December 24, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

"It's Steel!"

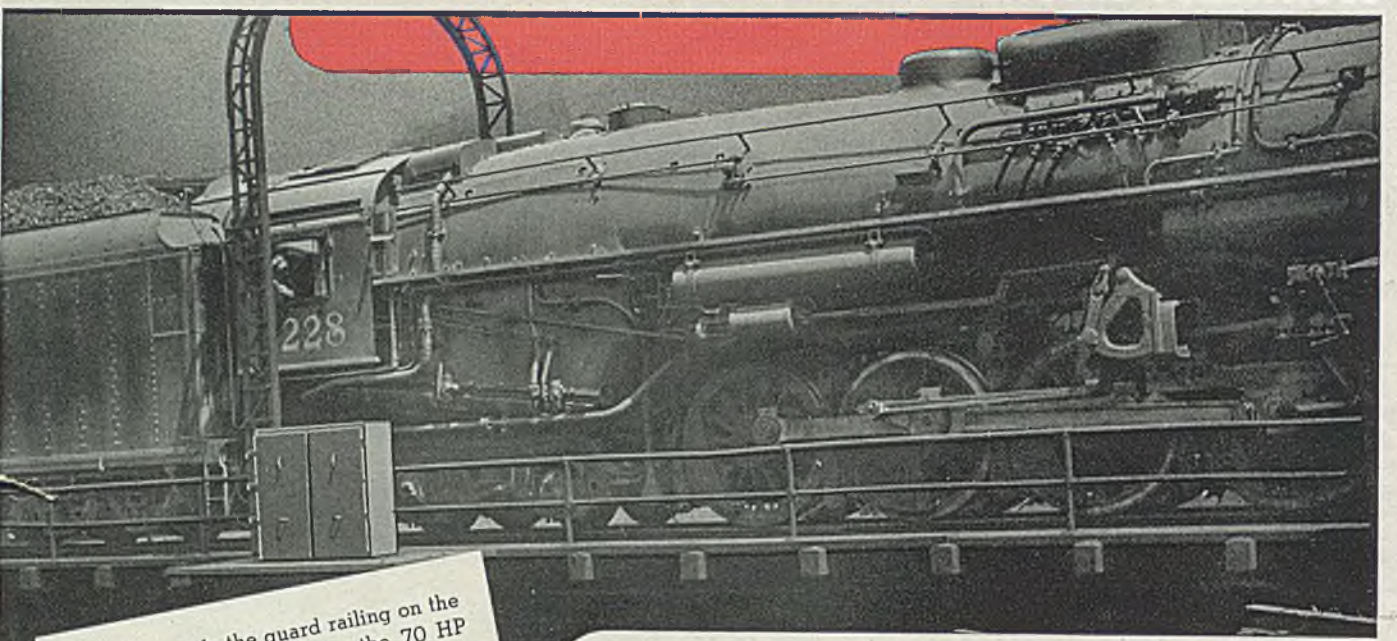
Steel, in all its thousands of uses, has demonstrated so well its attributes of strength, durability and versatility that the words, "It's Steel!" carry with them an expression of finality and of acceptance wherever they are heard.

Today, for the first time since 1942, steel is slowly becoming available in quantity for civilian enterprise. If the output is to be anywhere near adequate, production levels must be kept high.

With this firmly in mind, The Ohio Steel Foundry Company continues to produce and ship fine steel rolls to America's steel mills in the quantity and quality necessary for sustained capacity production.

EC&M DUPLEX-CONTROL

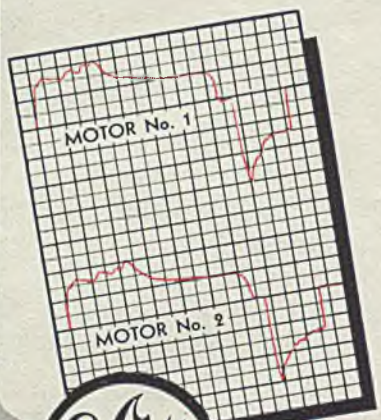
ASSURES EFFICIENT OPERATION OF 2-MOTOR ENGINE-TURNTABLE



Taken through the guard railing on the turntable, this photo shows the 70 HP EC&M Duplex TIME-CURRENT Controller for operating this table. Rear of Type III (weather-resisting) cabinet housing the control is shown above.

TO drive turntables serving engine roundhouses, two identical motors connected in parallel are generally used.

The graphic ammeter curves, below, show the efficient operation of these 2-motor drives obtained with EC&M Duplex Control. Superimposing one curve on top of the other shows that current values at any point on the curves—during starting, accelerating, running, or plugging—are practically duplicates of one another.



Duplex controllers are built for both a.c. and d.c. service. They are available, when desired, with transfer knife switches which permit isolation of either motor circuit for emergency single-motor operation. Complete information gladly furnished on request.

THE ELECTRIC CONTROLLER AND MANUFACTURING CO.
2698 EAST 79TH STREET CLEVELAND 4, OHIO

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 14 OCT. 1, 1945

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NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

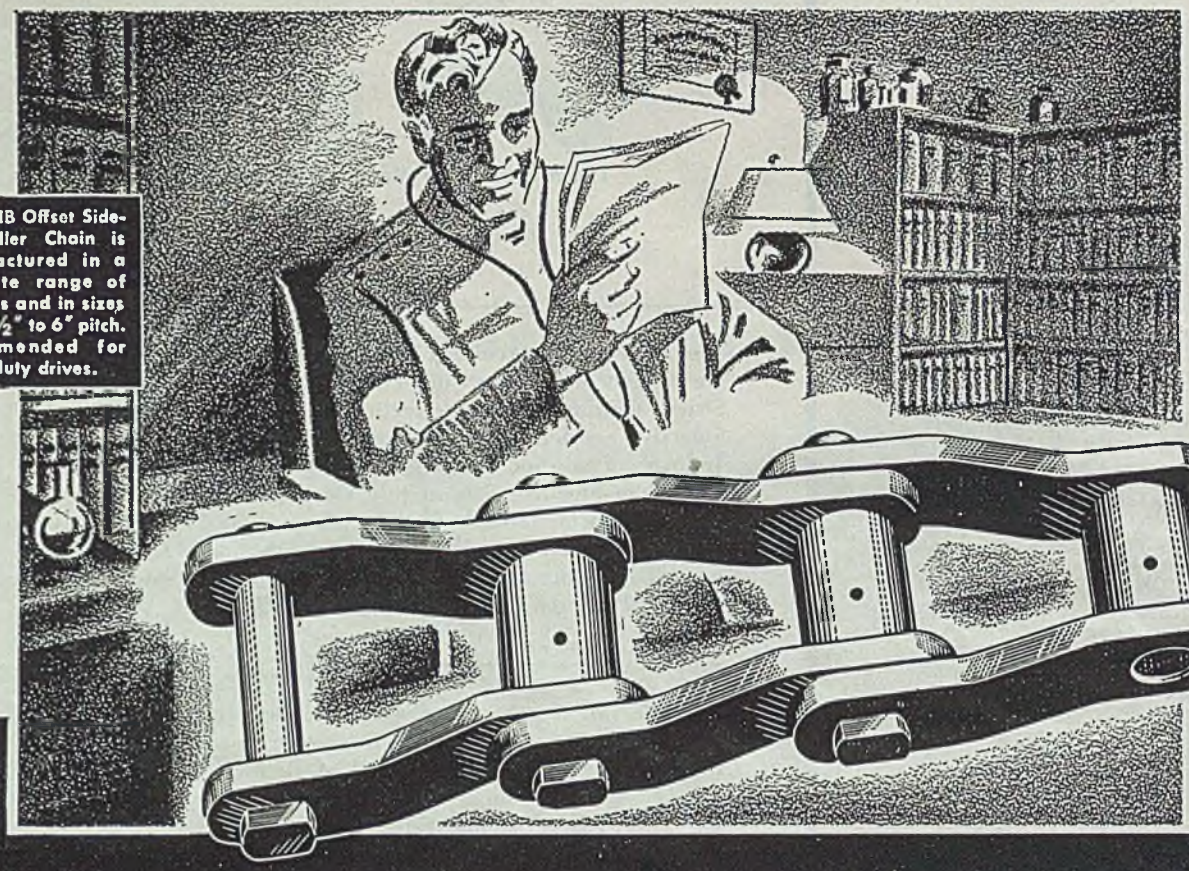
Mechanical Oxyacetylene Welding of Containers

Improved Tooling Steps Up Employee Output

Current Zinc Electroplating Practice

Lubrication in the Drawing of Metals

Equipment Employed in Straightening Operations



Union HB Offset Sidebar Roller Chain is manufactured in a complete range of strengths and in sizes from 1½" to 6" pitch. Recommended for heavy duty drives.

THE VALUE OF SPECIALIZATION

☆ Diagnosticians, after determining the cause of an illness, send the patient to another specialist who has had special training and experience concentrated in the particular kind of illness which is to be treated.

Similarly, many users of chain come to Union for advice on the proper chains for specific tasks of power transmission and mechanical handling of materials. Others ask Union to specify the correct Union Chains to incorporate as integral parts of their own machine products. This is because Union's complete effort is devoted exclusively to the design and manufacture of chains for these purposes. If you are not already aware of the advantages accruing from specialization, consult Union about your next chain problem.

The Union Chain and Manufacturing Company, Sandusky, Ohio, U. S. A.

Union Chains for Every Application

Drive and Conveying Chains and Sprockets
- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

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Finished Steel Roller Chains and Sprockets
- All manufacturer's standard, size ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

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Silent Chain and Sprockets
- All sizes ⅜ in. to 1½ in. pitch

★

Flexible Couplings
- Roller chain type
- Silent chain type

Catalog A-2 covers Drive and Conveying Chain. B-2 covers Finished Steel Roller Chain. FC-1 covers Flexible Couplings. Ask for your copies.

ARMY ★E★ NAVY

UNION CHAINS

STEEL
October 1, 1945

Priceless Technique

In "A War Job Thought Impossible" by Wesley W. Stout, the Chrysler Corp. presents the story of how its Dodge division manufactured 5500 gyrocompasses for the Navy by engineered production methods.

The compass was designed and engineered by the Sperry Gyroscope Co. Until the late war created an urgent need for hundreds of these compasses on short notice, they had been turned out a few at a time by Sperry and one other company with workmen of highly specialized skills. The Navy's contract with Dodge in 1942 to make 1000 compasses marked the first opportunity to manufacture these 1300-pound precision instruments on a mass production basis.

Dodge engineers disassembled a sample compass, studied the parts and tooled the job so that employees with ordinary skills could be used. The first 1000 compasses were entirely satisfactory and the Navy gave Dodge additional contracts. In all, 5500 compasses were completed. Not one was rejected.

This is a fine wartime achievement, but there is a significance in this story which goes beyond the glamour of doing the "impossible" in an emergency. The point of prime importance is the tremendous asset that exists in the American "know how" in engineered production.

When the Navy offered Dodge its first contract for 1000 compasses, it set $7500 per compass as a fair price. Dodge manufactured 5500 compasses at an actual cost to the Navy of only $4098 each. A revealing insight into one factor of this reduction is found in the cost of tooling. To tool up for the first 1000 compasses involved 5000 tools, jigs, dies and fixtures costing $1,037,000. Later, when the Navy asked that production be stepped up to eight units per day, this doubling of output was accomplished through the expenditure of only $163,000 for added facilities. Still later, the installation of equipment costing only $60,000, permitted production of 12 compasses per day.

It is this pattern of low unit cost on high volume that enables Americans to buy a 1942 model automobile for $1500 that is superior to its hand-built counterpart of 1910 which cost $6000. It enables one to purchase a 1942 mechanical refrigerator for $125 which is far superior to the 1922 model for which he paid $450.

Looking ahead, we can visualize attractive opportunities in lower unit costs and greater volume of demand for any article that can be produced in lots of ten thousand or more. We have a technique for this that is priceless.

THEY ASKED FOR IT: As this is written, numerous strikes in progress throughout the nation—none of them large—are responsible for keeping from 1,250,000 to 2,000,000 persons away from their jobs.

That employees who wish to work are prevented from doing so by others is leading to interesting situations. In a number of instances, AFL labor leaders have led their members through CIO picket lines in order that the former could remain at their jobs. This act is becoming common enough to seriously impair the sanctity-of-a-picket-line idea built up by Mrs. Roosevelt and others.

Excessive zeal on the part of unions has invited other repercussions. Not long ago Senator Tydings of Maryland walked out of a committee meeting in disgust as a CIO labor leader persisted in threatening the legislators present. Evidence is mounting that men in public life are getting tired of being browbeaten by labor and other pressure groups. General Hershey's ruling that returning veterans are not required to join unions in order to take up

(OVER)

civilian jobs came at a time when the unions were on the defensive in the eyes of the public because of the present wave of unnecessary work stoppages.

If the tide of public resentment against unions is rising, it is because union behavior asked for it. —pp. 80, 81

° ° °

"SOLD" ON RESEARCH: Almost every week for months it has been possible for this publication to report that one or more industrial corporations had announced plans to build new laboratories or research centers. The number of companies whose executives are placing new or expanded research facilities in the forefront of their postwar programs is impressive.

Industrial management is hard boiled when it recommends to boards of directors expenditures of millions of dollars in new plants and equipment. No such recommendation is made or approved unless there is general agreement among managers and owners that the investment will be profitable.

Therefore, the impending flow of hundreds of millions of dollars into industrial research means simply that industry leaders have been sold thoroughly on the effectiveness of research. Perhaps this selling was made easier by the evidences of the benefits of research that were revealed in wartime.

At any rate, the heightened interest in research activities is one of the most encouraging aspects of industry's postwar expansion program. —p. 104

° ° °

FOREHANDEDNESS PAYS: If Studebaker Corp. is moving through reconversion more swiftly and smoothly than some of its contemporaries, it may be because it has been forehanded in anticipating trouble.

Studebaker officials credit co-operation of the Chicago Ordnance District and the pretermination agreement worked out with it for the speed with which military stocks were removed from the plant after war contracts were terminated. Less than 30 days after production on military vehicles ceased, such stocks, comprising 50 carloads of freight and 45 truckloads of materials, had been appraised and removed.

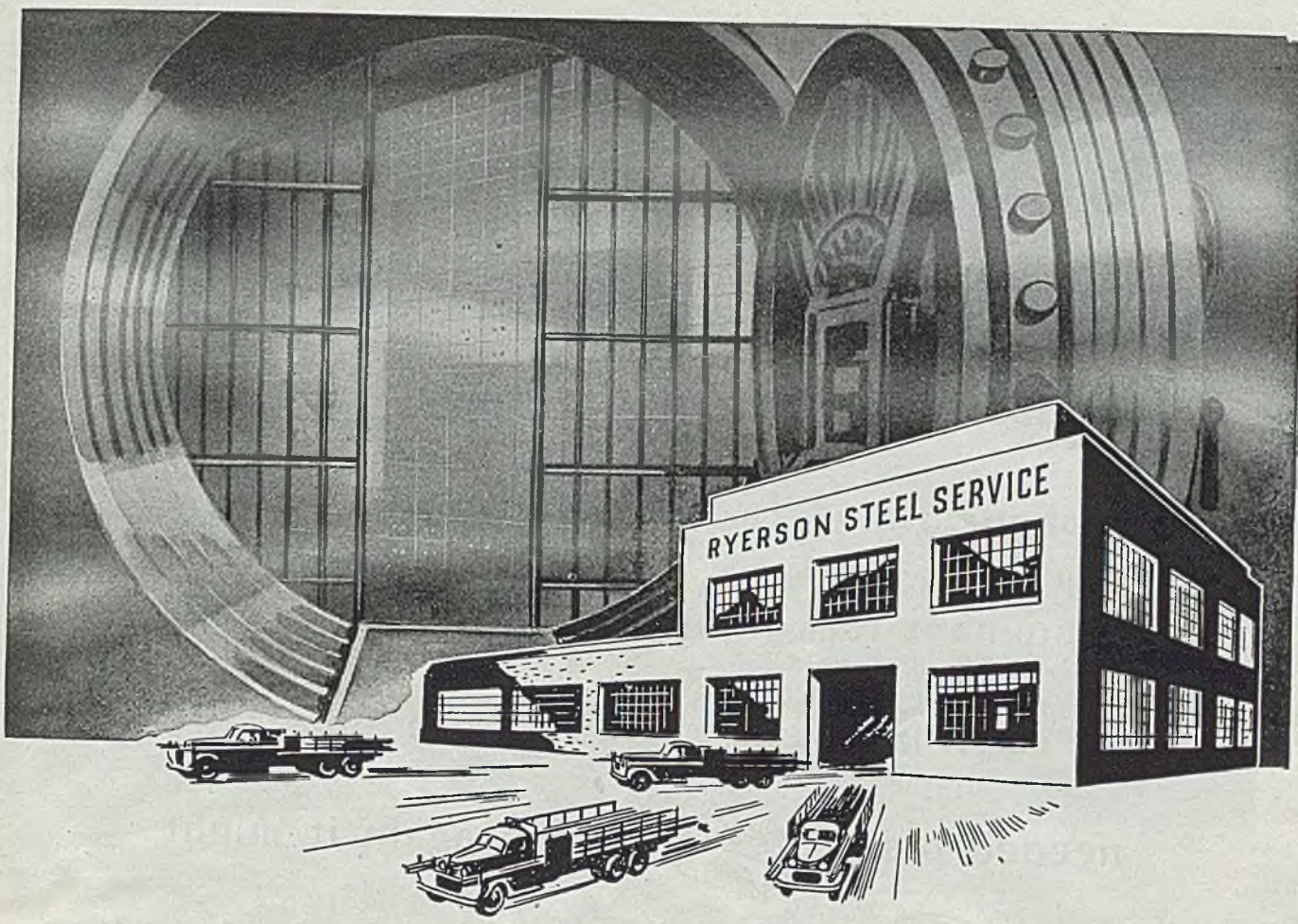
Studebaker also has been fortunate in labor matters. It negotiated a 12-cent per hour increase in basic wage rates to offset in part take-home pay reductions resulting from cutback to a 40-hour week, thus avoiding strikes that have plagued some other auto companies.

The dollar-value of these anticipatory actions runs into impressive figures. —p. 93

POSTWAR POSTSCRIPTS: One clear indication that the war is over is the announcement by the Federal Trade Commission (p. 88) that it will now proceed with actions against certain industrial corporations which were held in abeyance during the recent emergency period . . . . Several organizations are co-operating in a campaign to reduce the accident rate in the fabricated structural steel industry. Last year one out of every 12 workers in this industry was injured (p. 77), a record that can be improved considerably by methods that have been proved effective in other industries . . . . RFC will apply the Clayton pricing formula, hitherto limited to standard general-purpose machine tools (p. 86), to many other standard tools in order to expedite their sale . . . . Studebaker's postwar plans involve a number of features of manufacturing technique (p. 93) based upon experience acquired in airplane engine work during the late war . . . . Allegheny Ludlum Steel Corp. announces the immediate erection of a $2 million laboratory and experimental center (p. 104) as the first project on its peacetime expansion program . . . . National Housing Administrator John B. Blandford Jr. believes that housing has potentialities (p. 89) for providing opportunities for an annual investment of $6 billion to $7 billion and jobs for from 4 to 4½ million persons . . . . French industry, hard hit by German occupation and the fighting when the enemy was pushed east across the Rhine (p. 90), faces difficult problems of rehabilitation. Help from the United States is sorely needed at a time when Americans in liberated France are not too popular . . . . Bethlehem Steel has resumed shipments of steel to foreign points from Sparrows Point. Last week 5000 tons of plates, sheets and bars were loaded on a Norwegian freighter (p. 105) for delivery to Swedish and Norwegian ports . . . . In view of the rather optimistic predictions concerning the applications of atomic energy appearing in the public prints, many readers will welcome a statement of cold facts on this popular subject. There are attractive possibilities for peacetime uses of atomic energy (p. 112) but they are largely in the long range future . . . . Wire cables which expand and contract in varying temperatures at almost the same rate as duralumin, recently developed by American Steel & Wire Co. (p. 100), will increase the efficiency of controls in airplanes of the future.

E. L. Shaner

EDITOR-IN-CHIEF



Like Money On Deposit

Yes, steel in Ryerson warehouses is like money on deposit—there for you to draw on, in the amounts you need. More than 10,000 kinds, shapes and sizes are typical stocks at our eleven steel-service plants.

Steel from our stocks has valiantly served the war effort, as it will now serve the peace. We've met tough situations, almost without number, where steel—a piece, a few pounds, or many tons—was needed immediately to avert production delays.

We've met tough situations on the technical side, too—situations where our engineers and metallurgists have been able to find a way when a way had to be found. In cutting and otherwise preparing steel to meet ticklish specifications, we've also done exceptional things.

Furnishing steel promptly—the kinds and quantities wanted—has been our business for 103 years. Stocks these days have not always been in balance from a size standpoint, because of the tremendous war demand for steel. But our stocks are the nation's largest. And they are here for you to draw on.

For Stock List and Data Book, write our plant that is nearest you.

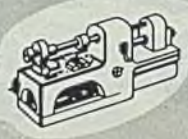
RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC.

Steel-Service Plants at Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh Philadelphia, Buffalo, New York, Boston

RYERSON STEEL

PARISH SAYS..

Whether or not you may be interested in producing one of these post-war  or perhaps a modern  or maybe it's new equipment for streamlined  or continuing the manufacture of vitally needed plant  then again it might be  or a hundred and one other products that will grace our new free world...

Pressed metal parts and stampings point the way to perfect reproduction of modern design and low cost manufacturing. THE PARISH PRESSED STEEL CO. has realized that metal parts must be properly fabricated to meet the demands of manufacturers for beauty in design, shock and temperature resistance and surface protection through fine finishes. PARISH engineers are ready to assist you with your present and post-war fabricating problems from the drawing board to the finished product. We are equipped to reproduce the most intricate modeled shapes in aluminum or other metals, faithfully and economically. Why not call on PARISH for the very finest in engineering and modern production methods?

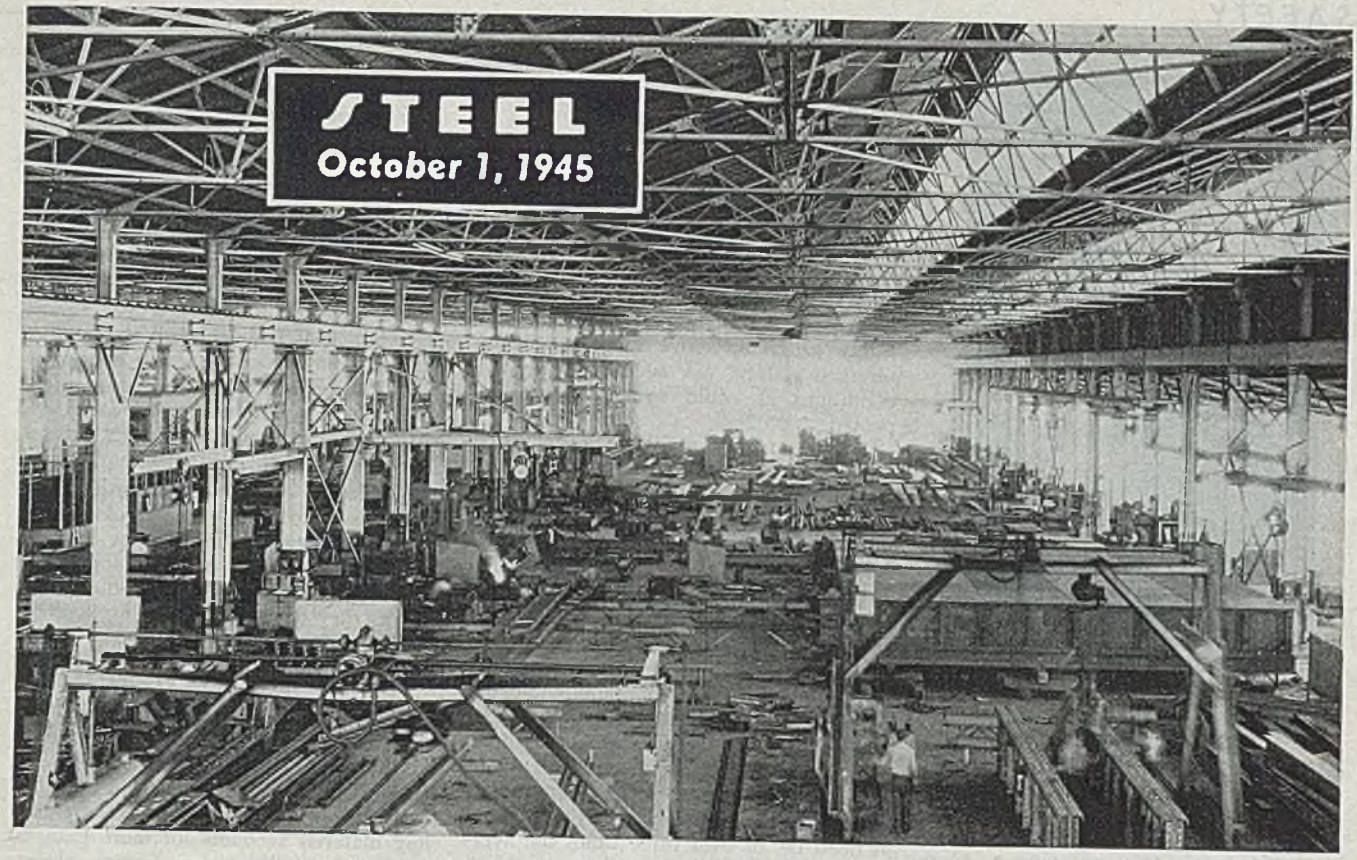
PARISH PRESSED STEEL CO.

READING, PENNSYLVANIA

Subsidiary of SPICER MANUFACTURING CORPORATION

WESTERN REPRESENTATIVE: F. SOMERS PETERSON, 57 CALIFORNIA ST., SAN FRANCISCO, CAL.

STEEL
October 1, 1945



A safety campaign in this and other plants fabricating structural steel has as its aim a 40 per cent reduction in accidents by the end of this year. Attainment of this goal would save employers over $2 million and employees more than $200,000

Seek 40 Per Cent Accident Reduction In Fabricated Structural Steel

Safety campaign launched by Department of Labor in co-operation with trade associations, labor organizations and other state and federal agencies. Plants offered consulting and advisory service on industrial safety and health and fire prevention

By V. A. ZIMMER
Director, Division of Labor Standards,
U. S. Department of Labor

ONE out of every 12 workers injured last year—4,500,000 man-hours lost because of work injuries. That's the accident record of the fabricated structural steel industry. With an accident frequency of about 36 disabling injuries per million man-hours worked (roughly 500 employees working one full year) fabricated structural steel, no more hazardous than its parent industry, iron and steel, has a frequency more than three times higher.

In industrial safety and health and fire prevention the industry has not kept pace with others of equal importance. About 6700 workers were killed, permanently or temporarily disabled last year. Forty were killed, 261 were partially but permanently disabled and 6400 temporarily disabled.

Management's cost was about $660 per injury. This included workmen's compensation payments, medical care and incidental machine and plant damage. The average injured worker, excluding the dead and crippled, lost some 11 days' pay over and above his compensation benefits.

Granted the hazardous nature of the fabricated structural steel industry, the accident experience of most plants and of the industry as a whole can be materially improved. This improvement will bring large savings to employers and employees. It is not too much to expect a frequency rate of ten—not more than one employee in 50 injured during the year. Many individual plants now have low rates.

To effect a reduction in fabricated structural steel accidents, the U. S. Department of Labor in co-operation with the Concrete Reinforcing Steel Institute, National Association of Miscellaneous & Ornamental Iron Manufacturers, U. S. Chamber of Commerce, labor organizations and other federal and state agencies is spearheading a drive to reduce accidents in the industry by 40 per cent by the end of the year.

Such a reduction would prevent at least 2680 deaths and serious injuries every year. It would save over $2 million in direct and indirect costs to employers and more than $200,000 in lost wages to employees.

For the purpose of the drive the fabricated structural steel industry embraces plants primarily engaged in manufacturing fabricated iron and steel for structural purposes. The basic products are parts, such as trusses, beams, and angles for buldings and bridges. Other products are structural steel stairs, stair cases, fire escapes, grills, railings, iron fences and gates, fabricated bars and rods for reinforcing concrete and portable buildings.

The importance of these industrial

V. A. ZIMMER

establishments, now that the combat war is over and the construction industry will play a major part in maintaining our economy, underline the need to conserve its workers from accidents. A large percentage of our people live and ride in or on the products of this industry during most of their lives.

The industry employs approximately 100,000 workers in about 1138 plants distributed over 41 states.

To accomplish the maximum amount of accident prevention, each plant will be visited during the drive by a safety specialist of one of the co-operating agencies. The purpose of the plan is twofold: 1. To offer to the individual plants betweeen now and the first of the year the services of expert safety consultants to aid in setting up and operating a sound plant safety program; and 2. to assist existing trade and labor organizations within the industry in the establishment of a sound, permanent safety program on an industrywide basis.

Representatives of the co-operating agencies will call upon the plants offering their services as consultants and advisors on safety and health. They will aid in analyzing the plants' safety performance and help to find and correct existing hazards. They will suggest means of strengthening the weak spots and will advise as to the type of safety organization and program best suited to the particular plant. The utilization of these services, at no expense to the establishment, will be wholly at the discretion of each establishment. The service is advisory only.

Safety-wise management and the safety profession know that nine out of ten accidents can be prevented. Within the fabricated structural steel industry proof exists that the wastage of men, money and productive time can be reduced. Several establishments boast long-time frequencies of 10 or less and a few have gone several years without an injury. What these plants have done can be done by the entire industry.

Plants with effective safety programs show that a large proportion of injuries can be prevented by proper guarding of machinery, worker education, and adequate attention to accident prevention. While management in some cases has done an outstanding job, the majority of plants have neither an adequate safety program, active management interest in safety, nor such safe physical conditions as could reasonably be expected.

Many small plants have never been adequately served by any accident prevention agency. They do not know the service available, or the methods by which job injuries may be avoided. The owner or manager of a small plant which has two or three injuries a year may think his experience is good. In reality it may result in an accident frequency of 50 to 70—five to seven times as high as it need be. Such a plant employing 50 workers was visited recently. The owner believed he was doing a good job in accident prevention. Yet an analysis indicated an accident frequency of 110—approximately 10 times what it need be, or over three times the average for the industry—and an accident cost of $10,000 a year or $200 per employee per year, an enormous waste of manpower and money.

Fortunately this case is not typical of the industry. A few plants have an accident frequency of 5 (approximately one accident per 100 employees per year).

What some fabricated structural steel plants have done in accident prevention can be done by any concern.

These records prove that energy spent on safety promotion is well spent. Decreased accident costs help offset increased operating costs.

Management Held Responsible

These records also prove that accident prevention in the fabricated structural steel industry—as in industry in general—lies in the hands of management. Workers in a plant, be they ever so careful, cannot maintain accident-free operation if the tools, machinery, and buildings they use are unsafe. Management's job lies not only in teaching employees to work safely but in being sure their tools and surroundings are safe and providing competent safety-minded supervisors. Only when management is determined that accidents shall be avoided can good safety performance be obtained. This responsibility of management cannot be delegated. While safety men can take care of the mechanics and technical phases, management interest needs to be kept at a high pitch.

Safety-minded senior executives recognize that an effective accident prevention program is essential to profitable and efficient operation.

To obtain results, management must assume major responsibility and leadership. Its part is to:

1. Provide a safe plant and safe equipment.
2. Lay out and arrange all operations with full regard for safety.
3. Find and correct all hazard points.
4. Provide competent safety-minded supervision.
5. Set up and maintain a definite safety program.
6. Solicit actively the full co-operation of all employees in the safety effort.
7. Train all new employees in safety.

Accident experience in the fabricated structural steel industry indicates items 2, 3, and 7 are of particular importance.

Employees expect to take orders from the boss. If the boss overlooks safety, so will the employees. If the boss insists on safety and provides for safety, the results will soon show themselves just as they do in any other phase of the work.

Injuries to Eyes Frequent

Studies in this industry show that less than 10 per cent of all reported injuries result from moving machinery. For the rest, the hazards common to any industrial operation predominate. Handling material accounts for more than 20 per cent of all injuries; foreign objects in eyes, for more than 25 per cent; hand tools, for 10 per cent; falling material, for 10 per cent; and slips and falls, for nearly 5 per cent.

Attention, therefore, is directed principally to injuries that can be prevented by:

1. Wearing or utilizing safety clothing or equipment; 2. training or supervising personnel.

Injuries to eyes, toes and head can be prevented by wearing safety clothing. So can a large precentage of injuries to feet, hands, and fingers. Such clothing includes safety shoes; safety or hard hats; eye protective equipment suitable for the individual job, or at least regular safety glasses for any job outside the office; and heavy gloves suitable for the specific material handling involved.

Getting employees to change their work habits and wear safety clothing is not easy. It means gaining their confidence, convincing them that wearing such clothing will help them and not interfere with job performance. It means providing some convenient source for obtaining the material for properly fitting each employee or for adjusting and readjusting the equipment for his use. Most important is the conviction on the part of management that wearing such equipment is necessary if employees are not to be injured.

Management and labor organizations are the only parties which can do the selling and educational job required to get employees to wear protective equipment. Over 50 per cent of the serious injuries in this industry can be avoided through the use of safety clothing and equipment. Both management and labor see

the necessity for an active program to get such equipment fully used.

Since many of this industry's products are custom built, employees generally serve a long apprenticeship or training period and receive close supervision. For an effective accident prevention job, this training and supervision should include accident prevention. This will be done only at management's insistence, and by its persistent follow-up.

Good housekeeping is a joint project for supervisors and employees spearheaded by management. Lack of interest in good housekeeping contributes to the large number of injuries, particularly slips and falls. The variety of stock, finished products, scrap, and welding cables throughout the shop necessitates a carefully thought out housekeeping program. In some shops, overhead cable lines and a carefully maintained aisle system have accomplished a great deal. In any event, the housekeeping program has to be designed for the shop. Unless there is some system so that workers do not have to walk over scrap, materials, parts, and cables, they will continue to slip and fall.

Model Program Outlined

While the actual form of any permanent industry-wide accident prevention program must be shaped largely by developments and accomplishments, it is suggested that the following program be considered:

A permanent committee consisting of:

1. Industry representatives, probably from trade associations and preferably trained in accident prevention.

2. Labor representatives, preferably trained in accident prevention.

The duties of the committee should include:

1. The establishment and maintenance of a permanent active program that would tie in management and labor.

2. Collection of accident data.

3. Assistance in the development of safety standards.

4. Preparation and distribution of information on all pertinent phases of accident prevention, health preservation, and fire prevention.

5. Consultant and advisory service on safety problems in individual plants.

6. Close liaison on behalf of the industry with safety congresses and other phases of organized safety.

7. Issuance of promotional material on accident prevention, health preservation, and fire prevention.

A generation of organized safety work has developed basic principles and effective procedures, gathered information and built standards for good safety conditions and performance. Everyone responsible for safety in a plant can be trained in this body of knowledge.

To help key supervisors obtain this training, an extension course in safety engineering for key men to whom the employer has assigned full or part-time responsibility for safety is available through many local colleges and universities.

Under the sponsorship of the Department of Labor and the National Safety Council a ten-session (20-hour) safety course for foremen has been developed using sound slide-films as the basis for each session. This can be given in the plant, or by the local safety councils or through the divisions of vocational hazards.

The above course will reasonably meet the needs of key men in safety. However, a good understanding of the why and how of safety is essential throughout the entire working force if there is to be first-rate safety performance. To assist the foreman in instructing the individual worker about the hazards of his job, a supervisor's safety guide has been prepared relative to the hazards of this particular industry. From this manual the foreman can develop a short course designed for the worker.

Any establishment in the industry interested in availing itself of the services of the safety specialists who have volunteered their services in the accident reduction drive may write or telephone any of the following representatives:

Lewis E. MacBrayne, 80 Federal St., Boston 10.

E. G. Quesnel, 350 Madison Ave., New York 17.

Walter W. Matthews, 1129 Walnut St., Philadelphia 7.

Carl L. Smith, 4282 Post Office Bldg., Cleveland 13.

William H. Ivey, 2225 Comer Bldg., Birmingham 3.

Theodore O. Meisner, 104 South Michigan Ave., Chicago 3.

Charles A. Miller, 300 Keller Bldg., Houston 2, Tex.

R. E. Donovan, 200 Bush St., San Francisco 4.

Ralph E. Walter, 603 Electric Bldg., Omaha 2, Nebr.

Present, Past and Pending

■ DENY PRICE CONTROL LIFTED ON SOME STEEL PRODUCTS

WASHINGTON—Reports last week that government price control had been lifted from alloy steel, including stainless steel, tool steels, fine wire, wire rope and seamless boiler tubes, were declared unfounded in responsible OPA circles. Lifting of controls on some products is under consideration but no decision has been reached. It was said initial action, if taken, would involve only stainless steel.

■ AMERICAN LOCOMOTIVE CO. BUYS BEAUMONT IRON WORKS

NEW YORK—American Locomotive Co. has purchased Beaumont Iron Works Co., Beaumont, Tex., subject to approval of Beaumont stockholders.

■ ADDITIONAL OFFICIALS LEAVE WPB STEEL DIVISION

WASHINGTON—Following officials are leaving the Steel Division, War Production Board, on Oct. 1: Alex Miller, assistant director in charge of raw materials and facilities, and chief of the Scrap Branch, who is returning to Columbia Iron & Metal Co., Cleveland; Russell J. Greenly, deputy assistant director in charge of production, who is returning to Carnegie-Illinois Steel Corp., Chicago; and C. L. Wyman, chief, Iron Ore Section, who is returning to Butler Bros., St. Paul.

■ WESTERN PIPE ACCEPTS CONSOLIDATED STEEL OFFER

LOS ANGELES—Western Pipe & Steel Co., San Francisco, has accepted, subject to stockholders' approval, an offer of $6,217,372 from Consolidated Steel Corp., this city, to purchase all assets of Western Pipe.

■ MALLEABLE IRON CASTINGS INDUSTRY ACTIVE

WASHINGTON—Continued large order backlogs for malleable iron castings, bulwarked by reconversion needs, insure a high rate of operation for the industry.

■ SPB SPEEDS DISPOSAL OF SURPLUS PROPERTY

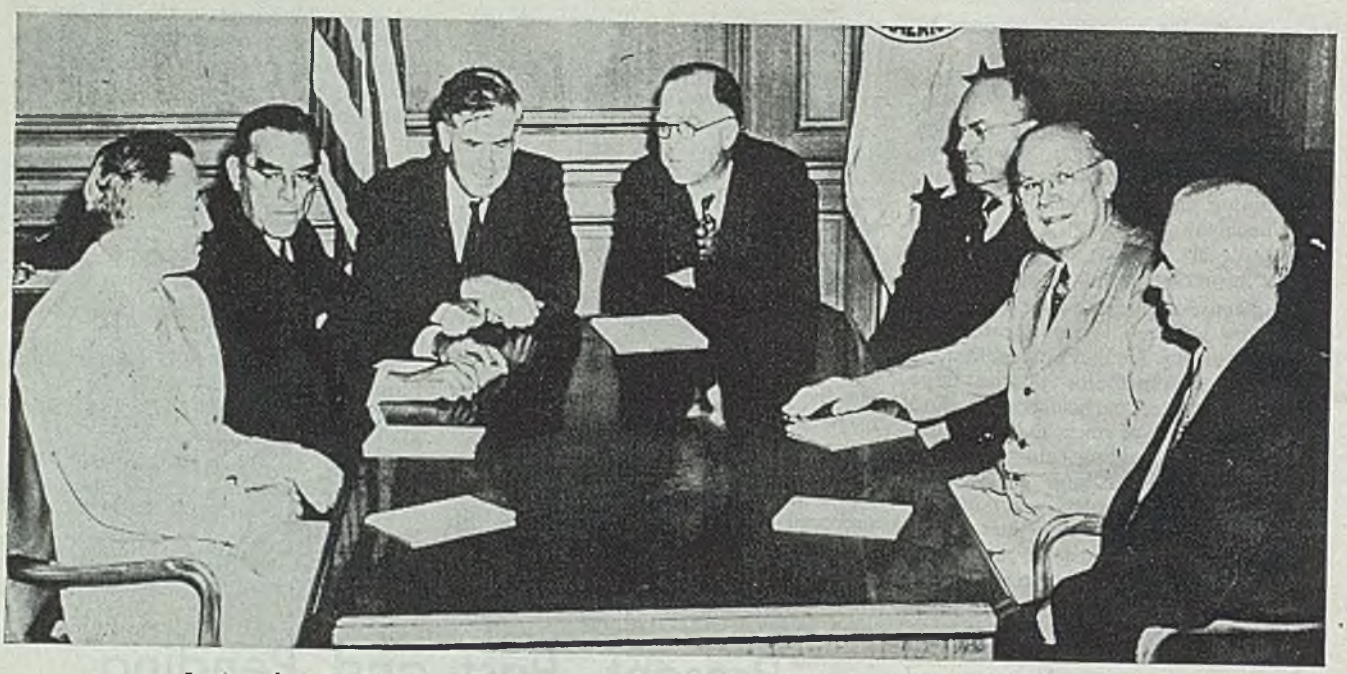
WASHINGTON—Surplus Property Board has established reserves of surplus material to take care of preferential buyers. Property in excess of these reserves may be sold immediately to non-government buyers.

■ HINDUSTAN MOTORS TO BUILD STUDEBAKER CARS

SOUTH BEND, IND.—Studebaker Export Corp. and Hindustan Motors Ltd. have entered into an agreement providing for exclusive manufacture, assembly and distribution by the latter company of Studebaker passenger cars and trucks in India, Napal, Burma and Ceylon. Hindustan Motors is building a new plant in India.

■ HILLIARD NAMED VICE PRESIDENT, CARNEGIE-ILLINOIS

CHICAGO—Thomas J. Hilliard has been elected vice president in charge of sales, Carnegie-Illinois Steel Corp. He will be succeeded as general manager of sales by J. Douglas Darby. A. Paul Selby has been named assistant general manager of sales and Wesley C. Bobbitt, manager of sales in Philadelphia.



Laying plans for the labor-management conference to be held in Washington Nov. 5 are these spokesmen of industry, labor and government meeting in Washington. Left to right: Eric Johnston, president, Chamber of Commerce of the United States; Ira Mosher, president, National Association of Manufacturers; Secretary of Commerce Henry Wallace; Secretary of Labor Lewis B. Schwellenbach; John W. Snyder, director, Office of War Mobilization and Reconversion; William Green, president, American Federation of Labor; Philip Murray, president, Congress of Industrial Organizations. NEA photo

Seek New Methods To Curb Strikes

Stoppages during reconversion period find country unprepared, lacking both policy and effective machinery. Labor-management conference to meet in Washington, Nov. 5. War Labor Board to go out of existence Dec. 15

THE wave of strikes and threatened strikes, No. 1 obstacle to speedy reconversion and large employment, has caught the nation unprepared. It has neither an integrated national labor policy nor effective machinery to prevent interruptions to production while disputes are being settled.

Little relief from this situation is in sight for at least six weeks. The wartime machinery for adjusting disputes is fading out of the picture and no longer can be counted on to deal with the new problems. The unions feel freed from their wartime "no-strike" pledge, which was of questionable effectiveness even while hostilities were continuing. The Smith-Connally antistrike act has lost face and probably will be repealed soon. The reorganization of the Department of Labor and the re-emphasis of the conciliation service have not yet demonstrated any effectiveness of settling disputes.

Organized labor has chosen this time to launch its campaign for wage rate increases to consolidate and enhance gains made during the war. In almost every major industry, unions are asking or preparing to ask for rate advances which will maintain their weekly take-home pay at the wartime levels as work-weeks are cut back to 40 hours or less. Generally the increase asked is a flat 30 per cent, the equivalent of 52 hours' pay at present rates for 40 hours of work.

Voluntary methods of settling disputes promptly and of maintaining production while such disputes are in process of settlement will be sought at the national labor-management conference to be held in Washington, Nov. 5.

Although plans for the conference have not yet been completed, it now appears the agenda will include these points:

1. How to set up machinery that will work out a solution of disputes that develop in collective bargaining contracts.

2. How to renew expiring contracts without strikes or lockouts.

3. Framing of industrial codes by labor-management agreements in the various industries.

Some differences of opinions exist among the various sponsors of the conference. Industry spokesmen and to an extent the American Federation of Labor wish to confine the discussions to ways of maintaining industrial peace after the War Labor Board winds up its affairs and quits about Dec. 15. The Congress of Industrial Organizations, on the other hand, wishes to inject considerations of wages, the full employment bill, fair employment practices and other matters into the conference.

The conference is expected to be strictly a labor-management affair with the government represented only by observers. Whatever decisions are reached will be those of the 18 representatives each of labor and industry. This representation may be increased by naming alternates so that industry and labor each will have 36 delegates.

Consideration is being given to obtaining an outstanding public figure to preside at the conference to lend dignity and importance to the meetings. Henry L. Stimson, former secretary of war, is being mentioned for the chairmanship. George W. Taylor, chairman of the War Labor Board, is being considered for the post of secretary of the conference.

Although President Truman and Secretary of Labor Lewis B. Schwellenbach

are optimistic over the probable results of the conference, other observers view the prospects gloomily. They point out that the windup of the conference and the demise of the WLB probably would coincide and that for a period there would be no machinery to deal with labor disputes, other than the Department of Labor's conciliation service.

Additional 55,550 Workers Needed in Steel Industry

Steel industry requires approximately 55,550 additional men to meet anticipated peacetime production schedules, according to the American Iron & Steel Institute. Survey indicates employment was down to approximately 548,000 persons in mid-September, compared with an estimated 552,000 persons in mid-August.

Addition of 55,550 persons needed in plants and offices would raise the industry's employment to around 617,000 persons.

Selective Service Holds Veterans Need Not Join Unions To Regain Jobs

"Super-seniority" for returning servicemen upheld. Must be reinstated even though older civilian employees are displaced. Standards to govern veterans' job rights under Selective Service act set up in new interpretation

EMPLOYERS' obligations in the rehiring of returning servicemen are clarified in a broad interpretation of the veterans' rights under the Selective Service Act, issued last week by the Selective Service System.

The interpretation virtually eliminates interference by the unions in the reinstatement of veterans. The returning serviceman does not have to join a union to get his job back, even though the plant became a closed shop during his absence. The veteran's right to his job does not depend on his prewar seniority; he must be rehired even though he replaces a cvilian employee of greater seniority.

The reinstatement of servicemen, under the interpretation, makes the matter one for the veteran and his former employer to determine in accordance with section 8 of the Selective Service Act. Consequences to "third parties" are not to be considered.

The views of Selective Service are contained in a new handbook issued by Maj. Gen. Lewis B. Hershey for the guidance of draft boards. It supersedes all previous interpretations of section 8 of the act, dealing with veterans and rights to re-employment.

Veteran Gets Benefit of Doubt

The new regulations discard an older interpretation of the law that only the senior veteran of the second World War among several who might have held the same job in succession was entitled to re-employment as a matter of right. In many border line cases the new guide lays down regulations which would resolve doubts in favor of the serviceman.

Section 8 of the Selective Service Act provides that all men who served in the armed services have the right of restoration to their former jobs or other employment of like security and pay, with protection against arbitrary dismissal for one year.

The guide sets up seven standards to govern the veterans' job rights under the following conditions:

1. If he had been in the employ of a private employer, the United States government, its territories and possessions or in the District of Columbia.

2. If his position had been other than a temporary one.

3. If he left such a position in order to enter upon active military or naval service in the land or naval forces of the United States.

4. If he satisfactorily completed his period of training and service or period of active duty and received a certificate to that effect.

5. If he is qualified to perform the duties of such a position.

6. If he makes application for re-employment within ninety days after he is

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Oil and Coal Strikes Cutting Into Metals Production; Nearly 2,000,000 Workers Idle

NEARLY 2,000,000 persons were idle throughout the nation last week as the result of strikes. This figure included the strikers and those whose idleness was enforced because of strikes.

Of the total about 1,500,000 were New Yorkers made idle by a strike of 15,000 elevator operators and service employees in Gotham buildings.

In addition 367,000 others were on strike or idle because of strikes.

The labor tieups are beginning to be reflected in the iron and steel, automobile and other metal goods production.

The oil workers' strike which late last week affected 35,000 workers in seven states and which threatened to spread across the country affecting 250,000 was reflected in shutting down of some open-hearth furnaces at steel plants to conserve meager supplies of fuel oil. Youngstown Sheet & Tube Co., Youngstown, took off seven open hearths last Wednesday and other producers were considering similar action. Some producers were taking steps to substitute tar for oil but not all furnaces are equipped for such conversion and the supply of tar also is threatened.

A strike in about 70 soft coal mines in Pennsylvania and West Virginia caused a loss of more than 140,000 tons of coal daily and was reflected in the banking of a number of blast furnaces and the curtailing of operations at coke plants. Republic Steel Corp. shut down one blast furnace at Cleveland and one at Youngstown. Further shutdowns may be expected early this week if the situation does not improve, company spokesmen said, and will result in heavily curtailed deliveries of steel to industries that now are ready to go on peacetime production. Youngstown Sheet & Tube Co. shut down three blast furnaces and cut coke plant operations 75 per cent. The coal shortage will cause a tar shortage and prevent any widespread conversion from fuel oil to tar in the open-hearth departments.

The oil workers' strike holds a danger of interruptions at all metalworking plants if gasoline supplies dry up and workers are unable to obtain transportation to their jobs. High absenteeism in many cases would call for complete shutdowns until gasoline is available again.

Elsewhere on the strike front were the following developments:

PITTSBURGH: Negotiations between Carnegie-Illinois Steel Corp. and union on demands for $2-a-day wage increase tentatively scheduled to start Oct. 10.

DETROIT: Kelsey-Hayes Wheel Co. strike in second month, tying up Ford; union attempting to end walkout. Chrysler and union recess conference on wage demand until Oct. 4. Murray Corp. workers return.

CAMDEN, N. J.: Sitdown strike staged by 14,000 at New York Shipbuilding Corp.

MUNCIE, IND.: Twenty-five hundred walked out at Warner Gear Co.

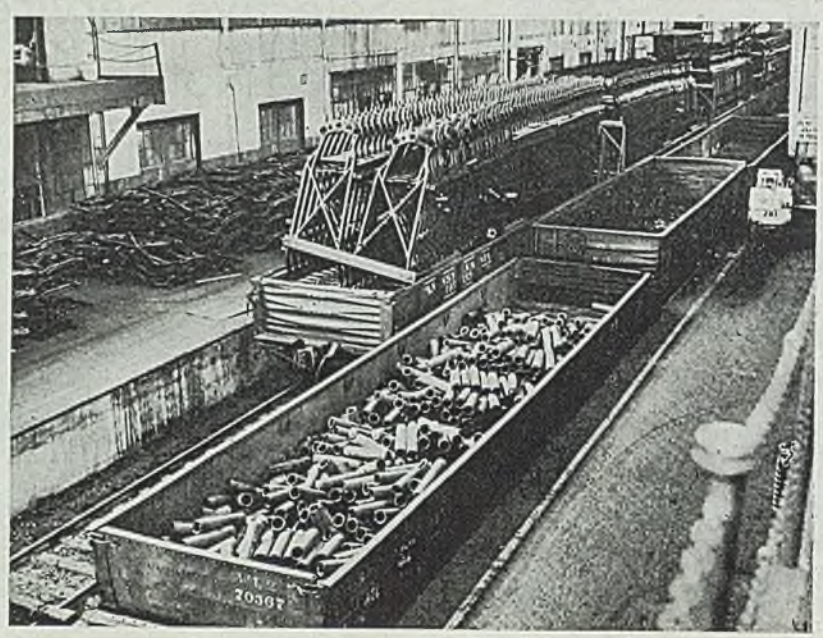
TOLEDO, O.: Spicer Mfg. Corp. closed after breakdown of negotiations for wage increases for 3300. Company said demands amounted to 103 per cent with 52 hours' pay for 30 hours' work.

CINCINNATI: Five hundred Victor Electric Products Co. employees out in demand for 30 per cent increase.

CANTON, ILL.: Several hundred International Harvester Co. employees idle because of truck drivers' strike.

Industry's Transition Progressing

Overall reconversion going ahead with surprising speed despite labor difficulties. Projected early demise of WPB reflects gains



RECONVERSION: Freight cars on one track carry away war materials while a car on another hauls in body frames at the Pontiac plant as the first 1946 models are produced. NEA photo

RECONVERSION of industry to civilian goods production has been going ahead with surprising speed despite strikes and other labor disturbances in important sectors of the economy.

Work stoppages in several lines have been crippling to some extent. This has been especially true with respect to the automotive field which wields tremendous influence in countless areas of manufacturing industry. On the whole, however, the overall reconversion job has been progressing. Even in those industries wrestling with 100 per cent reconversion the expectation in some lines is that 20 per cent of prewar manufacturing rates will be attained during the closing three months of the year, barring labor tieups.

Important in the reconversion picture at this juncture is the fact that the Controlled Materials Plan and all of the regulations issued under it expired as of Sept. 30.

Price Administrator Chester Bowles last week urged manufacturers who have received cost questionnaires from the Office of Price Administration to complete and return them promptly.

"A big part of reconversion still lies ahead," Mr. Bowles said. "If we can get prices figured promptly, it will help to speed up industry's task of putting workers on the payroll and filling stores with goods that have been out of stock for three or four years."

Aside from the problems associated with labor the big question mark before reconverting manufacturers has been the matter of raw materials. To date there has been surprisingly little complaint of inability to obtain supplies. Some products continue tight and under government control, but major materials, such as steel, have been moving to consumers in sufficient volume to keep pace with the step-up in their manufacturing operations. As the tempo of manufacturing increases, however, adequacy of raw materials supply may become a more pressing matter than at present.

Indicative of the encouraging progress being made by industry in getting back to a peacetime basis is the fact that the War Production Board, which directed production for war and since the end of the war has been the government agency directing reconversion, is rapidly winding up its affairs.

Some branches of WPB will go out of existence before the end of the month. In fact, some already have been discontinued. For instance, effective Sept. 28, the Warehouse Branch of the Steel Division, which has been headed by J. R. Stuart, ceased to function as an operating unit of the board.

Remaining functions of the Warehouse Branch have been taken over by the Distribution Branch of the Steel Division. Dudley S. Bright now is in charge of all matters pertaining to the warehousing of steel.

While official announcement is lacking, it was reported in responsible circles in Washington last week that WPB probably will go off the stage at the end of this month. It was reliably reported that a memorandum has been distributed to WPB officials informing them that the agency's end is near. If WPB passes out at the end of this month, its demise will be about two months ahead of schedule since it had not been anticipated the reconversion job would be sufficiently along to permit the folding up of the agency until around the end of the year.

Demise of WPB will not mean that its functions will be entirely eliminated. According to those in position to know, most of the board's reconversion functions will be turned over to the Office of War Mobilization and Reconversion which is headed by John W. Snyder. Such disposal, it is understood, was recommended by J. A. Krug, chairman of WPB. Of the WPB's present staff of 2700 in Washington, reduced from around 6000, it is said about 5 per cent may be shifted to Mr. Snyder's staff.

Under Mr. Snyder's reconversion office it is indicated the following functions of WPB will be maintained: Continuance of production and distribution controls over specified scarce materials; allocation of critical commodities between foreign and domestic consumers; maintenance of inventory restrictions to discourage hoarding and maldistribution of materials still in short supply; compilation of industrial statistics; exercise of necessary priorities to break production bottlenecks.

WPB's performance in organizing and directing the functioning of American industry for war production was without parallel in history. It was the last of four agencies created by President Roosevelt to handle the war production program, being preceded by the National Defense Advisory Commission, the Supply Priorities & Allocations Board and the Office of Production Management.

Decline in industrial production which is marking the war-to-peace transition will be halted by early 1946, Mr. Krug predicts.

"We have heard a great deal about total war and full mobilization," says Mr. Krug. "It may not be generally recognized that, great as our war effort was, at no time during the struggle did it absorb more than two-fifths of our total national output."

During the five-year war period, the

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July Steel for Sale Output Decreases

Finished rolled tonnage 383,-557 tons under 1944 figure. Sheared and universal plates production drops sharply. Hot-rolled bars increase

Production of steel made for sale in July totaled 5,214,074 net tons, compared with 5,597,631 tons in July, 1944, according to the American Iron & Steel Institute, New York, based on reports from companies that in 1944 represented 99 per cent of total output of finished rolled steel products.

Largest decline was in sheared and universal plates, which totaled 1,055,204 tons in July, 1944, and 615,484 tons last July. On the other hand hot-rolled bars production in July rose from 966,743 tons to 1,001,320 tons this year. Sheet production also increased over July, 1944, hot-rolled moving from 1,020,912 tons to 1,154,884 tons, cold-rolled from 313,-931 tons to 396,492 tons and galvanized from 113,958 tons to 137,635 tons. Cold-finished bars increased from 169,861 tons to 174,861 tons. Standard railroad rails, 60 pounds and over, increased from 180,-277 to 190,808 tons. Cold-rolled strip production rose from 97,609 to 106,363 tons. Only a slight rise was shown in structural shapes, from 302,873 to 313,-849 tons.

Manganese Ore Production Drops Slightly in July

Consumption of manganese ore (35 per cent or more Mn) in the United States during the war was maintained at a level nearly twice that of the 1935-1939 rate and 60 per cent more than the peak attained in World War I, according to the Bureau of Mines.

Domestic production during July was 17,700 tons while shipments were 17,-800 tons, and producers' stocks at the end of the month were 500 tons. Monthly rate of shipments averaged 20,635 tons in 1944. Imports of manganese ore (35 per cent or more Mn) in July were 132,246 tons.

Production of ore containing 5 to 35 per cent manganese amounted to 189,-800 tons in July compared with 207,600 tons in June while shipments declined 6 per cent and totaled 201,100 tons. Stocks at mines on July 31 totaled 35,400 tons.

Production of ferromanganese totaled 52,137 tons in July, an increase of 2 per cent over June. Shipments from furnaces amounted to 53,930 tons.

Stocks of Iron and Steel Scrap Drop During June

Stocks of iron and steel scrap at plants of consumers, suppliers and producers at the end of June, 1945, approximated 4,847,000 gross tons, a decline of one per cent from the 4,902,000 tons reported on May 31, 1945, according to the Bureau of Mines, United States Department of the Interior.

Bureau of Mines figures indicate that consumers and suppliers are holding their stockpiles at a constant level. The sharp reduction in consumption did not result in an increase in iron and steel scrap stocks in consumers hands because of decreases in production of home scrap and in receipts of purchased scrap from suppliers.

