5 inches from the front of the tool.

Silver brazing can also be used to make high-speed steel tipped tools, but the low melting point of commercial

(*Please turn to Page* 132)

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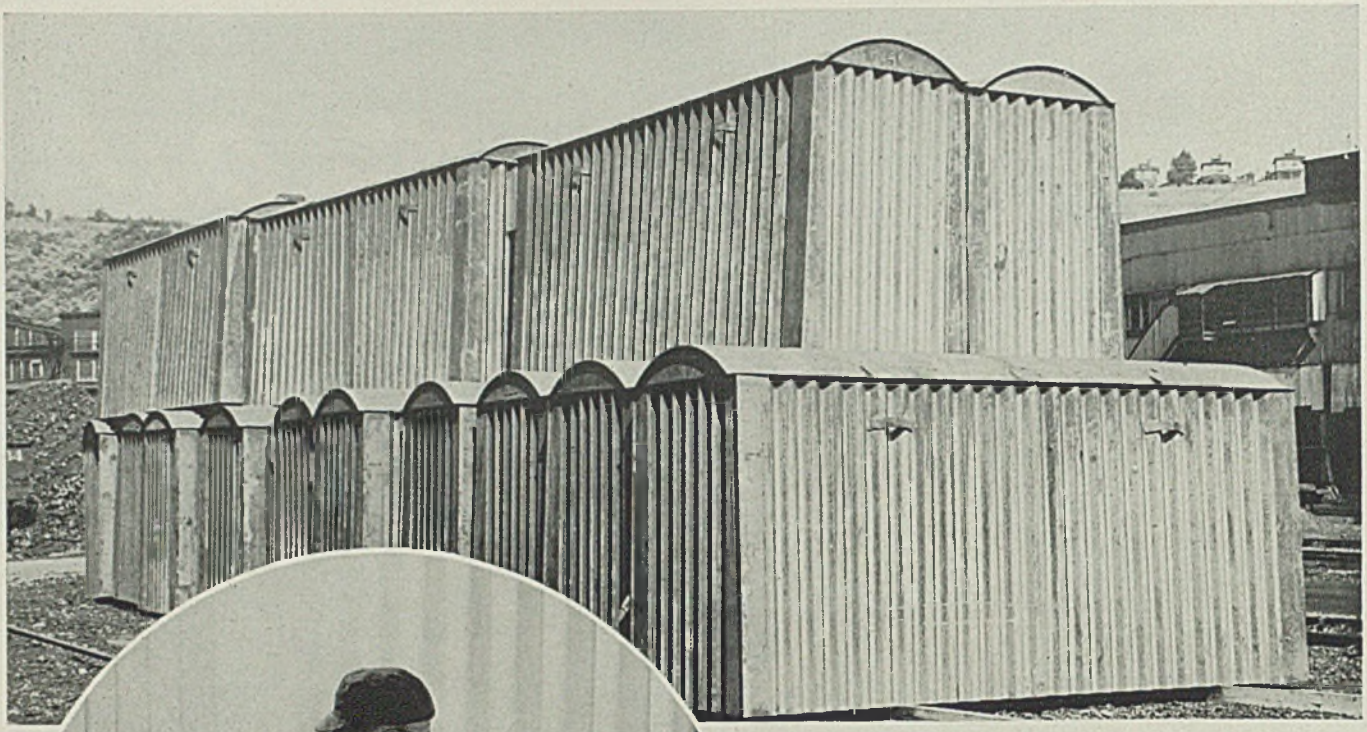

Fig. 1. (Above)—Carbon steel annealing covers before being sprayed with molten aluminum

Fig. 2. (Left)—Spraying thin coat of molten aluminum on plain carbon steel helps protect it against effects of high-temperature service

CONSERVING CRITICAL ALLOYS

In Heat-Treating Equipment

Annealing covers are made from plain carbon steel and then sprayed with molten aluminum to conserve vital chromium and nickel; 30 pounds of aluminum saves 840 pounds of nickel and chromium in typical example

By HERBERT S. INGHAM
Vice President and Chief Engineer
Metallizing Engineering Corp. Inc.
Long Island City, N. Y.

IT IS well recognized that small amounts of aluminum properly absorbed in the surfaces of iron and steel will protect these metals against oxidation and scaling at high temperatures. While the principle involved is not new, past methods of its application have left much to be desired. Most pronounced objection to previous methods has been the difficulty of obtaining uniform and consistent results.

Widely used today to overcome these difficulties is a simple three-step procedure described here. Known to industry as Metcolizing process No. 11—one of three processes developed by Metallizing Engineering Co. Inc. to treat steel to resist heat corrosion—it not only overcomes the inconsistencies encountered with other processes but affords a far greater degree of protection than has been obtainable in the past.

An outstanding example of the important savings in nickel-chrome alloys effected by process No. 11 is in its application to annealing covers at a large steel fabricating and rolling mill in Pennsylvania. Previously made from stabilized 18-8 type stainless steel 3/16-inch thick, each of these covers required approximately 600 pounds of chromium and 240 pounds of nickel. Now the covers are made from ordinary carbon steel boiler plate, which is sprayed with molten aluminum as a protection. Covers so made cost only one-third to one-half as much as the former stainless steel covers. While it is true that new boxes withstand about 96 heats, as against 150 to 175 for those of stainless steel, the use of chromium and nickel has been eliminated entirely.

Simple Three-Step Procedure: First step in process No. 11 is to grit blast the annealing covers in preparation for metal spraying with aluminum. Grit

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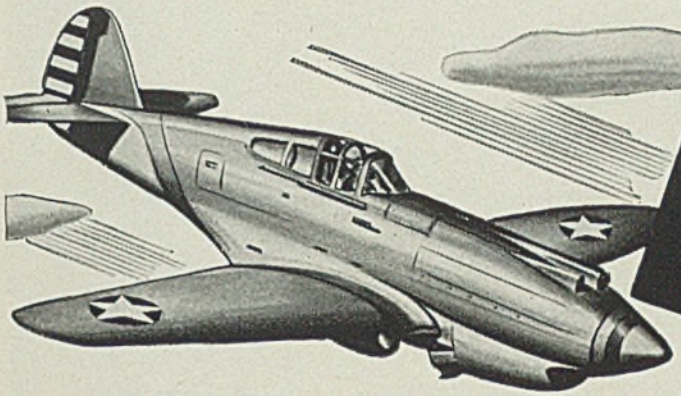

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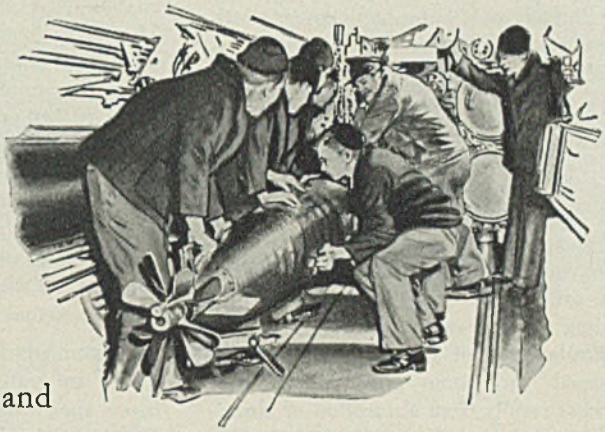

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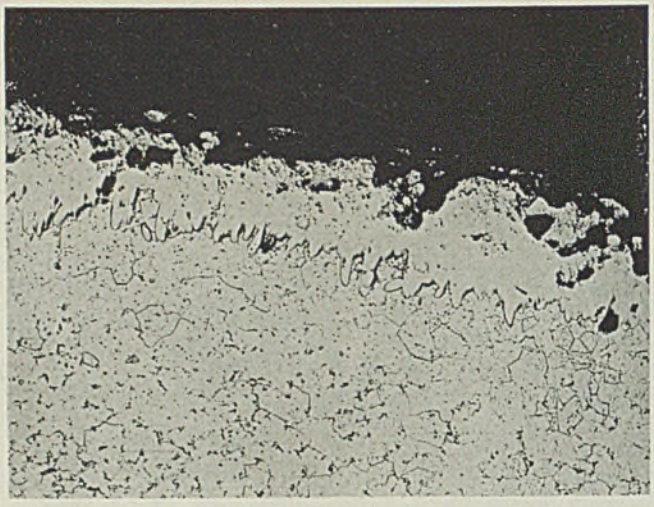

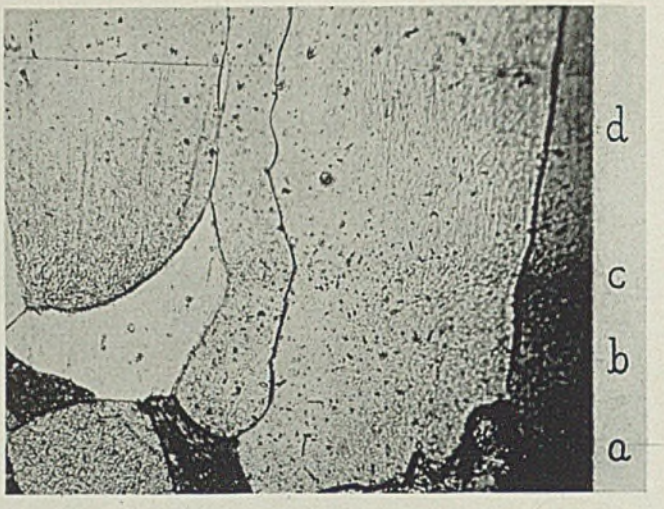

Fig. 3. (Left, above)—A layer of sprayed aluminum on steel, shown at 100 diameters

Fig. 4. (Right)—Aluminum coating on steel after 32 hours at 1700 degrees, at 400 diameters. Note original steel at A; high Fe-Al solution at B; Fe_2Al_5 eutectic at C; high Al-Fe solution at D

blasting is necessary to assure a satisfactory bond between the sprayed aluminum and the base metal. Approximately 1½ ounces of aluminum are sprayed per square foot. After metallizing, a special sealer, known as Metcoseal, is applied to the aluminum coating with an ordinary paint brush. The covers are then heat treated at a temperature of approximately 1450 degrees Fahr. for about 40 minutes. After this operation the covers are ready for service.

Fig. 1 shows the aluminum coating being applied with the Metco metallizing gun. In Fig. 2 appear a number of the carbon-steel covers before metallizing. The accompanying table compares the Metcolized annealing covers with those made from the 18-8 type stainless steel.

In addition to annealing covers, many types of equipment in different industries are Metcolized to protect them against heat. Magnesium melting pots, salt and cyanide pots and carburizing boxes are typical. Furnace and furnace conveyor parts in increasing numbers also are protected against oxidation and scaling in the same manner.

Explanation of Process No. 11: The unusual protection provided by this process results from absorption of aluminum into the steel at the surface. The key to the success of the process is in the proper timing of the relative absorption and oxidation of the aluminum. This timing is assured by the Metcoseal sealer coat painted on after metallizing. The heat treatment itself is not very critical.

When heat is first applied, the aluminum melts and is absorbed into the steel. The sealer coat prevents oxidation of the aluminum for a limited time. When the sealer finally burns through, the coating of aluminum becomes oxidized. The final coating consists of an outer coat of aluminum oxide, a thin layer of nearly pure aluminum and then a series of layers of iron-aluminum alloys which vary from high aluminum content near the outside to high iron content at the inside. By applying the aluminum with a metallizing gun, enough aluminum is provided for continual absorption as heat continues to be applied in actual service.

Photomicrographs shown in Figs. 3 and 4 are transverse sections of Metcolized specimens produced by process No. 11. A compound etch was used—steel, picric acid; aluminum, 10 per cent ammonia persulphate. In Fig. 3, at 100 diameters, is shown a layer of aluminum on the steel, with a distinct boundary between the two phases. The dark irregular areas of the surface are aluminum oxide.

In Fig. 4, shown at 400 diameters, the specimen has been heated at 1700 degrees Fahr. for 32 hours, not counting the initial heat treatment. In this instance the gradual diffusion of aluminum into the steel may clearly be seen, varying from Fe-Al (iron eutectic at one end, to aluminum at the other). The various zones are indicated by the letters at the side of the figure. A indicates the original steel; *B*, high Fe-Al solution; *C*, Fe_2Al_5 eutectic; *D*, high Al-Fe solution.

The distinct boundary between the two phases shown in Fig. 3 gradually disappears as the metals diffuse into each other—as indicated in Fig. 4. The protection is continuous, therefore, until all of the excess aluminum has been dissolved.

TABLE I—Savings from Use of Metal Spraying

	18-8 Stainless Steel	"Metcolized" Carbon Steel
Area, square feet	325	325
Chromium required, pounds	600	...
Nickel required, pounds	240	...
Aluminum required, pounds	...	30
Metcoseal required, gallons	...	2
Heats obtained (24 hours at 1500 degrees Fahr. each)	150 to 175	96
Cost fabricated (excluding Process No. 11)	$700	$225
Grit blasting time, hours	...	3¼
Metallizing time, hours	...	9
Heat-treating time, minutes	...	40

NOTE: Continued heat on the original stainless steel covers necessitated a certain amount of maintenance by welding on patches and repairing cracks. The amount of this service required has been minimized with the Metcolized covers.

Blueprint Reading Made Easier for Students

Problems in Blueprint Reading, revised; by Drew W. Castle; paper, 93 pages, 7¾ x 10½ inches; published by Manual Arts Press, Peoria, Ill., for 96 cents.

New problems have been added in the revised edition, which continues the fast, practical method for instructing apprentices, machine workers and others in blueprint reading without necessitating instruction in mechanical drawing.

It assumes that the latter is not necessary but that a certain fundamental body of information must be familiar to the student. That is the language of drafting and beyond it is the necessity for a course in reading that language.

To convey gas, oil, air and water, as well . . .

Perhaps the most intriguing angle of flexible metal hose and tubing is its seemingly endless range of application. Using practically any workable metal, we can build flexible hose or tubing for anything from a simple spout to a high pressure seamless hydraulic line that can be flexed millions of times without breaking—a line that will give you the flexibility of garden hose, the dependability of metal and the *strength of rigid pipe!*

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Blind Operators Weigh Material by "Ear"

New Toledo scale enables "sighted" operators to work in dark

BLIND as well "sighted" operators now can make accurate and fast weightments entirely by "ear" with the use of a new scale called the Audioweigh, recently developed by Toledo Scale Co., Toledo, O. It enables "sighted" operators to work in total darkness or, under lighted conditions, allows them to manipulate material being weighed such as filling narrow-mouthed bottles to a net weight of contents.

The scale, shown in the accompanying illustration, consists of a sensitive, even-balanced unit of the zero center type equipped so weighing operations may be carried out efficiently by audible signals alone. According to the company, the signals are of such character the hearer may sense the position of the pointer on the chart with a performance closely paralleling that secured by sight.

Manner in which the audible signals indicate weight, is similar to the principle used in guiding airplane pilots in "blind flying," it is reported. The scale pointer, in this case, corresponds to the airplane in space. When the pointer is at the extreme left, or minus side of the chart, an audible A is heard. As it advances toward zero this signal strengthens until it reaches a maximum slightly on the minus side of zero. Thereafter as the indicator advances toward zero the signal changes progressively to the steady "on beam" tone, which is realized when the pointer reaches exact zero.

When the pointer exceeds zero the N becomes increasingly audible and rapidly reaches maximum strength at a pointer position only slightly on the plus side of zero. Thereafter as the pointer is advanced further in the plus direction the N signal recedes in strength.

In the instrument alternating current of 1000 cycles flows in a tuneable double-branch circuit in which an earphone coupling transformer is common to both branches. A motor driven contactor switches current alternately to the two branches in such manner that intermeshed A and N pulses are applied respectively to the minus and plus fixed plates of the scale indicator balancing condenser.

Here blind operator is shown working with the Toledo Audioweigh

At desired weight both signals are heard, synchronized.

Suggestion for this scale, it is said, was originally made by a blind woman in Buffalo. It was developed by engineers in co-operation with the American Foundation for the Blind, and is adapted for weighing specific amounts of war materials, for packaging exact numbers of small pieces.

New Process Provides Bond on Hard Surfaces

Machine components and similar metal parts now may be prepared for metallizing electrically by development of a Fuse-Bond process, and equipment for its application by Metallizing Engineering Co. Inc., Long Island City, N. Y.

Main advantage of the process is that it affords an adequate bond on the hardest surfaces, heretofore impossible or impractical to prepare by blasting or rough threading it is said. It also simplifies preparation of narrow edges, flat areas, and cylindrical parts having keyways and other interruptions in their surface.

Application of the process is made with special equipment. Operating on any 110 or 220-volt single-phase power line, the equipment fuses a rough deposit of electrode metal into the surface to be metallized. Electrodes are applied to the work with a special holder which uses up to six electrodes at a time, depending on the size and nature of the part to be prepared. Small parts may be prepared with this equipment as easily as large shafts, since there is no excessive heating of the base metal, or disturbing of its physical characteristics.

The Fuse-Bond unit is compact, and is contained in a cabinet measuring only 24 inches high. Mounted on casters, it can be wheeled right to the job with ease.

Poster Shows Four Ways To Lengthen Tool Life

In response to the War Production Board's request for simple and visual educational posters to aid workers in war industries, Vascoloy-Ramet Corp., North Chicago, Ill., recently prepared a huge wall poster which shows graphically four simple ways to obtain longer life from cemented carbide tools.

Measuring 48 x 27 inches, the poster is being offered without charge to those companies that request it.

Bibliography of Alloy Constitutional Diagrams

Bibliography of Literature Relating to Constitutional Diagrams of Alloys, by J. L. Haughton; limp cloth, 167 pages, 5½ x 8½ inches; published by the Institute of Metals, 4 Grosvenor Gardens, S.W.1, London.

This is No. 2 in the Institute of Metals monograph and report series. It contains over 5000 references to papers dealing with the constitution of binary, ternary and higher alloy systems, both ferrous and nonferrous. References are included not only to papers of a purely constitutional character but also to many X-ray and physical-property studies of alloys which have some bearing on the constitution.

The bibliography is fully up to date and contains references to all papers up to the time of going to press. It is of value to all research workers in metallurgy, works metallurgists and others interested.

The familiar Miracle

Look twice. You think you see a negative of two soldiers clashing in bayonet practice. Actually you are looking at sunlight and silver bromide.

The mysterious action of light on certain silver salts is just as much a miracle today as it was a hundred years ago when the first photographs were made.

Hardly less amazing is the remarkable sensitivity of present-day photographic emulsions.

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Air Conditioning and Commercial Refrigeration Department, Division 432, General Electric Co., Bloomfield, New Jersey.

Air Conditioning by GENERAL ELECTRIC

By CHARLES E. AGNEW
Consultant,
Blast Furnace & Sintering Plant Operations
Cleveland

Smelting Sinter

Beneficiated iron-bearing material is a controversial subject among operators and the extensive use of such material, which seems destined to occur, is certain to force a change in some of the accepted operating practices. An effort is made in this treatise to clarify the controversial subjects and to anticipate for the operators some of the problems to be encountered

EFFICIENT use of heat is the major problem of the blast furnace operation. Problems of the operator in the selection, handling, and charging of the raw materials are manifold but after they are charged into the furnace the only control he has over the quality and the quantity of the product is the degree of efficiency with which the heat generated is used.

With laboratory control the art of producing iron has advanced further in the past 100 years than it had in the previous 50 centuries. The knowledge of laboratory control has enabled the present-day operator to anticipate and correct many of the troubles previously accepted as inevitable but he is still dealing with the same natural laws as his predecessor of previous centuries. The knowledge of those natural laws has enabled the operator to exercise a degree of control over them but not to change them.

Iron can be produced in the blast furnace from any molecular formation of iron which will reduce within the temperature range developed in the furnace and with the use of the carbon reducing agent. So far as the chemical reaction of reduction is concerned the knowledge of the necessary temperature with the available reducing agent is the operator's only requirement, but in the interests of economical operation he is concerned with the problem of applying heat to the material to effect the reduction.

Material characteristics, which influence the efficient use of heat, are both physical and chemical. For centuries the evolution in the art of iron production has been in the development of equipment for better application of heat to the natural raw materials, but the trend today is definitely toward the beneficiation of the natural materials for a better reception of heat.

The present urgent need for increased tonnage of pig iron and the rapid depletion of our naturally rich iron ores from the Lake Region has given the subject of beneficiation of iron bearing materials greater prominence than it has ever had before.

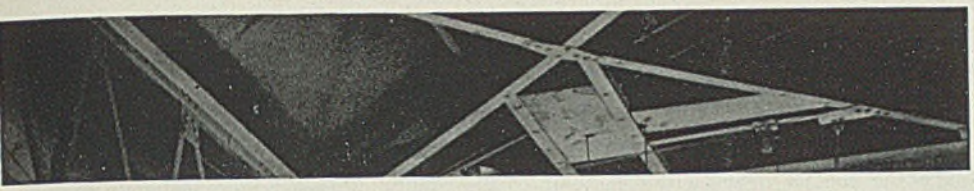
Sintering is the best known and the most economical method of large scale beneficiation for natural ores but sintering alone is not always the complete answer to beneficiation. A fully beneficiated ore might be said to be one which was concentrated, sintered, and sized. All natural ores do not lend themselves to full beneficiation because in some ores the iron is so finely disseminated it is impractical or impossible to concentrate the iron. If such materials contain volatile matter they can be partially beneficiated by sintering and sizing. Some ores do not require sintering, and concentration and sizing are sufficient.

Operation Is More Economical

The use of fully beneficiated iron-bearing material assures a more economical operation than the use of natural materials but that use also requires the recognition of the natural laws which govern the efficient use of heat. Because the soft ore operations are by far the most numerous the problems of those operations are too frequently accepted as inherent with all blast furnace operation when actually they are material problems only.

Smelting of iron to the element from any molecular compound is effected by heating the iron-bearing material, in the presence of a reducing agent, to the temperature required by chemical law to effect the reduction. An unalterable phase of the process is the required temperature. Iron-bearing materials, the molecular compound of iron, and the reducing agent may vary, but the reduction temperature for any given molecular compound in the presence of a given reducing agent will remain unchanged because it is fixed by chemical law and the only cause for a variation in the reducing rate of identical molecular compounds is in the relative ability of the materials carrying the compounds to absorb the heat necessary to effect the reduction. This ability to absorb heat is a material characteristic.

For present-day blast furnace operation the iron-bearing materials cover a wide range, from natural ores to a variety of waste materials from associated operations and the by-products from other industries. In the natural ores the iron usually exists in some form of oxide, hydroxide, or carbonate. In many of the waste products from associated operations it exists as a silicate, and in scrap as a metallic alloy. The range of materials will vary as widely in their physical characteristics as in their chemical composition; frequently the physical characteristics have a greater influence upon the ability of the materials to absorb heat than their chemical composition lias. The fundamental laws governing the absorption of heat are the same for iron-bearing materials as they are for any other material—ratio of surface to mass (to contact the heat) and the degree of conductivity are the two factors which govern the rate of heat absorption for any material, any place. The ratio of surface to mass is governed by particle size of the materials, and the degree of productivity by physical structure and chemical composition.



in the Blast Furnace

Thousands of tons of iron that had its inception in sinter flows down many runners of American blast furnaces today. Photo, U. S. Steel News

In the blast furnace operation carbon is the reducing agent. Every blast furnace completely exhausts the fixed carbon of the fuel but no furnace permanently exhausts the reducing ability of that carbon; otherwise, there would not be any carbon monoxide (CO) in the gas leaving the top of the furnace. Carbon monoxide reduces iron oxide the same as carbon; consequently, all material passing through the furnace is in the presence of the reducing agent continuously. Since the reducing agent is always present the rapidity with which it can be made effective and the amount of reduction it can be made to perform in a given unit of time are the principal factors governing the overall economy of the operation. Heat generated in the blast furnace is dissipated as follows:

1. Absorbed by and radiated through the furnace walls. This is partially subjected to control.

2. Absorbed by and taken from the furnace with the molten iron. This serves a useful and necessary purpose but is a loss to the furnace.

3. Absorbed by and taken from the furnace by the slag. This is a necessary loss but a definite place for savings if the iron-bearing materials can be concentrated.

4. Absorbed by and taken from the furnace with the gas. This also is a definite loss to the extent of the amount of heat used to drive off moisture and combined volatile matter because this necessary operation can be effected more economically outside of the furnace.

Since temperature is the vital factor in the blast furnace operation the operating problem is to generate and deliver to the raw materials entering the furnace enough thermal units to maintain the required reducing and melting temperatures despite the constant drain upon that delivery by the molten and gaseous products leaving the furnace. Obviously a most important factor in the problem is the character of the raw materials and their ability to absorb and hold the heat delivered to them because it is the conservation and concentration of thermal units within the furnace which determines the productive capacity and the overall economy of the operation.

It seems reasonable to say the critical temperature of a blast furnace operation is the minimum temperature necessary to produce the grade of iron specified with the available raw materials. It is therefore a variable but whatever that temperature may be the control of it is in the division of the thermal units delivered to the furnace, between the burden materials within the furnace and the molten and gaseous products leaving the furnace. The loss of heat with the molten products is intermittent but the loss with the gaseous products is continuous and if the number of thermal units delivered is not enough to satisfy all requirements the demand of the flowing gaseous products will be satisfied at the expense of the stationary burden materials. The proof of the statement is the universal practice of lowering the blowing rate to raise the temperature of a cold furnace. With the cold furnace condition the burden materials need more heat but instead of increasing the blowing rate to generate more heat it is lowered and the retarded

velocity of the gas stream permits the stock column to absorb a greater percentage of the heat generated.

When thought is given to the fact that in the average soft ore blast furnace operation for every ton of iron produced there is also produced approximately ½-ton of slag and 5.5 to 6 tons of gas, plus a variable amount of water vapor with the gas, the importance of the thermal units drained from the furnace to the economy of the operation will be better appreciated. Temperature of molten products leaving the furnace is more or less determined and fixed by the grade of iron being produced but the temperature of the *gaseous* products leaving the furnace is dependent upon the degree of efficiency obtained in the transmission of heat from the ascending gas to the descending stock. It is this factor of heat transmission from gas to stock which determines the fuel economy and productive capacity in any blast furnace operation, using a given iron-bearing material.

The gas column rising through the interstices of the stock column is the agent for the distribution of heat throughout the stock column and the more intimate the contact between the gas and the stock and the more uniform the distribution of the gas throughout the stock column, the more efficient the transmission of heat will be and the more uniform and rapid will be the rise in temperature of the stock to the desired temperature.

A time element governs the rate of heat absorption for each class of materials charged into the furnace and without any proven data to establish a rule it seems reasonable to believe there is a relation between that rate of heat absorption and the velocity of the gas stream which governs the possible rate of efficiency in the transmission of heat from the gas to the materials. If the velocity of the gas stream is too rapid for efficient transmission of heat to the materials, in the limited time they are in contact, there will be a loss or sacrifice of heat when the contact is lost. In the interests of economical use of heat the ability of the burden materials to recover the heat from the gas column is just as important as the temperature of the gas because if the heat is not recovered effectively the gas temperature has no value.

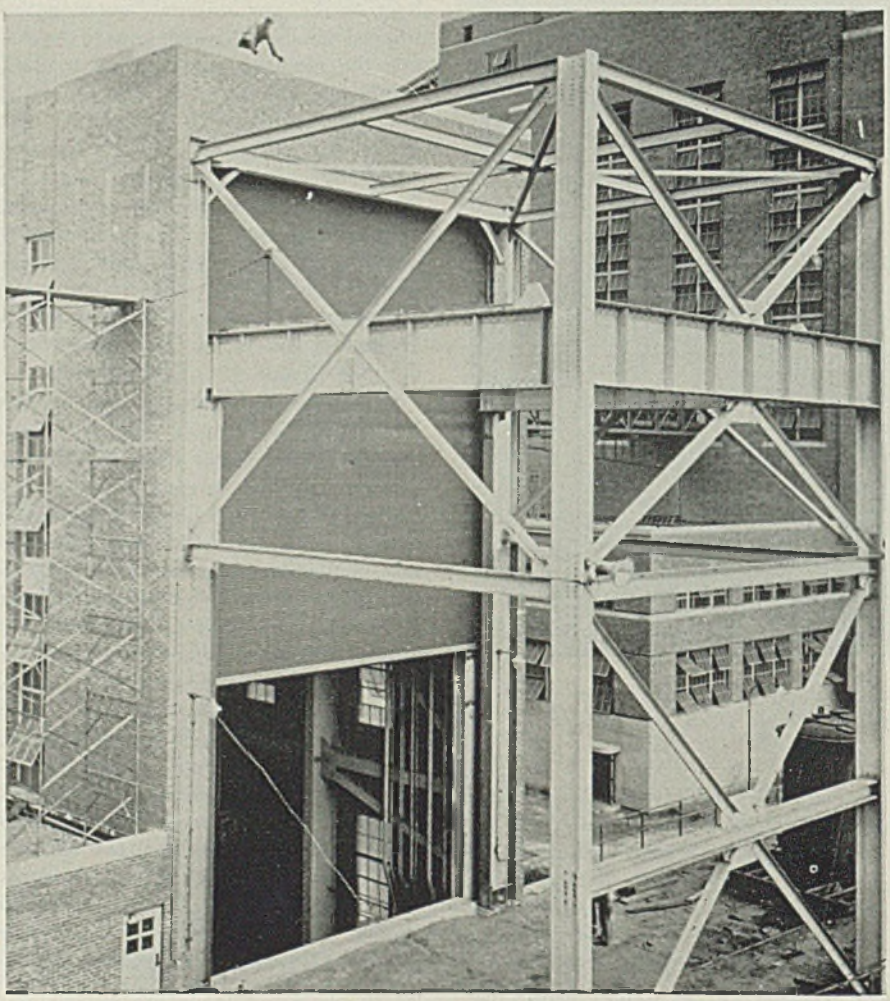
Fuel is one of the principal items of cost of any blast furnace operation. While there is a definite relation between efficiency and economy in the use of heat there is also a distinction. With certain burden material conditions heat may be used efficiently but not economically. The preferred condition is of course a combination of both.

The ideal-bearing material for blast furnace use might be said to be one which is rich in iron, low in gangue, and free from volatiles. It should have sufficient structural strength to forbid packing in the furnace and should be of such a particle size range to force the maximum contact between the descending stock and the ascending gas, consistent with a free uniform passage of the gas. It should be a good conductor of heat. Such materials seldom if ever exist in the natural state but they can be approached by the beneficiation of natural materials.

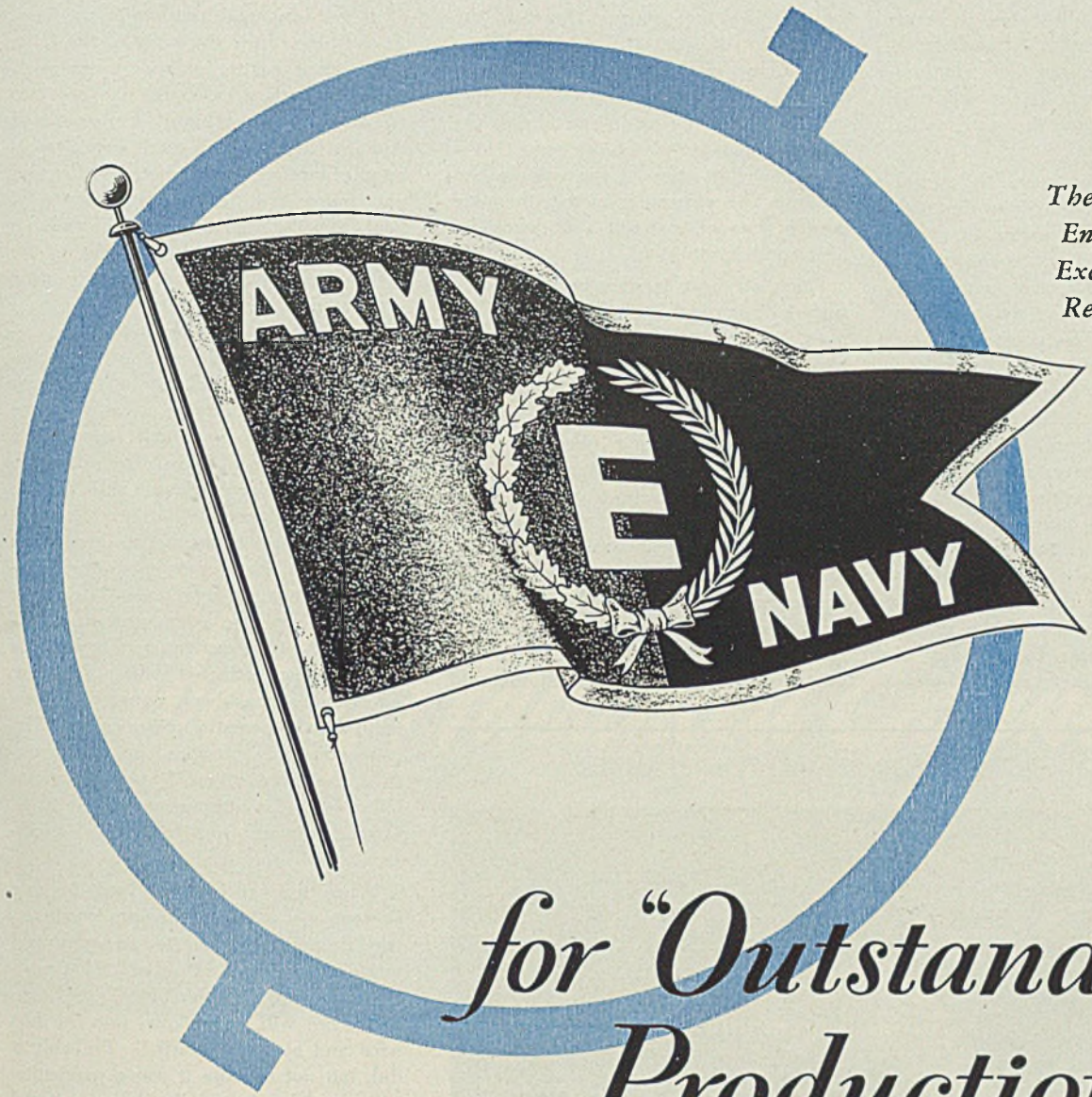
Obviously, the efficiency and economy of the heat depends upon its use and the manner in which it is applied. A mix of materials low in iron, high in gangue, and high in volatiles, could use heat efficiently for the elimination of the gangue and the volatiles but with the low iron content the operation could not possibly be as economical as one using a mix high in iron, low in gangue, and free from volatiles, providing there was equal efficiency in the application of heat. On the other hand a mix high in iron, low in gangue, and free from volatiles, could not be economical if the character of the materials did not permit an efficient application of heat.

Of the range of iron-bearing materials used in the present-day blast furnace operations the greatest individual percentage is that of the natural soft hematite ores. Practically all of these ores contain a percentage of moisture and combined volatile matter. The majority of them will have a wide range in particle size, minus 4 inches to minus 100 mesh with the fines predominating, might be said to be representative. When such materials are lowered into the furnaces all the volatile elements must be eliminated before the non-volatile elements can absorb heat for reduction and smelting purposes. Since

SEVEN-STORY STEEL ROLLING DOOR



COVERING almost the entire rear wall of a seven-story building, this huge steel rolling door was designed by Kinnear Mfg. Co., Columbus, O., for a building in which a 120-ton overhead crane, used in hoisting and moving heavy transformer units, had to pass through the opening. When opened, the door coils into a compact cylinder in a small housing on the roof of the building



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volatiles are heat absorbents and the heat used for their elimination is taken from the furnace with the gas their elimination in the furnace retards the reducing and smelting action of the nonvolatile elements.

Aside from the moisture the usual volatile elements contained in the natural ores are hydrates, carbonates, and sometimes sulphur. The respective percentages and character of such volatiles will vary greatly with the source of the ore but whatever the character their elimination in the furnace leaves the iron existing in a simple oxide formation. The form of the oxide is not of any practical importance in the reduction of the iron because any difference in the reduction temperatures of the different oxides is slight and that temperature is less than the melting temperature of the gangue elements of the mix. Consequently, since the materials are continuously in the presence of the reducing agent while in the furnace any of the oxides are certain to reduce before the melting action occurs. Therefore, the governing factor in the rate of reduction of any of the oxides must depend upon the rapidity with which the material carrying the oxide can absorb the heat necessary to effect the reduction—after the elimination of the volatile elements. The governing factors then are particle size of material and degree of heat conductivity.

Since all heat is absorbed from the surface inward the ratio of surface to mass, to contact the heat, is of the utmost importance. Frequently there will be favorable or unfavorable opinions formed regarding certain materials or ores based upon their chemical composition when the advantage or disadvantage is really due to a physical characteristic. An example is the widely accepted belief that magnetite ore is harder to reduce than hematite ore. The belief originated with the discovery of the Lake hematite ores which "reduced easier than the magnetite ores." Magnetite ore as mined is a hard material of large lump and practically no fines. At the time of the discovery of the Lake hematites it was the practice in the magnetite operations to charge the ore into the furnace in the lump form as mined and in that condition there was a minimum of surface contact between the furnace gas and the ore for transmission of heat from the gas to the ore. The Lake hematite ore as mined is usually a soft earthly material, more or less uniformly graduated in particle size, with the fines predominating. The hematite ore reduced easier than the magnetite ore because the small particle size of the hematite ore afforded a much greater surface contact with the heat and permitted a rapid absorption of heat. The difference in the molecular form of oxide had no practical importance whatsoever. In recent years since magnetite ores have been ground fine for concentration various percentages of raw concentrate, up to 35 per cent, have been used in a furnace mix with excellent results and the reduction was effected with a fuel rate which never has been equaled by any natural Lake hematite ore operation. The concentrates in question ranged in particle size from minus 8 mesh to minus 200 mesh. No attempt was made to go beyond 35 per cent because of excessive fines in the mix.

When the use of Lake hematite ores became general some Eastern producers tried mixing fine hematite and lump magnetite in the furnace burden. That practice gave birth to the belief "the magnetite ore will work down into the furnace and cool the hearth." Probably it did, but not because it was a magnetite. The particle size of the lump material being out of proportion to the particle size of the fine material caused the lump material to absorb heat more slowly and, consequently, it could not reduce as rapidly as the fine material.

In former years those furnaces using a percentage of puddle cinder in their mix had trouble similar to that caused by the lump magnetite ore. In puddle cinder the iron exists as a silicate and in particle size the material was similar to the lump magnetite ore and as with the magnetite ore it was the particle size that caused the trouble and not the chemical composition.

The experiences cited are examples of beliefs which, if repeated often enough, become a part of furnace practice lore and generally are accepted as true, yet they are entirely erroneous.

Most of the present-day blast furnace operations using the range of iron-bearing materials common to the industry have all the factors in the mix which contribute to an inefficient and uneconomical use of heat, namely, volatiles, wide

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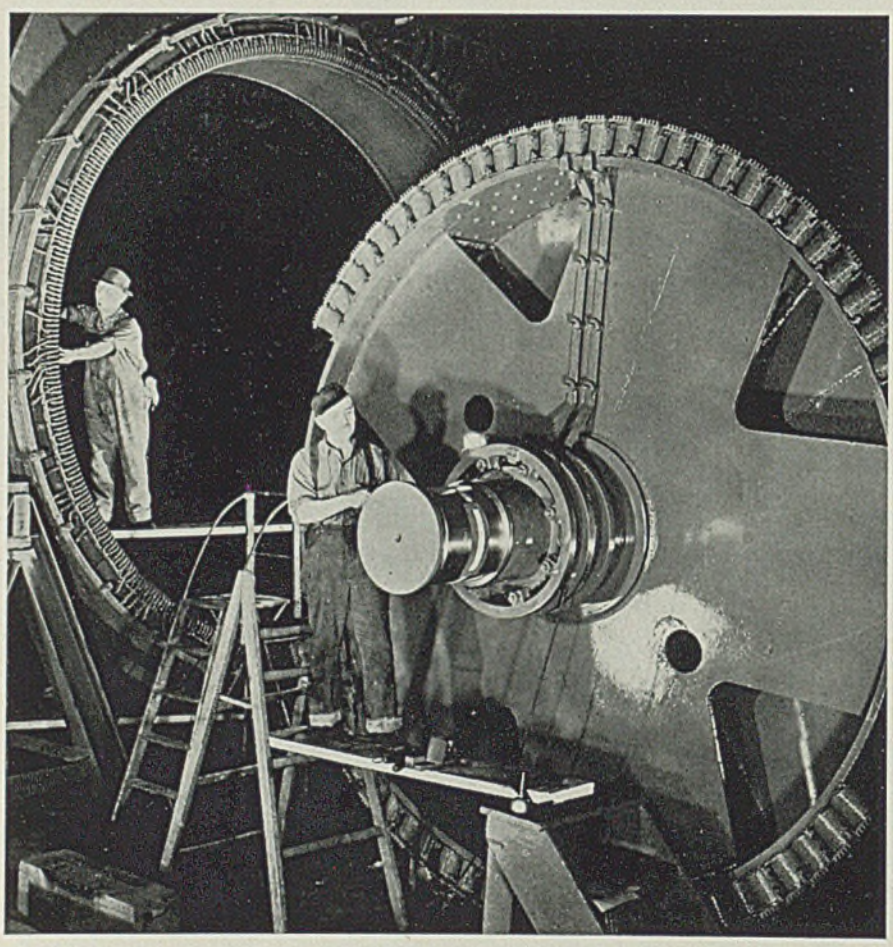
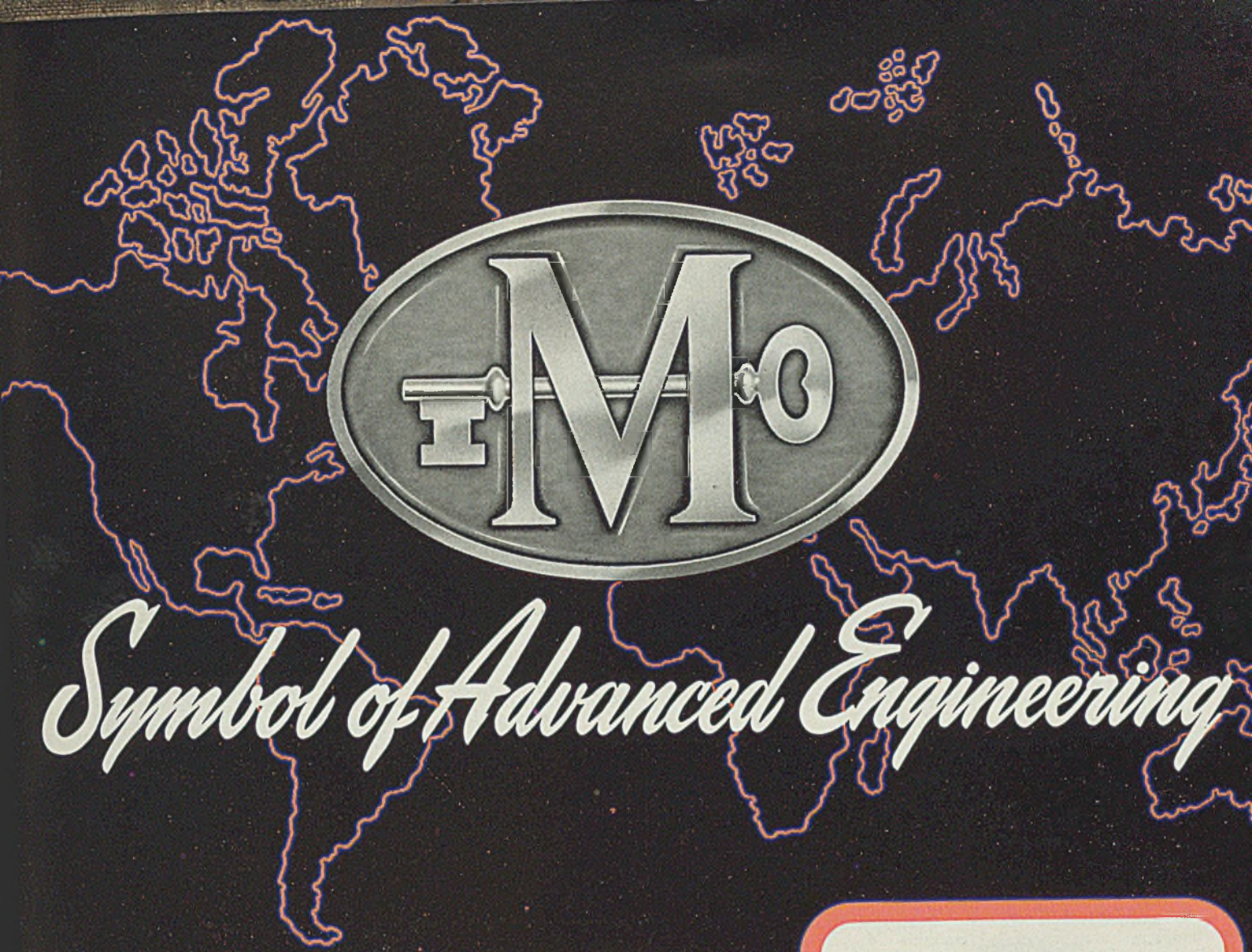
MOTOR ROTOR FOR 21,000-TON TANKER



ANOTHER 21,000-ton oil tanker will receive its motive power from this 30-ton wheel being built by Westinghouse. Standing 13 feet high, it is the rotor of a 6600-horsepower motor. Worker in foreground is polishing journal of the rotor's shaft, while the other inspects insulation of the stationary part of the motor. Twelve of these motors already have been completed with 28 more on the way



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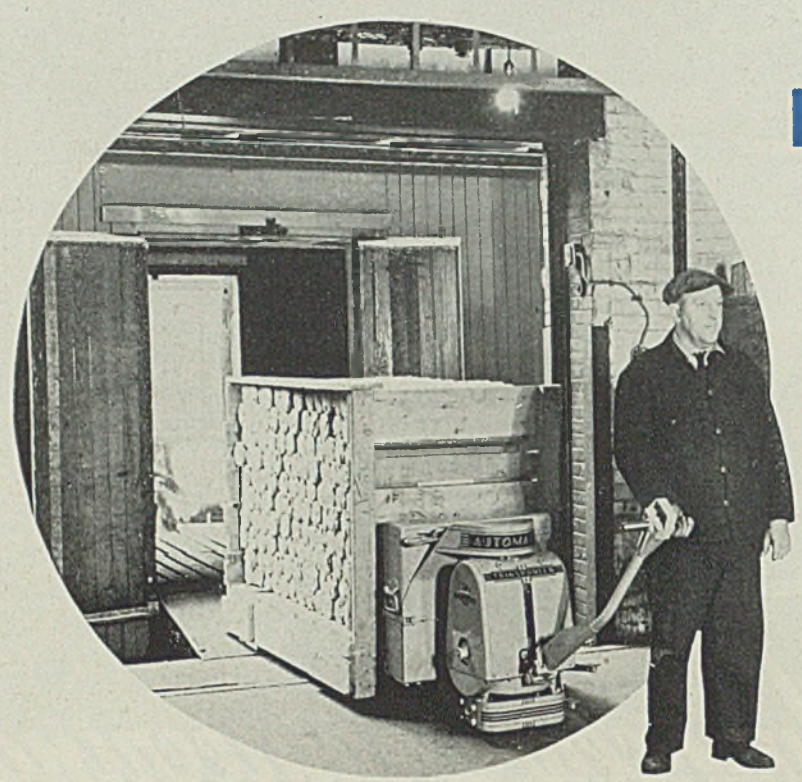


MECHANIZED HANDLING

For Small Loads

By HERBERT J. FRAMHEIN

Chief Engineer
Transporter Division
Automatic Transportation Co.
Chicago

INTRAPLANT transportation — receiving raw materials, warehousing them, carrying them to and along the production line, storing and rehandling finished products for shipment—has become a major problem in many plants suddenly choked with war orders. Cramped quarters and lack of a systematic materials handling system often combine to shackle production. Any means that helps to bring order out of chaos is of great value.