Pig iron stocks in this period increased slightly, the use of pig iron being at its lowest point since the Bureau's surveys were placed on a monthly basis in July, 1941.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period JULY - 1945

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) Total	To Date This Year: Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	51	1	xxxx	xxxx	xxx	588,150	182,276	xxxx	xxx	5,170,111	1,363,258
Structural shapes (heavy)	11	2	9,580,550	313,849	40.5	309,323	xxxx	1,995,027	58.4	2,012,260	xxxx
Steel piling	3	3		15,144		17,151	xxxx	139,574		144,075	xxxx
Plates (sheared and universal)	27	4	17,841,320	615,484	40.7	591,982	73,867	5,026,457	48.5	4,919,992	374,309
Skelp	6	5	xxxx	xxxx	xxx	66,357	30,889	xxxx	xxx	451,324	243,789
Rails—Standard (over 60 lbs.)	4	6	3,669,000	190,808	61.3	188,558	xxxx	1,281,876	60.1	1,271,382	xxxx
—All other	5	7	512,000	12,952	29.8	13,306	xxxx	104,540	35.1	104,696	xxxx
Splice bars and tie plates	12	8	1,745,960	64,031	43.3	66,753	xxxx	447,577	44.1	462,281	xxxx
Track spikes	10	9	349,400	12,566	42.4	12,930	xxxx	89,885	44.3	93,274	xxxx
Hot Rolled Bars—Carbon	38	10	xxxx	708,038	xxx	564,193	101,368	5,190,791	xxx	4,072,016	645,977
—Reinforcing—New billet	13	11	xxxx	61,538	xxx	61,700	xxxx	367,309	xxx	371,281	xxxx
—Rerolled	14	12	xxxx	5,179	xxx	6,673	xxxx	44,320	xxx	49,343	xxxx
—Alloy	24	13	xxxx	226,565	xxx	158,674	18,081	1,814,596	xxx	1,313,765	160,163
—Total	46	14	22,381,700	1,001,320	52.8	791,240	119,449	7,417,016	57.0	5,806,405	806,140
Cold Finished Bars—Carbon	23	15	xxxx	145,531	xxx	145,924	xxxx	1,069,895	xxx	1,069,187	xxxx
—Alloy	25	16	xxxx	29,330	xxx	25,565	xxxx	257,759	xxx	234,582	xxxx
—Total	32	17	3,015,910	174,861	68.4	171,489	xxxx	1,327,654	75.8	1,303,769	xxxx
Tool steel bars	17	18	273,010	8,275	35.8	9,187	xxxx	80,550	50.8	80,984	xxxx
Pipe & Tubes—Butt weld	16	19	2,232,520	131,770	69.6	129,570	xxxx	904,103	69.7	881,922	xxxx
—Lap weld	9	20	830,200	43,637	62.0	47,070	xxxx	318,715	66.1	330,211	xxxx
—Electric weld	11	21	1,570,900	83,775	62.9	77,027	xxxx	614,933	67.4	545,024	xxxx
—Seamless	16	22	3,377,700	256,285	89.5	199,501	xxxx	1,828,147	93.2	1,454,924	xxxx
—Conduit (cap. & prod. incl. above)	7	23	xxxx	xxxx	xxx	5,874	xxxx	xxxx	xxx	48,861	xxxx
—Mech. tubing (cap. & prod. incl. above)	11	24	xxxx	xxxx	xxx	59,950	xxxx	xxxx	xxx	457,137	xxxx
Wire rods	27	25	7,266,670	357,062	58.0	114,652	39,443	2,678,575	63.5	772,217	269,496
Wire—Drawn	41	26	5,664,690	265,236	55.2	149,815	8,478	2,108,445	64.1	1,264,645	70,363
—Nails and staples	19	27	1,253,360	47,121	44.4	47,210	xxxx	348,560	47.9	353,968	xxxx
—Barbed and twisted	15	28	539,610	18,484	40.4	18,203	xxxx	138,896	44.3	139,133	xxxx
—Woven wire fence	16	29	1,113,860	26,693	28.3	25,630	xxxx	212,437	32.8	210,900	xxxx
—Bale ties	12	30	149,700	6,155	48.5	6,520	xxxx	43,257	49.7	48,086	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	40,945	251	xxxx	xxx	295,971	2,936
—Chemically treated	8	32	465,000	7,555	19.2	7,716	xxxx	67,889	25.1	62,053	xxxx
Tin and Terne Plate—Hot dipped	10	33	3,793,850	188,560	58.6	190,317	xxxx	1,216,778	55.2	1,301,470	xxxx
—Electrolytic	10	34	2,231,850	79,973	42.3	78,765	xxxx	514,811	39.7	533,407	xxxx
Sheets—Hot rolled	30	35	19,197,320	1,154,884	71.0	558,126	43,204	7,937,386	71.2	4,036,648	280,650
—Cold rolled	12	36	7,131,460	396,492	65.6	219,287	xxxx	2,636,363	63.6	1,529,797	xxxx
—Galvanized	16	37	2,915,130	137,635	55.7	137,862	xxxx	1,026,931	60.6	1,030,574	xxxx
Strip—Hot rolled	24	38	7,055,390	223,426	37.4	132,387	19,322	1,601,837	39.1	989,956	159,476
—Cold rolled	35	39	3,119,850	106,363	40.2	101,324	xxxx	829,452	45.8	779,975	xxxx
Wheels (car, rolled steel)	5	40	319,400	24,080	88.9	22,940	xxxx	174,856	94.2	173,487	xxxx
Axles	6	41	408,170	12,159	35.1	13,289	xxxx	87,278	36.8	89,755	xxxx
All other	5	42	190,490	4,071	25.2	3,668	xxxx	28,435	25.7	26,226	xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	5,214,074	517,179	xxxx	xxx	39,176,900	3,570,417
Effective steel finishing capacity	152	44	67,310,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	82.3%	xxxx	xxxx	xxx	91.1 %	xxxx

Friction Sawing Speeds Cutting, Consultant Tells Steel Engineers

Speaker at Pittsburgh regional meeting of Association of Iron & Steel Engineers says method faster than others, except shearing. Blade with smooth rim permits continuous production cutting of high-carbon annealed steels

FRICTION sawing of steel permits faster cutting than with any other known process except shearing. This fact was brought out by J. M. Lewis, consulting engineer, Kling Bros. Engineering Works, Chicago, at the third regional fall meeting of the Association of Iron and Steel Engineers, William Penn Hotel, Pittsburgh, Sept. 26.

Other regional meetings of the association were held in Birmingham, Sept. 17, and Detroit, Sept. 24. Still others are scheduled in Chicago, Oct. 1, Cleveland, Oct. 3, and Philadelphia, Oct. 6.

Mr. Lewis pointed out that rounded corners of a deformed blade rim produce considerable more burr on the edge of the sawed faces, as the blade emerges from contact, than is produced if the corners of the blade rim are sharp.

If heat is dissipated from the blade rim with the application of a coolant in a manner so the rim cannot reach a red heat and will not show any indication of a red heat on the periphery immediately ahead of contact with the material for the entire duration of every cut, there will be no adherence of foreign metal to the rim regardless of the type of steel being severed.

A blade having a smooth rim, he explained, will permit continuous production cutting of all high-carbon steels in their hardened or annealed condition, where the carbon content varies from 0.060 to 1.00 per cent. On steels having lower values of carbon content, the smooth rim blade will not roughen but tends to glaze into a smoother surface, which requires more energy to sever steel sections having the same section area of higher carbon content. By indenting the rim in a manner resembling gear teeth of about ¼-in. pitch, the blade will readily sever any of the lower carbon steels with less energy than that required by the smooth rim blade when cutting high-carbon steels of the same section area and shape.

Efficiency of friction sawing increases with the rim velocity for speeds up to about 20,000 fpm but seems to remain nearly constant for higher values.

For friction saw blades cutting cold steel sections with uniform rim velocity of about 24,000 fpm, the minimum rim thickness of 5/32-in. for 24-in. diameter and increases at the rate of 1/16-in. with each additional foot of diameter for proper tension.

The power which the 24-in. blade will withstand is limited to that of a 25-hp driven motor, and, as the diameter and thickness are increased, the power may be increased by at least 25 hp per additional foot of diameter.

With complete heat dissipation during the arc of cooling, the safe length of contact which allows the rim to emerge from contact without excessive heating is about 3 in. for the 24-in. blade, and seems to increase at the rate of 2 in. for each additional foot of diameter.

Sawed surfaces of all cold steel sections cut by friction sawing will be subject to sudden heating and rapid cooling practically equivalent to quenching. The hardness developed is dependent upon the carbon and alloy content of the material. But the depth of hardness on high-carbon or alloy steels is shallow. The hardness is completely removed if the pieces severed are to be followed by heat treatment. In such cases a saving in material cost is often obtained by purchasing such materials in their unannealed condition.

Twelve Technical Sessions On ASME Meeting Program

Leading technologists in the engineering, industrial and educational fields will participate in the program of the Cincinnati section fall meeting of the American Society of Mechanical Engineers at Hotel Netherland-Plaza, Oct. 2 and 3.

Although national in scope, the program was developed by the Cincinnati section, with Mario Martellotti, Cincinnati Milling Machine Co., its chairman, heading the arrangements committee.

Twelve technical meetings will deal with such subjects as aviation, railroads, plastics, metals engineering, fuels, applied mechanics and management. Four sessions will be devoted to the subject of metal cutting.

Plant visits will be paid to the Cincinnati Milling Machine Co. on Tuesday afternoon, and to the Wright Aeronautical Co. on Wednesday afternoon.

Among technical papers to be presented are: Plastics—R. N. Backschieder, and George H. Clark, Cincinnati; Management (two sessions)—Stewart M. Lowry, Pittsburgh; Millard Romaine, Cincinnati; M. H. Trytten, Director of the Office of Scientific Personnel, National Research Council, Washington, D. C.;

FREEMAN H. DYKE

Mr. Dyke, assistant general manager, steelworks, Wheeling Steel Corp., Steubenville, O., was named for the presidency of the Association of Iron & Steel Engineers for 1946, at the organization's regional meeting in Pittsburgh Sept. 26.

Dr. Raymond Walters, president, University of Cincinnati; Metal Cutting (four sessions)—Albert H. Dall, Cincinnati; W. H. Oldacre, Chicago; Professor O. W. Boston and W. W. Gilbert, University of Michigan, Ann Arbor; A. O. Schmidt, Milwaukee; Hans Ernst, Cincinnati; Michael Field, University of Cincinnati; Joseph F. Allen, Cleveland; M. E. Merchant and Norman Zlatin, Cincinnati; Fred W. Lucht, Detroit; M. F. Kronenberg, Cincinnati; M. E. Feldstein, Dayton, O.; Applied Mechanics—Chu-Kia Wang, Denver; D. A. Wells, University of Cincinnati; Chi-Teh Wang, Providence; Metals Engineering—John Urban, J. W. Bolton and A. J. Smith, Cincinnati; Professor George Sachs and J. D. Lubahn, Case School, Cleveland; Fuels—Irvin D. Groak, Chicago; E. C. Benton, Louisville, Kentucky, and R. B. Engdahl, Battelle Memorial Institute, Columbus, O.; Aviation—D. D. Streid, West Lynn, Massachusetts; W. P. Green and C. A. Shreeve, University of Maryland; Railroad—A. M. Unger, Chicago.

Open-Hearth Committee To To Hold Annual Meeting

Metallurgical and operating problems will be discussed at the annual meeting of the Ohio section, Open-Hearth Committee, and Ohio Valley Section, American Institute of Mining & Metallurgical Engineers to be held at the Deshler-Wallick hotel, Columbus, O., Nov. 2-3. Surveys covering the steel and scrap situation in Europe will be presented by N. E. Ebersole, general purchasing agent, American Rolling Mill Co., Middletown, O. and T. W. Lippert, editor, *Iron Age*, New York. At the dinner Friday evening, Milton Chase, WLW station staff, will speak on world affairs.

Lease of Willow Run Believed on Sliding Scale

Kaiser-Frazer rental thought starting at $500,000. Present Graham-Paige plant to be vacated

DETROIT

AGREEMENT between Reconstruction Finance Corp. and Kaiser-Frazer Corp. covering 5-year lease of the Willow Run bomber plant, administration building, commissary, power plant, training building and other structures exclusive of hangars and airport, makes no mention of the rental fee but it is believed to be on a sliding scale upward from $500,000 the first year to $1.2 million the fifth year.

To finance operations, which will include manufacture of the Frazer and Kaiser automobiles, as well as tractors and farm implements, a public offering of 1,700,000 shares of common stock in Kaiser-Frazer Corp. will be made at $10 per share, exclusive of 500,000 shares which are being bought jointly by Kaiser interests and Graham-Paige at the same price. Thus the operators will have invested $5 million, the public $17, which, less underwriting expenses, provides working capital of around $20 million.

Graham-Paige will move its facilities from the present plant on West Warren avenue to Willow Run, and will lease the vacated plant to the Surplus Property Division of RFC for display and storage of surplus war production machinery and equipment.

Designs for the Kaiser automobile are still in a state of flux, but it is being aimed at the low-price field and eventually will be produced on the West Coast as well as at Willow Run.

Officers of the Kaiser-Frazer Corp. are: Henry J. Kaiser Sr., chairman of the board; J. W. Frazer, president; Vern R. Drum, vice president and general manager; Hickman Price Jr., vice president and treasurer; Henry J. Kaiser Jr., vice president; Clay Bedford, vice president; W. A. MacDonald, vice president; O. B. Motter, vice president; John S. Slick, secretary; H. V. Lindbergh, vice president; G. C. Sherwood, assistant secretary and assistant treasurer.

Tennessee Coal Starts $8 Million Expansion

Tennessee Coal, Iron & Railroad Co., Birmingham, is increasing ingot capacity 120,000 tons a year, or to about 3 million tons, by construction of a new open-hearth furnace at its Fairfield Works. This is part of an extensive expansion program which will start immediately and which will require about 18 months for completion. Cost of the project is unofficially estimated at $8 million.

The program includes development of a new coal mine with potential capacity of 4200 tons daily, nine miles of railroad, and the customary surface facilities. The company also will make improvements looking to increased production at its Edgewater and Short Creek coal mines.

The hoisting stopes for ore mines Nos. 8 and 13 which have been out of action for several months, will be placed back in operation and additional workings will be opened in all the present ore mines.

Capacity will be raised in the limestone mine No. 5 and the dolomite quarry at Dolonah through the addition of mining and quarrying equipment. A new battery of 63 modern coke ovens will be installed at the Fairfield Coke Works, replacing one of the old batteries which is expected to be removed.

American Rolling Mill and Rustless To Be Merged

Charles R. Hook, president, the American Rolling Mill Co., Middletown, O., and chairman, Rustless Iron & Steel Corp., Baltimore, announced last week at meetings of the boards of the two corporations that resolution had been adopted by each board authorizing officers of the respective corporations to proceed with the preparation of an agreement providing for merger of Rustless into American Rolling Mill. The Rustless plant at Baltimore will be operated as the Rustless Iron & Steel Division.

Sheet & Tube To Expand Capacity of Rolling Mill

Youngstown Sheet & Tube Co., Youngstown, will start construction next month on an addition to its cold rolling mill at Campbell, O., boosting output about 200,000 tons a year. New wire drawing facilities will be installed at the wire and rod mill at Struthers, O.

The new mill additions will take the place of several old hand sheet mills dismantled during the war.

Reliance Electric Expands Cleveland Plant

Construction of an extension to the Ivanhoe road plant of Reliance Electric & Engineering Co., Cleveland, was started last week, according to James W. Corey, president. The extension and equipment will cost approximately $350,000.

Republic Steel Acquires Steel Container Company

Republic Steel Corp. has purchased the Stevens Metal Products Co., Niles, O., manufacturer of steel drums, barrels and other specialties. The purchase will give Republic a direct outlet for use of its steel in manufacture of such products.

TRANSITION TOPICS

LABOR—Effects of strikes begin to permeate entire industrial structure as union demands catch nation unprepared with either national labor policy or effective machinery for handling disputes. See page 80.

RECONVERSION—Progress made in initial stages of resuming peacetime production. Labor unrest chief obstacle to speedy transition. War Production Board to disband. See page 82.

SURPLUS PROPERTY—Clayton pricing formula will be applied to sales of surplus machine tools, other industrial equipment. See page 86.

CONSTRUCTION—New home building may supply jobs for 4 to 4½ million. See page 89.

AUTOMOBILES—Studebaker launching $16 million expansion program to enable production of 300,000 cars annually. See page 93.

MODERN BAR MILL—Bethlehem Steel Co.'s new 10-in. bar mill at Lackawanna will embody most recent developments in high-speed low-cost production, with monthly capacity of 22,000 tons. See page 110.

ATOMIC ENERGY—Despite amazing achievements of controlled atomic forces, possibilities for early commercial use dimmed by prohibitive cost of physical equipment and materials. See page 112.

MACHINE TOOLS—Trend toward shorter hours and higher pay accentuate interest in self-actuating machine tools as factor capable of checking sharp rise in cost of manufactured products. See page 116.

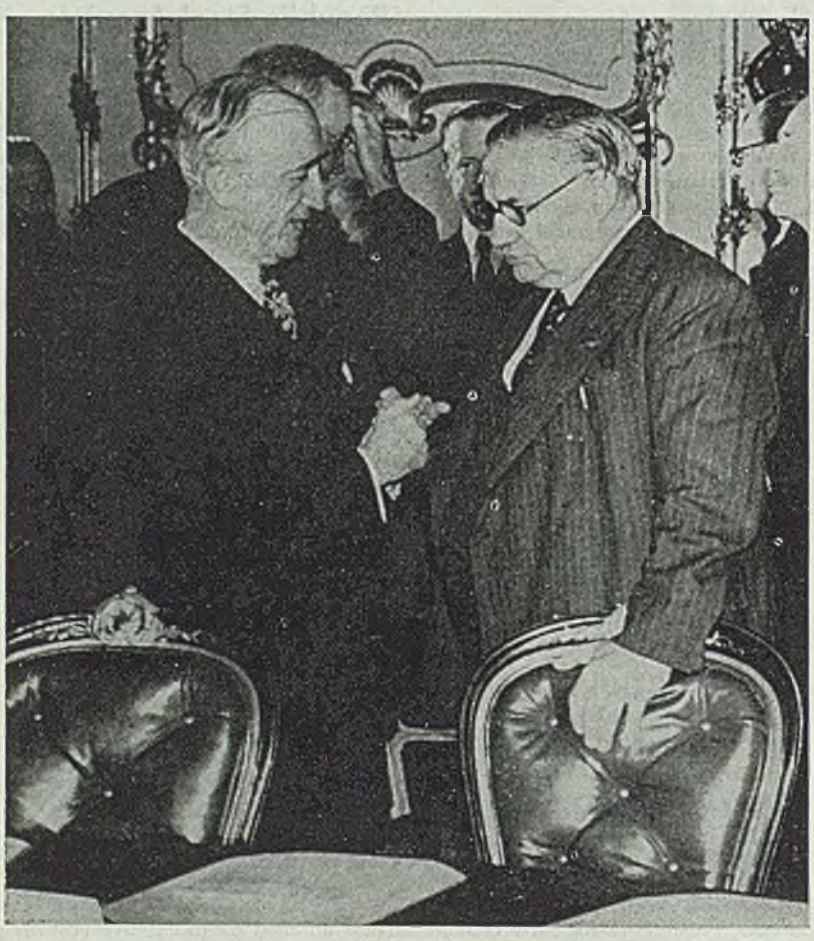
Widened Use of Clayton Pricing Plan To Speed Surplus Tool Sales

Formula previously limited to standard general-purpose machine tools now being applied by Reconstruction Finance Corp. to many other standard tools to expedite sale of surplus industrial equipment

TO EXPEDITE sale of surplus machine tools and other industrial equipment, the Reconstruction Finance Corp. will apply the Clayton pricing formula, hitherto limited to standard general-purpose machine tools, to many other standard tools. Included are the following:

Press brakes, bending machines, hydraulic and mechanical presses, shearing and punching machines, forging machinery, wire forming machines, thread-rolling machines, tube reducing machines, sheet metal shrinking machines, electric welding equipment, gas welding equipment, physical properties testing machines, fluorescent, magnetic and X-ray inspection machines, other testing and measuring machines, riveting machines, woodworking surfacing machines, woodworking lathes, wood jointers, wood veneer and plywood machines, foundry molding machines, die casting machines, foundry coremaking machines.

An important change in the method of marketing surplus standard general-purpose machine tools has been made to eliminate many delays which, according to W. Stuart Symington, surplus property administrator, "resulted from: 1. Time necessarily consumed by owning agencies in preparing the detailed information required for formal declarations of surplus under SPB Regulation 1; 2. the priority provisions of the statute and the regulations indicating a waiting period of 30 days for federal and state agencies to assert their claims; 3. the provisions of section 18 of the act relating to sales in small lots designed to give small business a better competitive position in purchase; 4. the previous interpretation of section 11e of the act which required individual advertising of particular lots of tools."



TALKING THINGS OVER: James Byrnes, left, United States Secretary of State, chats with Ernest Bevin, British foreign minister, during a meeting of the United Nations Council of Foreign Ministers at Lancaster House, London. NEA photo

Under the new procedure all these delays are to be minimized if not eliminated. For one thing, the surplus property administration, since V-J Day, has established the fact that all government-owned tools, aside from a small percentage to be set aside by the armed forces as war reserve, are to be made immediately available for private industry, and that there will be plenty of standard general-purpose machine tools to satisfy all requirements. Under these circumstances federal and state agencies, as well as small business, can get all the tools they desire without priority protection and hence there is no need to hold up sales to other buyers in order to give these favored buyers adequate priorities.

Provides for Prompt Sales

As a further means of preventing delays, sale of standard general-purpose machine tools prior to the completion of the formal declaration of surplus has been authorized. As a result, Reconstruction Finance Corp. may sell such tools promptly after receiving a preliminary statement from the owning agency that certain property now is surplus and in process of being formally so declared. The RFC now is working out arrangements with all the owning agencies to furnish such preliminary statements.

"We are working to get two or three large plants in each area opened up," an RFC spokesman told STEEL, "and we hope, as a result, to have enough tools broken loose in the next 10 days to two weeks to enable us to meet all demands. We already have a preliminary statement to the effect that the Studebaker airplane engine plant at Chicago is surplus, and our Chicago regional office right now is taking buyers to that plant so they can see what is there and buy any desired machines and have them shipped immediately to their plants. We hope to open up three more big Chicago plants containing large numbers of standard general-purpose machine tools. We expect to be able within a few days to begin selling machine tools from the big Consolidated Vultee airplane plant at Miami, Fla.; that plant will be under our Jacksonville, Fla., regional office.

"With these big plants opened up to buyers, we hope to have plenty of tools to meet demands of the next 60 to 90 days. By that time the Army and Navy will be giving us formal declarations of surplus on a large scale so that there then will be no further need for emergency action."

Sales on the basis of preliminary state-

NOW IT CAN BE TOLD

Accuracy in "Millionths" on Production Job Obtained on Bryant No. 112 Internal Grinders

B-29 FUEL INJECTION PUMP PRODUCED BY ECLIPSE

SPRINGFIELD, VERMONT — Another stride by American war production genius was disclosed recently by the Army Air Forces Air Technical Service Command and Eclipse Machine Division of Bendix Aviation Corporation.

Mass production of fuel injection pumps for the B-29 Superfortress has been achieved at the Eclipse plants in Elmira, New York. The Bryant No. 112 Internal Grinder was chosen for the sleeve bushing job, and technical details for production of this part were worked out through the close cooperation of Eclipse and Bryant engineers.

Production Tolerances Unbelievable

In the hands of Eclipse workers, the Bryant machines are producing parts to diameter *tolerances of 10 millionths of an inch or less.* This necessitates maintenance of straightness and roundness to even finer tolerances. This infinitesimal degree of precision was graphically demonstrated by Mr. T. W. Tinkham, General Manager of the Eclipse Machine Division. After demonstrating the precise fit between the plunger and the bushing ground on the Bryant machine, Mr. Tinkham had a newsman rub his fingers on the pump piston. The very slight film left by the newsman's fingers was sufficient to make the plunger stick in the bushing.

Improves Bomber Performance

B-29's equipped with the fuel injection pump are flying surer than ever before at extreme altitudes where rarefied atmosphere, varying pressures and sub-zero temperatures must be taken into account. It is interesting to note that the gasoline is the only lubricant used in the pump assembly.

Cooperation Plus Secrecy

This is a typical example of the way Bryant men have cooperated with the engineers of our leading manufacturers during the war years. This is one example, but hundreds of others still must remain on the secret list. Now, when you are planning for a peacetime production there still is a Bryant man ready to assist you.

(Photo Courtesy Eclipse Machine Division)

MACHINES THAT DO THE JOB. This is part of the group of over a hundred Bryant internal grinders at Eclipse Machine Division, Bendix Aviation Corporation, Elmira, New York. These machines are grinding sleeve bushings to a tolerance of 10 millionths or less.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

ments indicating certain property is surplus, this spokesman said, can be made only in the case of government-owned plants, and then only after the lessees have surrendered rights under their options to purchase. In quite a few cases, this spokesman said, the lessees do not intend to purchase under their options and are glad to waive them—or they may be glad to waive them after they have arranged for the purchase of such tools as they want, thus leaving the remaining tools free to be sold to other buyers.

There is no intention, he explained, of attempting to sell tools from privately-owned plants on the basis of preliminary statements of surplus since the contracts with the procurement agencies provide that the government will clear these plants within 60 days following termination. That means that tools available for sale in privately-owned plants in most cases will have to be sold from the warehouses to which they are moved.

Mr. Symington now is trying to find a way of extending this new method of selling surplus tools in advance of a formal declaration of surplus by including all other types of standard shop equipment—as those mentioned above which now are covered by the Clayton pricing formula. So far the obstacle has been the lack of certainty as to whether there will be enough of these other types of standard tools to satisfy all demands and thus make it unnecessary to hold up their sale in order to protect federal and state agencies, small business, etc., as stipulated by the Surplus Property Act. Until it is found that the quantity of these other items of equipment is sufficient to meet all demands, they will continue to be offered for general sale only after having been formally declared surplus, and after the federal and state agencies and small business have had 30 days' refusal.

Under the new policy of permitting the general sale of standard general-purpose machine tools in advance of formal declarations of surplus, the RFC has been authorized to depart from its previous policy of making no sales until the specific tools involved have been advertised locally. Instead, the RFC, from its Washington office, will "immediately initiate a national program of advertising design to advise the public that government-owned machine tools are now being offered for sale, and such advertisement will be widespread and repeated enough to satisfy the statutory requirements for wide public notice."

Manufacturers' Shipments Drop Sharply In July

Value of manufacturers' shipments dropped sharply in July, a total of $11.4 billion in deliveries representing a 12 per cent drop from June and 6 per cent from the same month last year, according to the Department of Commerce.

Shipments of the durable goods industries fell 14 per cent from June, continuing a decline of the previous three months. The sharpest curtailment was a 21 per cent decrease in the daily average deliveries of the automobile industry, the department reported. Industries producing machinery of all kinds showed only a minor reduction.

In the nondurable goods field, the petroleum and chemical industries reported decreases of 2 to 4 per cent in deliveries.

A 5 per cent drop in unfilled orders in the durable goods industries in July compared with June made the third successive month in which a decrease was reported. The volume of unfilled orders in these industries was 22 per cent below that of last year.

New orders received by all manufacturers declined 6 per cent in July from June. New business received by the nondurable goods industries showed moderate declines for the first half of the year, but showed a 10 per cent drop between July and June.

FTC To Proceed on Cases Suspended During War

Action by the armed services in withdrawing previous requests for deferment of Federal Trade Commission actions against various firms because the latter were engaged in war production, has now cleared the way for expediting these proceedings, the Federal Trade Commission has announced.

The commission said it will now proceed as expeditiously as possible with cases hitherto in suspense.

The FTC made public parts of identical letters received from the Army and Navy canceling the requests and terminating the arrangement by which the services were authorized to seek this postponement.

The cases, said the commission, involve a wide range of products, including chemicals, instruments, machinery, construction materials and tire chains.

Department of Commerce To Undergo Modernization

An ambitious postwar modernization of the Department of Commerce to make it more valuable to business and industry, has been proposed by Secretary Wallace.

A departmental summary of the program includes the following: Revitalized foreign trade service, in co-operation with the State Department, to formulate commercial policy and to promote vigorously a high level of foreign trade on a sustained basis; a strengthened statistical and business intelligence service; a broad analytical program to give business and industry current information on the economic situation and business outlook; technological aids to business, especially small business; management aids and other forms of direct service to business, especially looking to small business requirements; a greatly expanded technical service.

The plan calls for three new assistant secretaries of commerce, who would head special services under the general program.

Program is especially designed to assist in building up foreign trade, import and export, by keeping American business informed as to markets abroad, firms abroad engaged in specific lines, and other such service.

Businessmen To Aid in Forming Postwar Policies

Representatives of business and industry have been invited to assist State and Commerce Department officials in making improvements in the method of their foreign staffs to meet changing postwar conditions, for the benefit of American business.

For some time, a joint statement of the two departments said, consideration has been given to the methods employed by the Foreign Service in providing information on conditions in foreign countries of interest to business and industry in the United States, and otherwise promoting and protecting its foreign trade.

Six leading business and industrial organizations of the country were invited to name an advisory committee of representative business men to work with the departments on this matter. The two departments have now jointly announced the following committee: H. F. Sheets, chairman of the board, Socony-Vacuum Oil Co., representing the Chamber of Commerce of the United States; F. Scott Fletcher, executive director, Committee for Economic Development; Francis L. Hopkinson, vice president, Willys-Overland Motors Inc., representing the National Association of Manufacturers; Morris S. Rosenthal, member of Stein Hall & Co., representing National Council of American Importers; J. G. Fletcher, vice president, Caterpillar Tractor Co., representing the National Foreign Trade Council; John P. Gregg, executive director, United States Associates, representing the International Chamber of Commerce; Wilbert Ward, vice president National City Bank of New York, and Clarence F. Hunter, vice president, New York Trust Co., representing the Bankers Association for Foreign Trade.

Graphite and Construction Materials Controls Revised

War Production Board has removed all controls on distribution and use of graphite through revocation of order M-61. Restrictions on the use of critical materials and equipment in housing construction, with the exception of those on lead and tin, also have been removed through revocation of schedule I and schedule II to order P-55-c.

Home Construction May Provide 4 to 4½ Million Jobs Annually

Million and quarter new housing units a year needed for next decade to meet requirements of returning veterans, new families and to replace substandard structures. Inflationary price increases deemed hazard to prosperous construction activity

WITH the lifting of wartime controls over housing construction, the housing industry faces the challenge of gearing its operations to meet a broad and urgent need without precedent in the history of this country, according to National Housing Administrator John B. Blandford Jr.

"Serious housing shortages exist today in practically every city in the country," Mr. Blandford said. "In many areas, these shortages will become more acute during coming months as millions of veterans return to civilian life. If the housing industry will set its target at meeting the demand for new houses on a broad front, it will open up the path to a sustained volume of peak construction which will produce big outlets for jobs, production and investment during the reconversion and postwar years."

The main hazard to attaining this objective is the possibility of inflationary price increases, made possible by a demand greatly in excess of the available supply which has already caused a sharp rise in the prices of existing houses in crowded areas, Mr. Blandford said.

"Unless a majority of the new houses which are produced in the next few years are within the means of average American families, there is the very real danger of a short-lived boom in home building, followed by an abrupt decline such as occurred in 1920 after the First World War," he declared.

Received Wartime Aid

Mr. Blandford pointed out that a substantial core of the private home building industry was kept alive during the war—that it was helped to produce more than $5 billion in war housing.

"After victory in Europe, we expressed the hope that 400,000 homes could be started by next July," he said, "and reached an agreement with the War Production Board on a materials allocation for that amount of housing. We still are hoping the 400,000 units will get started and that there will be a rapid increase in production in the following year. We estimate that an average of a million and a quarter homes a year will be needed for the next 10 years to meet the needs of returning veterans, new families and those now 'doubled up' and to make substantial progress on the replacement of substandard structures.

"We believe that housing is potentially an industry providing opportunities for an annual investment of up to $7 billion and providing up to 4½ million jobs."

WPB Grants Priority Aid For Construction Work

During August, 542 applications for authorization or priority assistance for construction equipment and materials, totaling $182,279,000, were approved by the War Production Board. Of this total, $137,597,000 was for construction, $44,588,000 for equipment, and the remaining $94,000 for production materials.

From April 1 through Aug. 31, WPB has approved 530 applications from the iron and steel and products industries totaling $98,869,000 of which $50,715,000 was for construction, $48,126,000 for equipment, and $28,000 for production materials. Breakdown of these figures shows the value of construction and equipment, respectively, involved in the applications as follows: Rolling mills, foundries, etc., $31,573,000 and $36,446,000; hand tools, cutlery, and general hardware, $8,484,000 and $808,000; stoves, ranges, etc., $4,015,000 and $4,170,000; metal stamping and coating, $877,000 and $1,918,000; fabricated structural metal products, $1,921,000 and $402,000; steel springs, $450,000 and $812,000; tin cans, $970,000 and $646,000; wire products, $467,000 and $517,000; other, $1,958,000 and $2,407,000.

Mead Says Tin Shortage Impeding Reconversion

Serious shortage of tin is an impediment to full-scale reconversion. Prospective shortages of strategic materials in the future, such as those we faced during this war, are an obstacle to full production for national defense, according to Sen. James M. Mead, chairman, special Senate Committee Investigating the National Defense Program. The committee is conducting a hearing on strategic materials.

The committee's studies of shortages in strategic materials have disclosed as an important underlying cause of inadequate supplies the existence of cartel monopolies and artificial trade barriers. "In our united effort," says Senator Mead, "many of these artificial peacetime practices have been swept aside for the good of the common cause and because of performance by the governments of trade functions normally within the control of private enterprise in peacetime. The end of the war, the withdrawal of governments from these commercial activities, the recovery of tin producing areas previously occupied by the enemy, and the cessation of the unifying force of defeating a common enemy now open the way to the restoration of monopolistic cartel controls and the re-establishment of other artificial trade barriers.

"The peacetime economy of the United States will be directly affected by the extent to which such artificial monopolistic practices are re-established and the ultimate price to the consumer will be increased. The future security of the United States will be impaired if we permit a condition to develop where an expansion of production necessary to defend ourselves is made impossible or more difficult for the lack of adequate sources of strategic raw materials."

Government Zinc Stockpiles To Relieve Any Shortages

Government stockpiles of zinc metals, which total about 187,000 tons, will be available in part to supply deficiencies in zinc production for reconversion needs during the next six months, the War Production Board reported recently. Government holdings totaled 187,200 tons of slab zinc as of July 1 and 314,500 tons of zinc concentrates as of Aug. 1.

Barring any sharply increased reconversion demands over previous peacetime needs, WPB officials indicate they do not expect that the government stockpile would be needed to any great extent during the next six months.

Detroit Regional WPB Chief Re-enters Business

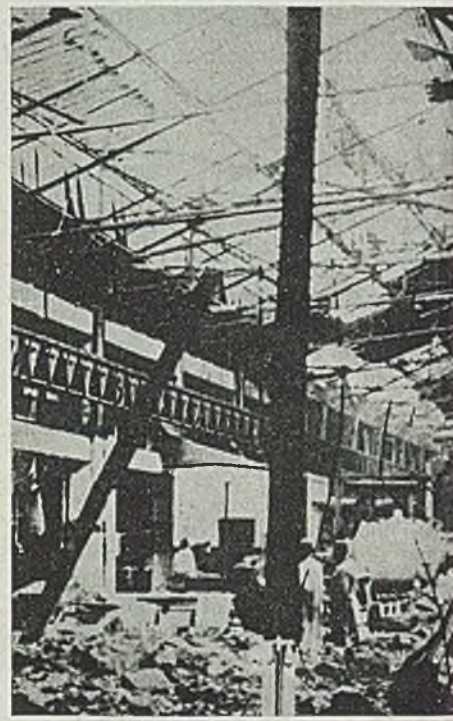
Carsten Tiedeman has resigned as Detroit regional director of the WPB, effective Oct. 1, to re-enter business for himself as president of Carsten Tiedeman Inc., manufacturers' representative, with accounts including Gear Grinding Machine Co., Detroit; Mills Co., Cleveland; and Diversey Machine Works, Chicago.

Walter F. Wright, deputy regional director, succeeds Mr. Tiedeman who held the post since March, 1944. The former was at one time vice president of Graham-Paige and later a Chrysler distributor in Cleveland.

Staff of the Detroit regional WPB office is being gradually trimmed from a wartime peak of 371, to 300 as of Sept. 1, 173 as of Oct. 1, 130, as of Nov. 1, and likely to be closed out by year-end. Principal activities now are the assignment of CC ratings on materials and parts to break production bottlenecks, and supervision of inventory controls.

French Factories Hard Hit by War;

Industrialists look to United States to rehabilitate plants damaged by bombs or stripped by Germans. Initiative lacking as country faces difficult task of getting back to prewar production. Americans unpopular after liberation



FRENCH industry has a long, stiff, uphill pull ahead before it can give the industries of the United States, Great Britain, Russia, and other important powers much competition in international markets.

Right now French industry presents a depressing picture. It needs nearly everything—machine tools, coal and oil, new plants, skilled workmen, new equipment, modernized manufacturing processes and practices, new inventions—and, chief of all, a lot more individual initiative and the "will to win."

It needs, first of all, to get rid of its communist and socialist element, the same group that made France weak, militarily and industrially, and easy for the Nazis to knock over back in 1940; the same gang seems back in the saddle again.

Many Frenchmen think a kindly and benevolent Uncle Sam ought to be doing a lot for them now, pulling them out of their financial and industrial hole; they feel that should be their reward for allowing the Americans to free them from their Nazi bondage.

About the only thing the French have is a large unskilled labor force and gold, perhaps the world's third largest gold reserve—but they're not inclined to spend much of it if they can help it.

That's the distinct impression I gained of industrial France in a recent 20,000-mile tour of Europe.

The war appears to have done an effective job of knocking out French factories, especially those around Paris and in northern France, for years to come. The Germans methodically stripped some of their best machine tools, carrying off this equipment to set up their new bomb-proof underground factories to build V-1 and V-2 missiles or jet fighter planes; they also impressed some of France's most skilled workmen into the "slave labor" gangs which were taken into Germany to operate these factories. Most of the other factories were converted to make components for German war equipment—and many of these, especially those near Paris, were smashed in Allied air raids to soften up the German resistance. Among these were the big Renault motor plants. You'll find the ugly burned-out wreckage of the bombed plants strewn around Paris' fringe; other factories untouched by bombs are pretty well stripped.

"One of our biggest hurdles to getting back a French industry," one French leader told me, "is getting machine tools, good modern equipment. We could handily use a lot of that war surplus of machine tools you have in the United States."

No, the French can't get back machine tools from the factories in French-occupied territory in Germany—even though that was one of the things they apparently had in mind in demanding the right to occupy so large a part of Germany.

The reason?

"Well, we tried it," said one leader. "But the factories in the French territory just haven't got many machine tools; the bombs wrecked many of them, others were moved out by the Nazis before the advance of the Allies—and they're in the territory occupied by the Russians. The Russians are getting all that equipment.

"What we get now apparently will have to come from America; we can't make our own within any reasonable time."

Acute Shortage of Workers

The slave gangs were hard on the impressed French workmen, many are dead, the others are scattered throughout Europe, those who have drifted back into France are so seared by their wartime experiences—torture and starvation and overwork—that they'll never again be useful workmen.

The Germans apparently had done a fair job of getting some work out of the French workers in the French factories—although it wouldn't compare with the efficiency of free labor. French factories worked chiefly on components of various Nazi war weapons. In many cases, the components were shipped to Germany for assembly; the Nazi bosses had persisted in a "tell 'em nothing and keep 'em dumb" policy. In many cases, the French workmen never did learn just what was the purpose of the components they were making.

In these French factories, the appeals that all the belligerents—the American, British, Germans and others—had posted on their factory walls for just an extra stint of work to help win the war didn't do much good; the French workers just wouldn't hustle to greater output.

"Ah, but when these French workers got back to making things for the French military . . . ." said Marcel Clicques, 27-year-old French minister of civilian aviation, "well, they showed they still knew how to work."

He explained production in factories in operation doubled with less manpower; some factories, after the Germans were driven out, quickly resumed production at the insistence of workers, even though there was no method of paying them in sight.

The French, with their air force disbanded by the Germans, wanted a new air force immediately after France was liberated. It had some trained aviators—but no machines for them. So it used captured Nazi machines, also built more Nazi-designed planes from the components the French factories had been making for the Nazis. Currently, the French air force is flying the best German equipment.

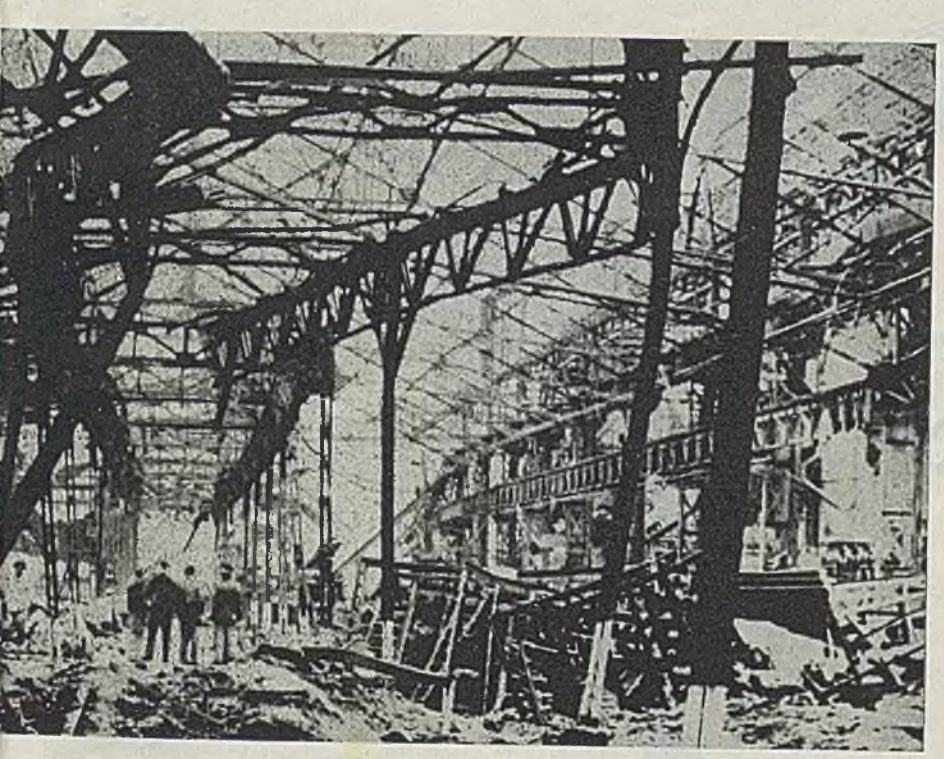
"That," explains Clicques, "was the best we could do; there hadn't been any new French designs to speak of during the occupation and those French designs at the war's outbreak had been long outmoded by the war's advances—just as those American planes at the beginning of the war were outmoded by the end of the war."

However, one of the first postwar tasks

This is the fourth and concluding article of a series by Mr. Reiss on postwar Europe, written after a 20,000-mile tour of the Continent.

Need Tools, Equipment

By GEORGE R. REISS
Editorial Correspondent, STEEL



Ruins of the huge Renault factory near Paris after being hit by Allied bombers. NEA photo

of the French, insists Clicques, will be to get some new French-designed military aircraft for its air forces, with what tools and equipment and labor are available; thereafter, it wants to build also an important civilian aviation, including large volume of private flying. Clicques, however, speaks quite vaguely of the plans for this private flying; there is none in France now.

France's whole industrial attitude seems to be represented pretty well by that of Clicques; and Clicques doesn't seem to be a heavyweight for his very important job. It seems that his chief qualifications for the job include that he was a prewar pilot, that he was active in the underground organization which harassed the Nazis during the occupation—and that he is a Socialist.

Clicques, in an interview at the French Air ministry, made it quite clear that France would like to rebuild a powerful air force and commercial air service, becoming a world air leader,—if Uncle Sam would supply airplanes and manufacturing licenses and doesn't want much of anything in return.

As a starter, he said, France would like to have some good American Douglas DC3 and DC4 airliners, the two engined 21-passenger and four-engined 48-passenger craft. She wants nice, shiny, new ones, not discarded army equipment. So would most of the American domestic airlines. Also she would like to have licenses to make some American aircraft engines.

One of the reasons for all the rush, of course, is the competition of the world air lines to get started on their postwar routes; those who get the equipment first, get the biggest jump on their competitors, and the French airlines would like to be out front, even over American lines. And the world air lines probably will control a large share of world trade.

Clicques said a French mission already has visited the United States and Britain to get some new planes and engine manufacturing licenses. But the negotiations bogged.

"Why have they bogged down?" Clicques was asked. What concessions did the mission offer for the new ships—and a jump on the rest of the world in getting started?

Clicques shrugged indefinitely, said he couldn't discuss policy.

He also dodged the question of whether France is willing, at the forthcoming international air conference at Montreal, to change her stand that virtually wrecked the Chicago World Air Conference. France just isn't willing to swap use of air bases for planes, to trade use of bases throughout the world, for she has an edge on them.

France's political situation doesn't look good, either, for any solid postwar prosperity; in Paris and Marseille, there seems to be a smoldering undercurrent, something you can't put your fingers on but it's there; and it gives one a distinct feeling that once the American troops leave France, things may begin to pop.

Americans, by the way, aren't popular in France, especially in South France. That's partly because of jealousy of the better financial condition of the American troops and partly the result of air bombings which caused many deaths and much destruction when the Allies sought to retake France.

When we visited Marseille, a kindly officer advised:

"You'd better stay together in groups of three or four—and stay off the back streets at night; one American soldier got his throat cut here the other evening, and Americans aren't popular."

All that might give you some idea of what's in sight in France.

Japanese Production Hit Hard in Last Year of War

Information developed to date in the economic survey being taken by American experts under Gen. Douglas MacArthur indicate that Japanese productive capacity dropped sharply during the closing months of the war.

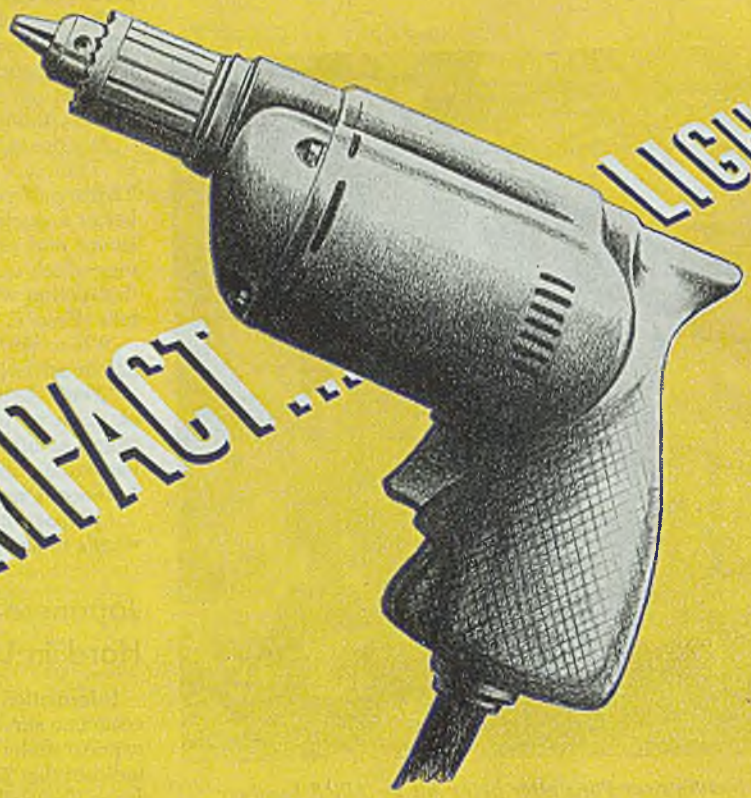
According to a report prepared by the Tokyo government, coal production dropped from 50 million tons in 1944 to an indicated 38 million tons this year. In the same period production of refined oil slumped from 3,000,000 liters to 1,200,000, while synthetic oil declined from 90,000 kiloliters to 35,000 and alcohol production dropped from 1,000,000 to 96,000 kiloliters.

At the same time Japanese productive machinery is shown to have dwindled from a 1944 value of 600,000,000 yen to 310,000,000.

If the Japanese had been allowed to exploit fully the resources of the overrun countries and to harness the available manpower, they could have been on the road to world domination, Dr. R. R. Sayers, director, Bureau of Mines, said in issuing two maps of Japan proper showing the location of important mines and industrial works. The maps reveal the magnitude of the network of mines and plants that helped Nippon to fight a long war, and the information on which they are based will be utilized by authorities of the United Nations in administering the affairs of the Japanese empire.

Japan proper contains a great variety of minerals, but the country is not adequately self-sufficient in any class to support the vast industrial state that had been established before and during the war, according to Dr. Sayers.

CAPACITY . . .
¼" holes in steel
SPEED . . .
up to 5000 RPM



COMPACT . . . LIGHTWEIGHT

It takes a lot of doing to put together a portable electric drill so it will drill ¼ inch holes in steel hour after hour, will run at speeds up to 5000 RPM without overheating, and will be COMPACT and LIGHT in WEIGHT.

At five vital spots in that drill, spinning shafts must be supported to carry the radial load of the motor armature and the reducing gears. Add to this the heavy thrust load of the operator who "leans" on the work, and, don't forget, the allowable space is measured in small fractions of an inch.

The space, weight, speed, load and lubricant retention requirements dictate ball bearings. Performance data show conclusively the superiority of The Fafnir Balanced Design – larger balls and deeper races – for longer life and greater load capacity. Compactly designed grease seals and shields reduce maintenance to a minimum by keeping lubricant *in* the bearings, keeping dirt and dust *out*.

If weight saving and continuous performance are "musts" in your product specifications, you will find it to your advantage to call in a Fafnir Field Engineer early. The Fafnir Bearing Company, New Britain, Connecticut.

MOST COMPLETE LINE IN AMERICA

FAFNIR BALL BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Studebaker spending $16 million on expansion, to make possible sustained production of cars at rate of one a minute. Pontiac makes bodies on new models more resistant to corrosion. Henry Ford steps down again as president of motor company

DETROIT

LIKE most of the other independent manufacturers, Studebaker is putting finishing touches on grandiose plans for passenger car production over the next few years and has initiated a program of $16 million expenditures which will change the complexion of virtually every department in the South Bend, Ind., plant. The goal is production of 300,000 units annually.

Principal phases of the expansion are fourfold: (1) Increased facilities throughout the plant to make possible a consistent assembly rate of just under one passenger car per minute, which involves the elimination of bottleneck departments, these being the limiting factors in 1941 when production of a car a minute could be maintained for only one shift on the assembly line because other departments required two shifts to keep up a float of parts; (2) tripling of commercial car and truck production; (3) installation of batteries of high-speed semi-automatic machining equipment, patterned after types used in machining of aircraft engine components; and (4) resumption of foundry operations with new equipment considerably advanced over any previously available, the gray iron foundry having been closed during the war.

Speeds Work on Cylinder Blocks

Among machining innovations is a 27-foot milling machine which performs multiple operations on cylinder blocks formerly carried out at single stations. Blocks are loaded and clamped, valve side and bearing locks are rough and finish milled; and blocks ejected, all automatically. On the crankshaft line is a new grinder which simultaneously grinds three of the four main bearings on the Champion engine, the oil seal diameter and gear fit, formerly five distinct operations.

Precision boring of cylinder barrels with carbide tools and new boring machines will be instituted. New gear hobbing equipment will handle four camshafts at the same time. Cam grinders automatically index and precision grind shafts. Flywheels will be plunge-cut by a new method carried over from aviation engine production. All grinders are being equipped with new spindles which provide greater accuracy, less chatter and lower upkeep.

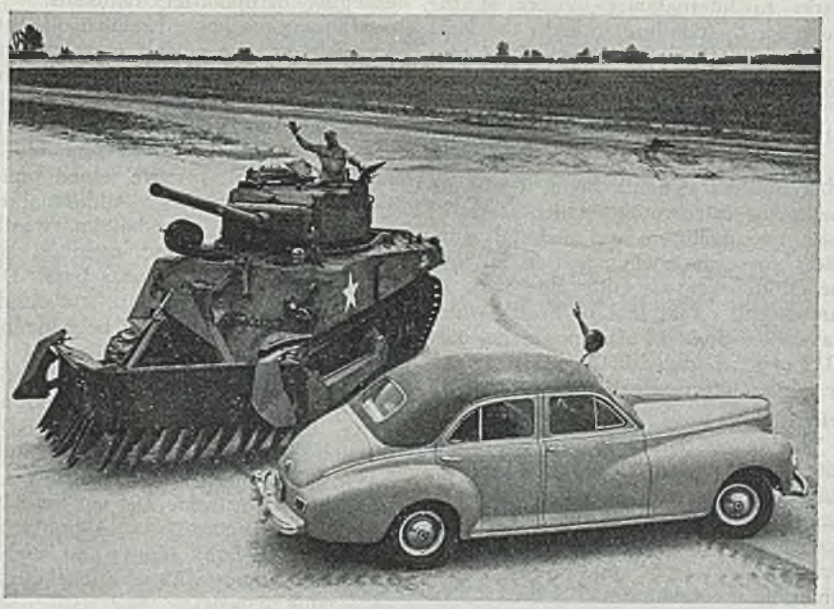
A special rotary-type grinder, with three heads, has been installed to grind both top and bottom of clutch housings. Former practice was to grind one side, mill the other, then repeat the operation after the housing was reversed. Twenty-nine new spot welding machines carry attachments for precise adjustment of the depth of body and frame welds.

Considerable rearrangement of plant equipment and departments has been necessary. All cast iron machining operations have been moved to a position nearer the foundry, requiring the rerouting of conveyor systems but reducing the amount of handling of heavy parts. A new conveyor line has been installed to transfer incoming frames from an unloading dock to the second floor of the assembly building, providing the means for carrying a moving float of frames and guarding against interruption to assembly operations by delayed shipments. On the final assembly line itself there is a new 1000-foot flush-floor conveyor permitting the selection and removal of any car on the inspection line and eliminating the hazards of floor protuberances such as chains, tracks, etc. All finish ovens in the body plant are being fireproofed and air locks installed at the main entrance of the passenger car assembly building to cut off drafts. Six new 500-ton presses have been ordered for the body stamping plant.

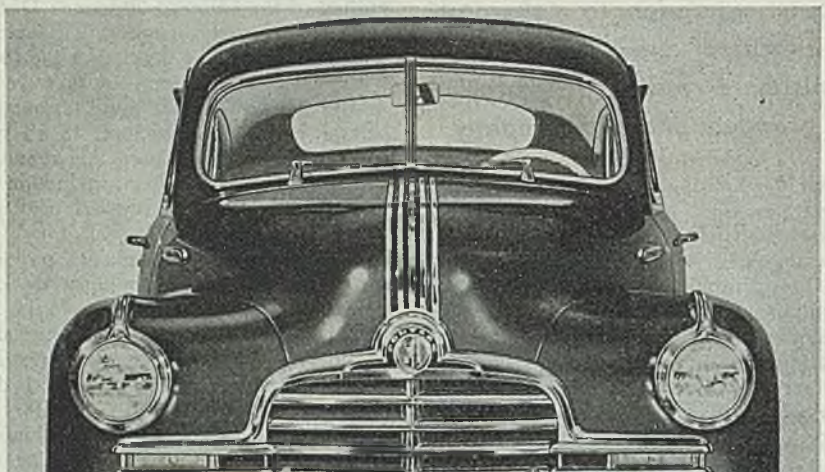
Studebaker officials credit the co-operation of the Chicago Ordnance District and the pretermination agreement worked out with the district for the speed with which all military stocks were removed from the plant after termination of war contracts. By Sept. 18 all such stocks had been appraised and removed, less than 30 days after production on military trucks and a tracked personnel carrier was stopped.

Terms of the agreement provided three classifications of military stocks—items to be scrapped, items to be retained by the company at a predetermined price, and items to be shipped to government warehouses. On V-J day, production ceased and an inventory of the three classifications started immediately, Ordnance officers verifying the count as it progressed and completing their work three days after the company inventory was concluded. Result was that all productive departments were cleared without delay and in a matter of weeks over 50 carloads of freight and 45 truckloads of material had left the plant. Remaining work is largely clerical and should be wound up by Nov. 15.

Meanwhile, Studebaker appears to have taken steps to anticipate possible production interruptions by labor trouble within its own plants, by negotiating a 12-cent per hour increase in basic wage rates to offset partially the effect on take-home pay of a cutback to a 40-hour week. The Studebaker UAW-CIO local has taken pride in making this agreement and has made some scornful re-



OFF WITH THE OLD AND ON WITH THE NEW: The last of scores of tanks, which during the war ran up more than 500,000 test miles at the Packard Motor Car Co.'s proving ground near Utica, Mich., is driven from the test center's 2½-mile concrete oval. Simultaneously, the first Packard makes its appearance on the track since the grounds were leased to Chrysler Corp. for war use in January, 1942



COMING AT YOU SOON (UAW-CIO WILLING): Heavier bumpers, redesigned radiator grille and a score of mechanical refinements characterize the 1946 Pontiac. While it was hoped originally to build 30,000 over the next three months, this estimate has had to be revised in the light of current interruptions. First assemblies will be two-door sedans and coupes, with station wagons coming along in November, four-doors in December, and convertibles in January. Six branch plants, four of them new, eventually will be turning out Pontiacs for 3300 dealers

marks to international officers of the union for their failure to assist the local in its negotiations. The terms of the proposal further offer to meet any advance beyond 12 cents an hour which might be put into effect by Detroit.

While the wage increase may stall labor troubles at South Bend, it will not soothe the interruptions which scores of parts manufacturers and materials suppliers are experiencing, and in the end the Studebaker assembly line may be just as bad off as that of Ford's which was stalled Sept. 14 after producing only 2312 of a scheduled 6500 passenger cars by strike interruptions in plants of 16 suppliers.

Writing on the subject of plastics in automobiles, C. A. Scoglund of Studebaker declares in the *Plastics Reporter* that "it is not economically practical to make the exterior panels of an automotive vehicle from plastic materials," while "in the interior use of thermoplastic materials the automobile industry has a past history of failures." Principal reason ascribed for these failures is that due consideration has not been given to the thermal distortion points and coefficients of thermal expansion of thermoplastic materials. Conclusion of this engineer is that new automobiles will not differ substantially from present models in plastic components, with the possible exception of upholstery materials.

Scanning mechanical refinements listed for 1946 Pontiac models reveals considerable attention directed toward making bodies more resistant to corrosion. Sills, doors and the undersides of floors are sprayed with a material (probably asphalt-base paint) to give added protection against corrosion. Additional clip retainers secure door-bottom weather strips. Chrome plated moldings now have stainless steel or brass base. Door sill plates are of aluminum, and durability of chrome plating has been doubled by increasing thickness of the plate.

Piston pins are shot peened after final grinding and lapping. Manifold heat valve bushing has been changed to chrome-nickel stainless steel. Muffler has a thicker shell, and tailpipe is coated with aluminum inside and out for better resistance to corrosion. All attaching parts such as bolts, screws and nuts are zinc plated, some with additional coating of organic material.

Polished chrome hardware replaces plastic for interiors, and "fiddleback walnut" finish has been chosen for metal panels such as instrument control panels. Heavier bumpers, redesigned radiator grille, relocated parking lights are other features.

Pontiac's original plans called for production of 30,000 units over the balance of this year, but tieups resulting from striking labor have thrown this figure out the window. It was also planned to start with only two-door models, station wagons coming along in November, four-door styles in December and convertibles by January. Plant expansions, including expenditure of $3 million on the foundry alone, are directed toward peak output of 550,000 cars annually, which it is hoped will be reached by mid-1946.

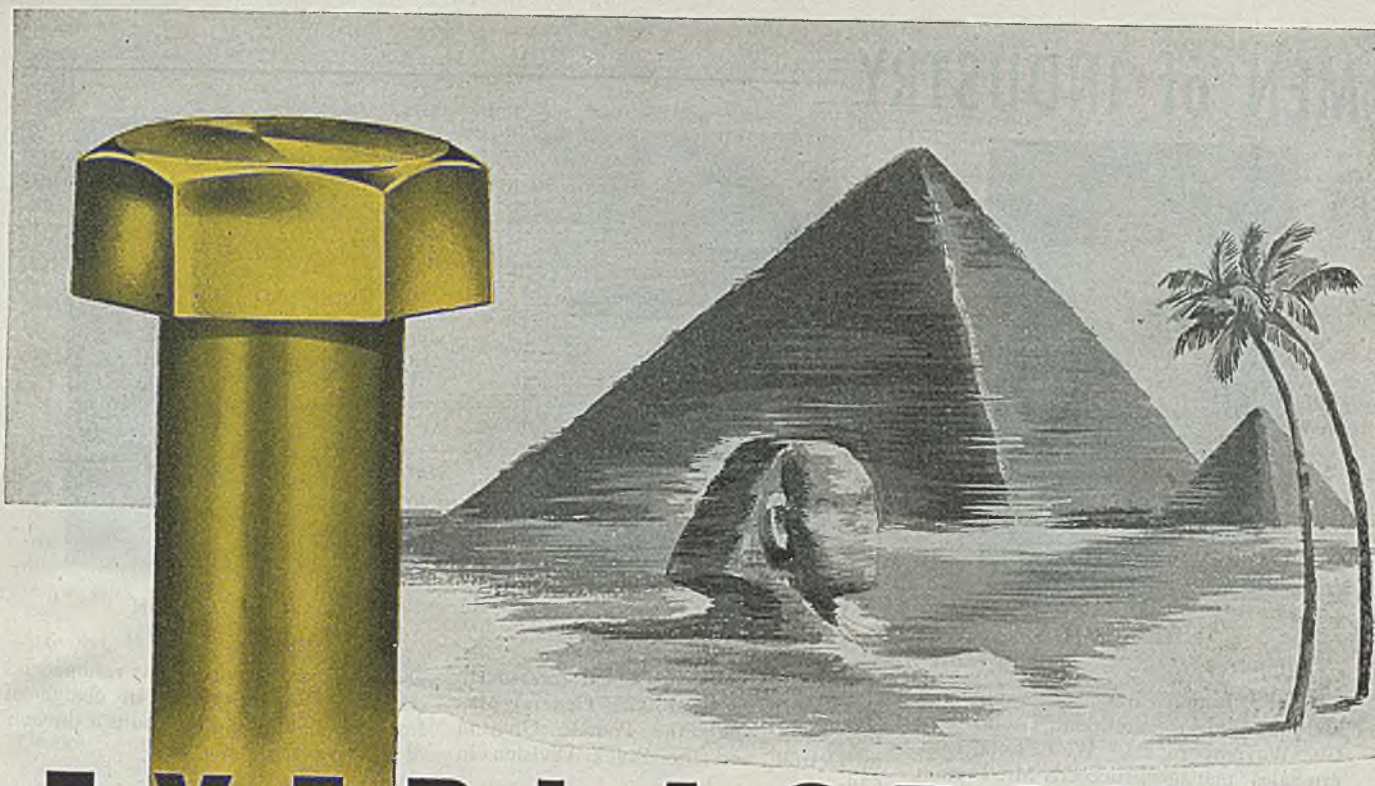
Social aspects of changes wrought by the automobile in the period between the two world wars are examined in detail in a handsome 48-page illustrated booklet, *A Car Traveling People*, just released by the Automobile Manufacturers Association and written by Franklin M. Reck. It traces the changing trends in growth of cities since 1919, and points to the highway and building construction programs necessary in the immediate future. Likewise, Mr. Reck enumerates changes in rural living conditions, the creation of a tourist industry doing a $5 billion annual business and car selling and servicing industry with yearly volume of $8.5 billion. Interesting figures on automobile costs are presented, showing average cost in 1940 of only $9.10 per horsepower against $31.50 in 1925, or 26 cents a pound against 49 cents. Operating costs likewise dropped 50 per cent in the 15-year period. Copies of the study may be obtained from the A.M.A. by addressing requests to New Center Building, Detroit 2.