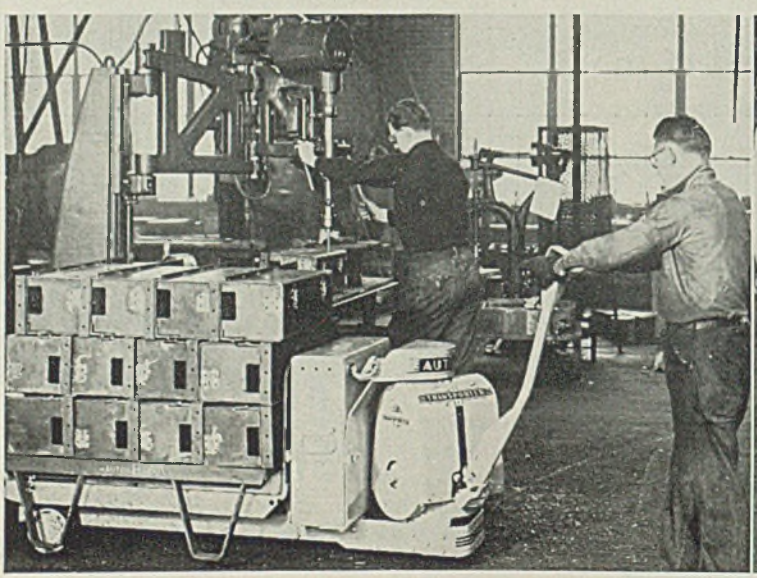
As in the case of the camel whose back was broken by a straw, it is the *little* things that count. A 50-pound box must be moved from one end of the building to the other; 200 pounds of raw material is needed at the production line; 3000 pounds of machinery crated in 500-pound units is on the freight dock and until it is moved a huge order of raw material cannot be unloaded. Just such "odds and ends" which sometimes can be handled by hand and which usually are too small to justify the use of a large industrial truck can work havoc with production schedules.

Hand labor is slow and expensive at best, and with the present shortage of workers, it is practically a criminal waste of manpower. Large industrial trucks can usually be kept busy handling just the large loads. Of course they should not be run carrying only a small fraction of their capacity if it can be avoided. Also, frequently a full size truck cannot be operated in the space available.

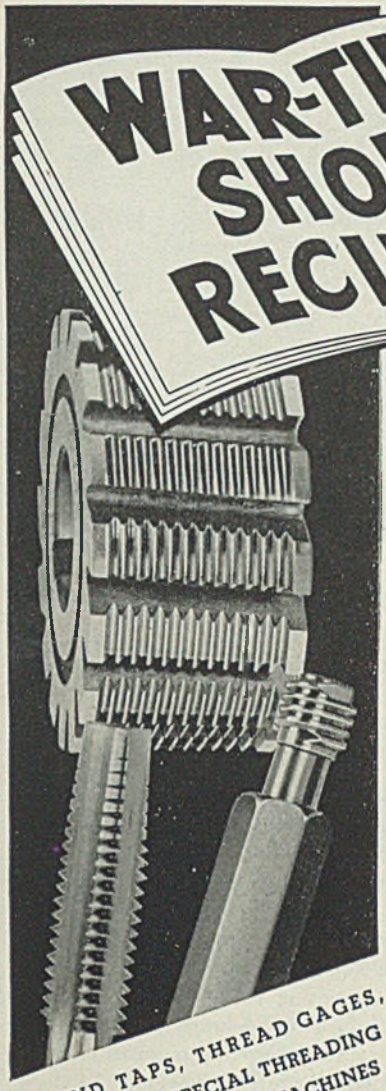
To meet this situation, American equipment makers are developing small, power-driven materials-handling units designed especially for handling small loads and for operating in confined spaces. One such unit is the Automatic Transporter designed by Automatic Transportation Co. Division of Yale & Towne Mfg. Co., 101 West Eighty-seventh street, Chicago. It is a battery-powered lift truck built in capacities of 4000 and 6000 pounds with platform lengths ranging from 36 to 72 inches and platform widths of either 20 or 26½ inches.

In Fig. 1 a Transporter is being used

Fig. 1. (Above)—The Transporter readily enters box cars to load and unload them quickly
Fig. 2. (Left, below)—Mechanized handling of parts on production line speeds processing
Fig. 3. (Right)—Intrashop handling can be done faster when mechanized



WAR-TIME SHOP RECIPES *for thread production*



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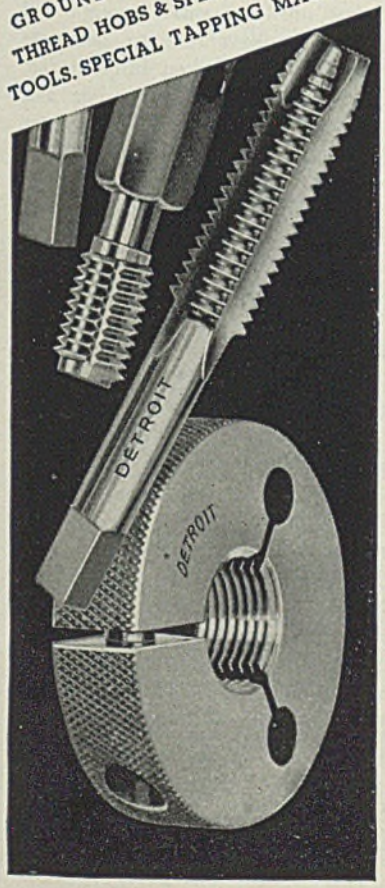

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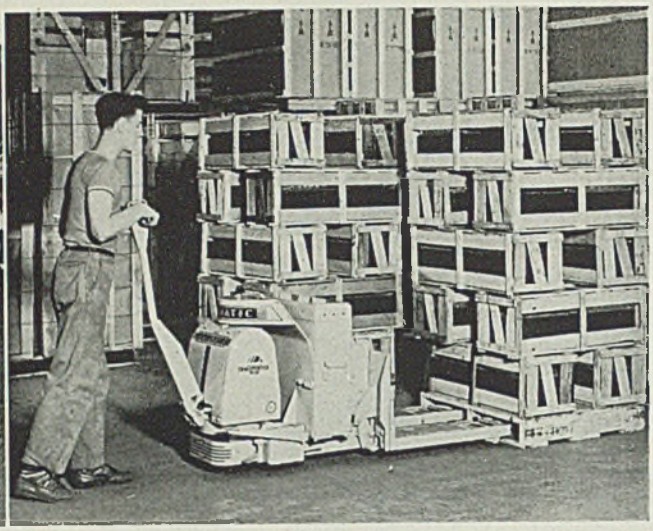

Fig. 4. (Left, above)—Warehousing requires stability and maneuverability in close quarters

Fig. 6. (Right)—The pallet Transporter is equipped with forks instead of a platform

to unload incoming material from a box car. Movements of the long handle held by the "driver" not only steer the truck but also afford complete brake and speed control, thus assuring instant, positive control and safeguarding the operator. When the handle is vertical or inclined toward the platform, the brakes, which are of the external contracting type, are applied. When it is tilted toward the operator at an angle of from 45 to 90 degrees from the horizontal, as in this view, the unit moves in its first speed. If the handle is tilted still lower—to about 35 degrees from the horizontal—the second speed is reached. Forward and reverse direction pushbuttons are built into the steering handle grip, and the two speeds are available in either direction.

The entire drive mechanism and the control units are mounted on a steering turntable which is controlled by the handle and beneath which is a solid rubber-tired drive wheel. When the handle is turned to either side to steer the truck, the drive unit turns with the wheel, as can be seen in the accompanying illustrations. Full power can be attained in steering at any angle through a 210-degree range, making it easy to break out loads from storage with little maneuvering.

The small Transporter in Fig. 2 is moving a load of metal boxes stacked on a skid platform from a drilling operation to the next station on the production line. Note drill operator in background is drilling another similar box.

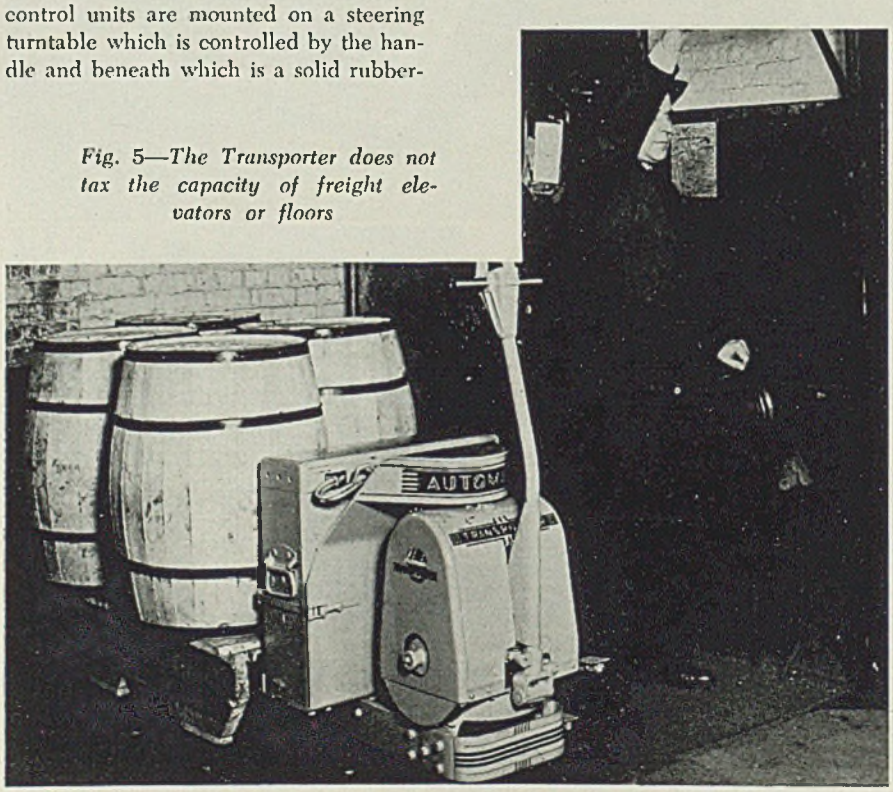

Fig. 5—The Transporter does not tax the capacity of freight elevators or floors

Another example of use of this unit on a production line is shown in Fig. 3. In this view parts stacked on a skid platform are being transported from a machining operation to the next station on the line for further machining.

Warehousing usually requires maneuvering in close quarters and is apt to be a source of trouble in small or overcrowded factories. Powered handling equipment must be small enough and sufficiently maneuverable to negotiate narrow aisles, even when fully loaded. The forward and reverse speeds and wide turning range of the Transporter make it particularly suitable for this type of operation. Fig. 4 shows one of these trucks loaded with cartons of completed products ready to be stored. Note the stability of this load. In this case the long platform and the widely spaced steel trail wheels, mounted on an overhanging axle, contribute much to the stability that makes such loading possible. Overall length of truck with platform down varies from 67⅞ to 103⅞ inches, depending on size of platform.

The platform is a one-piece formed steel plate of all-welded reinforced construction with a high back plate to protect the battery from the load. Two widely spaced lift brackets, raised and lowered hydraulically by operation of a foot lever at the right of the drive unit, support the platform. This foot lever can be seen in Figs. 1, 3 and 5. A heavy-duty hydraulic pump is employed to raise and lower the platform, insuring shockproof operation. Lift is 3½ inches from low to high on all models, and

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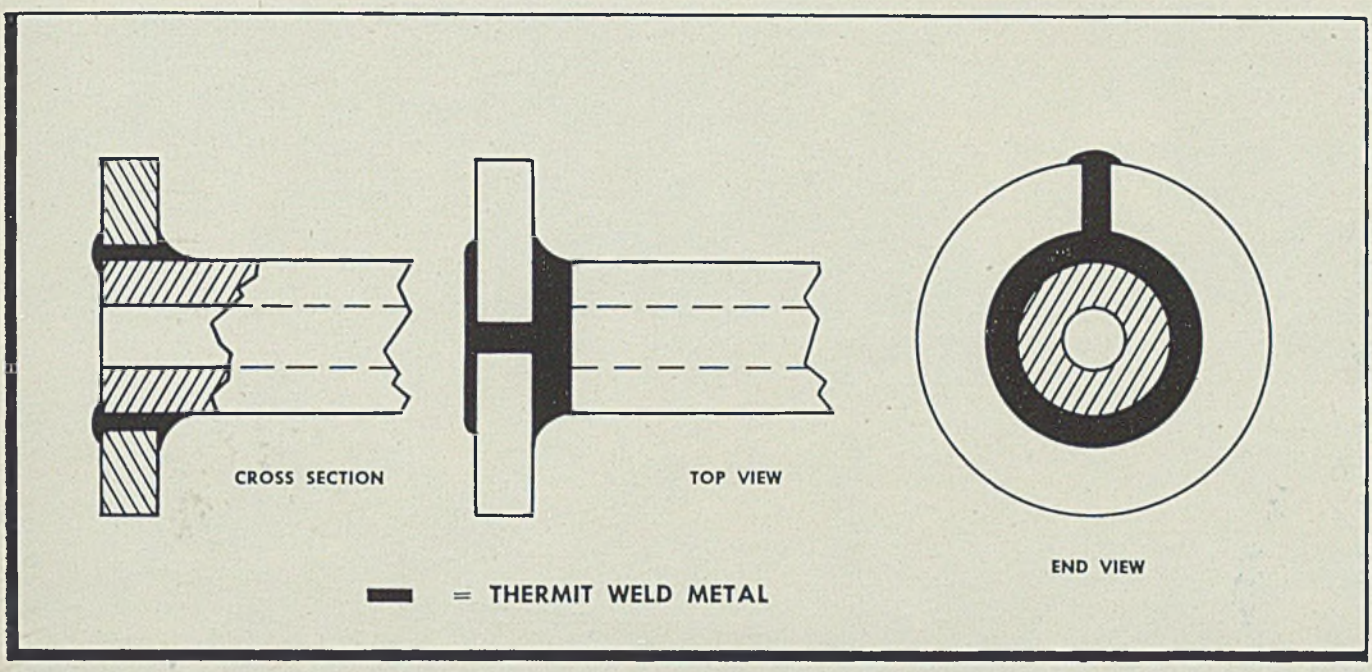

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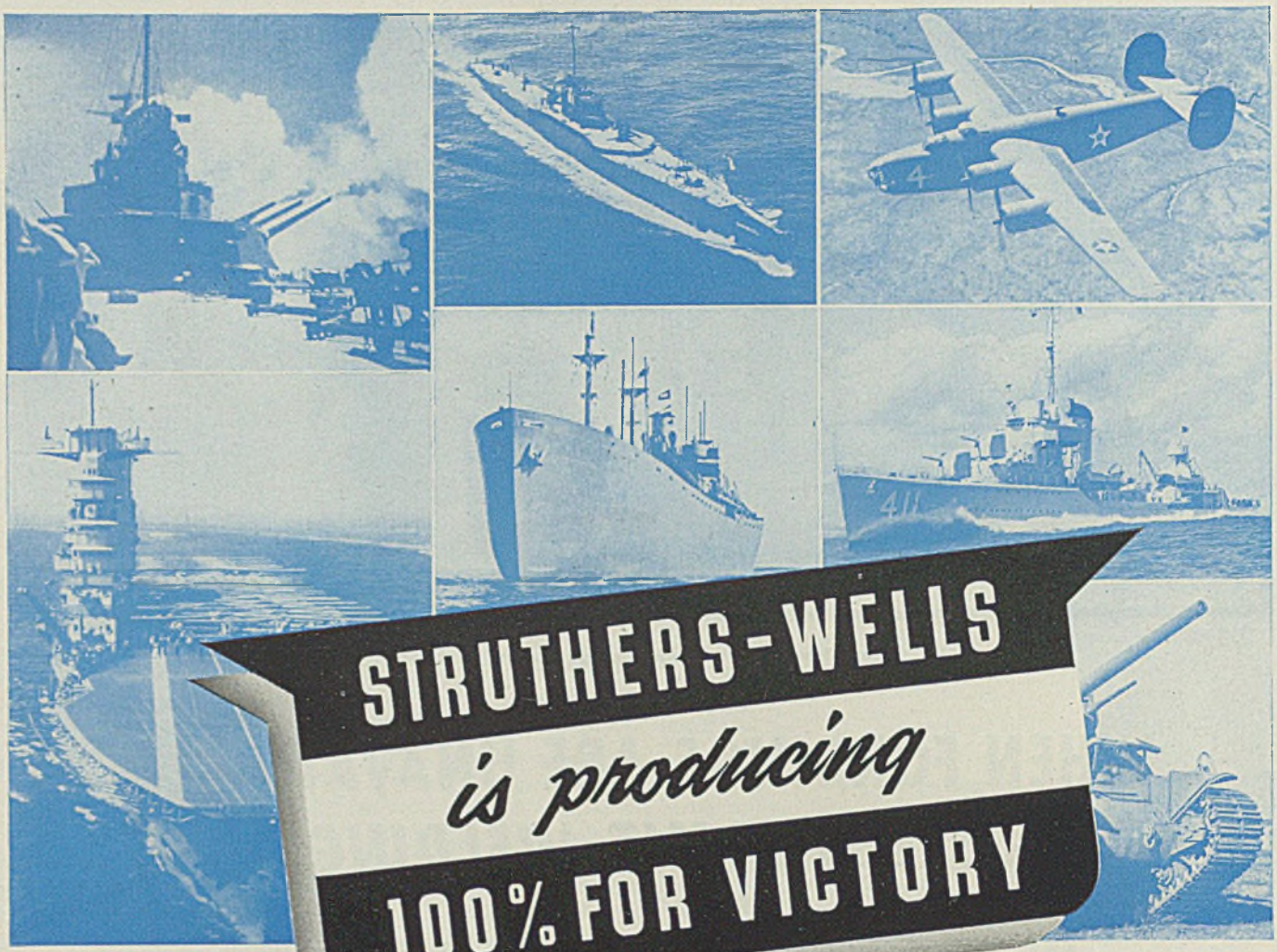

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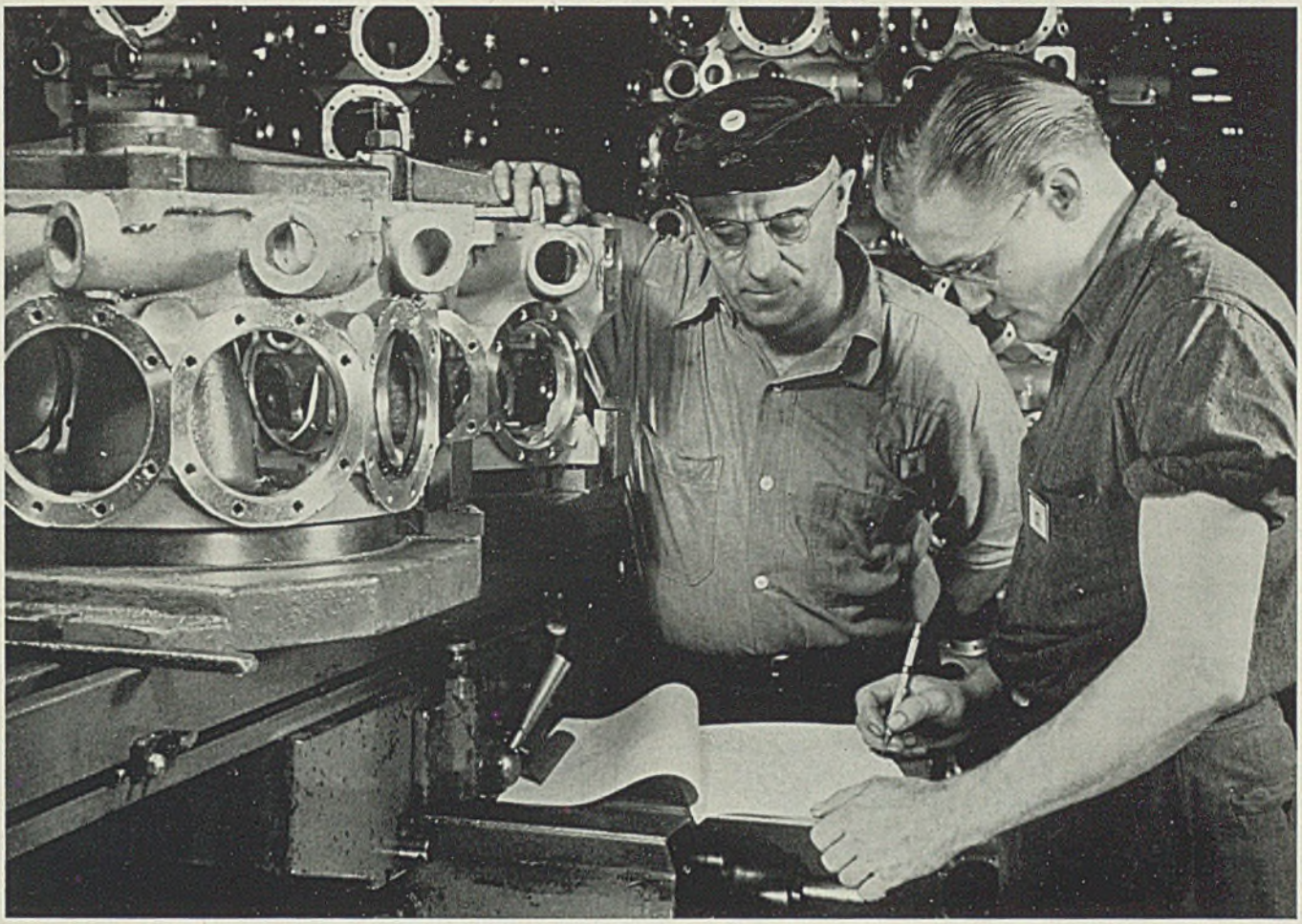


A new machine-tool operator at Lycoming gets some pointers from an old-timer on filling out his machine-tool questionnaire. Although new men are asked to write out their answers at home, they are encouraged to seek information while on the job at the plant

OPERATOR TESTS

Aid Lycoming Training Program

HOW MUCH should a new machine tool operator know about his work after he is on the job a few weeks?

And how can a company determine if a new man meets the minimum standard?

In normal times these questions just aren't a problem. A good foreman can pretty well size up a green hand after spending some little time with him. But in the present expansion period, a foreman isn't able to spend much individual time with all his new men. And there are so many green hands to be considered that it is important that some standard be established for checking up on all of them.

In this connection, a series of written questionnaires for job-testing developed by the personnel department of the Lycoming Division of the Aviation Corp., Williamsport, Pa., is attracting considerable interest.

Lycoming, manufacturer of radial and horizontally-opposed airplane engines, has almost quadrupled its shop personnel in the past two years and is still expanding. In breaking in new machine tool operators the company has adopted the widely used plan of assigning a new hand to the machine of an older, experienced operator under whose supervision the new man gradually takes over. In a few days or a few weeks, the novice, who is usually a graduate of the Williamsport Technical Institute (the local public vocational school) is able to handle the machine entirely on his own and is then generally transferred to the second or third shift.

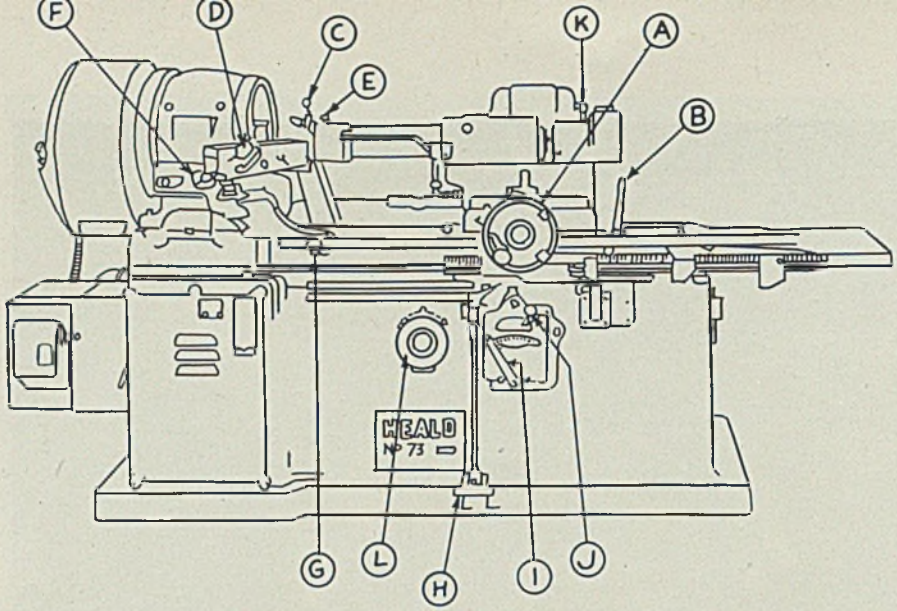
The company makes sure, however, that before the new man is put in full charge of a machine he satisfactorily answers a written questionnaire about that particular machine. The questionnaire consists of three parts:

1—A drawing (or, in some cases, several drawings) of the machine with arrows pointing to all the important levers, wheels, buttons and other controls. The operator must name and explain the use of all these controls, proper space being provided on several sheets of the questionnaire for the answers.

2—A series of 15 to 30 questions (depending upon the complexity of the machine) about its operation, such as the setting of the cutters, selection of spindle speeds, use of hand adjustments, the handling of chucks and arbors, lubrication, etc.

3—A series of 14 questions (standard for all operators) on general shop practice. Typical questions here are: What would you do in case of an oil fire? Who should be the first one to know of a mistake made or discovered by you? How often should your gages and micrometers be checked?

The questionnaire is given the new



This diagram is part of the questionnaire that the machine-tool operator is asked to fill out. He must name and explain the use of each control marked on this sketch

23. How is wheel wear compensated for? Should the pawl which is feeding the cross slide be thrown out before dial indicator registers zero?

man within a few days after he first goes to work, and he is asked to fill it out at home. Some questions can be answered in a single word, others take a paragraph. Many require the operator to use initiative—he must find the department foreman for some answers, look up the machine manufacturer's manual for others, and generally ask his instructor and foreman quite a number of questions.

Lycoming people feel that the questionnaire serves a number of useful purposes. For one thing, it establishes a minimum standard for new hands, making certain that operators of general-purpose machines aren't "one-operation" mechanics. Too often, it is felt, some operators, never learning the purpose of all the controls, fail to get out of a machine anywhere near all the efficiency that is built into it. On the other hand, an operator who is familiar with all his controls is likely to use them.

The questionnaire also provides the green hand with a guide for learning. He finds out by this means what the company expects him to learn about his machine, what the company considers important. And he knows what questions to ask. In the same way it makes certain that the older operator-instructor doesn't hold back any important information. Very little of this attitude still exists today, but there sometimes is a tendency on the part of older men to limit their help to new men for fear the younger men will get their jobs.

The questionnaire is further considered valuable in that it goes far to determine a man's interest in his job. And it points out outstanding men, also men who have unusual ability in certain other types of work, and those of lesser ability who need help. This shows up in the way a man answers the questions, his thoroughness, the sketches he makes, how promptly he returns his papers, and so on.

Sometimes, for example, shy and backward men who don't sell themselves as well as they might in personal interviews are shown to have unusual ability, while on occasion others who can talk persuasively are shown to be less experienced or gifted mechanically than they supposed.

In this connection, the company points out that the new man is not rated solely on this paperwork. The questionnaire is simply a supplementary means of evaluating him—though a rather useful one. Certainly in cases where the instructor and foreman are undecided about a new man the questionnaire is very helpful.

Lycoming has already given the test to hundreds of men. With the help of their most experienced old hands and the co-operation of the builders of the various machines, the company has developed questionnaires on the operation and setup of some 60 different standard machine tools. These include everything from simple single-spindle drill presses to thread grinders, 6-spindle automatic screw machines and specially-designed horizontal multiple-drilling machines.

TABLE I—General Questions for All Operators

Directions: Find out and write answers to the following questions. It is suggested that you write out the answers at home.

1. What would you do in case of an oil fire?
2. What would you do in case of a magnesium fire?
3. What would you do in case of an electric fire?
4. What would you do in case of a paper fire?
5. What precautions should be exercised in the use of an air hose?
6. What do you do in case of an injury to yourself, no matter how slight?
7. What precautions should you take before starting on a job left by someone else?
8. Who should be the first one to know of a mistake made or discovered by you?
9. What precautions should be taken when working in the vicinity of flying particles?
10. What would you do if a fellow workman received an electric shock and could not let go while working at his machine?
11. What would you do if a fellow workman became caught in his machine?
12. When do you use gages provided for the job?
13. When do you use micrometers of the various types?
14. How often should your gages and micrometers be checked?

TABLE II—Quiz on Heald Type 73-5 Airplane Cylinder Grinder

1. How often should wheel head be oiled?
2. How are the table ways lubricated?
3. What height should oil be maintained in the control box?
4. How often should the cross slide be oiled?
5. How often should the diamond bracket, diamond unit, and diamond roll level be oiled?
6. How often should wheel head be oiled, and to what level; also, what grade oil?
7. How often should the dog bar support roll, sliding dog return arm, sliding dog quick return unit and reverse lever be oiled?
8. How is work prepared for loading?
9. How is work loaded?
10. Before starting machine, how should the cross slide hand wheel be moved? Why?
11. What precaution should be taken in relation to condition of work previous to grinding? Why?
12. How far should wheel pass through each end of the hole? Why?
13. What precaution should be taken before setting the grinding stroke?
14. How is the stroke set?
15. What precaution should be taken before adjusting diamond?
16. How is the diamond set?
17. How is the truing stroke set?
18. How is a tapered hole corrected?
19. How is the diamond set for size?
20. How may the best feed and speed be determined?
21. How is the dial indicator adjusted?
22. How is the diamond given the final adjustment?

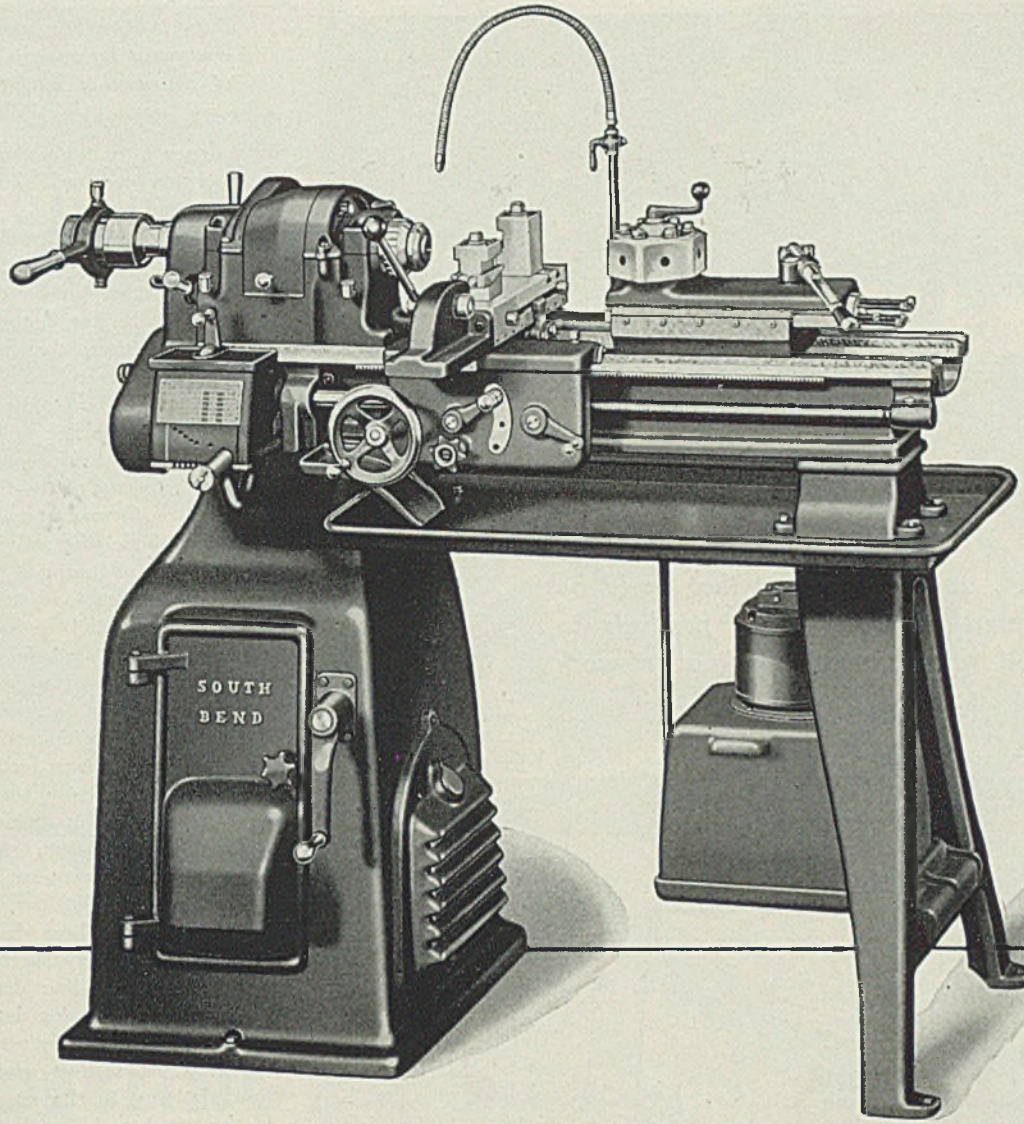
GE Introduces New Electron Microscope

A new small, mobile electron microscope that operates on ordinary house current was revealed recently by Drs C. H. Bachman and Simon Ramo of the General Electric Electronics laboratory at the National Chemical Exposition.

Capable of producing images 10,000 times the size of the subject, the device makes it possible for small laboratories and war plants to take advantage of this type instrument.

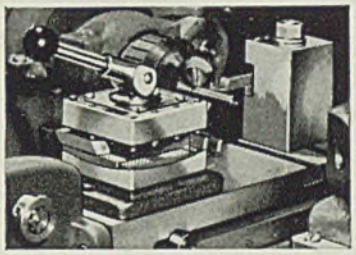
The microscope is said to use electrons in an entirely different way than earlier electron microscopes, applying electrostatic focusing to the beam of electrons instead of electromagnetic focusing. Its beam of electrons passes through the specimen inside a vacuum chamber and produces a visible picture on the fluorescent viewing screen. This image can then be photographed outside the tube, and, if desired, enlarged many thousand times the original size of the specimen for a wall print known as an Electronmicrograph.

Former instruments required taking of the photograph inside the vacuum chamber. Due to priority requirements, the device is available only to essential laboratories and war plants.

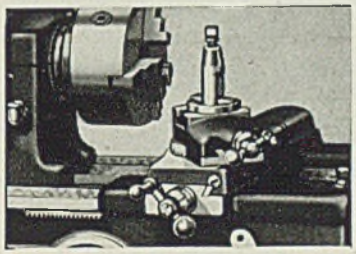


For Rapid Machining
OF SMALL PRECISION PARTS

In hundreds of important war production shops the new Series 1000 South Bend Turret Lathes are first choice for machining small precision parts. Highly efficient on all work within their capacity, these lathes are especially popular for close-tolerance, second operation jobs.



4-Way Turret Tool Block permits greater number of operations per setup. Indexes to 4 positions. Optional equipment.



Compound Rest Cross Slide, interchangeable with Handlever Cross Slide, is also supplied as regular equipment.

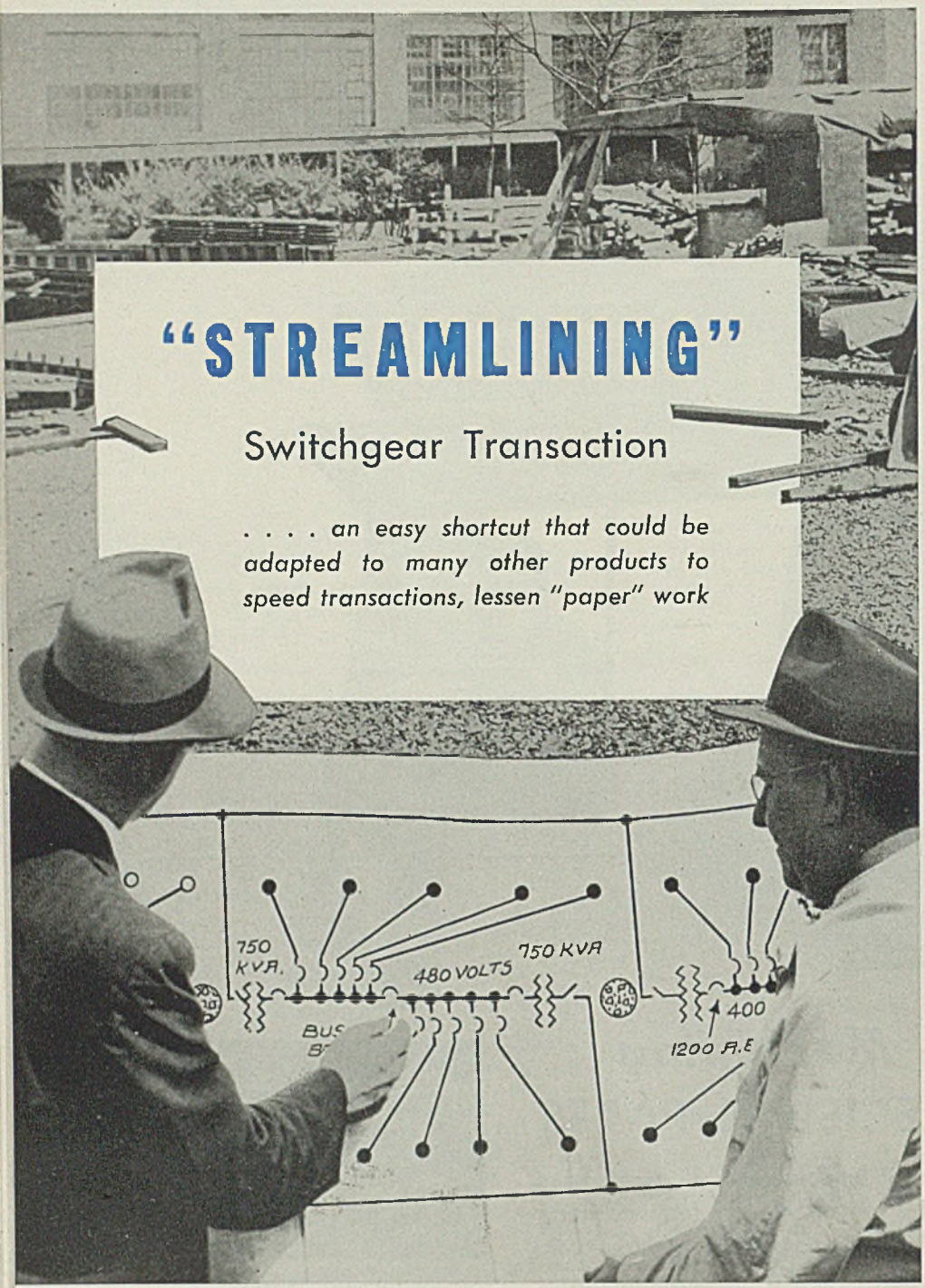
SPECIFICATIONS

Hole through spindle	1⅜″	Spindle speeds (12)	50 to 1357 r.p.m.
Collet capacity, round	1″	Thread cutting feeds (48)	4 to 224 per inch
Swing over bed and saddle wings	10⅛″	Universal carriage power feeds—	
Effective feed of turret slide	4″	longitudinal (48)	.0015″ to .0836″
Turret face to spindle, max.	19⅜″	transverse (48)	.0006″ to .0309″

South Bend Turret Lathes, Engine Lathes and Toolroom Lathes are made in a wide range of sizes and types. Write for catalogs and the name of our nearest dealer.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 36 YEARS — SOUTH BEND, INDIANA, U. S. A.



"STREAMLINING"

Switchgear Transaction

. . . . an easy shortcut that could be adapted to many other products to speed transactions, lessen "paper" work

Fig. 1—One-line diagram helps contractor by speeding the layout of distribution circuits and gear

By E. H. BECKERT
Switchgear Division
General Electric Co.
Schenectady, N. Y.

PROPOSAL routine and ordering routine, real time consumers in negotiations for plant equipment, have been effectively speeded up in many transactions for switchgear. Depending on the type of equipment and conditions involved, savings up to 50 per cent are being made in the purchaser's and the manufacturer's time previously required to decide on the switchgear needed for a job, order it and get it into production.

Two factors are responsible for the saving. Factor number one is standardization of equipment, already accomplished by leading switchgear manufacturers. Without it the scheme would be unworkable. Factor number two is a double-barrelled one—the use of a one-line diagram by purchaser in his request, Fig. 3, and the use of a combined one-line diagram and perspective outline picture of the equipment by the manufacturer in his proposal, Fig. 2.

This method short cuts the preparation of detailed specifications by both purchaser and manufacturer and, as well, eliminates much of the proposal routine preliminary to the actual placing of the business and often a great deal of correspondence after the order is received.

A typical case will illustrate how the new method works.

The XYZ Mfg. Co. plans to erect a small plant and needs switchgear to control and protect the distribution system. To begin with, the engineer on the job, of course, knows the total amount of power required and he must select the system of distribution he desires to use and the distribution voltage; he must know how his load centers are located and the capacity of the feeders required for each of these centers.

In the simple case chosen it is assumed that the size of the plant is such that the engineer decides to distribute power at low voltage with the stepdown transformers located outside the plant. He wishes to control the incoming service and four feeders to load centers with space on the switchgear control board for a possible future feeder. (The one-line diagram scheme could be applied equally well had he decided to distribute at high voltage with stepdown transformers at load centers, using the unit substation system).

Having made these decisions it takes the engineer a very short time to make up a simple one-line diagram, Fig. 3. This diagram contains data as indicated and is accompanied by very brief general specifications stating essential information applying to the specific conditions of the purchaser's installation. This constitutes his specifications and request for a proposal.

The manufacturer readily determines the standard equipment applicable and prepares his bid. This consists of (1) a letter quoting prices and estimated shipping date; (2) a drawing Fig. 2, which is a dimensioned perspective outline of the equipment containing a one-line diagram showing the connections of each unit with a keyed list of each unit's equipment; (3) a set of stock descriptive sheets that describe details of the equipment offered; and (4) a set of brief specifications containing only such general essential data as machine and circuit capacities, general reference to descriptive sheets, and a limited amount of other data not easily covered on the drawing.

XYZ Mfg. Co. then places its order in a form as simple as: "One Switchgear Equipment in accordance with Proposal No. so-and-so."

In completing the order, of course, the manufacturer provides the usual drawings including front view and complete wiring diagram for operating purposes. But their preparation is coincident with the manufacture of the equipment.

The point may be raised, "Doesn't the

ROEBLING "Blue Center" gives them all they ask for!

They're carpenters and blacksmiths and gravediggers. Ready to build a railroad, or blow it up... spin a river-crossing for tanks, or set a trap to stop them.

And when the Corps of Engineers set out to trap a tank, watch them roll up this mechanical gravedigger, and *work to specifications*. Straight down and just wide and deep enough so the tank buries its nose helplessly against the opposite wall. And when they rope-rig this or any other equipment, they select a rope they know won't let them down.

In fact, wherever the going is toughest ...you'll find Roebling "Blue Center" Steel Wire Rope. Built into every foot of it is the knowledge of Roebling engineers, gained in the field... in the Roebling mills... in Roebling development engineering. Each adds its part to the extra values in "Blue Center" Rope... each helps it meet conditions unfailingly wherever wire rope has a routine or unusual job to do for Victory.

JOHN A. ROEBLING'S SONS COMPANY
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STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

ARE YOUR ROPES DOING FULL DUTY?

You can make sure that they are... and save steel for war in the bargain... by taking proper care of wire rope *on the job*. To help you, Roebling has assembled a wealth of conservation data and boiled it down to fit on a 5 x 4 inch tag that operating men can fasten right to the equipment. It's a simple, convenient way to remind and instruct them about such vital precautions as these:—

1. INSTALL PROPERLY
2. SPOOL CORRECTLY
3. USE ENOUGH CLIPS
4. LUBRICATE REGULARLY
5. INSPECT FREQUENTLY
6. OPERATE CAREFULLY

Copies of this tag are yours for the asking. Our nearest office will furnish as many as you need. ASK FOR TAG "A".

To help Reduce TOOL BREAKAGE IN YOUR SHOP

Tool breakage due to improper handling of tools, etc., has been climbing at an appalling rate lately. Much of this undoubtedly is due to the introduction of large numbers of workers with no previous industrial training.

In an endeavor to help you reduce tool breakage in your shop, Genesee has produced and is making available without charge to users of **"TOMAHAWK"** tools a series of educational posters illustrating the effect of careless tool handling on the war effort.

These dramatic posters, measuring 2⅓ by 3½ ft. and in 3 colors are designed for mounting next to your tool room windows and emphasize that THERE IS JUST SO MUCH TOOL STEEL.

A new poster will be supplied every other month, thus providing a continuously fresh slant on this vital subject.

Write or wire today if you wish to be put on the list to receive these posters regularly—advising us of the number of posters you will need to cover your plant requirements.

The supply is necessarily limited

GENESEE TOOL COMPANY

FENTON, MICHIGAN

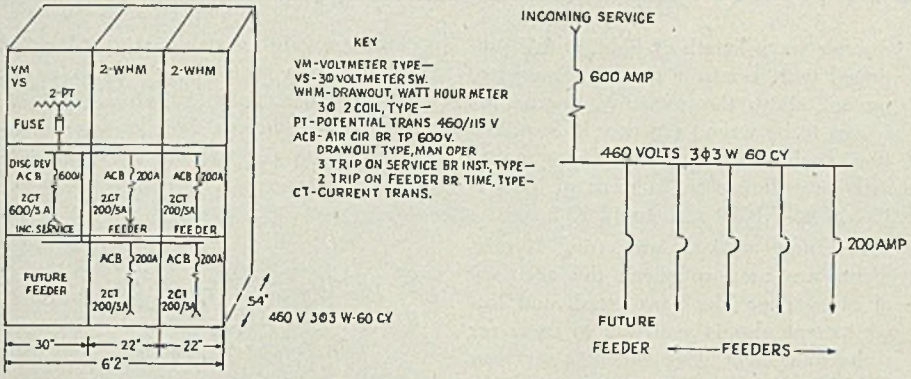


Fig. 2. (Left, above)—This is the corresponding manufacturer's proposal diagram to give him what he has asked for. Note simple one-line wiring diagram and how it is effectively combined with overall dimensions of the three switchgear panels

Fig. 3. (Right)—This is the simple one-line diagram that is submitted by the customer to show what he wants

one-line diagram method mean that the purchaser is putting himself pretty much in the hands of the manufacturer?" The answer could be "yes," but it should be "no." "Yes," because this method places a larger share of responsibility on the manufacturer and takes for granted the suitability of his standard equipments. "No," because, after all, no real details are left open since standard equipments are furnished and these are very definitely described in the diagram and in the stock construction sheets submitted with the proposal. All manufacturers on a transaction of this kind will take pride in safeguarding the customer's interests and in furnishing equipments that will fulfill all requirements.

Issues Wartime Manual On Power Transmission

Dodge Mfg. Corp., Mishawaka, Ind., reports the release of a 388-page wartime manual of mechanical transmission which includes complete descriptions, diagrams, dimensions and prices of thousands of power transmission appliances.

Identified as manual No. 42, it contains over a hundred pages of engineering data essential to proper design, installation and operation of mechanical power drives. Attention is given to products which may be used as alternates for those difficult to obtain. In addition to the power transmission equipment and data, a section is included devoted to belt conveyors for bulk materials handling augmented by engineering information essential in laying out conveyor systems to meet any operating requirement or service condition. The manual is available by making request on firm letterhead.

Ceramic Storage Batteries To Save Much Rubber

Savings of tons of rubber for war is being effected by Storage Battery Division, Philco Corp., Trenton, N. J., through development of Vitrabloc storage batteries using a vitrified ceramic case composed of non-critical materials.

The new batteries will be used in telephone, public utility and industrial installations. Research on the development began 2 years ago. Because of its location, center of the ceramics industry, Philco engineers turned to these materials as alternates to rubber and after extensive research developed the new batteries.

A special blend of four clays provides desired density, color, strength and resistance to shrinkage. Like glass, Vitrabloc does not absorb moisture, and acid does not penetrate or affect it.

Link-Belt Method Reclaims Used Core Sand

A new method of reclaiming foundry core sand—the thermal method—is announced by Link-Belt Co., Chicago. It is reported to reclaim used core sand at a fraction of the cost of new sand, with considerable savings in labor, railroad transportation and handling.

Equipment employed in this new method consists of a rotary kiln and Roto-Louvre cooler. Binders, oils and other foreign materials are burned out of the shakeout-sand after the cores have been broken and screened. The sand is then cooled in a Roto-Louvre cooler. When reclaimed it is as clean and usable as when new, it is reported.

Mechanized Handling

(*Concluded from Page* 108)

height of platform at low position varies from 6 to 11 inches.

In Fig. 5 a Transporter loaded with barrels has been driven into a freight elevator for transfer to the level where the barrels are desired. This truck is ideal for use where floors or elevators have limited capacity, for the weight of the 4000-pound unit complete with battery is only approximately 1000 pounds and of the 6000-pound capacity unit with battery approximately 1200 pounds. (Actual weight depends on size of the platform.) Also, sufficient power is available so no extra manual push or pull is necessary to help the truck over toe plate humps or elevator ridges.

Fig. 6 shows the pallet Transporter, which is equipped with forks instead of a platform and handles single and double-faced pallets weighing up to 4000 pounds. These forks are pressed steel channels welded to cantilever plate, and each is supportetd by a steel wheel 3¼ inches in diameter and 6 inches long. Weight of the truck battery is about 1200 pounds, exact weight depending on fork length, which can vary from 30 to 60 inches.

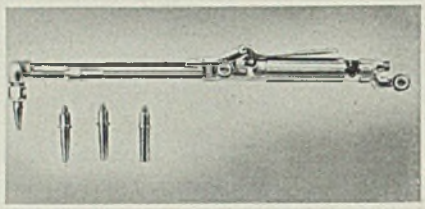
Standard equipment with the Transporter is an electric storage battery of the proper capacity recommended to assure an adequate power supply sufficient to operate the truck 8 to 10 hours or longer daily, depending on the nature of the hauling done, plant conditions and type of loads. The hinged latch of the battery cradle makes the battery easily interchangeable with a spare battery for 24-hour operation. Portable plug-in type charging equipment is available for recharging the batteries.

The drive motor is a heavy-duty industrial-truck series type and has a high starting torque and overload capacity. The armature shaft is mounted on precision-type ball bearings with accessible lubrication facilities. The drive unit consists of a double-reduction roller-chain drive. The first reduction jack shaft is mounted with self-lubricating ball bearings. The drive wheel is mounted on its axle on large-diameter adjustable Timken tapered roller bearings with ample lubrication reservoir. The steel trail wheels are similarly mounted on their axle, or if needed, rubber tired wheels may be obtained.

Drive operating and control mechanism is amply protected by steel guards —which are quickly and easily removable for accessibility. The main load frame supporting lift platform, battery, drive and lift units is constructed with two continuous solid deep-section members, riveted and welded to cross supports to form a box-type structure.

Cutting Torch

National Cylinder Gas Co., 207 West Wacker drive, Chicago, is offering a new Rego model NC cutting torch which will handle, in addition to regular plate cutting, such jobs as hole piercing, cutting



rusty multiple plate, billet deseaming, cast iron, and rivet washing. A new mixing principle provides fast preheating.

Oversize high-pressure oxygen passage permits unrestricted flow of cutting stream to enable fast, economical operation on all metal thicknesses, the company reports. Leak-proof high pressure oxygen valve is made possible by a diaphragm which replaces packing ordinarily used. Valve's smooth action permits "easing in" of the oxygen cutting stream to give better starting control. Stainless steel oxygen and acetylene needle valves embodied are nonseizing, nonscoring to provide sensitive and positive preheat flame adjustment.

A new cutting attachment for use with the standard torches also is available. It features essentially the same operating and construction features included in the NC torch.

Gage Blocks

Savage Tool Co., Savage, Minn., is offering new Doall master gage blocks which come in sets of 81 blocks. These, the individual blocks range in length from 0.050 to 4.00 inches, and are pro-

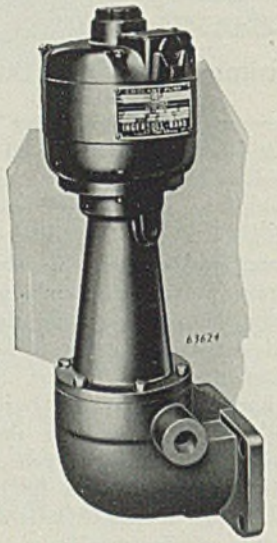
duced in AA grade (accuracy 0.000002-inch), A grade (accuracy 0.000004 inch), and B grade (accuracy 0.000008 inch).

Each gage block besides being accurate in length, has its measuring surface lapped to a flatness of less than the quarter wave length of light, and is produced with a mirror finish. These two factors, states the company, enable the blocks to be wrung together in combination, enabling the user to secure practically any dimension in steps of 0.0001-inch from 0.1000 inch to 12.00 inches.

Precision optical measuring instruments are used to check the accuracy of every gage block produced, and this equipment also is available to users for rechecking their gage blocks after they have been in use. The used gage blocks sent in will be recalibrated and gages that have been worn beyond tolerance of the original set are replaced to maintain the required standards of accuracy.

Circulating Pumps

Ingersoll-Rand Co., 11 Broadway, New York, is offering a number of coolant and circulating pumps for installation on machinery requiring a coolant or circulating

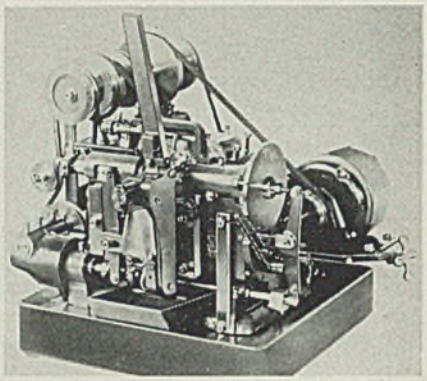


unit; for example, lathes, drills, automatics, cut-off machines and grinders which require a constant supply of cooling fluid or cutting oil. These are being made in ¾ and 1-inch side-wall mounted types, a 1¼-inch side-wall-mounted type for low-submergence applications, and a 1¼-inch horizontal type.

Pinion Cutter

Waltham Machine Works, Waltham, Mass., announces that the incorporation of a few changes in its pinion cutter now makes it possible for the nachine to be used for cutting teeth on sectors, slotting ends of tap screws, milling flutes on small taps and similar tools, grooves on special scoring tools, milling flats on various items and squaring ends of taps or rods.

An adjustment embodied in the machine provides variable stroke lengths. Thus strokes of 3/16 to 1-3/16 inches can be taken. Same adjustment permits setting machines so short strokes can be taken at any point of the work, not only

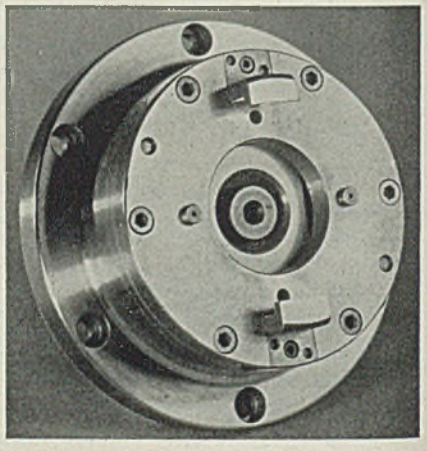


at end of strokes.

Automatic indexes on the machine permit indexing for any number of positions and uneven spacing can easily be handled. The magazine can be arranged for hand or magazine feeding providing, in the latter case, the blanks are such as can be handled by a magazine feed. Machines are offered with single or multiple cutters.

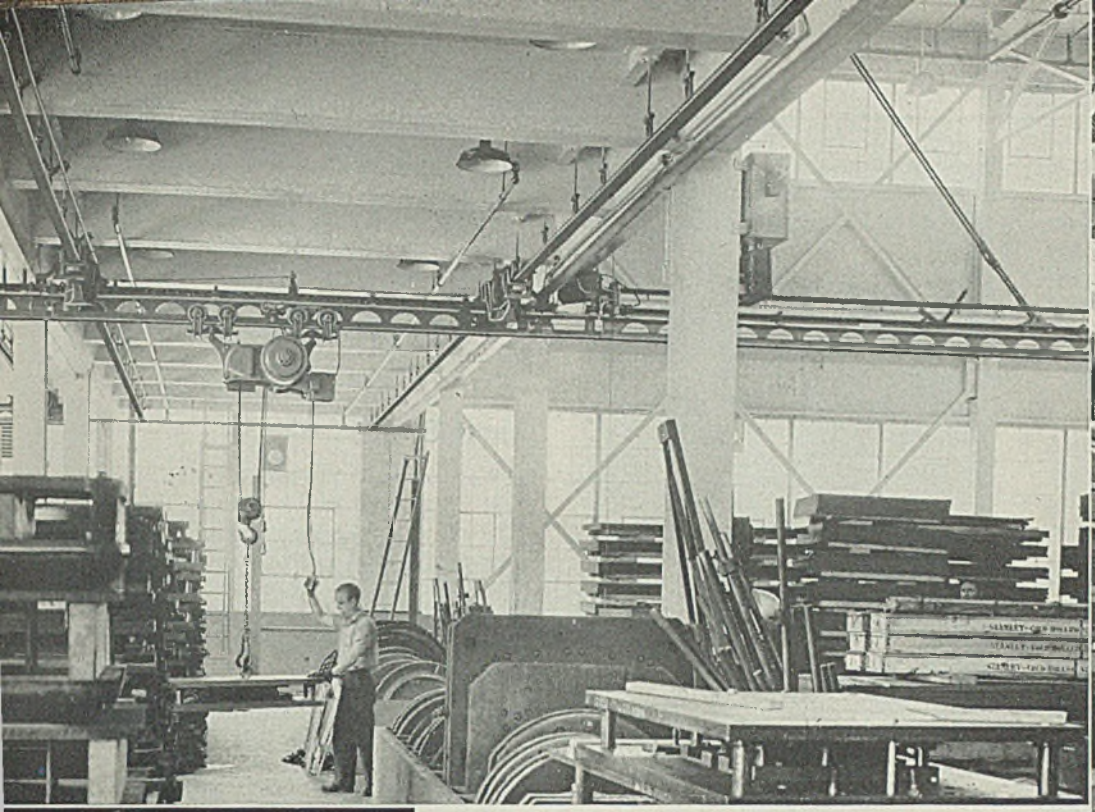
Finger Chucks

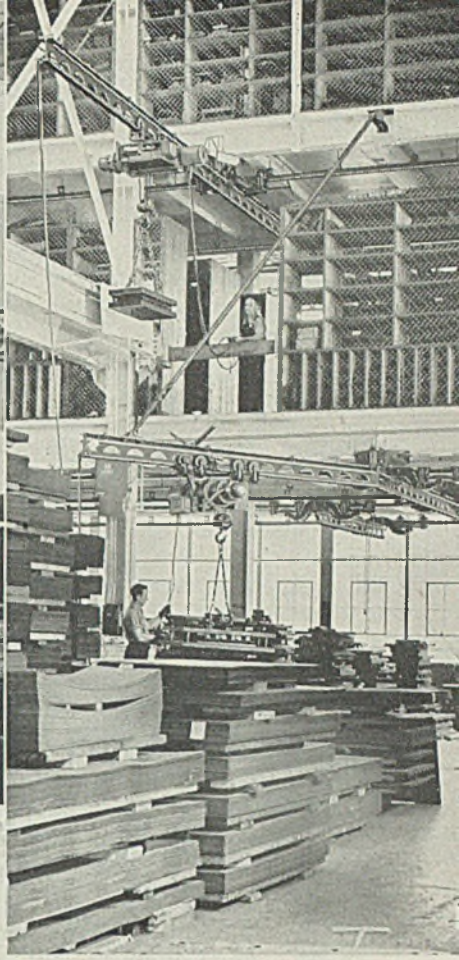
Anker-Holth Mfg. Co., 332 South Michigan avenue, Chicago, announces the addition of special compensating type finger chucks to its Airgrip holding device line which permits one finger to pull in farther than the other thereby compensating for varying thicknesses of pieces to be held. The pieces are located from a fixed center stop position. Chucks are designed for second operation work to extremely close tolerances. The piece is driven by two fixed driving

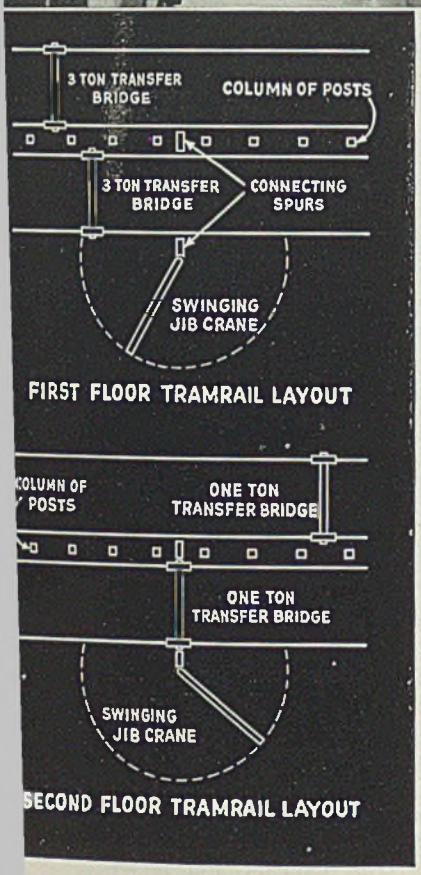


pins and the part is held against the chuck face by the two compensating fingers.

The chuck body is flanged and drilled for direct mounting on the spindle







. . . UNIQUE TRAMRAIL LAYOUT

. . . Solves Handling Problem

The problem of handling heavy dies in the plant of a large electric motor manufacturer was solved by a combination of standard Cleveland Tramrail transfer bridges and swinging jib cranes.

The dies are stored on the first floor at one end of the building and also on a mezzanine directly above. Two crane runways with interlocking transfer bridges and a jib crane are provided for the first floor and similar handling equipment for the mezzanine. The equipment for the first floor is of 3-tons capacity because the heaviest dies are stored there. Lighter dies are stored on the mezzanine and only one ton equipment is required there.

The Cleveland Tramrail equipment makes it an easy job to deliver dies to and from any point on the first floor or the mezzanine. Since the areas covered by the swinging jib cranes overlap, loads may be easily transferred from first floor to mezzanine or vice versa.

The bridges and carriers are hand propelled since the effort required to propel them even when fully loaded is very little. The heavy lifting is done by push-button-operated electric hoists.

Cleveland Tramrail representatives are in a position to help you solve today's problems or develop plans for the future.

GET THIS BOOK!

BOOKLET No. 2008 . . Packed with valuable information. Profusely illustrated. Write for free copy on your company letterhead.

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THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRE

CLEVELAND TRAMRAI

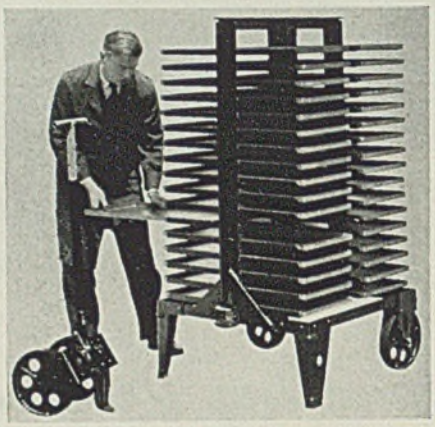
OVERHEAD MATERIALS HANDLING EQUIPMENT

nose. Range of finger travel is made to suit requirements.

Chucks are offered in a range of sizes and are designed to be operated by the company's high-speed revolving air cylinders which are made in sizes from 3 to 18 inches inclusive.

Handling Expedient

Factory Service Co., 4615 North Twenty-first street, Milwaukee, recently introduced a new handling expedient that can be quickly and effectively moved in restricted space with a jimmy, power lift truck, crane, tractor or conveyor. It is a modified slide shelf rack mounted



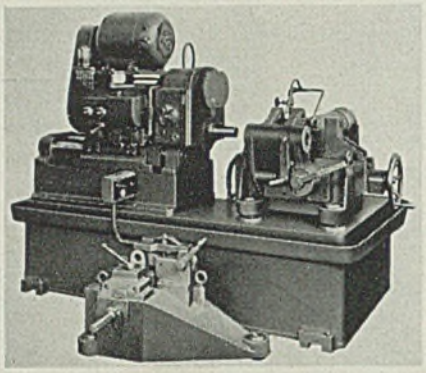
on a transport chassis. Superstructure of the unit is made to accommodate standard trays—14 x 31 inches and 14 x 14 inches. Where conditions require, wooden trays can be substituted.

Horizontal Driller

Snyder Tool Engineering Co., 3400 Lafayette boulevard, Detroit, announces a single-end horizontal machine for drilling and reaming a hole in the exact center of a boss on an aircraft part.

This operation is accomplished with the use of two special fixtures. The first fixture, foreground, is used for drilling the sidewalls of the fork-like flange. Equalizing clamps balance the stock to bring the drill in exact center of boss. After being drilled, this flange is welded to a tubular member and the outside diameter of the tubular member is used for locating the assembly in the second fixture, shown on the machine.

The second fixture is equipped with a pivoted 2-hole bushing plate—one set of bushings for core drilling the holes on this assembly and the second set of bushings for line reaming. Work cycle is as follows: A bank of flanges is drilled, using the first fixture which is then replaced by the second fixture. Flanges are welded to the tubular member, placed in the second fixture and core drilled and line reamed. A quick-change tool chuck permits fast ex-



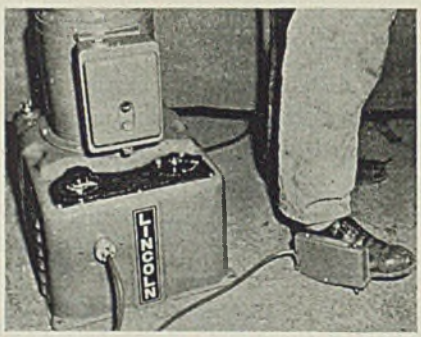
changing of drill, core drill and reamer.

Also embodied on the machine, is a quick-speed change for the spindle so various tools can be driven at their proper surface speed. Overall spindle speed is changed through the use of pick-off gears. The head and its drive unit are mounted in guide bars. The base of the machine is welded steel construction and contains the coolant tank.

Arc Welding Control

Lincoln Electric Co., Cleveland, announces a new arc welding control which is said to enable the welder to speed up his work and do a more accurate job. Called the Lincontrol, it is almost as light as a shoe, is strapped on the welder's foot, enabling him to move about with it freely. It is especially suited for aircraft welding, but is applicable for welding of light-gage sheet metal of all kinds.

With the control strapped to his foot,

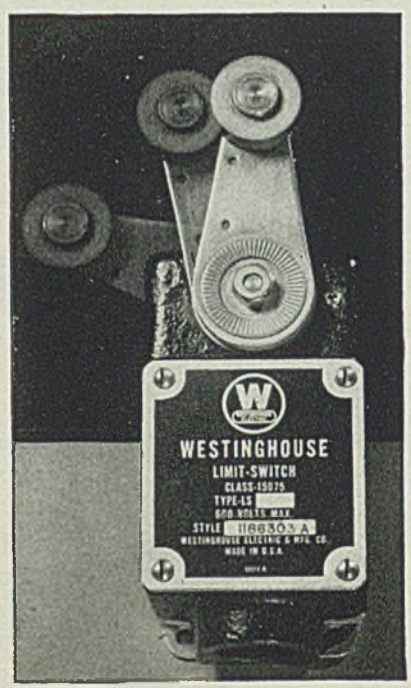


the welding operator merely presses down on the pedal which moves the pin to operate a current control. As he exerts pressure he increases the current.

Control's action provides accuracy, and achieves in one unit the same results as both the so-called "hot-start" and "crater eliminator". Because the operator has complete control, he can adjust the arc at any time without changing his position. Yet while welding in and around a fuselage assembly on "pick-up" work, he can move at will without the hindrance of constantly keeping his foot in one place. According to the company, the unit will make welding operations easier for women operators.

Limit Switch

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering a new LS limit switch of the roller-arm, spring return type for making and breaking control circuits or indicating circuits at a fixed point in any operating cycle. It uses replaceable double-break self-



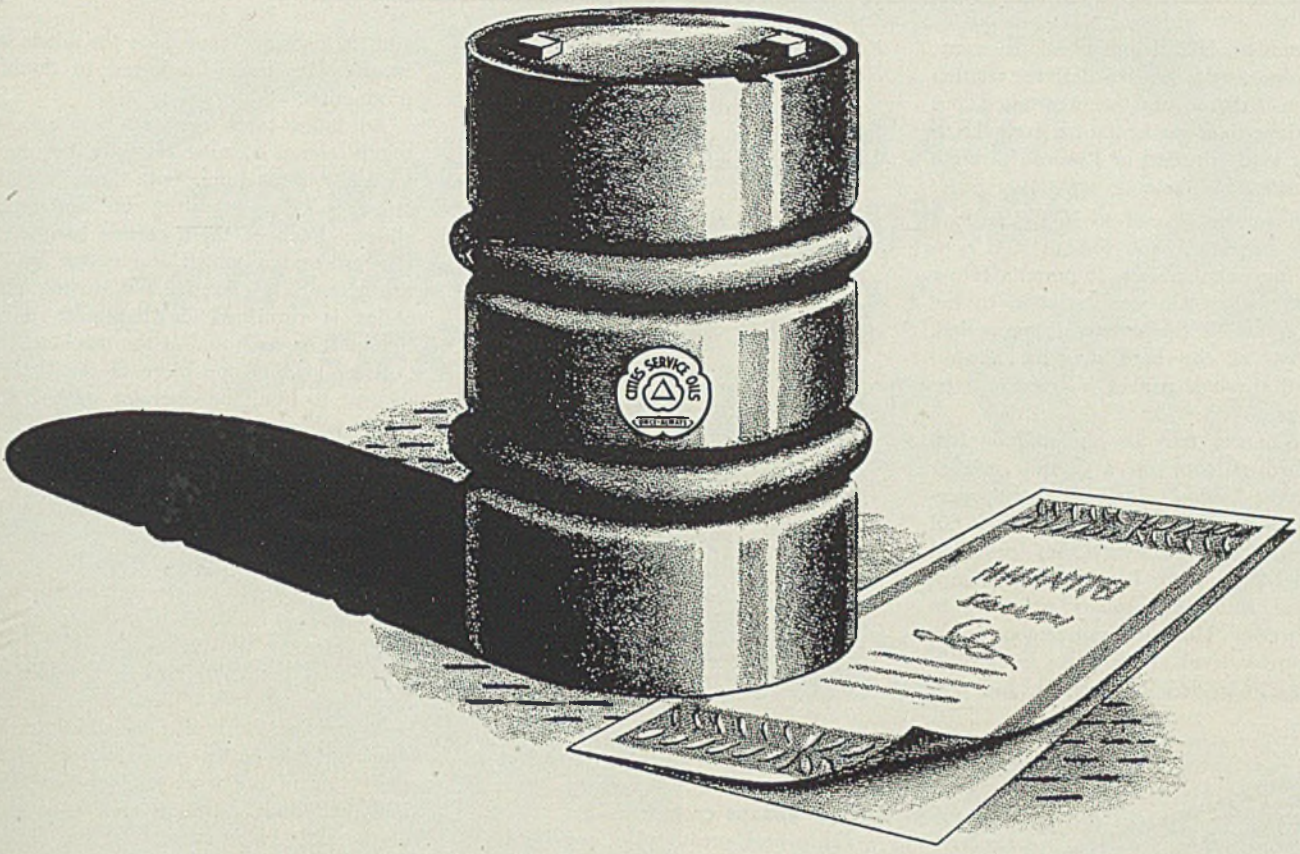
aligning silver-to-silver contacts.

Both a set of normally open and a set of normally closed contacts are embodied. The switch for heavy-duty applications, is protected from accidental damage by a heavy cast-iron enclosure. It is easy to initial, inspect and service. The operating arm can be set in any one of 30 positions, and is offered in two sizes. The standard arm is 2⅛ inches and the short arm is 1½ inches between centers.

Overhead Carrier

Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O., announces a new stabilized Tramrail carrier which suspends a load rigidly with the use of the usual flexible hoisting ropes.

By a simple arrangement of ropes to form a triangular suspension, a load can be held rigidly in place eliminating



How to insure Machine life with a Policy written in Oil !

Insurance policies usually reimburse the beneficiary for loss or injury sustained. But today money alone cannot replace damaged machines or vital moving parts. Nothing can compensate for time lost in repairs and delay in vital steel output.

The best protective policy is one of preventive maintenance. And the first thing to check is your lubrication system.

Under the severest on-the-job tests, Cities Service Oils have proved *precision-perfect* for the exacting demands of wartime steel production—and Cities Service Lubrication Engineers are ready to serve you on such vital problems as quenching, heat-treating, machining, scale formation and rust—with expert counsel and quality products.

Simply get in touch with your nearest Cities Service office.

THE INDUSTRIAL HEAT PROVER

The Cities Service Industrial Heat Prover enables those engaged in oxygen control of furnace atmospheres to achieve certain physical results desired in the processing of metal, or in the control of the amount of combustibles present. Recordings are continuous and almost instantaneous. Write for a completely informative booklet to Room 1340, Sixty Wall Tower, New York, N. Y.

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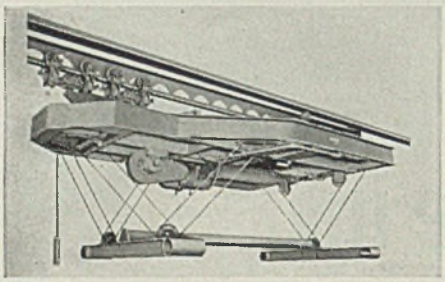
longitudinal, lateral and rotational sway. The rope angles have a definite relation to one another and were worked out according to a mathematical formula so that a load is raised or lowered through a considerable distance remaining rigid.

The carrier is said to hold the load rigidly in place, even though it is considerably unbalanced. It permits tilting in either direction with relation to the rail on which the carrier is propelled. Rotation of the load may be accomplished through use of a trunnion-type load bar.

The carrier may be operated on two standard rails or on a double grinder rail crane bridge. It also can be operated on the regular type overhead rail on each side of which are provided parallel flat rails or I-beams for the support of stabilizing rollers attached to the carrier. This rail arrangement keeps the carrier level at all times, regardless of type of load or its position, and permits moving the carrier through switches to other tracks.



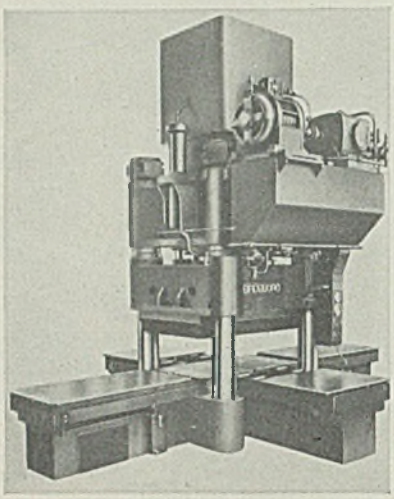
Some applications for which the carrier can be used are: Mass production of aircraft on a straight-line production basis; spray-painting large planes by painters on platforms; delivering hot metal from cupolas to molds; anodizing chromodizing, salt bath heat treating and other tank operations; supporting welding equipment for applying long continuous welds automatically; welding positioner; handling X-ray equipment used for inspecting welds. Carriers are offered in capacities of 1, 3 and 5 tons —or electrically-propelled, but all with motor-driven hoist.

Hydraulic Press

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., is introducing a new hydraulic rubber pad airplane press feature of which is unusual arrangement of four separate loading platforms so as to permit uninterrupted flow of aircraft parts.

Loading and pressing operations, it is said, are fully synchronized and are controlled automatically to reduce strain on operators. Tables can be provided in varying lengths if desired—long tables for long work, short tables with full accessability for smaller parts.

Other interesting features are elimination of starting and stopping jars through automatic speed control which keeps

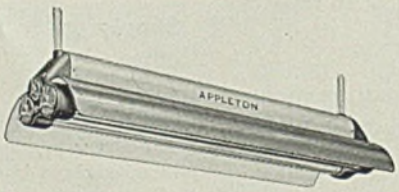


work from shifting during transfer; independent acting, fully synchronized, fully automatic cycle control.

Table and press cycle can be interrupted instantly by operators anywhere around the press. Moving platen cannot drop suddenly when power is interrupted. Full manual control is available for set up, tryout and special work requirements.

Fluorescent Unit

Appleton Electric Co., 1701 Wellington avenue, Chicago, is offering a new explosion-proof fluorescent unit construction of which completely eliminates need for sealing fittings and accessories. It is reported to comply with the requirements for class I, group D and



class II, group G hazardous locations.

For making line connections, the unit is provided with a terminal block. This permits connection to be made without splices. The unit is equipped with a non-metallic reflector having a white enamel finish. The fixture is furnished with two 48 inch T-12 (40 watt) lamps.

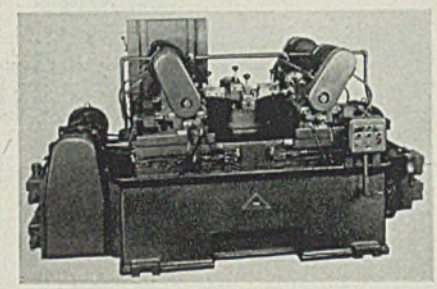
Hollow Mill

LeMaire Tool & Mfg. Co., Dearborn. Mich., announces a specially designed hollow mill for machining a round trunnion on each end of a turbine blade, and at the same time face the blade to length. Its use is reported to double production.

An index table carrying four special toggle clamp fixtures occupies the center of the machine, with hollow mills on two sides operating on horizontal slides. Each of these carries two auxiliary slides on which the cutter heads are mounted. Power for moving the slides is furnished by hydraulic units mounted on each end of the machine.

After loading one piece of the fixture nearest to him, the operator pushes the cycle-starting button, which turns the table 90 degrees around toward the left where the roughing is done. The station directly opposite the operator is not required for this particular work. The fourth station (the one on the right) completes the finishing operation. As the operator loads each piece, work is proceeding on the pieces already in the fixtures at the right and to the left of him.

As soon as the horizontal slides are in position, the cutter heads advance rapidly toward the work and go into feed hollow milling a trunnion on each end of the slide blade stock. At the end of



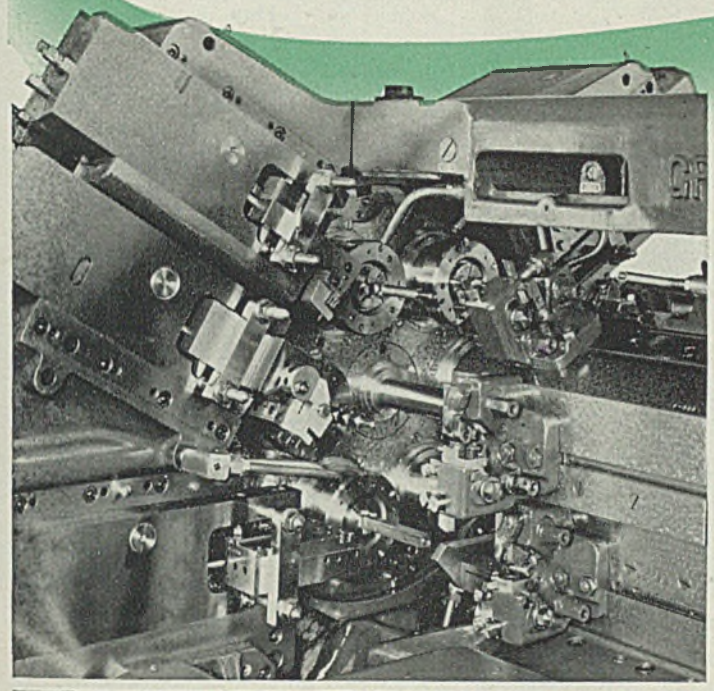
the milling cycle, the cutter heads retract on rapid return. When the cutters are in the back position, the horizontal slides move back to the end of the machine to complete the cycle. During the working cycle, the operator, unloads and reloads the front fixtures and starts each cycle with a push of the button.

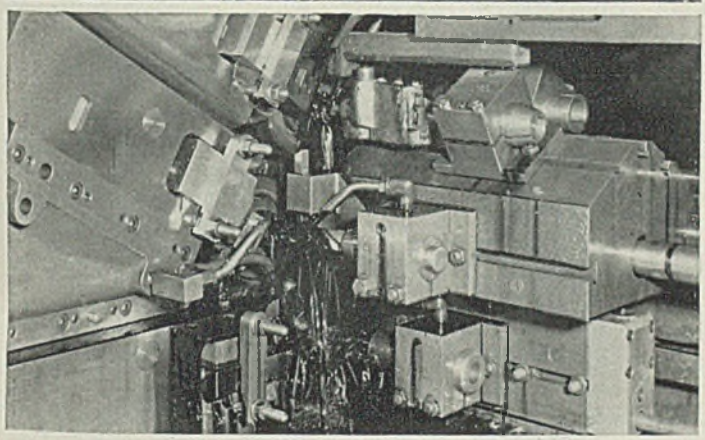
The auxiliary slides, carrying the cutter heads, are pivoted and equipped with protractor and vernier scales. This permits heads to be fixed so trunnions can be hollow milled at any angle.

This feature makes the machine flexible enough to produce blades with trunnions straight with the axis on both ends, with one trunnion straight and the other at an angle, with a trunnion only at one end, or with both trunnions at any angle with the axis.

CORRECTION: Illustration which appears in above story was erroneously used in conjunction with a Snyder Tool Engineering Co. story in the Jan. 25 issue. The Snyder Tool story re-appears on page 120 of this issue.—The Editors.

THIS WIDE-OPEN TOOLING AREA ON THE GREENLEE MAKES MY JOB EASIER AND FASTER!





BUILT-IN COOLANT SYSTEM distributes the coolant through the tool and cross slides direct to the various cutting tools. The above photograph of a typical set-up on the Greenlee shows the coolant outlets in each tool holder and the easy-to-use, short nozzles.

JUST ONE OF THE REASONS OPERATORS PREFER GREENLEE SCREW MACHINES

Ask the man who knows . . . the operator right out on the machine . . . and he'll tell you that the Greenlee Multiple-Spindle Screw Machine is one of the easiest machines to set up and to operate that he has ever worked on. He'll tell you that the wide-open tooling area of the Greenlee makes his work so much easier and faster because he has plenty of elbow room in making adjustments and changes. He'll also tell you that the built-in coolant system with an outlet in each tool holder permits the use of convenient, easy-to-use short nozzles to bring the coolant to each cutting tool. He'll mention how the low, compact design of the Greenlee reduces physical strain and eliminates the necessity of standing on the pan or boxes to install tooling to upper positions, and also how the positioning of the cross slides makes it easy for him to observe all cross-slide tools in action. And what's more important he'll tell you that these design features, permitting easier set-up and operation, enable him to obtain maximum efficiency and to turn out more work in a day with less fatigue.

Free Help For Your Operators

Enlarged copies of three recent Greenlee advertisements giving many valuable suggestions and production short cuts are available, without charge, for distribution to your operators. Write today for copies of (1) 14 *Practical Suggestions For the Inexperienced Screw Machine Operator;* (2) *Correct Application of Cutting Fluid To Insure Longer Tool Life;* (3) *Suggestions For Changing and Adjusting Collets On Greenlee Screw Machines.*

GREENLEE BROS. & CO.

1922 MASON AVENUE • ROCKFORD, ILLINOIS

ASK THE OPERATOR  ***WHO RUNS ONE . . .***

Conserving Tin

(*Continued from Page 87*)

to be shipped to Britain through submarine infested waters and, after smelting, re-shipped across these same waters to our own shores.

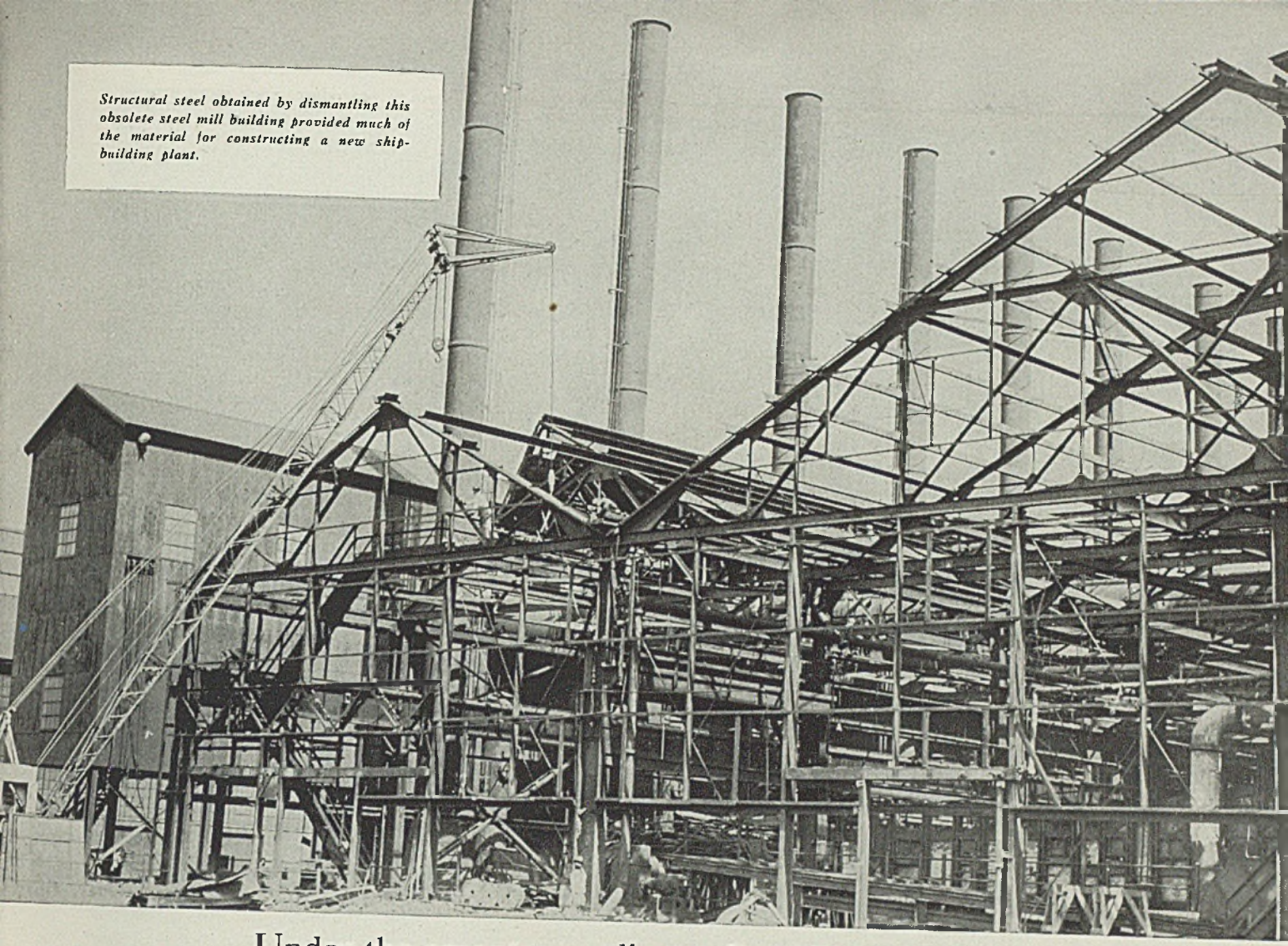
By way of further conserving our resources, export control measures were adopted and surveillance over domestic uses exercised. Intensive investigation of substitute and alternate materials indicated that up to 40 per cent of the former consumption of tin for containers could be saved for the more vital needs of solders and babbitt metals for bearings. Production of pewter, jewelry, badges, toys, etc., using tin was stopped. The tin used in galvanizing was eliminated since it adds nothing to the corrosion resistance of the zinc coat but is added merely for the sake of appearance.

Babbitts Nearly Tin Free

Tin foil around packages of cigarettes and other commodities was abolished wherever possible and lead or a much thinner tin coating employed where this form of protection was essential. Bronze, which formerly accounted for some 6500 tons of tin annually (of which, by the way, only about 60 per cent was virgin metal) can, in many instances, be produced with little or no new tin. Reductions of the tin content can be made in many instances. The newer babbitts are nearly tin-free. Solder, which used a total of 9578 tons of primary tin and 7701 tons of secondary tin in 1939, has now a lowered tin content, or, as in the case of the tin can industries, has been replaced by silver.

By May of last year these various measures had resulted in accumulations of tin in government and private consumers' hands in excess of 100,000 tons, or about the amount used for all purposes in 1940. Added to this is the output of the Texas City smelter—which, however, is not considered by some to be suitable for plating on account of its lower quality. But it will be available for solders and the like. Thus in various ways the private citizen is learning to do without—or at least with less—tin in tinplate. Already cans for coffee, beer, peanuts and dog food are taboo. He also finds that small size cans are fast disappearing. Too, many liquids such as oil are arriving in cans made of black iron coated with lacquer.

Curiously enough, the reason for coating cans with tin is not, as is commonly supposed, to prevent contamination of the contents by direct contact with the steel (except in the case of a few products high in acid and some baby foods) but in order to make the soldering of the side seam possible. Germany has reached a partial solution of the problem by applying a narrow strip of tin along the



Structural steel obtained by dismantling this obsolete steel mill building provided much of the material for constructing a new shipbuilding plant.