Henry Ford II Named President

Elevation of Henry Ford II to presidency of the Ford Motor Co. and retirement of his grandfather marks the final exit of the elder Ford from active participation in the manufacture of motor cars. He was president from 1906 to 1918, when his son, the late Edsel Ford took over the reins, and resumed the post in June, 1943, when Edsel died. The younger Ford was elected a director in December, 1938, and executive vice president in December, 1943. In addition to the two Fords, directors include Benson Ford, a brother of Henry II, H. H. Bennett, B. J. Craig, M. L. Bricker, R. R. Rausch and Frank Campsall.

National public showings of Ford passenger car models, once slated for Sept. 21, have been postponed indefinitely along with any price announcement, as the result of crippling strikes closing down the Rouge plant. Calculation of price according to OPA formulas may be upset entirely by further wage increases if they should be granted.

Meanwhile parts manufacturers are in a tizzy over the removal of price ceilings on parts going into original equipment and the retention of ceilings on identical parts for service and maintenance. The situation is not without its humorous aspects, since many manufacturers figure to lose money on original equipment parts and make up the loss on service business, an impossibility with ceilings kept on the latter.



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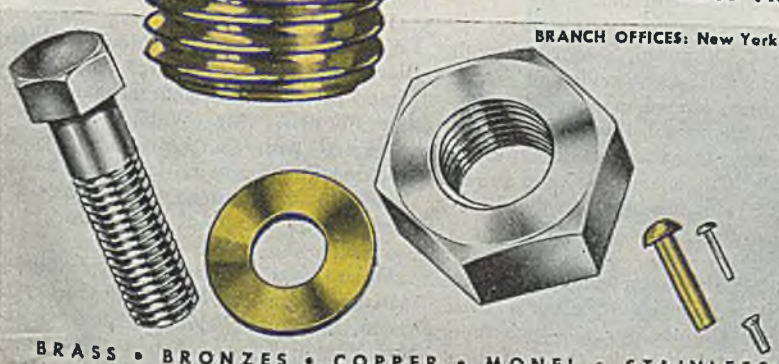

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MEN of INDUSTRY

R. F. INGRAM

JOHN GRAHAM

W. J. DAVIDSON

R. F. Ingram has been appointed secretary and vice president, Landis Tool Co., Waynesboro, Pa. **W. P. Lotz**, eastern sales manager, succeeds Mr. Ingram as general sales manager.

—o—

John S. King has been named acting manager, Railroad Division, Fairbanks, Morse & Co., Chicago, succeeding the late **C. H. Wilson**. **Arnold G. Brown**, formerly assistant manager, Pump Division, succeeds Mr. King as manager of that division.

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S. U. Shorey has been appointed assistant manager, plasticizers and resins sales, and **B. B. Langton**, assistant manager, intermediates sales, Organic Chemical Division, Monsanto Chemical Co., St. Louis.

—o—

Dr. Charles A. Getz, vice president in charge of research, Cardox Corp., Chicago, has returned after a two months' trip to Europe as one of a group of scientific consultants investigating German industry.

—o—

William D. Meagher has been named factory superintendent and **Carl C. Whitcomb**, design and development engineer, Schelm Bros. Inc., East Peoria, Ill. Mr. Meagher formerly was with Operadio Mfg. Co., St. Charles, Ill., and Mr. Whitcomb previously had been associated with Commercial Solvents Corp., Peoria, Ill.

—o—

W. S. O'Connor has been named national field sales manager to assist **L. L. Corcoran**, sales manager, United States Gauge Co., New York. **H. M. Bear** succeeds Mr. O'Connor as district manager of the sales territory served by the New York office. **A. E. LeVan** is head of research and development.

—o—

Earl B. Pridmore recently became associated with International Molding Machine Co., Chicago, as plant superintendent in charge of production. Mr. Pridmore attended Massachusetts Institute of Technology, and previously had been associated with General Motors Corp., with the Pontiac Division in Detroit, and the Buick Division in Chicago.

—o—

John Graham has been appointed general manager of sales, American Steel & Wire Co., Cleveland. **R. F. Curtis**, formerly assistant manager, Manufacturers Products Division, has been named manager of that division, succeeding Mr. Graham. **Norman Sted**, formerly in Cleveland district sales, has been named assistant manager under Mr. Curtis. **J. H. Vail** has been appointed assistant director of industrial relations, being transferred to the Cleveland office from the company's Duluth, Minn., works, where he has been supervisor of industrial relations. **C. N. Schmidt** has been appointed advertising manager. **Wilmer H. Cordes** relinquishes that position to devote full attention to his duties as manager of sales research, development and promotion.

—o—

George Fobian has been elected president, Oilgear Co., Milwaukee, succeeding the late **Harry M. Swigart.**

—o—

Harley C. Lee has rejoined Basic Refractories Inc., Cleveland, as vice president and technical director after having been in charge of the technical department of the company's former subsidiary, Basic Magnesium Inc.

—o—

William C. Simpson, associated with Lukens Steel Co., Coatesville, Pa., since 1934, has been named manager of sales, Lukenweld Inc., a subsidiary. Mr. Simpson had been manager of direct sales, Lukens Steel Co., since 1943, and previous to that was manager of the Pittsburgh sales office.

—o—

Wilfrid Mavor has returned to Ferro Enamel Corp., Cleveland, after a five-year leave of absence during which time he served as brigadier with the Canadian army in the capacity of deputy master general of ordnance. He has resumed his duties as vice president in charge of foreign activities and he also is a director of the corporation.

—o—

W. J. Davidson will be administrative engineer for the new General Motors' Technical Center, Detroit. **Col. A. J. Schamehorn** has been named assistant administrative engineer. **Lyle A. Walsh** will be manager of operations of the advanced engineering section of the center. **C. F. Kettering, B. D. Kunkle** and **H. J. Earl** will direct the research laboratories, process development and styling sections respectively.

—o—

B. W. Crenshaw has been appointed sales representative with headquarters in St. Louis, Scullin Steel Co., St. Louis. Mr. Crenshaw has been connected with the company since 1941 as works engineer and as assistant works manager.

—o—

Frans Wethly recently was appointed a vice president, Wilputte Coke Oven Corp., New York.

—o—

Robert O. Brannan has been elected vice president in charge of sales and purchases, Cleveland Steel Barrel Co., Cleveland. Mr. Brannan has been associated with the company for the past eight years and has served as sales manager for the past three years.

—o—

Frank E. Walling, acting manager, Lewis Foundry & Machine Division, Blaw-Knox Co., Pittsburgh, has been named president and general manager of that division. Mr. Walling has been associated with the Lewis Foundry & Machine Division since 1941, first as assistant to the manager, then as vice president in charge of operations.

—o—

Oscar Nuss has been named district manager, Industrial Rubber Products Division, Thermoid Co., Trenton, N. J. Mr. Nuss will serve the southern California, New Mexico and Arizona areas

with headquarters in Los Angeles. **Walter B. Chick** also has been appointed a district manager of that division and will serve the northwest Pacific coast area with offices in San Francisco.

—o—

Lt. Comdr. Allan M. Johnson, USNR, who spent the past four and one-half years in the service, has returned to his former duties in the Philadelphia office of Debevoise-Anderson Co.

—o—

Leonard C. Doolittle has been appointed industrial hose sales engineer, Weatherhead Co. of Cleveland. Mr. Doolittle has returned from three years of service with the Army Air Forces where he served as a major. Before entering the service, Mr. Doolittle was division sales manager, Gates Rubber Co.

—o—

Robert H. Boyer recently joined the Osborn Mfg. Co., Cleveland as sales engineer in its Brush Division. In his most recent position before joining the Osborn company, Mr. Boyer was engaged in the inspection of precision equipment used in Bullard Co.'s manufacturing operations.

—o—

Herman H. Pancake, sales engineer, has been named manager of mine car sales, American Car & Foundry Co., New York. He succeeds **J. L. McDowell** who recently retired.

—o—

Ernest Koyle has been appointed Detroit district metallurgist, Steel & Tube Division, Timken Roller Bearing Co., Canton, O. Mr. Koyle has for the past 14 years been in the metallurgical department, Timken Steel & Tube Division, specializing in automotive alloy steels.

—o—

B. K. Wickstrum recently was appointed midwestern sales manager with headquarters in Chicago, for the Lighting Division, Sylvania Electric Products Inc., Ipswich, Mass.

—o—

W. E. Stadel and **M. W. Woodruff** have been added to the engineering staff of the George L. Nankervis Co., Detroit, manufacturer and distributor of plating and metal-finishing equipment.

—o—

Dr. Harry G. Mitchell has rejoined Speer Carbon Co. and its affiliate International Graphite & Electrode Corp., St. Marys, Pa., as advertising manager.

—o—

Howard F. MacMillin has become associated with Arthur D. Little Inc., Cambridge, Mass. Mr. MacMillin formerly was president and general manager, Hydraulic Press Mfg. Co., Mt. Gilead, O.

—o—

Felix Doran Jr., has returned as general manager, Fleet Division, General Motors Corp., Detroit, after two and a half years' service as a lieutenant colonel of ordnance. He was stationed at the Rock Island arsenal. **W. L. Shaffner**, who has been acting general manager, resumes his position as director of national users' sales.

—o—

Kenneth Campbell, San Francisco, has been appointed manager, foreign commerce department, United States Chamber of Commerce, effective Oct. 15. He succeeds **Edward L. Bacher** who resigned several months ago.

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Edward de Luca recently became associated with Machine & Tool Designing Co., Philadelphia, as field representative in the South. He will have headquarters in Jacksonville, Fla.

—o—

A. L. Campbell has been appointed manager of the Eastern Division, Pittsburgh-Des Moines Steel Co., with headquarters at Neville Island, Pa.

—o—

Robert A. Craig has been appointed treasurer, Sikes Co. Inc., Buffalo, succeeding **Francis A. Bacon**, who recently was elected president.

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Paul B. Bernhardt, former sales engineer, Wales-Strippit Corp., North Tonawanda, N. Y., has been appointed western New York representative, Adjusta-Post Co.

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R. L. Cain has been appointed assistant sales manager, Pennsylvania Salt Mfg. Co., Philadelphia. He joined the company in 1942 as assistant to the director of sales.

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Lt. Col. C. F. Wiley has returned to his post as secretary, Thomas Machine Mfg. Co., Pittsburgh, following retirement from the Army.

—o—

H. J. Arnot has been appointed vice president in charge of production, Pipe & Tube Products Inc., Jersey City, N. J. He formerly was plant manager of the company's Reading, Pa., works.

—o—

J. H. Edmonds, general manager, Lebanon, Pa., plant, Bethlehem Steel Co., is retiring and **Walter R. Penman**, formerly assistant general manager, succeeds him. Mr. Penman's entire industrial career has been with Bethlehem Steel, entering the employ of the company at Lebanon in 1919. He has been assistant general manager since 1940. Mr. Edmonds has been general manager at Lebanon since 1928, and connected with Bethlehem Steel since 1907. **Robert L. Riley**, assistant factory superintendent and superintendent of the Bethlehem-Lebanon Forge Co. during the war, succeeds Mr. Penman as assistant general manager.

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George M. Ryerson has been appointed regional sales manager, Plomb Tool Co., Los Angeles, for the Michigan, Ohio and Indiana area. He will have headquarters in Detroit.

—o—

F. D. Haberkorn has been named manager, Sales Training Division, Caterpillar Tractor Co., Peoria, Ill. **J. W. Mohler**, district representative in the Dallas, Tex., and New Mexico territory, succeeds Mr. Haberkorn as assistant sales manager of the Central Division.

—o—

N. A. Doolittle, Tulsa, Okla., has been named representative in Oklahoma, southern Kansas, and southwestern Missouri, Ampco Metal Inc., Milwaukee. **W. W. Swan**, New Orleans, La., has been assigned several counties in southeastern Texas in addition to the states of Louisiana, Alabama and Mississippi which he has been covering.

—o—

Gordon P. Reif has been appointed vice president, sales; **Guy W. Allis**, vice president in charge of the Richmond, Ind., plant; and **Joseph Stross**, vice president, purchasing, Metal Specialty Co., Cincinnati. **Harry M. Forman** has been named controller.

—o—

R. H. Khuen, formerly sales manager, Powdered Metal Division, Chrysler Corp., Detroit, has formed his own com-

W. R. PENMAN

R. H. KHUEN

DONALD WILLIAMS

Who recently was named general sales manager, Dow Chemical Co., Midland, Mich., and noted in STEEL, Sept. 17 issue, p. 99.

N. B. WILLIAMS

Who recently was appointed superintendent Cleveland plant, United Tube Corp. of Ohio, as noted in STEEL, Sept. 24 issue, p. 104.

A. M. WRIGHT

Who is assistant general manager, Chandler-Evans Corp., West Hartford, Conn., as noted in STEEL, Sept. 17 issue, p. 101.

pany, Richard H. Khuen Associates, Grosse Pointe, Mich.

—o—

Walter H. Hallerberg, Master Specialties Co., Chicago, was elected a director, Chicago Control, Controllers Institute of America, at its recent annual meeting.

—o—

Sterling Smith has resigned as manager of the Refrigeration Division, Mills Industries Inc., Chicago. Before becoming associated with that company a year ago, Mr. Smith served for three years as chief, Refrigeration and Air Conditioning Section, War Production Board, Washington.

—o—

Prof. Raymond E. Kirk, head of the Department of Chemistry, and dean of the Graduate School, Polytechnic Institute of Brooklyn, N. Y., is chairman-elect, New York section, American Chemical Society, New York.

—o—

W. H. Spooner, previously New England district sales manager, Central Iron & Steel Co., Harrisburg, Pa., has been named sales manager of the New York district. **Fred L. Steuber**, district sales manager, Philadelphia, for the past four years has been purchasing agent, Heat Transfer Products Inc., New York, and prior to that time was with Carnegie-Illinois Steel Corp. in Philadelphia. **E. S. Webster**, district sales manager with offices in Richmond, Va., will be in charge of both the Baltimore and Richmond offices. **R. T. Kilduff** has been promoted to district office work and will have headquarters in Baltimore. **W. A. Hill** has been promoted from the general sales department to district sales manager at Boston. **Kenneth M. Rhoads** will cover the central section of Pennsylvania from the Harrisburg offices of the company.

—o—

J. Herbert Lund, formerly sales manager, Kropp Forge Co., Chicago, has been appointed sales manager, Troy Laundry Machinery Division, American Machine & Metals Inc., East Moline, Ill.

—o—

Harry P. Barrand has been elected a vice president and director, Hanson-Van Winkle-Munning Co., Matawan, N. J.

—o—

Oliver E. Nelson, former export manager, Winchester Repeating Arms Co., a division of Olin Industries Inc., has been appointed general manager of the corporation's new Export Division. Headquarters will be maintained at the Winchester division's home office, New Haven, Conn.

—o—

John S. Hutchins has been elected president, Ramapo Ajax Division, American Brake Shoe Co., New York. Mr. Hutchins became sales manager in 1941 and was made executive vice president in October, 1944. He succeeds **J. Brookes Spencer** who served as president of the division since 1936 and who is a vice president of American Brake Shoe.

—o—

Joseph Edie has been named branch manager at Indianapolis, Jessop Steel Co., Washington, Pa. Mr. Edie formerly was the company's sales representative in Cleveland.

—o—

Riley R. Clark has been named supervisor of wage and salary administration, Chicago district industrial relations department, Carnegie-Illinois Steel Corp. He is succeeded at South works by **J. J. Morrissey**, formerly assistant to division superintendent of steel production in charge of personnel. **Porter R. Wray** has been appointed alloy metallurgical engineer, Pittsburgh.

OBITUARIES . . .

Maxwell G. Tielke, president, Crucible Steel Casting Co., Cleveland, died at his home in Lakewood, O., Sept. 19. He became an executive of the casting company in 1912.

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Franklin T. Woodward, 63, consulting patent attorney, Western Electric Co., New York, died Sept. 18 in that city.

—o—

W. Harry Blocksidge, 67, chief metallurgist, H. J. Williams & Co., Buffalo, died Sept. 15 in that city.

—o—

Guy C. Chamberlain, 65, refrigeration engineer, Worthington Pump & Machinery Corp., Harrison, N. J., died Sept. 22 at his home in South Orange, N. J.

—o—

Arthur E. Quere, A. E. Quere Co., Cleveland, died recently in that city. The Quere company is sales agent in the states of Ohio, Kentucky and Indiana for the Hendrick Mfg. Co.

Victor J. Hanlon, 60, vice president and treasurer, Hanlon Scrap Iron Works, died recently in Rochester, N. Y.

—o—

George W. Lentz, originator and patentee of the Bonnot-Lentz billeteer and associated with the Bonnot Co., Canton, O., for the past 17 years, died Sept. 19.

—o—

Eugene C. Batchelar, 64, a director and for 36 years manager, Pittsburgh district office, Motch & Merryweather Machinery Co., Cleveland, died recently in a Pittsburgh hospital.

Surplus Property Disposal Slow

Reconstruction Finance Corp. now has 265 industrial plants in West. Six hundred thousand machine tools will be made available soon. Government agencies outline plans for selling surplus

SAN FRANCISCO

WITH more than a month of peacetime behind them, West Coast businessmen and industrialists are becoming anxious for progress on surplus property disposal.

Basically, of course, at stake is the future of the big war plants, such as the Geneva steel plant, the Basic Magnesium mill at Las Vegas and the Pacific Northwest aluminum plants. Much of the western industrialization hopes rest on what is done with these wartime facilities.

However, the problem of sifting the mountainous masses of surplus materials into the civilian economy is only slightly less important. Up to now there has been only a trickle of such goods.

Recently in San Francisco nine government agencies outlined for the first time their part in disposing of the war stockpiles. They promised that activity will be increased soon, although they warned that 12 to 15 years may be required before the program is completed.

Of the nine agencies represented at the meeting, the Reconstruction Finance Corp. holds the most important assignment. It has the task of disposing of capital and producer goods, such as production machinery, machine tools, raw materials and finished products, communications equipment, aircraft and railroad equipment and industrial plants and other industrial real estate.

RFC spokesmen at the meeting predicted 600,000 machine tools would be available soon for sale, and said that by mid-November the RFC expects its surplus inventory to increase to $60 million. At present it is about $10 million.

The RFC now has approximately 265 industrial plants in the West, at least 60 per cent of them in California. It expects to put them up for sale in the near future.

In disposing of materials, tools and the like, the RFC will sell to individuals, large and small businesses on a price tag basis. It will negotiate on lower prices for sales of materials in quantity.

The OPA's role will be that of policing the pricing of surplus items being offered for resale. The agency also will govern the prices put on such articles by purchasers in disposal to the general public.

PLAN WESTERN RECONVERSION: Pacific Coast states officials meet at San Francisco in a series of conferences on reconversion and employment problems. Left to right: Gov. Mon C. Wallgren of Washington; Richard Neustadt, regional director, Social Security Board; Attorney General Bob Kenney; Roger Lapham, mayor of San Francisco. NEA photo

Southern California Still Needs Workers Despite Large Pool of Displaced Labor

LOS ANGELES

SOUTHERN California's industrial reconversion is a moving picture showing changes that, in varying degrees, are typical of postwar readjustments taking place in other sections.

Activities of management, labor and government, each with a program keyed to the unavoidably diverse interests of these time-defined groups, make up the picture.

Management's fundamental need is one of release of men and materials from wartime controls, many of which continue to operate in the form of price ceilings, material segregation and allocation, retention of manpower by the military and other limiting rules.

Labor's announced aims also are basic —more wages for less work to achieve what is termed the "cost-of-living scale."

The goal of government is not definable in such simple terms. While it is contended that supply and demand must be guided so as to bring delivery of goods to consumers at noninflationary prices, the method of arriving at a fair compromise between management and labor so as to make such distribution possible has not been clearly set forth.

According to USES figures, some 55,050 workers in all categories still are needed to prevent serious bottlenecks in peacetime production advances. In addition, government establishments report difficulty in maintaining shipping schedules to overseas forces because of lack of workers.

Meanwhile, there exists a labor pool of 143,000 workers in Southern California composed of workers separated from jobs voluntarily or involuntarily since the war's end. A few of these, but only a few, have left the area. Others have accepted jobs. The majority, however, continue to shop around, hesitating to take new offerings.

Government officials are predicting that employment in durable goods industries will not reach prewar levels until about February, 1946. This refers specifically to steel products, automobile and truck assembly operations, household equipment, communications apparatus and furniture.

Construction approaching peak proportions is not expected before next spring. In canning and other food processing activities, overall employment has increased 25 per cent since 1940. Higher consumer demand coupled with continuing government procurement are expected to keep average employment in this field at or above the augmented level.

WING TIPS

Efficiency of airplane controls increased by American Steel & Wire Co.'s newly developed cable which expands and contracts at about the same rate as the frame of the plane. Development banishes number of engineering difficulties

AIRPLANES of the future are going to have more flexible and efficient "muscles" as the result of a development perfected by the American Steel & Wire Co., subsidiary, United States Steel Corp. The "muscles" of all planes are thin steel cables made up of fine wires which enable the pilot to manipulate the rudder and ailerons of his ship.

The newly-developed cable performs the same functions as former types and banishes a number of aircraft engineering difficulties in one sweeping stroke by having the ability to expand and contract in varying temperatures at almost the same rate as duralumin. The virtual elimination of this discrepancy between the two metals has done away with special compensating devices and at the same time has contributed to the efficiency of both the pilot and his plane.

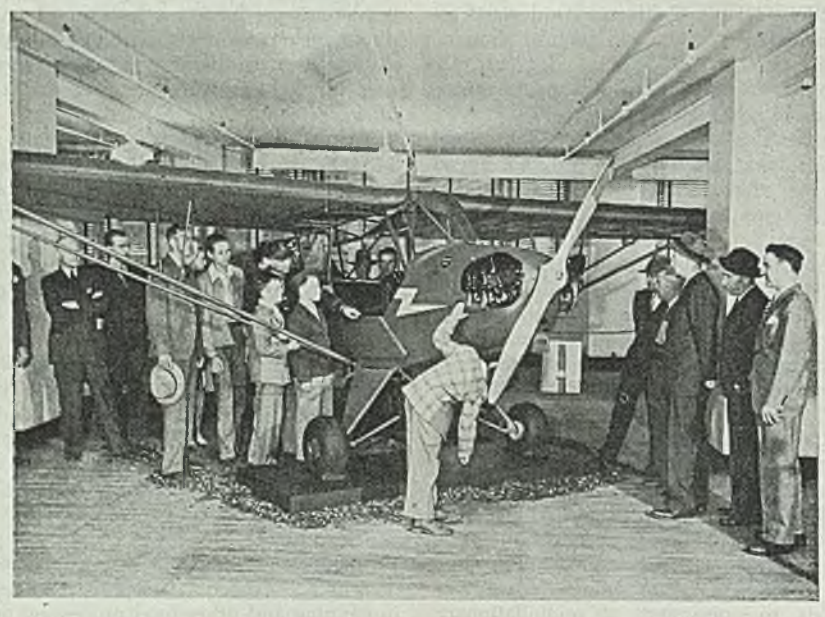
Because they are concealed beneath the skin of the plane, control cables are often overlooked by the casual observer. However, their importance cannot be minimized and they represent one of the many uses of steel in aircraft.

For the most part these cables have been made of plain carbon steel, although in some applications where extreme corrosion or temperature factors must be overcome, stainless was used. Steel is the only material which has sufficient tensile strength and the ability satisfactorily to resist wear at points of contact with pulleys to perform this vital task. However, steel has a different coefficient of expansion than has duralumin, of which the frame of a plane is constructed. The result is that when a plane passes from temperatures at ground level to the subzero temperatures of high altitudes, the frame contracts to a greater degree than the ordinary control cables thus creating slackness in the cables and sluggish control of the ship. In passing from a temperature of 70°F to —70°F, for instance, in a running length of 70 ft the airframe of a plane will contract approximately ¾ in. more than the carbon steel control cable. Failure to compensate for the varying cable lengths assumes tremendous importance when it is considered that a B-17 Flying Fortress contains 3000 feet of control cables, while the new giant B-29 Superforts have considerably more spreading to all parts of the ship. This discrepancy had to be overcome by the use of temperature compensating devices in the control system which automatically took up the slack. However, these devices created added weight to the plane and their delicate and complicated construction demanded frequent servicing and attention, which were not always available in some areas.

The steel in the new control cables is a high nickel manganese alloy formerly used for making hold-down devices for aluminum housings. Because of the special analysis of the material, it requires an entirely different practice in wire drawing technique to effect utilization of its maximum beneficial properties. Only after many months of work and experimentation was production of the material made possible through development of these drawing procedures, together with special closely-controlled heat treatments.

All types of aircraft control cables are being produced from the new material in American Steel & Wire plants. They range from a single strand of 7 wires, where a degree of rigidity is desired, to 7 strands of 19 wires each—a total of 133 fine wires—where a maximum of flexibility is demanded. Sizes range from 1/32 in. to ¼ in. diameter.

The net results are not only considerable weight savings due to the elimination of the compensating equipment, but more satisfactory and efficient handling of the plane by the assurance of constant tension. The development has removed the necessity for extreme rigging tensions, which in many cases increase the friction losses in the system to a point where actual control of the plane imposes pilot fatigue more rapidly than is justifiable.



WRAP IT UP? The Piper Cub is viewed by curious prospective buyers at Mandel Bros., Chicago department store which is offering the light plane to the public. Purchase price of $2010 includes 8 hours of basic instruction. NEA photo

Curtiss-Wright Facilities Are Being Consolidated

Further consolidation of Curtiss-Wright Corp. manufacturing facilities in its Airplane Division and a realignment of certain key corporation executives has been announced by G. W. Vaughan, president.

The first of these moves called for the closing of the Airplane Division plants at Buffalo upon the completion of current commercial contracts for the CW-20 Commando transport being produced there and the transfer of headquarters, such key personnel and manufacturing facilities as are necessary, to its Columbus, O., plant early next year, provided that proper arrangements can be made with the Defense Plant Corp. for the utilization of that facility.

The following changes, affecting certain key corporation executives, were announced by Mr. Vaughan:

Robert L. Earle, vice president, has been placed in complete charge of the Airplane Division as well as the Propeller Division of which he has been general manager since 1938. He joined Curtiss-Wright in 1929, became Washington representative in 1933, was made assistant to the general manager of the Airplane Division's plant in Buffalo in 1937, and became a vice president of the corporation in 1939. He was elected to the board of directors in 1941.

Burdette S. Wright, vice president in charge of the Airplane Division since 1940, will move from Buffalo to the company headquarters office in New York to assist in reconversion. He joined the organization in 1928 as manager of the

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17-7 (Type 301)	110,000	40,000	1600
18-8 (Type 302)	90,000	35,000	1650
18-8 (Type 304)	85,000	35,000	1650
20-10 (Type 308)	90,000	35,000	1800
18-12 Mo (Type 316)	85,000	40,000	1650
25-12 (Type 309)	95,000	45,000	2000
18-10 Ti (Type 321)	90,000	35,000	1650
18-10 Cb (Type 347)	90,000	40,000	1650
13 (Type 410)	65,000	35,000	1250
17 (Type 430)	75,000	45,000	1550
27 (Type 446)	80,000	50,000	2000

*ARMCO High Tensile Stainless Steel meets specifications requiring yield strengths as high as 140,000 psi. and tensile strengths up to 185,000 psi. min.

THE AMERICAN ROLLING MILL COMPANY

CIVILIAN PLANE: First Aeronca Champion postwar civilian airplane comes off the assembly line at Middletown, O. Plane is a tandem two-seater, has a cruising speed of 90 miles an hour, landing speed of 38 miles an hour, cruising range of 270 miles, and costs $2095. NEA photo

Washington office of the Curtiss Aeroplane & Motor Co., and became vice-president of the Curtiss-Wright Corp. in 1929, general manager of the company's Buffalo plant in 1936, and general manager of the entire Airplane Division in July, 1940.

G. M. Williams, senior vice president of Curtiss-Wright Corp. and executive vice president, Wright Aeronautical Corp., came with the organization on a war-time basis in 1943. He has been on leave of absence as president of the Russell Mfg. Co. since December, 1941, and will return to that company about Nov. 1.

F. H. Harrison, vice president, has been named general manager of the Airplane Division. Mr. Harrison had been borrowed from International Harvester Corp. for the wartime period.

The proposed move to Columbus was decided upon after the careful consideration of all factors involved, Mr. Vaughan stated. Among the major points favoring the move were: 1. Location of Columbus plant in the interior of the United States. 2. Adaptability of Columbus plant to either a small or large operation. 3. Better year-round weather conditions. 4. Overall economy of operation at Columbus.

Mr. Vaughan stated that the consolidation of facilities and reassignment of executive duties were part of an overall corporate plan to convert as rapidly as practical to an economic basis consistent with peacetime requirements.

SAE's New Board To Plan For Peacetime Activities

Effective operation of the Society of Automotive Engineers war engineering board which co-operatively tackled over 1400 essential wartime engineering projects and brought most of them to a successful conclusion has been recognized by the organization of a new SAE technical board to co-ordinate and supervise all technical committee activities of the society and to convert the war engineering program to peacetime service of industry and government. The war engineering board still functions and will continue until the official end of the war, but the new technical board anticipates the termination of its functions.

The new board comprises three groups of eight engineers each, serving for terms of one, two and three years each, beginning next January. Each succeeding January eight new members will be appointed. L. R. Buckendale, engineering vice president of Timken-Detroit Axle, is chairman and will serve for a three-year term. J. M. Crawford, Chevrolet chief engineer and SAE president, is an ex-officio member.

Serving for three-year terms, in addition to Mr. Buckendale: B. B. Bachman, engineering vice president, Autocar Co., Ardmore, Pa., G. W. Laurie, automotive transportation manager, Atlantic Refining Co., Philadelphia; William Littlewood, engineering vice president, American Airlines Inc., Jackson Heights, N. Y.; R. H. McCarroll, executive engineer, Ford Motor Co., Dearborn, Mich.; Delmar G. Roos, engineering vice president, Willys-Overland Motors Inc., Toledo, O.; C. G. A. Rosen, research director, Caterpillar Tractor Co., Peoria, Ill.; and J. C. Zeder, chairman of the engineering board, Chrysler Corp., Detroit.

For two-year terms: A. T. Colwell, vice president, Thompson Products Inc., Cleveland; R. E. Cole, engineering vice president, Studebaker Corp., South Bend, Ind.; J. H. Hunt, director, new devices section, General Motors Corp., Detroit; R. D. Kelly, superintendent of development, United Air Lines Inc., Chicago; C. R. Paton, director of automotive engineering, Packard Motor Car Co., Toledo; A. W. Scarratt, engineering vice president, International Harvester Co., Chicago; Mac Short, vice president, Lockheed Aircraft Corp., Burbank, Calif.; and T. C. Smith, automotive engineer, American Telephone & Telegraph Co., New York.

For one-year terms: D. P. Barnard, associate research director, Standard Oil Co. (Indiana) Whiting, Ind.; Rex B. Beisel, general manager, Chance Vought Aircraft Division, United Aircraft Corp., Stratford, Conn.; R. M. Hazen, chief engineer, Allison Division, General Motors Corp., Indianapolis; Erle Martin, engineering manager, Hamilton Standard Propellers Division, United Aircraft Corp., East Hartford, Conn.; Arthur Nutt, director of aircraft engineering, Packard Motor Car Co., Detroit; L. S. Pfost, chief engineer, tractor division, Massey-Harris Co., Racine, Wis.; R. R. Teetor, engineering vice president, Perfect Circle Co., Hagerstown, Ind.; and R. W. Young, chief engineer, Wright Aeronautical Corp., Paterson, N. J.

From this imposing list of automotive and aircraft engineering experts, a temporary executive committee has been named including Messrs. Buckendale, chairman, Bachman, Hunt, Littlewood, McCarroll and Zeder. First meeting of the entire board was held in Detroit Sept. 11, with 21 of the group present. R. C. Sackett is permanent secretary of the board.

ATSC Seeks To Reduce Airplane Fire Hazards

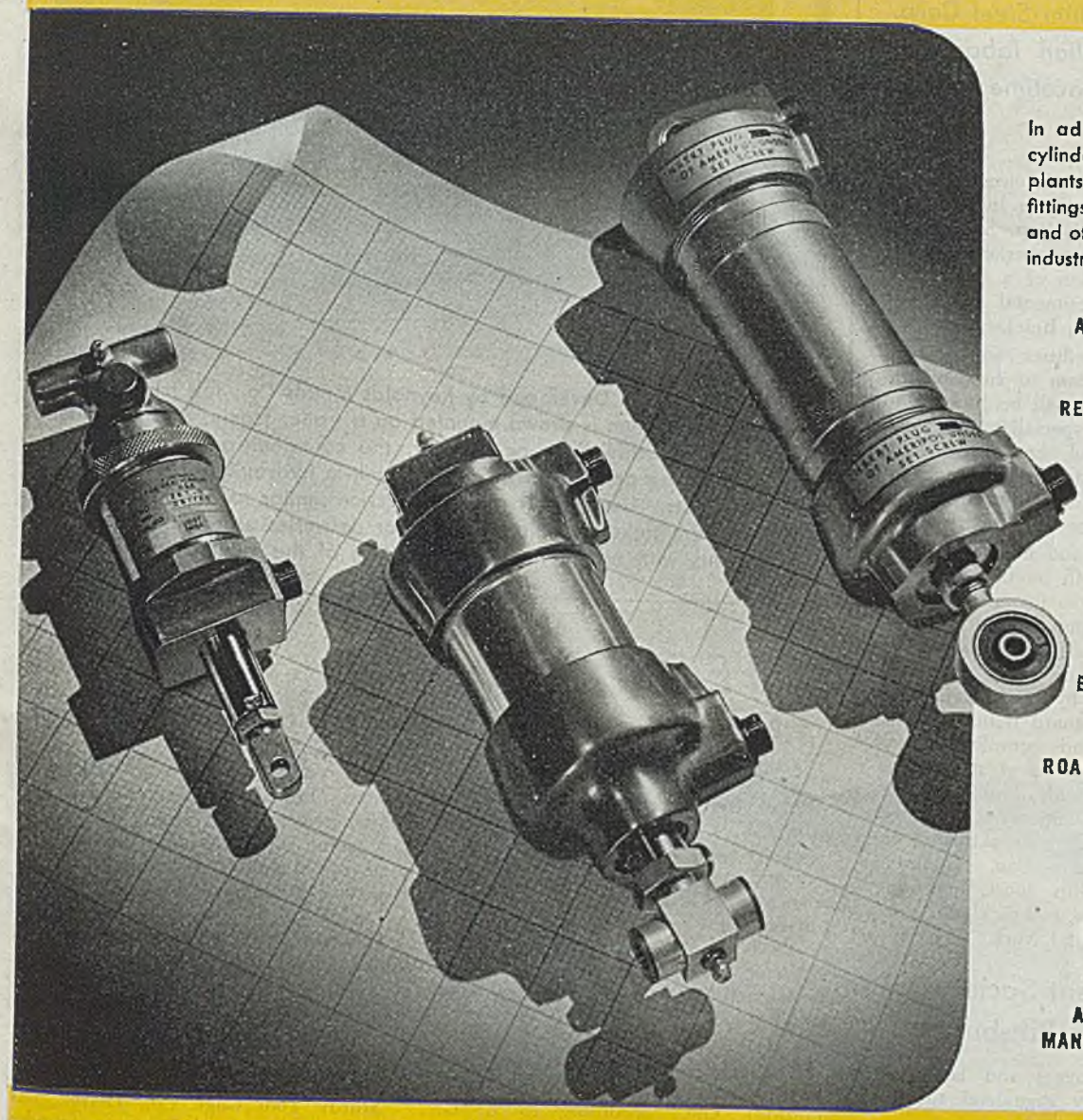
Airplane safety, both military and civil, will be materially increased as a result of experiments on fire hazards being conducted at the Air Technical Service Command headquarters, Wright Field, O.

To prevent fire hazards in engine nacelles, the ATSC Engineering Division is conducting experiments in its power plant laboratory to test the comparative fire resistance of all types of fuel and oil hoses and lines forward of the fire wall, and of all equipment in the accessories section of the nacelles.

The experiments seek to discover how to prevent fire hazards while the plane is in the air and to develop new equipment and materiel which will withstand the intense heat of such a fire long enough for the fire to be extinguished before it can spread and cause an explosion.

One of the practical results of the tests is the development of a special aircraft hose which will withstand the intense heat for a period of 30 minutes or more, as against the 3-minute period of previous hoses.

Improved HYDRAULIC CYLINDERS



In addition to hydraulic cylinders, Weatherhead plants make all types of fittings, valves, hose lines and other parts for these industries:

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Steel Company Plans Center For Research

Allegheny Ludlum Steel Corp. places $2 million laboratory first on its peacetime expansion program

TO CARRY industrial science deeper into the service of postwar living, Allegheny Ludlum Steel Corp. has placed first on its peacetime expansion program the immediate erection of a $2 million laboratory and experimental center at its headquarters plant, Brackenridge, Pa.

With the new facilities, an enlarged and intensified program of fundamental and applied research will be brought to bear on the highly specialized stainless, magnetic, valve, tool, and other complex steels produced by the company. These are the steels which have led the technological advance of industry.

In addition, new and improved fabricating techniques will be developed, to bring increased aid to manufacturers of appliances and equipment used in American homes, businesses and industries.

Complete air conditioning, including elimination of dust by electrostatic precipitation, will safeguard delicate scientific instruments and complex experiments. The structure is of steel frame and brick design, with double insulating glass windows. The main two-story-and-penthouse building is extended by a one-story furnace section, containing melting and make-up floors, annealing and melting furnaces, and pickling equipment, for experimental work.

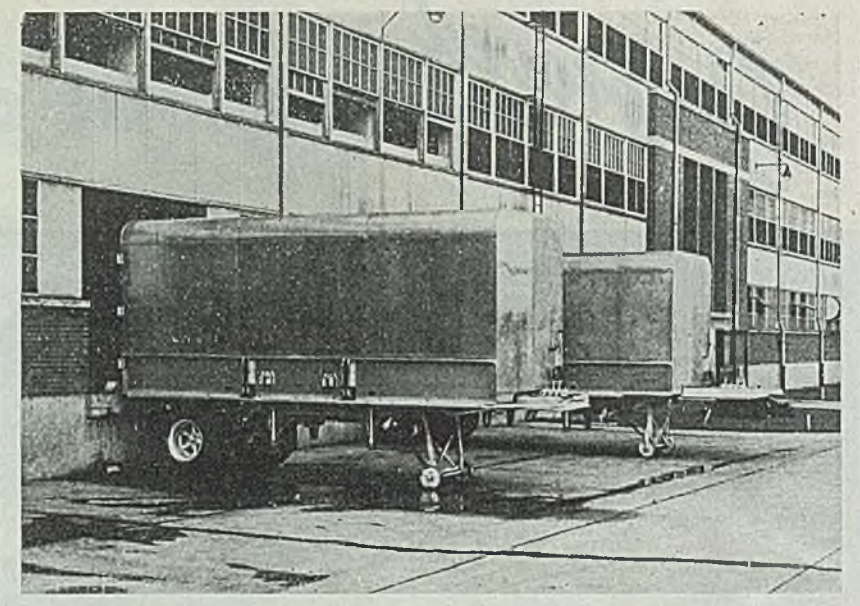
Form Instrument Society Of America in Pittsburgh

Instrument engineers and laboratory technicians recently organized the Instrument Society of America.

Albert F. Sperry, Chicago, was elected national president of the new society; Carl Kayan, professor of mechanical engineering, Columbia University, New York, vice president; Richard Rimbach, Pittsburgh, secretary; and Clarke E. Fry, Westinghouse Electric Corp., Pittsburgh, treasurer.

Continental Plans Big Can Plant at Weirton, W. Va.

Continental Can Co., plans to erect one of the largest canmaking plants in the country near Weirton, W. Va., on property acquired from the Weirton Steel Co. It will specialize in general line can manufacture.



LCL CONTAINER: Developed by Reynolds Metals Co., this lcl container of aircraft aluminum is shown mounted on a trailer frame. When trailer is parked alongside dock or flat car, the container and contents are easily shifted on or off with the aid of built-in hydraulic jacks and ball-bearing rollers. Used with a delivery service similar to Railway Express, the containers make possible door-to-door deliveries on one-half box car shipments with no intermediate handling of the contents required

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Stokes Industries Inc. and Sebastian Lathe Co., Covington, Ky., have been bought by D. C. Morrison, formerly president and general manager of both companies, and will be operated as D. C. Morrison Co.

—o—

Detroit White Lead Works, Detroit, has changed its corporate name to Rogers Paint Products Inc.

—o—

Massey-Harris Co. Ltd., Toronto, Ont., will soon open a $1,750,000 foundry at Brantford, Ont., according to E. G. Burgess, vice president, who also forecast full production for the company's Canadian plants in the next two years.

—o—

National Bureau of Standards, U. S. Department of Commerce, has approved for promulgation revision of Simplified Practice Recommendation R169-37, Machine, Carriage and Lag Bolts, effective Oct. 1, 1945, to be known as R169-45. The new list contains additional listing and further simplifications to aid purchasers in selecting stock-available sizes. Copies are now obtainable on request.

—o—

Massillon Aluminum Co., Massillon, O., has purchased from the Reconstruction Finance Corp. the Defense Plant Corp. plant in Massillon originally built for Canton Drop Forge Co. and later reconstructed for the Hoover Co. The new plant covers 18 acres and will be used by Massillon Aluminum to make Ekco cooking utensils for civilian trade.

—o—

Wm. Sellers Co., Philadelphia, has added a marine division for the development and manufacture of modern ship machinery, and has increased capacity for manufacture of hydraulic molding and pressing equipment.

—o—

Sturdy Tool Gage Co., Detroit, has been formed with Al Robinson, founder and for 16 years president of the Lincoln Park Tool & Gage Co., as head.

—o—

Maytag Co., Newton, Iowa, has purchased a substantial minority interest in Globe American Corp., Kokomo, Ind., and Macomb, Ill., manufacturer of gas ranges and brooders.

—o—

Engineering Research Laboratory has been organized by Willard Morrison to carry on product development for the General American Transportation Corp., Refrigeration Laboratory Division, Highland Park, Ill.

—o—

Osgood Co. and General Excavator Co., Marion, O., have appointed four

new distributors as follows: Carl R. Miller Tractor Co., Des Moines, Iowa, central Iowa; American Equipment Corp., Harrisburg, Pa., several Pennsylvania counties; J. S. Innes Ltd., Leaside, Ontario, eastern Ontario; and General Machinery Co., Spokane, the Inland Empire region.

—o—

Athey Truss Wheel Co., Chicago, has changed its name to Athey Products Corp.

—o—

Marmont Automotive Products Inc., Chicago, has purchased the 19-acre Harvey, Ill., plant of the Austin-Western Co., Aurora, Ill., and plans to extend its products into the agricultural field. Ammunition Container Co., whose war contracts have been canceled, will vacate the premises by Dec. 1.

—o—

Elliott Co., Jeannette, Pa., plans to spend $750,000 on a new testing laboratory, mainly for research and development on gas turbine power plants.

—o—

Robins Conveyors Inc., Passaic, N. J., and its affiliate, Hewitt Rubber Corp., have opened a new office in the United Carbon building, Charleston, W. Va.

—o—

John G. Hetzell & Son, Baltimore, sheet metal workers, have moved to 2119 Frederick Avenue.

—o—

Ferry Cap & Set Screw Co., Cleveland, has adopted the name Hi-Carb for its high carbon hexagon head screws.

—o—

Standard Electrical Tool Co., Cincinnati, has added a belted motor driven dust collector to their "Air-rester" line.

Additional Surplus Plants Offered for Sale, Lease

Reconstruction Finance Corp. has listed the additional following government-owned plants as being offered for sale or lease:

Ferro Enamel Corp., Bedford, O., 40,000 sq ft factory, machinery and equipment, including laboratory items.

Ferro Enamel Supply Co., Cleveland, 52,300 sq ft warehouse and processing building, equipment, including furniture and fixtures, rail siding.

Ekcor Inc., Chicago, 55,600 sq ft plant, equipped with machine tools, production equipment and laboratory units.

Canton Drop Forge & Mfg. Co., Canton, O., main building with 158,600 sq ft of floor space, machine tools, production equipment, furniture and fixtures.

Bendix Aviation Corp., Sidney, N. Y., buildings containing 183,000 sq ft of floor space, machine tools, production items, laboratory units, furniture and fixtures.

Bell Aircraft Corp., Burlington, Vt., three buildings and boiler house, plant equipment, including machine tools, production items, laboratory and testing units, portable tools. Main building has 130,000 sq ft of floor space.

Aviation Corp., Williamsport, Pa., factory of 161,430 sq ft, two traveling cranes, equipment, including machine tools, production items, laboratory units, furniture and fixtures.

Auto Specialties Mfg. Co., Benton Harbor, Mich., foundry building of 140,450 sq ft, machine tools, portable tools, furniture and fixtures, and some laboratory items.

Atlantic Steel Castings Co., Crum Lynne, Pa., foundry building of 33,600 sq ft and 12 other buildings, machine tools and miscellaneous equipment.

Bellanca Aircraft Corp., New Castle, Del., factory, machine tools and miscellaneous equipment.

Barr Mfg. Corp., Weedsport, N. Y., building of 9450 sq ft.

Axelson Mfg. Co., Vernon, Calif., building of 50,000 sq ft, machine tools, laboratory and testing units, traveling cranes, portable tools.

Arcos Corp., Philadelphia, plant of 33,000 sq ft, machine tools, production equipment, furniture and fixtures.

American Propeller Corp., Toledo, main buildings of 415,000 sq ft, machine tools, production items, crane hoists, conveyors, laboratory units, furniture and fixtures.

Bell Aircraft Corp., Buffalo, 32 permanent buildings and 6 other structures, totaling 1,250,000 sq ft. Equipment includes machine tools, metal-forming tools, production items, laboratory units, furniture and fixtures.

Bellanca Aircraft Corp., New Castle, Del., building of 122,000 sq ft, machine tools, laboratory units testing units, furniture, fixtures.

Koppus Co. Inc., Baltimore, aircraft engine parts plant, buildings containing 112,000 sq ft of floor space, machinery, including units for production of piston rings.

General Electric Corp., Bedford, Ind., aircraft cylinder head castings plant including. Two plants of 81,200 sq ft and 55,700 sq ft of floor space, respectively; other buildings, including power house, office buildings and several minor structures with total floor area of 25,000 sq ft; machinery and equipment having capacity of 1,302,500 lb of head castings production per month; furniture, fixtures, laboratory and testing units.

Interstate Aircraft & Engineering Corp., De Kalb, Ill., buildings having total area of 190,000 sq ft, machine tools, production equipment, laboratory and testing units, furniture and fixtures.

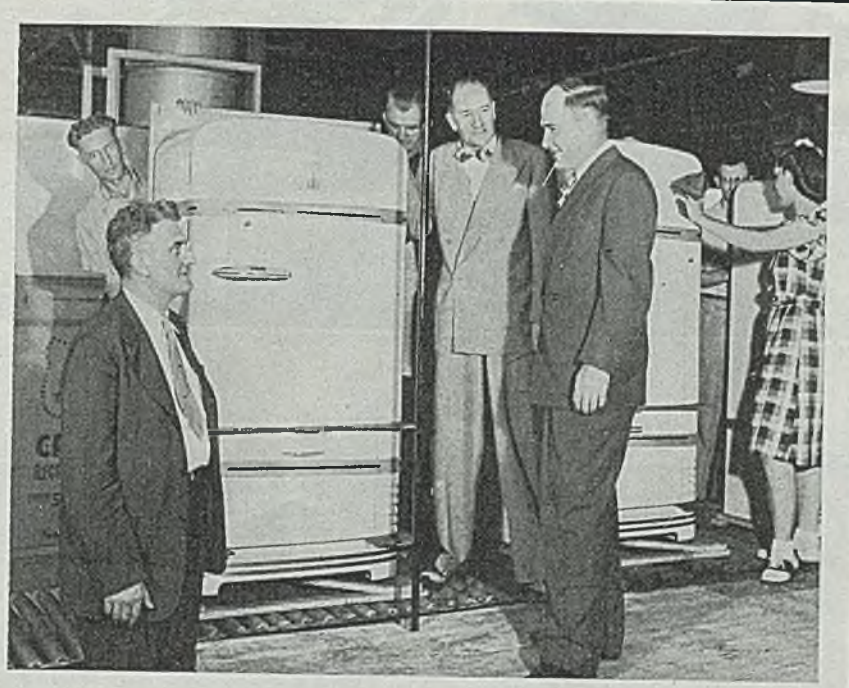
Plant Resumes Exportation of Steel Products

Bethlehem Steel makes shipment of plates, sheets, and bars from Sparrows Point, Md., to Norway

FIRST foreign shipment of steel products since the end of war directly from Bethlehem Steel Co.'s Sparrows Point, Md., plant was made last week.

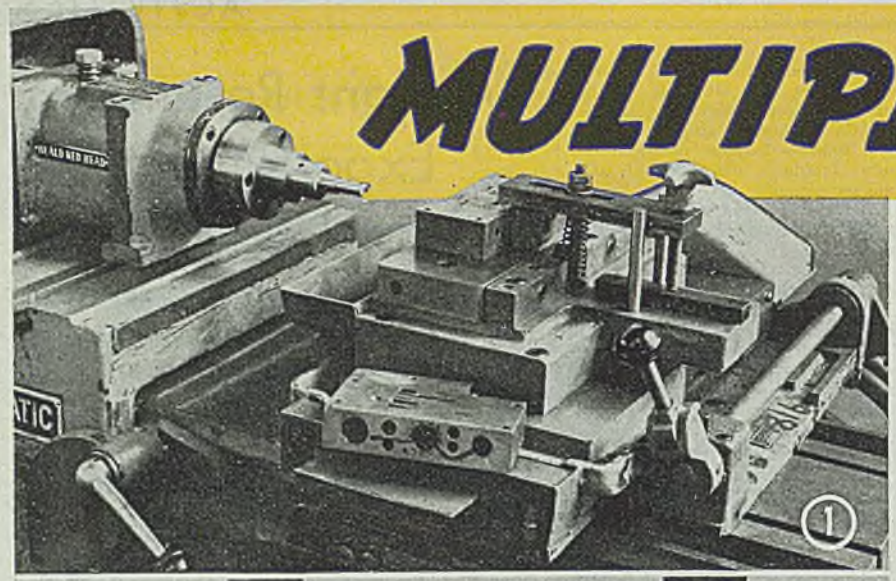
It consisted of 5000 tons of steel plates, sheet steel and sheet bars consigned to the Royal Norwegian Purchasing Agency of the Royal Norwegian Ministry of Supply and Reconstruction. The cargo was loaded on the S. S. Havnann, a Norwegian freighter which will deliver the Bethlehem products to the ports of Stavenger, Trondheim, Oslo and Bergen, in Norway.

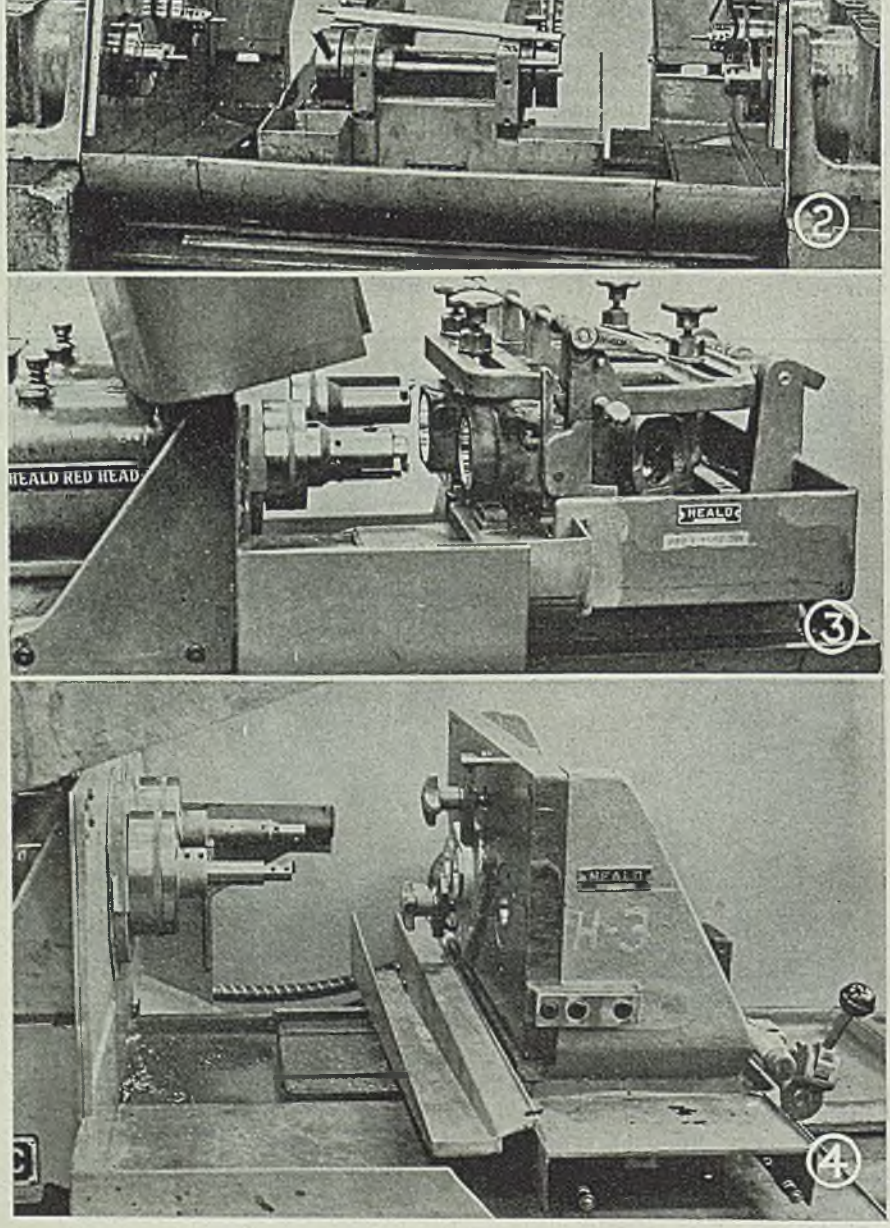
The shipment marked the resumption of peacetime trade from Sparrows Point with Norway. While many thousands of tons of Sparrows Point products were shipped to foreign countries during the war, they were sent from Sparrows Point by rail to other East Coast ports for distribution into various vessels taking on other war cargoes at the same time.



NEW REFRIGERATORS: When the Richmond, Ind., plant of the Crosley Corp. stopped turning out gun turrets for Navy patrol bombers and resumed production of household refrigerators, Frank A. Schotters, left, Crosley vice president, congratulated John W. Craig, right, works manager. At center is Lee Stratton, refrigerator sales manager

MULTIPLE BOR





BECAUSE precision finishing by the borizing process may include boring, turning, chamfering, facing, grooving, milling, drilling and reaming in any combinations, on single or multiple head machines, wide scope is offered for ingenuity and originality in devising tooling and fixtures to take full advantage of the method's inherent versatility.

While some jobs are quite complex—sometimes involving more than twenty operations—it does not necessarily follow that the setup and equipment need be complicated. Take for example the valve body shown in Fig. 1 in which eight holes are bored and faced. Six of them which have shoulders at the bottom must be bored and faced to definite depth. The other two are bored through.

Yet, complicated as the job is, tool and fixture design is simple. A single boring head equipped with a quill adapter does for all operations, since interchangeable taper shank quills are used.

Nor is the work holding fixture complicated. It consists merely of a flat plate fixture and three interchangeable adapter plates. The part is located by dowels and clamped by a strap. An adjustable boring cam permits instant change of boring stroke to fit the depth and position of each hole. This equipment greatly reduces the setup time for each operation.

Three of the holes, of different diameters, are bored in line and the adjacent shoulders faced merely by changing quills, in one setup. The adapter plate is then reversed on the fixture and a different quill bores another hole and faces the shoulder in line with these three holes from the opposite side of the part. Another quill next bores a smaller, open hole in line with the four.

The fixture adapter plate is then re-

Fig. 1—Single boring head bores eight holes in a part using interchangeable quill adapters plus ininterchangeable taper shank quills and a work fixture having three interchangeable locating plates

Fig. 2—Machine here has two stations with two boring heads at each. It bores and faces both ends of push rods, two at a time

Fig. 3 — Special setup for rough and finish boring, facing and chamfering rear crankcase

Fig. 4—Both gear case and cover are borized at same time in this setup; see Fig. 5

IZING SETUPS

By C. G. NORDMARK
Heald Machine Co.
Worcester, Mass.

. . . exhibit much ingenuity in working out a simple way to handle complicated jobs. Production quadrupled over former methods in certain instances

placed, a hole bored and faced in another location, the quill is again changed and an open hole bored in line.

Finally, after changing the adapter plate and quill, another hole is bored in the opposite end.

Tool drag lines are prevented by positioning the tool with a handwheel on the boring head spindle and backing off the work with the hydraulic cross-slide on which the fixture is mounted.

Steel aircraft push rods, shown in Fig. 2, have a 0.375-in. diameter blind hole 7/16-in. deep bored in each end and have ends plunge faced. By using two boring heads at each end, two rods are processed simultaneously.

The fixture is simple. It consists of two uprights at each end of the fixture base, to which lever operated collets are attached. The push rods are slipped through the collets from the right end against raisable end stops which locate them end-wise. Individual hand levers on the collet nuts are turned to clamp the rods in position.

The boring head quills each carry a boring tool and a tool for plunge facing. The cycle is fully automatic.

The large, bulky aircraft crankcase shown in Fig. 3 has three sets of holes rough and finish borized in four setups. The fixture is designed to permit the part to be located in either of two positions, depending on the operation to be performed. The part is located in the fixture by pins which engage bushings in the fixture and is clamped against the bottom face on four pads by a hinged clamping member which contacts the top. Two sets of bushings are provided to permit locating the part at the front or rear of the fixture.

In the first setup two sets of holes at the front and rear of the part are roughed, using both boring heads. The part is then relocated at the front of the fixture and a central set of holes are rough bored with a different quill on the front head. The third operation, without change of setup, consists of finish boring two holes and bottom facing one.

For the fourth operation, the part is again located at the rear of the fixture, the front quill is changed, and the front and rear holes are finished. This operation consists of boring and chamfering two holes and boring and bottom facing another with the front quill, while the rear quill bores another inside diameter.

Often the accuracy and production of mating parts can be greatly increased by finishing them simultaneously on a single machine instead of separately. This was done with the aircraft cover and gear case shown in the sketch, Figs. 4 and 5.

The machine has two boring heads. Both parts are held by a single angle plate fixture mounted on an indexing hydraulic cross-slide. The cover is loaded on the left or front side of the fixture and the gear case on the right side, or rear. Each part is located by dowels and clamped by straps. It is, of course, essentially a simple fixture.

Holes Bored Simultaneously

The first operation is performed by the rear boring head with three tools. The front face of the cover is faced a 1.3749 - 1.3755-in. hole is bored in both the cover and case, this hole in the case is also bottom faced and a 1.240 - 1.260-in. hole in the case is bored in line with the other.

After indexing the fixture, the front head carrying a quill with two tools faces the cover front face, bores a 1.124-1.1259-in. hole in the cover and case, bottom faces this hole in the case, bores and bottom faces a 1.000-in. hole in line in the case.

By doing each of these series of holes in a single pass, production is increased and kept in balance automatically, and close alignment and precise duplication of hole sizes secured. In fact, jig bore accuracy is secured with drill press production.

Finishing eight slots in the aircraft propellor blade bushing shown in Fig. 6 is done on a single head machine by milling. Six of the slots lie on radii, but the remaining two are offset 1/32-in. Each slot is generated in a side cut by a rotating tungsten carbide single-lip cutter.

The fixture consists of a rotary indexing spindle at right angles to the boring head and a lever operated plunger that accurately locates the spindle in each position.

The part is located from the bore on an arbor attached to the end of the indexing spindle and also from two holes in the flange by two dowel pins. After attaching a C-washer and bayonet locking device on the end of the locating arbor, the part is clamped endwise against the flange face by a handwheel on the end of the spindle.

The indexing spindle is carried on a vertical hand-wheel operated slide which raises or lowers the work when milling the two offset slots. The vertical slide has a dial indicator for accurate positioning.

The table first moves in at rapid traverse to the positive stop, when automatic travel of the hydraulic cross-slide follows and the rotating cutter travels through one of the slots in a cross cut to mill the slot. When the cut is completed the table automatically reverses, the part is indexed, and the cycle repeated for the next slot.

The hydraulic cross feed unit provides an excellent way to insure close accuracy between a bore and adjoining face. Such a job is shown in Fig. 7.

Each of the four boring heads is equipped with a cross-feed unit carrying a single tool for generated facing and a fixed quill holding a second tool for boring.

Both trunnions on one side of the air-

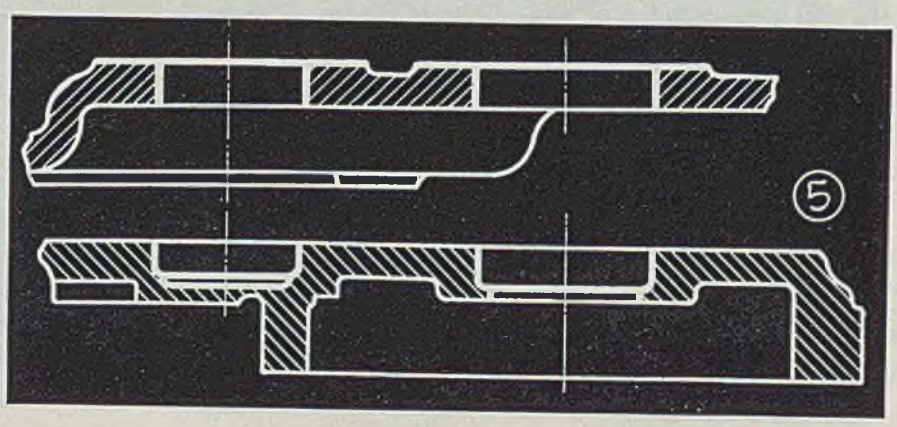
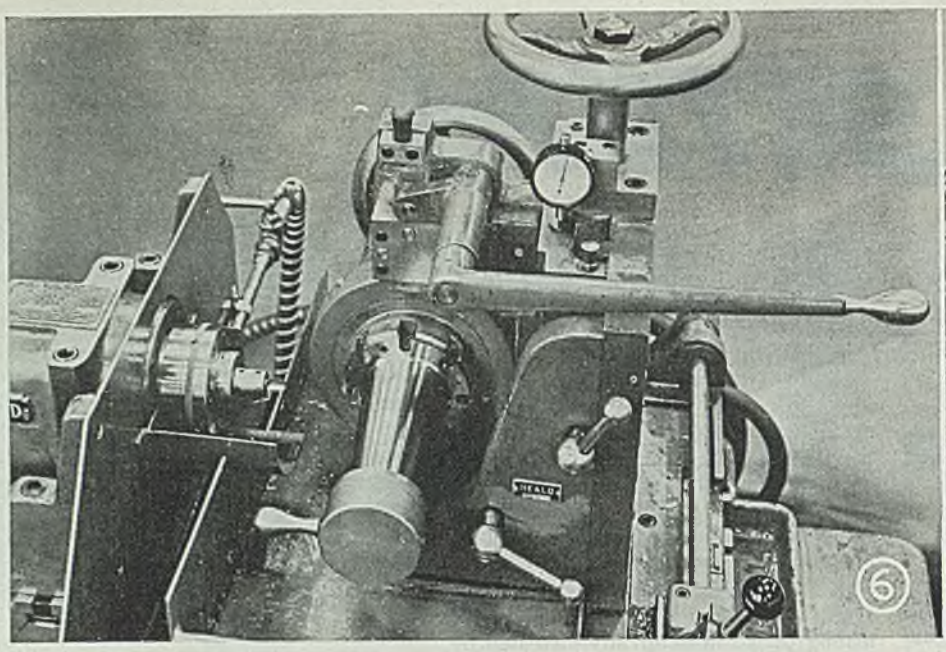
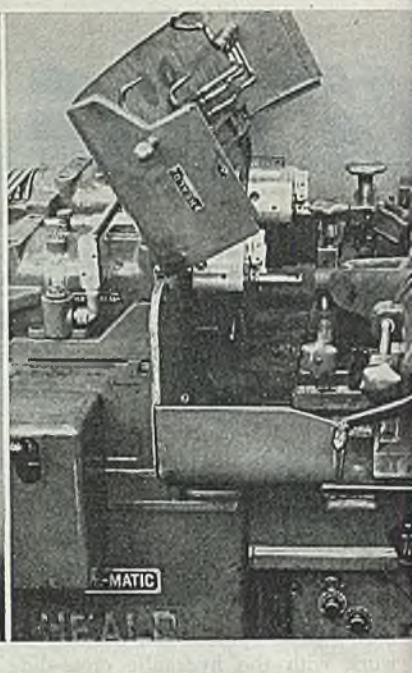


Fig. 5—Accuracy and production of mating aircraft cover and gear case are greatly increased by finishing them simultaneously on a single machine, Fig. 4





craft strut cylinders shown are bored simultaneously and then the cross feed units are started by manual valve control to generate the outside faces of the trunnions. The table is then reversed and the same operations are performed on the two trunnions on the opposite side.

The strut cylinder is located in the fixture by a fixed plug at the rear and a screw plug at the front. Additional location is provided by a pivoted retracting plug which engages the front right trunnion hole. The part is clamped on top of the trunnions by four straps, support being provided directly beneath by four self-aligning spring jacks. A spring jack at the rear of the cylinder and a support screw at the front are also provided.

The unusual job shown in Fig. 8 was solved by means of a unique fixture. Two sets of operations are performed, one set with the work stationary in the front station and one with the work revolving in the rear station.

The really unusual part of the job is performed at the front station. It consists in boring to a high degree of precision as to radius, parallelism and spacing, four curves of one radius and one of another. To prevent errors accruing through rechecking, all five surfaces are bored in a single setting.

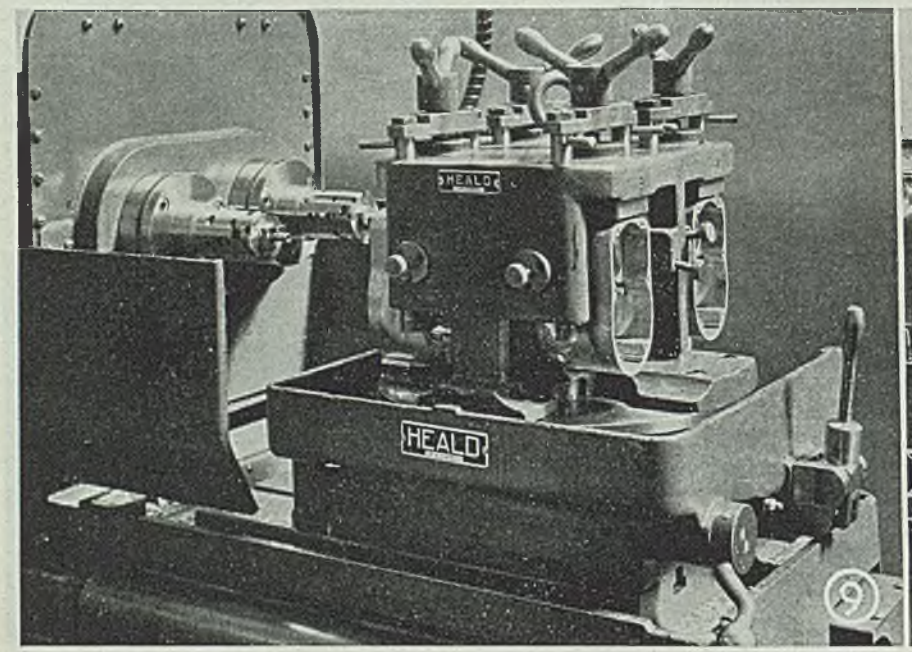
The part is held in a vertical rotary index fixture mounted at the front of a hydraulic cross-slide. It is chucked in this fixture so that the axis of index-rotation coincides with the axis of the central 1.572-in. radius, and also lies in a common horizontal plane with the boring head. This makes it possible to bore the four 1.474-in. radius curves by indexing angularly three times and finally boring the 1.572-in. radius by indexing the cross-slide 3/8-in. For the latter operation, the boring quill is changed.

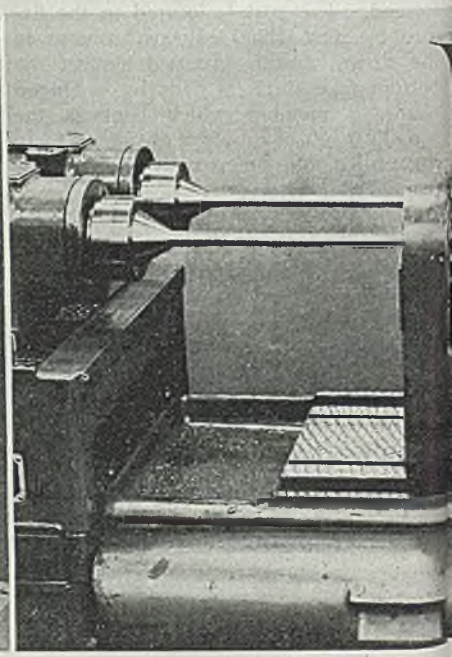
The station at the rear is used for boring and facing all four sides of the part, which is held by a square type shuttle and rotating fixture. The tool block for facing is mounted on the cross-slide. The boring bar is attached to a bridge over the slide. The shuttle is then turned 180° between operations

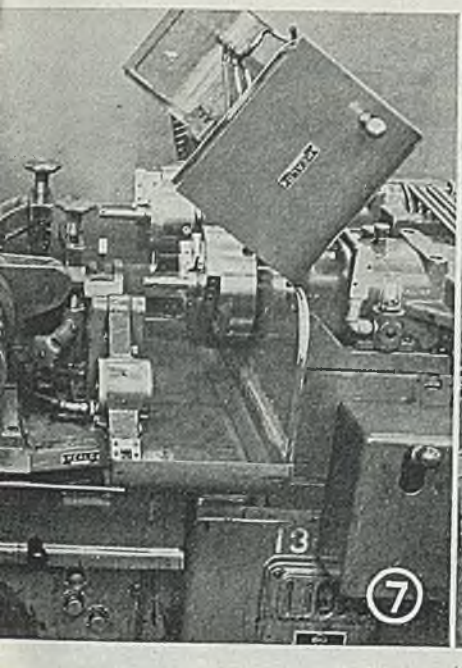
Fig. 9—Rotary fixture on this setup permits machining ten surfaces on each of two parts in a single pass while two other parts are being loaded into other end of fixture

Fig. 10—Spherical adapters help locate work in both stations of the 2-station fixture shown here

Fig. 11—Outboard supports aid in boring to close limits two bushings in line







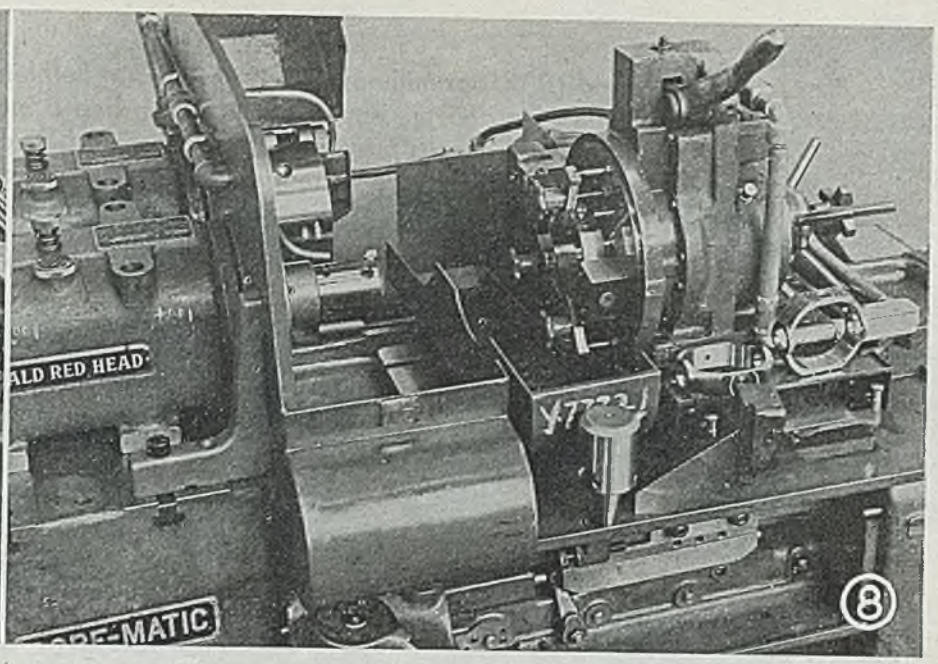


Fig. 6—Arrangement for milling eight slots in a blade bushing using a tungsten carbide single-lip cutter

Fig. 7—Here four trunnions on a strut cylinder are bored and faced

Fig. 8—This setup does complicated job—bores internal curved surfaces and bores and faces four sides of the rings

on opposite sides. The tools are changed for operations on the other two sides but the same fixture and shuttle are used.

Down time for loading can often be greatly reduced or even eliminated by holding the work in rotary fixtures which can be loaded at one end while a part on the other end of the fixture is being machined.

Such a fixture is shown in Fig. 9. The part—a magneto housing—is machined on ten surfaces in a single pass, the operations including boring, facing and chamfering. The machine has two boring heads, tooled the same and performing identical operations on two parts simultaneously. When the machining on one pair of parts is complete, the double end rotary indexing fixture is indexed through 180° and a new cycle starts on the two parts which were loaded on the back of the fixture while the others were being machined. These finished parts are now removed and unfinished ones loaded. Actually, the only down time is that needed for indexing the fixture 180°.

The fixture is quite simple. Each housing is held upside down against an overhead adapter plate, locating against four finished pads and by two dowels, while clamping is provided by two vertical fingers which engage the sides of the housing. Additional support is given by screws contacting the sides of the housing.

By using two work heads instead of one, as formerly, and by virtue of practically eliminating down time for loading, the production over the former method has been almost quadrupled — which was the important end to be achieved by the setup.

Valve chambers in the trumpets shown in Fig. 10 must be bored to plus or minus 0.0001-in. for size, roundness and straightness in spite of very thin wall sections. Such extreme accuracy makes the method of holding part important.

In the setup shown, two stations are provided—one for semi-finish boring in the front and one for finish boring at the rear. Three chambers are bored in each trumpet, one at a time.

The first operation is to semi-finish

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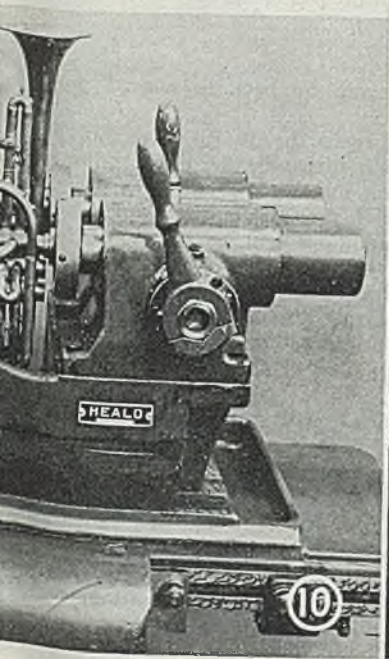
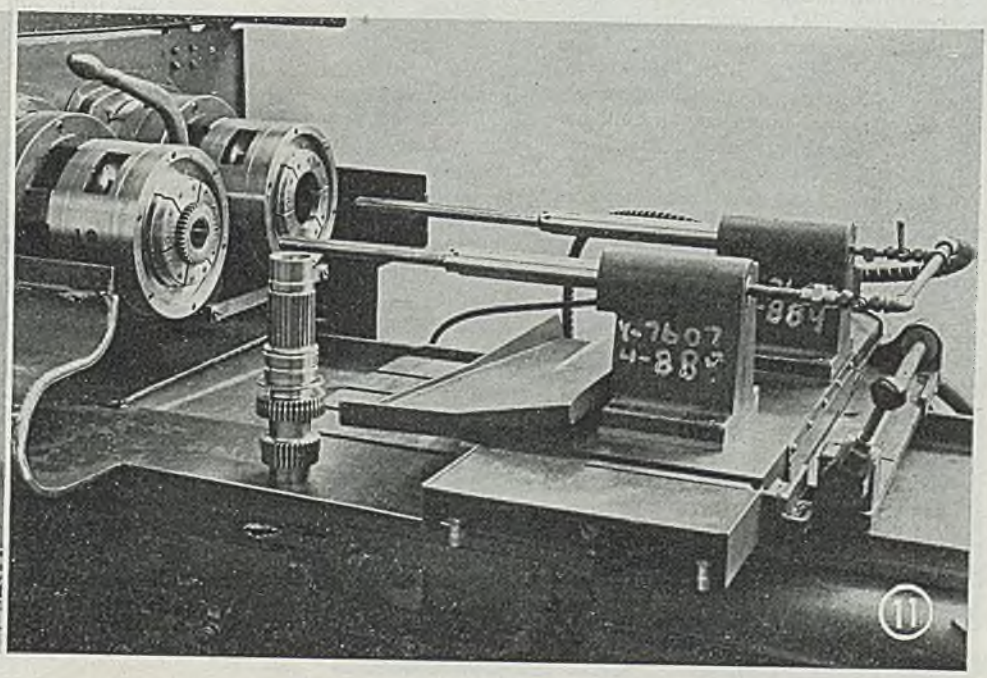
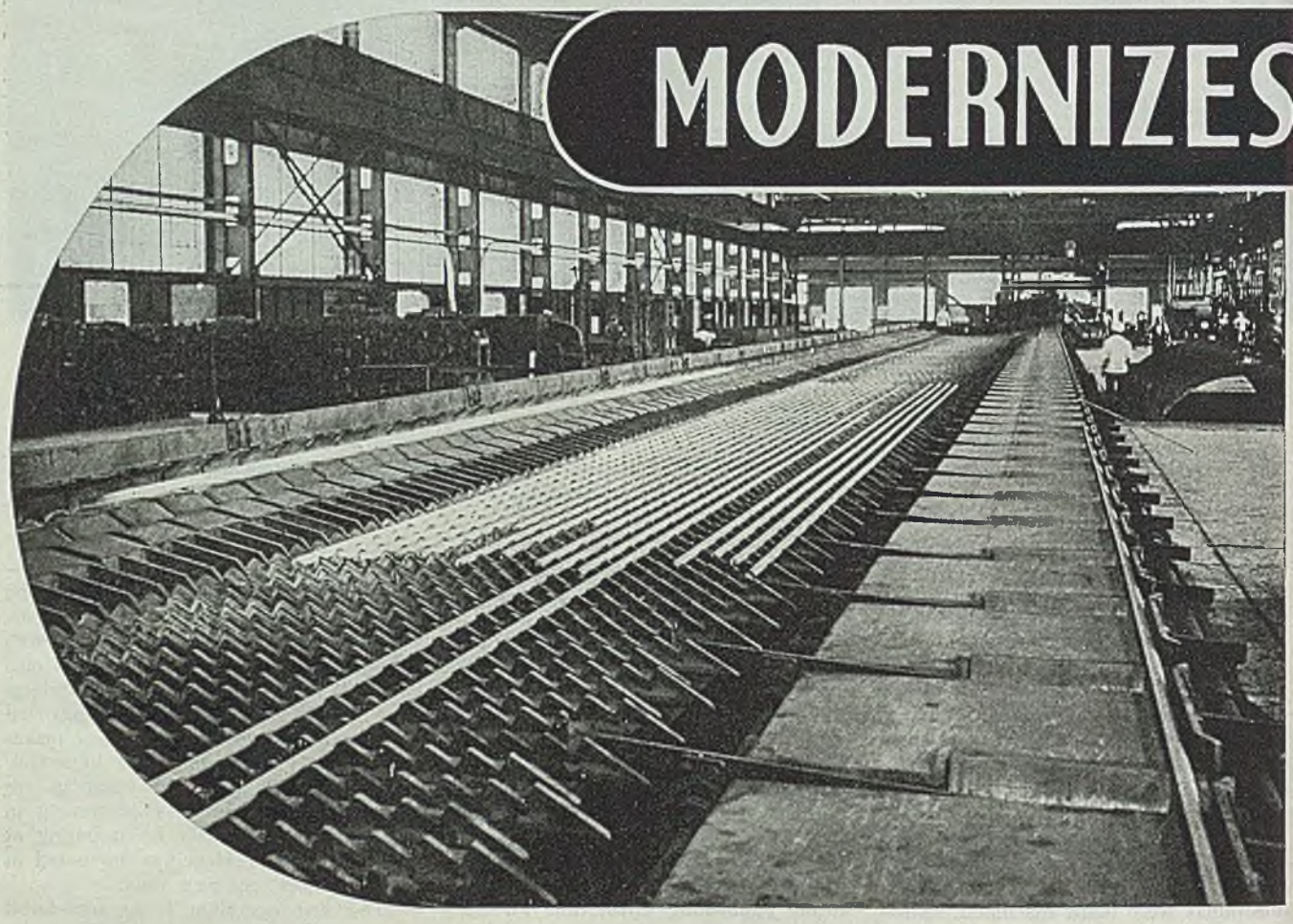




New 18-stand 10-in. bar mill now being installed at Bethlehem's Lackawanna division will have a delivery speed of 2400 fpm and a monthly capacity of 22,000 tons. Vertical rolls prevent twisting of stock between passes. Cooling bed arranged for space formation cooling or pack annealing. Mill assures increased operating efficiency and improved quality of alloy and carbon steel bars

MODERNIZES



Cooling bed serving 12-in bar mill. A bed of this type will be installed in the new 10-in. mill

PLANS are nearing completion for the modernization of bar producing facilities at the Lackawanna, N. Y. plant of the Bethlehem Steel Co. Improvements include the installation of a continuous high-speed 10-in. merchant bar mill adjacent to the 12-in. mill on the Hamburg turnpike, Woodlawn.

When the 12-in. mill was built in 1940, it was recognized that the arrangement of a series of mills in one area with a centralized billet storage and preparation yard, and common finishing and shipping departments, would represent the most efficient operating condition. At that time, therefore, provisions were made for the ultimate grouping of all bar production in this one location, now known as the Bar Division.

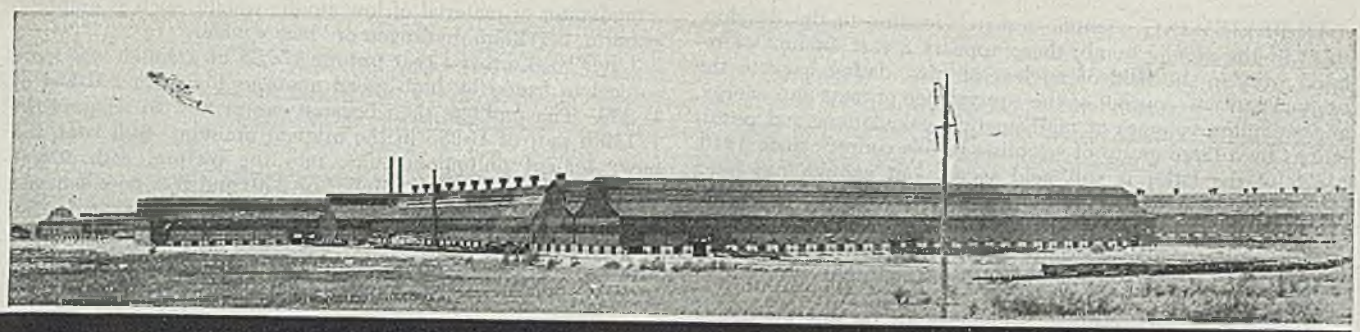
The new mill will have a rated monthly capacity of 22,000 net tons, in sizes from ⅜ to 1½ in. rounds, practically the same as the combined capacity of the present 8 and 10-in. mills which it will replace. The principal objectives of the changeover are to increase the operating efficiency and to improve the quality of alloy and carbon steel bars.

In rolling a quality product, careful attention must be given to quality in the production of the billets from which bars are rolled. Essential requisites are good heating, continuous scarfing at the bloom stage, elimination of the twist between stands which has a tendency to open seams, and finally, proper cooling and surface preparation of the billet.

In line with the consolidation of the bar mills the entire load of billets for bar production will be transferred to the 40/30/21-in. mills. At present, all high-grade carbon and alloy billets are rolled on the 44/32-in. mills. The new arrangement will permit a better distribution of the load on the different blooming mills at the plant, a highly desirable objective when the production of slabs and blooms for continuous sheet-strip, structural steel, and rails will again be back to normal proportions.

To equip the 40/30/21-in. mill combination to handle the entire billet production for the bar mills, including alloy and special grades, many changes and additions will be required. Proper ingot heating will be attained by adding three 5-hole blocks of 20 x 7½ x 11 ft soaking pits at the 40-in. bloomer. A continuous hot-scarfing machine will be installed at the delivery end of the 40-in. mill. In this machine a thin layer of metal will be removed from the entire surface of the bloom, thus eliminating much work in subsequent billet preparation.

In the 30-in. continuous billet mill following the 40-in. bloomer three of the six stands will be replaced by vertical stand, to eliminate twisting of the billets between stands. This feature is particularly important in the rolling of



BARMAKING FACILITIES

alloy steels. On the remaining three horizontal stands alterations will be made to increase the speed of the screwdowns, and new bed plates will be installed under each stand, to make them adjustable the full width of the mill.

The 30-in. mill when altered will roll 3⅞ x 3⅞, 4 x 4, 5 x 5 and 6 x 6-in. billets, in lengths varying from 6 to 30 ft; slabs 7 x 2⅝, 7 x 2⅝, 11 x 3, and 12 x 2-in. in lengths from 7 to 15 ft; and tube rounds of 3 to 8-in. diameter, from 15 to 30 ft long. A 60-in. hot saw will cut the billets and tube rounds into desired lengths.

To provide the extra cooling required for alloy and special grades of steel, the cooling beds of the 30-in. mill, now 83 ft long, will be lengthened to 134 ft. They will then extend into the present 10-in. mill building, which will be converted for billet storage and preparation after all equipment has been dismantled and removed. The two cooling beds are 15 ft wide and can be combined into one 30-ft bed when billets over 15 ft long are rolled.

Directly in line with the 30-in. mill is a 6-stand, 21-in. billet mill, producing the following sizes: 1¾ x 1¾, 2½ x 2½, and 3 x 3-in. in lengths of 12 to 30 ft. No change will be made in the mill proper, but a new steam-operated flying shear will be installed at the exit of the last stand to provide flexibility in the cut lengths of billets for the trade and for rerolling. Improved cooling will be provided by extending the two present cooling beds to 158 ft, almost twice their present length. In addition, a third bed, also 158 ft long, will be added. All three beds are 30 ft wide.

The layout of the mill is such that the controlled cooling facilities for billets now rolled on the rail mill will be accessible to the revamped 30/21-in. billet mill. Thus the tender steels will go directly from the hot saw to the controlled cooling furnaces and the common grades will be cooled on the revised cooling bed layout, both of which will deliver their product directly to the new billet preparation and shipping department.

Billet preparation now carried out at four different localities, will be consolidated in two areas, in the present 10-in. mill building, and at the new Bar Division, where a building 89 x 850 ft will be erected over the existing scarfing beds which now are in the open. This building will serve both the 10-in. and the 12-in. mill. The new arrangement will expedite shipments to the trade and reduce to a minimum the time lost in handling billets between the separate preparation yards and the finishing mills.

Billets for the trade and for the 14-in. bar mill will be handled in the present 10-in. mill building. This mill will be removed when the new 10-in. mill is completed, and an area of 107,000 sq ft will thereby be available for pickling, scarfing, chipping, and interdepartmental shipments of billets for rerolling.

The new 10-in. mill will be housed in an 80 x 632-ft structure adjoining the 12-in. mill building. At the upper end will be a furnace building, 105 x 150 ft, which will accommodate a billet heating

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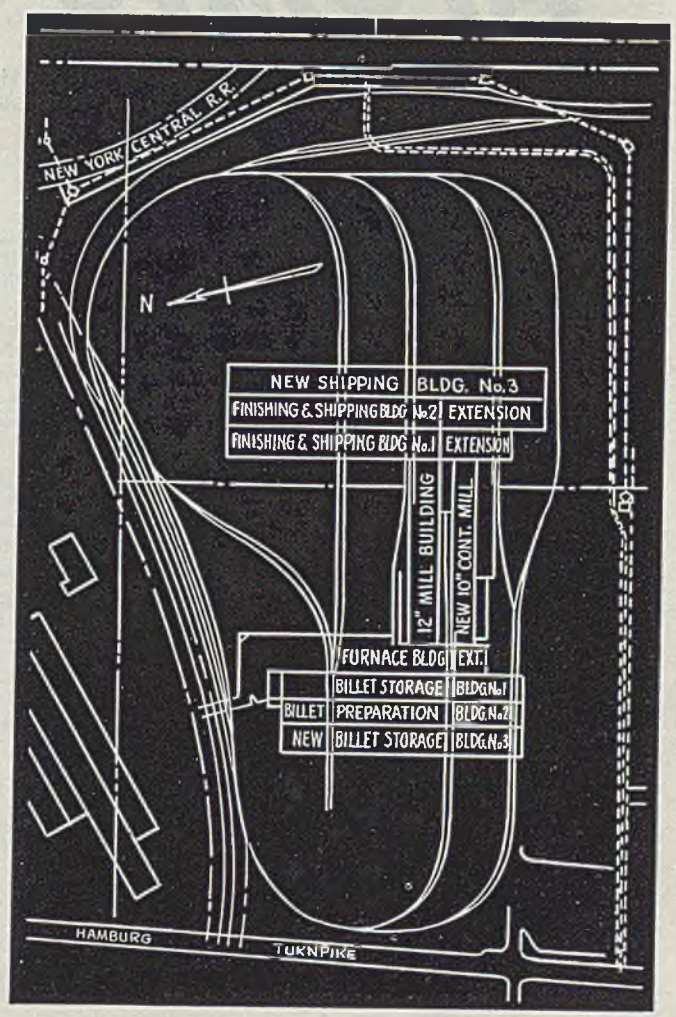
Above — Completion of 10-in. mill will afford 18 acres of barmaking facilities under cover at this plant



Right—General arrangement of Bethlehem's Lackawanna bar mill division showing location of new 10-in. mill

The Facts about... ATOMIC ENERGY

By A. H. ALLEN
Detroit Editor, STEEL

IN REVIEWING scientific research leading to the development of the atomic bomb, there appears a vast amount of related work in the field of nuclear physics, dating back to the original Einstein concept of the equivalence of mass and energy, and including volumes of mathematical calculations and postulations by a large group of scientists in this country since 1940. Much of the latter is still held secret, but enough has been released, particularly in the 175-page report prepared by Dr. H. D. Smyth, head of the physics laboratory of Princeton University, at least partly to draw back the curtains on the most amazing (and costly) scientific adventure of all time.

Strange Behavior: Without wandering too far into the higher reaches of atomic and subatomic concepts, it is first necessary to outline the rather strange behavior of the element uranium. The natural pure metal, with atomic number of 92 and a "mass" number, or atomic weight, of 238, has three isotopes known by their mass numbers of U-234, U-235 and U-238, in proportions of 0.006, 0.7 and 99.3 per cent, respectively. By way of explanation, isotopes may be defined as species of atoms having the same atomic number but different mass numbers, or atomic weights, the latter changing by virtue of emission of particles—alpha, beta or gamma—from their nuclei, such elements thus being known as radioactive. It should further be pointed out that the atom itself comprises a nucleus of protons with positive charges just balanced by satellite electrons which carry negative charges.

Neutrons and Protons: If the reader is still with us, let him hold his chair a moment longer until it can be explained that in 1930 it was discovered atom nuclei comprise both neutrons and protons, the number of protons equalling the atomic number and the number of neutrons equalling the difference between the atomic weight and the atomic number. Neutrons were late in being identified because they show a peculiarly powerful short-range penetrating force, but carry no electrical charge.

Since elements at the end of the periodic table have nuclei made up of comparatively large numbers of protons and neutrons, they are inclined to be unstable. Some 250 stable nuclei have been identified, ranging in mass number from 1 to 238 and in atomic number from 1 to 92.

When elements with unstable nuclei are bombarded, so to speak, by free neutrons, they may undergo what is termed fission, and this cleavage or fission may release new neutrons to carry out a so-called chain reaction with attendant release of enormous energy. On the other hand neutrons produced in the fission of uranium, for example, may escape entirely, may be captured in a process not resulting in fission, or may be captured by impurities. The question of whether the chain reaction continues or not depends on the "fission capture" of neutrons being in excess of the other three possibilities.

Speed is Complication: A complicating factor is the speed of the neutron particles. High-speed ones may be absorbed in uranium without resultant fission, while slower ones or so-called thermal neutrons may bring about the desired fission. It is possible to slow down neutron speeds by passing them through a moderator or material of low atomic weight, such as graphite, paraffin, beryllium, hydrogen or "heavy water."

Later work proved that isotope U-235 of uranium was more subject to fission by high-speed neutrons than either U-234 or U-239. The problem then became one of how to separate the 1/140th part of U-235 in the original uranium. Still later, the new element plutonium came into the picture, with atomic number of 94 and mass number of 239, and it is now believed plutonium is even better as a fissionable material than U-235. Strangely enough it has been found possible to produce small quantities of plutonium from uranium by a controlled fission process, and then to separate the plutonium chemically.

Chain Reaction: Briefly, what happens in the controlled chain reaction process is that neutrons emitted in the fission of U-235 are absorbed by the original U-238, producing U-239, each atom of which then emits a beta particle, becoming neptunium (another new element with atomic number 93). The latter then emits another beta particle, transforming to plutonium which eventually will decay to U-235 by emission of an alpha particle, but this is a slow process and plutonium is relatively stable.

As a measure of the explosive power of these vague new materials, it may be stated that if all the atoms in a kilogram of U-235 undergo fission, the energy released is equivalent to explosion of about 20,000 short tons of TNT. But, of course, it is not practical to expect 100 per cent fission; in fact 0.1 per cent may be good expectancy.

All the above postulations and deductions were fairly well known to nuclear physicists by the end of 1941. At first the entire uranium project was in the hands of the National Defense Research Committee, a unit of the Office of Scientific Research and Development, headed by Dr. Vannevar Bush. Late in 1941, when an "all-out" effort was getting closer to realization, the project was transferred to the OSRD, section S-1. Up to this point expenditures had been relatively small, but with the start of war and with the knowledge gained principally from the British that German scientists were working at top speed on similar experiments, a large-scale expansion of the work seemed imperative.

DSM Project: In June, 1942, the Army Corps of Engineers was asked to form a new district to carry on atomic bomb research, and this was designated the Manhattan District, its work labeled for security reasons the DSM (Development of Substitute Material) project. In September, 1942, Gen. L. R. Groves was placed in full charge of all Army activities on the DSM project. The period of joint OSRD-Army control continued to May, 1943, when the Army took over full control.

So much for a quick administrative history. Turn now to the University of Chicago where in 1942 the cryptically named "Metallurgical Laboratory" was organized to centralize research on atomic disintegration which had been carried on diversely at Columbia University, Princeton University, University of California, and elsewhere. Specifically its objectives were: To find a system using normal uranium in which a chain reaction would occur; to show that if such a chain reaction did occur

Possibilities Overestimated

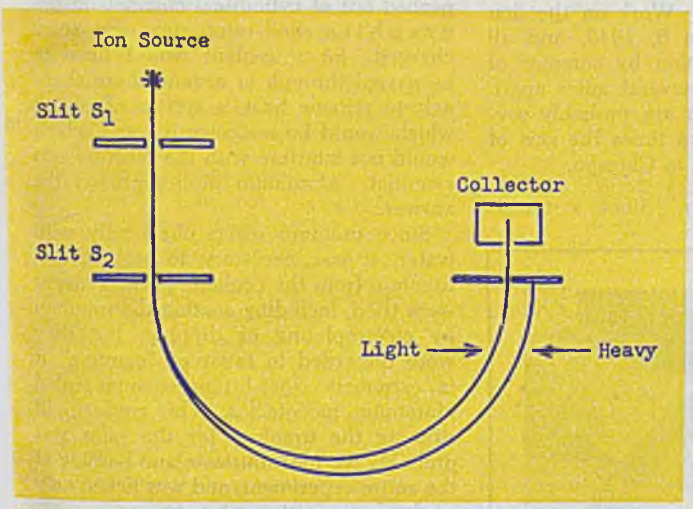
Possibilities for peacetime uses of atomic energy are largely overestimated, one of the leading figures in the development of the atomic bomb told STEEL in a personal interview.

Some time in the future, however, it may be possible to generate steam from water, heat air to drive gas turbines or heat metals. On the basis of present costs, atomic energy cannot compete with gas, petroleum products or coal as a source of heat.

Whether industry will be permitted to go ahead with development work still remains in the lap of Congress, as the U. S. government controls all patents. Also, it may be decided to confine all future experimentation to government plants and laboratories, especially if one of the "science" bills now before Congress is passed.

it would be possible to separate plutonium chemically from the other material, and to obtain the theoretical and experimental data for effecting an explosive chain reaction with either U-235 or plutonium.

Materials—$44,000 a Ton: The immediate problem was one of materials procurement. At the end of 1941 the only uranium metal in existence was a few grams of good material made



Electromagnetic separator, diagrammed here, produced first appreciable amounts of pure U-235. Gaseous compound to be separated is introduced at "ion source" where an electric discharge ionizes some of its molecules. Ions are pulled through slit S_1 and greatly accelerated between S_1 and S_2 by a powerful electric field. Entering strong magnetic field at S_2, beam is distorted as shown, heavier ions moving in larger circles, enabling light and heavy ions to be separated as they are gathered in the "collector". This is the principle of the mass spectrograph, and is best method for determining relative abundance of many types of isotopes, its value being its almost complete separation of the isotopes, its great speed with small hold-up and short start-up time

experimentally by Westinghouse and others, and a few pounds of highly impure pyrophoric powder made by Metal Hydrides Co. Raw material source of uranium then was a commercial grade of black uranium oxide, with considerable impurities. By accelerated experiments, purification methods were pushed to the point where by June, 1942, a highly pure brown uranium dioxide was being shipped at a rate of 30 tons a month—a remarkable achievement.

Low Cost Method: Process which Westinghouse used to make the pure metal was the electrolysis of potassium uranium tetrafluoride (KUF_4) at a cost of a mere $1000 a pound. Later it was found uranium tetrafluoride could be used at a saving and by October two companies were supplying the new material in a volume of 1000 pounds per day. A year later Westinghouse was supplying the pure metal at a rate of 500 pounds a day and cost had dropped to $22 a pound—still a neat $44,000 a ton! Meanwhile a new, rapid and low cost process for uranium production was evolved at Iowa State College.

Next step was the development of a pure form of graphite for use in the chain reaction pile. National Carbon and Speer Carbon worked at top speed on this subject, with good success.

Plans matured rapidly for construction of the first self-sustaining chain reacting pile, on a timber framework erected on the squash courts under the West Stands of Stagg Field at the University of Chicago. The original plan called for an approximately spherical pile with the best materials near the center. The pile itself comprises essentially pieces (lumps) of uranium or uranium oxide embedded at carefully calculated positions in a graphite matrix. Control measurements showed the critical size had been reached before the spherical construction was completed, so it was modified to an oblate spheroid flattened at the top.

It was desired to have the uranium lumps spaced in a cubic lattice embedded in graphite. Consequently the graphite was cut into bricks and built up in layers, alternate ones of which contained lumps of uranium at the corners of squares. The critical size was reached when the pile had been built to a height only three-quarters of that specified by the most cautious estimates, so only one more layer was added. The pile contained 12,400 pounds of uranium.

Control By Slots: For purposes of control and experiment there were ten slots passing completely through the pile. Three of those near the center were used for control and safety rods, while to facilitate experiment further, particularly the removal of samples, one row of bricks carrying uranium and passing near the center of the pile was arranged so that it could be completely pushed out.

The reaction was controlled by inserting in the pile some strips of neutron-absorbing material, described only as cadmium or boron steel. When the pile was not in operation, several such cadmium strips were inserted in a number of slots. To accelerate the intensity of the reaction the rods were removed; to slow it down they were pushed inward. To operate this first pile, all but one of the cadmium strips were taken out, and the remaining one slowly withdrawn. As the critical conditions were approached, the intensity of neutrons emitted by the pile increased rapidly, but by careful manipulation of the final control rod it was not difficult to keep the pile operating at a constant level. The apparatus was first operated on Dec. 2, 1942, to a maximum energy production of about 0.5 watt; on Dec. 12 this was run up to about 200 watts, but because of possible radiation dangers to personnel nearby it was not felt safe to go above this level. A self-sustaining controllable release of atomic energy had been achieved!

Atomic Power?—Yes, But At A Price: At this point, someone doubtless is asking: Well, if this is true, have we not solved the controlled production of atomic energy, and developed a new means of making power without fuel? Scientifically speaking, yes; but practically and economically speaking, definitely no. While the chain reaction pile does generate energy in the form of heat, the cost of the starting materials is enormous, and of course the reaction will not continue indefinitely, since there will finally arrive a condition of equilibrium. There is a vast array of other problems, such as health hazards, corrosion,

shielding, waste disposal and, most important, how to use effectively the heat generated.

With a self-sustaining reaction proved, the succeeding step was to examine the matter of plutonium production. It was found, partly as a result of expert guesses, that to produce a kilogram a day of plutonium, a chain-reacting pile would have to be releasing energy at the rate of 500,000 to 1,500,000 *kilowatts*, and the one just described was operated at a maximum of 200 watts, which would mean the elapse of 70,000 years to produce enough plutonium for a single bomb. Evidently an enormous expansion of the chain-reacting pile was an immediate necessity, along with detailed knowledge of how to separate the plutonium, once produced.

Plutonium a Mystery: The chemistry of plutonium was unknown beyond a few generalities, and there was no supply of the metal readily available. It was necessary to obtain some plutonium to be treated as an ordinary substance on the ultrachemical scale. This was finally accomplished by the prolonged bombardment of several hundred pounds of uranyl nitrate with neutrons obtained with the aid of cyclotrons at the University of California. By the end of 1942 about 500 *micrograms* had been obtained by this method in the form of pure plutonium salts—less than enough to cover the head of a pin. From this infinitesimal amount successful studies were concluded, demonstrating that plutonium could be separated from uranium by a series of intricate solution and precipitation treatments.

Plans were immediately launched for the construction of a large-scale plutonium production plant, the location chosen being a 1000-square mile tract in the center of the state of Washington, north of Pasco, on the west side of the Columbia River, almost uninhabited except for a few farms and two small villages, Richland and Hanford. Here, on April 6, 1943, ground was broken for the Hanford Engineer Works, which eventually grew to a city of 60,000 and which was to be the scene for erection of three enormous reaction piles and the vast stretches of auxiliary equipment required for separation of plutonium from the product of the piles. Work on the first pile was begun June 6, 1943, and all three were in operation by summer of this year. They are several miles apart, and in energy output are probably several hundred thousand times the size of the first pile operated in Chicago.

Grams From Tons: Since a terrific amount of heat is generated in any pile producing appreciable amounts of plutonium, the matter of cooling is a design problem of the first magnitude. Several types of plants were considered but it was finally decided to use ordinary uranium metal in a graphite moderator with water cooling. The goal in general was production of some *grams* of plutonium daily from some *tons* of uranium. What this meant in terms of an extraction plant alone, can be imagined readily.

To engineer the project, E. I. du Pont de Nemours & Co. Inc. was called in and agreed to undertake the work on a cost-plus-fixed-fee contract. The fixed fee was $1.

Early in the work it was decided that loading and unloading of the uranium would be expedited by the use of the metal in the form of rods, instead of lumps as was done originally at Chicago. With the rod system the uranium, in the form of small cylindrical slugs, could be pushed out of cylindrical channels in the graphite moderator and new stock charged. Since coolant would have to be passed through or around these channels to remove heat, a system of piping which would be noncorrosive and which would not interfere with the reaction was essential. Aluminum piping proved the answer.

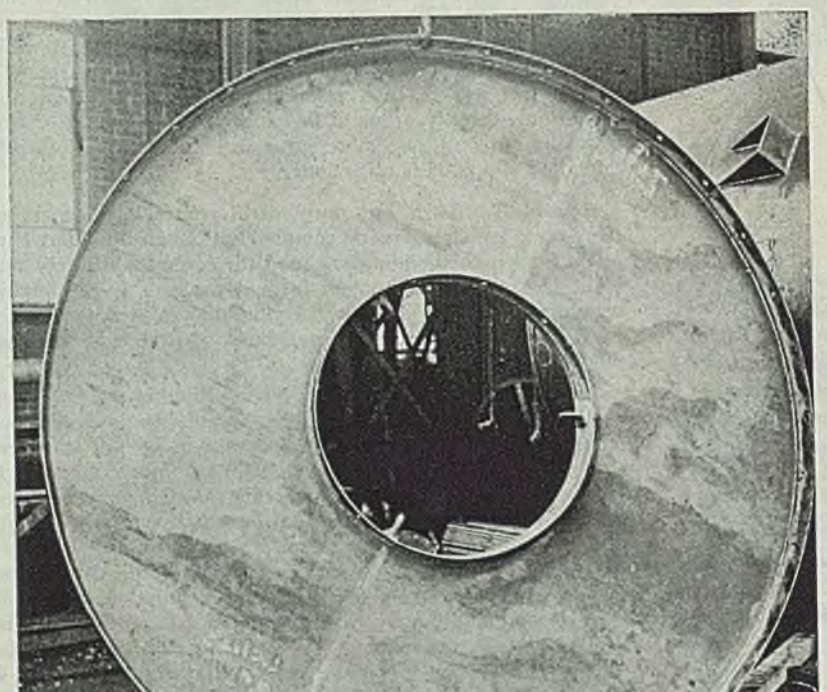
Since uranium reacts chemically with water, it was necessary to seal off the uranium from the coolant. Various means were tried, including coating the uranium by electroplating or dipping, but they were discarded in favor of "canning" it in extremely close-fitting vacuum-sealed aluminum receptacles. This problem of canning the uranium for the piles was probably the most intricate and baffling of the entire experiment, and was licked only at the last minute.

The matter of dissipating thousands of kilowatts of energy through the coolant was another tough one. Even though the Columbia River water was exceptionally cold, the water supply requirement was that of a fair-size city. Pumping stations, filtration and treatment plants all had to be provided, and the system had to be trouble-free, with quick-acting controls to shut down the chain reacting unit in a hurry in case of failure of water supply. Additionally, some means had to be provided for decontaminating cooling water which had absorbed radioactivity in passing through the piles.

Shielding Against Radiation: Radiation from these tremendously large piles also called for extensive shielding to protect operating personnel. Large housings of concrete, steel and other absorbing material were built, and all loading and unloading was done by remote control. Openings in the shields for the water cooling and loading systems had to be air tight, since air exposed to radiation would become radioactive.

Radiation dangers extend on through a large part of the separation plant, and further, since the fission products associated with the production of plutonium are highly radioactive, the uranium after

(*Please turn to Page* 148)



WROUGHT IRON PAN: A new type of wire vulcanizing pan, with outside diameter of 8 ft 6 in. and center hole of 36-in. diameter, is being fabricated by M. J. Daly Co. of Waterbury, Conn. for Kerite Insulated Wire & Cable Co., Seymour, Conn. The pans are made from wrought iron plates. Wire is coiled inside the pan, then saturated with an insulating compound before being vulcanized in steam furnace

DIE CASTING METHODS

In Germany

Far Behind Those of U. S. and Britain

By A. T. LILLEGREN

Vice president
Madison-Kipp Corp.
Madison, Wis.

THE findings of the investigators have proved that the German die-casting industry is chiefly confined to two areas, namely, Berlin and Stuttgart-Munich. As it was not possible to inspect the Berlin district, all subsequent general remarks should be considered as referring to the latter area.

The plant is mainly of the Polak type, and with one exception is of an age which gives uneconomical production. An outstanding feature was the absence of heat temperature control in most plants in the holding pots.

While the workmanship of dies was good, it was uninspired and not up to American or British standards. Due to shortage of alloying elements, inferior steels were being used. Core pulling was conventional—angle pins and hydraulic.

Finishing Equipment was very ordinary and far below U. S. and British standards. X-ray apparatus for inspection was seen on only two occasions and then it was doubtful whether the apparatus would be suitable for all castings and materials. The only inspection appeared to be of visual nature; even weight testing was not employed.

Production Rates were low in comparison with those of the U. S. and Great Britain. The output per machine also seemed low.

Die Cast Materials were confined to three: Namely, magnesium, aluminum and zinc. The results on magnesium were good, but no better than in the U. S. or Great Britain, and the reasons for Germany's fairly high production in this material was probably controlled by supply.

Nothing in the way of new alloys, die steels or hydraulic mediums was seen. Hydraulic systems were usually water and soluble oil.

It was concluded that the German die casting industry is far behind that of the U. S. and Great Britain. Only one firm would be considered first class in either country, and that firm is Mahle K. G.—Fellbach near Stuttgart.

German die casters and the American investigators had one thing in common. That was a desire to see the plants operating again. The Germans wanted to let by-gones be by-gones and start a chummy little German-American die casting bund. One of the first aims of such a club would be the importation of some up-to-date die casting machines from America, but with or without new machines, they said they knew we had another war to win and thought they could help us a great deal. The investigators wanted to see the plants in operation only for a few hours or enough time to inspect a live plant instead of a dark inoperative one. We were unimpressed with the idea that the Germans really wanted to help us win the Japanese War, especially when we knew they had been helping Japan as much as possible and also because Germany didn't look particularly like a winning team celebrating a push-over victory.

It is difficult to make a really good appraisal of a plant that is not in operation, but we were less handicapped in Germany than would be expected because the die casting machines were nearly all of the old type rocking air gooseneck or Polak Nos. 408, 600, 900, 2255 or copies of them. One outstanding exception was Mahle vertical air gooseneck type. This machine looked rather business-like but with most glaring inconsistencies. The sample castings from this machine were large and complicated and of excellent quality. As a matter of fact, the final casting results obtained by the German die casters seemed in general to be superior to what one might expect from inspecting the die castings machines. It was the familiar story of cheap labor and slave labor and good organization at the top.

As far as the large Mahle vertical machine was concerned, the labor not only had to be cheap but expendable. The valving of the air gooseneck was submerged in the metal with no provision against chips or foreign matter lodging on the valve seat. An open valve at the time of the shot meant a blow-out of all the metal in the metal pot. The chief engineer of the main Mahle plant admitted that the machine was most dangerous to personnel and said they had had many accidents and some of them fatal. He had eventually designed and put in operation a series of electrical switches on the machine and on the door of the ante-room so that the personnel had to "run quick in the office" before the machine was shot. Such an antidote for a poorly designed machine struck us as not being up to the touted German efficiency, but there it was and it carried us back to some old, old-time machines in America which were safe to run only if the operators were yards away and operated the shooting valves by remote control.

Mahle executives claimed to do 65 per cent of all the magnesium die casting in Germany and 35 per cent of the aluminum die casting and a substantial tonnage in zinc alloy. Their magnesium casting was done either in the large vertical air gooseneck machines referred to before or the Mahle displacement plunger type. Castings made on these machines would not meet U. S. Ordnance specifications because they were not made by the "cold chamber" process. Nonetheless, the castings, themselves, if acceptance were on the basis of visual inspection, would be sure to pass a high visual quality standard.

The tiebars on the large Mahle vertical were only approximately 3½ in. in diameter which seemed altogether too small for the sizes of castings which had been made on it. Much of the pressure load, however, was taken by auxiliary hydraulic wedge locks on the dies. These locks were placed on opposite sides and extended over about one-half the width or length of the die. Provision could be made to place the die locks on all four sides of the die if necessary. The central hydraulic system seemed adequate to handle numerous auxiliary die locks and core pulling devices. The core pulling hydraulic cylinders were not made a part of the dies but were standard extras to be applied as needed and in any sizes needed. The Mahle store room was very well supplied with these extra cylinder assemblies.

Water and soluble oil seemed to be the standard hydraulic fluid. Polak or Muller systems were popular.

The melt-down rooms were interesting from several standpoints. First of all, the larger plants were always equipped with duplicate melt-down capacity—one set for electric firing and the other for gas. If the "gas house" got blown to hell and the electric plant didn't, a switch-over could be accomplished without much time loss. If both got knocked out temporarily, the plants improvised as best they could with coke firing in the gas furnaces until the "juice" came back. Quick repairs to damaged plants seemed to be a very strong point in the German industrial planning. The race between the repair gang in Germany and our bombers was, of course, won by the bombers, but at times or for a time

(*Please turn to Page* 164)

Trends toward shorter hours and higher pay accentuate interest in labor-aiding machinery as major factor in preventing costs of manufactured products from rising sharply

FROM its very beginning, civilization has been advanced through adoption and invention of mechanical aids which, in one way or another, have relieved mankind of mental or physical drudgery. The primitive man who first cracked a tough nut with a stone instead of with his teeth was dimly conscious that the mechanical way was the better way. The same was true of the first one who crossed a swift stream on the trunk of a fallen tree instead of risking his life struggling through the water.

One of the earliest machine tools was a bow drill, the operator of which sat on the ground holding the work with his toes, while he fed the drill spindle with one hand and powered it by sawing the bow back and forth with the other. With the advent of mechanical power, the operator was emancipated as far as being the source of driving energy was concerned. Next came slides which made the machine hold and guide its own tools, which relieved the operator of those responsibilities. Then power was applied to the slides so that the operator no longer had to feed the tools by hand. About 50 years after that, the turret was applied to present a succession of tools to the work in proper sequence.

Finally, in 1873, the late Christopher Miner Spencer of Connecticut applied circular cams to turret machines and made them carry out their full repetitive cycles without much attention on the part of the operator other than loading in the bar stock, removing work and chips, replacing dull or broken tools and generally acting in a supervisory capacity —not over one machine, but over a battery of them.

The basic principles represented by mechanical slides, turrets and cams are relatively simple, but the permutations and combinations of them—combined with more recently developed hydraulic and electrical devices—have resulted in the creation of automatic production machine tools, the capabilities of which surpass the wildest dreams of the earlier inventors.

Regardless of what has been said against them (opposition to mechanization dates way back to the introduction of power driven saw mills and textile machinery), their effect inevitably has been and will be to make more jobs for more people by making possible more top quality products at prices which more people can afford to pay. Automatic machinery, therefore, is just as much a vital part of the American industrial system as are the fixtures and gages which insure interchangeability of parts.

The class of "automatics" (bar machines and chucking machines and "between-the-center" machines) which fall within the lathe group have set an industrial pace which has inspired automaticity in many other types of machines. This is one of the things which can be read between the lines in STEEL's "Special Report to Industry on Machine Tools."

This report, based on analysis of 2358 replies to inquiries sent to general managers of 11,000 plants using production machine tools (see summary in June 25, 1945, issue of STEEL) reflects strong preferences toward all kinds of machines which relieve operators of tedious repetitive mental and physical efforts in the high speed production of duplicate parts.

This is no reflection on the workmen. Human beings can think and act only so fast. Modern industry demands speeds far above those limits. Therefore, thought and action are transferred to mechanism which can be speeded far beyond human endurance and ability. The whole process possibly can be compared to mechanized telegraphy wherein thoughts are transferred to tapes which in turn send them over the wires at terrific rates of speed.

To get across the extent of the rising tide of automaticity in American metalworking plants, I have selected two examples outside the realm of conventional "automatics." Fig. 1 shows a special automatic machine built by Snyder Machine & Tool Co., Detroit, for Wright Aeronautical Corp., Paterson, N. J. This is a four-station machine (loading, spotting, drilling, and boring, with duplicate tools coming in from two sides simultaneously) for accurately creating and finishing piston pin holes in aircraft engine pistons.

The central turret, which indexes auto-

Fig. 1—Since the original application of the indexing turret principle to machine tools nearly a century ago, many ingenious ways have been found to utilize this principle for easing operation and increasing production. In this machine built by Snyder Tool & Engineering Co. for Wright Aeronautical Corp., an automatically indexed four-station work-holding turret makes possible fast, exact drilling and boring of piston pin holes by tools working from both sides

matically around a horizontal axis, holds the work instead of the tools. The slides are represented by the automatically advancing and retreating heads which carry the exactly spaced drilling and boring tools and also power them. Quick-acting fixtures built into the turret position the pistons accurately and allow the operator to load and unload them with ease and without delaying the indexing cycle.

According to Wright production engineers, this installation reduced the number of machines required from three to one, incidentally saving 323 sq ft of floor space. It reduced capital investment in machinery from $23,000 to $15,000, thus saving $8200. It reduced the number of operators on a three-shift day from eight to three, thus releasing five skilled people for other operations at a time when manpower was at a premium. It reduced machine production hours during the three-shift day from 54.3 to 19.7, a saving of 34.6 over the three-machine method of doing the work.

No figures are available to me on the comparison between the spoilage of work by the three-machine method and that under the automatic method, but the chances are that there would be at least three times the chances of spoilage where the work had to be set up three times—instead of once as in the automatic machine. It is usually true that, if work can be carried through without unlocking it from its fixture or chuck, it is much more efficient than is remounting or rechucking—as far as accuracy is concerned.

As special station-type automatic machines go, the foregoing is a comparatively simple design. I selected it for two reasons. One was it demonstrates quite effectively the points which I am bringing out. The other is that its simplicity of design is one of the marks of good engineering. Automatic machine tools adhere to that principle more consistently than any other class of self acting machinery. There are a lot of practical engineers in this business, and that is one of its greatest sources of strength.

Getting into another extremely important type of machining—that of production milling—I present Fig. 2 as an example of the penetration of automaticity into this field. Referring again to figures in STEEL's "Report", more companies indicate their intention to buy tracer controlled milling machines than now have—the ratio being 4.9 to 4.2 throughout industry. In September 10, 1945, issue of STEEL, pages 120 and 121, I touched on one phase of this, not so much from the production angle as from the toolmaking (die sinking) angle. What I present now strictly a production job.

The machine illustrated in Fig. 2 is a Cincinnati duplex tracer controlled Hydromatic milling machine. The parts being machined with the help of a special two-station fixture are cast steel cylinder head retainers for railway diesel engines. The operation consists of combined contouring and beveling of plates on the sides of these parts.

The manner in which "camming" of the machine is accomplished is obvious in the photograph, the edge cam representing one-half of the complete profile being clearly visible below the right hand milling head. Procedure is to mill half of two plates at one setting, then reverse the work and complete the profiles.

Without going into details of operation of this highly developed machine tool, suffice it to say that, with light contact on the cam or template, it has the ability to cause its powerful spindle heads to follow exactly the shape of the template—thus translating it to the work through the action of the milling cutters. A variable feed attachment maintains constant actual cutting feed (in this case 4 in. per minute) regardless of variations in angularity of the cut.

One of the remarkable features of such machines is the "lightness of touch" of the tracer mechanism, as compared to the great power thus controlled in the cutting heads. In a demonstration, I have laid my hand on the machine table and had the tracer "walk" over the back of it without the slightest discomfort. In the meantime, the cutter was faithfully recreating the contour of my hand.

In the new conception of automaticity, the cam or template or other control element is entirely divorced from the job of powering the feed works. Therefore, this metal or even cardboard templates will do the trick in many cases. In other instances, perforated paper strips similar to player piano rolls are employed. In still other cases, a principal not unlike that of the old-fashioned music box is made use of.

These things are made possible through the application of pneumatics, hydraulics, electrical control and electronics to machine tools. The possibilities as yet have only been scratched. We are due to see big developments in these directions in the very near future.