Under the emergency, dismantling idle buildings and re-erecting steel at strategic sites provides a

3-EDGED CONSERVATION WEAPON

WE know the critical importance of saving time and materials in war construction. That is why American Bridge has undertaken a number of projects involving the dismantling of idle industrial buildings, reclaiming and altering serviceable steel, and moving it to strategic sites for re-erection into emergency structures. This type of operation gives the war conservation program a 3-edged weapon:

1. CONSERVES NEW STEEL—*Every ton of structural steel reclaimed from a non-essential building replaces a ton of new steel and releases just that much more material for tanks, planes and ships.*

2. SPEEDS ERECTION TIME — *Strategic war plants can be built faster, without losing time for coordinating steel deliveries with construction schedules.*

3. RELEASES HEAVY SCRAP—*Dismantled steel which cannot be reclaimed or suitably altered is returned to steel mills to fill a serious need for heavy melting scrap.*

So the transformation of inactive, non-strategically located structures into key shipyards and war plants—without draining heavy steel tonnages from armament production—is proving to be a timely solution to war construction problems.

In the numerous and varied projects of engineered construction now entrusted to American Bridge Company, we are missing no opportunity to use our personnel, facilities and technical resourcefulness where they serve best in meeting the nation's war needs.

HOW AMERICAN BRIDGE WORKERS ARE HELPING TO WIN THE RACE AGAINST TIME

- ★ 8700-ton industrial plant erected in 53 calendar days.
- ★ Marine works launched 4 large coal barges a week for 13 consecutive weeks.
- ★ Heroult electric furnaces have helped boost production of high-alloy and stainless steels 150% in four years.
- ★ 2246 field rivets of ⅞" diameter driven by one gang in a single day on a steel mill project.
- ★ Erected in one month more than 41,000 tons of structural steel, entering into various projects throughout the nation.

AMERICAN BRIDGE COMPANY

General Offices, Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit · Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

UNITED STATES STEEL

seam, a procedure much more expensive than dipping the entire sheet.

Just as in the case of Mr. John Citizen, the United States Army Ordnance Department has been obliged to pare down its use of tin. Among its successful efforts in this direction have been the substitution of chromium steel liners for the tinned copper liners formerly used in smokeless powder boxes — some 3.87 pounds of chromium steel replacing 12.6 pounds of tinned copper. This new liner is now standard and is being procured.

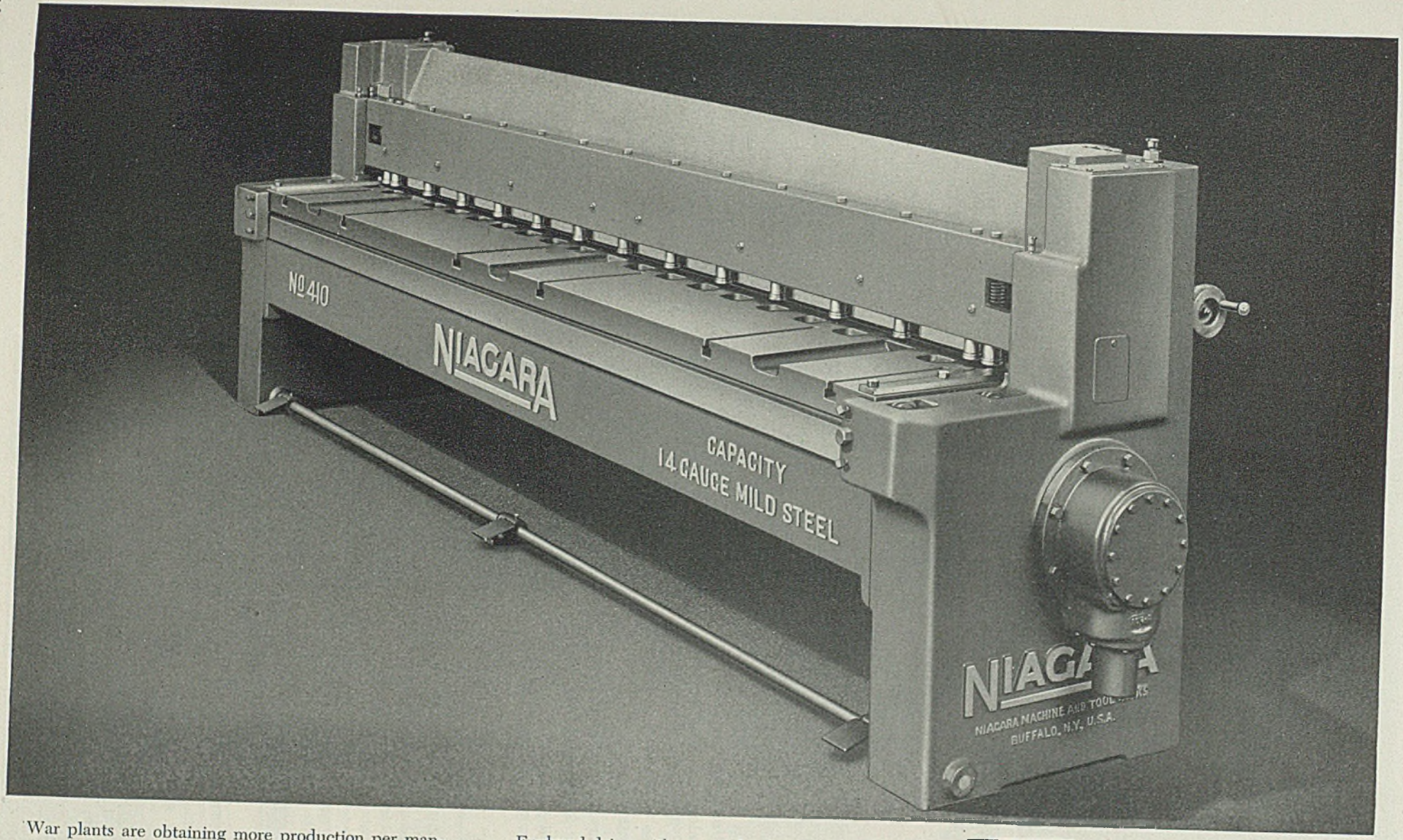
Changed designs of containers for packaging artillery ammunition have also resulted in material savings, not only tin but also aluminum having been eliminated. Attempts are further being made to cut down the tin content of the solder used for mounting the caps of armor piercing projectiles, the success of this project being dependent upon the availability of other metals. Then, too, the pre-existing requirement of powdered tin in the propellant for 20-millimeter shell has been greatly reduced, thus effecting a saving close to half a million pounds based on next year's program.

Military Savings High

Fuze containers, formerly made from terneplate (25 per cent tin, 75 per cent lead) or tinplate, have been changed to lacquered black iron sheet, with savings of over 100,000 pounds over just part of 1942. The bomb and pyrotechnic section has effected large savings through reduction in the tin content of solder from 50 to 30 per cent. Through the substitution of silicon bronze for phosphor bronze in the arming wire safety clip, 1200 pounds of tin per million clips will be eliminated. The total of these conservation efforts must be left to the reader's imagination.

Neither has the Artillery Division been neglectful. Solder for submarine mines has been changed from a 50:50 ratio of tin to lead to 20:80 ratio until such time as experiment is able to demonstrate that a 3 per cent silver solder with no tin will answer the purpose. This same type of solder has been recommended to Frankford Arsenal for tinning electric cables. At Rock Island Arsenal experiments have been conducted on bronze bushings in collaboration with manufacturers with a view to using bronze-on-steel in place of solid bronze, a move which is also proving successful in the case of glands.

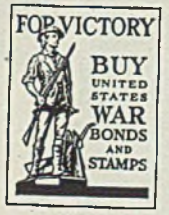
These items, involving some 200 different types, have varying tin contents with perhaps an average of 10 per cent. The savings in this field are conservatively estimated at 100,000 pounds annually. Tests which have been under way to substitute plain carbon steel for the bronze now used in control rod,



War plants are obtaining more production per man-hour with Niagara Power Squaring Shears because of accurate cutting, quick setting, ball bearing, self-measuring parallel back gages, full visibility of cutting line, instant acting Niagara sleeve clutch and other modern features.

Enclosed drive with gears, clutch and eccentrics running in oil assure long life and low maintenance cost. Four-edge, solid tool steel knives are standard equipment. Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: Detroit, Cleveland, New York.

—Advt.



Shear Knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

valve cam and valve gear of recoil mechanisms will, if successful, save some 93,000 pounds of tin this year and 143,000 pounds in 1943.

A 0.4 per cent copper, 0.4 per cent molybdenum alloy cast iron hemisphere bearing for some anti-aircraft gun carriages has been successfully substituted for bronze, with accompanying reductions in the need for tin in amount of 190,000 pounds in 1943. Silver-plated steel for certain bronze parts of the 105-millimeter howitzer recoil mechanism is under consideration; and tests are under way on some ten different alloy compositions with a view to replacing the 80 per cent tin babbitt in all artillery recoil mechanisms. Among the substitute alloys under test are lead base, cadmium silver, silver, and bronze with a tin content not exceeding 10 per cent. The weight of tin in bronze for recoil mechanisms, under formerly established specifications, has been greatly reduced and may be completely eliminated but is estimated to have saved around 250,000 pounds in 1942 and close to 500,000 in 1943.

Sees Saving of 8 Million Pounds

In the field of small arms, savings of tin in packing boxes by reducing the thickness of the terneplate and reductions in the tin content of the solder from 70 to 50 per cent are estimated to cut the tin in small-arms ammunition boxes alone by 1,500,000 pounds in 1942 and over 3,000,000 in 1943. It was further planned to eliminate the use of terneplate altogether as of Jan. 1, 1943, and to replace existing types of container with others made of fiber. With this done, a further saving of 5,000,000 pounds will be effected, or a total of over 8,000,000 pounds of the now precious metal.

For 0.30-caliber machine gun ammunition, expendable steel containers requiring no tin have been developed. A 250-pound loaded fabric belt is packed in each of these containers.

Tank and combat vehicles also have contributed their quota of savings. The composition of the bronze used in the recoil sleeve of the 75-millimeter tank mount has been changed so as to reduce the tin content, which will effect a tin saving of around 400,000 pounds by the end of 1943.

In normal times, tinplate accounts for well over 40 per cent of all the tin consumed in this country, solder being next in line with over 20 per cent. By the same token, used tin cans offer an excellent prospect of tin salvage. Under the program laid down by the Tin Unit of the War Production Board's General Salvage Section, the capacity of

can detinning plants will rise to over half a million tons annually by the spring of this year. From this tonnage about 5000 tons of tin will be recovered and the balance of steel scrap usefully employed to help feed steel furnaces. For the present, tin can collections are being limited to selected metropolitan areas, favorably located and possessing well equipped sanitation departments, accessible railroad loading yards and capacity for frequent carload shipments. Ultimately, should the necessity still exist, it is estimated that this total could be increased to a million tons, with proportionate increase in tin salvage.

Cans Boiled for 2½ Hours

For the purpose of detinning, all thoroughly clean food and tobacco containers made from tinplate are acceptable, even if lithographed. However, cans which are not thoroughly clean (since food articles and other foreign matter contaminate the detinning solution) and cans which are made from terneplate, such as motor oil cans, are not wanted since these latter have little tin in their makeup. Further, any cans which have been compressed in a power-driven baling machine are not usable since the tin cannot be removed from tightly adhering surfaces, and the resultant tin-bearing scrap cannot be used by the tin mills. *The part of the householder in this salvage operation consists in washing the cans thoroughly, opening both top and bottom and then stepping on the can lightly so that one can still see through the opening.*

The detinning operation consists in placing the prepared cans in huge circular cages which are lifted into hot water vats where dirt and paste are removed. Should the cans be enameled, the cage is next dipped into a vat for paint removal. The cage is then lowered into a vat of detinning solution consisting of caustic soda and sodium nitrate, in which the cans are boiled at from 215 to 318 degrees Fahr. for 2½ hours.

The cage with its contents is now removed from the detinning solution and run through with clear water twice. The hot cans are then dumped and later baled. The hot detinning solution is used for several days before being drawn off and distilled into sodium stannate, containing some 40 to 41 per cent tin. The sodium stannate dissolved in hot water is passed over a series of electrodes mounted in a series of vats. In the process, the hot water passes off after having deposited its burden of tin on the plate electrodes.

Every four weeks these electrodes are taken out, and the tin, weighing up to

a ton per electrode, is melted off and run into a crucible, from which it is ladled out into 100-pound pigs. The tin thus recovered is commercially pure and worth 53 cents a pound.

The principal source from which virgin tin is obtained is the dioxide cassiterite or tinstone, which has its origin in the segregations which surround granite intrusions and probably represent a late phase in the cooling of the granite in which tin fluoride reacts with water. Of a highly indestructible character, these crystals of tin ore resist the processes of decay which disintegrate the parent rock and survive in favored regions as secondary deposits in alluvial gravels, from which over five-sixths of the world's supply is derived. Only in Cornwall (where the alluvial deposits have been worked out) and in Bolivia is vein mining practiced, if we except that small portion of the Australasian output which originates in veins and granitic rocks carrying disseminated tinstone.

Tin Mined by Open Cut Methods

Most vein tin is mined by open cut methods, while placer tin is recovered by hydraulic mining or dredges. Cassiterite, being a heavy mineral, is readily concentrated by hydraulic methods, gravity process being usually employed. In the Malay region, where cheap labor is available, somewhat crude washing methods are in evidence. In hydraulic mining, the tin ore is generally recovered in riffled sluices, the resulting concentrate having a tin content of some 60 per cent.

On occasion, roasting precedes gravity concentration in order to change heavy sulphides to light oxides. Where the concentrate is sufficiently pure, roasting is unnecessary; but where sulphur, arsenic or antimony is present, the first mentioned is driven off as SO_2 while the arsenic and antimony are released as volatile As_2O_3 and Sb_2O_3. It is rather important to remove the sulphur since tin sulphide volatilizes during the smelting operation.

When the roasted ore is smelted in a reverberatory furnace, some 20 or 30 per cent of charcoal or powdered anthracite is mixed with the charge and fluxes added to produce a suitable slag, consisting perhaps of 35 per cent silica, 25 per cent lime and 12 per cent iron. As the charge commences to fuse, it is rabbled frequently until fusion is complete, whereupon the entire charge is tapped into a settler and the slag allowed to overflow into a pot.

The chemistry of the action may be briefly described as follows: As fusion takes place, the bulk of the tin oxide

reacts with the carbon to produce metallic tin and carbon dioxide, while the ferric oxide present appears both in this form (and immediately unites with the lime and silica to produce slag) and also as metallic iron which combines with some of the tin to form an alloy. The slag from the smelting operation is generally too rich in tin to reject and is further treated and finally purified by liquation or drossing.

From earlier times in remote parts of Asia, much more primitive smelting methods persist. Furnaces may be no more than a hole in the ground, where charcoal is burned with the aid of hand bellows; or a simple clay structure supported by bamboo. But these are merely evidences of tin's ancient and honorable history. With a modesty which has belied its real worth, it has rarely sought the limelight but instead has been content to alloy itself with other metals to their notable improvement or spread itself upon them for their protection.

The bronze of another age served to lift mankind out of the stone era and down through the years tin has played a notable part in the unfolding pattern of human affairs. From the days of the ancient Phoenicians, plying their search for this pure white and incorruptible metal on the far-off shores of the Cassiterides, to our own days filled with the urgent needs of tanks and planes and guns, its silvery voice has pealed forth in both victory and defeat; its dull pewter sheen brought comfort and solace; and, under its protection, scores of millions have safely received their daily "bread".

Question of Manpower

Is There Enough Manpower? by Harold W. Metz; paper, 25 pages, 5½ x 8 inches; published by the Brookings Institute, Washington, for 25 cents.

This booklet contains a discussion of manpower from a world point of view, with particular application to the United States in the present war. It discusses the estimated national product available for war purposes, methods of increasing manpower, potential production per man-year and requirements for an armed force of 9.5 millions and of 12 millions.

The author then takes up foreign experience, the relations of the lend-lease problem, ship supply to transport troops. In conclusion it is maintained that if we are to build up an armed force of 9.5 millions of men by the end of 1943 the government must immediately increase actual work week to an average of at least 46 hours; bring at least 6.4 millions of additional workers into the labor force; drastically curtail output of civilian goods; greatly expand the shipbuilding program.

High Speed Tools

(*Continued from Page* 92)

silver solder (about 1200 degrees Fahr.) prohibits using the same procedure as with copper brazing. However, by using previously hardened tips, it is possible to braze the tip and temper it simultaneously. Since the melting point of silver solder is higher than the usual tempering temperature of high-speed steel, it is imperative that very short brazing times be employed to avoid overtempering and consequent softening. Any high-speed steel composition can be used as tips; however, special compositions such as high-carbon high-vanadium high-speed steel and cobalt high-speed steel are particularly suited to this method since they have greater resistance to softening on tempering than the ordinary high-speed steels. This method has been named braze-tempering.

Flux Applied Over Tool

In braze-tempering, the joining surfaces of the shank and hardened high-speed steel tip are thoroughly cleaned and covered with a commercial silver brazing flux made in paste form. The tip is fitted on the shank with an intervening strip of silver solder 0.003-inch in thickness. The assembled end of the tool is then heated by playing the flame of an oxyactylene torch along the bottom until the heat soaks through the shank and melts the silver solder. Care must be taken to avoid overtempering of the tip by minimizing the time between melting and solidification of the silver solder. During this time, the tip is pressed firmly in place.

When the silver solder sets, the tipped end of the tool is quenched in oil for a few seconds to drop the temperature of the tip below 1000 degrees Fahr., where effective tempering ceases. The tool is removed from the oil and allowed to cool in air in order that transformation of the retained austenite present in the hardened high-speed steel tip may occur more uniformly and with less danger of cracking the tip. The result of this procedure, which takes about 15 minutes for an ordinary size tool, is that the tip is in the tempered condition and brazed firmly to the shank. A subsequent temper at 1050 degrees Fahr. for 1 hour is recommended for the purpose of stress relief and will have practically no effect on the hardness of the tip.

Three goose-necked tools tipped with high-carbon high-vanadium high-speed steel by the braze-tempering method are shown in Fig. 2. The largest tool shown in this figure measures 20 inches in length and weighs 18 pounds, while its tip weighs only about 2 ounces—less than 1 per cent of the tool. The assem-

bly used in braze-tempering is illustrated in Fig. 3. A hardness survey was made on a braze-tempered tipped tool having the same size as the tool illustrated in Fig. 4. As shown in Fig. 5, the tip retained its initial high hardness. The hardness of the shank was unaffected by braze tempering except directly below the tip, where the critical temperature was exceeded by direct contact with the oxyactylene flame and the subsequent oil quench (followed by an air cool) caused hardening.

As compared with the braze-hardening method, the braze-tempering method is less suited to making tools required to take heavy cuts. In taking heavy roughing cuts, sufficient heat may be developed to cause softening of the silver-alloy braze and consequent movement of the tip. For this reason, it is preferable to use braze-tempered tools mainly for finishing cuts. Since, however, copper softens at a much higher temperature than silver solder, braze-hardened tools can be used to take either roughing or finishing cuts, as desired.

Another advantage of the braze-hardening method is that substantial hardening of the shank takes place, while in the case of the braze-tempered method the shank is relatively unhardened. This means that the braze-hardened tool shank is stronger and will have less tendency to take a permanent set due to bending in taking a heavy cut. Of course the shanks used for braze-tempered tools could be previously hardened to develop a strength equivalent to that secured in braze-hardened shanks, but an extra heat-treating operation is required. In the case of braze-hardening, it is necessary that the shank steel possess resistance to excessive grain coarsening because of the high temperature involved. This requirement is not necessary in the case of braze-tempering because the shanks are subjected to a much lower temperature.

There are several advantages in using tools tipped with high-speed steel by the two brazing methods. First in importance is the saving of high-speed steel, which means conservation of strategic metals as well as lowering of tool cost. The amount of high-speed steel saved depends upon the design of the tool. For ordinary straight lathe tools which are reforged and rehardened until half of their original length is used up, the saving is estimated as 75 per cent; while for tools of special shapes it may be as high as 99 per cent. This economy makes it possible to use special high-speed steels such as high-carbon, high-vanadium and the cobalt types, which give superior performance to an ordinary high-speed steel in some instances.

Although these special compositions

contain relatively large percentages of strategic metals, their use in tipped tools would be practical. As an example, consider the case of a medium-size goose-necked tool weighing 5½ pounds tipped with high-carbon high-vanadium high-speed steel which contains 4 per cent of strategic vanadium. The vanadium content of the entire tool (assuming the shank steel contains no vanadium) amounts to about 0.08 per cent. Compared with the vanadium in a high-carbon high-vanadium high-speed steel (4 per cent), which would give the same life, or in a solid tool of ordinary high-speed steel (about 1 per cent), which would perform far less efficiently on a job requiring high resistance to abrasion, the consumption of vanadium in the tipped tools is insignificant.

Conservation of high-speed steel may also be accomplished by salvaging solid tools which have been discarded as undersize. These tools may be annealed and then cut up into appropriate tip sizes. This method of conservation is very important in the case of special high-speed steel compositions which will become more and more difficult to obtain as time goes on.

Danger from Cracking Lessened

Besides conservation of high-speed steel, there are other advantages to the use of tipped tools by the brazing methods. Since only the tip is fully hardened, there is less danger of the tool's cracking or of harmful internal stresses being set up than in the case of hardening a solid tool, especially one having a complicated shape. Breakages of tools can also be avoided by the use of tough alloy-steel shanks in tipped tools, particularly for those applications involving shock. Cutting efficiency will also be increased since it is easier to obtain full hardness in a tip than in a large solid tool. Likewise, using a tough shank permits the tip to be used at a higher hardness than would be possible in solid tools for applications involving shock. The cost of making a tipped tool compares favorably with that of making a solid tool even without taking into account the saving in high-speed steel.

At Watertown Arsenal both methods of brazing have proved successful, and high-speed steel tipped tools are being substituted for solid tools wherever possible. Thus far, these methods have been used mainly for lathe tools. The limiting factor in the application of these methods is the difficulty involved in brazing, and therefore they would be of little advantage in making complicated drills or cutters of special shapes.

Various methods of making high-speed steel tipped tools besides brazing are in use. These include mechanical fasteners, inserting, welding and cementing. Some

of these methods are comparatively new and their relative advantages have not yet been established. However, these methods are available, and if adopted on a nation-wide scale, they would result in a considerable saving of strategic metals. In view of the present shortage of these metals, the adoption of high-speed steel tipped tools wherever possible is considered a patriotic duty, besides offering definite economic advantages.

Smelting Sinter

(*Continued from Page* 104)

range in particle size and slow rate of heat conductivity. The upper region of the furnace working volume must act as a material preparation zone for the reduction zone below it and the preparation of the materials within the furnace reduces the effectiveness of the working volume for reduction purposes. It is common to say, "scrap runs ahead of stock." An analysis of the expression can mean only one thing—scrap being a metal and a good conductor of heat will absorb heat faster than stock. It is just as true to say, fine stock runs ahead of lump stock, because fines will absorb heat faster than lumps. Using the minus 4-inch to minus 100 mesh as representative of the particle size of the soft ores the smelting rate of such ores is certain to be irregular, the saving grace being the fact that the irregularities are more or less regular in their irregularity and so average themselves. But furnace troubles develop when those irregularities get out of adjustment because most furnace troubles are due to maladjustment of temperature zones in the stock column. The preferred condition of stock flow through the furnace is a uniform rate of flow. If the stock has absorbed heat uniformly it will arrive at the melting zone without interfering with the movement of the stock above it.

Another most important factor in the concentration of thermal units within the furnace is the temperature of the blast. Thermal units delivered to the furnace with the blast are delivered at the bottom of the stock column and, consequently, have maximum time-contact with the stock. The character of the burden materials largely determines the maximum temperature which can be carried by the blast and is discussed later. Anything having substance entering the furnace must come out again and in that egress it will drain some thermal units. Since temperature has no substance the thermal units delivered to the furnace with the blast is a net gain to the concentration of those units in the furnace.

The reduction of the iron is effected by the chemical reaction between the carbon of the fuel and the oxygen of the

iron-bearing materials. There is direct reduction from incandescent carbon ($C + O_2 = CO_2$) and indirect reduction from carbide monoxide ($CO + O = CO_2$). In the presence of incandescent carbon there is another reaction, $CO_2 = 2\ CO$, which regenerates and restores the reducing ability of the reducing agent and it seems reasonable to say this reaction will feed and multiply upon itself so long as the products of the reducing action are in the presence of incandescent carbon. Every furnace has these well-proven reactions but the extent to which the reducing ability of the carbon can be exploited depends upon the height in the stock column where the temperature of carbon incandescence can be maintained. It seems reasonable to say this height is entirely dependent upon the degree of success attained in conserving heat within the furnace and that success is dependent upon the character of the burden materials and the efficiency of the transmission of the heat from the gas to the burden materials.

To support the statements which have been made a comparison of data from two periods of actual operation is given. During these periods the iron-bearing material of the respective burdens was sintered magnetite concentrates and the two burdens were practically the same in their composition of chemical elements but there was a vast difference in the particle size of the sinters in the two periods:

Size, inches	1st Period, per cent	2nd Period, per cent
+2	20.0	0.87
—2 and +1	40.0	8.74
—1	40.0	90.39

In the first period, using the sinter of large particle size and deficient in fines, there was poor contact between the gas and the stock and the fuel rate was consistently 2000 pounds plus per 2240 pounds of iron. The temperature of the gas leaving the top of the furnace was held from 700 to 800 degrees Fahr. only by the use of a large, but unmeasured, amount of water on the stock.

In the second period, using the properly prepared sinter of small particle size range, with close contact between the gas and the stock, the coke consumption for one month of the period was 1333 pounds per 2240 pounds of iron, with one week of that month 1299 pounds. The temperature of the gas leaving the top of the furnace ranged from 350 to 400 degrees Fahr. without the use of any water on the stock.

The lesson from the data seems to be that with a material prepared to the best advantage to recover and conserve heat in the furnace less fuel will be used without any loss of reducing ability and with the lessened amount of fuel and the absence of volatiles in the mix there will be less gas evolved from the operation and, consequently, a large saving in thermal units normally taken from the furnace as sensible heat of the gas.

Engineering skill has developed the mechanical equipment for efficiently and economically charging the raw materials into the furnace for the application of heat. The next logical step seems to be to prepare the materials to receive that heat efficiently and economically. For this purpose concentration and sintering is the best known and most economical method for large scale beneficiation. To obtain the benefits of full beneficiation the third step of sizing the sinter must be added.

Sinter vs. Natural Ores. Sinter is the product of a fusion, only momentarily sustained in the molten state, but long enough to actually melt the components. The mix can be prepared from any number of materials selected from their chemical analysis and fed into the mix in the proportions necessary, to give a sinter product of a predetermined desired chemical composition. The pugging of the materials before delivery to the

sintering machine prepares them in a homogeneous mass. Fusion of the sintering operation eliminates all volatile chemical elements and blends all nonvolatile elements into a homogeneous chemical compound which will absorb and conduct heat uniformly and which when charged into the furnace will remelt at a lower temperature than that needed to melt them in their natural state.

Good sinter approaches the ideal iron-bearing material for blast furnace use closer than any other material but the term sinter is sometimes loosely used. There can be as many different kinds of sinter as there are different kinds of material from which sinter can be produced. All sinters have a few things in common—they are all free from volatiles, they all absorb heat uniformly and hold it, and they all conduct heat readily; but they all differ in their chemical composition of nonvolatile elements the same as the materials from which they were produced. They will differ in their physical characteristics to the degree they are affected by the structural strengthening effect of the iron silicates formed during the sintering operation.

Simple characteristics possessed by all sinters, that is, their freedom from volatiles and their ability to absorb, conduct, and hold heat, are of greatest practical value to the blast furnace operation but to get the full benefit of those virtues they must be accompanied by a particle size which will force maximum contact between the sinter and the furnace gas. In a partial sinter burden a small particle size of sinter is an advantage; in a total sinter burden it is imperative.

The form of molecular compound of iron oxide in the sinter is not of any practical importance to the reduction of the oxide because of the reasons given in the previous discussion on the reduction of iron in the blast furnace. Sometimes it is said the molecular form of the oxide is changed during the sintering operation. The question of whether or not there is any change will not be contested. In all probability under the variable conditions of the sintering operation there will be a change at times but the assertion is made that if and when a change occurs it has not practical value to the blast furnace operation. Further, considering the close range of the heats of formation of the different molecular compounds of oxides in relation to the wide range in the temperature of the sintering flame due to the variables of feed and operating conditions, the possibility of controlling the change of oxide with any hope of success is open to question.

The inevitable formation of iron silicates during the sintering operation is important because of the manner of the formation and because of the structural strengthening effect of the formation on the particle size of the sinter. The only importance of the chemical composition of the sinter to the reduction of the iron is the effect of that composition upon the physical characteristics of the sinter and the effect of those characteristics upon gas contact.

The vital importance of small particle size of sinter cannot be overestimated yet the need for that characteristic is received with reluctance by many soft ore operators. The reluctance probably can be explained by the fact that most of the operating difficulties of the soft ore operations are caused by the restriction offered to the passage of gas by the fines of the soft ores. It is the nature of the fines that cause the trouble more than the property of fineness. The fines of all earthy materials have the tendency to pack. The minute particles, particularly when wet, possess great adhesive force and a mass of such material when packed is almost as impervious to the passage of gas as a solid body. A

mass of sinter fines, like washed sand, has little adhesive force and offers a uniform resistance to the passage of gas without the objectionable restrictive action of the soft earthy ores.

When a charge of earthy ore is lowered into a blast furnace the first action is that of drying. Inevitably, fissures of various sizes will develop in the body of ore because of the natural law governing the drying of earthy material. The rising gas column will rush through the fissures at great velocity and so have little opportunity to transmit to the ore the heat which it carries and this condition will continue until the dried lumps of ore have absorbed enough heat to be burst asunder by the release of the bound volatiles. Reason dictates that this action must be as outlined. That part of the furnace working volume used for drying the ore and for releasing the bound volatiles is really a material preparation zone for the reduction zone below it.

When a charge of sinter is lowered into a furnace no fissures can develop because the sinter carries little or no moisture. If any is present it will be found on the surface of the sinter particles because sinter cannot absorb moisture. Release of bound volatiles is impossible because sinter does not contain bound volatiles. In short, sinter already is prepared for reduction, and all it needs is the application of heat. The reduction zone of the furnace therefore is increased in size to the extent of that part of the working volume otherwise used for material preparation.

A basin may be fashioned from clay or loam and that basin will hold water while the basin wall slowly saturates itself. If a fissure is created in the basin wall the water will rush through it. A basin of similar size may be fashioned from sand but it will not hold water because the water will leach out through the interstices of the basin wall and the leaching will be uniform. The action of the furnace gas with the soft ore and the sinter will approximate the action of the water in the clay and sand basins. Reason dictates this action must be as outlined.

Two Factors Govern Size

The factors governing the preferred particle size of sinter are the desire to transmit heat as rapidly as possible from gas to stock, and the desire for free passage of the gas through the interstices of the stock. To serve the first purpose fines are desirable because of the large ratio of surface to mass, to serve the second purpose some larger sizes are needed. The desired minimum in particle size is that size which will not easily be entrained in the gas stream by the velocity of the stream. The desired maximum is that size which is small enough to form a compact stock column and still retain enough structural strength to be a self-supporting column. A sinter graduated from minus 1 inch to minus 100 mesh with as large a percentage of the smaller sizes as the freedom of gas will permit serves both purposes very well. The volatile free fines will not pack but will absorb heat rapidly and hold it, the larger particles will absorb heat reasonably fast and hold it, the graduation in particle sizes and the granular characteristic of the sinter forces a uniform distribution of gas throughout the stock column. Natural friability will permit some sinters to adopt the preferred sizes from ordinary handling, any sinter can be crushed to it.

A stock column of good sinter, properly sized, is free from most of the irregularities of the soft ore column. The extremes in the range of particle sizes are greatly reduced and the intermediate sizes are more uniformly graduated. The volatile free, granular, particles of sinter permit a compact stock column which is desirable for gas contact but it is free from the earthyness of the soft ore which tends to pack and so force the gas

through the channels of least resistance. The granular characteristic and the structural strength of the sinter particles prevent packing and thus equalize the resistance to the flow of gas and force the gas uniformly throughout the stock column. The cellular structure of the sinter particles provides a large ratio of surface to mass for gas contact and so permits the maximum opportunity for transmission of heat from the gas to the stock.

Provides Compact Stock Column

The natural tendency of soft ores to pack places the responsibility of maintaining a stock column permeable to gas largely upon the coke. This necessity explains the blast furnace operator's desire for a strong coke which will not break down or crush from the weight of the furnace burden. Since the structural strength of sinter is similar to that of the coke the coke is largely relieved of the obligation of keeping an open stock column. Since the sinter particles are free from chemically bound volatiles they retain their individual identity far down into the furnace. The structural strength advantage possessed by the sinter not only permits but makes desirable a smaller particle size of coke than is usual with the soft ore operations. Minus 3-inch and plus 1-inch size has been used in sinter operations successfully. The advantage gained is that of a more compact stock column. A compact stock column, offering a maximum uniform resistance to the flow of gas, but free from the localized restrictions to flow common to the soft ore operations, is the preferred condition of gas flow within the furnace.

Resistance to gas flow conserves heat in the furnace. Without this conservation it would be impossible to maintain a hot hearth yet the construction of the furnace is such that in simply obeying natural laws the tendency is for the rising gas column to take heat away from the hearth. Air is blown into the bottom of the furnace and the products of combustion have no other way to go but up. If the stock column does not absorb the heat from the gas as the gas passes up through it the heat will leave the furnace with the gas. The compactness of the soft ore column has been its only advantage but it has the disadvantage of offering localized restriction to the flow of gas which causes irregularities in the rate of heat absorption by the stock. There would be no purpose in sintering a soft ore to eliminate the objectionable characteristics of it simply to create new objectionable characteristics in the sinter. It must be recognized by the soft ore operator that if the soft ore to be sintered contains a percentage of gangue elements which will cause the sinter to be of relatively large particle size with a deficiency of fines then the sinter must be crushed to get the fines.

(To be Concluded)

Choosing a Peace Plan

Peace Plans and American Choices, by Arthur C. Millspaugh; 107 pages, 5½ x 8 inches; published by the Brookings Institution, Washington, for $1.

Realizing that a democratic peace, made democratically, implies a great popular debate on the questions and issues involved, the author, without stating his own opinions and conclusions, sets up and describes about a dozen typical peace plans and gives the main arguments for and against each of them.

Among the most important issues is how world order may be securely established and war forever abolished and with numerous proposals for durable peace already advanced a many-sided and somewhat confusion debate is already under way.

The work is brief, pointed and simply written, aimed to help citizens generally to see the problem fairly from all sides and make their own reasoned choices.

Transportation Tax Regulations Issued

(*Concluded from Page 65*)

has previously been paid with respect to the coal so delivered, a statement to that effect shall be endorsed on the bill of lading or other shipping papers. This endorsement shall constitute authority to the carrier not to collect tax with respect to the transportation charges due on such shipment.

In-transit shipments: In the case of an in-transit shipment where a carrier has charged a local rate from the point of origin to the in-transit point and also a local rate from the in-transit point to the point of destination, and subsequently an adjustment is made for the difference between the sum of the local rates and the through rate, the carrier is authorized to make adjustment of the proportionate amount of tax involved and take credit for such amount in a subsequent monthly return.

Export shipments: The tax will not apply to an amount paid in the United States for transportation of property in course of exportation to a foreign destination, or shipment to a possession of the United States, in accordance with the applicable requirements of these regulations. The provisions of this subpart covering transportation of property for export shall also apply to transportation to a possession of the United States.

Property will be considered to be in course of exportation from the time of delivery to a carrier in the United States for transportation by continuous movement to a point beyond the boundaries of the United States. The term "United States" means the States, the Territories of Alaska and Hawaii, and the District of Columbia.

Nature of Shipment Shown

A shipment moving through the United States from one foreign point to another is deemed to be in course of exportation. However, if a break in the movement occurs within the United States, the tax will apply to any payment made in the United States with respect to that part of the transportation which takes place in the United States. Any subsequent transportation of such property would be regarded as a separate movement.

The export character of a shipment shall be evidenced by a contract, order, proposal of purchase or other written evidence of intention to export, antedating the delivery of the shipment to the carrier.

Continuity of movement: The continuity of movement shall be evidenced by a through bill of lading covering a shipment to contiguous territory or a

through export bill of lading covering a land-and-ocean shipment to non-contiguous foreign territory or to a possession of the United States, or through shipping papers by the bills of lading, freight or express receipts or other evidence. Any break in the movement must be due to the fault of transportation and not to any act of the shipper.

In case a break occurs in the movement of property shipped for export, which is not the fault of transportation, and the property comes to rest in transit prior to exportation, that part of the amount paid for the transportation which pertains to the movement from the point of origin to the point where the break occurs is taxable. A "break" may be said to occur wherever the property is stopped for a business purpose, such as grading, cleaning, mixing, sorting, or manufacture, and not merely in accommodation to the means of transportation.

When a shipment originating in, and consigned to a destination in, the United States, is subsequently diverted or reconsigned to a foreign destination and exported, tax will be due on that part of the amount paid for transportation which covers the movement from the point of origin to the point where the diversion or reconsignment to the foreign destination will be considered as exempt from tax provided a temporary exemption certificate and certificate of exportation are filed.

Air Patrol Offers Emergency Service

Cleveland Courier Air Service has been established at Cleveland by groups 511 and 514 of the Ohio Civil Air Patrol. More than 50 planes and pilots are available, planes varying from 65 to 345 horsepower, and pilots have more than 1000 hours in the air.

The service is organized to provide within half an hour emergency flying to any point in the United States when other means of transportation are not available. It is utilized for transportation of either men or materials where speed is needed to avoid interruption of the war effort.

The service is financed by underwriting by representative war industries on a cost basis, 42 firms engaged in the war effort being its first sponsors. Each industry agrees to a written underwriting contract at $150. Each time a plane is used a fee is charged according to the horsepower of the plane, ranging from $5.92 per hour for a 75-horsepower plane to $23.97 for 345-horsepower.

Already this service has been instrumental in preventing plant shutdowns by transporting needed parts to an assembly line or by carrying an expert to a plant in which trouble had developed.

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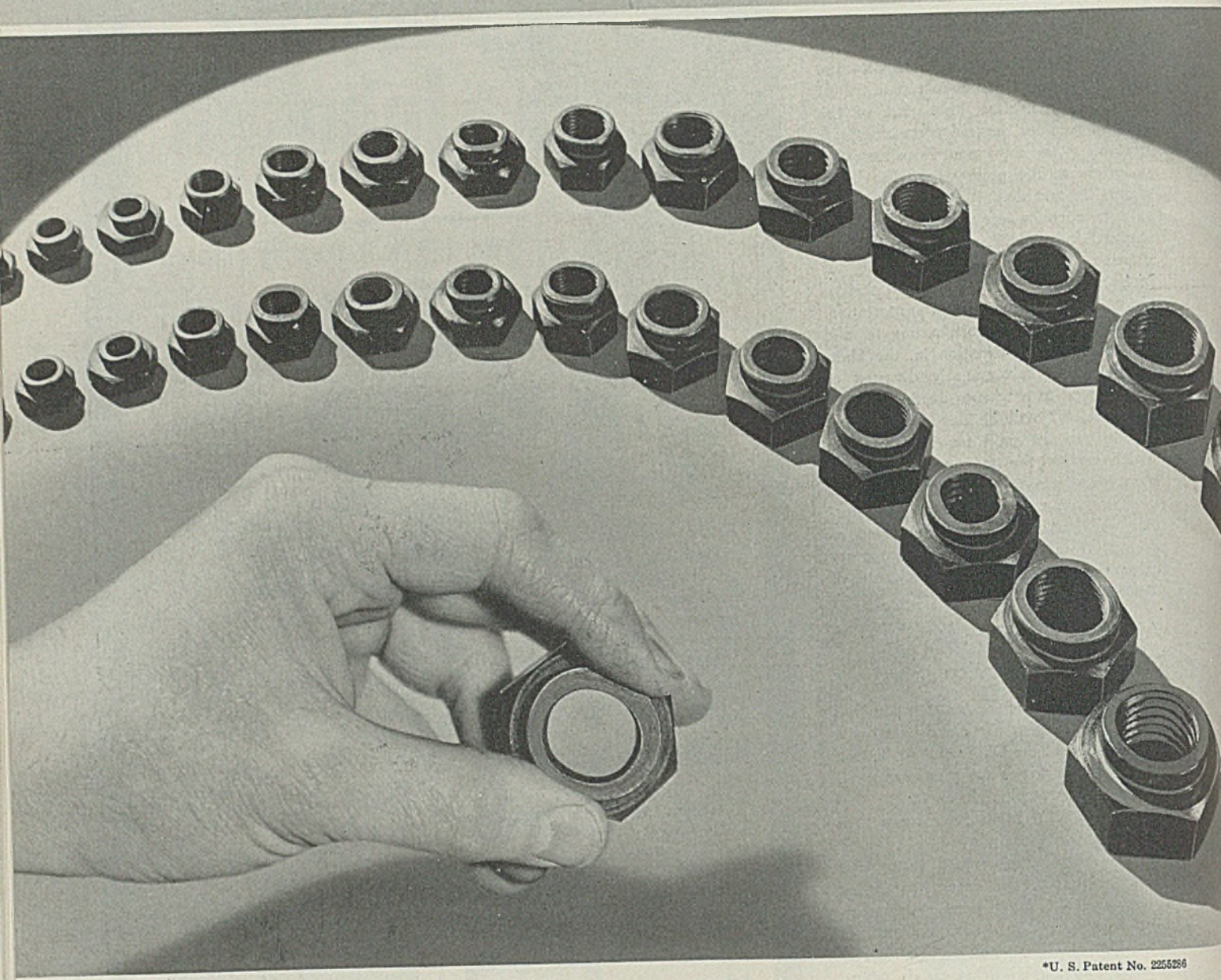

*U. S. Patent No. 2255286

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Your Jobber Stocks the Lamson Line

Heavy Steel War Needs Being More Easily Met

Restrictions on civilian products clear path for essentials. . . . Plate production record set in January. . . . Deliveries hold steady. . . . Scrap position continues easier

DEMAND
War needs expanding

PRODUCTION
Gained ½-point to 99 per cent.

PRICES
Beehive coke advanced.

WHILE shipbuilding needs are expanding and other war needs are substantial many plate producers believe pressure over the next several weeks will not be excessive, as various other outlets have been severely restricted by the government, including building, tank fabrication and railroad equipment construction.

In step with the enlarged shipbuilding program mills are increasing steel plate production, an all-time monthly record being established in January, when 1,135,413 net tons was delivered. This replaced the prior record of 1,124,118 tons made in July, last year. Contribution of converted continuous strip mills is shown by the fact that approximately half the total, 565,893 tons, was from that source. No record will be set in February because of its being a short month but March and April may challenge prior records, judging from indications in the shipbuilding industry, without exceeding available capacity.

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Deliveries fail to improve on most steel products, large bar rounds and flats holding at 10 to 12 weeks, with small rounds available at about six weeks. Some producers can not offer as favorable promises. Forging billets are available no sooner than late in second quarter but re-rolling billets are somewhat freer. Hot-rolled sheets on ratings down to AA-2X can be booked for five to seven weeks delivery, with cold-rolled sheets averaging slightly higher though some producers have offered five weeks recently. Structural shapes are offered in five to seven weeks, slightly better than recently.

Scrap position has been improved to the point that numerous large steelmakers have accumulated 30 to 60 days reserve and are not pressing for delivery. Receipts from other than industrial sources have declined recently, partly attributable to adverse weather conditions and also because of inability of dealers to maintain their working forces in face of better wages paid in other war industries. Considerable tonnage remains from salvage drives late last year, which has not been prepared, constituting a backlog for future weeks. Efforts by WPB salvage sections continue to uncover dormant scrap, much of which requires financing to make it available. Various adjustments are being made to move the surplus of borings and turnings which are found undesirable by melters in various consuming areas. Some interests fear the relatively easy situation may cause efforts at scrap gathering to lose force, resulting in a repetition of the shortage of last summer.

Steel production last week regained its former mark of 99 per cent, rising ½-point from the preceding week. The most important factor was an increase of 1½ points at Pittsburgh, to 99 per cent, due to repaired open hearths being returned to service. Cleveland also gained 1½ points, to 93 per cent, due to increased activity by one interest. Wheeling advanced ½-point to 80 per cent. Detroit dropped 3 points to 90 per cent and Cincinnati 5 points to 90, eastern Pennsylvania easing 1 point to 93 per cent. Rates were held unchanged at Chicago, 100; St. Louis, 93; Buffalo, 90½; Birmingham, 100; Youngstown, 97; New England, 95.

American Iron and Steel Institute, summing up steel production in 1942, points out that production in six kinds of steel used mainly in war work set new marks, exceeding the highs made in 1941. In products normally used for civilian goods production fell off sharply. Plate production was 90 per cent above 1941, alloy steel bars 20 per cent higher and carbon hot-rolled bars 2 per cent. Shape production, though building was restricted, was 8 per cent over 1941.

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Steel warehouse position is being defined under the Controlled Materials Plan, regulation No. 4 having been issued, defining the classes of orders that can be filled from stock. As a further aid the warehouse branch of WPB Steel Division is formulating a plan whereby definite quotas can be established, simplifying present procedure. The latter applies principally to jobbers handling seconds as well as primes.

Production of steel ingots and castings in January was second highest in the history of the steel industry, 7,408,744 net tons, compared with 7,584,864 tons in October, 1942, the all-time record. It compares with 7,303,179 tons in December and 7,124,922 tons in January, 1942. In January the industry averaged 97.8 per cent of capacity.

Composite steel and iron prices are steady at levels prevailing over the past few months. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Feb. 13	Feb. 6	Jan. 30	One Month Ago Jan., 1943	Three Months Ago Nov., 1942	One Year Ago Feb., 1942	Five Years Ago Feb., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.05
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	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.70

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

COMPARISON OF PRICES

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

Finished Material

	Feb. 13, 1943	Jan. 1943	Nov. 1942	Feb. 1942
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 $\frac{9}{32}$-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Feb. 13, 1943	Jan. 1943	Nov. 1942	Feb. 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
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	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.00
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. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

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, Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

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. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows 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 in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(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, Pheonixville, 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 Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	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	14½
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
2¼"	12	16.01	18.45	15.16	...
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $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
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	...	...
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F.	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	§§18.00	19.00	.....	.....	

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **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	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

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

Nuts

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

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo	2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.30
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	12.20
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$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. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65			28.15
Birdsboro, Pa., del	25.00	24.50	26.00	25.50
Birmingham, base	‡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	21.50	.....	.....
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 grade (1.75-2.25%), add 50c for each 0.25%. ‡For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, 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

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky. 51.30
Alabama, Georgia 51.30
New Jersey 56.00
Ohio 43.00

Second Quality

Pa., Ill., Md., Mo., Ky. 46.55
Alabama, Georgia 38.00
New Jersey 49.00
Ohio 36.00

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania $51.30
Joliet, E. Chicago 58.90
Birmingham, Ala. 51.30

Ladle Brick

(Pa., O.; W. Va., Mo.)

Dry press $31.00
Wire cut 29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $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

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46	7.75[23]	6.05[23]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[15]	4.60[1]	4.09[21]	3.51	7.60[23]	5.90[23]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.90[16]	4.63[25]	4.06[21]	3.31	7.56[23]	5.86[23]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[20]	4.04[21]	....	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[20]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.15[17]	5.10[20]	4.03[21]	....	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[24]	4.15[21]	....	....	....
Bethlehem, Pa.[a]	3.45[1]	....	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.[a]	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.[a]	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[15]	4.30[10]	3.75[21]	3.52	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[15]	4.20[10]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[18]	4.00[24]	3.65[21]	....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[13]	4.05[24]	3.75[21]	3.20	7.55[23]	5.85[23]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[13]	3.95[24]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[12]	4.30[24]	3.80[21]	3.40	7.67[23]	5.97[23]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[10]	4.37[24]	4.00[21]	3.45	7.69[23]	5.99[23]
Youngstown, O.[a]	....	....	....	....	....	....	....	4.40[13]	....	....	....	....	....
Middletown, O.[a]	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[13]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[10]	4.10[24]	3.75[21]	3.50	7.35[23]	5.65[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[10]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[10]	4.23[24]	3.88[21]	3.54	7.33[23]	5.88[23]
St. Paul	3.75[1]	3.80[2]	3.80[2]	5.40[2]	3.50[3]	3.85[3]	3.85[2]	5.00[2]	4.35[2]	4.34[21]	3.83	7.70[23]	6.00[23]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[24]	4.02[21]	3.61	7.72[23]	6.02[23]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[24]	3.97[21]	....	....	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[6]	4.10[5]	4.10[5]	5.25[11]	4.66[24]	4.31[21]	....	....	....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[20]	4.95[10]	4.60[21]	5.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[10]	4.60[21]	....	....	....
Houston, Tex.	3.75[8]	4.25[8]	4.25[8]	5.50[9]	3.75[8]	4.30[8]	4.30[8]	5.25[16]	5.43[10]	4.50[22]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[18]	7.15[6]	5.70[22]	....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[19]	7.55[19]	5.55[23]	....	9.80[9]	8.80[9]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[19]	7.45[19]	5.45[23]	....	....	....
Tacoma	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[6]	6.63[24]	5.75[23]	....	....	....
Seattle (city)	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[24]	5.75[23]	....	....	8.00[6]

[a]Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, any quantity is base.

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)

Designation	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 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-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.13-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
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-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9587	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.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

Chemical Composition Limits, Per Cent

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

	ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES													
					Low Phos. Grades							Alloy-Free		
						Bar	Heavy Structural, Plate			Foundry Steel		Low	First Cut	
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Crops and smaller; Punchings, Plate	3 ft. and less	2 ft. and less	1 ft. and less	2 ft. and less	1 ft. and less	Phos. & Sulphur Turnings	Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	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	15.50	16.50	17.50
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. †Toledo open-hearth grades cover only No. 2 busheling.

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 $1 (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 $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."

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 144

Delivery promises on hot-rolled sheets carrying ratings down to and including AA-2X range from five to seven weeks. On cold-rolled sheets the general average is slightly higher although five weeks has been promised recently and one mill has booked a limited tonnage for shipment in four weeks.

Sheet tonnage in the East has been stimulated by easing of restrictions on poultry and dairy farm equipment and by orders from some southern truck body manufacturers who have been given Army orders. These require 14 to 22 gage sheets.

Chicago sheet mills have found their situation easier as a result of some tonnage being diverted to other areas and to better semifinished steel supply as demand declines for structural and reinforcing products. Southern mills find pressure lessened for sheets but strip production is brisk as cotton tie requirements are being rolled.

Plates . . .

Plate Prices, Page 145

An all-time monthly record for steel plate production was established in January when 1,135,413 net tons was produced. The prior record was 1,124,118 tons, set in July, 1942. Converted continuous strip mills provided approximately half this total, establishing a new record with 565,893 tons, compared with the previous high of 551,959 tons, made in August, 1942.

Emphasis is on plates rather than sheets and schedules are being rearranged to increase plate output, in view of heavier demand for construction of synthetic rubber and high-octane gasoline plants as well as for the enlarged shipbuilding program.

One reason for increased pressure is said to be delay in completing new plate capacity expected to be ready during first half and which now appears likely to be delayed until late in the year because of material and labor shortage. As a partial offset conversion of sheet mills has progressed more rapidly than planned, in many instances.

Principal plate consumption is by shipyards, with fabricating shops second and warehouses third. Plate fabricators are obtaining increasing volume of special assembly work outside their usual lines.

Leading plate producers believe, in spite of the larger shipbuilding program, pressure for plates over the next few months will not strain capacity, inasmuch as restrictions on such other outlets as construction, tank fabrication and railroad equipment building have released capacity for more essential use. February output will be less than January because of the shorter month but new records may be expected in March or April, without putting too much strain on production.

Bars . . .

Bar Prices, Page 144

Delivery schedules on merchant bars are little changed with small rounds offered in about six weeks and larger rounds in ten to 12 weeks, some producers not being able to promise that well. Rerolling billets are somewhat freer but forging billets are scarce as ever with shipments running into second quarter.

Pipe . . .

Pipe Prices, Page 145

Demand for cast iron pipe has slackened and deliveries are improved, notably on small sizes. Backlogs of heavier pipe and fittings remain substantial with some pressure for deliveries. Municipal buying is confined to small lots for emergency maintenance, while requirements for government installations are declining. Stock sales are limited by small inventories at foundries. Less pig iron is going to cast iron pipe producers, but in view of lighter demand, reduced allotments are generally sufficient.

Cast pipe plants in Alabama are working at a high rate and employment is at a peak. A large part of their output is for other products than pipe, as they have converted largely to essential war work.

Tin Plate . . .

Tin Plate Prices, Page 145

Elimination of metal in special purpose containers for tobacco, cosmetics and other products for the civilian trade is restricting consumption of black plate for cans and dry package units, fiber being substituted for a large percentage.

Production of paper and fiber contain-

ers is slower than for steel, adding to cost. These substitutes would not be competitive with black or tin plate under normal conditions and the latter are expected to regain their position after war restrictions are loosed, both on a price and utility basis.

For food packs this year tin plate demand is expected to be as heavy as last, though first quarter use is below expectations. All crops will be packed to the limit beyond fresh consumption and dehydration. The latter process is expected to break all records, notably for lend-lease, to save shipping space, and most dehydrated foods require metal packaging for shipment.

Buying by canmakers is slow and while there has been some improvement recently it is no more than sufficient to allow manufacturers of tin plate to fill their quotas and maintain production schedules.

Rails, Cars . . .

Track Material Prices, Page 145

Of the 20,000 domestic freight cars planned for delivery during first half, the War Production Board has now authorized the building of 18,900. Included in latest authorizations are 1750 fifty-ton hopper cars for the Chesapeake & Ohio, of which 1250 are to be built by Pullman Standard Car Mfg. Co., Chicago, and 500 by General American Transportation Corp., Chicago. This railroad, it is understood, would also like to get a release on 1250 additional hopper cars for delivery, if necessary, in the latter half of the year. An order for this amount is said to have been on the books of the American Car & Foundry Co. and was subsequently frozen.

Other cars recently approved for construction during the current half include 400 gondola cars for the Chicago, Rock Island & Pacific, to be built by Pressed Steel Car Co., Pittsburgh, and 25 flat cars for the Western Maryland, for construction by the American Car & Foundry Co.

The Chesapeake & Ohio is inquiring for twenty-five 2-8-4 steam locomotives, with 21,000-gallon tenders. The War Production Board has authorized the purchase of one 600-horsepower diesel-electric switch engine by the Broder County Port Authority, Fort Lauderdale, Fla., from Electro-Motive Corp., La Grange, Ill.

Structural Shapes . . .

Structural Shape Prices, Page 145

Structural demand is increasingly light and deliveries are available from some mills in five to seven weeks. Fabricators in favorable locations with regard to shipbuilding yards are figuring a substantial tonnage of ship assembly work. This involves a greater proportion of plate work than of shapes, leaving some facilities idle while others are rushed. Larger use of welding than of riveting is an illustration. In some instances fabricators are losing men to other industries, particularly new war plants where wages are more attractive.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 145

On the limited volume of new billet steel reinforcing bars required, price shading is apparent. Few sizes are permissible for new rollings, including 1⅛ and 1¼-inch squares, also one-quarter inch rounds; other sizes are specified for rerolled rail bars, exceptions subject to WPB approval. Demand for both grades is sluggish, distributors moving small lots of new billet bars from inventories; most rail bars are sold direct. Prices for the latter are generally firmer than on new billet material. This reflects directive orders stressing use of rail steel where possible. Efforts to designate new billet bars as a group three material continue, curtailment in their use being due to specification restrictions.

One of the largest inquiries calls for 2000 tons for an off-shore defense project in New England.

Pig Iron . . .

Pig Iron Prices, Page 146

Pig iron production is at a high rate, few stacks being out of blast for relining or rebuilding. New high output is being achieved constantly as a result of war pressure and improved technique.

Two factors are causing some trouble, manpower and coke supply. The former may be alleviated by recent provisions by the War Manpower Commission and Selective Service and by the general use of manning tables to obtain deferments for essential employes.

Coke supply still is a problem. Con-

siderable metallurgical coke of inferior grade still remains on the market, principally beehive fuel high in sulphur. Efforts to render available a larger supply of good coking coal for beehive ovens are under way but the problem has not been solved.

Costs present another difficulty, labor and materials rising constantly and narrowing the margin for pig iron makers, especially non-integrated producers. This condition leads toward higher pig iron prices unless it can be checked. Present demands by coal miners for higher wages presage higher coke prices, a large factor in pig iron costs.

Some recession in demand for pig iron for March use has been evident in certain areas but indications are that April needs will show an increase. In some cases February allotments were larger than could be used, with a carryover into March. Part of the decline in demand has resulted from restrictions on civilian products. Renewed buying for railroad needs is expected to appear with spring and cause larger demand on castings makers.

Scrap . . .

Scrap Prices, Page 148

Sufficient scrap to build reserves for as much as 60 days, with accumulations in yards awaiting preparation, has made the current situation easier than for some time. In spite of bad weather and lack of manpower dealers have been able to ship much material, although their stocks have not been worked as closely as usual.

At the moment collections seem to be slowing and not as much tonnage is coming into their hands as usual. Government agencies charged with bringing out dormant material or releasing it from projects which require financial assistance are uncovering considerable tonnage and most of this is of better grade than that obtained in general scrap drives.

Mills in the Pittsburgh district have stocks for 30 to 60 days operations, the larger consumers being best supplied. It is estimated about 30 days supply is in transit and in dealers' yards awaiting preparation. Dealers and brokers report incoming material from industrial and miscellaneous sources has declined substantially and shipments from yards are not being replaced by new supplies. Many interests envision a shortage next summer or fall.

Deliveries on allocations from New England and the East to consumers in Pittsburgh and the Valley, prices on which are above ceilings because of freight charges, are not being taken freely under present better local supply. Inspection is more rigid and some rejections have resulted.

Steel mills in the Chicago area maintain reserves of about two months, current receipts usually being sufficient to support high steel production. Occasional interruption of supply because of weather conditions causes some scrap to be used from stock. Scrap yards are well supplied but are handicapped in preparation by lack of workers. Dealers equipped to bundle machine turnings are moving tonnages under the recent revision of prices but unprepared turnings continue to be shipped by those without presses.

Steel mills in the St. Louis district are in better situation than for some time. Supplies average 30 days or more and electric furnaces are well supplied. One interest has embargoed shipments temporarily and the material is being diverted to other users. Considerable cast scrap has accumulated, exceeding demand. Shipments from the Southwest are expected to be smaller as the territory has been closely combed in recent weeks.

In eastern Pennsylvania trade is sluggish, most consumers being in comfortable position and dealers having short labor forces. Practically the only grade in special demand is heavy breakable cast, for which some non-integrated mills have need. More active general demand is expected soon and steel mill and warehouse salesmen are preparing to start a new drive for dormant scrap March 1.

In the Detroit district officers of OPA have frowned on the long established practice of including steel grindings in carloads of borings and turnings, in some cases detaining cars. In the past many users have made no demur at this practice and in case grindings are not acceptable by the user they have not been included. No classification exists for the steel removed in grinding operations, which is of high quality and it is not included in any description of

scrap. With much machining now being done on grinders considerable waste results for which there seems no other outlet. The suggestion has been made that a classification at a differential from borings and turnings might be wise, thus allowing this material to be conserved.

Semifinished Steel . . .

Semifinished Prices, Page 144

Stanley Works, New Britain, Conn., has been granted permission by OPA to sell rerolling billets to Washburn Wire Co., Phillipsdale, R. I., under allocation orders at a maximum base price of $39 per gross ton f.o.b. the American Tube & Stamping plant, Bridgeport, Conn. The authorization is covered by order No. 33, under revised price schedule No. 6.

Metallurgical Coke . . .

Coke Prices, Page 145

Reflecting higher prices of coal and the transportation tax, Office of Price Administration has raised the ceiling price on standard beehive furnace coke, f.o.b. Connellsville ovens, to $6.50, an increase of 50 cents per ton. The same order allows operators of hand-drawn ovens using trucked coal to charge $7 per ton, both increases being effective as of Feb. 3.

Iron Ore . . .

Iron Ore Prices, Page 147

Summary of grades of iron ore shipped by lake during the 1942 season has been issued by the Lake Superior Iron Ore Association, Cleveland. Figures are in gross tons, cargo bill-of-lading weights, which are 1 per cent less than upper lake railroad weights. Details of grade shipments are as follows:

U. S. ranges	Tons	Percent of total
Non-bessemer	68,169,690	74.78
Bessemer	19,231,564	21.10
Manganiferous	2,509,870	2.75
Siliceous	776,762	.85
Total U. S. ranges	90,687,886	99.49
Canadian		
Bessemer	[illegible]	.51
Grand total	91,155,779	100.00

Season shipments by ranges, on the same basis, were as follows:

U. S. Ranges	Tons	Percent of total
Mesaba	69,650,407	76.41
Vermilion	1,547,329	1.70
Cuyuna	2,368,443	2.60
Total Minnesota	73,566,179	80.71
Gogebic	6,156,843	6.75
Marquette	6,187,394	6.79
Menominee	4,777,470	5.24
Total Michigan-Wisconsin	17,121,707	18.78
Total U.S. ranges	90,687,886	99.49
Canadian		
Michipicoten	467,893	.51
Grand total	91,155,779	100.00

U. S. Iron Ore Output Up 16 Per Cent in 1942

Iron ore production in the United States in 1942 is estimated at 119,853,000 net tons by the Bureau of Mines, about 16 per cent more than 103,498,728 net tons in 1941. Shipments are reported as 119,821,000 net tons, about 15,600,000 tons over 1941 shipments. Total value of ore shipments in 1942 was

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

$280,357,000, compared with $249,705,903 in 1941. Average value per net ton of iron ore at the mine was approximately $2.34, while in 1941 it was $2.39.

Total stocks at mines Dec. 31, 1942, are estimated as 4,129,000 net tons, compared with 4,023,198 tons at the end of 1941, an increase of 3 per cent.

Iron ore was produced and shipped from 18 states, which the Bureau of Mines divides into four main groups. The Lake Superior group is largest, producing 103,213,000 net tons in 1942, an increase of 17 per cent over 1941. Shipments from this district totaled 103,151,000 net tons, about 16 per cent over 1941. Lake Superior Iron Ore Association reports shipments from that area at 91,603,910 gross tons, compared with 79,654,785 gross tons in 1941. This association also reports 472,871 gross tons shipped from the Michipicoten area in Canada to ports in the United States.

Shipments by groups and states in 1941 and 1942 are as follows, as reported by the Bureau of Mines, in net tons:

	1941	1942
Lake Superior:		
Michigan	17,025,813	17,885,000
Minnesota	70,419,878	83,533,000
Wisconsin	1,665,189	1,733,000
	89,110,880	103,151,000
Southeastern:		
Alabama	8,818,015	9,950,000
Ga., Tenn., Va., Miss.	290,449	656,000
	9,108,464	10,606,000
Northeastern:		
Connecticut	31	
New Jersey	746,536	681,000
New York, Pa.	3,657,821	3,728,000
	4,404,388	4,409,000
Western:	1,596,741	1,655,000
Grand total	104,220,473	119,821,000

Steel in Europe . . .

London — (*By Radio*) — Heavy steel plates are in urgent demand in Great Britain to support the enlarged shipbuilding, locomotive and other construction programs. Specifications for heavy structural steel are easier but demand for steel bars is keen. Tin plate requirements are smaller.

Warehouse . . .

Warehouse Prices, Page 147

Regulation No. 4 of the Controlled Materials Plan has been issued by WPB, governing sales by warehouses and distributors. It is effective Feb. 15 on copper and March 31 for steel and aluminum.

After March 31 warehouses may fill only authorized CMP orders; orders for $10 or less; orders bearing AA-5 rating or higher, for delivery before July 1; orders calling for delivery of carbon steel under food production order B of the Department of Agriculture and orders calling for delivery during any calendar quarter to the same customer in amounts not exceeding those listed in a table in the regulation. Distributors must reject any order calling for delivery at one time to the same customer at one destination of 40,000 pounds or more of steel unless the order includes ten or more individual items, none of which weighs over 8000 pounds, unless all the items covered consist of oil country tubing, casing or drill pipe.

Warehouse branch of WPB steel division is working on a proposed method for permanent establishment of prime steel quotas which may be purchased by warehouses also engaged in sale of seconds. Under order M-21-b warehouses which in 1940 purchased more than 25 per cent of their tonnage in grades invoiced as less than prime quality are not permitted to buy from any producer in one quarter a quantity of primes greater than one-fourth the tonnage of primes bought from such producer in 1940. This provision is expected to be continued.

In determining prime steel quotas to which warehouses may be eligible it is proposed that 1940 purchases specifying definite quality and quantity may be included with prime steel purchases, while steel unassorted as to size and gage would not be included. Warehouses, under the proposed plan, would submit to mills by March 1, a detailed list of prime purchases. Verified by mills, these would be consolidated and report-

ed to WPB as a maximum tonnage figure to govern future quotas.

Equipment . . .

Boston—Machine tool shipments, in excess of new orders for some months, are maintained at a high rate. Backlogs on some lines are gradually lowered with improvement in deliveries. New contracts are still substantial for miscellaneous machinery, notably special grinding units. While some special negotiated contracts for government departments are placed, pool buying has declined and deliveries will be completed by some builders by the middle of second quarter.

Most new Defense Plant Corp. contracts are now for machinery or equipment and considerable miscellaneous volume follows. The 60-day freezing order on deliveries finds most shops concentrating on tools for the aircraft industry; the directive has smoothed out shop schedules, which continue at capacity in most instances with an easing of pressure for shipment on some lines. Scattered ordnance cancellations and readjustments result in earlier delivery on a few units to metal fabricators.

While the material supply situation has improved in general, bearings and motors continue tight; d.c. motors are installed only on machines to be used where only direct current is available for operation. Cutting tools and machine attachments, mill cutters, reamers, taps, high speed steel twist drills and other cutting units are among the tightest of steel parts, notably with New England suppliers; deliveries range up to 10 months on some.

The many thousands of machine tools placed in production during the last two years makes demand for cutting tools progressively heavier, and, while shops producing this equipment are operating above theoretical capacity in many cases with steel available in sufficient volume, demand is so great, little progress is possible toward reducing backlogs and deliveries are more extended. To some degree the same applies to heavy demand for grinding wheels.

Canada . . .

Toronto, Ont.—Iron and steel production again is close to capacity, following return of workers at steel mills at Sydney, N. S., and Sault Ste. Marie, Ont. All 12 blast furnaces are blowing and steel mills have increased to about 96 per cent and are expected to reach the maximum within the next ten days.

According to reports some change in shipbuilding activities is pending. In this connection it is stated that some yards that have been working full time on minesweepers and corvettes, are preparing to build oil tankers. Toronto Shipbuilding Co., a government owned project, is expected to be the first in this new field and is said to have cleared two ways for this undertaking. The company, however, still is building minesweepers and corvettes and will continue until present contracts have been completed.

The Canadian government, through the Department of Munitions and Supply, has placed an order with Canadian Car & Foundry Co. Ltd., Montreal, for 200 tank cars. It is understood that special allocations will be made to provide steel. There has been more swinging of orders from one producer to another recently in an effort to obtain stabilized delivery among the various war plants, and some consumers that formerly confined their buying to one particular mill are giving their business to other producers in better position to maintain deliveries. Wire products continue in good supply with larger quantities available for non-war consumers.

Plate sales are increasing and it is reported that arrangements are proceeding towards stepping up deliveries of plates in connection with expanding shipbuilding activities. While shipbuilding is creating greater demand for plates in the heavier gages, sales volume has been gaining recently in ¼ and ⅜-inch, with heavy buying reported from boiler and tank makers. It is stated that additional tonnages of plates are to be made available soon to rolling stock builders in an effort to speed output of tanks, cars, locomotives and freight cars.

Demand is absorbing all output of steel sheets, with a number of consumers reporting shortages. One Ontario mill is said to be shipping practically all output to the Montreal area to meet war demands in that locality. Use of sheets in tin plate mills, however, has been sharply curtailed, but fair tonnages are provided for bonderizing. Warehouses are supplying most small consumers, and mills are receiving steady orders from jobbers.

More action has developed in carbon and alloy bars. It is stated, however,

Nonferrous Metal Prices

Feb.	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
1-11	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	5.35- 5.50
[illegible]	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

that domestic production is now meeting most of the alloy bar demand. Bar mills continue production to the limit of their steel supply and are fully booked for the remainder of this quarter. Consumer inventories on special steel bars are comparatively light, but it is not expected any serious shortage will develop, as deliveries are gradually swinging back to schedule. Supply of reinforcing bars is drying up with some mills now entirely out of the market. However, curtailment in building activities has sharply reduced demand.

Decline in structural shape demand, due to restrictions on new construction work, has resulted in decrease of lettings to an average of 300 to 500 tons per week. However, fabricators still are busy on old contracts, but many of these will have been cleaned out by the end of this quarter. Most fabricators are engaging in assemblies for shipbuilding. Decline in demand for structural shapes has decreased production, turning much steel into other direct war channels.

Merchant pig iron sales continue brisk and numerous inquiries have come out recently. Deliveries the past week rose to better than 8000 tons, with allotments to melters averaging 100 to 200 tons. Basic iron sales are increasing, with deliveries slightly better than 1500 tons. Demand for foundry and malleable pig iron is about equal. Growing shortage of scrap is largely responsible for improvement in pig iron sales.

While there has been some improvement in steel scrap receipts, supply of iron scrap is steadily becoming smaller and little cast or stove plate is appearing. The betterment in steel scrap receipts was entirely due to renewed deliveries from war plants and automobile wreckers. Mills are drawing heavily on reserves. Foundries report serious shortage.

Scrap Reduction Ordered

A reduction of 5 cents per gross ton on steel scrap maximums at shipping points in Hudson and Bergen counties, New Jersey has been ordered by OPA.

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.

Chicago office, Contract Distribution Branch of WPB, 226 West Jackson boulevard, is seeking contractors for the following:

Borg & Beck Co., division of Borg-Warner Corp., 6558 South Menard avenue, Chicago, attention L. C. Seen. Gear bearing. Priority, AA-1. Quantity, 225,000. Size, ¾ x 1½-inch. Material, bronze. Equipment, bench lathe, 7 x 15-inch turret lathe, hand miller, 5 x 8-inch oil groover. Tolerance, .0005.

Bell & Howell Co., 7100 McCormick boulevard, Lincolnwood, Ill., attention Clinton S. Davis. Priority AA-1. ring, 3300 pieces, flange, 1100 pieces, ½ x 1½-inch, stainless steel, supplied by contractor. Equipment, 1¾-inch bar capacity turret lathe. Tolerance, .004.

Casco Products Corp., Bridgeport, Conn., attention M. J. Strassburg. Priority AA-1. Production requirements by any one subcontractor, minimum of 500,000 per month. Total requirements 7,000,000 per month. Size. ½ x 1¼-inch. Material, cold-rolled steel. Equipment, ⅝-inch capacity single-spindle automatic screw machine. May substitute five spindle ⅜-inch capacity or six-spindle 5/16-inch capacity. Contractor supplies material, tools and gages.

Crosley Corp., Cincinnati, O., attention W. A. Aiken. Priority AA-1. Retainer ring, in lots of 25,000, 50,000 and 100 000. Contractor will supply material, cold-rolled steel. Size, ⅜ x 2¼-inch. Equipment, single-spindle automatic screw machine, 2½-inch capacity; two-spindle bench drill, ⅜-inch dr. capacity. Tolerance, .001.

Dual Designing & Engineering Co., 767 Milwaukee avenue, Chicago. Attention Jerome Rossetti. Priority AA-1, end use 1.00. Tubular body. Quantity, 700,000. Size, ½ x 1-inch. Material, cold-rolled steel, supplied by subcontractor. Equipment, ½-inch capacity four-spindle automatic screw machine. No. 40 drill required for small hole.

Lion Mfg. Co., 2640 Belmont avenue, Chicago, attention W. C. Billheimer. Priority AA-1. Gland, ¼ x ½-inch. Quantity, 250,000, at 50,000 per month starting April 1. Quantity will be broken if necessary. Material, alloy steel. Equipment, ⅝-inch capacity four-spindle automatic screw machine. Contractor supplies material.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-63: Forging dies and facilities for producing drop forged steel flanges and steel pipe flanges, welding type. Various sizes and quantities. Specify size and type of dies available and available open time on forging facilities. Reference, 1-A-541.

SC-64: Facilities for producing forged link chain. Various sizes, ranging from ½ to 1-inch diameter steel rod. Large quantities. Only those concerns that are able to develop the manufacturing processes should apply. Reference, 1-A-535.

SC-65: Multiple-spindle chucking machine work for machines having 3¾-inch chucking capacity. Two items, ⅞ and 1¼-inch long. Material, steel forging WD1015 to 1035 or malleable iron castings supplied by prime contractor. Quantities, 200,000 each. Weekly requirements 6000 each. Reference, 1-F-502.

SC-66: Multiple-spindle automatic screw machine work for machines having 1⅞ and 2 1/16-inch diameter bar capacity. Material, cold-drawn hex steel WD1112 and WDX1914, supplied by prime contractor. Quantities, 200,000 each of two items. WeeKly requirements 6000 each. Reference, 1-F-503.

SC-67: Hand screw machine work for machines having 13/16-inch and 15/16-inch diameter bar capacity. Secondary operation of screw slotting. Tolerance .0005 for hole and spindle. Material, hard brass, supplied by prime contractor. Continuous production at minimum weekly rate of 3000 each of two sizes. Reference, 1-A-553.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-4-V: New York manufacturer seeks subcontracting facilities for milled threading a stud, a plunger and a sleeve.

S-4-VI: A Brooklyn, N. Y., manufacturer is critically in need of jigs and fixtures as well as all types of tools.

S-4-8996: A New Jersey prime contractor is seeking subcontracting facilities open capacity on 4½-inch single or multiple-spindle screw machines. Material, 4135 steel. Part, bearing races. Quantity, 210,000 per month. Steel furnished by prime contractor.

SO4-8967: A procurement agency is seeking a manufacturer capable of producing motor-driven alternaters with the following characteristics, 3KVA, 115 V, plus or minus 5%, possibly 400 or 800 cy, motor to be either single or three-phase 60 cycle, 440 volt. Complete unit must be for class A service, drip-proof and otherwise conforming in arrangement and requirements similar to the Bureau of Ships specifications No. 17-M-17. Quantities required on first order, 500 to 1000 units. Contact New York office to arrange appointment with engineer of Bureau of Ships.

S-4-8889: New Jersey manufacturer is seeking subcontracting facilities to make hex nut blanks from ⅜ to 15/16-inch. Machinery needed, multiple-spindle automatic. Tolerance, plus or minus .003. Material, steel, B-1112. Quantity 40 million weekly. Material to be furnished by prime contractor.

S-5-9493: A Brooklyn manufacturer is seeking subcontracting facilities to slot a rectangular hole which requires a slotter with a 16-inch stroke all over.

S-5-9455: A procurement office is seeking subcontracting facilities to manufacture and assemble fragmentation bombs, requiring the following equipment: Multiple-spindle automatic screw machine, 4-inch collet, or turret lathes with chucking facilities; threading facilities NF 1; arc welding and spraying facilities. Material cold-drawn bar stock WD1112 or X1314 alternate, forging WD1015. Prints available at New York office for inspection only. See engineer "S" at New York office.

S-5-9479: A Long Island corporation is seeking subcontracting facilities for landing gear retracting cylinder assembly. Machines indicated: External cylindrical grinder, 10 x 24 inches; horizontal boring mill, 3-inch bar; No. 2 miller; Heald 50 or 75A 5; turret lathe; drill press.

S-5-8929: New York City manufacturer is seeking horizontal boring mill facilities with 3, 4, 5 and 6-inch bars. Material, steel 4140. Tolerances, .001. Quantities, large. Material supplied by prime contractor.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

1520 tons, with option on 5000 tons additional, trusses for floating drydocks, Morgan City, La., and Eureka, Calif., for navy, to Mississippi Valley Structural Steel Co., Decatur, Ill.; Chicago Bridge & Iron Co., Chicago, prime contractor.

125 tons, Port street bridge, Newark, N. J., for New Jersey state highway commission, to Phoenix Bridge Co., Phoenixville, N. J.

115 tons, bridge for Pennsylvania railroad at Perrysville, Md., to unstated fabricator.

SHAPE CONTRACTS PENDING

10,000 to 12,000 tons, bridges for Alcan (Alaska-Canada) highway, for United States Engineers, Washington; bids Feb. 13.

Unstated tonnage, suction storage reservoir and pumping station, Tonawanda, N. Y.; bids Feb. 25.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

125 tons, U. S. Veterans hospital, Marion, Ind., new plans call for refiguring on basis of one-third reduction in reinforcement; bids Feb. 16.

RAILS, CARS . . .

CAR ORDERS PLACED

Chesapeake & Ohio, 1750 fifty-ton hopper cars released, 1250 to Pullman-Standard Car Mfg. Co., Chicago, and 500 to General American Transportation Co., Chicago.

Western Maryland, 25 flat cars, released to American Car & Foundry Co.

Chicago, Rock Island & Pacific, 400 composite gondolas, to Pressed Steel Car Co., Pittsburgh.

LOCOMOTIVES PLACED

Broder County Port Authority, Fort Lauderdale, Fla., one 600-horsepower diesel-electric switch engine, to Electro-Motive Corp., La Grange, Ill., under authorization of WPB.

LOCOMOTIVES PENDING

Chesapeake & Ohio, twenty-five 2-8-4 locomotives, with 21,000-gallon tenders; bids asked.

CONSTRUCTION AND ENTERPRISE

MICHIGAN

DETROIT—Hercules Forge Co., 2962 Hart street, has let general contract for forge shop to Haberkorn-Barry Co., 719 Boulevard building. Estimated cost $50,000.

DETROIT—Advance Steel Treating Co., 520 Orleans street, has been incorporated with $50,000 capital, to engage in metal business; Melvin Norris, 1423 Putnam.

DETROIT—Preferred Mfg. & Engineering Inc., 14801 Charlevoix, has been organized with $50,000 capital ,to engage in metal business; W. E. Mize, 14913 Evanston.

DETROIT—Abbey Fence & Wire Corp., 4704 Eighteenth street, has been incorporated to deal in wire, steel and other metals; William F. Mueller, 5040 Baldwin street.

DETROIT—Republic Broach Corp., 13084 Houston avenue, has been incorporated with $25,000 capital, to deal in cutting tools; Harry Collins, 5059 Newport.

DETROIT—Apex Tool & Die Co., 3516 Cadieux road, has been formed with $50,000 capital, to manufacture and deal in machinery, tools, dies, gages, etc.; William J. Tenbusch, 409 McKinley road, Grosse Pte. Farms.

CONNECTICUT

COS COB, CONN.—New York, New Haven & Hartford Railroad, E. E. Oviatt, chief engineer, Water street, New Haven, has awarded contract for power plant improvements to Gibbs & Hill Inc., Penn station, New York. Estimated cost $500,000.

NORWALK, CONN.—Dilik Experimental Laboratories has plans for factory, including office and warehouse. Estimated cost $40,000.

STAMFORD, CONN. — Schiavone-Bonomo, East Meadow street, has plans by D. Mansell, 24 Park Row, for machine shop and storage building.

TORRINGTON, CONN.—Torrington Mfg. Co., 70 Franklin street, has awarded contract for two-story laboratory addition to Torrington Building Co., 187 Church street. Estimated cost $40,000.

NEW YORK

FALCONER, N. Y.—Jamestown Sterling Co. Inc., Allen street, will build one-story plant addition costing $45,000.

NEW JERSEY

NEWARK, N. J.—Breeze Corp. of America, 35 South Sixth street, will soon let contract for plant addition. Stanford Spawn, 500 Central avenue, architect.

OHIO

CANTON, O.—Wenatchee Alloys Inc., Citizen's building, Canton, has had its contract with Defense Plant Corp. increased by about $120,000 for plant facilities in Washington state.

CLEVELAND—Republic Steel Corp., Republic buiding, has received a $23,000,000 increase in its contract with Defense Plant Corp. to provide additional facilities for a plant in Illinois.

CLEVELAND—Hickok Electrical Instrument Co., Robert D. Hickok, president, will add about 13,000 square feet to plant at 10514 Dupont avenue.

CLEVELAND—Clark Controller Co., Primus Clark, president, has leased 13,000 square feet of space at 14100 Euclid avenue which will be used for assembly work.

KENT, O.—Davey Compressor Co., 266 North Water street, has acquired two buildings in south end of town which it will remodel for the main plant.

WOOSTER, O.—Akron Brass Mfg. Co., foot of Spruce street, is adding to foundry.

PENNSYLVANIA

BRIDGEVILLE, PA. — Vanadium Corp. of America, 420 Lexington avenue, New York, has plans in progress for manufacturing plant facilities here. Approximate cost $750,000. O. M. Swensen, Bridgeville, company engineer. Rust Engineering Co., Clark building, Pittsburgh, general contractor.

JOHNSTOWN, PA.—Johnstown Traction Co. plans power substation addition, including installation of two motor generator sets. Estimated cost $40,000.

McKEESPORT, PA.—National Tube Co., L. F. Sattlee, superintendent, has let contract for design and construction of boiler plant, alterations and moving boiler house from Pencoyd to McKeesport, to United Engineers & Constructors Inc., 1401 Arch street, Philadelphia.

PHILADELPHIA—Milton Roy Pump Co., 1300 East Mermaid lane, has plans by William H. Lee, Schaff building, for plant addition.

ILLINOIS

ROCK ISLAND, ILL.—Rock Island Sash & Door Works, 2525 Fourth avenue, is rebuilding veneer, carpenter and panel shops at cost of between $100,000 and $250,000, including equipment.

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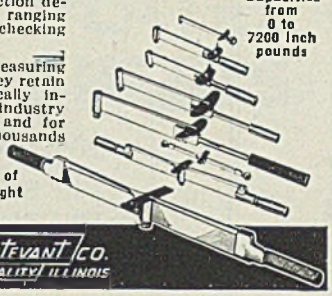

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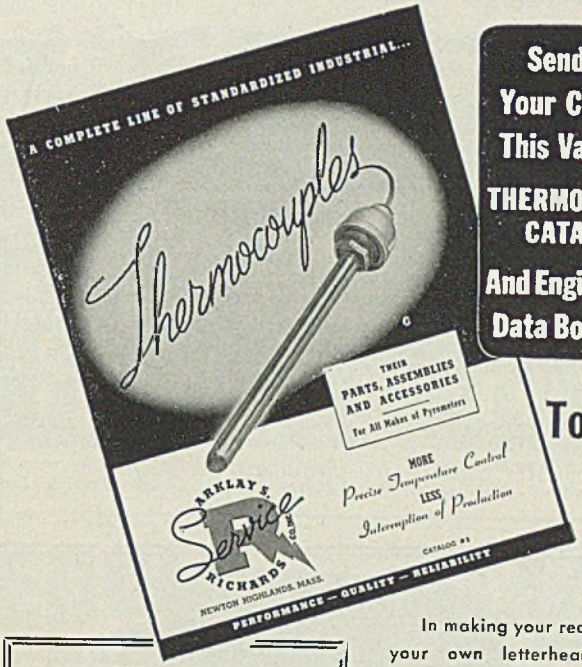

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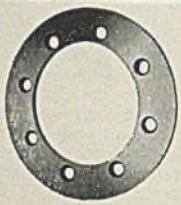

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INDIANA

MARION, IND.—Marion Handle & Box Co., H. M. Serviss, president, is rebuilding factory at cost of $50,000 or more, including equipment.

GEORGIA

ATLANTA, GA.—Southern Railway System, B. Herman, chief engineer, Washington, D. C., has awarded contract for diesel motor repair shop to Wesley Construction Co., 441 Courtland street Northeast.

AUGUSTA, GA.—Defense Plant Corp. has executed contract with Lombard Iron Works, Augusta, for equipping plant at cost of $90,000.

TENNESSEE

KNOXVILLE, TENN.—E. I. du Pont de Nemours & Co., Wilmington, Del., has leased offices here for erection of plant in Knox, Roane and Anderson counties.

NORTH CAROLINA

CHARLOTTE, N. C.—Defense Plant Corp. has completed purchase of Darlington Fabrics Co.'s plant near here which it will convert into war materials manufacturing plant to be operated by National Carbon Co, Inc., 30 East Forty-second street, New York. Cost is estimated at $500,000 for remodeling and equipment.

MISSOURI

JOPLIN, MO.—Rogers Iron Works Co. plans improvements to plant recently damaged by fire.

ST. LOUIS—Southern Equipment Co., 5017 South Thirty-eighth street, has let contract for one-story warehouse to James H. Bright Construction & Building Co., 1259 North Kingshighway. Estimated cost $40,000, including equipment.

WISCONSIN

GREEN BAY, WIS.—Selmer Co., Northern building, has awarded electrical contract for one-story work shop and warehouse to Gerhard Electric Shop, Green Bay. H. W. Williams, Northern building, architect.

LA CROSSE, WIS.—United States War Department has awarded contract to Peter Nelson & Son for erection of synthetic rubber plant. Boyum, Schubert & Sorensen, Hoeschler building, architects and engineers.

OSHKOSH, WIS.—Universal Foundry Co. has given contract to Ben B. Ganther Co. for addition to foundry.

OSHKOSH, WIS.—Bell Machine Co. has given contract to C. R. Meyer & Sons Co. for extensive improvements and alterations to factory.

SUPERIOR, WIS.—Globe Shipbuilding Co. plans expansion of plant facilities by installation of additional machinery and equipment to cost about $250,000. Project authorized by Defense Plant Corp.

MINNESOTA

DULUTH—Barnes-Duluth Shipbuilding Co. has started construction of several shop buildings at its plant at Riverside, including one-story repair and machine shop and one and two-story electric and blacksmith shop.

DULUTH—American Steel & Wire Co. will soon start construction of blast furnace, boiler and pump house and other buildings to cost about $1,000,000.

MINNEAPOLIS—Durable Box Co., M. N. Glazer, president, has given general contract to J. A. Johnson, for one-story factory.

ST. PAUL—Defense Plant Corp. has awarded general contract to Standard Construction Co. Inc., National building, Minneapolis, for additions and alterations to the old American Radiator Corp. plant, to cost about $4,000,000. Plant will be leased and operated by Aluminum Corp. of America. Equipment to be installed includes conveyors, open-hearth furnaces, 24 pouring furnaces and 10 treating and aging furnaces. L. B. Kuhns is general construction superintendent.

WINONA, MINN.—Donovan Contracting Co., 1725 Carroll avenue, St. Paul, has leased plant of Diamond Huller Co. for manufacture of hemp manufacturing machines.

NORTH DAKOTA

GRAND FORKS, N. DAK.—Armour & Co. will soon start construction of addition to packing plant to cost about $200,000. W. L. Anderson is plant superintendent.

NEBRASKA

OMAHA, NEBR.—Defense Plant Corp. has given contract to J. F. Pritchard & Co., 2200 Fidelity building, Kansas City, Mo., for converting old street railway company power plant into alcohol plant to cost about $1,800,000. Plant will be operated by Farm Crops Processing Corp. George E. Johnson is president and general manager.

WYOMING

LARAMIE, WYO.—United States government, Bureau of Mines, has given general contract to Permanent Construction Co., Milwaukee, for alterations and addition to factory to be converted into sponge iron recovery plant on North Second street. T. L. Johnson is engineer in charge of project.

CALIFORNIA

BURBANK, CALIF.—Contract has been let for additions and alterations to plant of Aircraft Accessories Corp., 235 East Angeleno street, to cost $10,000.

LOS ANGELES—An addition to machine shop of Coast Centerless Grinding Co. will be built at 761 East Slauson avenue, at cost of $10,800.

CANADA

KINGSTON, ONT.—Public Utilities Commission, Queen street, C. C. Folger, manager, has given general contract to Russell Construction Co. Ltd., 501 Harbor Commission building, Toronto, for intake and pumping station sub-structure. Gore & Storrie, 1130 Bay street, Toronto, consulting engineers.

TILBURY, ONT.—Canadian Top & Body Corp. Ltd., Louise street, has plans for plant addition, and installation of new equipment to cost about $25,000.

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 171 Eastern avenue, has plans and is calling bids for plant addition to cost about $10,000, equipment extra. James, Proctor & Redfern Ltd., 36 Toronto street, consulting engineers.

TORONTO, ONT.—John Inglis Co. Ltd., 14 Strachan avenue, has extended contract given to A. W. Robertson Ltd., 57 Bloor street West, to include one-story acetylene generating plant costing about $15,000.

TORONTO, ONT.—Howard Furnace Co., 881 Yonge street, is considering plans for plant addition estimated to cost about $30,000, with equipment.

WESTON, ONT.—Pressure Castings of Canada Ltd., 67 Main street, has given general contract to R. J. Hibbs Construction Co. Ltd., 15 Trent avenue, Toronto, for plant addition and installation of equipment to cost about $35,000.

WINDSOR, ONT.—Ford Motor Co. of Canada Ltd., Sandwich street, has given general contract to Hein Construction Co. Ltd., 172 Aylmer avenue, for further plant addition, to cost $63,000.

WINDSOR, ONT.—Defense Industries Ltd. has given general contract to Allan Construction Co. Ltd., 44 Wyandotte street West, for war industries plant to cost $500,000, including equipment.

CABANO, QUE.—Ernest Pelletier will rebuild sawmill recently destroyed by fire and install equipment to cost about $15,000.

JOLIETTE, QUE.—Joliette Steel Ltd., Laval street, is having plans prepared by Perry, Luke & Little, architects, 1405 Bishop street, Montreal, for foundry addition to cost about $25,000, with equipment.

MOUNT ROYAL, QUE.—Canadian Marconi Co. Ltd., 2440 Trenton avenue, is having plans prepared by James C. Meadowcroft, 1154 Beaver Hall square, Montreal, for plant addition estimated to cost $100,000, including equipment.

MONTREAL, QUE.—Dominion Engineering Works Ltd., First avenue, Lachine, is taking bids for further addition to its Longueuil works to cost about $65,000, with equipment.

MONTREAL, QUE.—Johnson Wire Works Ltd., 4760 Degenais street, is considering further plant addition, estimated to cost about $40,000, with equipment.

MONTREAL, QUE.—Steel Co. of Canada Ltd., Hamilton, Ont., has given general contract and work is proceeding on welding rod plant at 75 St. Joseph street, Lachine, to cost about $45,000. Walter G. Hunt Co. Ltd., 1405 Bishop street, Montreal, general contractor. Equipment to cost about $20,000.

MONTREAL, QUE.—Dominion Oilcloth & Linoleum Co. Ltd., 2200 St. Catharine street East, is having plans prepared by Hutchison & Wood, architects, 204 Notre Dame street West, for plant addition to cost about $50,000.

MONTREAL, QUE. — Keating Foundry & Forging Ltd., 335 Bourgeois street, has given general contract to E. Barabe, 1274 Ste. Elizabeth street, for foundry to cost $25,000.

MONTREAL, QUE.—La Salle Iron Works, 1225 Conway street, Myer Sager, manager, has given general contract to Tetrault Freres Ltee., 1200 Church street, for addition to machine shop to cost about $8000, with equipment.

MONTREAL, QUE.—Canadian Pratt & Whitney Co. Ltd., in association with Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has plans by Edward J. Turcotte, architect, 1010 St. Catharine street West, and bids will be called soon for addition to aircraft propeller plant, estimated to cost $50,000.