MACHINE TOOLS *Attention*

By GUY HUBBARD
Machine Tool Editor, STEEL

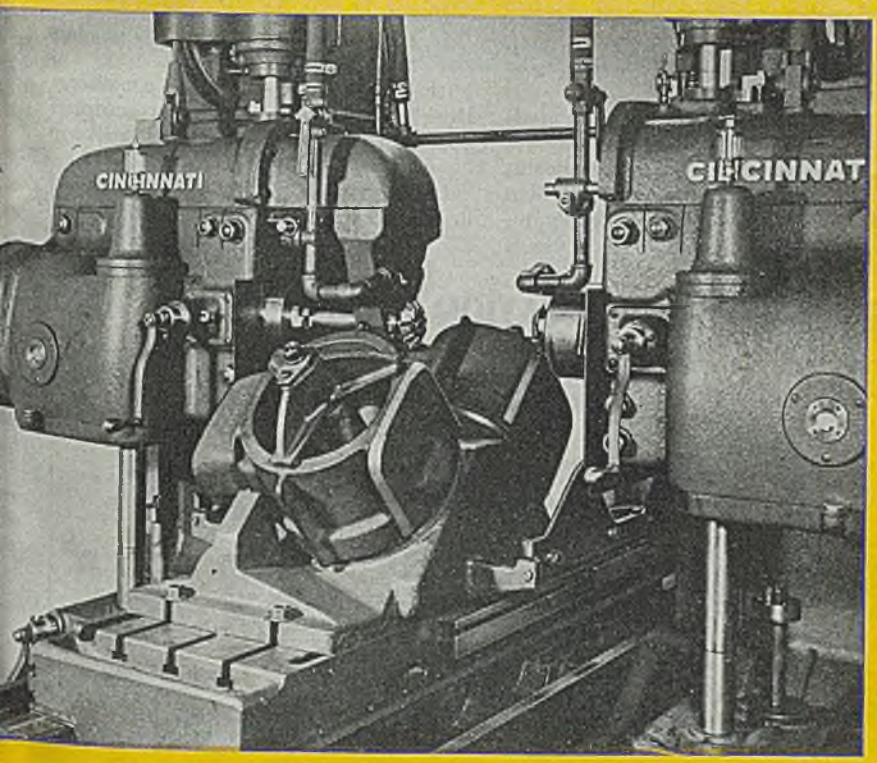


Fig. 2—Cam control of machine tools, once thought of primarily in connection with repetitive mass production of turned parts, is becoming increasingly important in connection with production milling. This setup in a duplex, tracer controlled Hydromatic solves problem of beveling and contouring side plates on cast steel railway diesel engine cylinder head retainers. Parts are contoured halfway at each station, then reversed. Note control cam below right head

Simplified Lubrication

Charts for lubrication of steel mill and metalworking equipment are designed to reduce inventories of lubricants and check errors in applications

By JAMES G. O'NEILL JR.
Staff Engineer
Sinclair Refining Co.,
New York

ACCELERATED schedules under which iron and steel and metalworking plants have been operating, means that proper lubrication is of the highest importance if maximum operating efficiency is to be maintained. At the same time, oils and greases should be selected which will service a wide variety of mechanical units. Through proper selection, inventories of lubricants may be reduced and savings in storage, errors in applications and the like, may be achieved.

For the purpose of simplifying lubrication as much as possible for lubrication engineers and plant management, a general lubrication chart is presented on the following pages, as well as data on specialized steel mill requirements. It will be noted that various types of mechanical equipment are covered, including engines, turbines, motors, pumps, machine tools, gear reducers, couplings, drives and shafting.

Lubrication has played a principal role in maintaining steel mills at maximum capacity. The lubrication engineers of the steel mills and oil companies, realizing the difficulties of replacing and repairing this heavy duty machinery, designed lubricants to partially correct the mechanical conditions and extend service life. Certain specialized lubricants were adapted to service wear, leakage, shock loads, and additional bearing pressures.

Lubrication charts for general industrial applications ranging from steam turbines and generators to chain belt drives appear on pages 120 and 122.

As is the case with many new products, the field of their application has broadened. These specialized lubricants are often used on machinery other than that for which they were originally intended. As time goes on, their use is spreading to such an extent that reduction in the number of plant lubricants through broader and more general application appears warranted. However, the very nature of these lubricants limits them to certain fields of application. Thus, it is still necessary for the steel mill to use conventional lubricants for services which cannot be satisfactorily handled by new-type products.

The lubrication requirements of a wide variety of mechanical units used by the metalworking industry have been established, as set forth in the chart. Specialized steel mill lubricants should not be used except under supervision or with the advice of a competent lubrication engineer.

It is important to note that the specialized iron and steel mill lubricants are each adapted to specific conditions. Here are the more commonly accepted applications and the general makeup of each of these.

Leak preventing oils are manufactured in five grades. Their makeup consists of

(*Please turn to Page* 124)

IRON AND STEEL MILL SPECIALIZED LUBRICATION REQUIREMENTS

SHAFTING

Bearings, Oil	OIL: Leak Preventing Oils
Bearings, Grease	GREASE: Normal Temperature Service— Calcium Soap EP Greases Nos. 0, 1, 2 High Temperature Service— Heavy Duty Soda Soap Greases Nos. 0, 1, 2, 3

MISCELLANEOUS HEAVY DUTY BEARINGS

Car Wheel Journals General Mill Bearings Conveyer System Bearings	OIL: Leak Preventing Oils
Car Wheel Journals General Mill Bearings Conveyer System Bearings	GREASE: Normal Temperature— Calcium Soap Greases Nos. 0, 1, 2 High Temperature— Heavy Duty Soda Soap Greases Nos. 0, 1, 2, 3
Hydraulic Plunger Mechanisms Plain Bearings subjected to excessive water wash, etc. Sintering Plant, Pallet Conveyer, Wheel Bearings	GREASE: Soda Soap Graphite Grease

PRESSURE LUBRICATION SYSTEMS

Table Rolls, Pinions, Drive Gear Sets, etc. (Bowser, DeLaval, etc.)	OIL: Normal Service— General Purpose Oils Heavy Duty Service— Extreme Pressure Oils
Table Rolls, Pinions, Drive Gears, etc. (Trabon, Bosch, B-K, Farval, Alemite, Lincoln, etc.)	GREASE: Normal Temperature Service— Calcium Soap EP Grease Nos. 0, 1, 2 High Temperature Service— Heavy Duty Soda Soap
Heavy Duty Roll Neck Bearings	GREASE: Calcium Soap EP Greases

GEAR REDUCERS

The selection of the extreme pressure oils is made by substituting for the applications shown in the "General Industrial Lubrication Chart" the substitute AGMA Number of extreme pressure oil.

Heavy-duty, slow-speed units in oil type cases are often lubricated to advantage by use of extreme pressure oils Nos. 9 and 10. These oils have adhesive qualities superior to the conventional oils normally recommended.

The postwar kitchen your wife's been dreaming about probably will include a lot of Stainless Steel. Wisely, she knows that Stainless gives her kitchen equipment the gleam, the cleanliness and the long, rust-free life few metals can match.

The trend toward Stainless in kitchens has been on for many years now—ever since Carpenter pioneered Stainless that costs less to use. That egg beater is a good example of a utility item that can be made inexpensively with Carpenter uniform and ductile Stainless Strip. And hardware trim, refrigerator shelves, cutlery, nuts, bolts, etc., can be turned out faster, with fewer rejects, at lower costs with versatile Carpenter Stainless Steels.

There's an idea here that can well be applied to your new or redesigned products—whether they're for household or industrial applications. Make them better at lower cost with easy-working Carpenter Stainless Steels. The first step is to take advantage of the diversified experience of your nearby Carpenter representative. Call him in to talk over your specific problems today, or write us at the mill.

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STEAM TURBINES AND GENERATORS

	S.U. Viscosity at 100° F	Oil Class
Direct Connected Turbo-Generator Sets (circulating system)	140-200	1 and 2
Geared Turbines (circulating system)	250-325	1 and 2
Turbines, Ring Oiled Bearings, With Cooling System (not oil circulating system)	250-325	1 and 2
Turbines, Ring Oiled Bearings, Without Cooling System (not oil circulating system)	300-600	1 and 2

STEAM ENGINES AND STEAM PUMPS

	Steam Temperature	
Cylinders (not circulating system)	Below 370° F. (to 160 lbs. pressure)	115-150 S.U. Vis. at 210° F with 6-10% acidless tallow, etc.
	370° F.-500° F.	140-160 S.U. Vis. at 210° F with 4-8% acidless tallow, etc.
	500° F.-700° F.	150-190 S.U. Vis. at 210° F with 3-6% acidless tallow, etc.
	Above 700° F.	190-225 S.U. Vis. at 210° F (straight mineral)

	S.U. Viscosity at 100° F	Oil Class
External Lubrication, Oil	200-600	1, 2, 3 and 4

External Lubrication, Grease — Calcium soap grease in N.L.G.I. (National Lubricating Grease Institute) 2 and 3 ranges with oil of 250-800 S.U. Viscosity at 100° F

	S.U. Viscosity at 100° F	Oil Class
Circulating Systems	175-600	1, 2 and 3

STOKERS

Gear Reducers and Cables — (see "Gear Reducers")
Hydraulic Pumps — (see "Hydraulic Pumps and Their Systems")

	S U. Viscosity at 100° F	Oil Class
Roller and Silent Chains and General Lubrication	175-600	1, 2, 3 and 4

Plain Bearings, Grease — Calcium soap grease in N.L.G.I. 2 and 3 ranges with oil of 250-800 S.U. Viscosity at 100° F.

Anti-Friction Bearings, Grease — Soda soap grease (meeting A.B.E.C. qualifications for general purpose anti-friction bearing grease) in N.L.G.I. number 1 and 2 ranges.

COMPRESSORS

	Equivalent SAE Grade	Approx. S.U. Vis. at 100° F	Oil Class
Air and Gas Compressors (follow manufacturers instructions)	10	180-240	1, 2 and 3
	20	280-360	1, 2 and 3
	30	490-700	1, 2 and 3
Refrigerating Compressors (follow manufacturers instructions)		135-525	Low pour point moisture free oils. Not shown in this chart.

DIESEL ENGINES

	Equivalent SAE Grade	Approx. S.U. Vis. at 100° F	Oil Class
(Follow manufacturers recommendations)	10	180-240	2 and 3 and detergent
	20	280-360	"
	30	490-700	"
	40	700-1000	
	50	80-105 (at 210° F)	

MACHINE TOOLS

Hydraulic Systems — (see "Hydraulic Pumps and Their Systems")

	S.U. Viscosity at 100° F	Oil Class
Circulating Systems	140-200	1 and 2
Automatic Lubricating Systems and General Lubrication of Slides, Ways, Bearings, etc., Oil	200-600	1, 2, 3 and 4

Anti-Friction and Plain Bearings, Grease — Soda soap grease (meeting A.B.E.C. qualifications for general purpose anti-friction bearing grease) in N.L.G.I. number 1 and 2 ranges.

Gear Boxes — (see "Gear Reducers")

Spindles, Separately Lubricated — (Follow manufacturer's instructions.) 45-125 — Highly refined light viscosity oils.

Electric Motors — (see "Electric Motors and Motor Generators")

SHAFTING

	S.U. Viscosity at 100° F	Oil Class
Bearings, Oil Lubricated	200-600	1, 2, 3 and 4

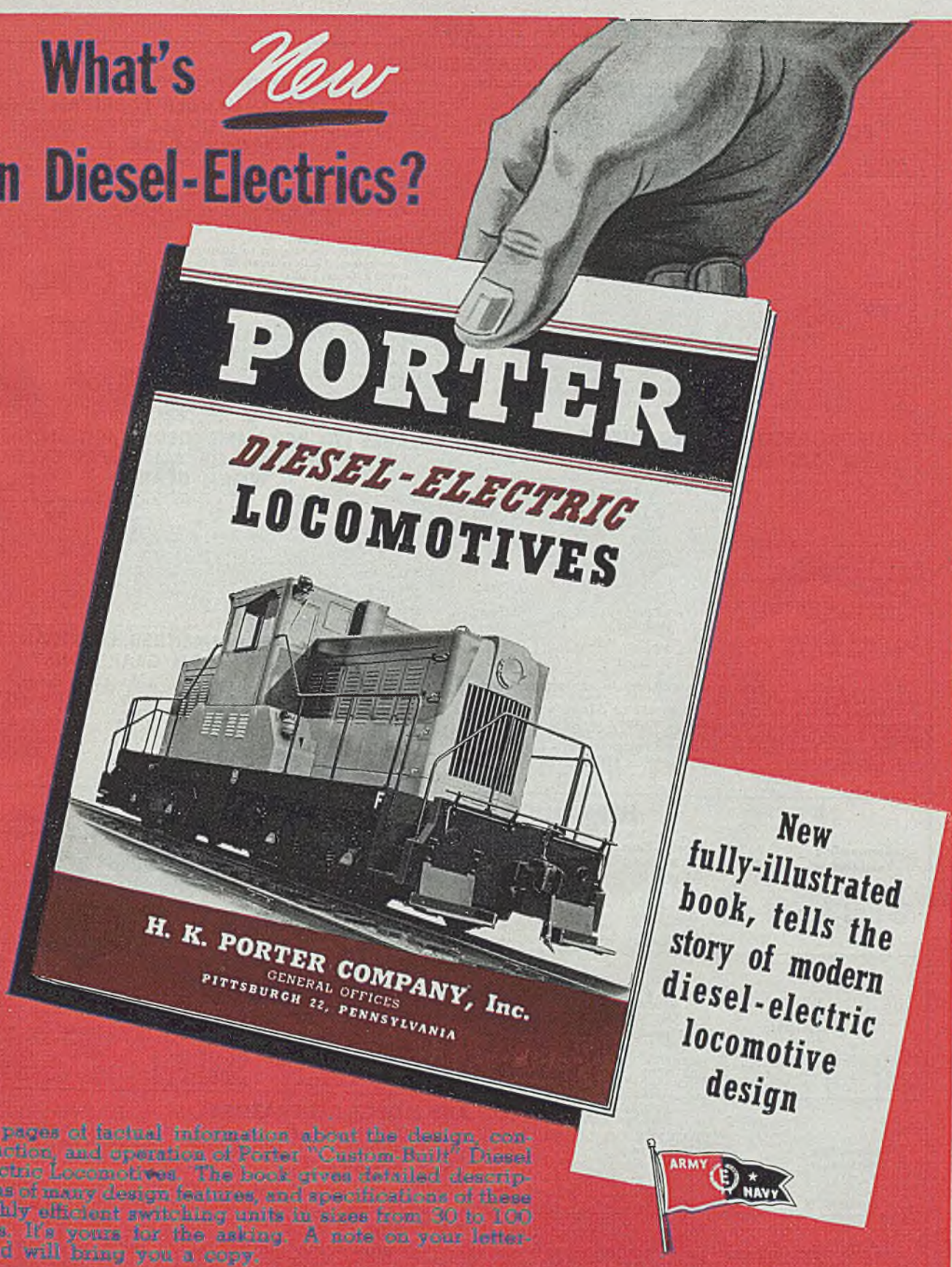
NOTE: Special leak preventing oils of 300 to 1600 S.U. Vis. at 100° F are sometimes found advantageous.

Plain Bearings, Grease Lubricated — Calcium soap grease in N.L.G.I. 2 range with oil of 250-800 S.U. Viscosity at 100° F.

Anti-Friction Bearings, Grease Lubricated — Soda soap grease (meeting A.B.E.C. qualification for general purpose anti-friction bearing grease) in N.L.G.I. number 1 and 2 ranges.

(Please turn to Page 122)

What's *New* in Diesel-Electrics?



New fully-illustrated book, tells the story of modern diesel-electric locomotive design

44 pages of factual information about the design, construction, and operation of Porter "Custom-Built" Diesel Electric Locomotives. The book gives detailed descriptions of many design features, and specifications of these highly efficient switching units in sizes from 30 to 100 tons. It's yours for the asking. A note on your letterhead will bring you a copy.

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GEAR REDUCERS

("Tentative AGMA (American Gear Manufacturers Association) Standard Specification—Gears 250.01")

TABLE I—VISCOSITY RANGE FOR VARIOUS AGMA LUBRICANTS

AGMA Lubricant No.	Viscosity Range at 100° F	S.U. Vis. Seconds at 210° F
1	180 to 240	.....
2	280 to 360	.....
3	490 to 700	.....
4	700 to 1,000	.....
5	.....	80 to 105
6	.....	105 to 125
7	.....	125 to 150
7 Comp.°	.....	125 to 150
8	.....	150 to 190
8 Comp°	.....	150 to 190
9	.....	350 to 550
10	.....	900 to 1,200
11	.....	1,800 to 2,500

° The oils marked "Comp." are those compounded with 3 to 10 per cent of acidless tallow or other suitable animal fat.
Oils No. 9, 10 and 11 should be of a tacky adhesive nature so that they will adhere well to the tooth surfaces.

TABLE II—RECOMMENDED LUBRICANTS FOR ENCLOSED UNITS OF ALL TYPES EXCEPT WORM GEARS

Type and Size of Units	Ambient Temperature deg. F: 0-40 use AGMA No.	41-100 use AGMA No.	101-150 use AGMA No.
Parallel Shaft Units			
Low-speed, Centers up to 20 in.	2	4	5
Low-speed, Centers over 20 in.	3	5	6
Planetary Gear Units			
O.D. of housing up to 16 in.	2	3	4
O.D. of housing over 16 in.	3	4	5
Gearmotors			
All sizes	2	4	5
Spiral or Straight Bevel Gear Units			
Cone distance up to 12 in.	2	4	5
Cone distance over 12 in.	3	5	6
High Speed Units			
All sizes	1	2	3

NOTE: Speed range = 600-1800 RPM — High Speed = above 1800 RPM — Gears heat treated after cutting use next higher AGMA No.

TABLE III—RECOMMENDED LUBRICANTS FOR ENCLOSED WORM GEAR UNITS ONLY

Service and Worm Speed	Ambient Temperature, deg. F: 0-40 use AGMA No.	41-90 use AGMA No.	91-120 use AGMA No.
Intermittent operation—all worm speeds	5	5	7 Comp.
Continuous operation—worm speeds below 600 rpm	7 Comp. †Diluted	8 Comp.	8 Comp.
Continuous operation—worm speeds 600 rpm and over	7 Comp. †Diluted	7 Comp.	8 Comp.

°Where period of operation is insufficient to produce any appreciable rise in oil bath temperature.
†Diluted AGMA No. 7 comp. oil should be diluted with a lighter oil, preferably not exceeding 500 sec. viscosity at 100° F, until the desired fluidity is obtained. The lubricant used for dilution should be of the same basic crude as that of the recommended oil. The lubricant supplier should be consulted if there is any doubt.

TABLE IV—RECOMMENDED LUBRICANTS FOR OPEN GEARING OF ALL TYPES EXCEPT WORM GEARS

Method	Ambient Temperature, deg. F: 0-40 use AGMA No.	41-100 use AGMA No.	101-150 use AGMA No.
Slush Pans	3	5	6
Hot—by brush or paddle°	10	10	11
Cold—by brush or paddle°	6	8	10
Hand-oiled	4	6	8

°Also for wire ropes and cables.

TABLE V—RECOMMENDED LUBRICANTS FOR OPEN WORM GEARS ONLY

Method	Ambient Temperature, deg. F: 0-40 use AGMA No.	41-100 use AGMA No.	101-150 use AGMA No.
Cold or hot—by brush or paddle	6	8	..

NOTE: Ambient = surrounding air temperature

HYDRAULIC PUMPS & THEIR SYSTEMS

Surrounding Temperature	VANE TYPE with Flow Control Valves: S.U. Viscosity at 100° F	Oil Class	VANE TYPE without Flow Control Valves: S.U. Viscosity at 100° F	Oil Class	GEAR & PISTON TYPE: S.U. Viscosity at 100° F	Oil Class
0° F- 70° F	140-200	1 and 2	225-275	1 and 2	140-200	1 and 2
70° F-120° F	140-200	1 and 2	225-275	1 and 2	250-325	1 and 2
120° F-180° F	140-200	1 and 2	225-275	1 and 2	300-525	1 and 2

NOTE: For below 25° F and above 150° F on the Vane Type Pumps, special instructions are issued by the manufacturer.

FLEXIBLE COUPLINGS

Surrounding Temperature	GEAR, FLOATING KEY & FLEXIBLE PIN TYPES, OIL LUBRICATED: S.U. Viscosity at 100° F	Oil Class	ROLLER, SILENT CHAIN & JAW TYPES — OIL: S.U. Viscosity at 100° F	Oil Class	GREASE: Soda Soap with oil 80-150 S.U. Vis. at 210° F	OPEN (Without Casing)
0° F- 70° F	1500-2500	2, 3 and 4	350- 600	1, 2, 3 and 4	N.L.G.I. No. 2	Special care required. Proper lubricant depends on the operating speed and the surrounding conditions.
70° F-120° F	2000-5000	2, 3 and 4	490- 700	2, 3 and 4	N.L.G.I. No. 2	
120° F-180° F	2000-5000	2, 3 and 4	700-1000	2, 3 and 4	N.L.G.I. No. 3	

ELECTRIC MOTORS AND MOTOR GENERATORS

Surrounding Temperature	BEARINGS, OIL LUBRICATED S.U. Viscosity at 100° F	Oil Class	BALL & ROLLER BEARINGS, GREASE LUBRICATED Soda Soap Grease (meeting A.B.E.C. qualification for general purpose anti-friction bearing grease)
0° F- 70° F	140-275	1 and 2	N.L.G.I. No. 1
70° F-120° F	140-275	1 and 2	N.L.G.I. No. 1 and 2
120° F-180° F	250-325	1 and 2	N.L.G.I. No. 2

CHAIN BELT DRIVES

SLOW SPEED DRIVES 0° F-180° F	MEDIUM SPEED DRIVES 0° F-180° F	HIGH SPEED DRIVES 0° F-120° F	HIGH SPEED DRIVES 120° F-180° F
S.U. Vis. at 100° F 300-600	S.U. Vis. at 100° F .. 200-600	S.U. Vis. at 100° F....140-275	S.U. Vis. at 100° F....225-325
Oil Class .....1, 2, 3 and 4	Oil Class .....1, 2, 3 and 4	Oil Class .....1, 2, 3 and 4	Oil Class .....1, 2, 3 and 4

DESCRIPTION OF OIL

CLASS

1—Specially refined, additive, turbine-type lubricating oils. Meet and exceed requirements of makers of steam turbines, hydraulic pumps, tc.
2—Highly refined, non-additive, turbine-type lubricating oils. Enviable reputation for indicated uses.
3—Highly refined, non-additive, coastal lubricating oils. Very outstanding for indicated uses.
4—GENERAL PURPOSE OILS: Conventionally refined, non-additive, general purpose oils. Excellent for General lubrication but not adapted to specialized operating conditions of critical units.

NOTE: A properly selected oil may service a wide variety of mechanical units. By proper selection, inventory can be lessened and savings in storage, errors in application, etc. achieved.

(Concluded on Page 124)

HELPS REDUCE FABRICATION COSTS.....

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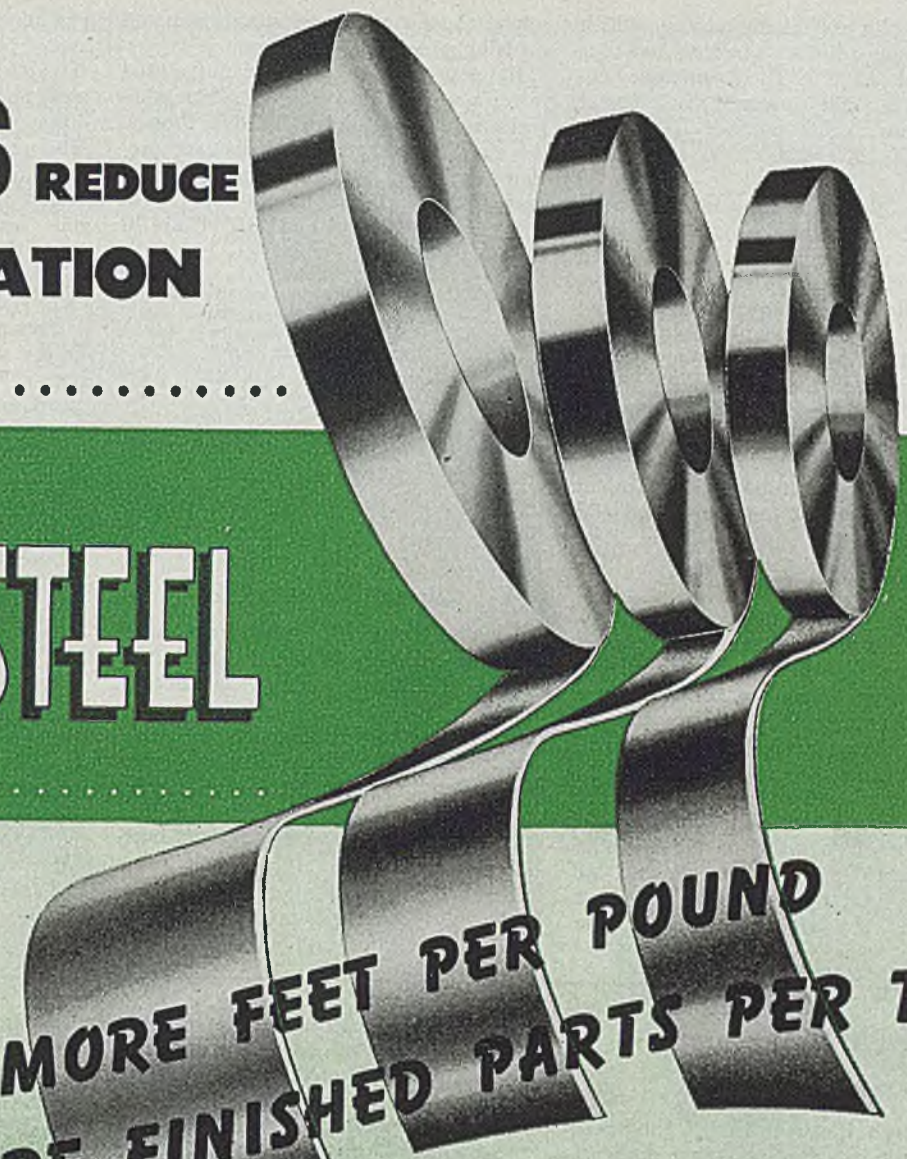

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black oils plus a synthetic additive which gives the oils adhesive qualities and thus reduces leakage. The generally encountered Saybolt Universal viscosities at 100° F are as follows: 500-700, 1000-1200, 1500-1800, 2000-2200 and 2500-2700.

These lubricants are not intended for enclosed circulating systems. Their principal application is on oil-lubricated bearings where leakage must be counteracted and where temperatures are not extreme. Examples are oil-lubricated shaft bearings and miscellaneous heavy-duty bearings, such as car wheel journals, general mill bearings, and conveyer system bearings. The selection of the proper leak preventing lubricant is made on the basis of substituting the equivalent viscosity product for the straight mineral oil in use.

Extreme Pressure Oils

Extreme pressure oils are designed primarily for use in worn gear reducers or reducers subjected to overloads and shock loading. They are also sometimes found advantageous in oil pressure lubricating systems of the Bowser, DeLaval, etc., types, for lubricating table rolls, pinions, and drive gear sets under heavy-duty service. The selection of the proper oil is made on the basis of reference to the straight mineral oil ordinarily used for the purpose. These oils should not be used on worm gear sets if the manufacturer specifies an oil containing tallow compound.

Extreme pressure oils are manufactured in ten grades. They consist of black oils and a lead compounded additive. Properties of film strength, shock load absorption, and leakage prevention are incorporated in their make up. The viscosities at 100° F and 210° F are as follows:

Oil	Saybolt Universal Viscosity at 100° F	Saybolt Universal Viscosity at 210° F	Substitute for AGMA No.
No. 1	300	50	2
No. 2	750	70	4
No. 3	1280	89	5
No. 4	1890	110	6
No. 5	2400	125	7
No. 6	3400	150	8
No. 7	....	210	....
No. 8	....	480	9
No. 9	....	520	9
No. 10	....	950	10

Calcium Soap EP Greases

Calcium soap EP greases are made in three N.L.G.I. (National Lubricating Grease Institute) grades, classification Numbers 0, 1, and 2. They incorporate calcium soap and a dark-colored, high-viscosity oil. In addition, they have good film strength properties. In general, their application replaces, for steel mill use, the more conventional cup and bearing greases.

Field of application of these greases is the lubrication of bearings under normal temperatures. Miscellaneous heavy-duty bearings, grease-lubricated such as car wheel journals, general mill bearings, and conveyor system bearings, can often use them to advantage. These lubricants are also employed in grease pressure lubricating systems, under normal temperature operation, for table rolls, heavy-duty roll-neck bearings, pinions, drive gears, etc., using Trabon, Bosch, B-K, Farval, Alemite, Lincoln, etc., systems.

Present practice in the steel mills tends to the use of calcium soap EP greases, both as plain bearing greases and general purpose anti-friction bearing greases. This reduces the number of greases in the inventory. However, when considering the use of any calcium soap grease in anti-friction bearings, the advice of the plant lubrication engineer should be followed. High-temperature service and speeds (above 175° F and 2000 rpm) prevailing on such bearings requires the use of conventional soda soap greases.

Soda Soap Graphite Grease

Soda soap graphite grease is made using a high viscosity oil and about 8 per cent graphite. It is of the N.L.G.I. No. 2 consistency and is designed for difficult lubrication problems, such as hydraulic plunger mechanisms and plain bearings subjected to excessive water wash and other drastic conditions. It is also recommended for lubricating sintering plant, pallet conveyer wheel bearings.

Use of Plastic Cements Described in Booklet

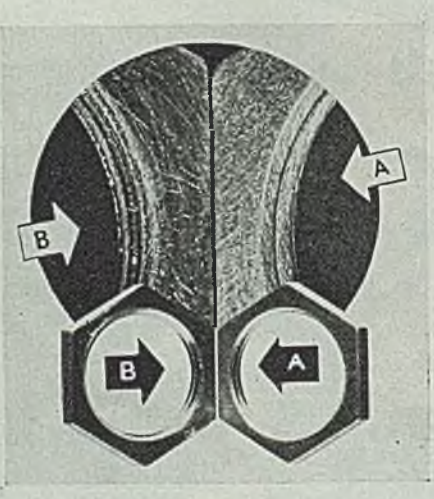
Tennessee Eastman Corp., Kingsport, Tenn., has issued a two page bulletin, entitled "Tenite Cementing and Assembling" which describes the procedure to be followed in cementing together pieces of molted tenite, Eastman cellulose ester plastic.

Two types of cementing agent are discussed. The first, solvent type, is generally used where surfaces in a single plane are to be cemented. Small pieces are joined and held together by hand, and the solvent is applied along the edges with a medicine dropper, or small oil can. For larger pieces, the surfaces are immersed in solvent until the material has softened. They are then clamped together until the bond has set.

Dopes, the second type of cementing agent, consist of tenite or a cellulose ester dissolved in a solvent blend. Dopes are used when the surfaces are irregular and are not easily accessible.

Cushioned Cutting Action Improves Deburring Process

Variety of precision parts can be deburred quickly and inexpensively to close tolerances in mass lots by a process which not only deburrs but also imparts a uniformly smooth overall finish. Soft Neoprene rubber impregnated with aluminum oxide abrasive is used in tumbling barrels, and, as each particle of the abrasive is rubber-mounted, cutting action is cushioned. The softest metals are not marred. Constant, steady sliding pressure on metal provides fast cutting action even on hardened steel. Tolerances are controlled easily by timing the run. No water is used, and there is no mess or rusting of parts.



Accompanying illustration shows before (B) and after (A) unretouched views of aluminum one-thread nuts, actual size and X15 photomicrograph sections. Tolerance was held to 0.001-in. Steel spacer washers 0.005-in. thick have been deburred to a uniformly smooth finish. Tolerance can be held to 0.0001-in. with this process, it is claimed.

This "De Burrette" process, developed by De Burr Barrel Co. Inc., 4577 Hollywood boulevard, Los Angeles 27, has been used on turbine blades, drills before grinding, small fine pitch gears, racks and pinions, tiny brass half-nuts with radii to sharp edges, precision bolts and nuts, steel locking inserts, and aluminum spacer washers. The manufacturer maintains a pilot plant for testing the process on parts sent in by manufacturers, and to establish methods for deburring.

Electronics Film Course Comprehensive

As the demand for fundamental electronic education far exceeds the supply of qualified instructors, available talent and resources have been utilized by General Electric Co., Schenectady, N. Y., in preparing its slide film course for general showing to industry. Although the course is elementary, and students are unable to service or adjust the electronic equipment discussed, they may learn the fundamental principles of electronics, how to tackle electronic jobs as they come, and how to extend their knowledge in actual practice. Course also points out what can be expected of electronic applications, where they can solve an industrial problem, and where use of electronics would be a misapplication.

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Modern HEAT TREATING Practice

Recommended procedure for heat treating high-speed steel concludes this series of articles on approved heat treating and quenching methods. Four preceding articles discussed general principles, S-curves, hardenability tests, interrupted quenching and carburizing

By ARNOLD P. SEASHOLTZ
Metallurgical Engineer
E. F. Houghton & Co.
Philadelphia

PROPER heat treating is essential to obtain greater wear resistance for maximum life in cutting, forming or shearing. Heat treating of high speed tool steel is one of the most exacting operations because of the high temperatures required for hardening—2150 to 2400°F. The important points to be taken into consideration when heat treating high speed tools are: (1) Preheating (rate, temperature, and time); (2) furnace atmosphere; (3) hardening temperature and time at that temperature; (4) quenching medium.

Hardening high speed tool steels such as 18-4-1, 6-6-2, etc., requires special care to prevent decarburization because of the high hardening temperature. These grades decarburize very readily, especially the molybdenum high speed steel. There are several methods of preheating and heating to the hardening temperature, the salt bath probably being the most used method among commercial heat treaters and tool manufacturers. Muffle-controlled atmosphere type furnaces are used successfully and care must be taken to maintain a neutral or non-oxidizing atmosphere at all times. When using the semimuffle type furnace, copper paint, borax or a commercial neutral packing compound should be used to prevent decarburization.

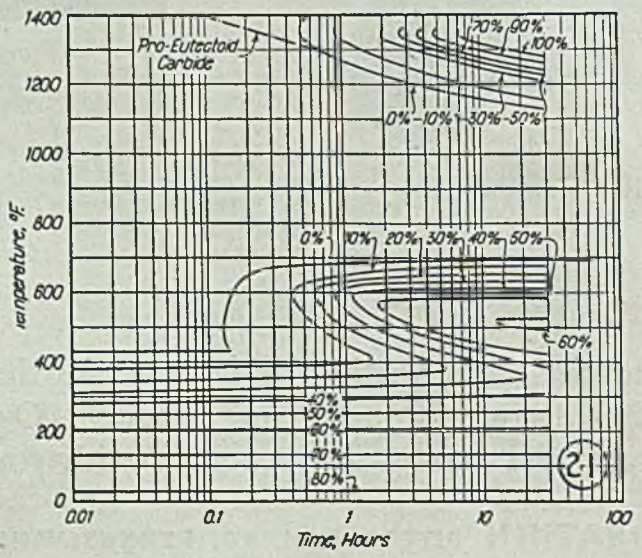
The salt bath offers many advantages in heat treating high speed steels. By excluding air, a controllable medium, or "atmosphere" is assured. Molten salt heats the work to a uniform temperature which is somewhat lower than other methods and results in less distortion. It is the simplest and most effective means for hardening high speed steels, as heat treaters with less experience can turn out consistently superior work. When transferred from one salt bath to another, the work is coated with a thin film of liquid which protects the metal from oxidation.

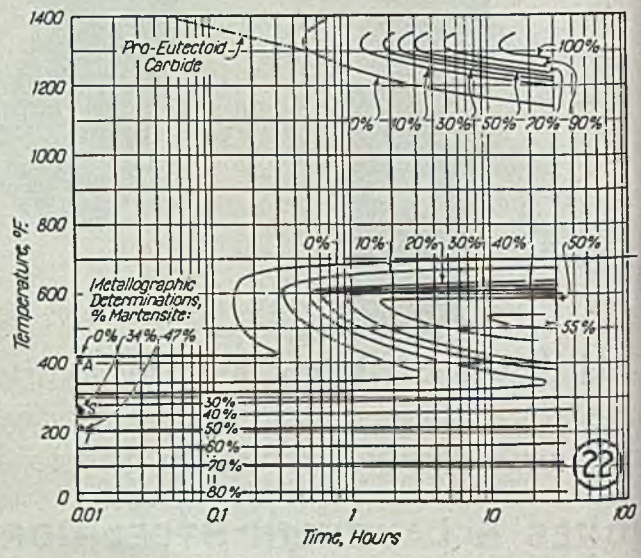
A salt bath can be used for a hot quenching medium. Interrupted quench by hot quenching methods has proven so successful in heat treating plain carbon and alloy structural steels that it

TABLE V
TOOL LIFE FIGURES AFTER FINAL CASING

Type of Tool	Normal Life Untreated Pieces	Life after Treatment Pieces
Counter Bore	700 - 1000	4000 - 4500
Outside Forming		
Rough	2000	4200
Finishing	2000	7400
13/16-inch Step Drill	9000	9400
3/4-inch Tap	1000	1995
Grooving Tool	2000	4000

Fig. 21—Transformation curves for 18-4-1 high-speed steel
Fig. 22—Transformation curves for 6-6-2 high-speed steel





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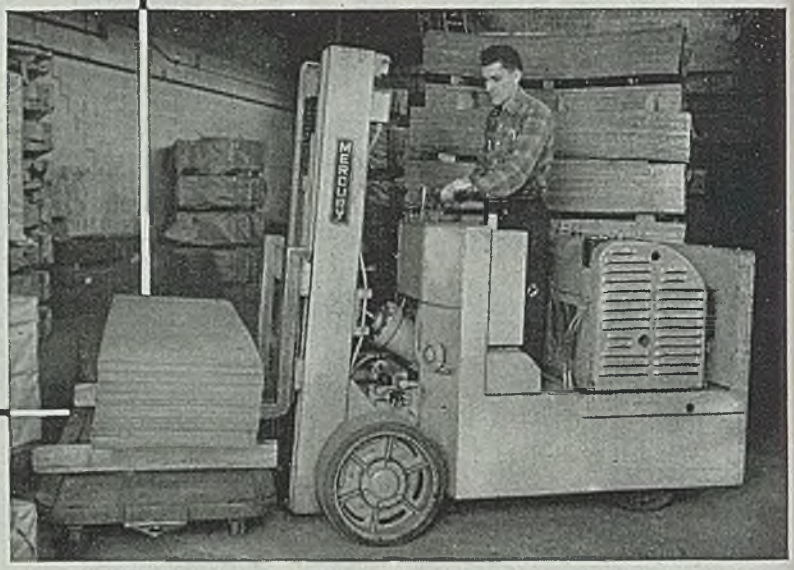

HANDLE Mercury "Yank" fork truck loading sheet steel on waiting trailers.

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Industry can well profit from close study of the improvements in materials handling technique developed by the supply divisions of our armed forces. Of particular interest is the wide use of the Fork Truck—"Trackless Train" System for handling materials when distances exceed 200 ft.

In the system the fork truck (a handling and stacking machine) is used for loading trailers. Loaded trailers are made up into trains and hauled away by a tractor. "The Trackless Train" has no fixed path and may travel anywhere that necessity dictates. At destination, the fork truck removes and stacks the pallet loads to ceiling heights.

A few of the many advantages of the system are:

(1) Equipment works continuously—"dead heading" reduced to the minimum.

(2) Handles larger loads—one trailer train is equivalent to 5 to 10 truck loads.

(3) Less manpower required.

(4) Lower investment in equipment for handling comparable volume.

(5) Lower power consumption in transporting; only the tractor consumes power.

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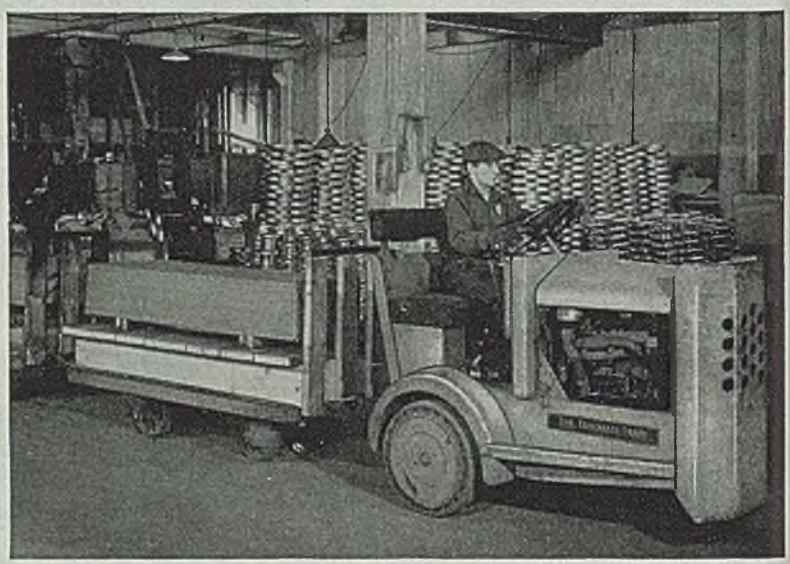


HAUL A train of loaded trailers is coupled to the Mercury "Banty" gas tractor and hauled to destination. The "Trackless Train" has no fixed path and may travel anywhere necessity dictates.

STACK At destination the tractor is uncoupled and sent on its way. The "Yank" removes the loads from the trailers and stacks them to ceiling heights.

is now applied to the high speed tool steels. Several metallurgical investigators have studied the kinetics of austenite decomposition. In general they have formulated the same technique, except that the results of their research work differs as to the amount of decomposition at atmospheric temperature and at the temperature at which martensitic transformation begins.

Figs. 21 and 22 show the TTT curves for 18-4-1 and 6-6-2 as developed by Paul Gordon, Morris Cohen and Robert S. Rose in their article "The Kinetics of Austenite Decomposition in High Speed Steels." They form the following conclusions from their work:

1. The kinetics of austenite decomposition in 18-4-1 and 6-6-2 high speed steels have been investigated and found to be virtually alike in every respect.

2. Both steels exhibit two temperature ranges of isothermal activity after definite incubation periods. The product of isothermal transformation in upper range (1400 to 1200°F) is very fine pearlite, preceded or accompanied by carbon precipitation. In the lower range (675 to 350°F), product is acicular bainite. Pearlite transformation goes to completion if holding time is sufficiently extended, but bainite transformation stops long before austenite is completely exhausted.

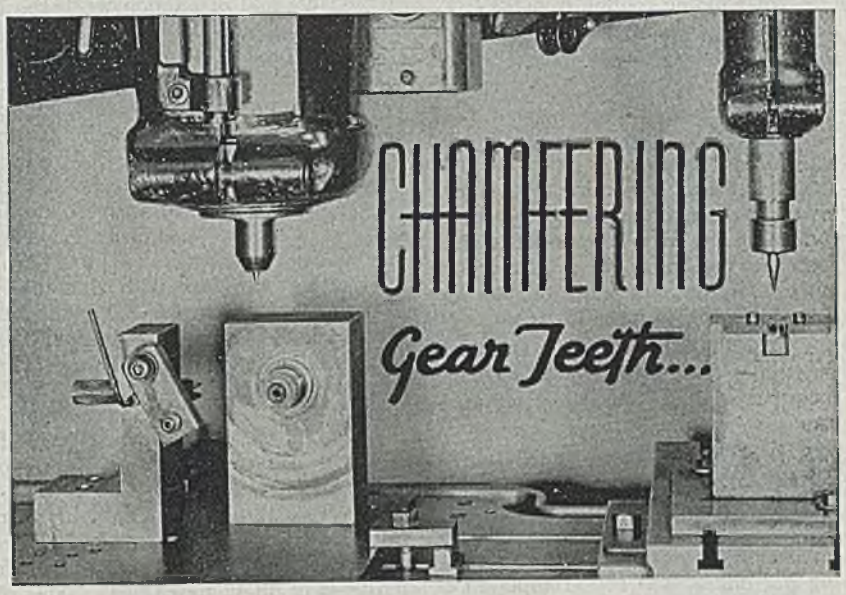
3. For the particular austenizing treatments used, the martensite transformation set in at 420°F for the 6-6-2 steel and at 430°F for the 18-4-1. There is no observable incubation period prior to the martensite transformation once the M- point is reached.

4. Hot quenching to temperatures within the martensite range leads to martensite transformation during the cooling from the M- point to the holding temperature, followed by isothermal bainite formation at the holding temperature. The latter transformation takes place in two stages; the first stage consisting of formation of occasional plates of bainite in the martensitic microstructural regions, and the second stage occurring later, with general formation of bainite throughout structure.

5. There is no detectable transformation on hot quenching into the intermediate range of 700 to 1100°F. Nevertheless, such hot quenching, particularly above 900°F conditions the austenite for bainite formation at the expense of martensite during subsequent cooling. The cooling transformation takes place in two steps, product of the upper step being bainite, and that of the lower step, martensite. As the holding time and the temperature are increased in this hot quenching range, the amount of bainite formed during the cooling increases, and leaves less austenite available for martensite formation.

6. By suitable hot quenching treatments, many combinations of pearlite, bainite, martensite and retained austenite can be secured in 6-6-2 and 18-4-1 steels at room temperature.

7. Attention is called to the relation between the present work and the common practice of hot quenching high speed steel in range of 100 to 1400°F as part of hardening operation.



. . . on a duplicator or profiling machine eliminates hand filing, reduces costs 30 per cent

A NEW method for chamfering gear teeth on a duplicator or profiling machine, adopted by General Electric's Pittsfield Works, has reduced costs 30 per cent. On the machine shown in the accompanying illustration, work is completed in one operation, eliminating the slow, expensive, hand-filing process formerly required when teeth were chamfered on a gear shaper and tops were radiused by hand.

In the new method, gear is placed in a plug, slightly smaller in diameter than the splined hole. A block on the left of the gear has a clamping-screw attachment which is screwed to the rim of the gear, giving enough pressure so that the gear can be turned on the plug, but will not move forward. The teeth of the gear engage and lock on a pin extended through the block when chamfering. A block attached to the device holds tracers used in obtaining the correct contour of the chamfer.

Curves Explain Some Failures

Transformation curves of high speed tool steel explain some of the failures which occur when quenching in oil. Tool steel, when quenched cold in water and oil, often cracks in the quenching operation or distorts badly. These failures can be attributed to the temperature differential throughout the piece during transformation. To prevent this type of failure, it is often recommended to remove the work from the quench bath while the work is still warm. The interrupted quench can result in failure or poor physical properties if the work is taken from the bath at a temperature at which only partial transformation has taken place. A good practice is to allow the steel to cool after the interrupted quench so that it can be held in the bare hands before tempering.

A recommended procedure for hardening high speed tool steels in salt baths is as follows:

—Preheat at 1500 to 1550°F. For extremely heavy production two preheats, 1100-1300°F and 1500-1600°F, may be advantageous.

—High heat 2150-2250°F.

—Quench in salt at 1000 to 1100°F and hold until work is equalized at this temperature.

—Air cool to room temperature.

—Draw at 950-1100°F.

—Final treatment may be given to increase tool life; this may consist of redraw or preheating in a nitriding salt to increase surface hardness. Subzero treatment to produce complete transformation is a third method on which there is much current discussion.

Curves in Figs. 21 and 22 show that austenite in high speed steels does not transform completely at room temperature. Results by different metallurgical investigators have shown that the amount of retained austenite at room temperature might be as much as 5 to 20 per cent.

Other work by Paul Gordon and Morris Cohen has contributed the following information:

1. During continuous cooling of 18-4-1 from a hardening temperature of 2350 to minus 310°F the austenite transformation sets in at 420°F, and transformation progresses smoothly through room temperature, and

stops at approximately minus 150° F.

2. Interrupting cooling from 2350°F at room temperature, as in ordinary oil-hardening operation, stops transformation.

3. Aging hardened high speed steel at room temperature before cooling to minus 310°F reduces magnitude of subatmospheric transformation and lowers the temperature at which transformation sets in. This stabilizing effect on the retained austenite becomes more pronounced the longer the time of room temperature aging.

4. Rate of subzero cooling and time of holding at minus 310° F have no measurable effect on extent of subatmospheric transformation.

5. If hardened 18-4-1 steel is tempered at temperatures between 200 and 875° F, retained austenite is stabilized sufficiently so that no transformation occurs during subsequent cooling to minus 310°F. Temperatures above 875°, however, produce enough carbide precipitation to lower its stability to the point where transformation again takes place during cooling from the tempering temperature to minus 310°F.

6. Tempering the hardened 18-4-1 steel after the subzero cooling completes the retained austenite transformation.

7. The increment of hardness developed in hardening 18-4-1 steel by subzero cooling is persistent during tempering up to temperatures as high as 1050°F.

8. The indications are that subzero hardening and tempering of 18-4-1 high speed steel will produce combinations of hardness, strength, and ductility unattainable by ordinary hardening and tempering.

Most investigators have found that the subzero treatment increases the productive life of a cutting tool. There are some differences in the amount of increased life and of opinion when the refrigeration should be done during the hardening process. Stewart M. De Poy, metallurgist, Delco Products Division, General Motors Corp., Dayton, O., has started an extensive research program on effect and procedure of subzero treatment of high speed steel. His first results showed marked increase in tool life, but of the four treatments employed, one was outstanding.

Selecting tool bits with the analysis C - 0.84; Mn - 0.32; Cr - 4.00; W - 5.28; Mo - 4.26; Va - 1.72; he subjected them to the following procedure (No. 3): Preheat at 1600°F, austenize at 2225°; quench in salt at 1050°; cool in air to minus 100 - 150°F.; temper at 1050° for 2 hr; at minus 110°F for 3 hr; temper at 1050°F for 2 hr.

Bits were tested on a dry lathe operation which reduced diameter of a large aircraft tubing of AMS 6380 steel having hardness of 38-42 rockwell C. This No. 3 procedure permitted average production per grind at 8.3 work units, against 7.5 for the next best treatment, and productivity increase of 45.7 per cent, compared with 31.5 per cent for the next best. The same procedure applied to circular form tools of the same grade of material proved equally successful, increasing productivity 54.5 per cent.

Heat treating was done in battery of electric furnaces using preheat, high temperature and quenching salts, tempering by Homo furnace, and refrigerating by placing parts in mixture of dry ice and methanol contained in refrigeration unit operating at minus 60°F.

Ralph G. Kennedy, Jr., Cleveland Twist Drill Co., presented results of his work at the 1944 Metal Congress, and showed the subzero treatment between the multiple temper increased production about 10 per cent.

Final casing of high speed steel tools is usually referred to as nitriding, although this is essentially the chemical explanation of the process. The method of application is entirely different from the usual "nitriding" process where gaseous ammonia is employed to form the iron "nitride" surface on the steel parts. Nitriding of high speed steel tools is a much simpler process and is applied through the medium of a molten salt bath at temperatures slightly below those which are recommended for the tempering of the particular type of high speed steel being treated.

Before nitriding, it is essential that the tools be correctly heat treated, with no carburized or decarburized surface. This would more or less defeat the purpose of the nitriding treatment, although of the two the slightly decarburized surface is preferable to the carburized, as the addition of nitrides to the surface of the steel will tend to neutralize the soft skin produced by decarburization process.

Time of Treatment Varies

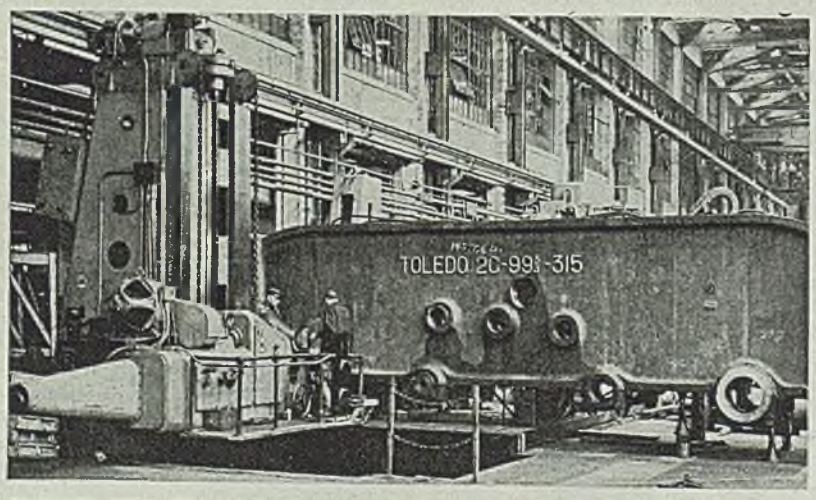
Usual temperature is either at, or slightly below, the final tempering temperature, and this is generally in the range of 1000 - 1050°F. Time of treatment will vary from 10 to 90 min, the temperature depending upon the size of the tool, design and shape, and also upon the operation for which tool is to be employed. Tools subject to considerable chatter or shock—especially those used on ferrous metals—should, for best results, be treated for shorter periods, whereas, with tools used on nonferrous metals, hard rubber or plastics, the longer periods of treatment will be of advantage.

In most instances, especially on milling and gear cutters, an extremely heavy case should be avoided, for although the number of pieces between grinds might be increased, total number of grinds per tool would be decreased, due to the deeper chipping that results when tool does fail.

Usual depth of penetration of the nitride layer is from 0.001 to 0.002-in. for treatments of 30 to 90 min and below 0.001-in. for treatments of 10 to 20 min. This superficial case is extremely hard and cannot be measured by the ordinary hardness testing method.

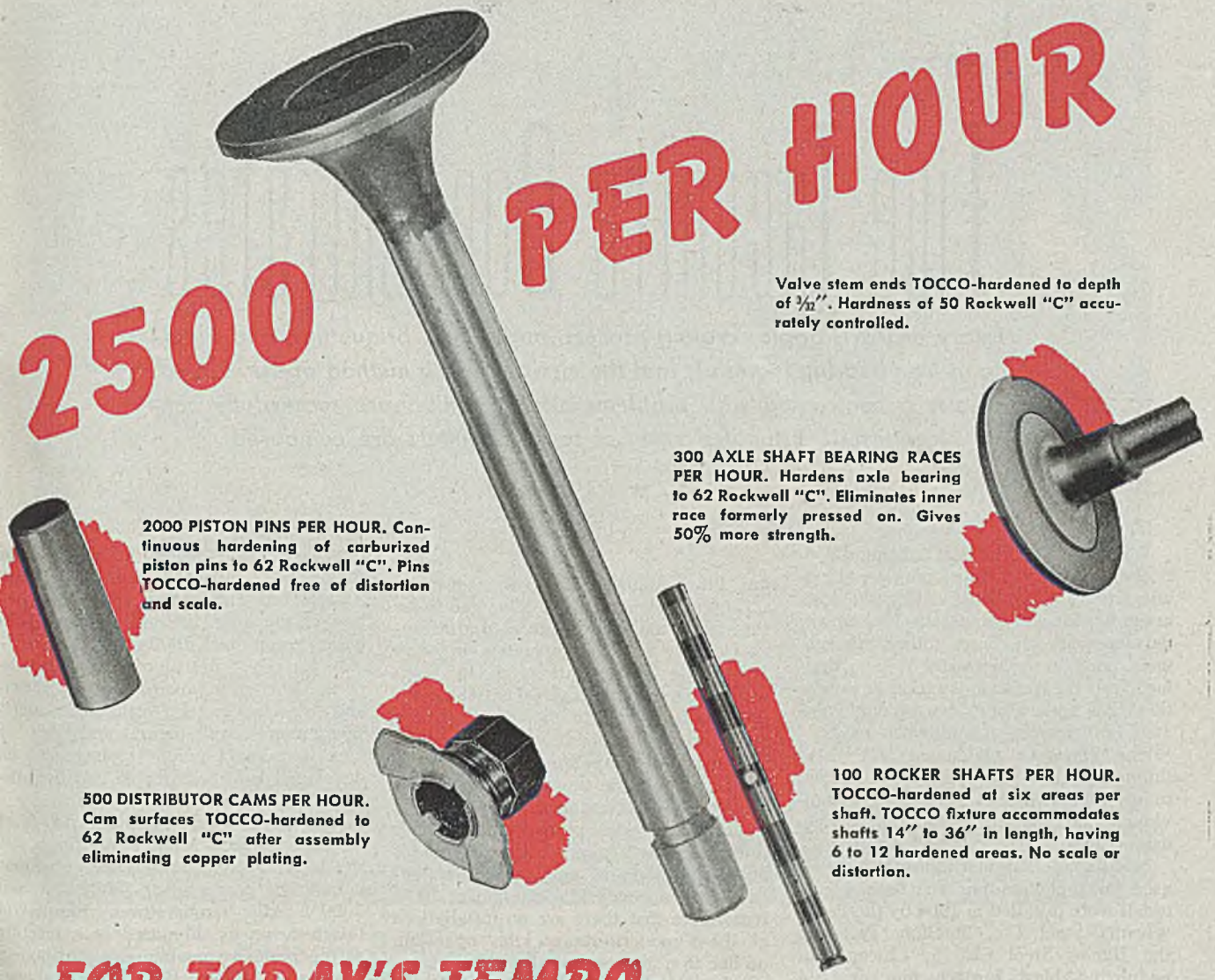
On a completely tempered tool, this nitriding treatment does not increase the size of the tool. There have been many tests made, and measurements determined, in which the size of the particular tool, after nitriding, did not vary over 0.0001-in. before and after the nitriding treatment.

Increase in tool life on several setups resulting from the nitriding treatment when applied to correctly heat-treated tools are listed in Table V. The expense of the nitriding treatment for high speed tools is extremely low. Manufacturers of salt bath materials have studied this problem and have developed a salt mixture to produce uniform and controllable results in obtaining the superficial hard case.



CROWN FOR GIANT PRESS: The casting being bored and milled weighs 147,000 lb and is 15 ft long and 7½ ft high. Mechanical press for which it is designed will weigh approximately 1,250,000 lb and will have a 2500-ton capacity at bottom stroke. Bed area will be 80 in. wide by 315 in. long, according to E. W. Bliss Co., Brooklyn, N. Y., the manufacturer

2500 PER HOUR



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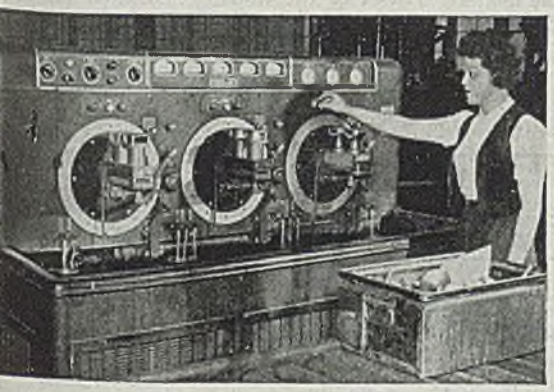

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INDUCTION

HARDENING, BRAZING

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Agglomeration of Fine Taconite Concentrates

History of Davis agglomerating process, nodulizing, briquetting and sintering of iron-bearing materials and the merits of each method are presented. Industry is confronted with problems after taconites are successfully concentrated. Estimated costs of taconite sinters are compared

By M. F. MORGAN
Arthur G. McKee & Co.
Cleveland

WIDESPREAD interest is being shown in the possibility of developing an economical process for beneficiating the low-grade taconites of Minnesota. Preliminary developments in concentrating this material point to the necessity of fine grinding. Thus the question is raised as to how these fine concentrates can be agglomerated economically if and when made.

The term "agglomeration" used throughout this paper has been applied to any process that consolidates fine individual particles of materials into coherent masses.

Nodulizing: The first rotary kilns to be used for agglomerating iron bearing materials were installed in 1904 by the Pennsylvania Steel Co., Steelton, Pa., and the Illinois Steel Co., S. Chicago for nodulizing blast furnace flue dust. A number of other kiln installations were made from 1904 to 1911. Most of these kiln plants have been replaced, because of their high operating and maintenance costs, by other agglomerating facilities.

Principal operating difficulties encountered when nodulizing these materials in a rotary kiln arose from the formation of "rings" which was caused by the sticky material adhering to the fire brick linings. These rings reached such proportions that the kilns had to be shut down and allowed to cool after approximately 1 week's operation in order to remove accumulations. The rings were removed by hand labor which required from 2 to 3 days. Under such operating conditions, the rotary kiln for nodulizing iron ore fines could not be tolerated in the steel industry and therefore was abandoned.

The rotary kiln process has recently re-entered the agglomerating picture for nodulizing fine iron ore concentrates because of improved kiln equipment. It is regrettable that there are no installations of these modern rotary kilns operating on fine iron ore concentrates in this country, but there are two installations where manganese concentrates are being nodulized, one at the Anaconda Copper Mining Co., Butte, Mont. and the other at the Cuban-American Manganese Corp., Cristo, Cuba.