SHAWINIGAN FALLS, QUE. — Shawinigan Foundries Ltd., P.O. Box 145, is having plans prepared for rebuilding foundry recently destroyed by fire, estimated to cost about $15,000, with equipment.

SYDNEY, N. S.—Dominion Steel & Coal Corp. Ltd. will start work soon on repairs to blast furnace ore bins, etc., to cost $45,000.

VANCOUVER, B. C.—Canadian Sumner Iron Works Ltd., 3550 Central Arterial highway, has given general contract to Dominion Construction Co. Ltd., 150 West First avenue, for plant addition to cost $12,000, equipment extra.

USED and REBUILT EQUIPMENT

FOR SALE — THE FOLLOWING

COLD ROLLING MILLS

2—Bliss Mills
4—Broden Mills
Driven by DC Variable Speed Motors through gear reducers. Rolls 8" diameter 5" face, water cooled and roller sleeve bearings. Motors 15-20 H.P. 230 volts, 500 to 1500 RPM, variable speed.
2—Broden mills same as above except rolls 8" diameter by 5½" face, and chain driven.
All mills equipped with one take-up for each two mills. Also all mills equipped with edge rolls. Also in first class operating condition. Address Box 815, STEEL, Penton Bldg., Cleveland.

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HOT ROLLED STRIP STEEL IN COILS

Carbon .60 to .70
Other analysis—standard

¾" x 105	⅝" x 120	½" x 135
⅞" x 105	⅞" x 120	¾" x 135
	1" x 105	

The above is surplus stock available for immediate shipment.

THE SENECA WIRE & MFG. CO.
FOSTORIA, OHIO

LOCOMOTIVE CRANES FOR SALE

1—American Steam 25-ton
2—American Diesel 25-ton
1—Browning No. 8 18-ton

The above are all rebuilt and guaranteed. Diesel units are new power units.

SCHNITZER STEEL PRODUCTS CO.
3300 N. W. Yeon A.e. Portland, Ore.

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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.

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London Electric Overhead Tramrail, Automatic Dispatch equipment.
1—No. 3 Waterbury Farrel Rotary Swager.

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Subject to WPB approval and prior sale is the following equipment located in central Michigan and dismantled for moving:—

1—W.T. 600 HP boiler, Standard 143, B & W Stirling type. Allowable pressure after reinstallation 163 pounds. Recommended operation 175% of capacity.
1—Taylor stoker (A.E. Co.) for above boiler.

Reply Box 840
STEEL, Penton Bldg., Cleveland, O.

COLD ROLLED COMMODITY STRIP STEEL

19,000 lbs.	#4	temper — .062	x	5.062
24,000 lbs.	#4	temper — .035	x	4.218
12,000 lbs.	#4	temper — .035	x	7.156
5,500 lbs.	#4	temper — .0375	x	7.000
5,000 lbs.	#4	temper — .0375	x	6.218
19,000 lbs.	#4	temper — .035	x	5.25
13,500 lbs.	#4	temper — .035	x	6.25
13,000 lbs.	#4	temper — .062	x	4.968
5,000 lbs.	#4	temper — .0375	x	2.062

SNEAD & COMPANY
Foot of Pine St. Jersey City, N. J.

FOR SALE

2—300# Capacity Type MP-5 Oxweld Generators good as new. Critical equipment cannot be purchased new.

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"Anything containing IRON or STEEL"

GEAR CUTTERS, Spur 30", 36" & 40", G & E
GEAR PLANERS, Bevel 36" & 54" Gleason, M.D.
GRINDER, Cyl. 18"x30"x96" Norton, M.D.
HAMMER, Steam Forging 1100 lb. N-B-P
HAMMER, STEAM Forging 2000 lb. Morgan
LATHE, Geared Head 43"x23' N-B-P, M.D.
STRAIGHTENER, 12-roll Kane & Roach, M.D.
STRAIGHTENER, Wire Shuster, cap. 5/8"

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STEEL BUILDINGS
With or Without Crane
RUNWAYS AND CRANES
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Of All Kinds
PIPE AND TUBES

Can Make Immediate Inspection

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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 . . .*

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RAILWAY EQUIPMENT

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1,000,000 ft. used pipe 2" to 20"
—valve fittings—boiler flues
—high tensile steel rods, etc.

Industrial Supply & Equipment Co., Inc.
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RA 0889

Grinder, Roll 30"x76" Farrel, M.D.
Keyseaters, No. 2 M. & M. & No. 2 Baker
Shaper, 36" Morton Draw Cut.
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
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BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers.
Centrifugals for gas and oil burning.
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Help Wanted

WANTED: GENERAL SUPERINTENDENT for medium size drop forging plant in New York Metropolitan area. Must be familiar with drop hammers and die production. Give full particulars, experience and salary expected. Reply Box 847, STEEL, 110 East 42nd Street, New York City.

Help Wanted

STEEL FOUNDRY FOREMAN

Desire foreman or assistant foreman with previous experience. However, man with steel moulding experience or background and capable of rigging, gating or risering jobs would be considered. Reply Box 849, STEEL, Penton Bldg., Cleveland.

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Help Wanted

MAN
WITH CREATIVE ABILITY

Wanted to develop new and better methods of manufacturing. Prefer college trained, but must have at least three years experience in process, methods, time study, tool engineering or similar work. An excellent opportunity to make a connection with an aggressive, growing concern normally manufacturing automotive parts. Sell yourself when you write. If at present on a war job and cannot be spared, do not apply. Reply Box 833, STEEL, Penton Bldg., Cleveland.

GENERAL SHEET AND STEEL PLATE FABricators in need of Mechanical Engineer capable designing, making detailed shop drawings and bills of material. Excellent future, right party. Growing concern. Dallas Tank & Welding Company, Inc., P. O. Box 5351, Dallas, Texas.

WANTED: FIRST CLASS LAYOUT MAN FOR sheet and steel plate products, also first class fitters and welders. Reply Box 846, STEEL, Penton Bldg., Cleveland.

Notice of Sale

NOTICE OF SALE

PLEASE TAKE NOTICE, that the Board of Directors of FRANKLIN SPRINGS LAND CO., INC. (in dissolution) will offer for sale the remaining assets of said Corporation, hereinafter briefly described, at a public auction, to be held on March 13, 1943, at 2 o'clock p.m., E.W.T., at the offices of Nottingham, Clymer, Smith & Paltz, 535-541 Onondaga County Savings Bank Building, Syracuse, N. Y.

The assets to be offered for sale are briefly described as follows:

ALL the right, title and interest of the said Franklin Springs Land Co. Inc. in a certain mortgage (now canceled) given by the Franklin Iron Manufacturing Company to the Trust & Deposit Company of Onondaga, New York, and recorded December 4, 1883, in the Oneida County Clerk's office, in Book 262 of Mortgages, at Page 385, excepting, however, all of the parcels of land and rights included therein which have since been conveyed, by various deeds recorded in the Oneida County Clerk's Office.

Such remaining assets consist of mineral rights in approximately 900 acres of land, and certain rights-of-way.

PLEASE TAKE FURTHER NOTICE, that the terms of sale shall be cash and the undersigned reserve the right to reject any and all bids if in their sole opinion the same are inadequate. The grants under this sale will be without recourse, in any event, to the undersigned.

Interested persons may secure complete descriptions and information concerning said assets, in advance, by writing to the undersigned at 535-541 Onondaga Bank Building, Syracuse, New York.

THE BOARD OF DIRECTORS OF FRANKLIN SPRINGS LAND CO. INC. (in dissolution).

Dated: Syracuse, New York,
January 18, 1943.

Help Wanted

WANTED
FURNACE
DISTRIBUTORS

New merchandising plan, high commission on priority business, better than average deliveries, the long experience of a well-established furnace manufacturer—these are the chief advantages offered sales engineers who are familiar with heat treating furnaces. Valuable territory in industrial centers now open. Excellent opportunity for permanent connection. Address Box 832, STEEL, Penton Bldg., Cleveland.

DOOR PRODUCTION MAN
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Door Production Man, preferably with engineering training, capable of handling details between office and plant and with experience as shop Foreman or Assistant Superintendent. Actual requirement is for post-war production work but will consider immediate employment on war work in production or engineering department. Nationally known company offering an excellent opportunity to right man. Reply Box 848, STEEL, Penton Bldg., Cleveland.

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EXPERIENCED CHEMIST DESIRES POSItion with blast furnace, foundry or steel plant. Over draft age. Reply Box 842, STEEL, Penton Bldg., Cleveland.

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CHIEF MECHANICAL ENGINEER

Manufacturer heavy machinery, established twenty years, Dun & Bradstreet rating AAA1, engineering department of one hundred employees, doing large successful business, now exclusively on war work, has permanent opening for Chief Engineer with following qualifications.

1. Proven genius for surveying requirements of a given field, with creative mind to initiate fundamental designs and supervise work through engineering department.
2. Applicant must be American citizen, graduate mechanic engineer, age 38 to 45, and of good personality with ability to cultivate confidence. Preferably with shop experience and employed as Chief Engineer, or in responsible capacity, with first class concern in heavy equipment industry.
3. All replies will be treated in absolute confidence, and neither employer or references communicated with until have your written permission. Equal opportunity comes to few men in life time. Compensation good. Later, if worthy, can acquire interest in closely owned business, known world over, as leaders their field and who have enjoyed signal success.
4. To have consideration give complete abstract of business experience, age, education, present compensation, salary expected to start, number of dependents and send snap shot not to be returned.

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Would like to contact Manufacturer who desires high grade Sales Representation in Detroit and adjacent territory. Native born Detroiters with a very unusual entree and an extensive acquaintance throughout industry in State of Michigan and Northern Ohio. Will be interested only in a permanent connection and exclusive representation with a high grade manufacturer, capable of large volume, on a product with repeat possibilities. Reply Box 834, STEEL, Penton Bldg., Cleveland.

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KIRK & BLUM
WELDED MACHINE BASES, PEDESTALS and FRAMES
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SPECIAL ENGINEERING WORK
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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

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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.

WANTED
SUB-CONTRACT WORK
STEEL PRODUCTS
Riveted or Welded
Bars - Plates - Structural Sections
Complete Facilities
THE WM. LANG SONS & CO.
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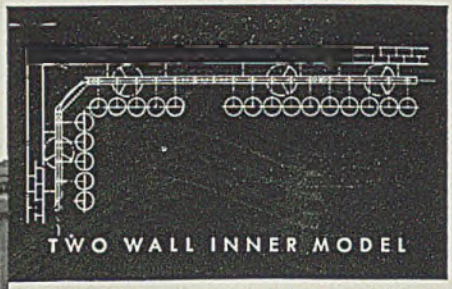

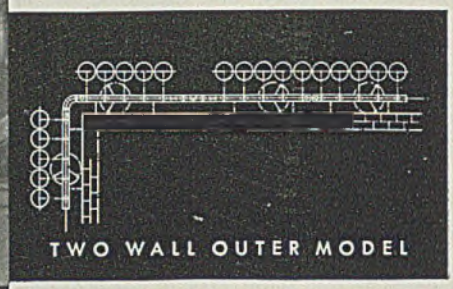

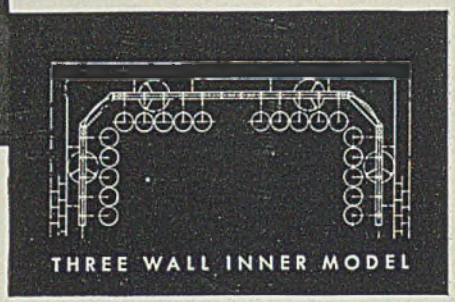

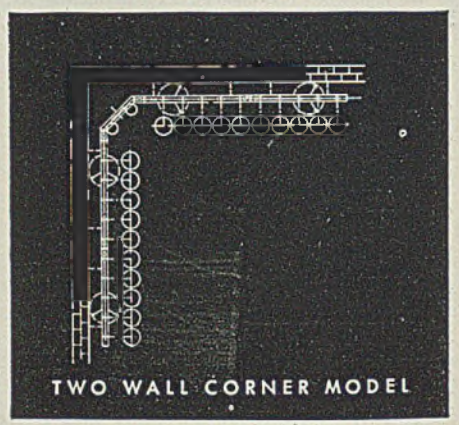

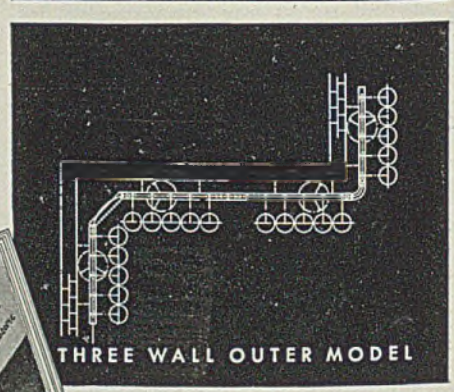

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Installing a modern Airco oxygen and acetylene cylinder manifold system in your welding shop no longer requires extensive alterations in shop layouts. Manifolded cylinders can be arranged in a number of ways to meet your individual requirements. Some of the possible layouts, illustrated in these diagrams, indicate the variety of cylinder arrangements that can be made with standard Airco equipment.

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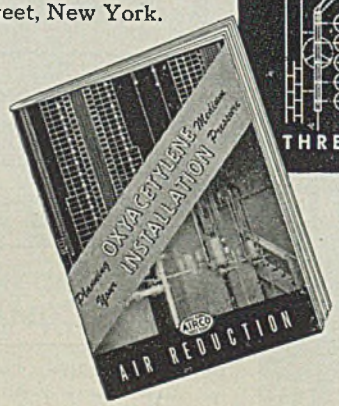

"Planning Your Oxyacetylene Installation," prepared by Air Reduction's Applied Engineering Department. Available free on request.

IDLE CYLINDERS ARE PRODUCTION SLACKERS: KEEP 'EM ROLLING FOR VICTORY!

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(Continued on next page)

ADVERTISING INDEX

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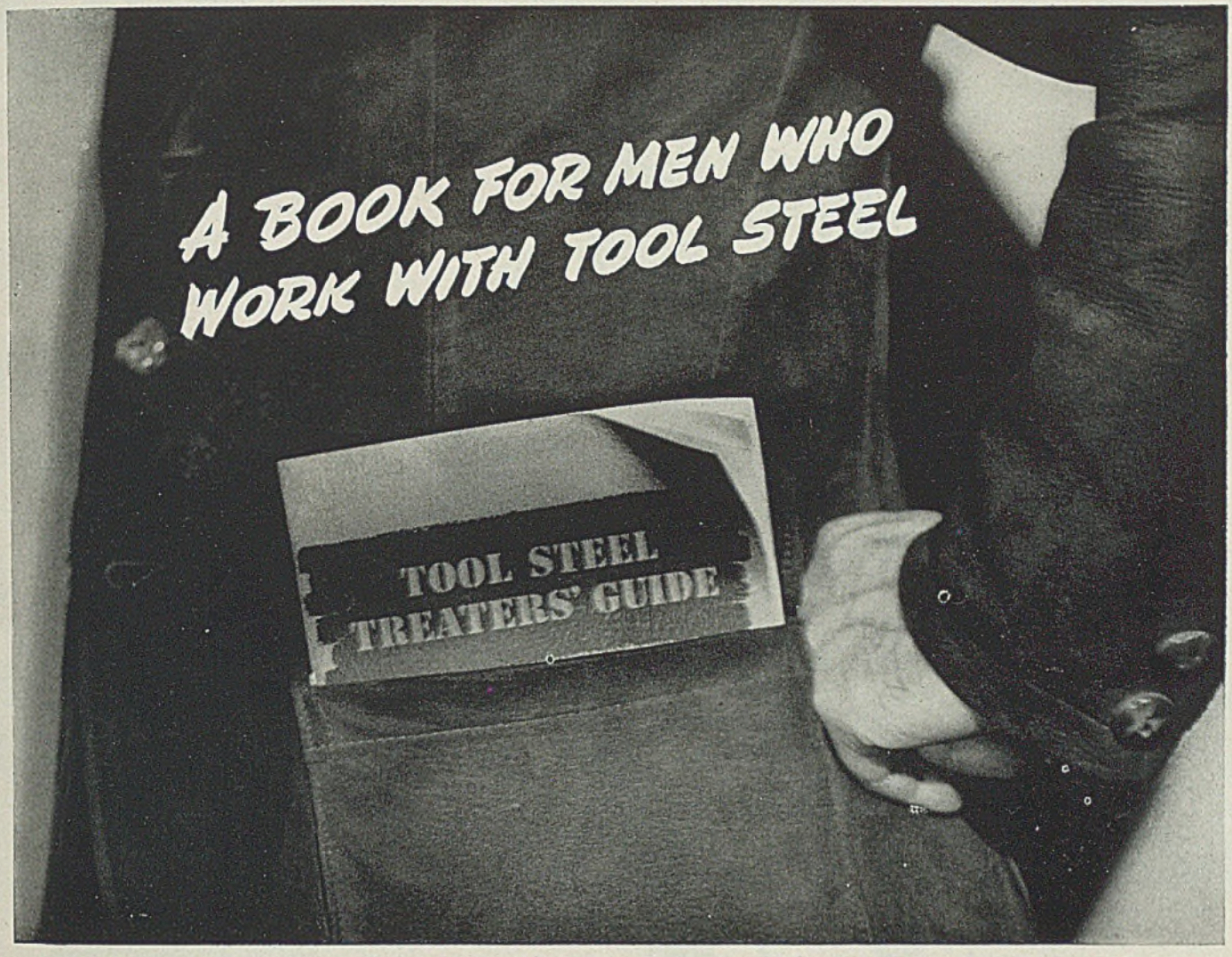

This little handbook, *Tool Steel Treaters' Guide,* is meant for practical men who work with tool steel. The book contains useful facts, simply and plainly set forth.

For example, there are full general instructions on the handling of tool steel. Practical information on forging, normalizing, annealing, spheroidizing, grinding, machining, cooling, quenching and tempering.

There are many charts and photographs. Heat-color and temper-color charts are printed in full natural color, so that by comparing them to a piece of hot steel, you can tell approximately what its temperature is. There are micrographs of tungsten high-speed steel, showing the effects on grain size of holding at quenching temperature for different lengths of time . . . photographs of hot acid-etch test samples . . . and dozens of other practical illustrations covering tool-steel treatment.

One section of the book is devoted to hundreds of definitions commonly used in the steel industry. These definitions should prove especially useful to new men getting into the metal-working field.

The last section of *Tool Steel Treaters' Guide* is made up of useful tables. Weights and areas of different sections of bars. Hardness- and Temperature-conversion tables. Equivalents of the various metric units in terms of inches and feet.

If you work with tool steel, and feel you could use this kind of information to good advantage, write to Bethlehem Steel Company, Bethlehem, Pa. We'll send you a copy of *Tool Steel Treaters' Guide* without any cost or obligation whatsoever.

BETHLEHEM STEEL COMPANY

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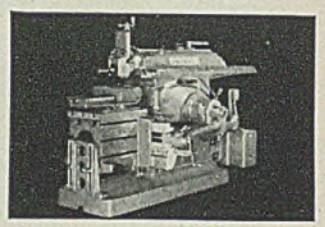
In 1936, The Cincinnati Shaper Company adopted the "Winged Victory" figure as a symbol for victory in production through accuracy. Today, in our minds, its significance has infinitely widened.



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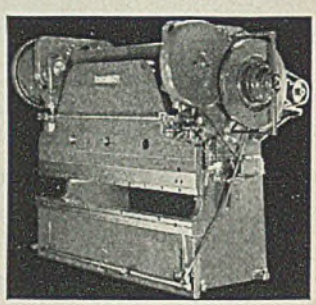
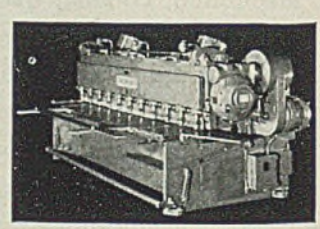


BRAKES



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At the end of the road lies Victory.

. . . It's "all out" production in your shop.

. . . It's "all out" production in our shop.

Together, we speed the tools for Victory.

THE CINCINNATI SHAPER CO.

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McKAY

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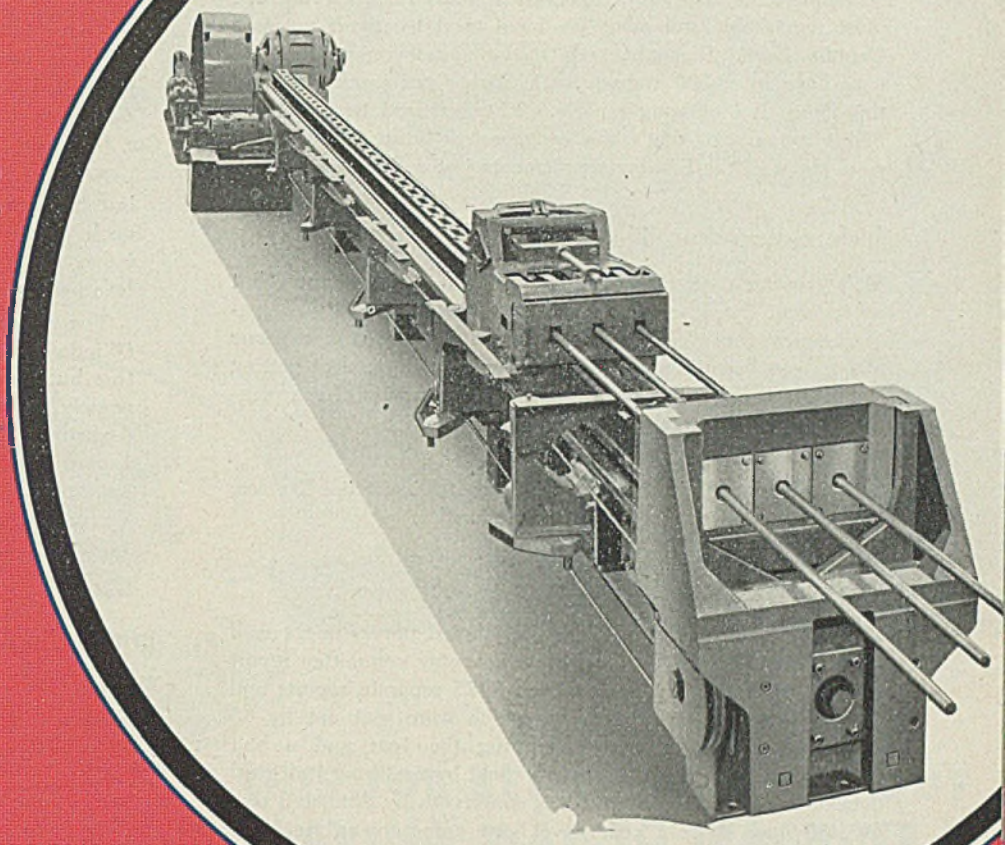
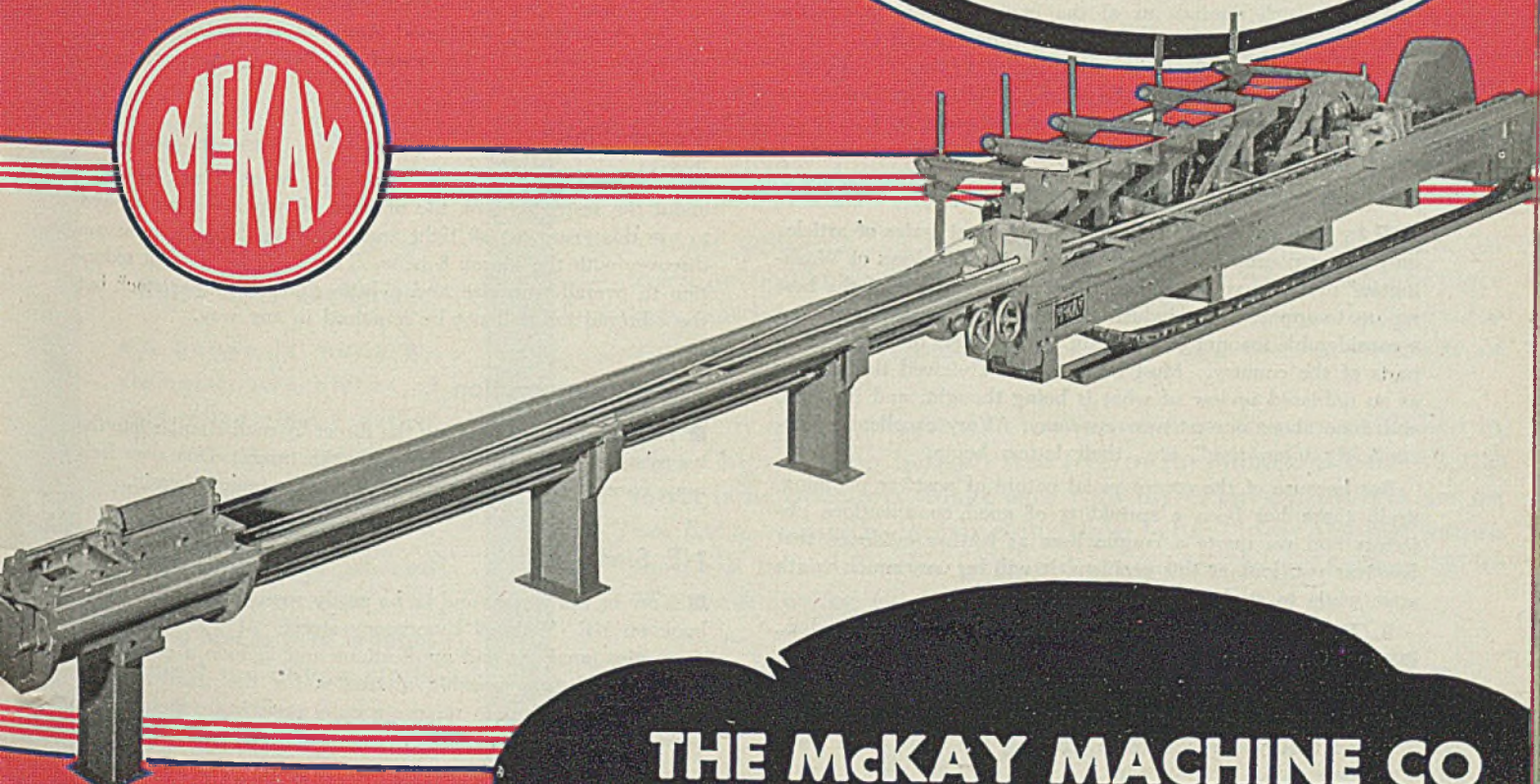


DRAWBENCHES for steel and non-ferrous tubes and bars, with conventional electric drive or automatic AC or DC drive for slow starting and acceleration to the drawing speed.

The automatic draw grip permits quicker interchange of the draw bits for size.

Push button control initiates the automatic drawing cycle.

Faster grip with automatic deceleration and air cushioned stop with positive positioning for gripping the tags, increases production and diminishes scrap.



We solicit your inquiries for tube and bar drawbenches. We also build complete tube forming, sizing, welding and cut-off equipment.

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ENGINEERS AND MANUFACTURERS OF SHEET, TIN AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

BEHIND THE SCENES

Tomorrow Today

■ In the three and a half years of World War II there have been many fanciful figures recited, many unbelievable things accomplished, and many tremendous gains recorded but the most remarkable statement we have tried to digest yet was Captain Eddie Rickenbacker's recent casual report that we now have over 500 trans-Atlantic flights *per week* and that this figure is increasing rapidly. Five hundred trans-Atlantic flights per week—that's the exaggerated future we used to read about in the Sunday supplements just a few months ago.

In-fore-may-shun Plee-yuzzz

■ These are days of jangled nerves and quick tempers but an incident the other day certainly proves the futility of getting sore at the over-worked phone girls. On a rush call one of our boys became more than a little bit chagrined at getting the wrong number three times and in an explosion of exasperation, he shouted at the operator:

"Look, sister, am I crazy or are you?"

"I am sorry, sir," came back the smooth, institutional voice, "we do not ha-uv that in-fore-may-shun."

The Great American Game

■ One reason, incidentally, for the jangled nerves might well have been indicated by the Senate economy committee report a week ago. Senator Byrd totaled 7025 separate reports and questionnaires requiring answers which were sent out by 48 different government agencies during the year and a half ending Dec. 1, 1942. OPA led the field by requiring statistical data on 7,715,229 forms, and it is conservatively estimated that 495,480 man hours a year have been going toward replying to government questionnaires, with each company in the country averaging 164 reports annually.

All of which reminds us of the cartoon in the paper the other day showing a chap in a straightjacket being led out of an office by two gentlemen in white coats, while the president of the concern remarks to the v. p., "Well, it looks like we need another new man to fill in our questionnaires, J. G."

Postwar Planning Provides Perplexities

■ If by now, you aren't following the current series of articles on postwar planning which are running in "Windows of Washington" make up your mind that you're missing one of the best reports to appear in the industrial press in years. It has evoked a considerable amount of comment from readers of STEEL in all parts of the country. Most every one has viewed the articles as an unbiased review of what is being thought, and planned, and done about our postwar economy. "Very excellent", "Exceedingly interesting", etc., their letters begin.

But because of the controversial nature of postwar planning, itself, there has been a sprinkling of good conscientious objectors and we quote a couple here as further evidence that however you look at this problem, it will be very much worth your while to study STEEL's report carefully.

R. H. McElroy, president, International Engineering, Inc., Dayton, O., writes:

> We have just read your "Windows of Washington" in the January 25 issue, and frankly we are very much surprised that you seem to be carrying the New Deal on one shoulder and business on the other. . . . From the literature so far put out by the National Resources Planning Board one would think that we are going to have a "Soviet" after the war.
>
> Practically all of the Washington business men that we have talked to privately certainly have not reversed their opinion about the New Deal. Frankly, we are astounded at this article coming from you.

And from H. C. Dodge, president, S. A. Woods Machine Co., Boston:

> Not with any thought of softening the next paragraph but because I really believe it, let me compliment you on having one of the most interesting publications in the industrial life of our country, and so with that remark let's pass on to the next paragraph.
>
> The article on page 45 in the last issue of STEEL (Windows of Washington) is interesting and I think quite true but there is just one exception I would like to take, namely, if whether or not you include in "government departments" the War Labor Board. If you do . . . then I most heartily disagree with you that there is any cooperation whatsoever from that . . . party.

As you can readily see there is plenty of food for thought in the report and your comments will be equally appreciated.

British Jingle

■ After reading the last installment G. G. Complin of the Metallic Roofing Co., Toronto, says he couldn't refrain from passing on the following jingle which an M. P. in Parliament allegedly recited recently:

Sing a song of plenty, a planet full of tools.
Everybody starving, by sound financial rules.
The banker in his counting house was counting out his money.
The land was overflowing with bread and milk and honey.
The shops were full of good things, the factories likewise.
The banker shut his books and said "We must economize."

Paper Situation

■ In case you have been wondering what STEEL is doing about the restrictions on the amount of paper we are allowed to use this year, just sit tight and see what difference you can discover with the March 8 issue. There will be a slight reduction in overall trim size and a little different paper stock but the editorial job will not be impaired in any way.

Metal Conservation

■ The old routine of tossing the direct-by-mail circular into the wastebasket unopened varies with the times. One now feels same carefully to see if a paper clip is concealed therein.

NE Steels

■ Now in the works, and to be ready soon, is a reprint handbook on NE (National Emergency steels. It will cover their properties, analyses and applications and include a convenient wall chart listing possible alternates for the standard AISI steels. If you want to reserve a copy now, write the Readers Service Department, Penton Building, Cleveland.

Vol. 112, No. 8, February 22, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 yrs $10; all other countries, 1 year $12 Current issues, 25c Yearbook of Industry issue, $2.00.

Editorial Contents—Page 35

Ideas for VICTORY

. . . from the Production Lines behind the Firing Lines

Mr. Schoen receives his Warner & Swasey Victory Pin and the congratulations of the joint Management-Labor Committee which steers the Packard Motor Car Company's WORK TO WIN War Production Drive.

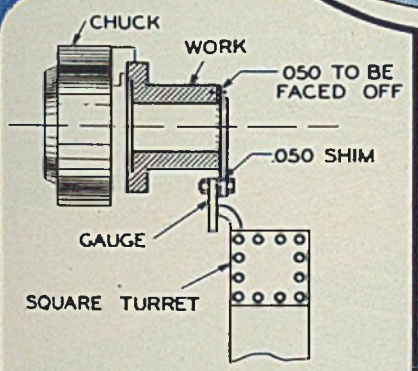
A Citation for Men in War Industry

THIS JOB SETTER WORKED OUT A TIME-SAVING WAY TO MACHINE A SHOULDER FROM A FINISHED FACE

CHARLES F. SCHOEN, a job setter in the Packard Aircraft Engine Division, which produces Rolls-Royce engines, is one of several score of turret lathe operators now wearing an Ideas for Victory Pin. These Victory Pins are given to resourceful operators who have developed practical ideas for increasing production.

Mr. Schoen's idea is explained in the accompanying sketch. To machine .050" off a finished and carburized face when length of piece may vary from job to job, Mr. Schoen made up a gauge that provides a quick way of positioning a cross-slide tool without necessity of measuring each cut.

Many of the ideas sent in to Warner & Swasey are published in Blue Chips, a shop bulletin sent free to the homes of over 38,000 turret lathe operators. Make sure your turret lathe operators are on our list to receive it—it may bring them helpful ideas and inspiration that will be reflected in increased production in your plant. Write Warner & Swasey, Cleveland, Ohio.



GEAR BLANK—
Finish after Carburize

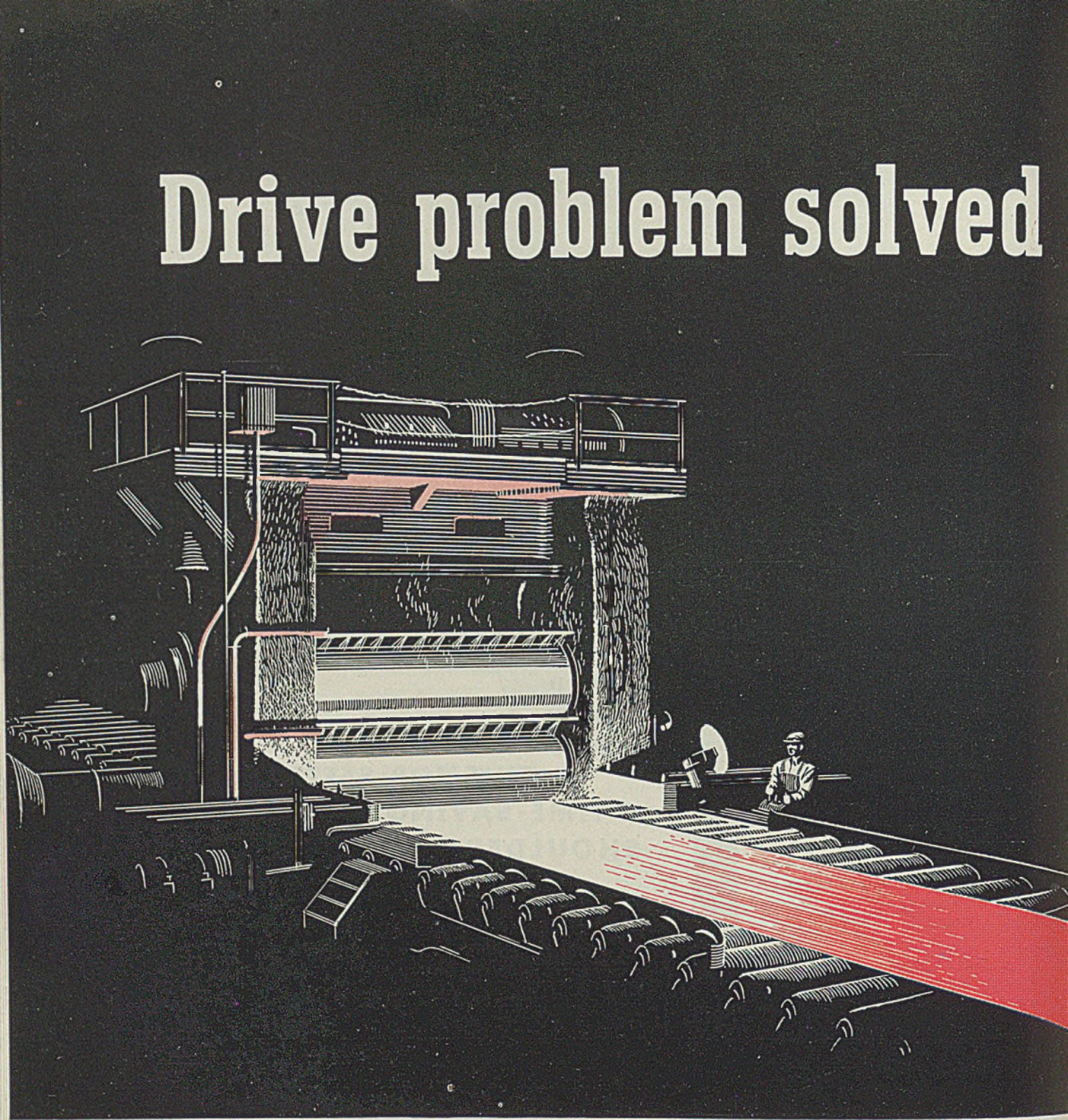
- A gauge is made by clamping two pieces of cold-rolled steel together with a shim between them, *same thickness as amount of metal to be removed.*

The gauge is placed against face of work. The cutting tool is then brought against the gauge blade and the carriage locked in this position.

WARNER & SWASEY FOR VICTORY

YOU CAN TURN IT BETTER, FASTER, FOR LESS—WITH A WARNER & SWASEY

Drive problem solved

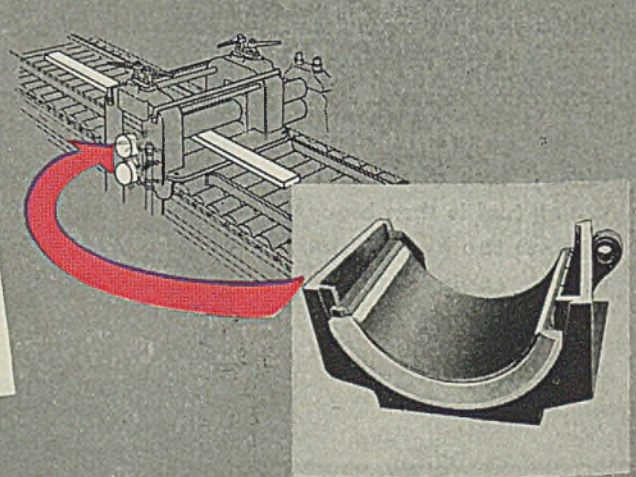


REPLACEMENT TIP:

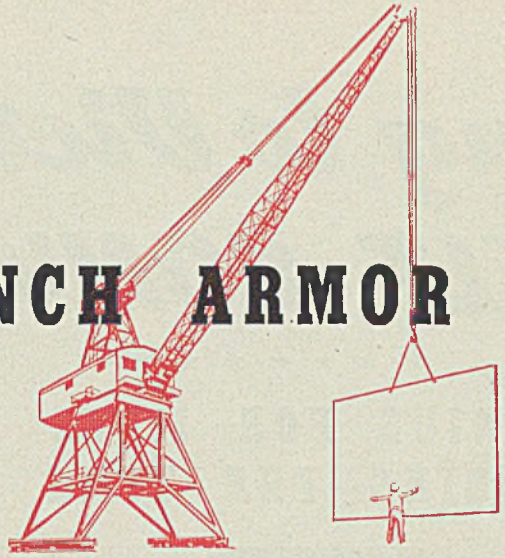
MICARTA ROLL NECK BEARINGS help you get more tonnage—and keep on getting it! Here's why: (1) Two to four times longer life; (2) Power savings up to 37%; (3) More accurate holding of gauge; (4) No more "hot necks" or "fire cracks."

Westinghouse Micarta Bearings are made for every rolling operation from blooming to bar and billet mills. They're available *now* for prompt delivery.

Westinghouse



FOR 160-INCH ARMOR PLATE MILL



WESTINGHOUSE ENGINEERING SERVICE

A nationwide corps of engineers offers you electrical and production experience gained through years of working with the steel industry.

In addition to engineering help on your specific industry problems involving electrical power, these men can give you assistance on these other vitally important activities:

PRODUCT DEVELOPMENT: engineering of equipment to meet war requirements.

MAINTENANCE: help in making existing equipment serve better, last longer.

REHABILITATION: redesigning and rebuilding obsolete equipment for useful service.

MATERIAL SUBSTITUTION: adapting available replacements for critical materials.

W. E. S. is available to every branch of the steel industry. Put it to use today on your production problems.

J-94542

To meet America's vast wartime requirements for armor plate, construction of a new 160″ plate mill was recently authorized. Only two mills of such size had ever been built in the U. S. Both were over 20 years old. Thus steel mill engineers faced a whole new set of problems in designing a modern mill of this size.

Key problem to be solved was—what type of drive should be used for the huge reversing stand? Westinghouse industry engineers were called in to study this problem with the steel mill engineers. A single reversing motor would require an extremely large set of pinions. Construction of a single shaft motor of sufficient capacity involved serious engineering problems.

Twin-motor drive was suggested. But such drives had been used only on blooming and slabbing mills for rolling thick, rough sections. Could they be perfectly synchronized to handle the exacting requirements of rolling finished plate?

A practical test was made. Actual plates were rolled on one of the existing twin-motor driven slabbing mills. Results were satisfactory to the steel engineers. Further tests on a 120″ reversing plate mill furnished data for calculating the load on the proposed mill.

Soon, armor plate 13 feet wide will be rolling at high speed from the new mill. Gear maintenance is eliminated, pinion markings on the finished plate avoided—through this practical new application of twin-motor drive.

Here is a typical example of the way Westinghouse engineers are at work today, searching out solutions for steel industry problems. These men are available to help on *your* problems. Just phone your nearest Westinghouse office. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania.

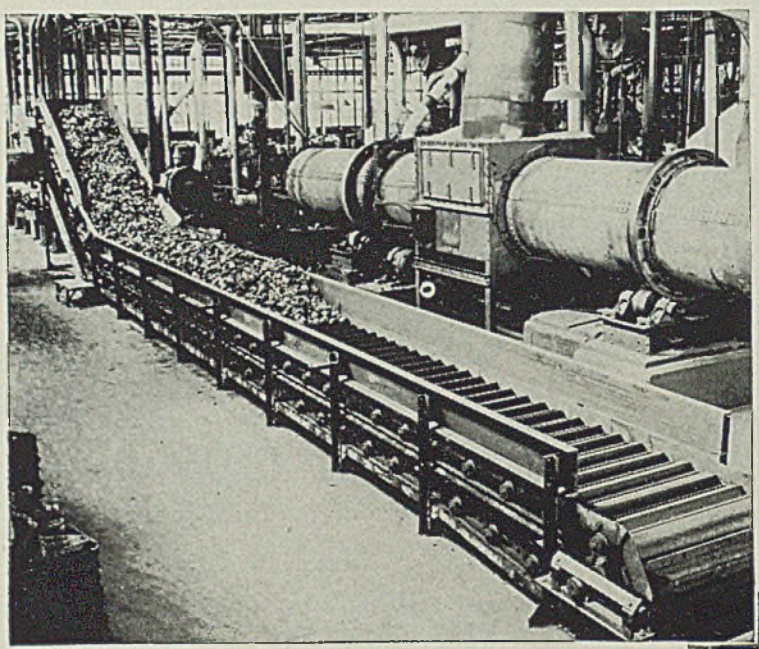
Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

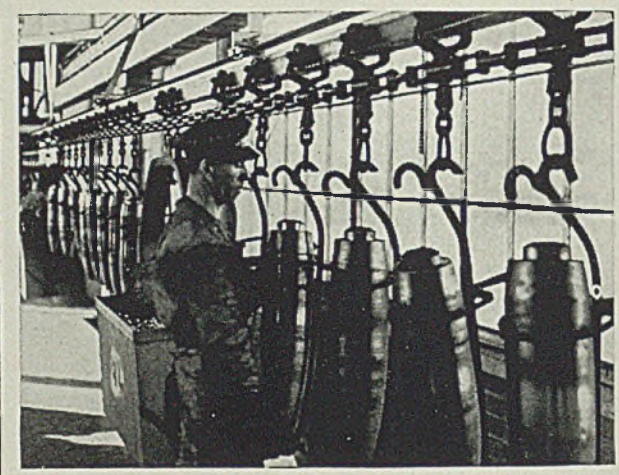
Speeding to Victory on LINK-BELT CONVEYORS

★ ★ ★ ★ ★ ★ ★

AMERICAN GENIUS FOR MASS PRODUCTION IS CONQUERING THE TIME ELEMENT



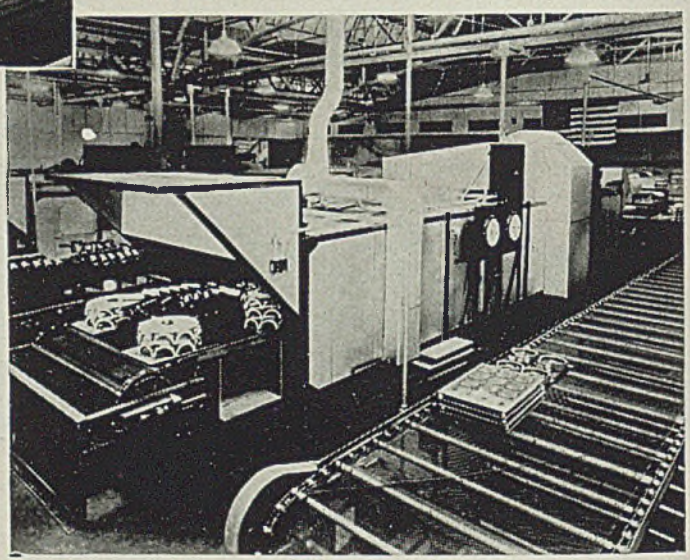
Link-Belt apron conveyor handling hot castings through continuous anneal, sorting and cleaning to shipping.