The first article[1] written on the modern kiln was delivered by S. C. Thyrre, vice president, F. L. Smidth & Co. at the February 1941 meeting of the Eastern States Blast Furnace and Coke Oven Association. The author made no mention of the initial cost of a modern kiln plant to produce 1000 gross tons nodules per day. Actual results of any experiment or new process must be known and also accurately estimated capital investment requirements and cost of operations for a practical plant must be developed before its merits can be satisfactorily evaluated.

One ore company submitted 600 lb of 9 per cent SiO_2 Mesabi ore for a test run in the rotary kiln and requested that nodules be produced at 1900, 2100 and 2300°F kiln temperatures. Results of this test run as submitted at a meeting of the previous mentioned association in Cleveland, in Jan., 1943, are as follows:

Samples of nodules were examined and all appeared dense and compact and highly magnetic. Some of the blast furnace and open-hearth operators were of the opinion that the physical characteristics of the nodules indicated that the nodules were made at a kiln temperature of 2700° F.

No operating data were submitted and no kiln has been installed in America to operate on iron ores. Discussion brought out the following on a plant to produce 800 gross tons of nodules per 24-hr.

One kiln, 12 ft at feed end, 15 ft at enlarged zone, 12 ft at discharge end, and from 230 to 260 ft long.

Operating costs per ton of nodules.

Power	$0.03
Fuel	0.40
Labor	0.15
Maintenance	0.12
	$0.70

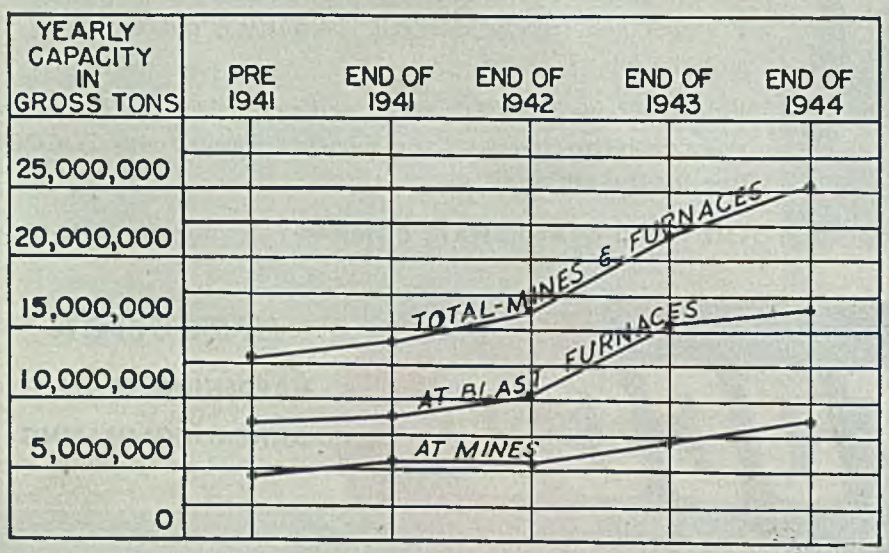
Cost of kiln without motors—$200,000.

Cost of plant without bins or tracks—$400,000.

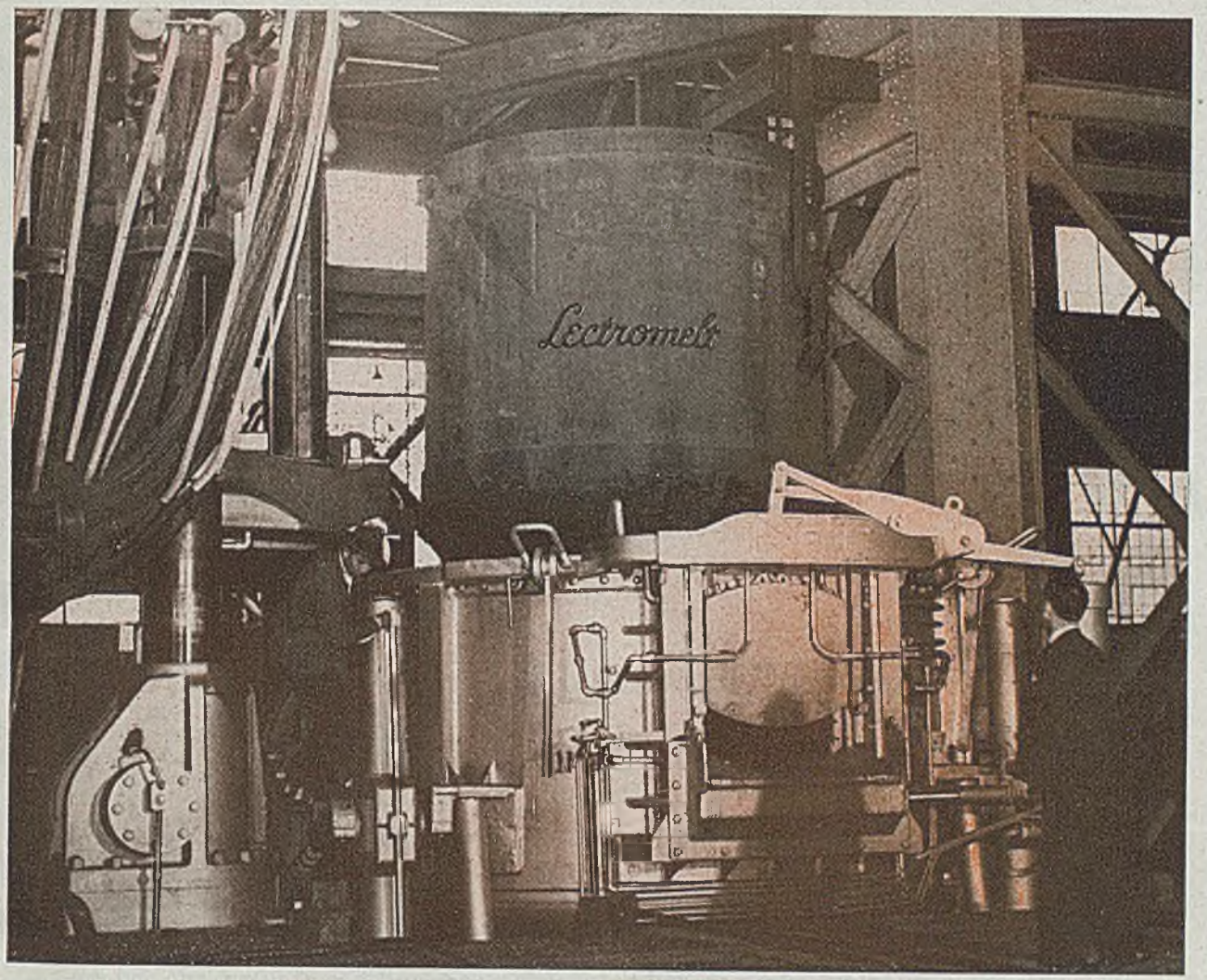
Heat required for nodulizing—2,250,-

[1] References presented at end of paper.

This paper was presented at the Sixth Annual Mining Symposium, University of Minnesota, Minneapolis, earlier this year.



Capacity of sintering plants installed in the United States



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LECTROMELT NT SPECIFICATIONS

(a) Usual acid steel hourly rating..... 10 tons

(b) Usual size of heat.....15 to 20 tons

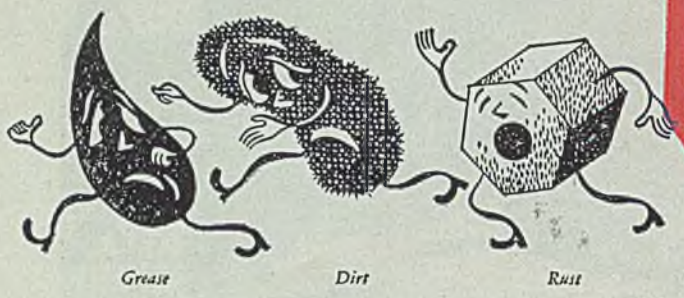
(c) Has poured in one heat.....40 tons

(d) Usual KVA rating.....6000 to 7500

(e) Shipping weight—furnace with electrical substation and control equipment (approximate).....NT 120 tons
N 105 tons

(f) Shipping weight —2 linings and 50 electrodes (approximate).....100 tons

(g) Volume data (e) 5000 cu. ft.
(f) 2500 cu. ft.



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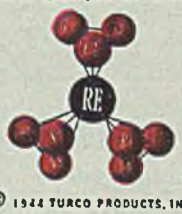

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000 to 2,500,000 Btu per ton of nodules.

The writer visited the modern kiln plant and the sintering plant of the Cuban-American Manganese Corp. in 1941, to see if such a plant could be used to agglomerate southern ore fines. The substance of the report submitted at that time is as follows:

The Cuban Mining Co., subsidiary of the Freeport Sulphur Co., is operating both nodulizing and sintering plants at its manganese mine near Cristo, Cuba. The product nodulized and sintered is manganese concentrates averaging 53 per cent manganese with the following screen analysis.

Mesh	Per cent
+ 65	13.53
100	25.69
150	12.09
200	15.36
−200	33.33

The moisture content of the concentrates is from 23 to 31 per cent.

The company originally agglomerated the concentrate by sintering but claimed that the operation was not satisfactory and that the costs were so high they were compelled to go to nodulizing in a rotary kiln.

The nodulizing plant is well constructed and is undoubtedly the most outstanding plant of its kind. They are making a product that is in fine physical condition and a good blast furnace material. The kiln has an overall length of 214 ft and is 8 ft 10 in. diameter at the feed end and 12 ft 4 in. at the control zone which is the heating portion of the kiln and is directly back of the sintering zone. The sintering zone section is the same diameter as the feed end and is only 14 ft long.

Unfortunately the capacity of this kiln is only 15 tons per hour and the initial cost was about $300,000. The temperature of the nodules as they were discharged from the kiln was 2700°F and the heat required was 3,550,000 Btu per ton. Fortunately the cost of fuel oil is only $0.04 per gallon. The overall cost of nodulizing was approximately double the sintering costs in the United States. The high value of the product permits operation under such conditions.

The Dwight-Lloyd sintering plant on the other hand, is of poor design and construction and means for necessary control over the feed, returns, and fuel are lacking. The method of feeding the sinter bed is poor. Grate bar openings are so small as to obstruct the free passage of air through the bed. As a result an excessive amount of coke is required and the machine must be operated at a low speed. The operating cost was three times higher than the kiln cost.

It appears that the first cost and the high operating cost prohibits the use of the kiln on southern ore concentrates. The Cuban Mining Co. spent a great deal of time and money developing the kiln before it became a satisfactory operation. We have a condition different from theirs and it would require some time to work out the problem of making a satisfactory nodule from our materials. It is my opinion that we are not justified in considering a nodulizing kiln for our operation.

Our inspection trip and general knowledge of other nodulizing kilns indicates conclusively that the first cost and operating cost are too high for our requirements and that not enough is to be gained from the smelting of nodules over the smelting of sinter to warrant the added cost.

An article, "Rotary Kilns for Agglomerating Ore", by Thyrre[2] claims many new developments in the use of the rotary kiln for agglomeration. With these new developments, according to the author, it would be possible, with minor modifications, to have a satisfactory operation with a plain cement kiln.

Another article, "Nodulizing of Iron Ore", given by Dr. Gilbert E. Seil[3] at the March, 1944, meeting of the Blast Furnace and Coke Association of the Chicago District, throws a little different aspect on rotary kiln operation. The author states that even today the kiln manufacturers do not agree as to the capacity of certain size kilns. Some of the theories expounded in this article have given many operators the impression that someone must eventually install a pilot kiln plant to verify or discredit some of the ambiguous information that has been published concerning rotary kilns and to provide complete information and operating data so that a true cost can be obtained.

Use of the rotary kiln should have consideration in the agglomeration of fine taconite concentrates for the following reasons:

1. Its ability to agglomerate fine materials into a satisfactory blast furnace material that can be handled without any appreciable breakage.
2. Its ability to agglomerate high moisture material.
3. Low power consumption.
4. All nodules discharged from the kiln are finished product, and no fines are produced if the kiln is or can be successfully operated.

Questions that must be answered before rotary kiln installations can be evaluated in comparison with other methods are:

1. The capital investment necessary for a plant that will produce 1000 gross tons per 24 hr day.
2. Details of all operating cost items based on actual data taken from a kiln plant operating on fine iron ore.
3. Percentage of operating time that can be expected from a kiln; i.e., hours per day, and days per month or per year.
4. Detail description and cost of all instruments necessary for kiln control.

A considerable amount of constructive work has been done in nodulizing iron ore with rotary kilns at some of the cement plants. Some answers to the many questions about rotary kiln operation have been developed at these plants, and, no doubt, will be reported to the industry in the near future.

Davis Agglomerating Process: This process for agglomerating fine ores developed at the Mines Experimental Station, has not been used commercially though a large scale experimental test was run April 1943. Operating and cost data that were recorded from the results of this run show great possibilities for making a preferred blast furnace material from fine ores. A limiting factor in this process, however, is that all the ore treated should be minus 100 mesh. Actually 80 per cent of that used in the test was minus 325 mesh.

A description of this test run and its results, taken from the published report and from a report submitted by the writer, after observing the operation of this process, is as follows:

The material used in this test run was very fine magnetic concentrates and was rolled into balls from ½ to 1½ in. diameter in a rotary drum. These balls were delivered by hand buggies to a shaft-type furnace where they were heated to an agglomerating temperature.

The Davis furnace was filled with

Table I—Cost of Briquetting Ore in Minnesota District

Moisture in natural ore, %	14
Moisture in dried ore, %	5
Natural ore/ton dried ore, tons	1.1
Water removed from 1 ton natural ore, lbs	202
Dried ore from 1 ton natural ore, lbs	2,000
Heat @ 232° F. leaving in moisture, B.t.u.	251,000
Heat leaving in dried ore, B.t.u.	49,500
Total heat to process, B.t.u.	300,500
Fuel efficiency of Drier, %	75
Powdered coal, B.t.u./lb	13,500
Fuel required/ton dried ore, lbs.	29.6
Cost of coal (drying ore with coal costing $7.63/ton), per ton net	$0.113
Fuel, 0.96 ton @ $0.113/ton ore	0.109
Labor 3/12 man hours @ $1.00/man hr	0.250
Repairs and supplies	0.060
Electricity 4 kw. hr. @ $0.005/kw. hr.	0.020
Miscellaneous expense	0.070
Total drying expense/ton of briquettes	$0.509
Natural ore 1.07 tons @ $2.75/ton	$2.945
Drying expense	0.509
Cement 64.5 lbs @ $0.00785/lb	0.506
Total cost of materials to briquetting machine	$3.960
Labor 5/12 man hrs @ $1.00	$0.417
Repairs and dies	0.063
Tools and supplies	0.020
Power	0.020
R.R. service	0.100
Other expense items	0.050
Total cost above materials	$0.670
Total cost of briquettes	$4.63

Table II—Estimated Cost of Sinter Produced at Mines

	Taconite	Mesabi Open Pit
Annual output, gt	1,000,000	1,000,000
Investment in mine, $	1,000,000	900,000
Mine operating cost, $	2.00	1.00
Preparation plant:		
Operating costs, $	1.46	0.10
Sintering Plant:		
Conversion loss, $	none	0.25
Operating cost, $	1.07	1.07
Cost of sinter		
64% Fe, $	4.53	
61.5% Fe, $		2.42
Transportation to Lake Erie ports, $	1.78	1.78
Cost Sinter Lake Erie Po ts, $	6.31	4.20
Cost per Unit, $	0.098	0.068

Table III—Cost of Sinter at Upper Lake Port and at Cleveland

Cost items	At Duluth		At Cleveland	
	Screened ore	Sintered fine ore	Screened ore	Sintered fine ore
Mining	$2.00	$2.00	$2.00	$2.00
Upper rail	0.81	0.81	0.81	0.81
Unloading dock to boat	....	....	0.11	0.11
Lake freight	....	....	0.77	0.77
Stockpile	....	....	0.09	0.09
Unloading at sinter plant	0.10	0.10	..	0.06
Screening	0.05	0.05	0.05	0.05
Cost of Ore for Sintering	$2.96	$2.96	$3.83	$3.89
Ore per ton sinter	$ ...	$3.65	$ ...	$4.80
Coke breeze	..	.35	...	.17
Fuel oil	....	.05	....	....
Coke oven gas	....	..	....	.02
All other	....	.35	...	.35
	$2.96	$4.40	$3.83	$5.34
Switching to ore docks	.05	.05	....	....
Unloading at docks	.11	.11	....	....
Lake freight	.77	.77	....	....
Unloading at lower dock	.09	.09	....	....
	$3.97	$5.42	$3.83	$5.34
Fe analysis, %	52.00	62.00	52.00	62.00
Cost per Fe unit, Lake Erie	$0.0763	$0.0874	$0.074	$0.086

hematite ore, minus 1 in. and plus ¼-in. Gas was applied to this material until the furnace and contents attained the desired temperature. The furnace was heated for approximately 10 hr before any of the concentrate balls were charged.

During the time required to heat the furnace the balling equipment was started so that all balling difficulties would be overcome and a supply of balls would be ready to follow the ore into furnace when it reached the proper temperature.

After a preliminary mixing, the ore was charged into a hopper from which it was conveyed to an Akins classifier employed as a screw conveyor. The classifier conveyed the material to a double shaft log washer, used as a pug mill, where moisture was added and mixed thoroughly with the concentrates. Due to the makeshift equipment and to the inexperience of the operators considerable time elapsed before satisfactory balls were made.

The log washer discharged into a revolving drum where the concentrate was formed into balls. Additional water was added in the balling drum and at times the balls made were of many different sizes, but when the proper amount of feed and water entered this balling drum, most of the balls made were between ½ and 1-in. diameter.

At the discharge end of the drum, the balls fell on a vibrating screen with ½-in. square openings. All balls minus ½-in. were returned to the drum and the large balls were picked off the screen by hand. All balls plus ½-in. and approximately minus 2 in. diameter were collected in steel buggies that delivered them to the furnace.

The ball size did not appear to be critical because, regardless of the size, the finished balls were all good. At one period during the test, several charges of balls the size of peas were charged and they passed through the furnace without any difficulty.

An excellent paper on agglomeration and a detailed description of this process was given by C. N. Firth at the April meeting of the AIME in Pittsburgh. This paper will be published in the near future so the merits, cost, and all other data will be available.

Briquetting: Molding or combining fine ore under pressure, called briquetting, was probably the first method of agglomeration used, but for economical or other reasons never became commercially important in the United States. Recently briquetting has been used for agglomerating fine ore for use as feed ore in the open hearth to replace lump ore. There are no commercial briquetting plants at the present time producing briquettes for blast furnace use.

Results that were obtained at several plants and available information is as follows:

In open-hearth practice, the prime idea in the use of feed ore is to accelerate the rate of carbon drop in the molten metal through the action of the oxygen contained in ore introduced into the bath of metal. Iron ores are the only commonly available substances through which oxygen can be conveniently carried into the molten metal.

Ores used as feed ores should be of substantial size, high in oxide of iron and of sufficient density to assure their sinking through the slag into the molten bath. Natural ores that are suitable for use as feed ores have not been available in sufficient quantities to meet open-hearth requirements so steel producers probed the possibilities of briquetting available ores of good chemical properties but physically unsuited for feed ore purposes.

One briquetting plant has been in operation for several years but most of the briquettes are used for charge ore and are made from ore fines that contain approximately 11 per cent moisture and 8 per cent silica. The briquettes are made on a bumper machine where a form is filled with ore and jolted until the ore is packed into a briquette 15 x 8 x 4 in. weighing approximately 90 lb. About 2½ per cent of cement is used as a binder. The cost of briquetting the ore is said to be about $1.05 per net ton.

The briquettes are stacked and dried and the drying time varies with the weather conditions but averages approximately 3 days.

Another company operated a briquetting plant but discontinued briquetting in December 1942 because of high operating cost which was given as $3.87 above the cost of the ore.

This plant was equipped with a tamping press and produced briquettes weighing about 70 lb each. Only about 1 per cent of cement was used for a binder. The ore used was difficult to handle into the press because of moisture and large lumps. The crude and inefficient raw material handling equipment was the cause of the high operating cost. The product was not uniform, which resulted in considerable breakage.

Another plant making small cubical briquettes, used a low silica Mesabi and 4 to 5 per cent of cement for a binder. The briquettes were used with entire satisfaction for both charge ore and feed ore, but the company has discontinued the operation because of the high operating cost.

Considerable interest has been shown in briquetting and experiments have been run using many different binders, also trying to air dry the products instead of furnace drying, but up to the present time few briquettes have been produced in this country for use in blast furnace.

The cost of briquetting has been estimated for a plant in the Minnesota district to produce 50,000 tons per year of briquettes to weigh approximately 7 lb. A tentative cost analysis is shown in Table I. To this cost must be added the transportation charges from the mines to Lake Erie and also depreciation, and capital expense.

Conclusions arrived at after a brief period of research on the suitability of briquettes for charge ore and feed ore purposes in basic open-hearth practice are:

1. With properly screened ore of suitable dryness, briquettes having a nominal cement content may be manufactured which will have stable physical qualities.

2. From the contacts we have been able to make with users of ore briquettes of any kind for either charge ore or feed ore, we have received no comments which indicate adverse metallurgical effects from the use of briquettes and the general opinion has been favorable to an extension of their use if the matter of economical briquetting cost can be achieved.

3. Shape of the briquette should eliminate all sharp corners to minimize breakage and should be such as to secure maximum density of loading.

4. Chemical analyses of certain fine ores briquetted may be found metallurgically superior to natural lump ore.

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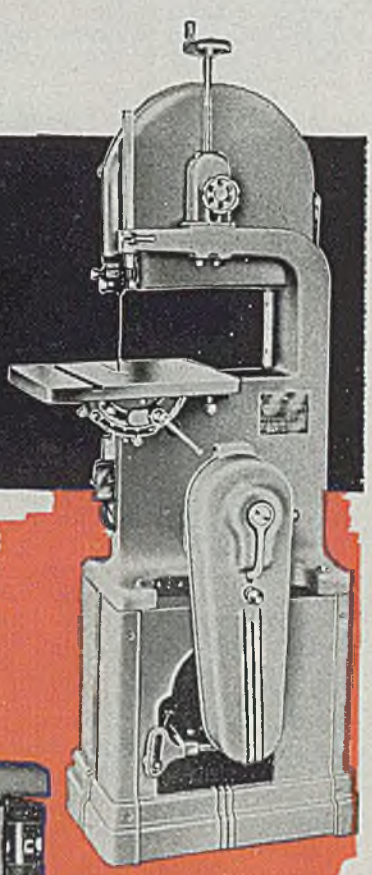
MACHINE TOOLS



Walker-Turner Light Machine Tools reduce your re-tooling problems to a minimum. Here's why:

(1) Quickly shifted from one operation to another.

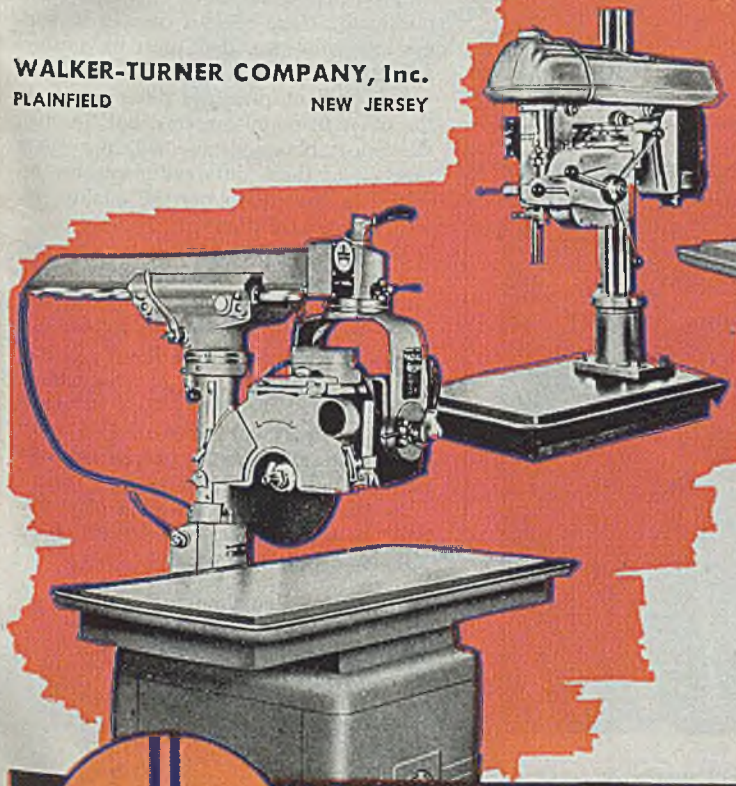
(2) Ideal for special tooling set-ups—precluding need for high-priced special machines of limited usage.

(3) Rugged, safe and simple to operate.

(4) Low in price and in power consumption.

Complete catalog on request.

WALKER-TURNER COMPANY, Inc.
PLAINFIELD NEW JERSEY



METAL CUT-OFF MACHINE
Universal head travels 18½" on gliding ram; patented, geared motor gets shaft closer to work, smaller blades.

$374.50 f.o.b. Plainfield, N. J.
With 2 or 3 H.P. Motor, less base.

20-INCH DRILL PRESS
Spindle speeds, 260-5200 r.p.m.; capacity, ¾" in steel, 1" in cast iron.

$255.00 less motor.

14" BAND SAW
Back-gearing and cone pulley gives high speeds for wood (up to 4630 s.f.m.), low speeds for metals (as low as 60 s.f.m.). Also made in 16" model.

$127.50 less base and motor.

RADIAL DRILL
Spindle speeds, 160-8300 r.p.m.; drills to center of 62" circle.

$352.50 less base and motor.

walker-Turner
COMPANY, INC.
PLAINFIELD, N.J.
U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

chemical advantages over natural lump ore, briquetting may be advantageous in open-hearth ingot costs.

6. Briquettes for use in the blast furnace have been produced only in small quantities and used experimentally, but there are indications that other tests will be conducted.

Sintering: The first sintering plant to treat fine iron ore was built in 1911 for the E & G Brooke Iron Co., Birdsboro, Pa. It replaced the roasters that had been used to desulphurize the magnetic ores from its French Creek mine. From this small plant that produced about 180 gross tons daily or 108,000 tons per year the sintering process for beneficiating fine iron ores has progressed so that now the sintering capacity of the United States is approximately 25,000,000 gross ton per year.

Increase in sintering capacity clearly demonstrates that sintering is the most satisfactory agglomerating process for treating fine ores that has been developed.

Development of sintering was not rapid. Most of the early installations built from 1912 to 1925, excepting those used to treat magnetic ores, were used to reclaim large stock piles of flue dust. The plants were small and inefficient. Mechanical delays and operating difficulties were tolerated only because the product would not blow out of the blast furnace and because sintering was the most economical agglomerating process that had been found.

Some of the difficulties encountered and results obtained from actual operating experiences, should reveal what can and cannot be accomplished in sintering fine taconite concentrates.

Sintering Blast Furnace Materials: The conventional blast furnace sintering plant, using flue dust, lake ores and coke breeze, cannot be compared in any respect with a sintering plant that is compelled to operate on fine concentrates and coke breeze or coal culm. A description of a typical blast furnace sintering plant's operations will show why this comparison cannot be made.

Raw materials used in this plant were fine Mesabi ores, screened minus ½-in.; flue dust, both dry and sludge; and, coke breeze screened minus 3/16-in. The coke breeze is used for carbon control in the sintering mixture and the percentage varies as the carbon content of the flue dust varies. Considerable difficulty resulted from irregular feeding of the sludge dust, but otherwise the sintering plant is of the conventional design which has not been appreciably changed in the last 20 years.

Size, Sintering Machine, ft	6 x 70¼
Grate bar area, sq ft	422
Production, gt	35,640
Tons/hour	49.5
Number of turns operated	90
Tons/8-hr turn	396
Tons/sq ft grate bar area	2.8
Practice from total materials charged, %	78.7
Fe content of sinter, %	62.2
Cost per unit of Fe, $	0.073

Raw Materials Used	Tons	Price, gt
Flue dust	11,110	$2.51
No. 1 ore	16,336	3.54
No. 2 ore	12,736	3.37
No. 3 ore	3,430	3.59
Coke breeze, nt	1,900	2.19
Total materials, gt	45,308 Avg	$3.20

Raw Material Mixture	Per cent
Ore minus ½-in.	71.7
Flue dust	24.5
Coke breeze	3.8
Cost of materials	$4.08
Cost above material	$0.45
Total cost of sinter per ton	$4.53

This plant has operated with a cost above materials charge of less than $0.50 for a number of years.

An experienced operating crew, given a mixture of 72 per cent screened Mesabi ore minus ½-in. with flue dust and coke breeze for fuel, should have no difficulty producing good sinter. This mixture of Mesabi ore, flue dust and coke therefore, does not present many operating difficulties.

Magnetic Concentrate Sintering: This process was developed by the operators who sintered magnetic concentrates, and to the time, thought and study spent by them in trying to improve sintering practice should be given most of the credit for advancing the sintering process to the position in ore beneficiation that it holds today.

At the present time 10 different plants are producing sinter from the magnetic concentrates of New York, New Jersey and Pennsylvania, with an annual capacity of approximately 7,000,000 tons, or 29 per cent of the total sintering capacity of the United States.

Magnetic concentrates produced at these plants differ both chemically and physically. The various degrees of fineness to which the ores must be crushed for concentration make the individual sintering plant practices differ one from the other in many respects, but the high efficiency obtained in sintering plant practice at these different plants has resulted in the production of quality sinter from all of them.

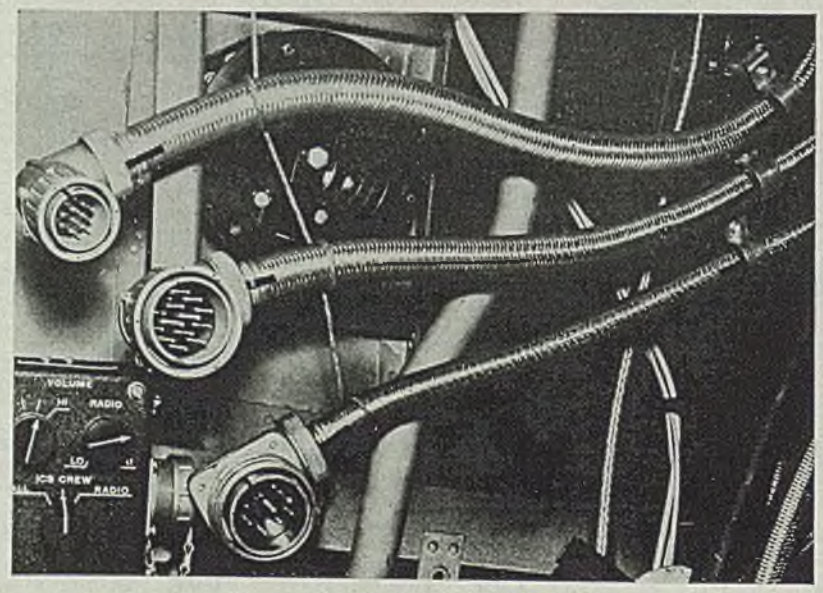
Sintering operations at these plants and description of some of the sintering problems which had to be solved will apply in general to the sintering of taconites; but since most of these problems apply to the sintering of concentrates with only 50 per cent minus 100 mesh material, they will be magnified when applied to the sintering of concentrates that are all minus 100 mesh.

In 1929 a modern sintering plant was built to sinter a fine concentrate of the following screen analysis:

Remaining on Screen No.	Per cent
10	7.01
20	4.70
30	5.18
40	2.96
60	14.75
80	4.35
100	5.44
Through 100	55.61

This plant was the most modern one ever built up to that time and is today one of the most outstanding sintering plants in the country. No expense was

(*Please turn to Page* 166)



CABLE FLOW: By following two painted indicating marks on each interconnecting cable for electronic equipment, installers at Glenn L. Martin Co., Baltimore, are able to locate the cable with respect to nearest structural clamp, thereby determining location of connector in the plane. Also, they can establish orientation of right-angle connectors to eliminate twisting and possible breaking of wires when cable is connected to equipment. Marks are applied before installation of any wires by means of a special jig. Thus, wire flow is established once and for all at assembly point

FOR 101 METAL CUTTING JOBS

WELLS NO. 8

Versatile

Here, in the Wells No. 8, is one of the most useful and versatile machines you can have in your shop. You will use your Wells for all types of cut-off work around the plant—in the stock and tool rooms and for maintenance.

It efficiently cuts bar stock, angles, square or round tubing—all types of metals. For production work, your Wells can be equipped with the new Wells Wet Cutting System for faster cutting and blade saving. Because it's portable, you can save time and labor by moving the saw to the work.

The gravity-feed and automatic shut-off make it possible for one man to operate two or more Wells saws simultaneously. Why not write today for full information?

Specifications

CAPACITY: Rectangular	8" x 16"
(Special Guides)	5" x 24"
ROUNDS:	8" Diameter
MOTOR:	½ H.P., A.C. or D.C.
SPEEDS:	Selective 60, 90, 130 feet per minute
WEIGHT:	Approximately 750 pounds

Wells Saws

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

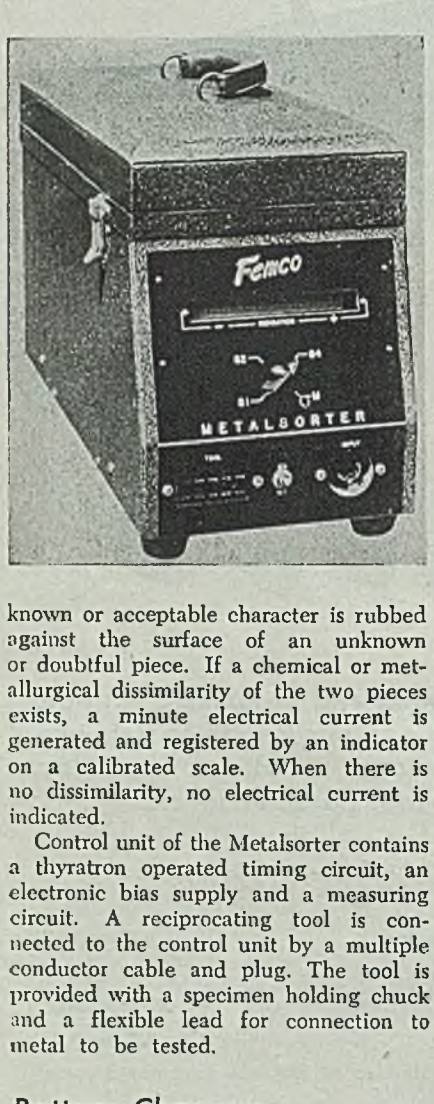
WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

INDUSTRIAL EQUIPMENT

Metal Identifying Unit

Known as the Femco Metalsorter, type AX, a new instrument that identifies and sorts pure metals, steels and nonferrous alloys is announced by Farmers Enginering & Mfg. Co., 210 Curtis street, Wilkinsburg, Pa. It is portable and requires no special electrical power supply and makes nondestructive tests on finished products.

The instrument uses the tribo-electric effect. A metallic specimen of standard,



known or acceptable character is rubbed against the surface of an unknown or doubtful piece. If a chemical or metallurgical dissimilarity of the two pieces exists, a minute electrical current is generated and registered by an indicator on a calibrated scale. When there is no dissimilarity, no electrical current is indicated.

Control unit of the Metalsorter contains a thyratron operated timing circuit, an electronic bias supply and a measuring circuit. A reciprocating tool is connected to the control unit by a multiple conductor cable and plug. The tool is provided with a specimen holding chuck and a flexible lead for connection to metal to be tested.

Battery Chargers

Two new battery chargers for motorized hand lift industrial trucks developed by Electric Products Co., Clarkstone road, Cleveland 12, are designed to enable the truck operator to charge his own batteries.

For charging just one battery at a time the E. P. single circuit charger is offered and for charging one to four batteries at a time the E. P. four circuit charger is available. Both chargers are easy to operate so that all the truck operator has to do when charging lead-acid batteries is to push in the connecting plug. When charging Edison batteries, he also sets a time clock.

Automatically, the charging current begins at the proper value; the charging current is controlled throughout the charge at rates established by the electric truck and battery industry; equipment shuts down in case of power failure;

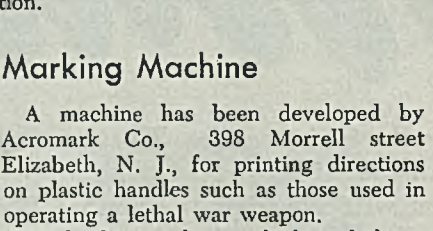
When power is restored, charging resumes; and charger shuts down completely when battery is charged fully.

No manual attention is required during the charge. This type of charging equipment has full automatic operation.

Marking Machine

A machine has been developed by Acromark Co., 398 Morrell street Elizabeth, N. J., for printing directions on plastic handles such as those used in operating a lethal war weapon.

With this machine, which includes a heat control unit and a heating head containing two cartridge units, which in turn heat an engraved steel die, mark is

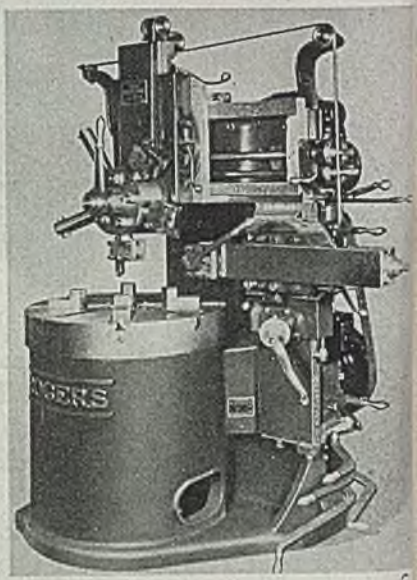


attractively and very readably applied at high temperature without breakage of brittle plastic handle. Automatic feed rolls carry concentrated white transfer tape through machine between die and part.

A special incline chute conveyer carries handles to a position in front of marking position where handles are fed either by hand or automatically with a slide action. For ejection of handles an airline is used. The unit is entirely motor driven and including air ejector, is adaptable to marking of cylindrical and tubular parts that require a prominent or attractive marking.

Vertical Turret Mill

The new vertical turret mill introduced by Rogers Machine Works Inc., 1807 Elmwood avenue, Buffalo 7, N. Y., is equipped with an adjustable five position main vertical turret that provides tool settings for boring, drilling, reaming, turning and thread cutting. Quick acting lever permits rapid indexing of turret head. Main stake has an adjustable swing up to 30° each side of vertical in addition to being adjustable left to right and up and down. Design of swivel side head permits setting at any angle up to 35° each side of horizontal. It is also adjustable up and down and left and right as well as being



designed for indexing to eight positions.

On production runs setups are easily duplicated by setting dials which are located at eye level for the operator. In addition the horizontal chuck is scribed to locate duplicating work. Output of finished work is further increased by motor driven rapid traverse.

Foot controls are accessible to the operator for rapid clutch and brake control and changeover of main drive speeds. Main gear box is enclosed and generated gears run in oil providing smooth operation and long gear life.

The unit may be equipped with a special coolant system which delivers two streams of coolant to the tool and work. The coolant is delivered to the point of operation by a self-contained and self-priming pump.

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

USED!..PROVED!!..PRAISED!!!

New form of "Fact-Power" works **RECONVERSION** wonders!

KARDEX converts **STOCK BALANCES** into **ACTION**... *without computation!*

PROVED in operation and praised by users* working under the stress of war production and reconversion!

THIS is the Graph-A-Matic Computing Chart — the revolutionary record-keeping idea that ends the need for time-costly computation and laborious analyzing to obtain positive stock control. Users report over-all operating economies ranging as high as 50%!

WITH the Computing Chart and Graph-A-Matic Signalling, stock control in the full meaning is accurate, certain and fast. And the "chart" idea is so simple, so flexible that the visible scales are re-set in seconds whenever conditions necessitate the establishment of a new reorder point.

TIME to reorder and to expedite, normal conditions, over-stocks and under-stocks — the needed and usable data supplied by Kardex "Fact-Power"—are seen clearly at a glance because they are *in uniform position.* The proper action is sure to be taken at the proper time!

GET FULL DETAILS. Management Controller No. 708 describes in full this proved-in-use stock control method, with illustrations and details on prominent installations. Available from our Systems Research Data File — at our nearest Branch Office or by mail from New York.

*Prominent companies whose names will be supplied on request.

SYSTEMS DIVISION

REMINGTON RAND

315 Fourth Avenue, New York 10, N. Y.

Multiple Borizing Setups

(*Concluded from Page* 109)

bore a 0.678-in. diameter and a 0.695-i counterbore in one chamber. For t second operation the trumpet is reverse the 0.678-in. diameter is finish bored 0.682-in. plus or minus 0.0001-in. a another 0.695-in. diameter counterbo is bored. The two sets of operations a of course, performed simultaneously two trumpets, as shown.

The 2-station fixture is attached to t machine table. In both stations t trumpets are located by spherical ada ters which are screwed on opposite en of each valve chamber. The front ada ters locate in fixed female adapter pla attached to the front section of the f ture. The rear adapters are located female adapters attached to sliding c inders operated by Q.C. locks for bo locating and clamping.

The rear locating and clamping me bers also provide out-board support the long, slender boring quills need for the long but small diameter ho that are bored.

Outboard support for the boring qu is needed when the ratio of length diameter of a hole exceeds the stabil factor, which may vary from 3:1 to 5 depending upon the type of work. Wit out such support, the quill is likely whip or vibrate under the cutting load.

Support Incorporated in Fixture

The method of providing such supp for a rotating quill has just been scribed. When the work is stationa it is simple enough.

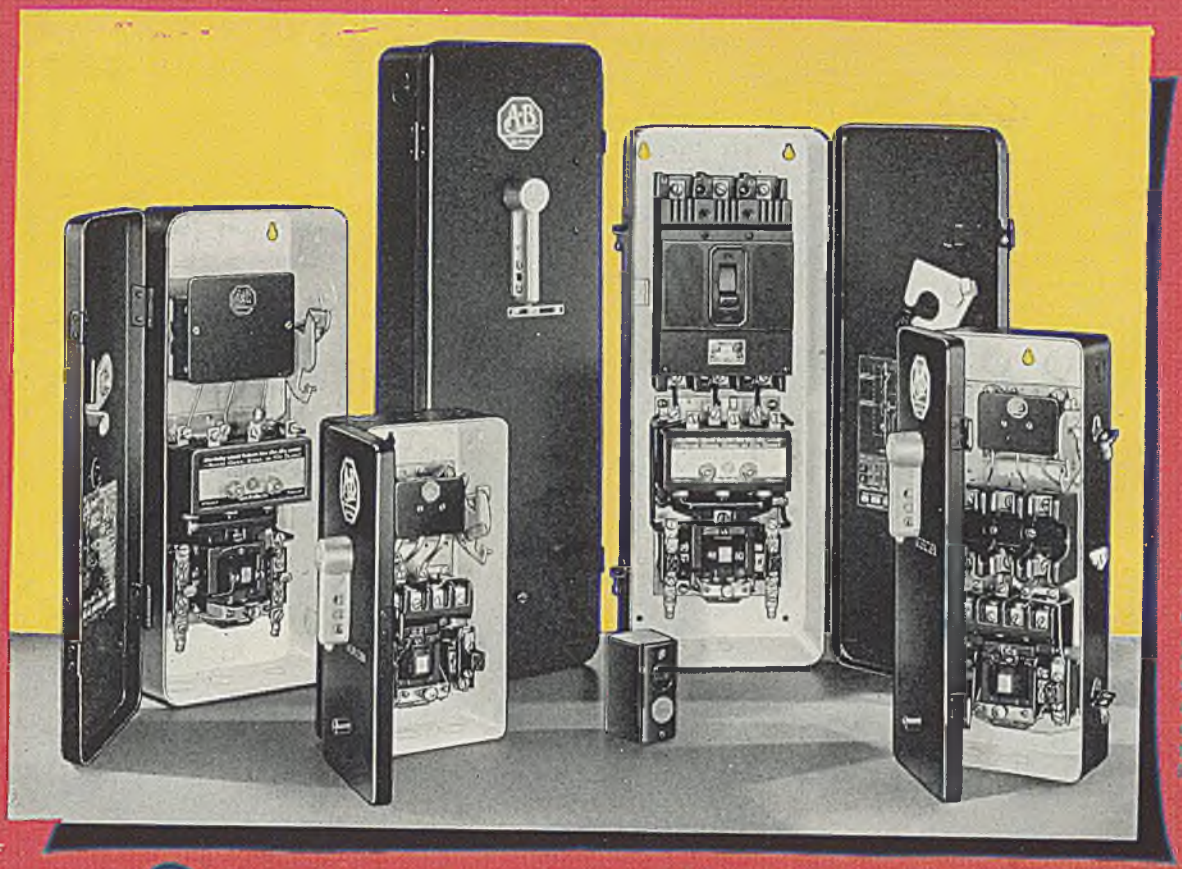
But when the tool is stationary and t work revolves it is necessary to inc porate the support for quills in the tating fixture.

The machine shown in Fig. 11 has t stations for handling two different si of impeller shafts. The job is to bo to close limits two bushings in line. reach the bushing farthest in requires long, slender boring bar which must supported.

Both fixtures are of the double d phragm type, air operated, with supp bushings for the boring bars built i the fixtures. Impeller shafts are locat in these fixtures at two points from outside diameter of a gear section a a spline section in the two diaphrag

To prevent tool drag lines, the fixt is arranged so that at the end of the b ing stroke, before reversal of the tab the work can be unclamped and mov away from the tools by means of a ha lever.

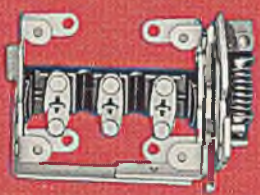
These setups and fixtures are, of cou not presented with the idea that any them can be used just as they are other jobs, but they show how typi borizing jobs have been set up to t maximum advantage of the versatility the method. The principles of tool and fixture design shown have wide plication to quite different kinds jobs, when accuracy at high product rates is desired.



Here is an A-B Combination Two Across-the-Line Starter for every service. Illustrated is the multiple-to-chute type of starter installation.

A Full Line of COMBINATION STARTERS

for Machine Tool Applications



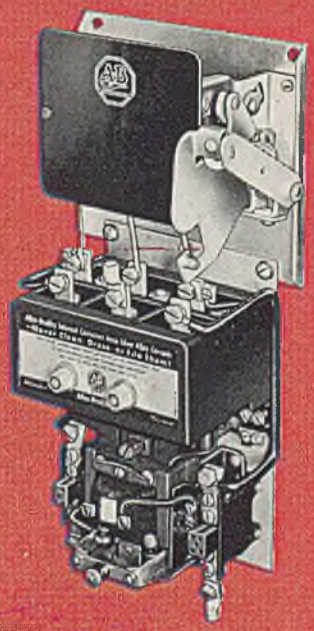
A-B Bimetal Switches have double break, silver alloy contacts. All built-in switch transfers are eliminated.

Can be supplied with step-down transformers for low voltage pilot control on 440, 550, and 600 v power lines.

Allen-Bradley Combination Starters consist of two units in a single cabinet—(1) an Allen-Bradley solenoid across-the-line starter and (2) a disconnect unit, which may be either a manually operated disconnect switch or a circuit-breaker. These starters are popular with machinery manufacturers, because they save space, they are easy to install, and they provide added safety features for the operator. Furthermore, they provide complete control with an improvement in the appearance over the separate units.

These starters are available up to 100 hp, 220 v; and 200 hp, 440-550-600 v, in seven types of enclosures which meet every service requirement. Disconnect lever is in front of cabinet, which permits close grouping of starters. Send for Bulletin 712-713.

Close-up of A-B Bulletin 712 Combination Starter. Disconnect switch is mechanically interlocked with disconnect lever so cabinet cannot be opened unless disconnect switch is in the "OFF" position.



A-B Quality

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

Solenoid plunger which drives the contactor arm

Plunger operating in the magnetic solenoid

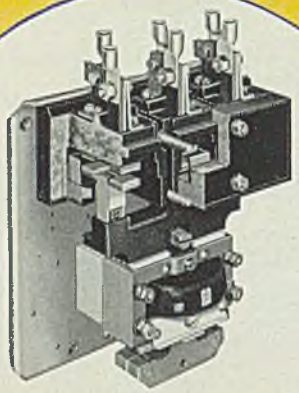
Switch open—plunger down—contacts open

Switch closed—plunger up—contacts closed

Side view of double break contacts

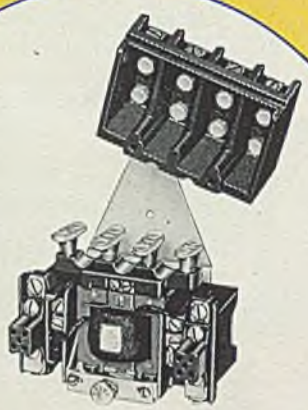
ONLY ONE MOVING PART

in ALL Allen-Bradley Solenoid Starters



Rating: 50 hp, 220 v; 100 hp, 440-550-600 v. Arc hood cut away to show double break contacts.

Rating: 15 hp, 220 v; 25 hp, 440-550-600 v. Cut away to show moving contacts on plunger.



Rating: 5 hp, 220 v; 7½ hp, 440-550-600 v. Arc hood lifted to show silver alloy contacts.

SIMPLICITY—The Keynote to Trouble-free Design

It is a fundamental fact that when you eliminate "parts" you eliminate "trouble"... when you do away with pivots, pins, bearings, flexible jumpers, and other gadgets in starters you do away with trouble-breeders.

Since the A-B solenoid starter has only ONE moving part . . . the one-piece solenoid plunger . . . it is the simplest starter on the market and therefore the most trouble-free.

Furthermore, the double break, silver alloy contacts never need filing, cleaning, or dressing. You can install an Allen-Bradley solenoid starter . . . and forget it.

Is it any wonder that A-B solenoid starters have set the standard for starter design and performance? Ask the machine tool manufacturers . . . more and more machine tools are A-B equipped. If you want trouble-free operation . . . just specify A-B.

Allen-Bradley solenoid across-the-line starters are available in five sizes and seven types of enclosures to meet all service requirements. White cabinet interiors make wiring easy in dark corners.

Allen-Bradley Company
1316 South Second Street
Milwaukee 4, Wisconsin

A-B Quality

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

Barmaking Facilities

(*Continued from Page* 111)

furnace of the recuperative type, with 33 x 52 ft effective hearth area, capable of heating 75 tons of steel per hour, with full automatic control and equipped for both oil and gas firing.

From the furnace the heated billets will move to a continuous mill with 18 stands — 8 roughing, 4 intermediate and 6 finishing stands. Alternate stands will have vertical rolls, to eliminate twisting of the bar between passes. The mill will have a delivery speed of 2400 fpm.

An up-and-down cut shear will be installed at the exit of the heating furnace, and a crop shear after No. 8 stand, to cut the leading end of the section, and any cobbles that may occur.

Following the last stand will be four pouring reels, two for coils of 40-in. outside and 25-in. inside diameter, and two for 49 and 33 1/3-in. coils. Depending upon the billet size from which they are rolled the coil will weigh up to 600 lb each. They will be discharged to a chain conveyor, transferred to a hook conveyor and carried to the coil storage building. The conveyors are designed to give the proper cooling in transit.

Bar Passes Flying Shear

When straight sections are produced, the bar, after leaving the last finishing stand, passes a flying shear where it will be cut into predetermined lengths before entering a 390-ft double, flat-type cooling bed, arranged for pack annealing and for cooling bars in spaced formation. The bed can be set to retard the cooling of steel subject to checking by hardening in air. Each half of the bed is 17 ft wide between center lines of hot run-in and cold run-out.

Cooling beds will extend into the finishing and shipping building, where the bars will be cut into lengths ranging from 3 to 62 ft, on two cold-bar shears equipped with back shear tables, gages, kickoffs, cradles, and tandem scales.

Two bays in the finishing building built for the 12-in. mill will be extended 375 and 250 ft respectively, and a third bay, 1125 ft long, will be added. Each bay is 105 ft wide. Round and flat straighteners, centerless grinders, roto-blast shot-cleaning equipment, and scales now located in existing 8, 10 and 12-in. mills will be installed in this building, which will have ample capacity to handle the entire output of both mills, finishing the products to the specifications demanded by the trade today. Equipment will also be installed for pickling coils and for annealing bars and coils.

Projected building additions to the Bar Division total 380,225 sq ft, bringing the total area of the division up to 784,350 sq ft, about 18 acres. All buildings will be of brick, steel, and asbestos-covered metal sheets.

Eleven new cranes will be installed, in

addition to the 11 now in use. Eighteen motors totaling 9900 hp will be required for the main mill drives. These will be housed in a separate, fully air-conditioned motor room. Other electrical installations include 425 auxiliary motors totaling 4500 hp, a 9000-hp motor-generator set, and a 1000-kw mercury arc rectifier. The rectifier will convert alternating current into direct current for the traveling cranes.

A roll and machine shop, 50 x 178 ft, will also be added to confine all roll grinding and repairs to one location.

Layout of the Bar Division has been made with the thought of eventually including in that location a new mill for sizes larger than the 12-in. mill range. For the present the larger sizes will be rolled on the existing 14-in. mill with some improvements. A separate motor-driven 18-in. stand will be installed in this mill, supplementing the original 14-in. stand at the end of the train. The purpose of this change is to permit rolling of large rounds, up to 5½ in. diameter, splice bars, and preformed sections.

A 180-ft extension will also be made to the finishing and shipping department of this mill. Some of the existing straightening equipment will be relocated and additional facilities will be provided for annealing and straightening in this modernizing process.

Announce New Flux for Low-Tin Solders

A new solder flux which is more effective and which can be used safely in such applications as electrical equipment and can manufacturing has been developed by Battelle Memorial Institute, Columbus, O.

Used experimentally by several war industries, the flux made possible the easy soldering of many metal combinations. Although the raw flux has an acid reaction, complete neutralization takes place at ordinary soldering temperatures.

Residue is noncorrosive, nonconductive to electricity, soluble in water, and nonhygroscopic, making the flux adaptable to a wide variety of uses in industrial soldering.

The flux is an organic mixture developed in an investigation sponsored by the Tin Research Institute. The investigation was initiated to disclose a flux which could be used successfully with low-tin solders now permitted by the WPB for general usage and, which could be employed in the electrical and can-making industries where zinc chloride or acid fluxes are not recommended.

Flux may be used in soldering copper, steel, silver, brass, various alloys, and various electroplated parts such as nickel-plate, silver-plate, and cadmium-plate. Whatever residue is left on the work may be removed readily by washing it off with water.

Atomic Energy

(*Continued from Page* 114)

ejection from the pile had to be handled by remote control and completely shielded. These fission products are extremely radioactive and include some 30 elements, among them radioactive xenon and radioactive iodine. They are released in considerable quantity when the slugs of reacted material are dissolved in the separation plant and must be disposed of through unusually high stacks at the first dissolving unit. It was also necessary to establish the fact that radioactive gasses mixing with the atmosphere would not endanger surrounding territory. Most of the other fission products could be retained in solution, but eventually required disposition, keeping in mind the possible danger of pollution of the Columbia River.

Even if the uranium were left in the pile until all the U-235 had undergone fission, there would still be a large amount (over 99%) of U-238 which had not been converted to plutonium. Actually the process is stopped long before this stage, presenting the problem of reclaiming the large amount of "spent" uranium which, as pointed out before, is not exactly cheap. Originally, there was no plan for recovery; the metal was merely to be stored, but later large-scale recovery methods were perfected.

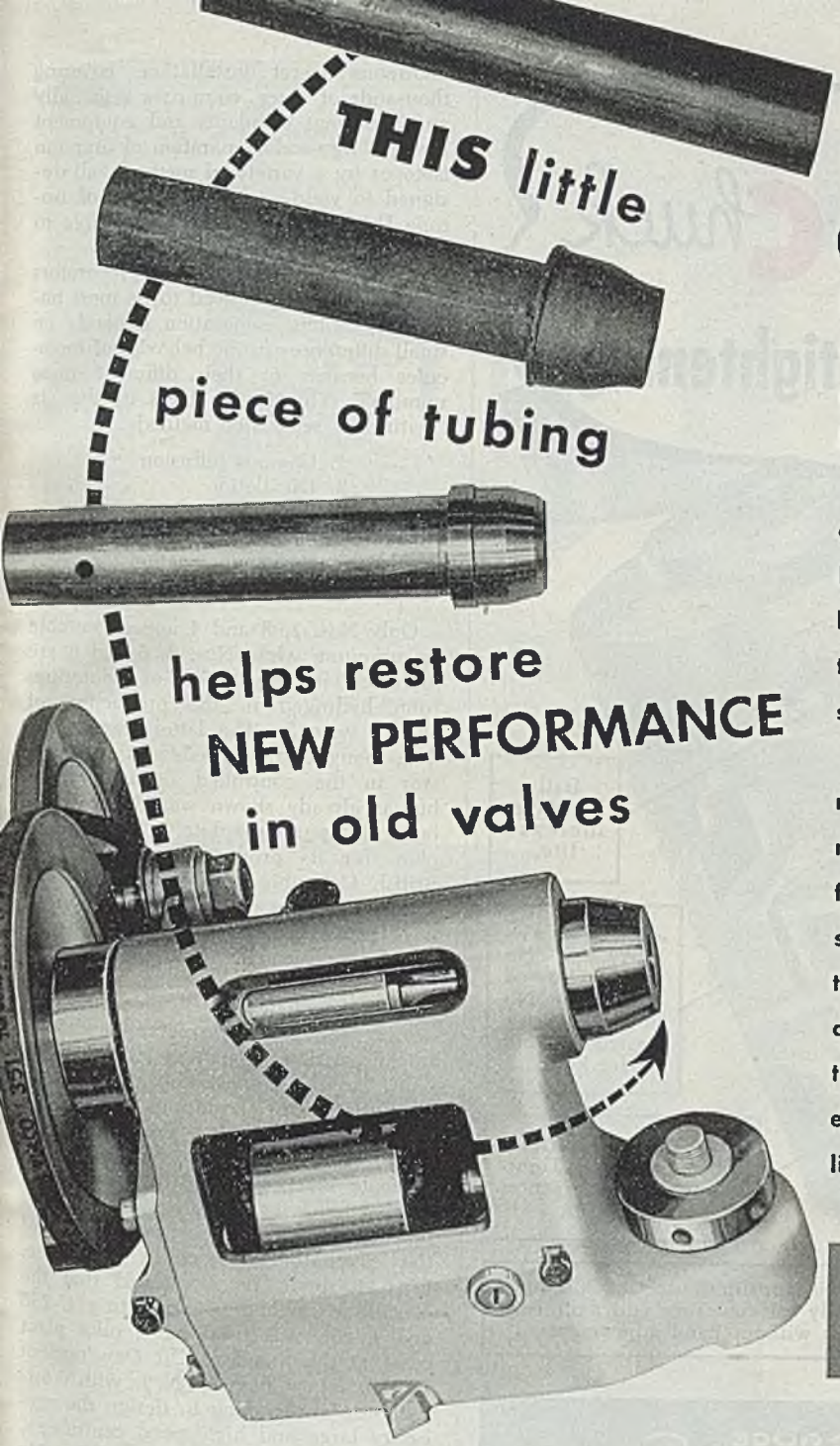
Unequal Fission Masses: Another word about fission products. When a U-235 nucleus undergoes fission, it emits one or more neutrons and splits into two fragments of comparable size and total mass 235 or less. Apparently fission into precisely equal masses rarely occurs, the most abundant fragments being one of mass number between 134 and 144 and one between 90 and 100. These two groups of products are isotopes of about 30 or so known elements and are unstable. Typically, they decay by successive beta emissions and gamma radiation to form known stable nuclei, supposedly barium and krypton.

The longer a pile is operated, the greater the concentration of these radioactive fission products which may have lives ranging from a few days to a few months; but on the other hand the greater the amount of plutonium concentration. Thus intermittent operation of the pile is necessary to avoid build-up of fission products, which further complicates the separation of plutonium because of its low concentration. Briefly the Hanford separation method is the "co-precipitation of small concentrations of one element along with a 'carrier' precipitate of some other element", to quote the scientists.

No figures have been given on cost of the Hanford project, but an estimate indicates something like $750 million.

A $2,000,000,000 Gamble: By far the larger proportion of the two-billion dollar gamble on the atomic bomb went into the Clinton Engineer Works at Oak Ridge, Tenn., where expenditures probably well exceeded $1 billion. This

THIS little piece of tubing helps restore NEW PERFORMANCE in old valves



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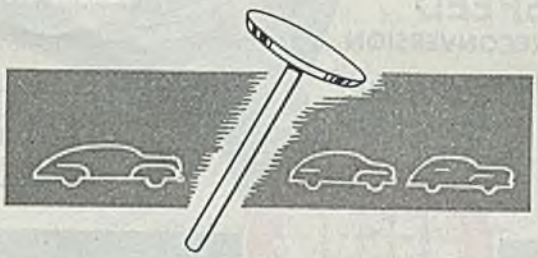

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enormous secret installation, covering thousands of acres, comprises essentially an assortment of plants and equipment for the large-scale separation of uranium isotopes by a variety of methods, all designed to yield usable quantities of isotope U-235, the one most susceptible to fission by thermal neutrons.