Link-Belt overhead trolley conveyor handling 155-mm shells and steel scrap. This type of conveyor has great possibilities in flexibility of arrangement, capacity and length.

● Production methods in this war have developed a new functionary: the expediter—one who clips minutes, hours or days from production schedules by speeding the movement of materials and products into and out of plants. Within the plants, from stage to stage of production, from machine to machine, as well as outside, Link-Belt conveyors are nipping minutes, from processes or intervals; bits of time that total up to huge aggregate savings, helping to bring true the production man's dream of "Plenty, On Time, and Right."

Link-Belt Company has long specialized in the engineering and manufacturing of practically every type of mechanical conveying equipment for all industries, and our engineers are ready to show you how to use efficient handling systems to save time and manpower and speed production.



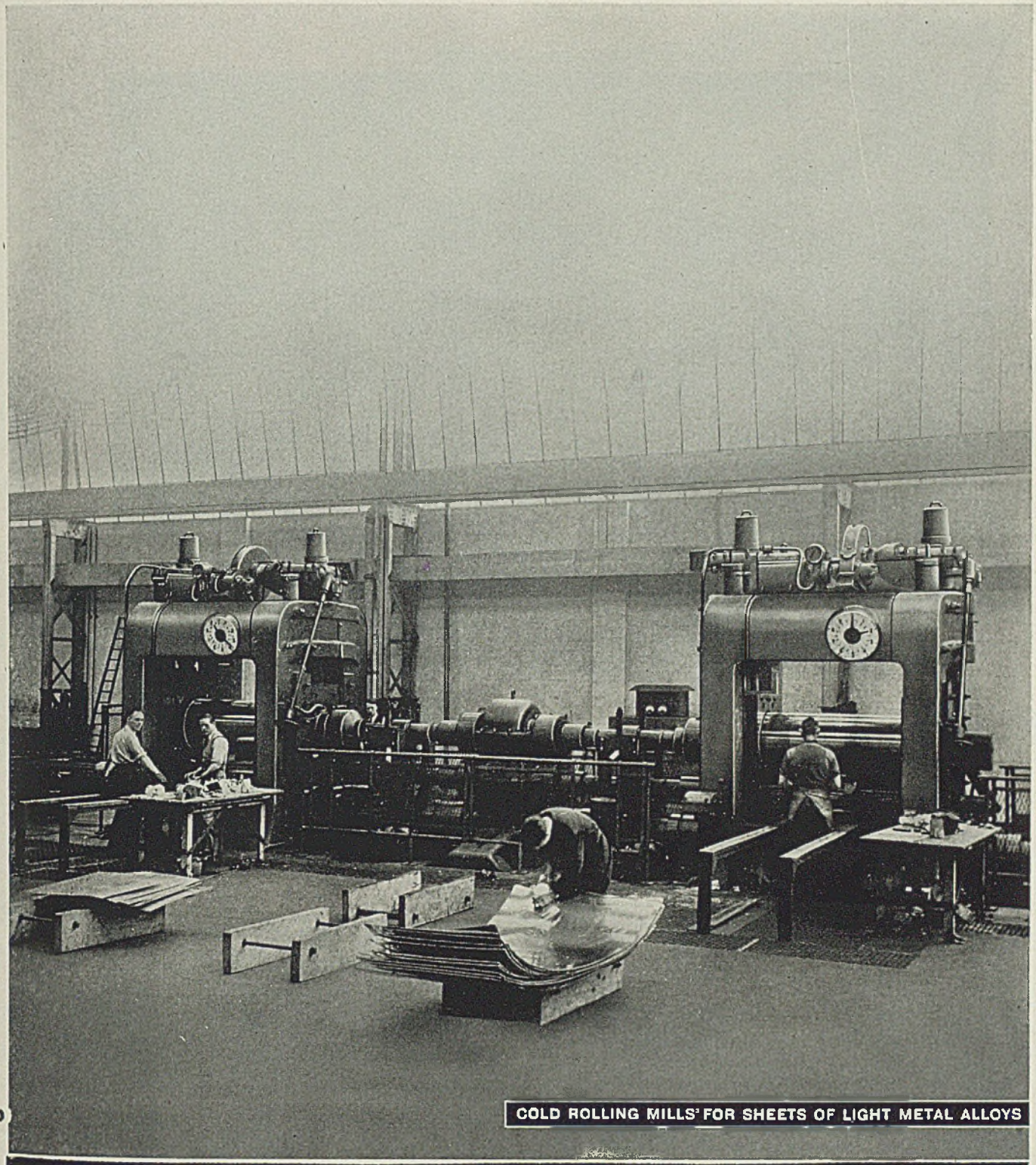
Conveyors using Link-Belt SS-4 chain with cross pipes, handling airplane motor parts to and from continuous conveyor-type oven built by The Gehnrich Corporation.

LINK-BELT COMPANY

Leading Manufacturer of Materials Handling and Mechanical Power Transmission Machinery
Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, San Francisco, Toronto
Pittsburgh, Cleveland, Detroit
Offices, warehouses and distributors in principal cities

8956-F

THROW YOUR SCRAP INTO THE FIGHT!



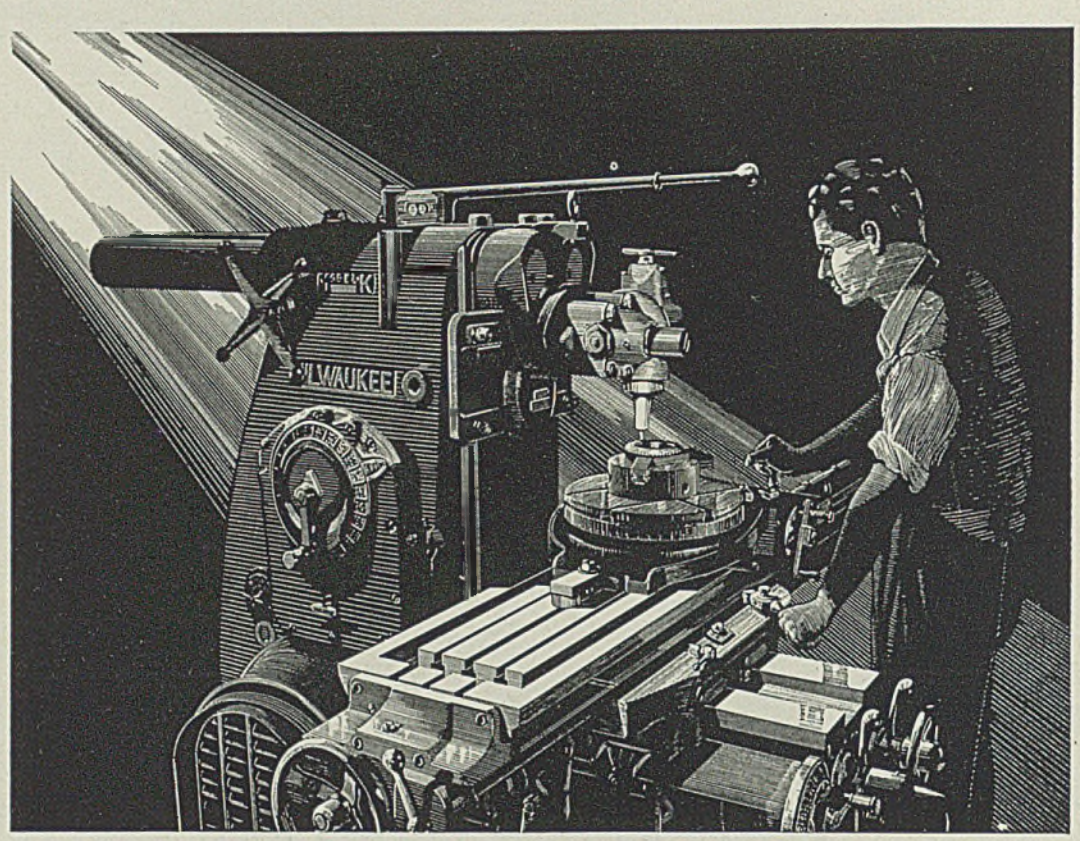
COLD ROLLING MILLS FOR SHEETS OF LIGHT METAL ALLOYS

HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE • NEW YORK • N. Y.



• • • CONVERSION IS JUST A "QUICKIE" WITH THIS ATTACHMENT

Here's a sixty-four dollar question for production men — what attachment quickly converts plain or universal horizontal Milwaukee Milling Machines enabling them to do more than five out-of-the-ordinary milling operations?

It's the Milwaukee Standard High-Speed Adjustable Universal Milling Attachment and here are the jobs it will handle:

— end mill a scroll (as shown above and using a low lead attachment and rotary table).

— for intricate milling on dies, templates, patterns.

— for milling dovetails, T-slots, other hard-to-get-at operations.

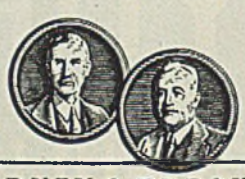
— for circular milling of various kinds, working with a rotary table.

— for spiral milling at high speed, working with a dividing head and lead attachment.

Buy Victory with at least 10% in War Bonds!

'43 FOR VICTORY

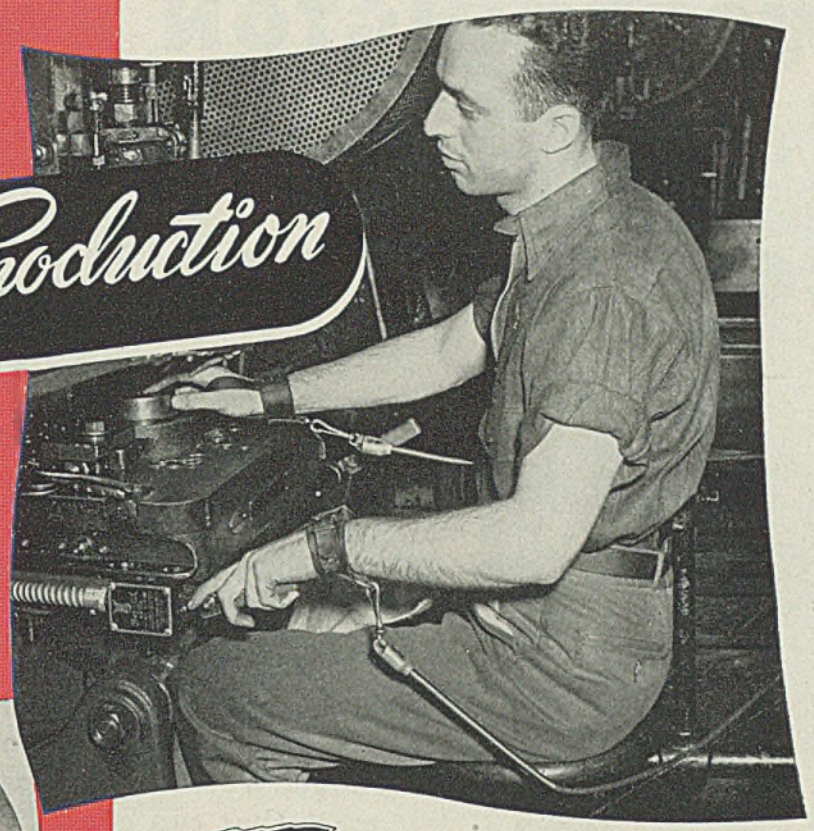
When You Can't Get A New Machine . . . conversion of existing equipment to special milling operations is often the answer. The Emergency Production Service Department of Kearney & Trecker is organized to aid you on quick conversion or tougher milling problems. Write or wire — you'll get action pronto.

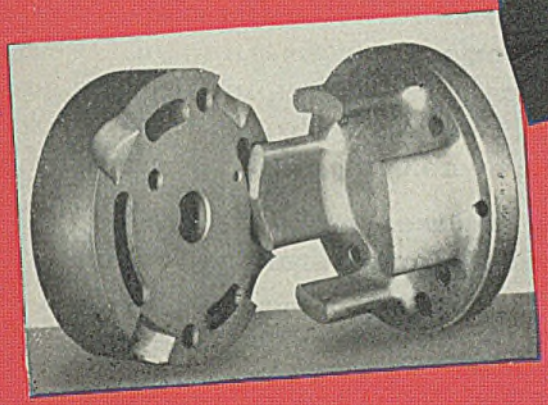


KEARNEY & TRECKER CORPORATION
MILWAUKEE, WISCONSIN

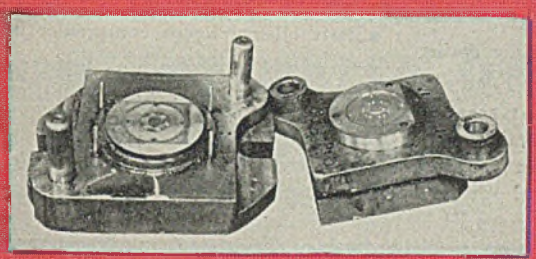
Milwaukee MACHINE TOOLS

for High Production

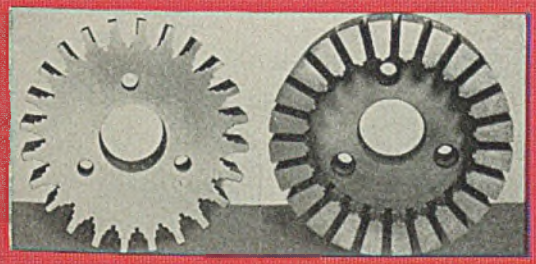




1. Blanking Die and Punch made from Jessop 3C High Carbon-High Chrome Die Steel.



2. Lamination Die and Punch made from C.N.S. High Carbon-High Chrome Die Steel.



3. Male and female sub-press die made from Jessop Windsor Air hardening Die Steel.

ARMY E NAVY

Jessop DIE STEELS

Jessop Die Steels have been developed primarily to give maximum resistance to wear — and production records show extra high runs on the most abrasive materials. Their high hardness qualities permit more pieces per grind of die, and their deep hardening characteristics permit several grinds before the die must be discarded. This extra resistance to mechanical wear and abrasion results in maximum production and die life.

Jessop Die Steels are available in these 3 types:

3C — Oil hardening production die steel alloyed for uniform high hardness and extreme resistance to wear.

C.N.S. — Air hardening, — its balanced properties of machinability, minimum size change, and toughness with only a slight sacrifice in wear resistance makes it the outstanding steel for general die use.

Windsor — air hardening, inexpensive cold working die steel possessing outstanding physical properties.

These cold working die steels are specially adapted for individual applications in consideration of hardness, wear resistance, distortion, machinability, toughness, and cost. The Jessop representative is a trained steel man; he will gladly recommend the type best suited for your particular needs. Jessop Steel Company, Washington, Pennsylvania.

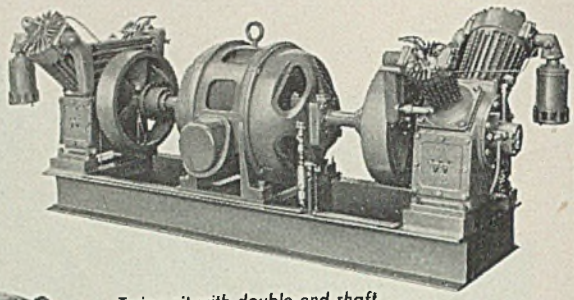
JESSOP STEEL CO. FINE JESSOP STEELS WASHINGTON, PA.

Jessop Steels

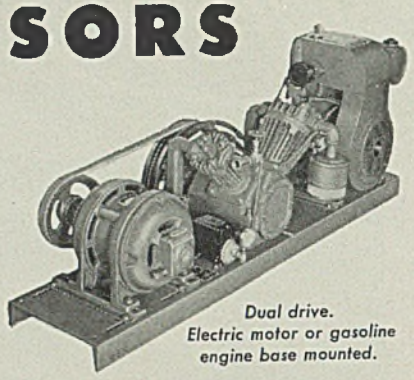
Est. 1901

CARBON • HIGH SPEED • COMPOSITE TOOL
SPECIAL ALLOY • STAINLESS • STAINLESS-CLAD (SILVER-PLY)

WORTHINGTON Vertical COMPRESSORS



Twin unit with double-end shaft motor on steel base



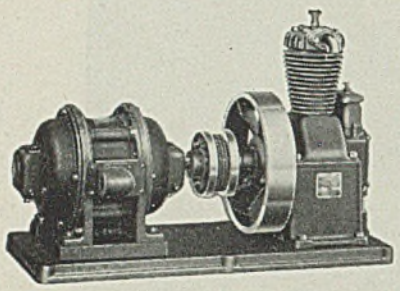
Dual drive. Electric motor or gasoline engine base mounted.

24 Sizes

344 Arrangements

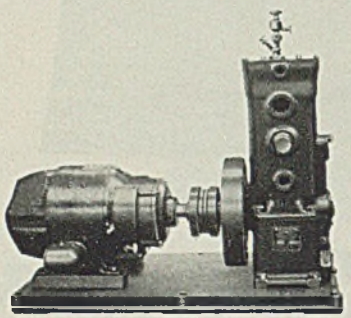
Capacities to 164 c.f.m.

Pressures to 1000 lbs.



Unit direct connected to electric motor

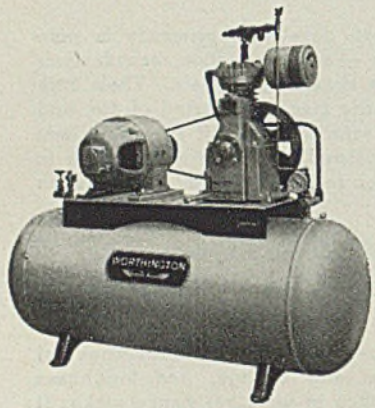
War production plants are now using these units in a total of more than two million horsepower. To any plant whose needs for compressed air fall within the above range, Worthington compressor equipment offers advantages that can contribute greatly to stepped-up output. They are built for users who demand the best equipment.



High-pressure unit direct connected to electric motor

The following features make Worthington compressors the choice of careful purchasers.

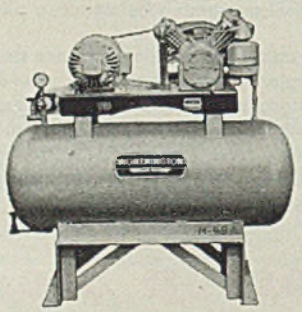
- One-piece Feather Valve . . . lightest, simplest, most efficient.
- Close-grained nickel iron cylinder, honed to mirror surface . . . generously finned for efficient cooling.
- Ground piston, closely fitted in cylinder . . . two compression rings and two oil rings . . . for oil-free air discharge.
- Full-floating wristpin . . . retainer spring prevents scored cylinder.
- Extra-long drop-forged heat-treated connecting rod . . . reduces cylinder wear. Shim-adjusted babbitt crankpin bearing. Graphite-bronze wristpin bushing.
- Drop-forged heat-treated integrally-counterbalanced crankshaft . . . journals ground and polished.
- Adjustable Timken main bearings . . . controlled splash lubrication.
- Force-feed lubrication to all shaft bearings . . . adjustable babbitt main bearings.
- Shaft oil-seal keeps compressor installation clean and oil-free.
- Crankcase ventilator . . . well baffled . . . keeps oil in, and dust out.
- Cast-iron belt wheel with fan spokes . . . good cooling decreases power required.



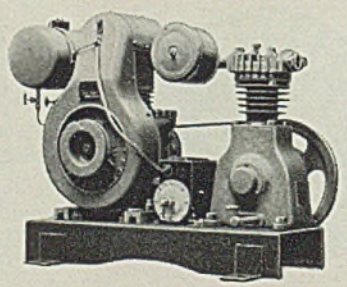
Tank-mounted belted unit showing pressure regulator control

Worthington vertical compressors are available to those manufacturers whose war production activities give them priority. An authorized Worthington industrial dealer or district office engineer will be glad to assist you with the correct selection for your requirements.

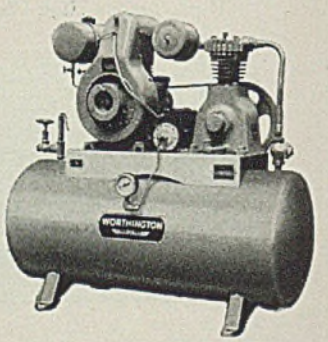
Unit mounted on Massachusetts code vertical tank



Massachusetts code horizontal tank-mounted compressor unit



Base-mounted unit with gasoline engine drive



Tank-mounted unit with gasoline engine drive

AC3-1A

WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY

MAKE IT FIT TO FIGHT

"FROM THE HALLS OF MONTEZUMA TO THE SHORES OF TRIPOLI"

WHEREVER our fighting forces may go, they need equipment —dependable equipment—*fit to fight!* And lots of it!

Interchangeable parts, produced in rapid succession and within close limits of accuracy, are the lifeblood of the mass production which America depends upon for Victory. With their extreme rigidity to maintain accuracy at high speeds, Gisholt Turret Lathes are performing with outstanding success in war plants everywhere.

GISHOLT MACHINE COMPANY
1217 East Washington Ave., Madison, Wisconsin

The Army-Navy "E" and the Treasury Flag fly side by side at Gisholt.

LOOK AHEAD . . . KEEP AHEAD . . .
With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

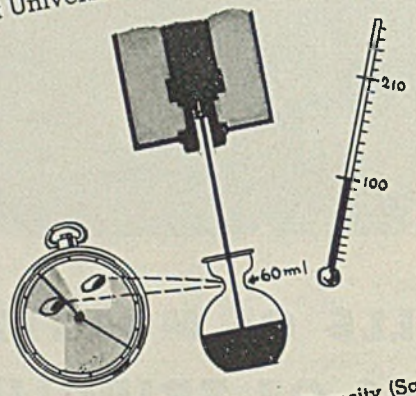
VISCO

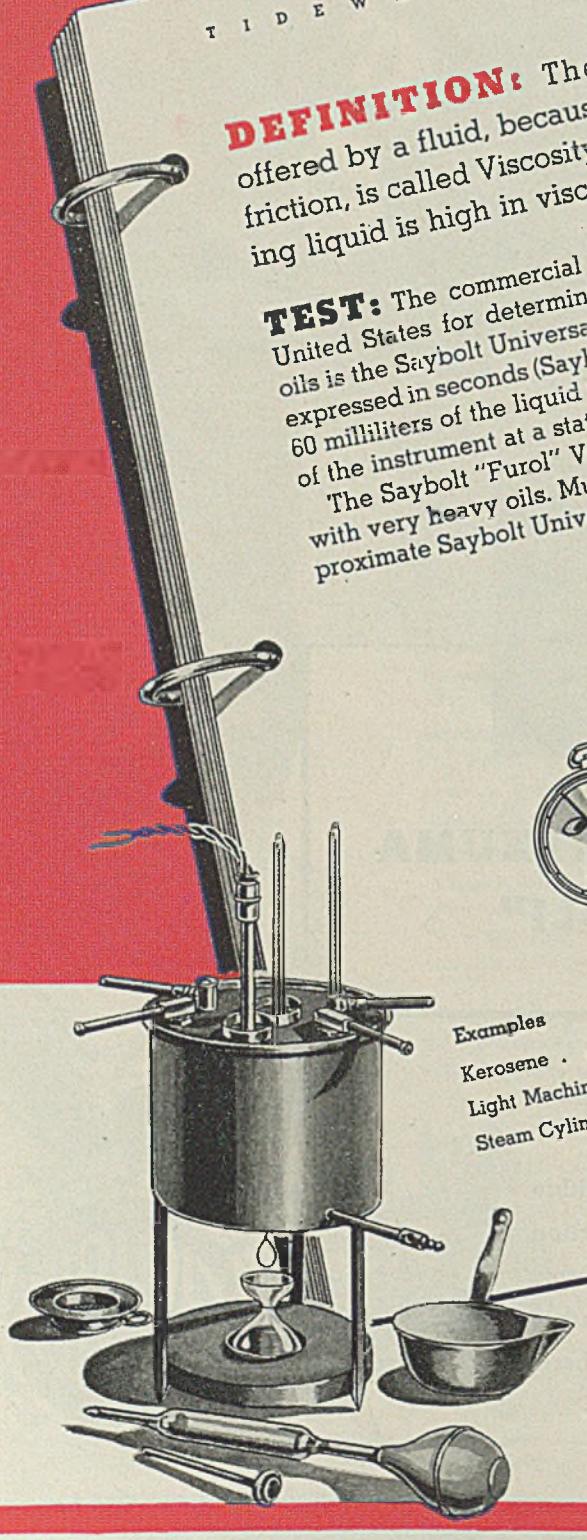
TIDEWATER LUBRICANIA

DEFINITION: The resistance to distortion offered by a fluid, because of its cohesion or internal friction, is called Viscosity. A heavy bodied slow pouring liquid is high in viscosity.

TEST: The commercial instrument commonly used in the United States for determining viscosity of mineral lubricating oils is the Saybolt Universal Viscosimeter (S.U.V.). The viscosity, expressed in seconds (Saybolt Universal), is the time required for 60 milliliters of the liquid to flow through the standard aperture of the instrument at a stated temperature.

The Saybolt "Furol" Viscosimeter is often used in connection with very heavy oils. Multiply Furol seconds by 10 to obtain approximate Saybolt Universal seconds.





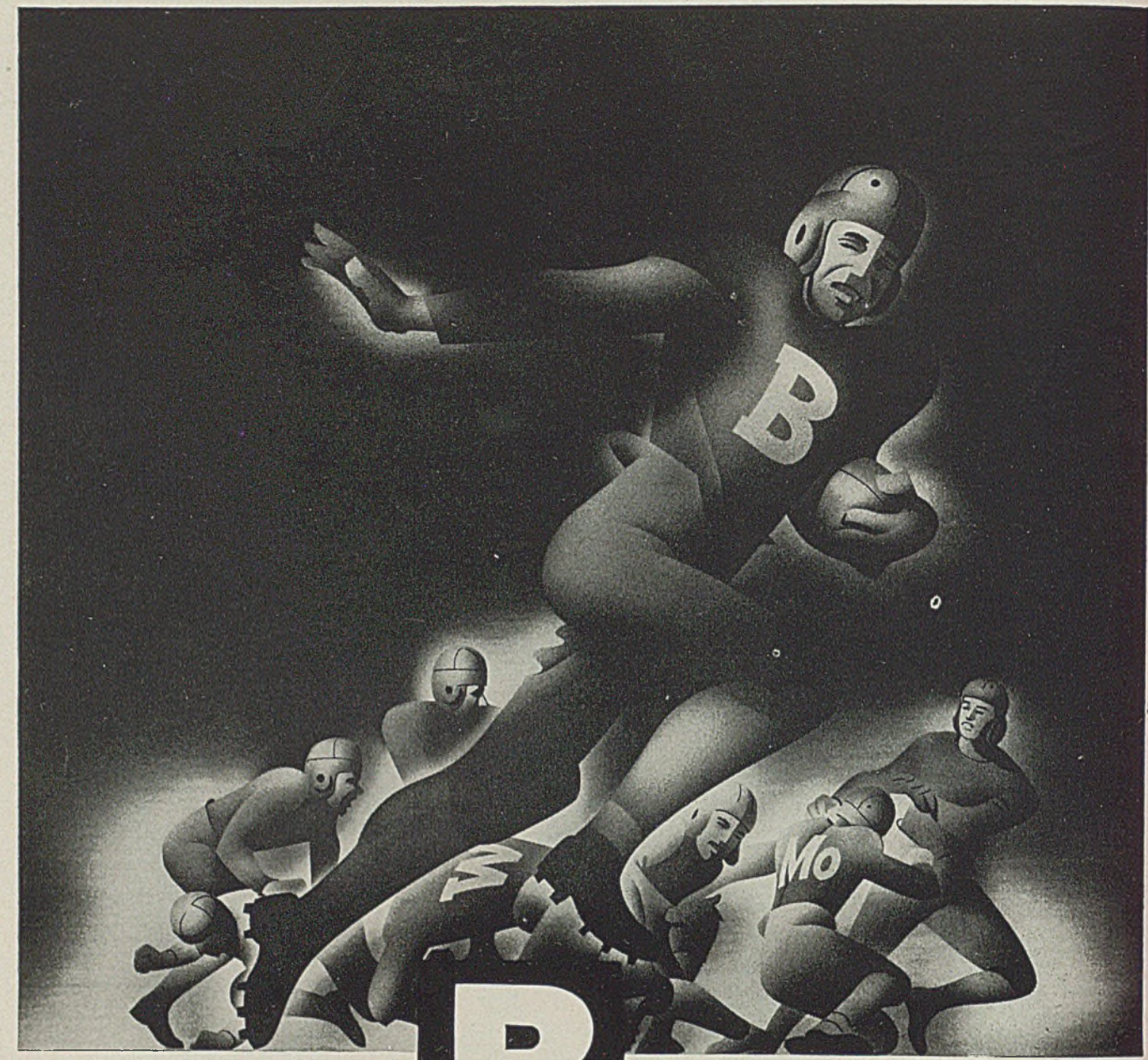
Examples	Viscosity (Saybolt Universal) at 100°F	at 210°F
Kerosene	32 sec.	
Light Machine Oils	150-250 sec.	40-50 sec.
Steam Cylinder Oils	2000-6000 sec.	150-250 sec.

INDUSTRIAL TYCOL OILS-GREASES

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

TYCOL

SCIENTIFICALLY



BORON

goes into the lineup!

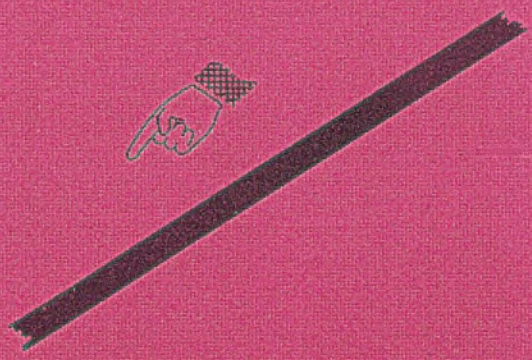
To make available materials go as far as possible is now an urgent responsibility of the metallurgist. He must still meet very exacting specifications in the physical properties obtained. But a new resource has come to his aid. Improved methods of introducing Boron as an alloying element in irons and steels have been developed, with satisfactory results. Full information is offered by the Molybdenum Corporation, producer of Molybdenum, Tungsten, and Boron.

AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

MOLYBDENUM CORPORATION OF AMERICA
Grant Building Pittsburgh, Pa.

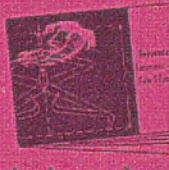
MCA

easy



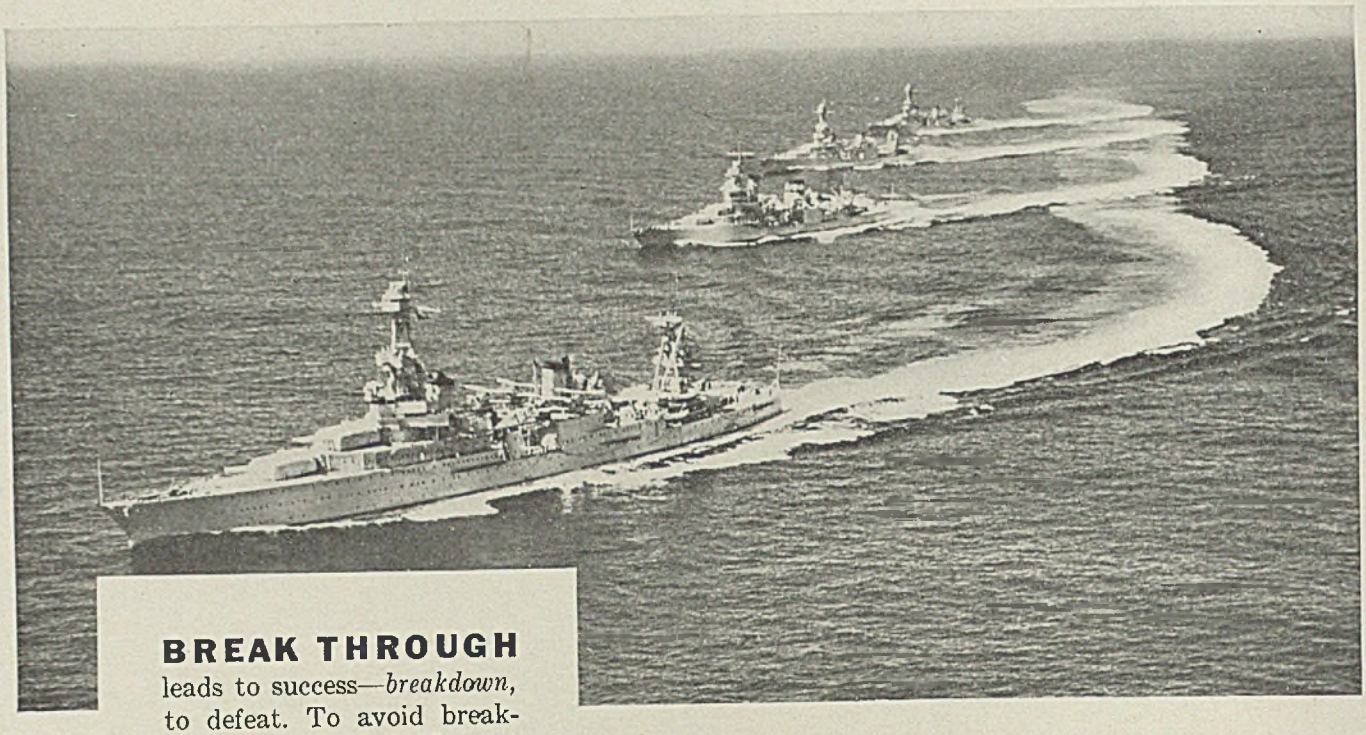
Easy is a good word to describe the way Heppenstall Automatic Safe-T-Tongs do a handling job. This is the way they operate: First you lower them on the work this way...  A little slack and the tongs unlock for lifting ...  The tongs grip as they come up...  The carry is safe, sure and fast...  and when the burden is deposited the tongs lock open automatically...  ready for the next job.

Many hundreds of these tongs are now used in all parts of the country to add speed and safety to materials handling. Each set is designed for the specific job to be done whether it's lifting suger sacks... 

or gun barrels...  Why not write for this descriptive book... 

It may give you ideas. Address Dept. T112 Heppenstall Company, Pittsburgh.

Heppenstall Automatic Safe-T-Tongs

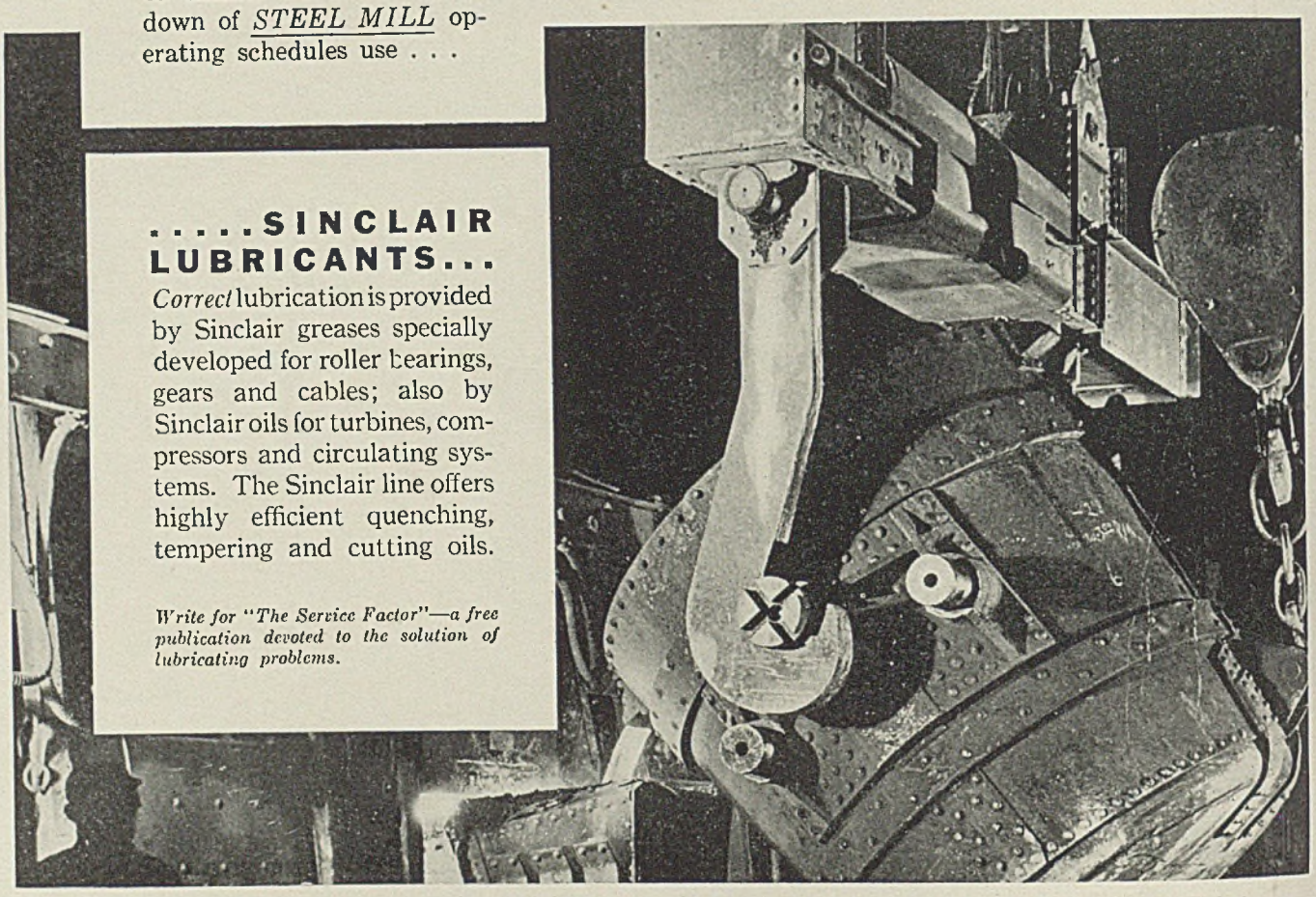


BREAK THROUGH
leads to success—*breakdown*, to defeat. To avoid breakdown of *STEEL MILL* operating schedules use . . .

. . . . . SINCLAIR LUBRICANTS . . .

Correct lubrication is provided by Sinclair greases specially developed for roller bearings, gears and cables; also by Sinclair oils for turbines, compressors and circulating systems. The Sinclair line offers highly efficient quenching, tempering and cutting oils.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

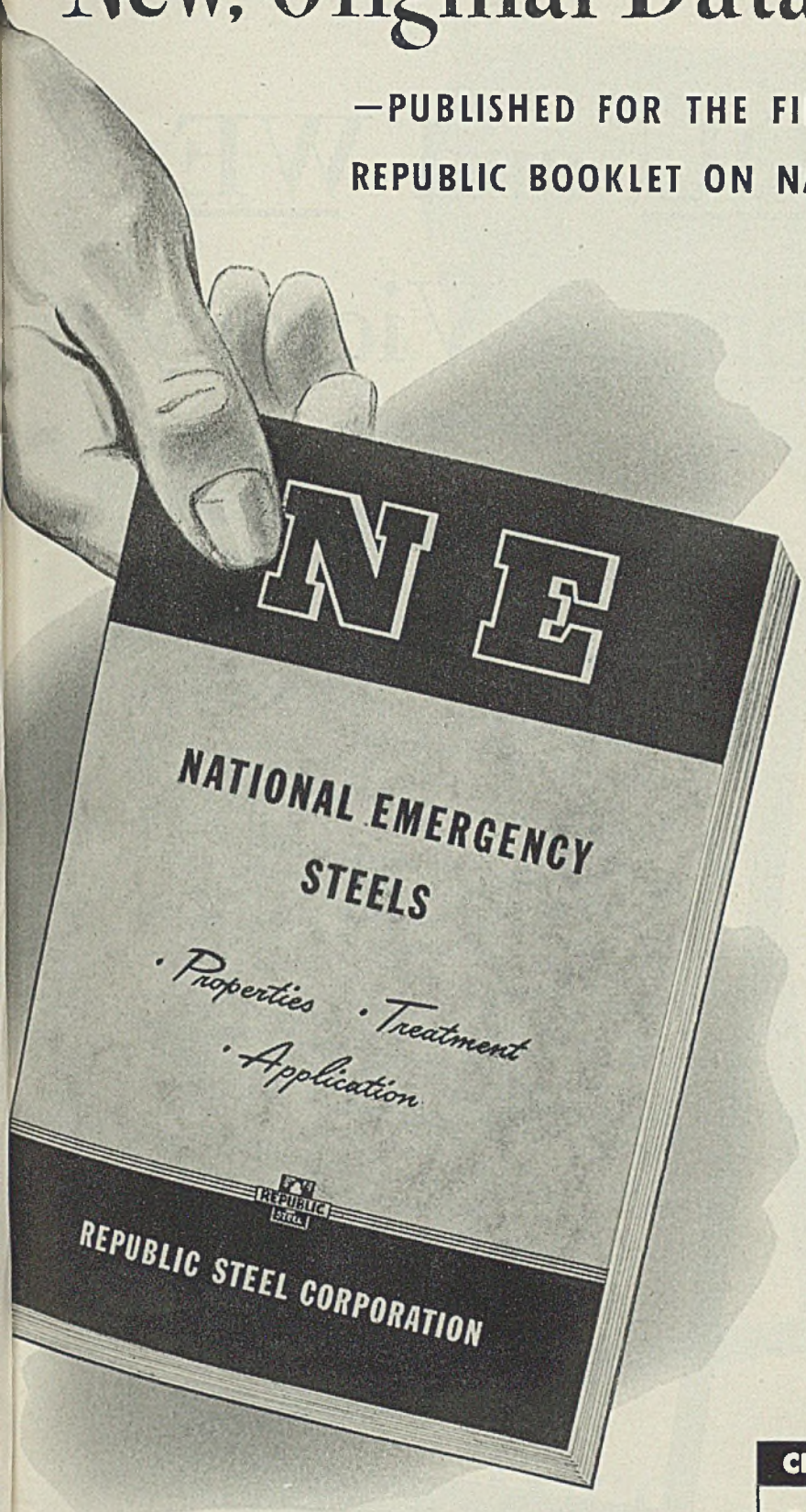
FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago · 10 West 51st Street, New York City · Rialto Bldg., Kansas City · 573 West Peachtree Street, Atlanta · Fair Building, Ft. Worth

New, Original Data on NE Steels

—PUBLISHED FOR THE FIRST TIME IN THIS HELPFUL REPUBLIC BOOKLET ON NATIONAL EMERGENCY STEELS



Here's just what you've been looking for—70 pages of valuable *new* data on the properties, treatment and application of the NE Steels—in handy, usable book form.

Much of the material in this book—charts, tables and specifications—has been prepared from original research conducted by Republic metallurgists. There's an explanation of the end quench hardenability test and its importance, too.

Republic—long a leader in alloy steel production—was an important factor in the development of the NE series. Now, Republic offers this helpful book on NE Steels as its contribution to more efficient, more productive, faster war fabrication wherever these alloy-conserving steels are applied.

If you have been using alloy steels, you probably are now using NE Steels—or will in the near future. You should have a copy of this book at your finger tips. You'll be surprised at the vast amount of data it will bring you. Printing is now under way, and the book will soon be ready for distribution to *engineers, metallurgists and production executives.* Send your request now to insure early delivery.

REPUBLIC STEEL CORPORATION
Alloy Steel Division
Sales Offices · Massillon, Ohio
GENERAL OFFICES • • CLEVELAND, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

CLIP, FILL IN AND MAIL TODAY FOR NE DATA

Republic Steel Corporation, Department ST
3100 East 45th Street, Cleveland, Ohio.

Please send me a copy of your new NE Steels Handbook, which I understand will be off the press shortly.

Name _____ Title _____

Company _____

Address _____

—REPUBLIC—
Alloy STEELS

Would you like data on other Republic products—Enduro Stainless Steel, Sheets, Plates, Upson Bolts, Nuts and Rivets, Hot Rolled and Cold Drawn Bars, Electrunite Aircraft and Mechanical Tubing? Write us.

10 Ways YOU and WE Can Help Speed Victory

A Mid-West metal distributor received an urgent call from an airplane instrument manufacturer. Unless 125 feet of "R" Monel could be delivered immediately, production of a vital part would be held up. The required metal was delivered from stock the same day. Production continued at top speed.

Additional footage was also supplied to keep the manufacturer going until his mill shipment arrived.

At nine o'clock on a Sunday evening, an Army officer drove to a distributor's office for a rush order of metal to go with a convoy sailing at dawn. The night watchman phoned warehouse employees. The order was filled on time for the convoy's sailing.

★

With all metals and alloys on the critical list, distributor stocks have assumed new importance . . . providing a country-wide pool of materials. Many examples . . . beside the two above . . . could be cited.

Less dramatic . . . but equally important . . . is the day-to-day service provided by INCO distributors. Maintaining complete and up-to-date information about Government orders and regulations saves time and trouble for metal users.

Distributors acquire broad experience in many industries...and familiarity with the fund of technical information made available by the engineering and research staffs of The International Nickel Company. Thus they are equipped to advise about proper uses of metals and alloys...and often help users overcome production difficulties.

What YOU can do:

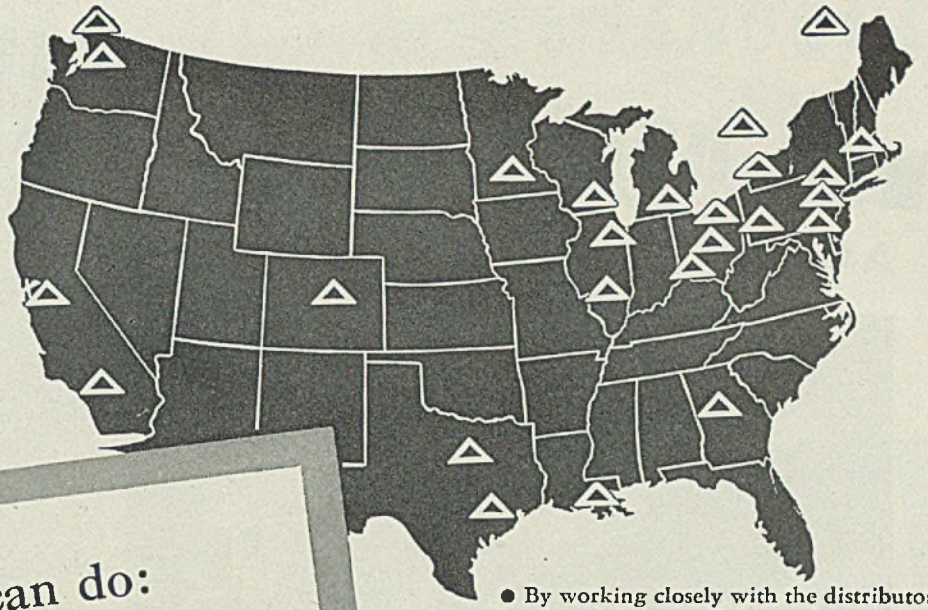
1 Conform with WPB regulations. New regulations are being issued constantly.

2 Place your orders as early as possible.

3 Indicate alternate choices on sizes and materials ...where possible. By so doing a satisfactory alternate may be obtained immediately. Otherwise considerable time may be required to obtain the exact size or material indicated.

4 Don't hesitate to ask technical questions about selection, uses and working of Nickel, Monel and other critical metals. We can often offer suggestions which reduce shop spoilage...and *save metal.*

5 Depend upon us—your metal distributor—for as much shop service as possible. Use our facilities to cut down the number of operations in your plant.



What WE can do:

1 Advise on WPB requirements. Special departments keep fully informed on Government regulations. Help metal users solve priority problems.

2 Help *new* users of Monel, Nickel, Inconel and other special alloys. We offer practical advice on welding, machining, heat treating and other processing methods.

3 Special sizes and shapes in stock. Stocks maintained complete as possible under wartime conditions. By suggesting alternate sizes or materials, we often keep production moving.

4 Special services...such as cutting, shearing or sawing to size...help overloaded plant facilities. Delivery as needed keeps metal moving to machines.

5 Mill orders. A close working knowledge of mill conditions enables us to handle mill orders with maximum efficiency, thus helping to relieve the burden on overtaxed mills. We...where possible...offer part shipment from our own warehouse stock.

● By working closely with the distributor, by asking for advice as well as metal, you can eliminate many delays, cut down useless paper work and step up production of finished war materials.

The Companies listed below are Distributors of the INCO High Nickel Alloys:

MONEL • "K" MONEL • "S" MONEL • "R" MONEL
"KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

They also supply other non-ferrous metals such as aluminum, copper and copper alloys.

★

DISTRIBUTORS

Atlanta—J. M. Tull Metal & Supply Co., 285 Marietta St.
Boston—Whitehead Metal Products Company, Inc., 235 Bridge St., Cambridge
Buffalo—Whitehead Metal Products Company, Inc., 254 Court St.
Chicago—Steel Sales Corporation, 3348 South Pulaski Road
Cincinnati—Williams and Company, Inc., 1921-1927 Dunlap St.
Cleveland—Williams and Company, Inc., 3700-3716 Perkins Ave.
Columbus—Williams and Company, Inc., 31 N. Grant Ave.
Dallas—Metal Goods Corporation, 1209 Texas Bank Bldg.
Denver—Hendrie & Bolthoff Mfg. & Supply Co., 1621-39 Seventeenth St.
Detroit—Steel Sales Corporation, 5151 Wesson Ave.
Houston—Metal Goods Corporation, 16 Drennan
Los Angeles—Pacific Metals Co., Ltd., 1400 S. Alameda St.
Milwaukee—Steel Sales Corporation, 647 W. Virginia St.
Minneapolis—Steel Sales Corporation, 529 S. 7th St.
Newark—Whitehead Metal Products Company, Inc., 205 Frelinghuysen Ave.
New Orleans—Metal Goods Corporation, 413 Canal Bldg.
New York—Whitehead Metal Products Company, Inc., 303 West 10th St.
Philadelphia—Whitehead Metal Products Company, Inc., 721-729 Arch St.
Pittsburgh—Williams and Company, Inc., 901-937 Pennsylvania Ave.
St. Louis—Steel Sales Corporation, 4565 McRee Ave.
San Francisco—Pacific Metals Co., Ltd., 3100 – 19th St.
Seattle—Eagle Metals Co., 3628 E. Marginal Way

IN CANADA:

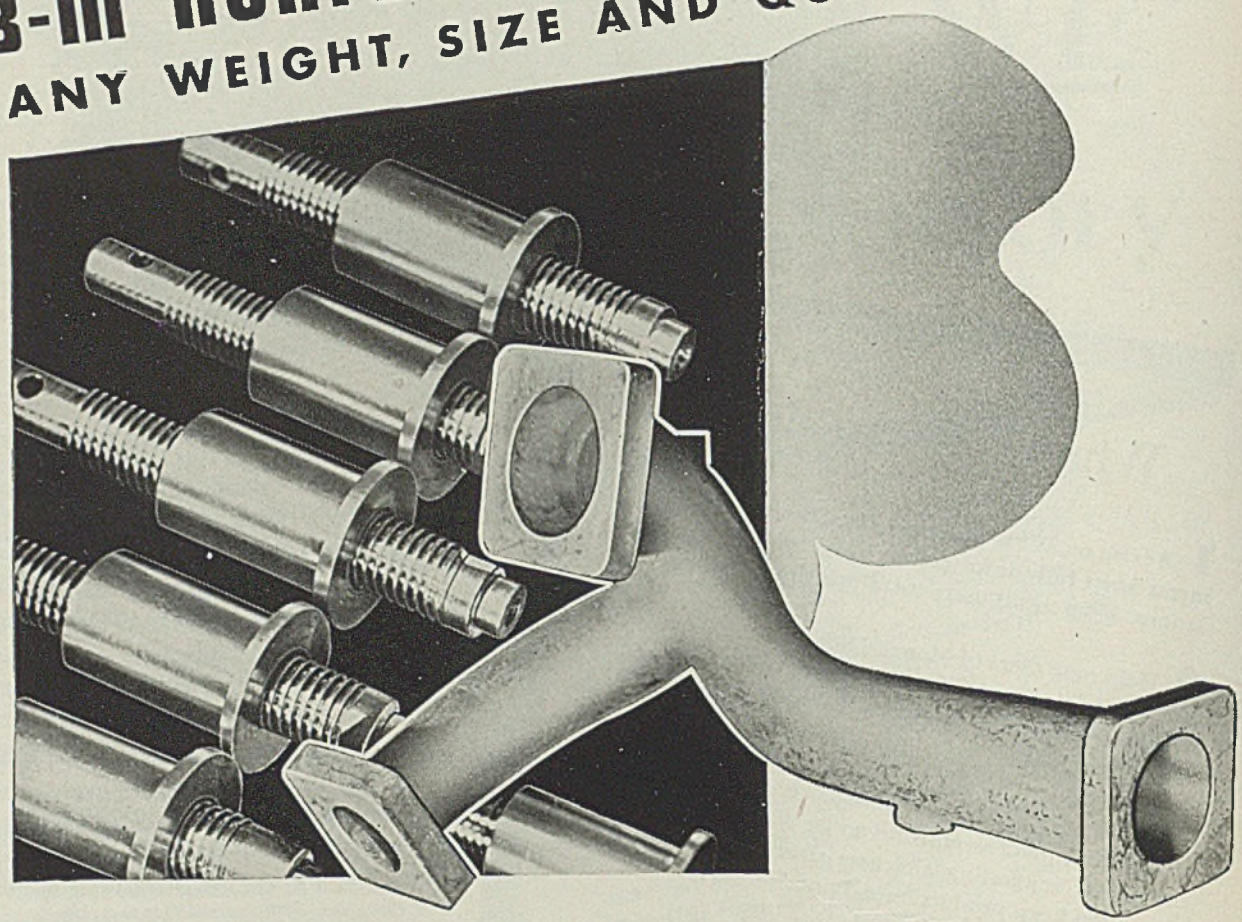
Montreal—Robert W. Bartram Ltd., 277 Duke St.
Toronto—Alloy Metal Sales Ltd., 861 Bay St.
Vancouver—Wilkinson Company, Ltd., 190 Second Ave., W.

Inco Distributor Service

MILL...WAREHOUSE...FIELD

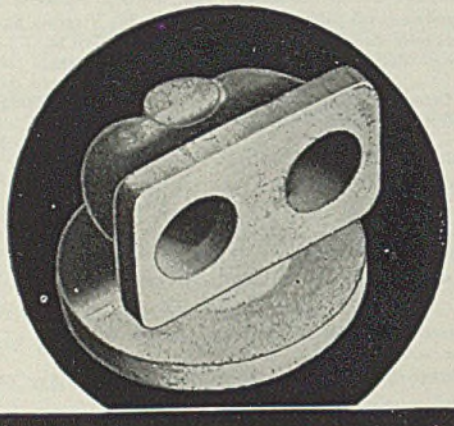
THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

N-B-M NONFERROUS CASTINGS
IN ANY WEIGHT, SIZE AND QUANTITY



GUN BRONZE • MANGANESE BRONZE • PHOSPHOR BRONZE • ALUMINUM BRONZE • HYDRAULIC BRONZE • LEAD BRONZE

ALSO LEAD AND COPPER CASTINGS



and all other nonferrous alloys to government specifications.

We are equipped to serve you *within required delivery time.* Chemical analyses and physical tests can be furnished by our own laboratories.

For 69 years we have specialized in nonferrous castings of all kinds for industrial and transportation services.

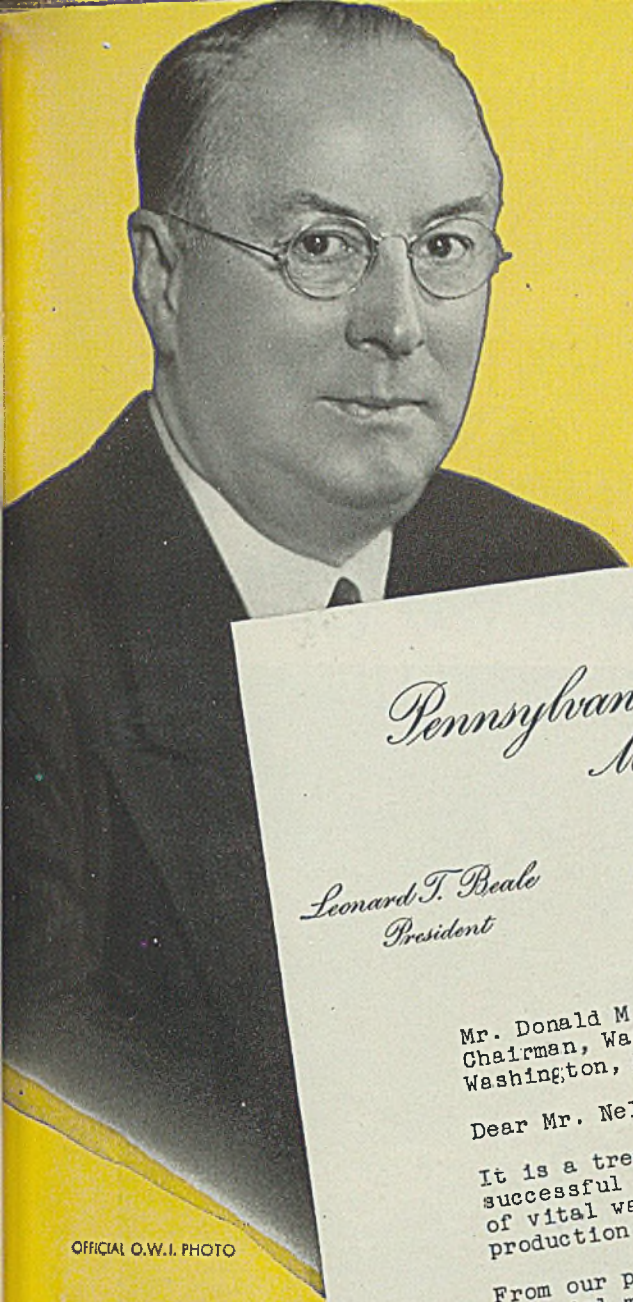
N-B-M Pumpbody Castings • Electrode Castings • Structural Castings • Pressure Castings • Marine Castings • Valve Castings.

NATIONAL BEARING METALS CORPORATION

ST. LOUIS • NEW YORK

PLANTS IN: ST. LOUIS, MO. • PITTSBURGH, PA. • MEADVILLE, PA. • JERSEY CITY, N. J. • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

IT'S A TREMENDOUS JOB YOU'RE DOING, MR. NELSON



OFFICIAL O.W.I. PHOTO

Incorporated 1850

Pennsylvania Salt Manufacturing Co.

Manufacturing Chemists.

Widener Building

Philadelphia

Leonard T. Beale
President

December 19, 1942

Mr. Donald M. Nelson
Chairman, War Production Board
Washington, D. C.

Dear Mr. Nelson:

It is a tremendous job you are doing. And a remarkably successful one to date, as evidenced by the huge volume of vital war supplies that is now rolling off American production lines.

From our position as but a single unit in the vast industrial march to victory, we have some appreciation of the immense problems and responsibilities that you and the War Production Board face in coordinating national production.

We know the task has just begun. We realize the imperative need of teamwork and cooperation. In supplying essential chemicals to key war industries we sometimes feel that we are playing only a limited part in the war program -- although there is no limit on our effort.

We are gratified, however, when we receive reports from the field showing how our products have helped do a better and faster job of turning out materials for war. One such routine serviceman's report read, in part, "Pennsalt Cleaner saved this large steel fabricating plant over 5000 lbs. of zinc per week in a galvanizing operation. Production was speeded 25% by reduction of rejects."

While this is just one example, it illustrates the kind of job we like to do.

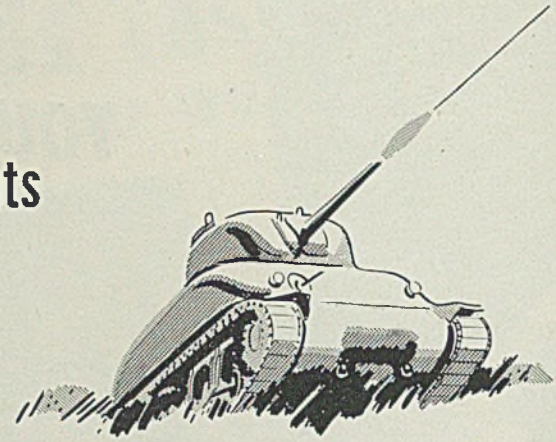
Yours for Victory,

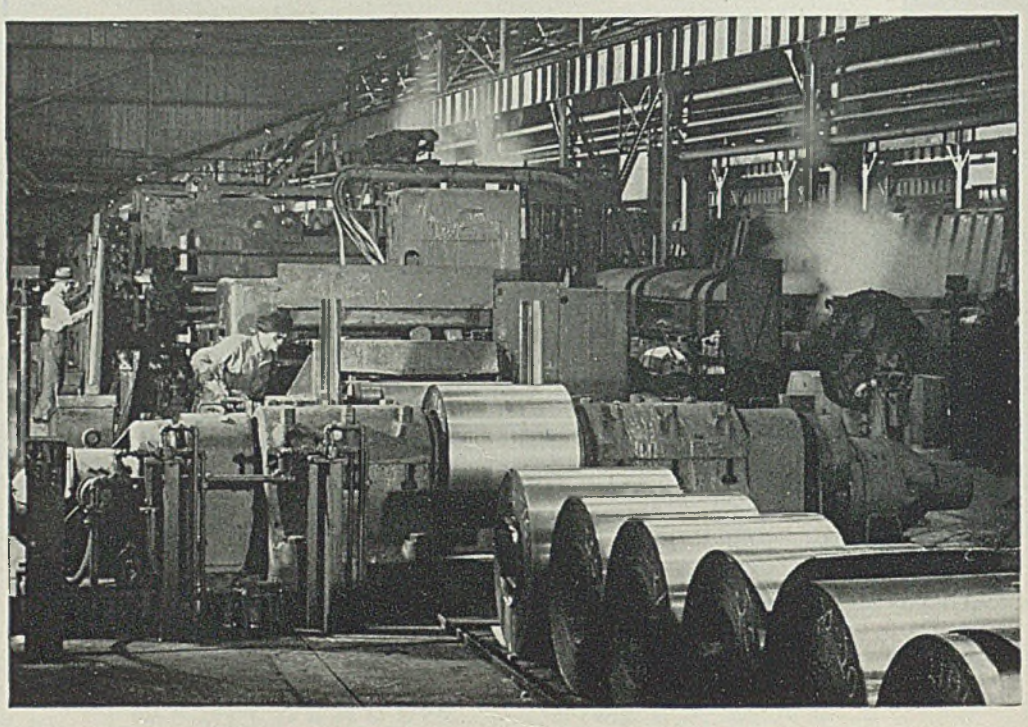
Leonard T. Beale

PENN SALT Chemicals

Steel

to meet the exacting requirements of our Armed Forces





is assured by

WEIRTON'S "DOUBLE CONTROL" OF QUALITY

Weirton's "double control" of quality means steel which meets specifications exactly for the manufacturing of equipment for our Armed Forces. To provide steel to meet exacting standards . . . within the range of commercial possibilities . . . Weirton exercises "double control" of quality over every process of manufacture, from iron ore to the finished product.

And "Double Control" of Quality means this—control by men plus control by machines. To accomplish this Weirton employs men experienced and especially trained in the art of making quality steel, in addition to using equipment and machines of the latest approved design.

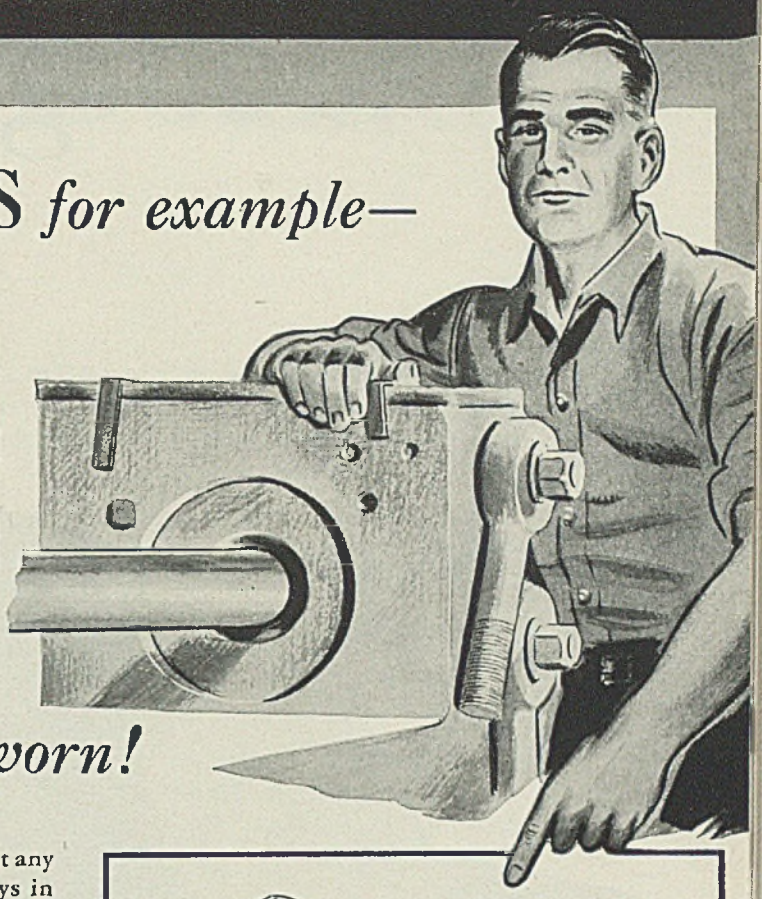
The men and women of Weirton are straining every nerve to turn out more and more steel . . . to make certain that our Armed Forces have ample tools with which to bring Victory at the earliest possible moment.

WEIRTON STEEL COMPANY
Weirton, West Virginia

Sales Offices in Principal Cities

Division of
NATIONAL STEEL CORPORATION
Executive Offices · Pittsburgh, Pa.

IS CHROMIUM PLATING YOUR ANSWER TO EXTENDING THE LIFE OF VALUABLE TOOLS AND EQUIPMENT?



MACHINE TOOLS *for example—*

CHROMIUM PLATING

may increase output of your cutting and forming tools . . .

reclaim them when worn!

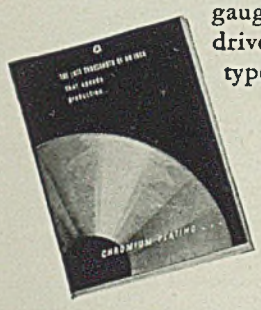
OBTAINING GREATER PRODUCTION per tool without any sacrifice in accuracy . . . meeting quotas despite delays in obtaining new tools and tool steels. These are two problems that chromium plating may be able to solve for you.

By applying a chromium plated surface to many types of cutting and forming tools, greatly increased service life is obtained. In addition, when worn undersize, they can be put back into production again simply by stripping, re-plating and grinding to size.

For example, chromium plated mandrels and dies last many times longer, reduce stoppages and speed output. Chromium plated taps—working in copper, brass, aluminum, nickel, rubber and plastics—often give 3 to 10 times increased production. On broaches and burnishing bars, chromium plating eliminates seizing, produces a finer finish and steps up service life.

FOR MANY OTHER EQUIPMENT PARTS

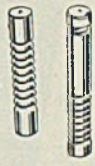
This is just one of countless ways that chromium plating saves valuable materials and man-hours for war production . . . by extending the life of a wide variety of surfaces subject to wear and corrosion . . . by reclaiming many hard-to-replace equipment and production parts which have been worn or machined off-size and would otherwise have to be scrapped. Successful applications of chromium plating for both new equipment and salvage include:—plug and ring gauges, ball and roller bearing parts, piston rods, drive shafts, axles, cylinders, shafts, and many types of spindles, fixtures and jigs.

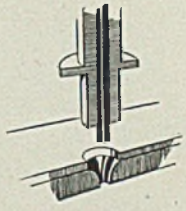


THE BOOKLET SHOWN *will assist you in determining the applications for chromium plating on your products and equipment. A copy of "The Last Thousandth of An Inch That Speeds Production" is yours for the asking. In writing, please mention* Steel.

TEN TIMES LONGER LIFE FROM DIES AND MANDRELS

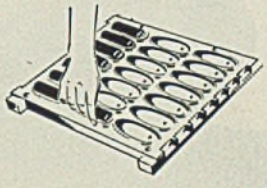
SMOOTHER, FASTER WORK FROM BROACHES AND BURNISHING BARS

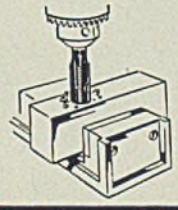




WEAR AND ABRASION REDUCED ON FORMING TOOLS

MOLDING DIE LIFE GREATLY INCREASED

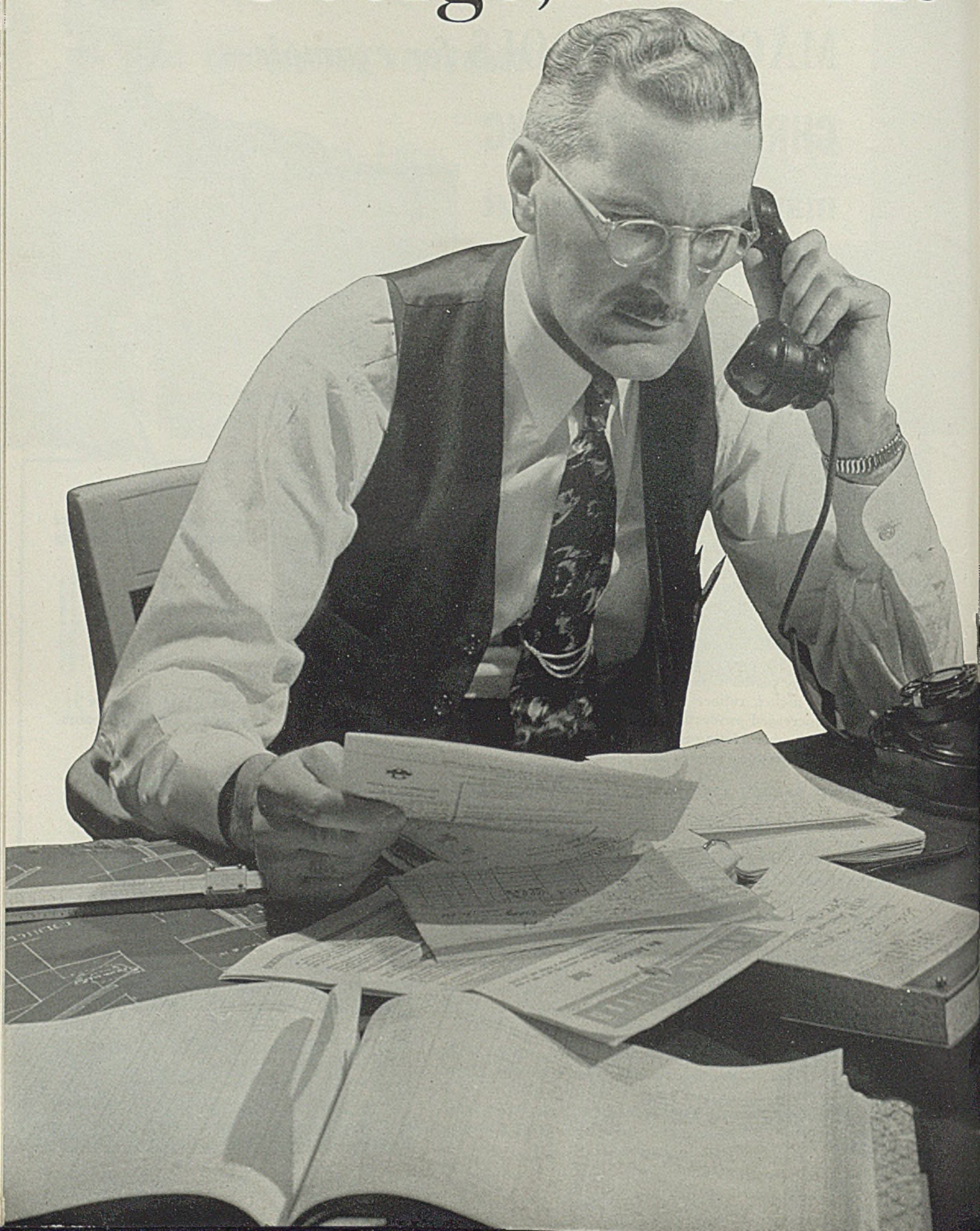




INCREASED OUTPUT FROM TAPS, DRILLS AND COUNTER-BORES

UNITED CHROMIUM
INCORPORATED
51 East 42nd Street, New York, N. Y.
Waterbury, Conn. ☆ Detroit, Mich.

George*, we'd like



to shake your hand...

YOU'RE such a matter-of-fact fellow, George, that maybe it never occurred to you that you've done anything out of the ordinary since that fateful Sunday when America found itself at war.

Sure—you've just done your job as you saw it. But listen, George. Planning and engineering our war effort—keeping the wheels turning and supplies and materials moving—figuring out the million minor details . . . that took brains of a special sort. The vast load of paper work that had to be done before a single machine could function, before a single bomber could lay its eggs, didn't just do itself. You did it.

When bad news came over the wires, you set your jaw and worked just that much harder. And when the news was good, you took it with a quiet smile and kept right on plugging away. No, George, not all the heroes in this war are making the headlines.

The late hours you spent at your desk when the others had left . . . the way you've planned and sweated to meet one emergency after another . . . the extra work you've taken on your patient shoulders when younger men were called away for more spectacular, more exciting duties, wasn't exactly a snap, either.

Maybe you don't wear a uniform, George, but remember this. You're on the all-important staff of the home-front army. If it weren't for you, and the thousands of Georges like you, our job of war production would be in an awful mess right now.

**Who is George?* *Surely you know dozens of Georges. He stands beside you on a crowded bus early in the morning. You've watched him coming wearily home from work long after the rest of the neighbors have finished supper. He may even be the fellow who makes those funny faces at you as you shave before your mirror in the morning. More power to you!*

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

USS

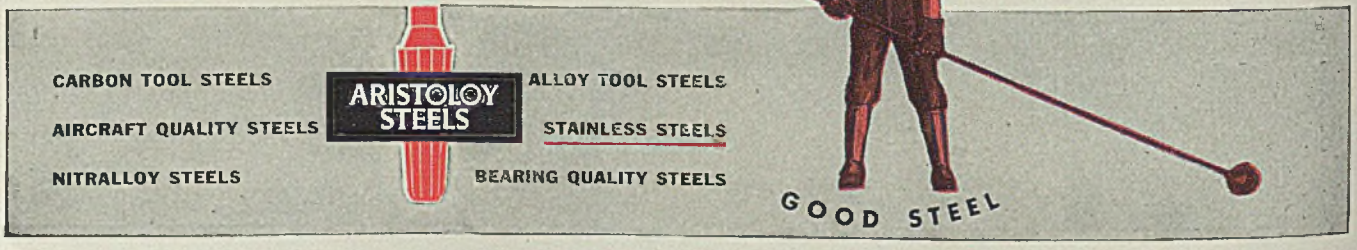
UNITED STATES STEEL

ARISTOLOY STAINLESS

ONE OF THE FAMILY OF ARISTOLOY STEELS

To conserve nickel and chromium, all industry is cooperating to limit the use of stainless steels to vital applications where only stainless will do the job. For such applications Copperweld Steel Company is furnishing Aristoloy Stainless steel bars and billets. We'll be glad to discuss your stainless steel applications with your engineering staff.

COPPERWELD STEEL COMPANY **WARREN, OHIO**



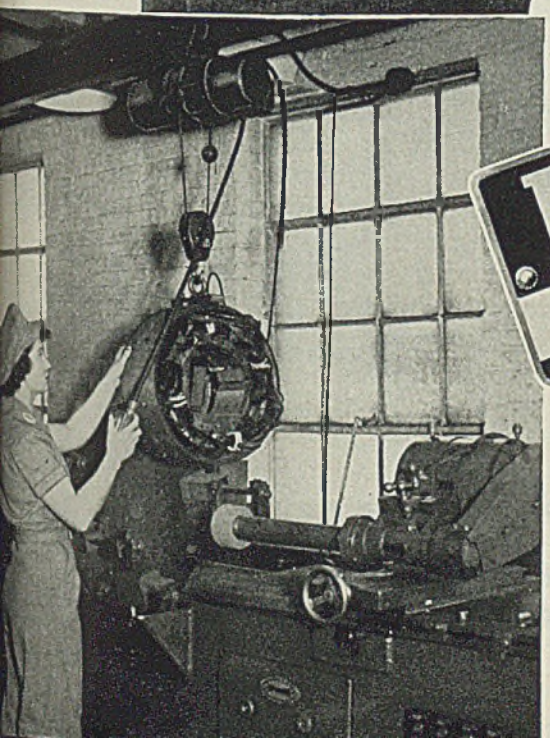
—and you thought we couldn't do it!

"Women in industry? . . . With all these heavy loads?" *Tush!*

Where's the need of a strong back? Why huff and puff and do yourself in? Electricity does all the heavy work here!

Handling materials in industry is the job of the P&H Zip-Lift. Now, it's merely a matter of pressing buttons to lift and lower heavy loads exactly where you want them. No trick to it, with such simple operation.

For any loads up to 2,000 lbs., Zip-Lifts are the practical answer for safe, speedy, and economical handling. Now is the time to modernize — for today's peak production and tomorrow's lower cost.



Available in 250, 500, 1000 and 2000-lb. capacities; with interchangeable mountings for bolt, hook, or trolley service. Just hang them up and plug into any standard lighting circuit. Ask for Bulletin H-20.

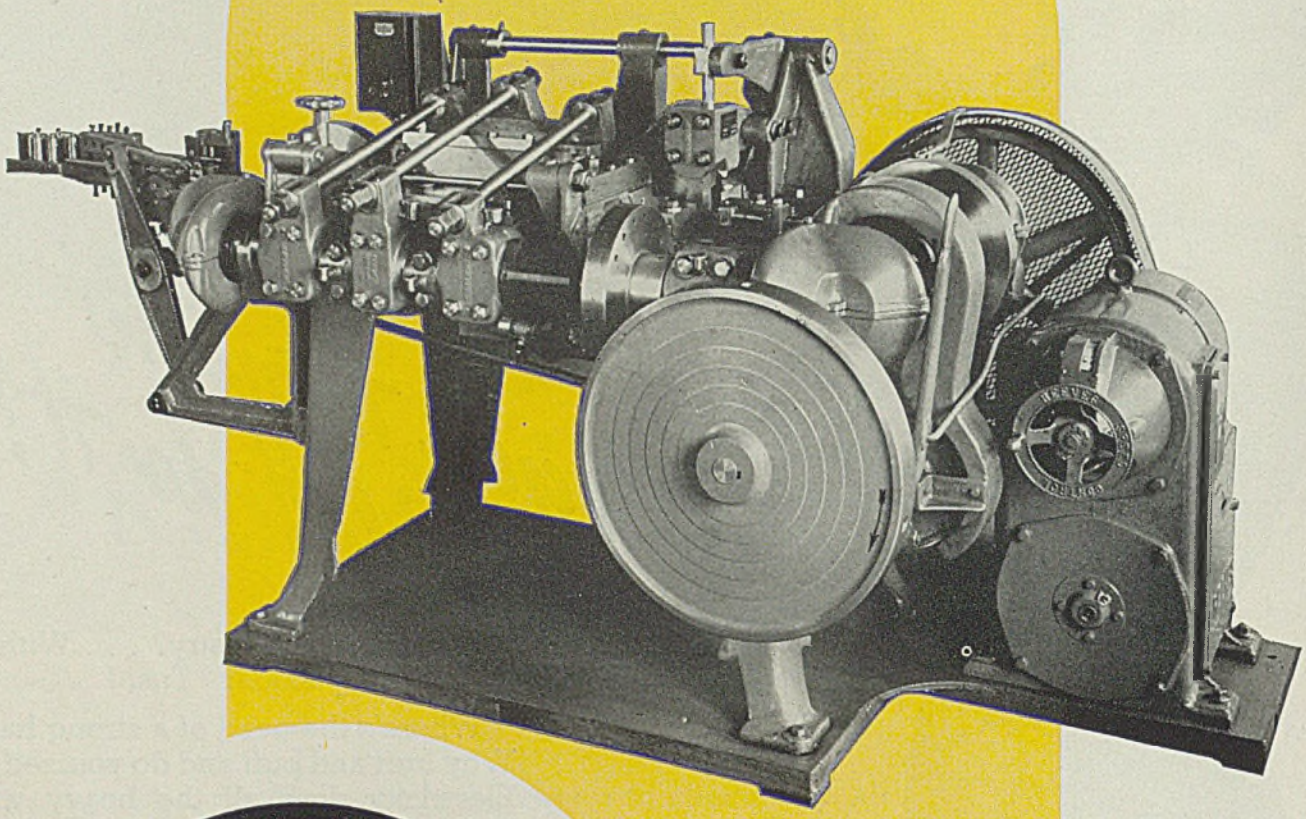
A new star has been added to P&H's award for excellence in war production.

General Offices: 4411 W. National Ave., Milwaukee, Wis.

HARNISCHFEGER
CORPORATION
HOISTS · WELDING ELECTRODES · MOTORS · P&H EXCAVATORS · ELECTRIC CRANES · ARC WELDERS

NILSON

automatic metal wire forming machine

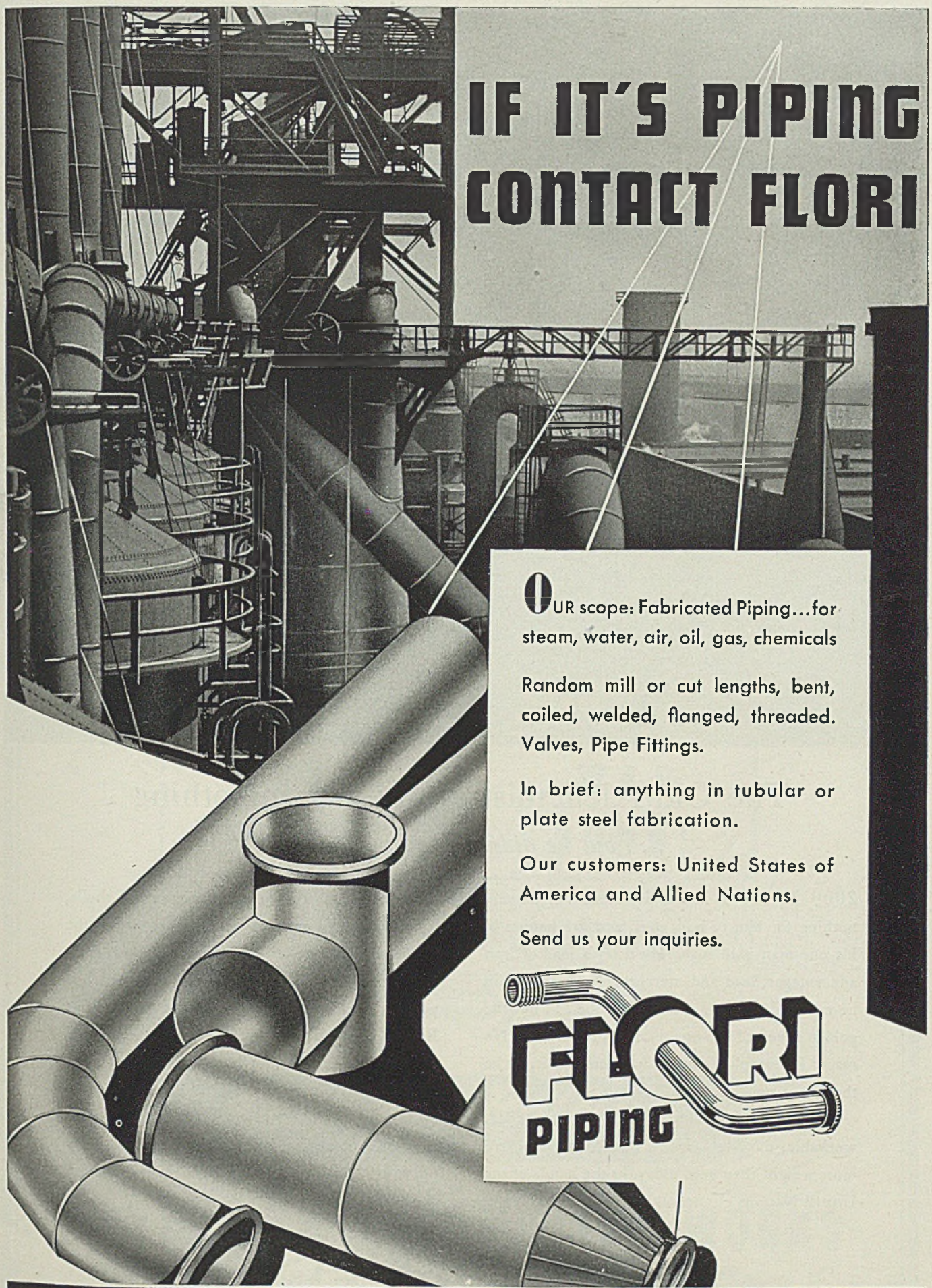


The Nilson line includes machines for forming paper clips, buckles, gate hooks, coat and hat hooks, ceiling hooks, wire ears, cable rings, screw eyes, sash chains, automobile slide chains, flat open link chains, staples, cotter pins, hose clamps, etc. Nilson also makes wire straighteners, wire reels, frame bending machines and special presses.

The machine pictured here is a simple and ingenious contrivance. Sturdy, solid, compact, requiring little space, it is a highly efficient and practical machine for forming wire and punching patterns from ribbon stock. Various patented features and extra attachments make it a necessary factor in reducing the manufacturing cost of your product. The Nilson automatic metal wire forming machine turns out the work faithfully, accurately and speedily—and it functions a long, long time free from repairs and replacements.

THE A. H. NILSON MACHINE COMPANY

BRIDGEPORT, CONN.



IF IT'S PIPING CONTACT FLORI

OUR scope: Fabricated Piping...for steam, water, air, oil, gas, chemicals

Random mill or cut lengths, bent, coiled, welded, flanged, threaded. Valves, Pipe Fittings.

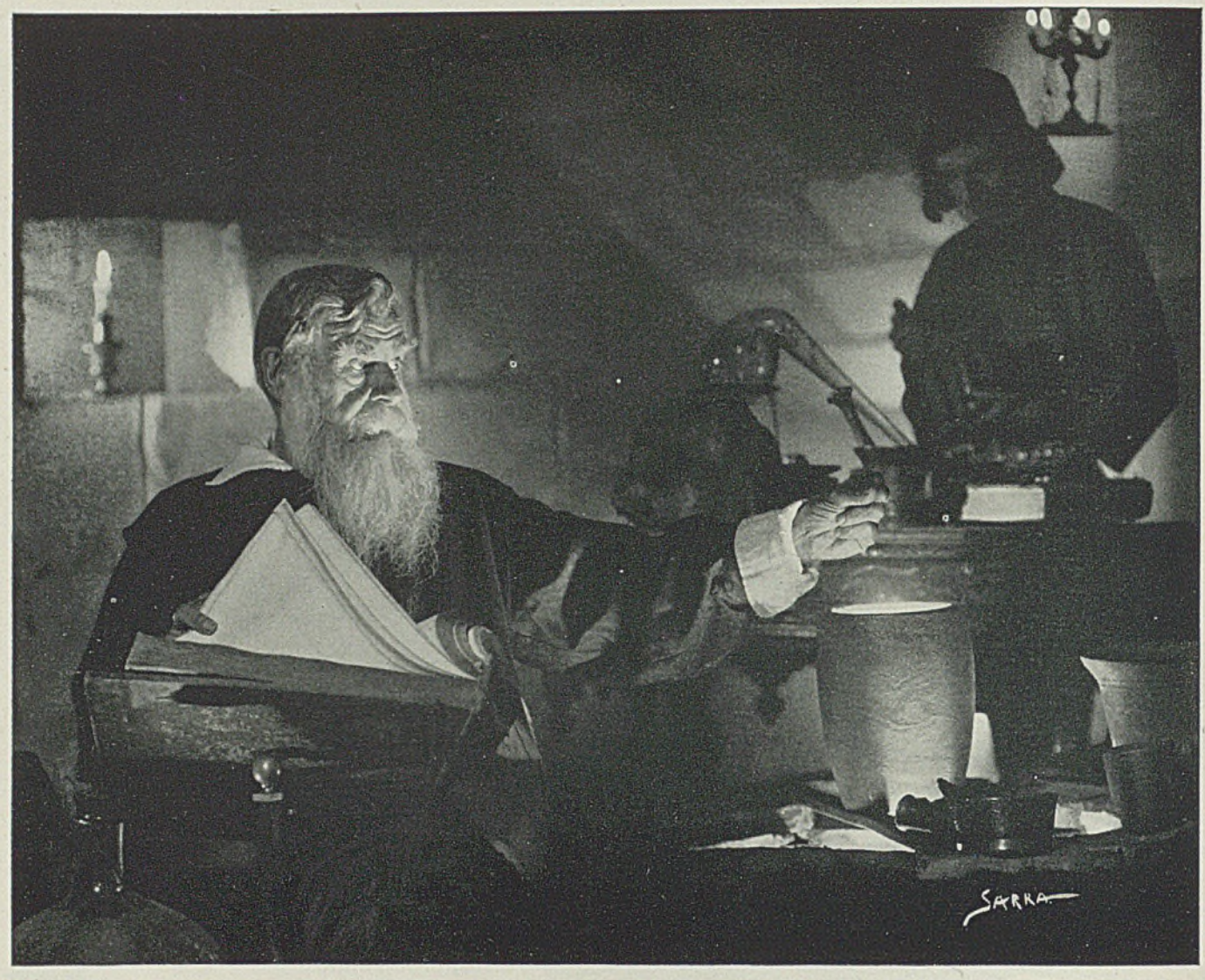
In brief: anything in tubular or plate steel fabrication.

Our customers: United States of America and Allied Nations.

Send us your inquiries.

FLORI PIPING

THE FLORI PIPE COMPANY • ST. LOUIS, MO.



The Old Alchemist really had something

. . . but he didn't know what it was

2000 HEN'S EGGS in one batch were nothing for him to boil, peel, and fire-harden in his one-man gold rush. He'd try a load of iron and vinegar, lead and mercury. Now and again he even hit on copper and calamine . . . but the golden sheen of the metal couldn't fool *him*. No magic Philosopher's Stone had touched it, so he thought it worthless.

Yet what he held in his hand then . . . good, workable, durable brass . . . has come to carry more weight than gold today, in the hands of the United Nations gunners who can't get too much of it, too soon. For brass cartridges and shells, torpedoes and bombs are a weighty part of the "foreign exchange" that is going to buy us Victory. To this end, the golden-yellow metal is pouring in a rising flood from the furnaces at Bristol. Every inch of sheet, rod, and wire shipped out of this plant has for its ultimate destination . . . *the enemy*. And when that end is reached, brass from Bristol will return from war to fill again the peacetime places that only brass *can* fill with complete efficiency, and with complete satisfaction to its users.

THE BRISTOL BRASS *CORPORATION*

MAKERS OF BRASS SINCE 1850 · BRISTOL, CONNECTICUT

They Speak a Language the Japs Understand

FIRE ONE! FIRE TWO!

From the first day of this war, the crews of U. S. submarines have thus "reasoned" with the enemy—and in his own waters.

They know *action* and *engines*—for they literally live with and by the Diesels which take them there and bring them back.

Many of these Diesels are Fairbanks-Morse Diesels. We feel that nothing short of our level best is good enough for these men of the silent service.

FAIRBANKS, MORSE & CO.