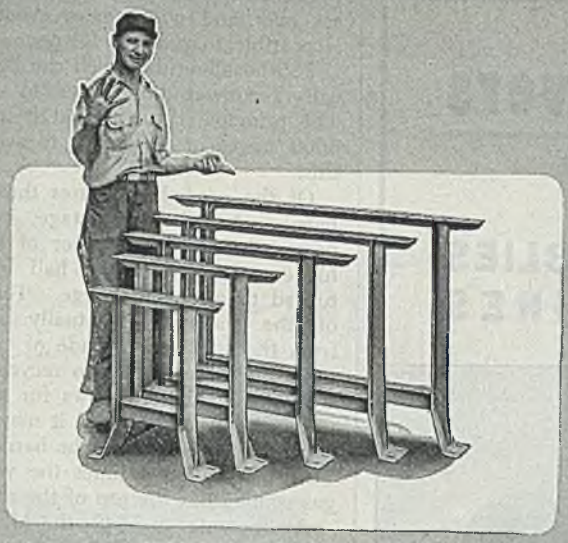
Except in electromagnetic separators (which eventually proved to be most important) isotope separation depends on small differences in the behavior of molecules because of their different mass numbers. This is the basis of the six "statistical" separation methods:

1. Gaseous diffusion
2. Distillation
3. Centrifugation
4. Thermal diffusion
5. Exchange reactions
6. Electrolysis

Only Nos. 1, 3 and 4 appear suitable for uranium, while Nos. 2, 5 and 6 are preferred for separation of deuterium from hydrogen in the production of "heavy water." The latter was at one time thought to be needed as a moderator in the controlled fission process, but as already shown was discarded in favor of pure graphite. However, a plant for its production was built in British Columbia and placed in operation. Heavy water actually still may have some undisclosed function in the atomic bomb itself. It is the combination of oxygen and deuterium, an isotope of atomic weight 2, or twice that of hydrogen, and present in natural hydrogen to the extent of 1 part in 5000.

All the above separation methods had been tried in laboratories with some success before 1940. Practical application of them was a technical matter of scale and cost as will be observed in the following discussion of installations at the Clinton Engineer Works of the Manhattan Project in Tennessee. First, it might be mentioned that the centrifuge method of separating U-235 and U-238 was tried on a pilot plant scale at the Standard Oil Development Co. laboratory, Bayway, N. J., with Westinghouse undertaking to design the necessary large and high-speed centrifuges. Although successful, the idea ultimately was abandoned.

Gaseous Diffusion: Principal efforts on isotope separation were concentrated on the gaseous diffusion method which is based on the multistage separation of the isotopes in the form of gaseous uranium hexafluorides by forcing them through thin, porous metallic "barriers," the lighter isotope diffusing through the barriers more rapidly than the heavier one at a rate inversely proportional to the square root of the molecular weight. When the hexafluoride gas is pumped into a chamber and allowed to diffuse through a porous barrier into an evacuated receiver, the first gas filtering into the receiver will be slightly enriched in isotope U-235, but only to a minute degree. If, then, this gas is removed before equilibrium conditions are established and recycled through more dif-



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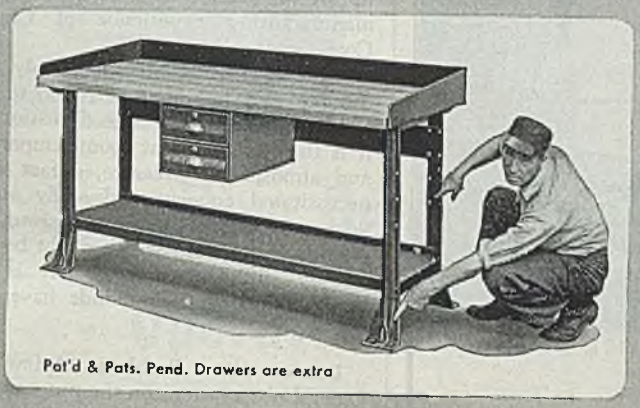

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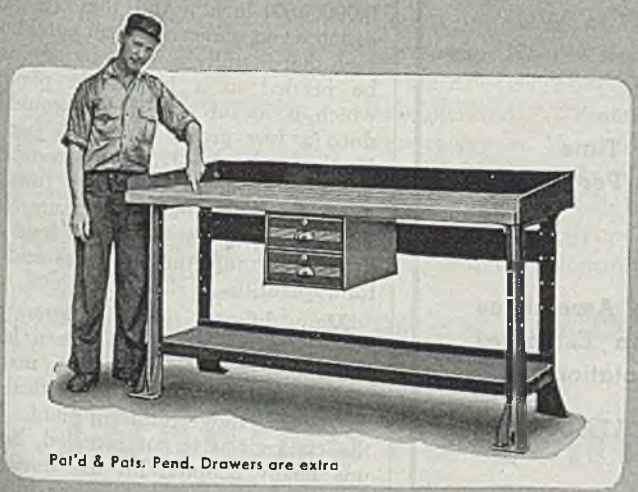

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fusion barriers, repeating the same process over and over again, eventually it is possible to produce 99 per cent pure U-235 hexafluoride which can be chemically reconverted to the solid uranium. The principal catch is that it may take 4000 stages or recyclings to accomplish this.

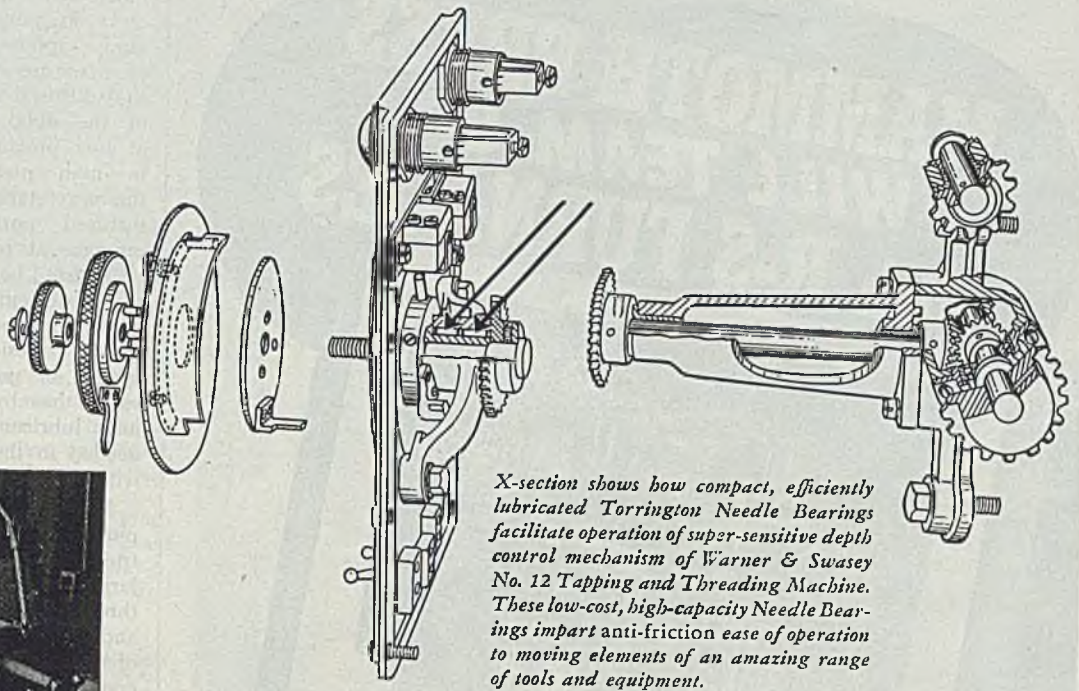
Of the gas which passes through the barrier at any given stage, only half passes through the barrier of the next higher stage, the other half being returned to an earlier stage. Thus, most of the material eventually emerging from the so-called cascade of successive diffusion stages has been recycled many times. Calculation shows for an actual uranium separation plant it may be necessary to force through the barrier of the first stage 100,000 times the volume of gas coming out the top of the cascade.

At any rate, in 1942, the M. W. Kellogg Co. was called in to work out a large-scale diffusion plant at Oak Ridge and the Kellex Corp., a subsidiary, was organized to carry out the undertaking. Large staffs of engineers plunged into the development, both in New York and in Detroit where the engineering and manufacturing experience of Chrysler Corp. was enlisted.

It was mentioned previously that uranium hexafluoride was found to be a suitable process gas. The difficulty with it is that it is solid at room temperature and atmospheric pressure, a fact which necessitated concentrated study on development of other suitable gaseous compounds of uranium which might be used in the diffusion process. It is safe to assume such compounds have been developed.

Barriers Are a Problem: A few more general observations on the process: Two principal bottlenecks were suitable barriers and pumps. One of the first types of laboratory barrier materials used was a thin sheet of silver-zinc alloy etched with hydrochloric acid so that it would have millions of almost microscopic holes, the largest of which would have diameter no larger 0.01 micron or 0.00000001-inch! And the rate of diffusion, even under optimum conditions is such that literally acres of barriers would be needed in a large-scale plant, by which is meant one which would produce a few grams of U-235 per day. Furthermore, the barrier material must be such as not to plug up from corrosion or buckle under a pressure "head" of 14.7 psi, and it must also lend itself to mass manufacture in large and uniform quantities.

Many different types of barrier materials were tried. Half a dozen laboratories contributed suggestions, many of which were tried out on a practical scale at the Oak Ridge diffusion plant. What the choice was is not revealed, but the one finally adopted for use during the past summer was far different from the one originally proposed. Just as in the case of developing a suitable method for "canning" the uranium slugs at the Hanford project, the perfection of a satisfactory barrier material was a last-



X-section shows how compact, efficiently lubricated Torrington Needle Bearings facilitate operation of super-sensitive depth control mechanism of Warner & Swasey No. 12 Tapping and Threading Machine. These low-cost, high-capacity Needle Bearings impart anti-friction *ease of operation to moving elements of an amazing range of tools and equipment.*

Sensitive Depth Control Mechanism Operates on Torrington Needle Bearings

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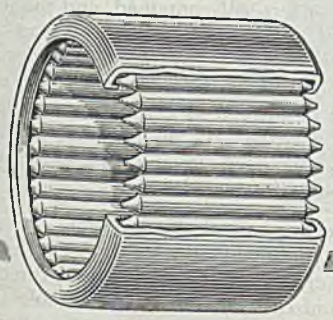

TORRINGTON NEEDLE BEARINGS

minute affair which ultimately proved much better than anticipated.

As to pumping requirements, thousands upon thousands in a variety of sizes are obviously essential. Since the diffused half of the gas in any of the 4000 stages of the system is at low pressure and must be pumped to high pressure before feeding to the next stage, and since even the undiffused portion at a given stage emerges at reduced pressure and must be boosted before being recycled, pumping requirements are multiplied over what might be thought necessary at first glance. Besides, the entire circulating system of pumps, barriers, piping and valves has to be vacuum tight, and if any lubricant or sealing medium is needed in the pumps it must not react with the process gas.

Assorted types of centrifugal blower pumps and reciprocating pumps were tried. In one of the pumps for the larger stages, the impeller is driven through a coupling containing a novel and ingenious type of seal. Another type of pump used is completely enclosed, its centrifugal impeller and rotor being run from outside by induction.

Huge Steam Plants: Steam requirements for the gas diffusion process are beyond anything hitherto experienced, necessitating construction of one of the largest steam power plants ever built at the Clinton site in the Tennessee valley. Operation of the diffusion plant was turned over to Carbide & Carbon Chemicals Corp. early in 1943.

An electromagnetic method for separation of uranium isotopes was worked out late in 1941 by E. O. Lawrence in the radiation laboratory of the University of California, using the large 37-in. cyclotron electromagnet there which was modified into a "calutron" mass separator. The method proved so successful, and so adaptable to large scale production, that it was quickly decided to construct a large plant at the Clinton site in which this separation method would be used. The beauty of the electromagnetic method was that it could be broken down into batch units, each more or less self-contained, and the number of units limited only by cost and the extent of U-235 production desired. Furthermore, design of succeeding units could be altered as fast as improvements were discovered, a flexibility not so easily achieved in the multistage continuous diffusion plant.

Electromagnetic Separation: The electromagnetic method involves the ionization (charging) of uranium gas, directing the ionized beam through a suitable aperture, accelerating its energy of motion by an intense electric field, passing the beam through a second aperture and into a powerful magnetic field. Here the ions are pulled into semicircular paths with radii proportional to the momenta of the ions. This means the lighter ions (of U-235 isotope) will travel in smaller semicircular arcs than do the heavier ions (of U-238 isotope). By proper set-

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ting of a separator and collector, the U-235 ions can be effectively isolated and subsequently reduced to the metal. See accompanying diagram, p. 113.

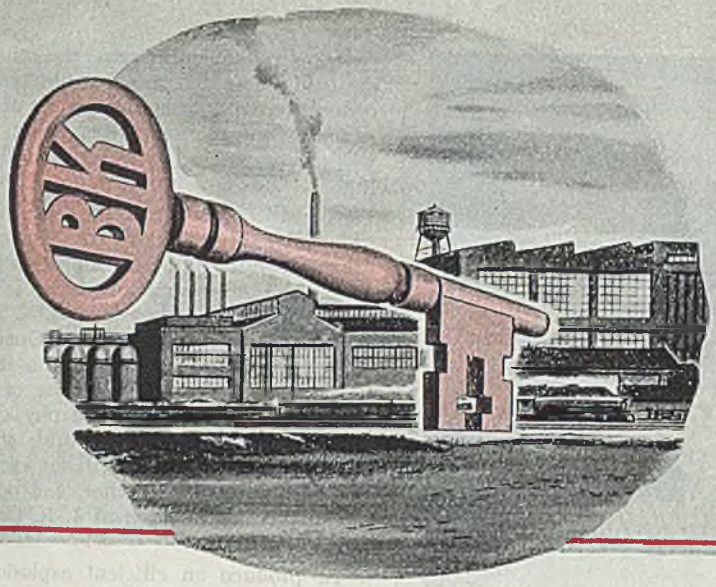
Construction of the electromagnetic plant was authorized late in 1942. Stone & Webster was asked to engineer it; Westinghouse, General Electric and Allis-Chalmers were to build the principal equipment; Tennessee Eastman Co. was to operate the completed plant. While theoretically it was believed possible to effect a separation in a single stage, it was found the yield would be so small that several stages of electromagnetic separation were preferable. For testing and training purposes, six electromagnetic prototype units were built at the University of California in Berkely, Calif., well in advance of the completion of the first unit in Tennessee.

In designing the plant units, many decisions had to be made, some of them necessarily being only shrewd guesses in the absence of sufficient supporting test data. Among these points to be considered were the following: Size of a unit as determined by the radius of curvature of the ion path, length of the source slit, and arrangement of sources and receivers; maximum intensity of magnetic field required; whether or not to use large divergence of ion beams; number of ion sources (electric arcs) and receivers per unit; whether the source should be at high potential or at ground potential; number of accelerating electrodes and maximum potentials to be applied; power requirements for arcs, accelerating voltages, pumps, etc.; pumping requirements; number of units per magnet pole gap, and number of units per building.

The electromagnetic plant was in operation by November, 1943, and for nearly a year was the only one operating, making the urge to increase its production rate tremendous. It was at once realized that any method of enriching the material fed into the plant would increase the production rate appreciably. So it was decided to resort to a thermal diffusion method of separating the uranium isotopes in a liquid compound of uranium as a means of supplying the electromagnetic plant a material of higher U-235 concentration.

The thermal diffusion process had been worked out at the Naval Research Laboratory; its principal drawback was enormous steam requirements. Nevertheless such a plant was rushed to completion at the Clinton site, using steam from the power plant built to supply the gaseous diffusion plant. It succeeded in its purpose of accelerating production by the magnetic method but, with the start of operations at the gaseous diffusion plant, steam supply was so reduced as to make difficult the functioning of the thermal diffusion plant.

Separation By Thermal Diffusion: The theory of thermal diffusion is briefly: In a chamber where a temperature gradient is maintained between the center and the outside there is a tendency for one of two isotopes contained therein to con-



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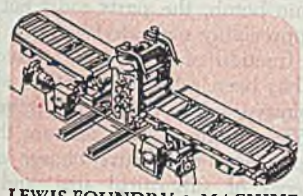

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centrate at the hotter area, the other at the colder area. It was first observed in connection with gaseous mixtures of two isotopes, but the separation effect later was found to apply equally well to liquids.

Now to the atomic bomb itself, where unfortunately the cloak of secrecy is drawn a little tighter. In November, 1942, the site for an atomic bomb laboratory was chosen, at Los Alamos, N. Mex., about 20 miles from Santa Fe. Once the site of a small boarding school, it has been transformed in the space of two years into the best-equipped physics research laboratory in the world, staffed by a galaxy of the most brilliant scientific stars ever brought together, and operating under the direction of J. R. Oppenheimer.

To produce an efficient explosion in an atomic bomb, the parts must not become appreciably separated before a substantial fraction of the available nuclear energy has been released; in other words the explosive fission of a small fragment of U-235, plutonium or a mixture thereof, might blow the entire charge apart into pieces of subcritical size, and the chain reaction described earlier in this text would be terminated.

Stated differently, the efficiency of the atomic bomb depends on the ratio of (1) the speed with which neutrons generated by the first fissions get into other nuclei and produce further fission, and (2) the speed with which the bomb flies apart. It was possible to estimate the order of magnitude of the time interval between the beginning and end of the nuclear chain reaction, which was proved to be extraordinarily brief—this fact being the source of nearly all the technical difficulties of the project.

The first determination to be made was the critical size of a charge of U-235 plutonium which would undergo automatic fission. From work with the uranium-graphite pile, it was known that this critical size could be reduced considerably by surrounding the metal with a graphite envelope which would reflect neutrons back to the interior. Such an envelope, called a tamper, has the added value in a bomb of delaying the expansion of fragmentation of the reacting material. It makes for a longer lasting more energetic and efficient explosion.

Chain Reaction Hinges on Critical Size: It is impossible to prevent a chain reaction from occurring when the size of the fissionable material exceeds the critical size. For there are always enough neutrons (from cosmic rays in the atmosphere, from spontaneous fission reactions, or from alpha-particle-induced reactions in impurities) to initiate the chain. Hence, until the moment of detonation, the bomb must comprise a number of separate elements, perhaps two or three, each of subcritical size by virtue of small weight or unfavorable shape. To produce detonation all that is necessary is to bring these components together, and with all possible speed to avoid predetonation.

The obvious method of bringing the

components together surely and rapidly was with the aid of a charge of powder timed to explode at just the proper moment and drive a projectile mass of the U-235 against a target mass of the material, initiating explosive fission. Beyond this, there is little that can be said about detonation.

While the Los Alamos laboratory drew most popular attention as the site of the first experimental bomb dropping on July 16, 1945, its experimental nuclear physics division has delved into scores of problems of pertinent scientific interest which were calculated as having a bearing on the final development of the bomb itself. Whether or not they did, at least valuable contributions have been made to the store of knowledge on the subject of nuclear physics which can be readily integrated with the findings of the other laboratories and plants. Other divisions of the laboratory include theoretical physics, chemistry and metallurgy, ordnance, explosives, and bomb physics.

The use of the first atomic bombs against the Japanese, their results in terms of intensity and widespread destruction are now well known. The scores of scientists who have spent the past 4 years enclosed virtually in a military vacuum are now chafing at restrictions. They want to get back out in the open, to exchange ideas and reports freely and openly, to see that credit is given where credit is due. One of them is quoted as saying that if the Army does not soon relent its pressure, the physicists will wash their hands of the whole affair and set out on a new study of the color of butterflies. Who can say their irritability is not justified?

No better summary of the breathtaking development can be given than the comment of Dr. Smyth in his report:

A weapon has been developed that is potentially destructive beyond the wildest nightmares of the imagination; a weapon so ideally suited to sudden unannounced attack that a country's major cities might be destroyed overnight by an ostensibly friendly power (providing of course said country did not have a few atomic bombs of its own which it could release the next day on the cities of the "ostensibly friendly power," the result then being merely extermination of civilization.—Ed.).

This weapon has been created not by the devilish inspiration of some warped genius but by the arduous labor of thousands of normal men and women working for the safety of their country. Many of the principles that have been used were well known to the international scientific world in 1940. To develop the necessary industrial processes from these principles has been costly in time, effort and money, but the processes selected for serious effort have worked and several not chosen probably could be made to work.

Before the surrender of Germany there was always a chance (many say now a certainty) German scientists and engineers might be developing atomic bombs which would be sufficiently ef-

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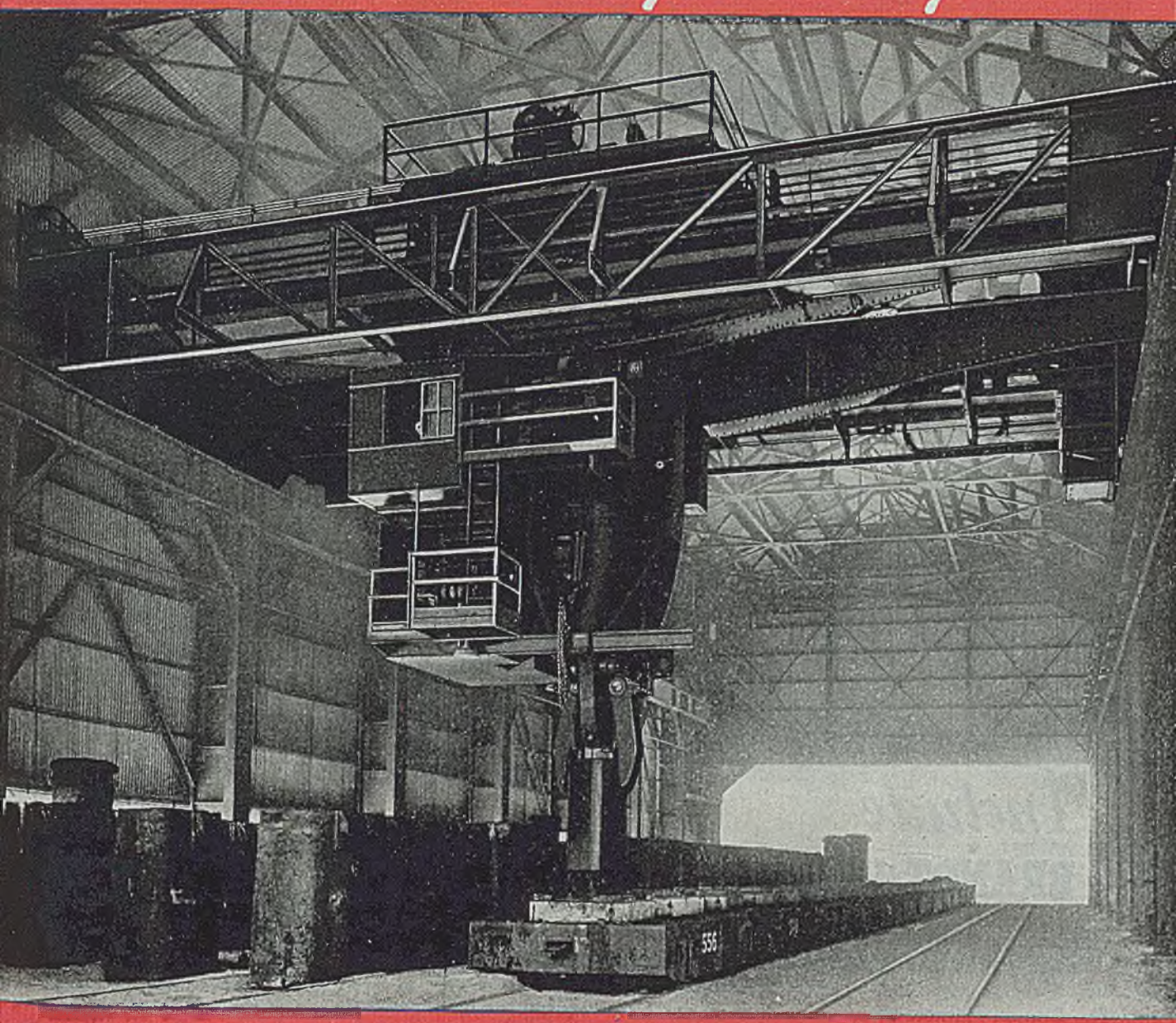

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The Stripper as illustrated will perform three distinct stripping operations without change in the stripping unit.

(1) Strip small-end-up or standard ingots.
(2) Strip big-end-up hot top ingots.
(3) Break small-end-up ingots loose from stools.

With this type of Stripper it is possible to strip a mixed heat without lost time.

Additional Morgan equipment in this plant includes: Two 300-Ton, 65'0" Span Pouring Cranes. Three 150-Ton, 65'0" Span Pouring Cranes. Two 150-Ton, 80'3" Span Hot Metal Charging Cranes.

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fective to alter the course of the war. There was therefore no choice but to work on them in this country. Initially many scientists could and did hope that some principle would emerge which would prove atomic bombs inherently impossible. This hope has faded gradually, and fortunately in the same period the magnitude of the necessary industrial effort has been demonstrated so that the fear of German success weakened even before the end came.

As to the future, concludes Dr. Smyth, one may guess that technical developments will take place along two lines. From the military point of view it is reasonably certain there will be improvements both in the processes of producing fissionable material and in its use. It is conceivable totally different methods may be discovered for converting matter into energy since the energy released in uranium fission corresponds to the utilization of only about 0.1 per cent of its mass. Should a scheme be devised for converting to energy even as much as a few per cent of the matter of some common material, civilization would have the means to commit suicide at will.

The committee of scientists appointed by General Groves to examine possible peacetime uses of nuclear energy for power and radioactive by-products for scientific, medical and industrial purposes, was in general agreement that a great industry might eventually arise, comparable perhaps to the electronics industry, but it found no agreement on how rapidly such an industry would grow, consensus being that growth would be slow over a period of many years.

At least there seems no immediate prospect of running automobiles with nuclear power or lighting houses with radioactive lamps, although there is good probability nuclear power for special purposes could be developed within 10 years and plentiful supplies of radioactive materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases in a similar period.

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In order to insure the safe shipment over long distances of airplane replacement cylinders for Pratt & Whitney engines, a special container was designed by General Box Co., Chicago.

The first step in packing was to bolt cylinders securely to the plywood platform base of the packing frame. In this manner, the container gave full protection against shifting and hence eliminated much of the danger of damage in transit. Next, four thicknesses of corrugated board were wrapped tightly around the frame and taped in place. This unit was slipped into a strong corrugated box. The flaps were sealed and then, to complete the job, a waterproof, asphaltum-impregnated liner was used, enclosing the entire unit.

Die Casting Methods

(*Concluded from Page* 115)

at least, the race was a close one. The ventilating system for magnesium casting, if any, was inadequate, and the plant personnel was said to suffer a great deal from fluxing fumes and SO_2 gas. Furnace equipment seemed to be excellent especially the new reverberatory electric furnaces.

"Go to Mahle, if you want to see the best German die casting," was the story frequently heard in Germany. This investigator agrees that Mahle was the best plant he saw, but not all the German plants could be investigated because some were blown up and some were located "out of bounds." Mahle made spectacular castings in size, complicity and thin sections, with comparatively small gates and vents. Further X-ray and other laboratory study may be desirable to fully assess their work. As to the process employed, a general statement can be made that it is inferior to American and British and that quality control is haphazard. Apparently they had nothing new in die casting alloys or die steel, nor did Germany go in for pressure die casting on a scale so large as America and Great Britain. The general term of "die casting" as has been pointed out by other commentators on the German casting industry precludes permanent mold casting and so may offer some difficulty to those who study German specifications.

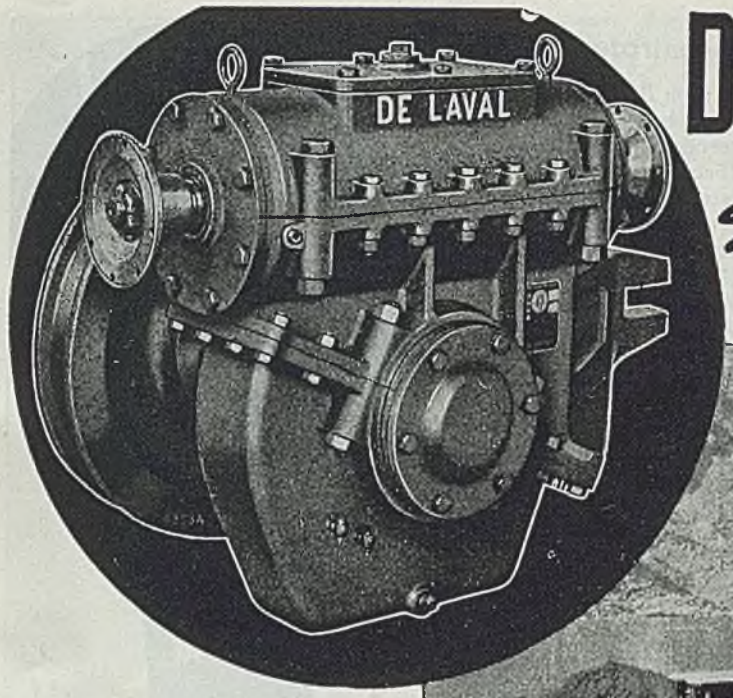
The main point is the Germans "had nothing on us," and, therefore, whatever comfort such a negative report may give, may be enjoyed to the fullest.

Hole-Cutting Kit for Many Materials Available

A new kit for cutting holes of various diameters in wood, metal, or plastics is available with straight shanks for use in drill presses, pneumatic and portable electric drills. Kit No. 790, produced by Bruno Tools, Beverly Hills, Calif., contains one model No. 100 adjustable hole cutter with ¼-in. shank for cutting holes ⅝ to 1¼-in. and one model No. 101 with ⅜-in. shank that cuts holes 1 to 2½ in. Tools are equipped with high speed steel blades with all-purpose grind for cutting wood, metal, transite, masonite, and other materials.

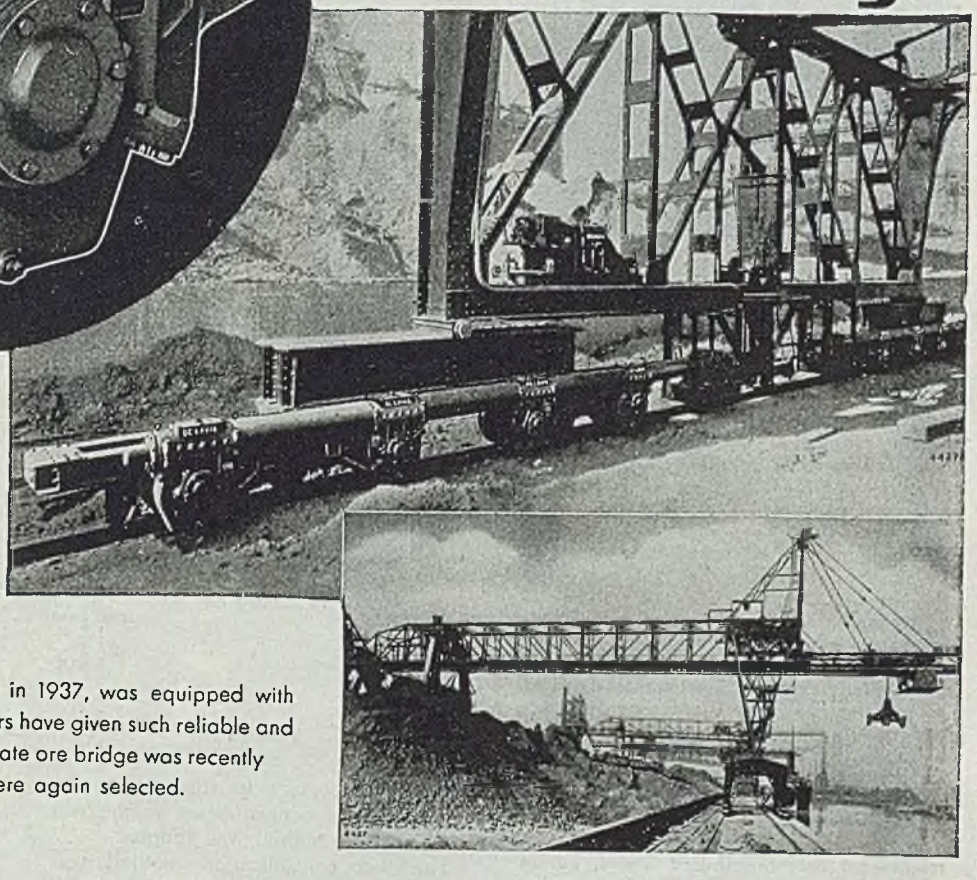
Diagnosing Power Plants

A diagnosis chart for determining the efficiency of fuel oil fired boilers and diesel engines provides a means for detailed investigation of oil burning problems in industrial installations. This service, in the form of a small folder, is available from Combustion Utilities Corp., 1451 Broadway, New York 18, manufacturer of Kleen-Flo diesel and fuel oil conditioners.



DE LAVAL GEARS *Specified for* Second Ore Bridge

This 10-ton ore bridge is propelled along the waterfront by four 33-h.p. motors driving the individual traction wheels through 32 De Laval 40-ratio Worm Gears. There are also two 8½-h.p. motors operating clamping drives through De Laval 24½-ratio Worm Gears.



The ore bridge here illustrated, built in 1937, was equipped with *DE LAVAL WORM GEARS*. These gears have given such reliable and excellent service, that when a duplicate ore bridge was recently ordered De Laval gears were again selected.

DE LAVAL gears are widely used on blast furnace and steel mill equipment, including billet pushers, catcher tables for three-high mills, coal crushers, cooling table transfers, crane trolleys, draw benches, edging rolls, fan drives, furnace door lifters, hot beds, heavy-duty roll lathes, ingot buggy drives, manipulator tables, piler tables, plate shears, roll grinders, screw-downs, steel wire fabricating machines, straighteners, up-cut bloom shears, etc.

De Laval worms and gears are supplied either separately or complete with bearings and casings. Our engineers will gladly assist in solving transmission problems.

Ask for Publication W-1135.

DE LAVAL WORM GEAR DIVISION

of the De Laval Steam Turbine Co., Trenton, N. J.

MANUFACTURERS OF TURBINES . . . STEAM, HYDRAULIC; PUMPS . . . CENTRIFUGAL, PROPELLER, ROTARY DISPLACEMENT, MOTOR-MOUNTED, MIXED-FLOW, CLOGLESS, SELF-PRIMING; CENTRIFUGAL BLOWERS and COMPRESSORS; GEARS . . . WORM, HELICAL; and FLEXIBLE COUPLINGS

Taconite Concentrates

(*Continued from Page* 138)

spared on this plant, but many changes in design were necessary before it operated properly because the difficulties that are encountered sintering fine concentrates were under-rated when it was originally designed.

The plant has two Dwight Lloyd continuous-type sintering machines, 72 in. wide, and 83 ft long. Each machine with 500 sq ft of grate bar area is rated at 100 gross tons or 3 gross tons per sq ft of grate bar area per 24 hr day. Rated capacity never was attained until other materials were added to the sintering mixture that increased porosity of sintering machine bed.

A representative cost sheet on this material in normal times is as follows:

Production, gt	41,470
Days operated,	30
Tons per day,	1382
Tons per sq ft grate bar area	1.38
Total material cost, net	$2.91
Cost above materials	0.85
Total cost	$3.76

Another plant on magnetic concentrates, concentrated by the dry method, operated for years satisfactorily and produced sinter that was considered the best quality for blast furnace use in the country. The screen analysis of the dry concentrates was:

Screen No.	Remaining on Per cent
10	1.2
20	27.3
35	0.315
65	0.193
100	6.6
200	7.4
Through 200	6.7

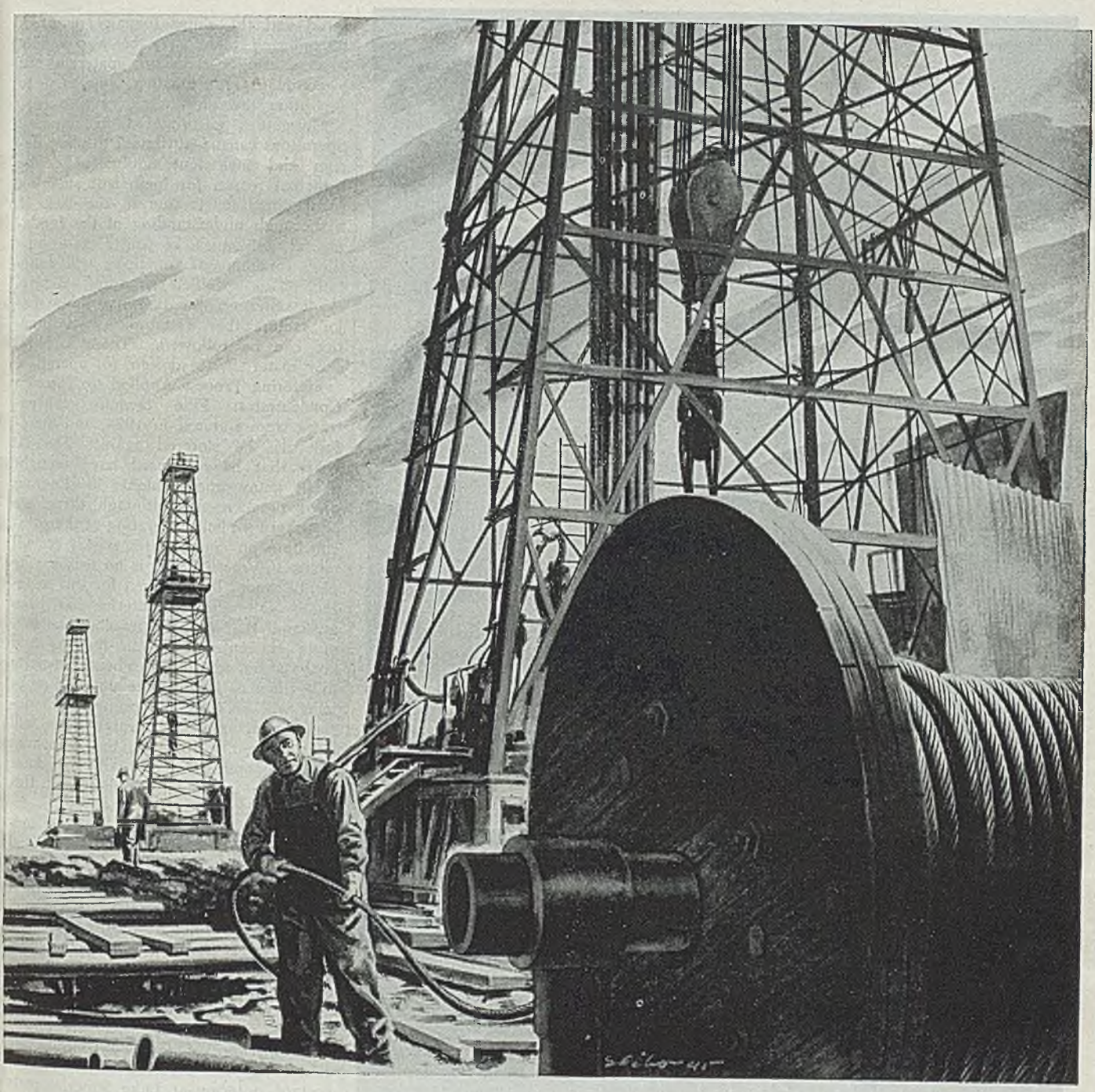
It was necessary to discontinue the dry method of concentration so the wet concentration method was adopted.

The wet concentration method was designed to produce a concentrate all minus 35 mesh and this product was to be sintered in the plant that had been producing quality sinter on dry concentrates. No provisions or changes were made in the sintering equipment or flow sheets, therefore the sintering results obtained on dry concentrates, minus 10 mesh and only 14 per cent minus 100 mesh, can be compared with the results on wet concentrates all minus 35 mesh and 62 per cent minus 100 mesh.

The sintering plant operation for the month preceding the starting of the wet concentration plant and the second complete month after the wet concentration method was adopted have been taken as a comparison.

	Concentrates—Dry	Concentrates—Wet
Production, gt	28,195	19,232
Concentrates, gt	27,888	91,929
Coal culm, nt	1,713	1,603
Days operated	24	27
Crew hr operated	196	632
Tons per crew hr	143.9	30.4
Pans turns oper.	121.5	201
Tons per turn	232.1	95.3
Cost above materials	$0.40	$1.02

This example of sintering plant operation is given to illustrate that the design of a sintering plant is governed by the raw materials that are to be sin-



Preformed wire rope

SAVES MONEY 3 WAYS

Are you looking for new ways to cut your production costs? Then follow the lead of successful operators, in every industry, who use Preformed wire rope. Their records prove that it saves money. First, because it lasts longer. This results from Preformed's ability to resist bending fatigue. Second, it saves money because it withstands heavy shock loads and thus helps avoid costly shut-downs. Third, Preformed spools better on the drum, and helps to maintain a profitable speed of operation. You can gain these and many other advantages by specifying Preformed the next time you order wire rope.

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR

tered and the sinter tonnage require A sintering plant may be a comple success using certain raw materials b a complete failure when compelled use other raw materials.

Difficulties encountered in sinteri operations can be attributed to plant d sign and inefficient equipment. T principal reason for inefficient sinteri plant operation is due to the lack a thorough understanding of the fund mental principles of sinter and ho these fundamental principles will fur tion on a specified sintering mixtu Each sintering operation has three m jor factors that determine what pra tice can be followed. These are: (Raw materials, (2) design, (3) operatio

Sintering Process Applied to Tacon Concentrates: Fine taconite conce trates were sintered in 1924, and ther fore can be sintered again. The years that have elapsed have broug about many improvements in sinteri plant practice and although there a no sintering plants operating at the pre ent time on concentrates which are minus 100 mesh, there is no reason wh plants cannot be designed for this mat rial. No sintering material has be available that even approaches the ta onite concentrates as to fineness a analysis but there have been defini indications as to what the sintering pro lems will be. By the proper plant d sign for taconite concentrates, sinter w be produced. However, the economi of the operations and quality of sint cannot be accurately predicted at th time.

Table II on the estimated cost of ta onite sinters, produced at the mines, a based on the annual output of 1,000,0 gross tons, compared to cost of Mesa open pit sinter, shows why sinteri of taconites has not been attractive co mercially. It should be noted that rel tive costs per unit of iron are not ne essarily the same as relative values. Th cost of smelting each product in the bla furnaces must also be considered.

Comparison of Costs: Considerab controversy has occurred concerning th cost of sintering at Lake Superior por versus the Lake Erie ports. The co parison, Table III, was made to es mate what advantages or disadvantag there would be at these locations, scree ing and sintering Mesabi ores on ne sintering plants.

From the foregoing study, therefo the following conclusions must be a parent:

1. The method that will be us to agglomerate taconite conce trates will be the one that pr duces the best product for th most economical manufacture pig iron.
2. Fine taconite concentrates we sintered in 1929 and can be si tered again in a plant designe and built to control all the know difficulties that occur when si tering fine concentrates.
3. No other agglomerating meth has been developed commercial

to a degree that results could be projected to apply to fine taconite concentrates.

4. The selling price of the agglomerated product should not be based on the iron content alone. Some of the savings made in the cost of producing pig iron by the use of the agglomerated product must be taken into consideration.

[1] *Blast Furnace and Steel Plant*, March 1941.
[2] STEEL, July 5, 1943.
[3] *Skilling's Mining Review*, June 17, 1944.

Dual Process Creates Accurate Embossing Dies

An ingenious method for rapidly producing male and female embossing and debossing dies with a consistently high degree of mating accuracy has been evolved by combining metal spraying and pantographic engraving processes.

In this die making process, developed

by New Methods Steel Stamps Inc., Detroit, a brass pattern is first prepared for the male embossing or debossing die. After this pattern has been used as template in pantographic milling of the male die, white metal is sprayed on the pattern to depth of approximately ⅛-in. to form the female die. This operation gives an exact reproduction of the male die.

Procedure can be carefully controlled to assure proper clearance for any gage of sheet metal between completed mating dies. The extremely accurate mating of male and female dies made in this manner insures the prevention of shear in the sheet metal embossed. Accompanying illustration shows the male and female dies made by this process.

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Opening of a precision measuring laboratory for checking all plain and thread gages, taps, form tools, dies, jigs and fixtures, for hardness testing, for checking and servicing all makes of pressure gages, from 1 to 4000 lb., and for testing and repairing dial indicators has been announced by Ashdale Testing Laboratories, 97 Montana Street, Philadelphia 19.

It's New! IT'S AT Lakeside!

Gas Carburizing HEVI DUTY Furnace

Our Services

Flame Hardening
Annealing
Aerocasing
Heat Treating
Bar Stock Treating
and Straightening
Normalizing
Nitriding
Chapmanizing
Pack or Gas Carburizing
Sand Blasting
Tensile and Bend Tests

Important Advance

IN LAKESIDE METAL TREATING

Here's big news for your carburizing needs! The installation of Lakeside's HEVI DUTY CARBURIZER now assures you carburizing service second to none—vastly superior to most. Here's why: (1) Every piece of the same analysis, regardless of size or shape, receives identical case depth; (2) Uniformity of results from heat to heat; (3) Superior physical qualities due to shorter time at carburizing temperature; (4) Clean work because of positive controlled protective atmosphere; (5) Core refinement is obtained by removing charge and quenching direct from heat; (6) Case refinement, to preserve case structure and maximum hardness, is obtained by re-heating in controlled atmosphere which prevents decarburization when quenched from the furnace.

Convenient facilities for loading and unloading material at our plant.

MTI MASTER CRAFTSMEN METAL TREATING INSTITUTE

THE LAKESIDE STEEL IMPROVEMENT CO.

5418 Lakeside Avenue CLEVELAND, OHIO Phone Henderson 9100

Substitute for Mica Won German Approval

A substitute material, developed by the German Robert Bosch Co. and consisting of several layers of impregnated glass fiber bonded together under heat and pressure, is claimed by the maker to be superior in every way to mica and one which that company plans to use even though mica should again become available. Report of the Publication Board, United States Department of Commerce, contains the following highlights:

The glass fabric, purchased from textile mills according to specifications for thread thickness, weave, warp, weight, and amount of oil used in the sheen process, is immersed in the impregnation solution which contains partially polymerized resinol, alcohol, and osmose-caoline.

Impregnation is done in a vertical type machine similar to those used in United States for the production of varnished cambric. Amount of impregnating material used per unit length is controlled by passing it through adjustable rolls. It enters the oven at room temperature and reaches a maximum temperature of 120° C at the top of the oven and then cools back down to room temperature by the time it emerges from the bottom of the oven.

Material is then cut into strips, folded into three thicknesses lengthwise and then molded under heat and pressure. This gives a molded piece of fiber 500 by 95 mm which is the largest piece of material which they can mold to the close thickness limits required for insulating strips between commutator segments. Special nickel-plated platens are used which are machined very flat. The molded material is then baked in an oven to remove all of the solvent and is then in its final form.

This substitute for mica is non-hygroscopic, it can be exposed to a continuous temperature of 250° C and will withstand many times the 1000 v used for the electrical breakdown test.

Prescribes Methods for Plating on Aluminum

The electroplating of aluminum presents special difficulties due to the very adherent oxide coating which rapidly forms on the metal, and to the high place of aluminum in the electromotive series. Further complications are caused by the reactivity of the metal toward many plating solutions, the difference between the expansion coefficients of the aluminum and the coating metal, and also the fact that aluminum often contains occluded gases.

To obtain this type of surface on aluminum the procedure is to apply first a deposit of nickel then a coating of chromium. According to H. Silman, who describes these processes in his article "The Finishing of Light Alloys" in the Aug., 1945 issue of the British *Sheet Metal Industries,* thin chromium deposits can be applied directly to aluminum if recourse is made to higher current densities than are usually employed in normal type of chromium bath. Resulting deposit is dull and must be polished. For coatings of reasonable durability the commercial method almost invariably includes nickel deposit prior to chromium finish.

Most methods depend on producing an etched surface on to which the nickel deposit can be keyed to obtain a good plating. Mere roughening of the surface is not sufficient, the etch must be carefully controlled to obtain a surface giving maximum adhesion.

After degreasing and alkaline cleaning, the oxide coating on the metal is removed by immersion in a suitable etch. In one process, the articles are dipped for 10 to 15 sec in a 5 per cent hydrofluoric acid solution; the use of hydrofluoric acid is desirable since it has a solvent action on silicon which is a common constituent of many aluminum alloys. Aluminum Corp. of America has compiled a list of etchants for castings, sheet and wrought alloys, and commercially pure aluminum sheets with recommended temperatures and times. Alkaline pickles, such as hot alkaline sodium zincate solutions, have also found some application.

Anodic Coatings Useful

Recently, anodic coatings have been employed to promote the adhesion of nickel deposits on to aluminum alloys. The anodic film serves to protect the metal and also provide the necessary etched surface for plating after the article is made the cathode in the plating bath.

Elytal process makes use of an anodic treatment for 10 to 15 min in a phosphoric acid bath, followed by cathodic treatment in an alkaline solution during which partial reduction of the film takes place, and after which plating is carried out in a buffered nickel or copper bath.

After suitable pre-treatment, the articles are quickly rinsed and plated in a nickel solution which is preferably of the type used in plating directly into zinc base die castings. These solutions are highly buffered with sodium sulphate, or sodium citrate to prevent attack on aluminum.

Solutions for plating on to aluminum have a tendency to pit, therefore hydrogen peroxide or a wetting agent is helpful in preventing this. A nickel thickness of 0.0005 to 0.0007-in. is required for reasonably good service in the case of articles for indoor use.

Primary function of an electroplate on aluminum is a decorative one, although such articles do present a more resistant surface to alkali corrosion and superficial scratches. Such platings, however, present poor resistance to atmospheric corrosion and may even accelerate the corrosion of the base metal owing to increased attack at pores in the deposit. Consequently, such plating is restricted to domestic ware.

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Early increase in industrial activity anticipated in Rocky mountain area is to be met by expanded facilities at Denver Maintenance and Repair Plant of Westinghouse Electric Corp.

Bunting Bronze Bearings today embody higher standards of precision and uniformity than ever before achieved in volume. These Bronze Bearings simplify design and assembly, assure silent, smooth, chatter-free operation and long life. Let us work with you on your designs. The Bunting Brass & Bronze Company, Toledo 9, Ohio.

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26

THE BUSINESS TREND

Reconversion's Basic Strength Is Manifested

THE GREAT inherent strength of the industrial reconversion movement is being manifested by a high level of business activity despite depressive effects of a wave of strikes, particularly those affecting the automobile and petroleum industries.

While the automobile industry's production in the latest week declined 18 per cent from the previous week, steel ingot production, bituminous coal output, and the stock market made significant gains.

STEEL—Recovering steadily from the V-J week recession, steel ingot production has shown an increase in all except one week in response to a heavy volume of orders stemming out of reconversion. As much ground has been gained in returning to high levels of production, the gains henceforth will not be so easily made, although the steel operating rate likely will continue an upward trend.

COAL—Although bituminous coal production in the week ended Sept. 15 was 24 per cent above that of the previous week and 4 per cent over a year ago, strikes by supervisory workers will lower output. Already, 1945 production to date lags 7.1 per cent behind that of a year ago.

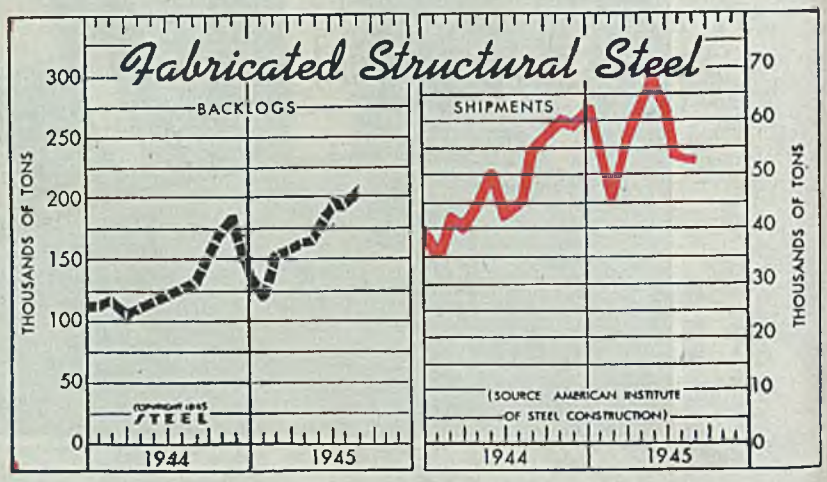
STOCK MARKET—Despite labor unrest that threatens progress of reconversion the stock market continued bullish, with the result that the industrial-share average in the week ended Sept. 22 closed 3.84 points above the previous week. Compared with the previous week, the railroad-share average in the latest week closed 2.25 points higher and the utilities-share average closed three-quarters of a point higher.

RETAIL TRADE—Among the indicators showing strength are department store sales, which reflect the consumers' desire and ability to buy. In the week ended Sept. 15, sales were 8 per cent greater than in the corresponding week a year ago, whereas the four-week period ended Sept. 15 had only a 3 per cent increase.

STRUCTURAL STEEL—Reflecting influence of plans for revival of construction, bookings of fabricated structural steel in August were 21 per cent greater than in July and 100 per cent over those of August, 1944.

CASTINGS—While July production of malleable iron castings dropped 25 per cent below the June output, net new orders in July exceeded those of June by 65 per cent.

PRICES—Continuing a downtrend that began in late July, the Bureau of Labor Statistics index of wholesale commodity prices receded another 0.3 per cent in the latest week as a result of lower prices for agricultural commodities and petroleum products.



Fabricated Structural Steel
(1000 tons)

	Shipments			Backlogs		
	1945	1944	1943	1945	1944	1943
January	55.0	35.2	91.9	124.4	113.1	339.1
February	47.8	42.9	90.8	151.6	117.6	321.0
March	58.4	41.4	94.0	153.3	106.3	299.8
April	59.4	44.5	86.6	162.5	111.2	272.5
May	67.1	50.7	78.9	165.7	116.3	220.6
June	63.0	43.0	68.4	195.2	122.7	207.1
July	54.4	45.3	56.8	194.0	125.4	201.8
August	53.2	55.2	50.2	201.1	130.4	195.6
September	....	57.5	51.8	.....	151.1	208.1
October	....	61.6	80.1	.....	174.4	274.0
November	....	59.4	42.7	.....	184.2	134.6
December	....	61.3	39.6	.....	142.5	113.0

Source: American Institute of Steel Construction. Figures represent members' reports only.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	83	80.5	70	96
Electric Power Distributed (million kilowatt hours)	4,019	4,106	4,116	4,377
Bituminous Coal Production (daily av.—1000 tons)	2,033	1,642	1,157	1,949
Petroleum Production (daily av.—1000 bbls.)	4,528	4,533	4,892	4,744
Construction Volume (ENR—Unit $1,000,000)	$55.2	$60.4	$23.0	$19.2
Automobile and Truck Output (Ward's—number units)	10,570	12,910	14,880	20,880

*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	859†	856	853	899
Business Failures (Dun & Bradstreet, number)	23	7	16	24
Money in Circulation (in millions of dollars)‡	$27,777	$27,793	$27,506	$23,558
Department Store Sales (change from like wk. a yr. ago)‡	8%	−1%	−17%	+9%

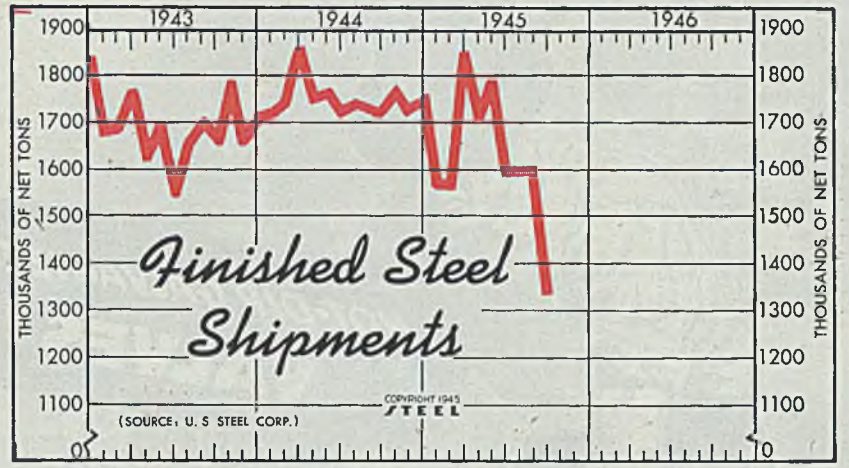
†Preliminary. ‡Federal Reserve Board

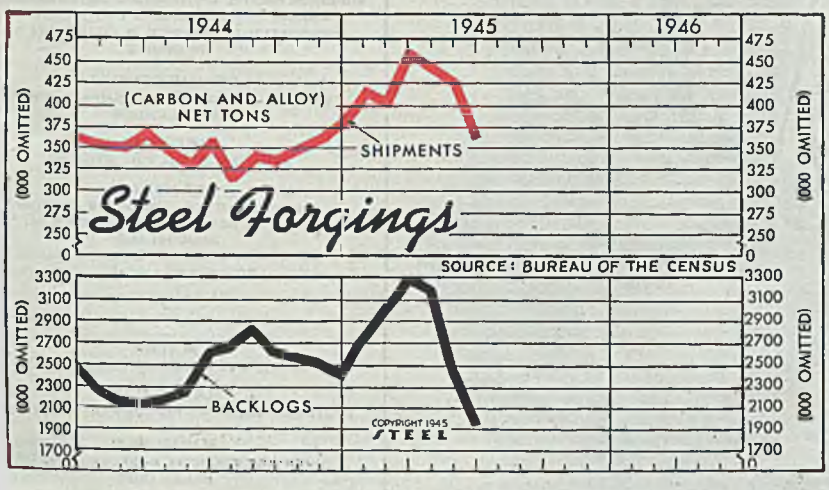
U. S. Steel Corp.'s Finished Steel Shipments

(Net Tons)

	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,685,993	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	1,608,994	1,754,525	1,660,762	1,765,749
Aug.	1,332,180	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	*98,609	*97,214	*449,020
Total	.....	21,052,179	20,147,616	20,615,137

*Decrease.





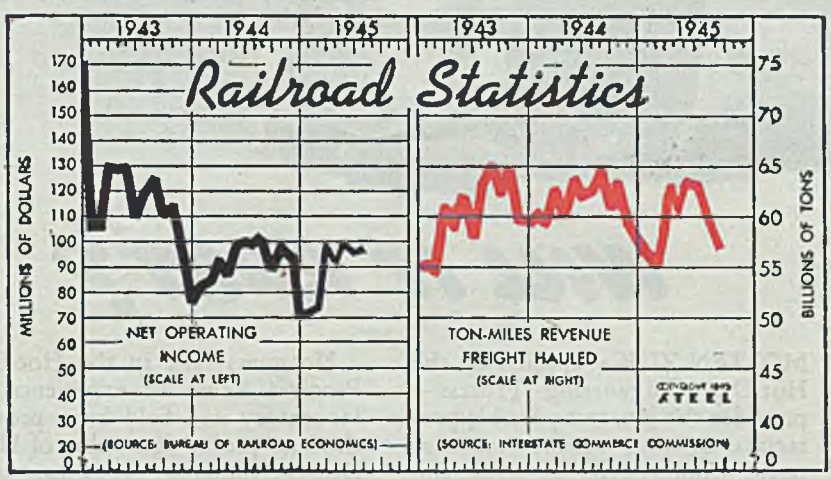
Steel Forgings

Tons—000 omitted

	Shipments		Backlog		Consumption of Steel	
	1945	1944	1945	1944	1945	1944
Jan.	417	355	2,723	2,256	556	521
Feb.	406	350	3,018	2,132	544	509
Mar.	469	370	3,304	2,142	632	521
Apr.	442	347	3,147	2,166	576	494
May	430	330	2,428	2,252	567	453
June	357	359	1,947	2,637	467	487
July	...	315	.....	2,670	...	441
Aug.	...	341	.....	2,821	...	483
Sept.	...	336	.....	2,602	...	463
Oct.	...	348	.....	2,564	...	488
Nov.	...	360	.....	2,510	...	488
Dec.	...	377	.....	2,408	...	506

Statistics of Class I Railroads

	Net Operating Income			Ton-Miles Revenue Freight		
	1945	1944	1943	1945	1944	1943
	(millions)			(billions)		
ın.	$73.0	$84.9	$105.3	56.8	60.5	55.1
eb.	73.2	84.5	105.8	55.3	59.3	54.4
lar.	99.9	92.5	129.7	62.9	62.7	61.2
pr.	91.9	87.7	128.7	61.6	60.4	59.1
lay	99.9	98.5	129.5	64.6	64.0	62.1
ıne	96.1	99.8	109.0	63.6	62.0	58.0
ıly	97.1	98.6	127.8	60.1	62.8	63.7
ug.	....	101.4	132.3	56.6	64.5	65.1
ept.	....	89.1	110.3	....	61.0	62.5
ct.	....	97.3	113.1	....	63.5	65.0
ov.	....	91.6	96.4	....	59.4	59.9
ec.	....	69.8	76.9	....	57.3	60.6
ve.	....	$91.3	$113.7	....	61.5	60.6



ANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,484	$9,733	$9,023	$10,859
Federal Gross Debt (billions)	$262.6	$263.2	$263.2	$210.6
Bond Volume, NYSE (millions)	$30.1	$25.9	$42.9	$29.2
Stocks Sales, NYSE (thousands)	7,064	6,425	5,756	3,175
Loans and Investments (billions)†	$61.8	$62.4	$63.1	$55.0
United States Gov't. Obligations Held (millions)†	$45,823	$46,182	$46,770	$41,113

*Member banks, Federal Reserve System.

ICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	104.7	105.0	105.5	103.6
Industrial Raw Materials†	115.0	115.3	116.9	112.8
Manufactured Products†	101.8	102.0	102.1	101.1

†Bureau of Labor Statistics Index, 1926=100.

WILL IT RUST?

MOLTEN ZINC—applied by the Hot-Dip Galvanizing Process—provides the greatest possible protective coating against rust. A positive bond between coating and base metal is the result of the high temperatures employed in the Hot-Dip Method. The definite fusion of the two metals means longer life and service. Thousands of installations—their life increased twenty to forty years—are testimony to savings of millions of dollars in costly maintenance and replacement.

No guesswork in the Hot-Dip Process! Years of experience in laboratory and field have proved the rust prevention value of Hot-Dip Galvanizing. It is *most* economical and *dependable*.

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HELPFUL LITERATURE

1. Stainless-Clad Steel

Granite City Steel Co.—16-page illustrated bulletin "Important Facts About Granite City Superbond Stainless-Clad Steel" explains advantages, characteristics and applications of this material which is adaptable for products where corrosion resistance is needed on one side only. Table lists corrodibility of common metals and alloys.

2. Industrial Electronics

General Electric Co.—40-page illustrated bulletin No. GEA-4309, entitled "Fundamentals of Industrial Electronics" is series of eight technical articles by G. M. Chute, application engineer, which appeared in STEEL. Developments in field which are applicable to metalworking and metal producing industries are covered. Basic principles of electronics are presented to provide working knowledge of subject.

3. Soft-Face Hammers

Greene, Tweed & Co.—Illustrated folder No. B-1 shows and explains design and use of Basa replaceable face hammer which is intended for use on surfaces that must be protected from marring. Interchangeable faces of aluminum, copper, babbit, rawhide and plastic are available in five standard sizes of hammers.

4. Heat Treating Equipment

Claud S. Gordon Co.—4-page illustrated bulletin and stock list No. 845 lists temperature control instruments, metallurgical testing equipment, laboratory furnaces and related equipment which are immediately available.

5. Screw Machine

Greenlee Bros. & Co.—16-page illustrated bulletin on the Greenlee automatic screw machine describes design, operation, features and uses of this precision machine tool which is designed for short and long run jobs. It is engineered for quick set-ups and easy operation. Machines are available with round chuck capacities of 1, 1-5/8 and 2-5/8 inches in four-spindle models and 1, 1-5/8 and 2 inches in six-spindle machines.

6. Plating Rack Insulation

B. F. Goodrich Co.—6-page illustrated booklet on Koroseal Tape RX and MX, and Herculac RX explains features of these easy-to-apply protective coatings for plating racks and for masking work. Characteristics, resistance to acids and alkalies and methods of application are given.

7. Reproduction Equipment

Ozalid Div., General Aniline & Film Corp.—8-page illustrated bulletin "10 Types of Prints Instead of 1" contains actual samples of work produced with Ozalid printing and developing equipment. These are Rapid Black, blue-line, red-line, opaque cloth, sepia-line, transparent cloth, Transblack, transparent foil, Chartfilm and Dryphoto methods.

8. Welded Steel Rings

Federal Machine & Welder Co.—18-page illustrated bulletin discusses company's facilities for production of roll-formed and resistance welded steel-rings. Engineering department, production equipment and typical parts produced are described.

9. Cylinders

Galland Henning Mfg. Co.—12-page illustrated bulletin No. 90 on Nopak cylinders describes double-acting, nonrotating type, cushioned cylinder for air or hydraulic service. Details, dimensions, application data and other information are given for various types of cylinders.

10. Roller Bearings

Hyatt Bearings Div., General Motors Corp.—Large tabloid-size pictorial review "Hyatt Rollcavure" shows typical applications of Hyatt bearings in war and peacetime equipment.

11. Carbide Tool Maintenance

Firth-Sterling Steel Co.—Six 17 x 22-inch four-color shop posters in cartoon style dramatically illustrate methods by which service life of carbide tools can be prolonged. Illustrated by Cy Hungerford, nationally known newspaper cartoonist, posters urge machinists to use proper size, style, tip and shape of tools; handle each tool carefully; set it correctly; keep it sharp; grind it properly; and avoid use of force in grinding.

12. Powder Metal Parts

Moraine Products Div., General Motors Corp.—56-page illustrated bulletin "Durex Self-Lubricating Bearings and Structural Parts" is practical guide book which provides information on powder metallurgy to enable user to determine where it fits into his production, and to provide design recommendations and technical data which will make possible best use of powder metal parts.

13. Manufacturing Facilities

Dresser Mfg. Co.—Illustrated catalog is descriptive of company's facilities for producing rings, weldments and similar circular shapes by rolling, flashing and expanding strip, bar, plate and special sections, thereby reducing material, machining and labor costs. Hydraulic press and upset forgings as well as unusual shapes are shown.

14. Metalworking Tools

Gairing Tool Co.—8-page illustrated condensed catalog on "Gairing Tools" contains brief data on line of metalworking tools which include cutter holders, counterbore sets, core drill cutters, standard driving bars, floating holders, tungsten carbide spot facer, milling cutters, boring tools, cutter heads, tungsten carbide counterbores and multi-diameter cutters.

15. Turbine Generators

Worthington Pump & Machinery Corp.—46-page illustrated plastic-bound bulletin No. 1960 deals with straight noncondensing, noncondensing extraction and condensing extraction turbines. Also included are four bulletins covering evaporative coolers and gas engine, steam engine and booster type refrigeration compressors.

16. Rust Removal

A. J. Stull & Co.—6-page folder contains description of Rustoff liquid chemical combination used to remove rust and corrosion from metal surfaces. This rust remover can be applied by brush or by dipping and chemically dissolves rust and corrosion, causing it to become loose and drop off.

17. Phenolic Resins

Durez Plastics & Chemicals, Inc.—4-page illustrated folder describes molding compounds and industrial and oil soluble resins which are used in manufacture of grinding wheels, plywood, paper, fabric, printing ink, linoleum prints, paints, varnishes, lacquers and other protective coatings.

18. Magnetic Pulleys

Dings Magnetic Separator Co.—32-page illustrated catalog No. 260 describes in detail uses of magnetic pulleys in paper, textile and flour mills, grain elevators, food plants and foundries. Tables covering capacities, dimensions and selection factors are included.

19. Electrode Furnaces

A. F. Holden Co.—4-page illustrated bulletin on company's line of electrode furnaces describes units for hardening, tempering and annealing. Both steel and ceramic pot models are covered with full dimensions on each type.

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20. Metal Cutting Tools

Haynes Stellite Co.—52-page illustrated catalog No. F-5401 is entitled "Haynes Stellite Metal-Cutting Tools". Described are high production tools made from Haynes Stellite 98M2 and Star J-Metal alloys. Descriptions, illustrations, engineering drawings, specifications, application data and prices are given for standard tools.

21. Manufacturing Facilities

Falk Corp.—44-page illustrated bulletin "The Story of a Good Name in Industry" traces 50 years of progress by this concern and shows typical gear drives and couplings produced for powering all types of equipment and machines. Production facilities and personnel of company are covered.

22. Induction Heating

Federal Telephone & Radio Corp.—4-page illustrated bulletin "MegaTherm Electronic Heat"; ten 2-page catalog sheets on various types of induction heating equipment; and 12-page preprint of speech entitled "Case Hardening by MegaCycle Induction Heating" give comprehensive data on this induction heating system and equipment.

23. Air Filtration

American Air Filter Co.—20-page illustrated bulletin "The Magic of Electronics in Air Filtration" explains theory and practice of removing entrained solids from air or gases by means of electric attraction. Theory of ionization, collecting dust particles, efficiency of dust removal, bacteria control and other subjects are covered. Company's research and development in electronic air filtration are described.

24. Rotary Dryers

General American Process Equipment Div.—8-page illustrated bulletin No. 53 gives details of Louisville steam-tube rotary dryers. Material which is to be dried is fed continuously into one end of dryer cylinder and is showered and tumbled in direct contact with steam tubes while current of air flows through cylinder to absorb and carry away evaporated moisture.

25. Low Temperature Welding

Eutectic Welding Alloys Co.—4-page illustrated bulletin No. EW-20 contains production ideas utilizing Eutectic low temperature welding alloys. Typical assemblies produced by this process are shown.

26. Stainless Steel Sheets

Eastern Stainless Steel Corp.—96-page illustrated condensed handbook, First Edition, contains complete technical data on company's grades of stainless steel sheets. Engineering information is presented on gages, sizes, tolerances, finishes, processing and fabrication, properties, corrosion resistance and general data.

27. Chipper Maintenance

Ingersoll-Rand Co.—22 x 38-inch wall chart entitled "Easy Repair Operations for I-R Flapper Valve Chippers" utilizes exploded view of tool and several cross-section drawings to show proper maintenance procedure for these tools. Tools to use, replacement parts and other data are shown clearly.

28. Protective Finish

International Engineering Corp.—4-page illustrated bulletin and two data cards present information on International No. 10 compound for phosphate treatment of iron, steel and zinc to condition, rustproof and furnish adhesive paint bond.

29. Electroplating Service

Hudson American Corp.—4-page illustrated folder "Announcing a Complete Service in Electroplating" shows company's facilities for handling silver, tin, cadmium, copper cyanide, zinc, bright nickel, chromium and anodizing plating of large or small parts on production basis.

30. Pressure Regulator

Hagan Corp.—4-page illustrated bulletin No. 1145 gives data on type SO regulator for control of suction, pressure or flow in any gas or air flow system. Construction features, operating characteristics, presure setting adjustments and accessories, as well as dimensions are included.

31. High-Chromium Iron

Electro Metallurgical Co.—8-page illustrated bulletin No. F-4988 is entitled "Abrasion-Resistant High-Chromium Iron". Commercial applications, composition, heat treatment and physical properties, commercial production and other data are given on this material.

32. Wirebound Boxes

Wirebound Box Mfgrs. Association—24-page illustrated bulletin "Your Product—How to Ship It Safely at Lower Cost" explains how modern wirebound containers save time in shipping department, reduce shipping costs and conserve space. Typical containers produced for specific products are shown and data are given on packing methods as compared with former processes.

33. Locomotive Cranes

Ohio Locomotive Crane Co.—16-page illustrated bulletin No. 137 shows locomotive cranes in actual use in wide range of materials handling operations. Construction details are given on diesel, gasoline, steam and electric powered models equipped with buckets, clamshells, hooks, draglines, magnets and other accessories.

34. Blind Rivets

Huck Mfg. Co.—16-page illustrated bulletin No. 451 describes operation, advantages, installation procedure and inspection of Huck blind rivets. These aluminum alloy fasteners consist of hollow sleeve with either brazier or countersunk head and pin which is pressed into sleeve. Sizes are 1/8, 5/32 and 3/16-inch diameters.

35. Straddle Truck

Hyster Co.—8-page illustrated bulletin No. 568D is descriptive of Yardmaster straddle truck which has capacity of 12,000 pounds and is particularly suited to transporting and handling stacks of lumber and similar materials.

36. Cleaning Machine

Hydra Lectric Products Co.—8-page illustrated bulletin on Hydra Lectric Hy-Pressure cleaning and degreasing unit explains features of design, construction and operation of high pressure cleaning machine for general maintenance cleaning, applying cleaning chemical and rinsing in one operation.

37. Pneumatic Fixtures

K M & H Corp.—4-page illustrated bulletin "Here's the Record" shows typical pneumatic indexing, single feed, milling and adapter fixtures which afford increased production on tapping, drilling, reaming, countersinking, milling, broaching and other operations.

38. Forging Press

Hydraulic Press Mfg. Co.—24-page illustrated bulletin No. 4407 gives design and operating details of All-Hydraulic forging presses for closed die and flat die forging of ferrous and nonferrous metals. Typical work produced is shown and advantages of system are explained.

39. Hard Facing Rod

Fansteel Metallurgical Corporation—4-page illustrated bulletin No. F-428 presents properties, applications and procedure of Fanweld hard facing metal. This hard facing material is furnished in 14-inch rods in 5/32 and 1/4-inch diameters. Containing no steel, it does not require heat treating after application.

40. Dragline Buckets

Erie Steel Construction Co.—4-page illustrated "Erie Dragline Manual" describes buckets designed for light excavation; general excavating service; and for mine stripping and digging in hard pan, hard shale, cemented conglomerate, blasted rock and like materials. Suggestions are given to aid in obtaining maximum dragline performance.

41. Swing Frame Grinders

Fox Grinders, Inc.—13-page illustrated catalog on Fox Hi Speed swing frame grinders discusses details of machines in models which are designed for heavy duty grinding of large slabs, heavy gates and risers; for foundry work; for general-purpose use; for grinding small billets and forgings; and light duty iron foundry work.

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Consumers Seek Steel in Spite of Strike Delays

Reconversion urge causes heavy demand for all products . . . Coal and oil strikes threaten steel output . . . Scrap scarcity holds

PROGRESS of reconversion continues, in spite of various ctors that becloud the outlook. Principal drawback to rapid ange to peacetime is the increasing number of labor disturb- ces, not only in the steel and metalworking industries, but others and in transportation and services.

A walkout in some soft coal mines in western Pennsylvania eady has caused the banking of some blast furnaces and con- tutes a threat to future activity in pig iron production.

Labor interruptions in the fuel oil industry carry a further eat to steelmaking, already causing shutdown of open hearths pendent on that fuel. This is evident in the Youngstown dis- ct and at Cleveland. The shortage of stocks is causing appre- nsion in the Chicago district. Conversion to tar as a substi- e fuel is hampered by the shortage of coking coal for by- oduct ovens.

Ending of allocation controls as of Sept. 30 finds steel pro- cers pressed to meet heavy demand but confident that under acetime conditions the change is for the better. Steel leaders ierally agree the plan was effective in war conditions, how- er. Remaining controls include those on inventories and such orities as the AAA, MM and CC ratings, which can be called if necessary to break choke points during the immediate nsition period. Few such ratings have been issued up to this ie and the disposition at Washington is to have producers et these emergency problems direct, without priority as- ance.

Notwithstanding labor troubles among steel users, demand for el is heavy, and orders are not being cancelled or deferred n that cause. Some of present pressure for delivery may ascribed to an effort to lay in stocks before strikes may be- ie worse. In the few cases where delivery has been asked to be delayed the resulting gap has been filled promptly. Automotive manufacturers have not sought to delay delivery of materials for their product, though important units are idle. Apparently it is considered better to take in sheets and other steel products and store them rather than interrupt mill schedules.

Inquiry for sheets still dominates the market, with deliveries on higher grades falling in second quarter, with some other grades available in late fourth quarter. Bar demand has increased until deliveries now are quoted generally for February and March, and shape deliveries have been pushed further forward, some producers quoting nothing earlier than January.

Steel production last week remained unchanged at an estimated rate of 83 per cent of capacity, interrupting the steady rise from the low point following the war's end. This resulted mainly from a coal strike and shortage of fuel oil for open hearths. Buffalo rose 4½ points to 86 per cent, Pittsburgh gained 1 point to 75, Cincinnati 5 points to 86 and Chicago 3 points to 91. Wheeling declined 6 points to 86, Detroit 2 points to 85, Cleveland 2 points to 83 and Youngstown 9 points to 80. Rates were unchanged at Birmingham 95, New England 80, St. Louis 68 and eastern Pennsylvania 76.

Scrap scarcity continues except on the Pacific Coast and in the South, where there is an excess. War Production Board will terminate all scrap allocations Sept. 30 and melters after that will be dependent on ability to obtain material by their own efforts. Cancellation of special freight rates from the Pacific Coast to the Midwest market has cut off this supply. Labor is the greatest factor in scarcity, collection and preparation suffering severely. Dealers are unable to obtain more men from the ranks of those dismissed from war work. Prices are at ceiling on everything except on borings and turnings in some instances. Cast grades are almost non-existent and foundries are short in spite of low operating rate.

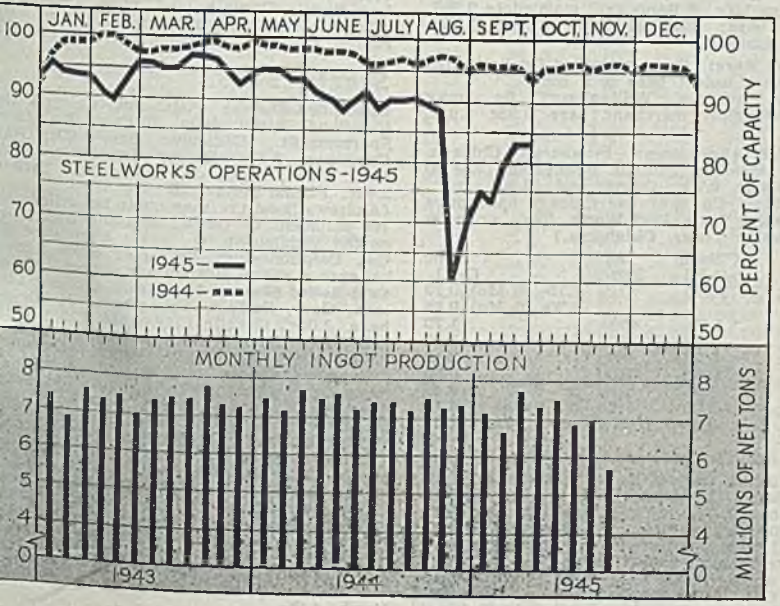
Average composite prices of steel and iron products hold unchanged at ceilings, finished steel at $58.27, semifinished steel at $37.80, steelmaking pig iron at $24.05 and steelmaking scrap at $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Sept. 29	Change	Same Week 1944	Same Week 1943
Pittsburgh	75	+1	91	100
Chicago	91	+3	99.5	99.5
Eastern Pa.	76	None	95	96
Youngstown	80	—9	88	97
Wheeling	88	—6	96	99
Cleveland	83	—2	74.5	95.5
Buffalo	86	+4.5	86	90.5
Birmingham	95	None	70	100
New England	80	None	89	90
Cincinnati	86	+5	91	94
St. Louis	68	None	75	93
Detroit	85	—2	88	89
Estimated national rate	83	None	93.5	99.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Sept. 29	Sept. 22	Sept. 15	One Month Ago Aug., 1945	Three Months Ago June, 1945	One Year Ago Aug., 1944	Five Years Ago Aug., 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	36.45	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.07	19.17	18.80

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material	Sept. 29, 1945	Aug., 1945	June, 1945	Sept., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.17	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron	Sept. 29, 1945	Aug., 1945	June, 1945	Sept., 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Philadelphia	26.84	26.84	26.84	25.84
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$19.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	16.05
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.67	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45, **Rerolling Billets, Blooms, Slabs:** Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.ob. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—41-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3 : Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Suply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100	(.15-.25 Mo) 0.70
			(.20-.30 Mo) 0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.96c; Phila. del. 3.87c; Pacific ports 4.25c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.30c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity O. H. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.85c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c. (Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 4.30c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St Louis, Geneva Steel Co., 3.25c, Pac. ports; Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports ..... $3.40 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	51½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½,3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., base, cents per lb.; Reg. carbon 14.00c, extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Base, per lb
18.00	4	1	.....	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb., f.o.b. mill base.

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. Governing basing point is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅜ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1⅛-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.25

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945

†14.25 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	$28.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[15]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[15]	4.152[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[20]	3.85[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[20]	3.75[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[12]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.448[24]	4.543[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[23]	6.281[23]
Memphis, Tenn.	4.015[6]	4.065[6]	4.065[6]	5.78[6]	3.965[6]	4.215[6]	4.215[6]	5.265[15]	4.78[24]	4.48[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.763[3]	4.313[6]	4.313[3]	5.313[26]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[9]	5.683[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.383	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.80[15]	5.633[15]	.....	.....	.....
Tacoma	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[23]
Seattle	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharge; 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 (Transval)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1 less $7 freight allowance	52.80

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa, base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. ‡For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos. f.o.b. furnace, Lyles, Tenn, $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn 33.00
(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: .Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. o.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome; (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil.4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

OMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

OMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less, $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum, 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Siminal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn	12.50-13.00
Short Shovel Turnings	15.75
Cast Iron Borings	12.50-13.00
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00
(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)	

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices.)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.60
Shoveling Turnings	12.60
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2, Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

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In mills, industrial plants and scrap yards, LOGEMANN SCRAP PRESSES are working day and night to prepare sheet scrap for the furnaces.

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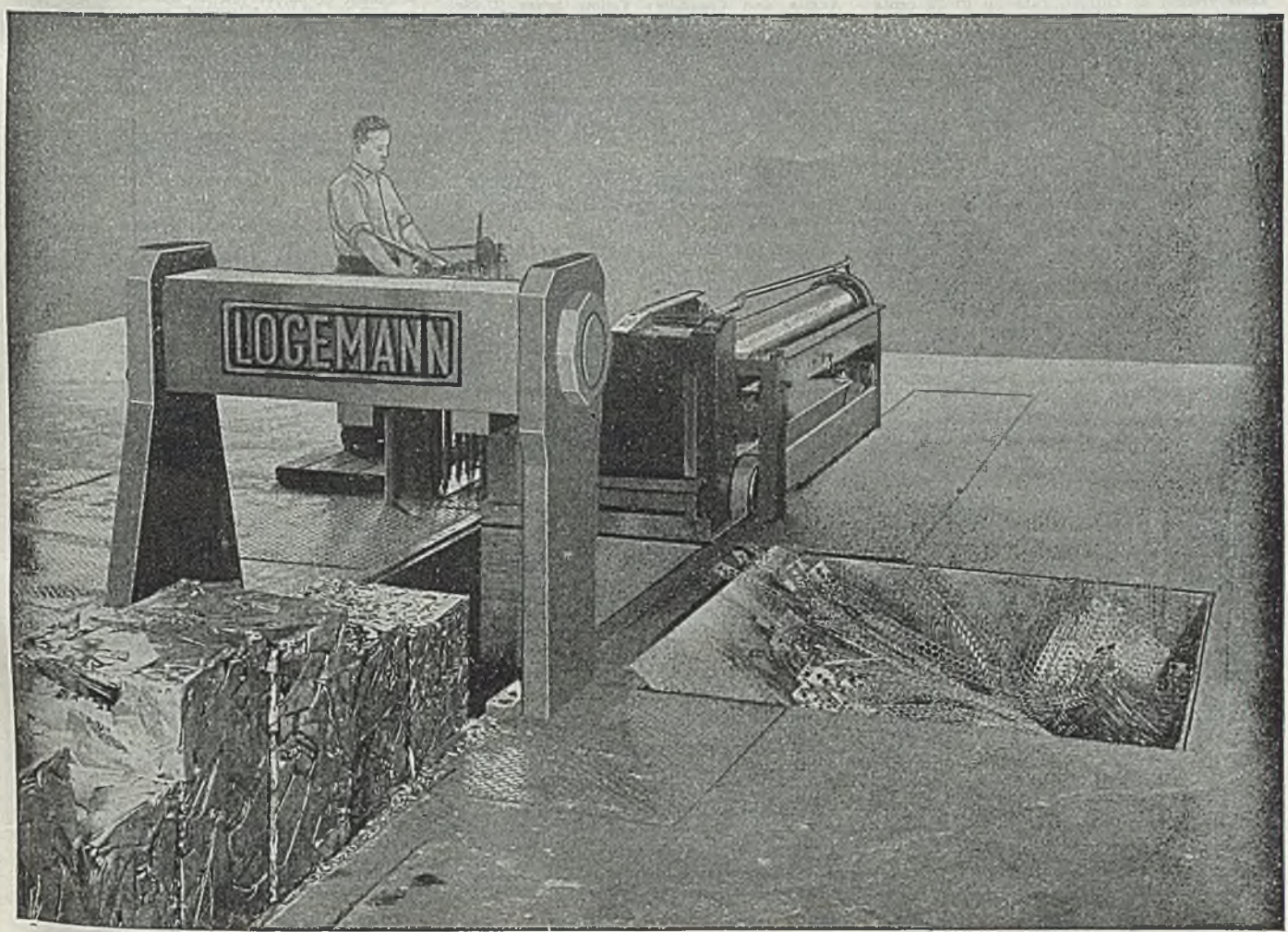

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¼c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1¼c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92¼% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (96-97¼%) 11.00c, Grade 2 (93-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1¼c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl, 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, nominal, $125 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 23.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu. 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ¼c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high-grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ⅛-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 180

Some observers believe volume of sheet and strip buying is above the war peak as a great deal of current inquiry cannot be entertained with any delivery promise of value to the consumer. In most grades best delivery is second quarter, except in stainless, in which unpolished can be obtained for late this year. Electrical sheets are scarcest grade, little being available before the middle of next year.

New York — Sheet inquiry continues brisk, with orders exceeding shipments in many cases, resulting in further extension of backlogs. Most leading sellers have little to offer in either hot or cold-rolled or galvanized sheets, before second quarter. Sellers of polished stainless sheets quote February and beyond, although on unpolished grades they still can make deliveries before the end of this year. The specialty in greatest stringency, however, is electrical sheets. Little of this material can now be had before last half of next year.

Pittsburgh — There is no means of measuring the volume of sheet and strip tonnage seeking position on mill rolling schedules, but some sellers consider it to be record breaking. With reconversion increasing, except where strikes have hampered operations, many metalworking companies are seeking to build adequate inventories for efficient operation. Possibility of higher prices is also an important factor in causing consumers to augment stocks at this time. Producers have a difficult job in attempting to allocate tonnage for most equitable distribution. It is almost impossible to estimate what proportion of incoming tonnage represents duplicate orders and determination of customers' actual requirements is difficult. Sheet and strip output has recovered rapidly, with most operating schedules now near capacity. Of particular interest to trade here was announcement of Stainless Steel Corp. establishing a base for stainless steel sheets at Baltimore.

Chicago — Producers of cold-rolled sheets find customers unable to comprehend why a shortage exists in this product now that the war has ended. Explanation is, of course, that schedules were extended at time of V-J day, and much tonnage was not canceled, and on top of this load came the rush of buying for manufacture of civilian goods. Without exception, sheetmakers quote first quarter delivery on virtually all grades of sheets, although hot-rolled are relatively easier than cold-rolled, galvanized and long ternes. Demand centers chiefly in lighter gages and customers are found willing to accept smaller deliveries than ordered, apparently due to slower than anticipated progress in reconversion.

St. Louis — Pressure for sheet production is unabated and shows no improvement, lack of labor being the principal choke point. Inquiry is reaching mills at an unprecedented rate with much tonnage being refused. Warehouses are pressing for all types of flat-rolled steel. No orders for galvanized roofing are being taken beyond April.

Cincinnati — Sheet buying continues unabated mill interests reporting that production is inadequate to meet the demand. Delays in reconversion caused by labor difficulties, particularly automotive, have not been reflected in cutbacks or delivery holdups so far. One mill is planning to cool open hearths for taking of inventory, but will continue rolling schedules.

Cleveland — Continued heavy demand for sheets has extended deliveries further. Schedules are filled rather fully until March and beyond on coated items and through the balance of this year on other types.

Despite the current tight supply War Production Board recently revised its general inventory control regulation, Priorities Regulation No. 32, permitting larger inventories of certain grades of sheets. Carbon and silicon electrical sheets, for instance, have reverted to the 60-day inventory limit formerly in effect before direction 24 to Controlled Materials Plan regulation 2 imposed a 45-day inventory limit.

Orders for all steel products being booked, as they have been since 1940, are on the basis of OPA approved prices at the time of shipment. This contract provision is assuming more importance in view of the increasing pressure for upward wage adjustments which could be met, industry spokesmen say, only by an increase in steel prices.

Boston — That total volume of unrated narrow cold-rolled strip placed earlier is heavier than estimated is made apparent by extended deliveries and bulky backlogs as this tonnage becomes definitely assigned in production schedules. Sustained new orders are accompanied by pressure for delivery from buyers seeking steel for reconversion and inventory. With few exceptions New England cold strip mills are scheduled through fourth quarter and extended into first. Makeup of backlog as to grades has shifted, with somewhat higher ratio of low carbon, less high carbon and with alloys maintained but in some instances heavier, due to buying of stainless for automobile trim, kitchen utensils and miscellaneous products. While substantial lots of cold-rolled carbon strip are available in surplus, specifications are not suitable for most fabricators, although Warren Telechron Co., Ashland, Mass., bought 307 tons.

Birmingham—Sheet order backlogs are exceptionally heavy, with bookings extended well into next year. A great portion of this district's sheet business is composed of roofing sheets for farm use, demand for which is heavy.

Steel Bars . . .

Bar Prices, Page 180

Whatever lag in demand for steel bars existed after war cancellations has been entirely overcome and mill books are filled for the year and well into next on hot-rolled. Smaller sizes are in most demand, bookings extending into second quarter. Hot alloy bars are easiest, deliveries being promised currently for November, the situation in this product being irregular.

Chicago — Carbon bar demand has tightened to the extent that most producers are sold out for the remainder of the year and find it necessary to allocate quantities to consumers to assure fair distribution. For alloy bars, a paradoxical situation has developed. One maker finds that at one of its district plants it has a heavy backlog of spring steel, but is limited on production. At its other plant, specializing on other alloys, including electric furnace, its books are less than 50 per cent filled through October.

New York — Most sellers of hot carbon bars are now well booked into next year. This is especially true of bars in smaller sizes, in which some producers are booked into second quarter. Most cold drawers are now practically out of the market for this year. The situation now in hot alloy bars, however, is still relatively easy, deliveries falling generally in November.

Philadelphia — Demand for hot carbon bars still expands, with some leading sellers quoting February and March on a wide range of sizes. Special consuming interest so far, however, is in light sizes of rounds and flats for a diversity of uses. Alloy requirements still lag, although the fact that deliveries can be made in five to six weeks is due mainly to capacity expansion during the war. Cold-drawn bar schedules reflect particularly heavy cancellations in war contracts, such as rockets and shell components. While some cold drawers are sold for the year others still can book tonnage for December and there have been even some openings recently for late November. However, automotive requirements are increasing and there is good demand from machine tool builders and nut and cap screw manufacturers and others. Some sellers believe cold drawn bar deliveries soon will parallel hot carbon shipments.

Birmingham—Bars are in comparatively good supply although building interests are consuming a large tonnage of reinforcing bars and backlogs are heavy.

Boston — Heavier bar consumers are covered on known requirements through this year and current buying centers mainly in size grades for which reconversion needs are developing. This volume is slightly heavier, with deliveries extending, notably in medium and smaller cold-drawn carbon sizes. More producers have filled fourth quarter schedules on rounds, flats and hexagons up to and including two-inch. Specification revisions growing out of return to normal lines has not yet run its course and in alloys involves warehouse changes from NE to SAE grades. Forge shops also are making revisions, including carbon grades. Alloy deliveries are relatively easy, result of spotty light buying and increased productive capacity built during the war. Numerous alloy uses canceled by the war's end are not being replaced.

Cleveland — Some space is still open on larger bar mills for late this year, while 8-inch mills can promise delivery not earlier than March. No clear indication has been discernible as to what trend alloy specifications will take in the postwar markets. Due to scarcity of practically all steel products, automobile manufacturers and other large consumers are not too particular as to the exact composition of the steel being shipped. Chief concern now is to get as much tonnage as possible moving into production lines.

St. Louis — Merchant bar demand continues heavy, notably small sizes. Barmakers, with practically all cancellations in, are filled to February and March. Production is down, due to labor

shortage. Mills are busier than during the war and many new buyers are turned down. No allocation system is in effect but new customers are being accepted cautiously. Order books are in good shape, changes in specifications, principal reconversion difficulty, being 90 to 95 per cent completed. Export inquiries are increasing, with little tonnage booked.

Steel Plates . . .

Plate Prices, Page 181

Slack demand for steel plates has been replaced by considerable miscellaneous inquiry and mills are filling schedules further ahead than for some time. Some producers have filled books for fourth quarter and orders continue to come out. Others are able to promise deliveries in October and November. Considerable demand has appeared for fuel oil tanks and export inquiry for Holland and Scandinavia is being entertained.

Pittsburgh — Although substantially below wartime demand, plate requirements are well sustained, with orders for barges, ship repair work, oil and butane gasoline tanks, pipe lines and freight cars bolstering operations. Miscellaneous requirements for export also are an increasing factor. Some eastern mills have space open on rolling schedules for both universal and sheared plates for shipment in October, but mid-western mills are booked into November.

Boston — Plate orders tend upward, and, while aggregate volume has not reached normal levels, demand for reconversion has increased ahead of expectations. Structural shops are fabricating less plate tonnage than during period of heavy subcontracting by shipyards and only a fraction of that peak volume is ahead. Most demand is for lighter plates for small tanks. Railroads are buying sparingly and the slack in weldments and flame-cutting is being taken up slowly. November delivery is promised by several producers, also floor plates. Miscellaneous industrial demand and jobber buying account for most orders for the latter.

New York — A sharp spurt in demand for fuel oil tanks for domestic purposes and filling stations is stimulating activity in plates. Certain large oil companies are pressing demands for various chains of filling stations. Also contributing to current activity is fairly substantial export demand for Holland and the Scandinavian countries. Most demand is for ship work, although in some countries, Holland and Norway in particular, a substantial volume of plates is going into rehabilitation work.

Deliveries fall largely in November and December, with some sellers now out of the market entirely for November.

St. Louis — Unexpected demand for plates continues and has filled mill schedules to the end of the year. Some tonnage is open in January and February. Plate output at local mills has risen from 10 per cent of total steel output to 15 per cent. Most demand is for plates from ⅜ to 1 inch. Railroad car industry is largest factor in plate demand here. Shipyards have ceased to be important consumers.

Seattle — Seattle has awarded an elevated steel water tank for the West Myrtle St. water improvement to H. D. Fowler for the Pittsburgh-Des Moines Steel Co., at $101,806, requiring 350 tons of plates and shapes. Washington state has asked authority to build a 130-foot fixed steel span over Coweman river.

Philadelphia—Plate requirements are fairly well sustained at recent levels, with most producers showing little concern over prospects for fourth quarter. Some have nothing to offer for December. The situation in light plates, 3/16-inch or so, has tightened as a particular result of demand for fuel oil tanks. Export demand is promising with inquiry heavy and increasing tonnage being placed. Plate shipments in August were 470,000 tons, against 597,000 tons in July. Preliminary trade estimates place September shipments over 500,000 tons.

Tubular Goods . . .

Tubular Goods Prices, Page 181

Pittsburgh — Demand for welded and seamless pipe has made substantial improvement and further gains are indicated. Considerable seamless tonnage, most of which was utilized in making bombs and shells during the war period, is now going into line pipe, while the automotive industry is taking a steadily increasing tonnage of cold-drawn seamless pipe. Order backlogs on seamless extend into February, although openings in schedules for some larger sizes are available in December. Considerable interest is shown in development at National Tube Co.'s National works, Mc-

Keesport, Pa., where pipe of the same analysis as in the 42-inch seamless of ⅝-inch wall, used in the fabrication of the "Big Inch" line at the company's Lorain works, is now used in making 26-inch seamless pipe with wall thicknesses of 5/16 and 9/32-inch. Seamless in these sizes can only be made by National Tube Co. Large size line pipe is being promised for December delivery, with shipments on smaller specifications extended into January. Some interests are booked into March on both lap and butt-weld pipe. Of particular importance in the immediate outlook are the relatively low inventories of pipe distributors, while lifting of WPB controls on oil exploration may increase requirements for oil well casings. However, reduction in oil requirements may retard this development.

Seattle — Seattle has awarded contracts for two water system improvements, requiring 100 tons of cast iron pipe. Bremerton, Wash., has placed a contract for 2000 feet of 16-inch steel pipe with Pacific Water Works Supply Co. Portland, Oreg., plans four major water system improvements.

Cleveland—All types of tubular goods are in heavy demand. Volume is made up of moderate sized orders from many consumers and distributors. Mill order books are filled into first quarter with deliveries of welded and butt-weld pipe more extended than those of seamless tubing. Producers are awaiting developments in labor's widespread demand for higher wages but are fully covered in their commitments which are made on the basis of price at time of shipment.

Philadelphia — Most merchant pipe sellers quote January and February, with most tonnage going into distribution stocks. One large producer estimated that 80 per cent of current tonnage goes to them. Stocks have been considerably unbalanced and with increase in construction and building maintenance, balancing of inventories still is difficult. One leading producer still has lap-weld available for December.

Tin Plate . . .

Tin Plate Prices, Page 181

Pittsburgh — Any important upward adjustment in tin plate production depends largely on specific developments in the Far East pig iron supply. However, the outlook in this connection is brighter than many predicted prior to the war end. Producers' fourth-quarter schedules, representing 95 per cent of their allotments in the corresponding 1944 period, are already substantially accounted for by customers' specifications and a substantial influx of new orders for first quarter is reported. No major changes in demand for hot-dipped and electrolytic tin plate is indicated next quarter, with the end-use of tin remaining the key factor affecting output. Demand for 0.25-pound electrolytic tin plate is expected to be limited until more pig tin is available to permit widening of applications for this type coating. Use of 0.75-pound electrolytic is limited mainly to manufacture of small size evaporated milk cans.

Chicago — Orders offered to tin plate producers indicate that many specifications are for uses not permitted under WPB limitation order M-43. However, reports indicate that smelter operations in the Far East are increasing, suggesting that pig tin supply may show improvement soon. If this proves true, it may lead to early relaxation of WPB restrictions.

Wire . . .

Wire Prices, Page 181

Boston—Deliveries are more extended on most wire mill products. Orders sustain backlogs, which are mounting to a point some producers consider withdrawing on some sizes. Coarser sizes of furniture spring wire are especially tight. Pressure for delivery is increasing and rationing of tonnage on a monthly basis is becoming more general. With few exceptions civilian tonnage has taken up equipment capacity opened by war cancellations, some exceptions being Signal Corps wire space. There is no easing of automotive pressure, including strikebound plants. In addition to immediate requirements most wire consumers also are seeking to build inventories, which is difficult in view of current filled schedules and pressure. Range of buying covers considerably broader range of products and specifications. For metal can keys and handles about 2500 tons of carbon steel wire was required during the first three quarters this year.

Pittsburgh — Sellers have orders on books for June delivery for some manufacturers' wire items, while most are

booked through this year on all sizes. Practically no cancellations have developed on merchant items and a heavy influx of new orders, exceeding production in some instances, is reported by some mills. Demand for alloy wire rods continues moderately below wartime levels, reflecting heavy inventories of fabricators in relation to curtailed demand. Output of wire items has not been increased much, with most steel producers placing emphasis on increasing production of other steel products. Order backlogs of fencing, barbed wire, nails and other merchant wire items are extended into February and March. To meet heavy pent-up demand for these items during the early reconversion period, sellers will have to control closely the distribution to jobbers and dealers.

Structural Shapes . . .

Structural Shape Prices, Page 181

Chicago — Structural fabricators are swamped to the point where they find themselves forced to avoid inquiries. Shortage of draftsmen and estimators and inadequate supply of steel are responsible. Shops are fully engaged to the limit of manpower. New inquiries continue to come out at an amazing rate and builders and contractors are unable to fathom the tight situation now that war work has ended. Some of the projects require several thousand tons each as industry seeks to build new plants and expand existing ones.

Pittsburgh — Mills are booked into January and February on standard structural items, while wide flange beams are obtainable in December. Output of structurals was hard hit recently by a strike at Carnegie-Illinois Steel Corp.'s Clairton works. However, overall production probably will show substantial gains, reflecting lifting of WPB building regulations. Railroads are already taking increasing tonnage of structural items and still further improvement is anticipated as freight car and locomotive shops increase production.

Philadelphia — At least one leading shape producer now is quoting January shipment, with others booked solidly into December and within another week or so will be out of the market for the remainder of the year. Not only are domestic requirements expanding but also export needs particularly for European rehabilitation and ship work.

Pig Iron . . .

Pig Iron Prices, Page 183

Lack of labor in foundries continues the choke point in pig iron melt in spite of the release of much manpower from war plants. Workers appear unwilling to take over jobs paying much lower wages than earned in war plants. Some increase in output of iron in the Chicago district will result in return of three idle furnaces to production. Castings orders are heavy, more than can be accepted.

Chicago — Prospects are that output of pig iron in this district will be increased within the next few days. Currently, only 34 of the 41 available blast furnaces are active. Inland Steel Co. was scheduled to return its No. 5 Indiana Harbor stack, down for repairs since June, to blast this week; Interlake Iron Corp. had similar plans for its Federal B furnace at South Chicago, out for relining Aug. 1; and Wisconsin Steel Co. has improved its coal supply to the point where one of its South Chicago stacks, out since Aug. 12, can resume shortly. Foundries are melting up to the limit of their inadequate manpower. Order backlogs are heavy and production behind schedule. Suppliers are pressed for iron and required to allocate carefully.

New York — Pig iron specifications are well sustained, with probability of still heavier movement this fall, especially if there is the expected easing in manpower among gray iron foundries. Outlook for steel foundries is not too promising, as backlogs are beginning to dwindle, but with most gray iron and malleable shops the situation is still highly encouraging. Most have far more orders on hand or in sight than they can handle. This is particularly true of soil pipe manufacturers. In fact, soil pipe is represented by Washington as being one of the principal bottlenecks in the metalworking field.

Boston — Fourth quarter pig iron melt, depending on foundry labor supply, is expected to be maintained with slight increases. Basic supply continues tight, all tonnage coming through Buffalo, one steel works getting iron by water. Inventories average not more than 30 days. Foundry grades about balance requirements with larger melt-

ers in the textile mill equipment industry subcontracting. In spots, as in the case of several foundries specializing in railroad castings, demand has not picked up as expected. While small lots of steelworks iron are coming into this area, the volume has not increased materially.

Pittsburgh — Revocation of WPB construction order L-41 is expected to increase operations of foundries supplying castings for furnaces, radiators and other household and building equipment. American Radiator & Standard Sanitary Corp.'s plant here, and Richmond Radiator Co.'s at Uniontown, Pa., are expected to share heavily in this demand. Other factors contributing to the tight supply situation in pig iron are expanding requirements from automotive interests, farm implement manufacturers and railroad equipment builders. There is also heavy inquiry for export, said to aggregate over 300,000 tons. Close check on pig iron inventories is probable for some time to prevent larger consumers from attempting to build up inventories.

RFC is offering for sale or lease a blast furnace unit at Chester, Pa., which was rejuvenated during the war and operated for a time by Pittsburgh Ferromanganese Co., a subsidiary of Pittsburgh Coke & Chemical Co., Pittsburgh. No new developments are reported as to the eventual status of another DPC blast furnace unit at Monessen, Pa., operated by Pittsburgh Steel Co.

Cleveland — Shortage of skilled foundry workers still limits consumption of pig iron, although melting schedules are increasing gradually. Foundries have a large volume of unfilled orders and will be able to increase operations as soon as labor is available. They are still limited to a 30-day supply of pig iron and have been able to replenish their stocks during the past two months because holidays reduced August to a 19-day melting month and September contained only 23 melting days. This inventory is considered a safe margin for the current rate of melt.

Cincinnati — Foundries in this district are trying to build pig iron inventories to the allowed 30-day supply and realize that even this is only slight protection against shipping lags that might develop during the winter. Deliveries now from northern furnaces are more prompt than from the South. The melt, with little change in manpower, is steady against insistent, heavy demand for castings.

Buffalo — Increased melt indicates that some foundries in this area have been able to obtain additional labor. The manpower problem, nevertheless, is a drawback on operations in general. Further decline is reported in shipments to Detroit motor foundries as a result of strikes, but no iron is being piled. Bethlehem Steel Co. plans to blow out a stack at the Lackawanna plant this week for repair.

Birmingham — On the basis of 18 blast furnaces operating, pig iron production is steady and supply is adequate. Pressure is being exerted for higher price since the increase in coke prices.

Philadelphia — Pig iron producers are viewing with concern the increasing labor disturbances in Pennsylvania soft coal mines. Should the recent strike of supervisors, with accompanying suspension of mining operations, be extended for only a short period some pig iron producers will be forced to bank furnaces. Meanwhile there is continued demand for foundry iron, with basic specifications holding up better than anticipated a month ago. A number of consumers have placed requirements for entire fourth quarter.

Scrap . . .

Scrap Prices, Page 184

Steel and iron scrap shows no signs of easing and in all consuming centers is scarce, with demand strong. Prices are at ceilings except occasionally in borings and turnings. Supply is far below needs and the labor situation in collection and preparation is not sufficient to provide needed tonnage. Allocated shipments from the Pacific Coast have disappeared with cancellation of special freight rates on such tonnage. Winter reserves are far from satisfactory in the case of most steelmakers. Scrap allocations by War Production Board will be terminated Sept. 30.

Pittsburgh — A leading mill entered the market recently for a fairly large scrap tonnage, paying full ceilings. This is the first new mill purchase of any consequence in about a month. Supply of scrap is low, including turnings as well as heavy melting steel and cast scrap. Strikes in automotive industry, coal mines and at Westinghouse Electric & Mfg. Co.'s plants are further restricting production scrap. The growing

shortage in turnings available to this area has been accentuated through the increased movement of this material to Youngstown district as a result of recent heavy purchases by Republic Steel Corp. and other large consumers.

Chicago — Good demand and ceiling prices continue for prime grades of open-hearth, electric furnace and foundry scrap. Steelmaking operations have climbed back almost to the level just prior to end of the war. This, plus the fact that inventories are not large, cold weather is not far away, and scrap is not too plentiful, contribute to a steady market. Some contend that the $16.75 paid for a small tonnage two weeks ago represents the market for machine turning bundles, but this grade has not been further tested. There is opinion also that short shoveling turnings would bring less than ceiling, but demand is lacking. Machine shop turnings hold at ceiling, short supply since the war ended contributing to the situation. Weakness persists in blast furnace grades, both demand and price-wise.

Buffalo — Although ceiling prices prevail on all scrap grades some concern is apparent among buyers and consumers as the principal melter here withholds buying pending outcome of current strikes. Scrap yard operators feel they cannot increase wages while prices are held to OPA ceilings. About 14,000 tons of scrap are scheduled to arrive this week by lake and canal.

St. Louis — Scrap shipments improved about 5 per cent last week to about 80 per cent of normal but unchanged labor shortage makes further improvement doubtful. For the first time in months there is no market for turnings and production has dropped 75 per cent; shipments to Chicago have ceased as contracts were filled and not renewed. Mill reserves are reported about 30 days, with little new buying. Dealer stocks are low and hampered by lack of labor.

Detroit — After a brief interval below ceiling, borings and turnings have reversed, due to short supply and are again quoted at ceiling. With continuing and spreading interruptions to production in automotive and parts plants, prospects are for further dwindling supply of scrap, darkening the outlook for fall and winter. Mill operations hold at good level, although alloy specifications are trimmed sharply, and buying is light as experiments continue on adapting NE steels to more automotive parts formerly taking full alloy analyses.

Los Angeles — With cancellation of land-grant rail rates on scrap allocated by WPB from Pacific shipyards, which has moved from southern California to the middle west on regular schedules for several months, local sales of this material are mounting. In lots of 5 to 25 tons, unprepared at public sales $6 to $8 per ton has prevailed. Mills and dealers have shared in this tonnage. The buying spurt is expected to last a month or longer. Mill stockpiles are normal. Collections are poor.

Cincinnati — Iron and steel scrap is firm although major buying is absent. Two outlets are definitely out of the market temporarily. Other mills accept scrap steadily and are fortified by adequate reserves. Some hesitancy is noted because of a heavy overhang of termination material. Foundries are anxious to build scrap inventories, and provide a steady market.

Cleveland — Tightness continues in scrap, all melters being in the market for tonnage but supply is small and little can be bought. Prices are firm at ceilings and show no sign of softening in any grades. Shipments are being continued against old orders but scrap available for new contracts is almost nonexistent. Blast furnaces are seeking their preferred grades in vain.

Birmingham — Most grades of steel scrap are in good supply, some being in substantial surplus, though ceiling prices are maintained. Cast scrap is in good demand at ceiling.

Philadelphia — Shortage of borings and turnings is increasingly pronounced and scarcity of cast grades is as marked as ever. Ability of at least one leading consumer to handle the increasing quantity of unprepared scrap now available is easing the situation somewhat in heavy melting steel. However, there still is considerable pressure for prepared scrap and prices are firm at ceilings. Labor disturbances have not resulted in important suspensions so far.

New York — Because of cessation of war work, with manufacturers not yet converted to civilian production in many cases, borings and turnings are in exceptionally low supply and insufficient to meet demand. Melting steel is moving actively, although one eastern Pennsylvania consumer has been forced to hold up deliveries because of labor troubles.

Warehouse . . .

Warehouse Prices, Page 182

Pittsburgh — Steel distributors report no important improvement in shipments from mills, except for plates and alloy items. However, with the exception of sheets and wide flange beams, warehouse inventories are in fairly good balance in face of reduction in daily average shipments from stock of 15 to 20 per cent in many instances since the end of the war. Many warehouse steel customers have reverted to prewar practice of obtaining steel from mill sources, but extended mill deliveries have retarded this trend somewhat.

Warehouse interests are in the same position as individual companies in the scramble for available steel production.

Chicago — Warehouses report a heavy influx of orders for steel in all forms, and with supplies coming in from mills slowly and in restricted quantities, they are hard put to serve customers adequately. Inventories are shrinking. Tightest of all products are cold-rolled galvanized sheets, carbon bars and light plates. Structurals also show signs of further tightening, a reflection of the growing volume of construction.

Increase Allowed on Copper Castings Prices

Office of Price Administration has allowed an increase of approximately 10 per cent in prices of copper and copper-base castings, effective Oct. 1. The order provides increase to net price of 4 cents per pound if the price before the increase is less than 25 cents per pound; 3½ cents from 25.01 to 30 cents; 3 cents on 30.01 to 35 cents; 2½ cents on 35.01 to 40 cents; 2 cents on 40

cents or more per pound.

The increases can be added only on unadjusted prices and not on those under individual adjustment orders allowed by OPA.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2600 tons, for Liquid Carbonic Corp.: 1400 tons in soda fountain building, Chicago; 450 tons in building addition, Chicago; and 750 tons in manufacturing building, Morrison, Ill., to American Bridge Co., Pittsburgh.

1500 tons, F. & M. Schaefer Brewing Co., Brooklyn, to Harris Structural Steel Co., New York.

1200 tons, research department building, Hammond, Ind., for Standard Oil Co., to Joseph T. Ryerson & Son Inc., Chicago; bids Aug. 27.

500 tons, warehouse, Chicago, for Lafayette Steel Corp., to American Bridge Co., Pittsburgh.

450 tons, fabricating plant, Chicago, for Ceco Steel Products Corp., to Wisconsin Bridge & Iron Co., Milwaukee.

430 tons, four-story plant addition and office building, Remington-Rand Co., South Norwalk, Conn., to Bethlehem Steel Co., Bethlehem, Pa., through E. & F. Construction Co., Bridgeport, Conn., general contractor.

400 tons, paint and test building, La Grange, Ill., for Electro Motive Division, General Motors Corp., to American Bridge Co., Pittsburgh; bids Sept. 14.

250 tons, theater, Philadelphia, to Bethlehem Fabricators, Bethlehem, Pa.

105 tons, plant building, Metals & Controls Corp., Attleboro, Mass., to Groisser & Shalger Iron Works, Boston, through Rowley Construction Co., Pawtucket, R. I., general contractor.

STRUCTURAL STEEL PENDING

10,000 tons, Cerritos Channel bridge, Terminal Island, Calif.

2000 tons, Navy administration building and laboratory, White Oak, Md.; bids Oct. 10.

300 tons, powerhouse, Strang, Tex., for E. I. duPont de Nemours & Co.

300 tons, state bridge, Paterson, N. J.

300 tons, crane runway, General Motors Corp., Trenton, N. J.

300 tons shapes and 150 tons fabricated pipe, pumping station for Philadelphia water department at Torresdale, Pa.; bids Oct. 3.

200 tons, Coop office building, St. Paul; bids Sept. 25.

150 tons, state bridge, Morgan, N. J.

140 tons, crane runway for Parrish Pressed Steel Co., Reading, Pa.

100 tons, building, Chicago, for South Shore National Bank.

100 tons, freight house, Chicago, for Chicago, Milwaukee, St. Paul & Pacific railroad.

Unstated, addition to factory, Florsheim Shoe Co. Inc.; bids Oct. 1.

Unstated, $500,000 plant, for Beall Pipe & Tank Co., Portland, Oreg.

Unstated, bridge over Coweman river, Washington state, by State Highway Commission; plans in preparation.

REINFORCING BARS . . .

REINFORCING BARS PLACED

950 tons, race track, Atlantic City, N. J., to Carnegie-Illinois Steel Corp., Pittsburgh.

103 tons, four-story plant addition and office building, Remington-Rand Co., South Norwalk, Conn., to Fireproof Products Co., through E. & F. Construction Co., Bridgeport, Conn., general contractor.

REINFORCING BARS PENDING

715 tons, mesh and bars, bridges and highway projects, State Highway Commission of New Jersey; bids opened Oct. 3 and 10, at Trenton, N. J.

PIPE . . .

CAST IRON PIPE PENDING

100 tons, various sizes, two Seattle improvement projects; general contracts awarded.

PLATES . . .

PLATES PLACED

350 tons, including shapes, West Myrtle St. elevate dsteel water tank, Seattle, to H. D. Fowler, Seattle, for Pittsburgh-Des Moines Steel Co.

RAILS, CARS . . .

RAILROAD CARS PLACED

Canadian National, 500 fifty-ton box, to Eastern Car Co., Sydney, N. S.

Chicago, Rock Island & Pacific, 1000 fifty-ton auto body cars, to own shops.

Chicago, Burlington & Quincy, 1500 freight cars, to own shops; included are 500 fifty-ton box, 500 fifty-ton automobile, 300 fifty-ton hopper, 100 seventy-ton flat and 100 box cars.

Chicago & North Western, 2400 cars, including 400 for its subsidiary, the Chicago, St. Paul, Milwaukee & Omaha; 800 fifty-ton box cars to General American Transportation

Co., Chicago; 500 fifty-ton box, to Pullman-Standard Car Mfg. Co., Chicago; 300 flats to Mt. Vernon Car & Mfg. Co., Mt. Vernon, Ill.; 800 seventy-ton gondolas to Bethlehem Steel Co., Bethlehem, Pa.

New York Central, 750 seventy-ton covered hopper cars, to Despatch Shops, East Rochester, N. Y.

Northern Refrigerator Line, 500 forty-ton refrigerator cars, to Despatch Shops, East Rochester, N. Y.

Pere Marquette, 300 freight cars, 200 fifty-ton box cars to the Ralston Steel Car Co., Columbus, O., and 100 seventy-ton hoppers, to Greenville Steel Car Co., Greenville, Pa.

Southern Pacific, 3500 freight cars, including box, auto box, hopper and gondola types; 1000 to Pressed Steel Car Co., Pittsburgh; 900 to General American Transportation Co., Chicago; 600 to Pullman-Standard Car Mfg. Co., Chicago; 550 to Bethlehem Steel Co., Bethlehem, Pa.; 250 to American Car & Foundry Co., New York; 200 to Ralston Steel Car Co., Columbus, O.

St. Louis Southwestern, 50 seventy-ton flats, to own shops.

Western Maryland, rebuilding of 300 fifty-ton box cars, to Bethlehem Steel Co., Bethlehem, Pa.

Veterans Can Regain Jobs Without Joining Unions

(*Concluded from Page* 81)

relieved from military training and service or from hospitalization continuing for a period of not more than one year.

7. If the veteran's position was in the employ of a private employer and the employer's circumstances have not so changed as to make it impossible or unreasonable to reinstate the veteran to his old position or to a position of like seniority, status and pay.

The handbook points out that one question provoking discussion in recent re-employment cases is the "impossible on unreasonable" provision of the law as it applies to the employer's circumstances when the veteran returns and seeks reinstatement.

The Selective Service Act provides that the veteran will be reinstated unless the employer's circumstances have so changed as to make it "impossible or unreasonable" for the employer to do so. The contention has been advanced that reinstatement of a veteran would be "impossible or unreasonable" if his re-employment displaced a nonveteran with greater seniority. The Selective Service interpretation meets this issue with the statement that the "impossible or unreasonable" clause applies only to the employer and that "consequences to third parties are not involved." The controversial clause "cannot be applied to cover the effect of restoration of the veteran on third persons, such as other employees," the Selective Service policy states.

Reconversion Progresses Despite Labor Troubles

(*Concluded from Page* 82)

United States produced $186 billion worth of weapons and supplies for war and more than doubled the nation's industrial output, according to WPB figures. America not only overwhelmed its foe but out-produced all its allies as well.

Summarizing the war production record from July 1, 1940, to July 31, 1945, Mr. Krug said this country had produced: 297,000 airplanes, including 97,000 bombers; 71,060 warships that made the United States Navy greater than the combined navies of the rest of the world; 315,000 pieces of field artillery and mortar; 5425 Maritime Commission vessels totaling 53.2 million deadweight tons (including vessels constructed for the armed services); 4 million tons of artillery ammunition and 6 million tons of aircraft bombs; 86,388 tanks and 16,018 tank chassis for self-propelled guns; $3.7 billion of radar equipment.

Expenditures included: $44.4 billion for aircraft; $10.8 billion for guns and fire control; $19.7 for ammunition; $21.5 billion for combat and motor vehicles; $10.6 billion for communication and electronic equipment; $38.1 billion for other equipment and supplies.

Mr. Krug noted that national output rose from less than a $90 billion annual rate in 1939 to a $207 annual rate just before the German collapse. Industrial employment rose from 10,151,000 in 1939 to 16,588,000 in 1944.

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON—Ohio Bell Telephone Co., 750 Huron Rd., Cleveland, will build a one-story 51 x 56-foot telephone exchange addition on Massillon Rd., to cost $60,000.

CLEVELAND—Celotex Corp., N.B.C. Bldg., Bror Dahlberg, president, has plans for post-war expansions costing over $5 million.

CLEVELAND—Chip-Chop Mfg. Co. Inc. has been incorporated with $5000 capital and 250 shares no par value to manufacture food chopping machinery, by A. W. Haiman, 309 Citizens Bldg., and associates.

CLEVELAND—Massa Laboratories Inc. has been incorporated with 250 shares of $400 value each to manufacture electronic parts at 3868 Carnegie Ave.

CLEVELAND—Laminated Plastics Inc., 6901 Morgan avenue, has been incorporated with $500 capital and 5000 shares no par value to manufacture plastics, chemicals, wood and metal products, by Roger B. White, formerly vice president of Lewis Welding & Engineering Corp., Bedford, O.

DELAWARE, O.—Delo Screw Products Co., 39 South Franklin Ave., has bought a site at 307 Park avenue for a new plant. William Russell is general manager. Plans are by Roland Rosser, Dayton, O.

SALEM, O.—Denning Co., pump manufacturer, will build a turbine factory building costing $78,500, on South Ellsworth Ave.

WARREN, O.—City is having plans prepared for a steel elevated water tank to cost about $80,000 and will take bids soon.

YOUNGSTOWN—Storm Sash Co., care W. E. Ballentine, 1817 East High Ave., manufacturer of storm sash and metal awnings, will remodel former plant of Sheet Metal Mfg. Co., West Federal St., and move operations there. Plant contains 25,000 square feet and operations will be expanded to double.

YOUNGSTOWN — Gas Generator Equipment Corp. has been incorporated with $500 capital and 250 shares no par value to manufacture artificial gas equipment, by M. E. Dinow, 1010 Market St., and associates.

MICHIGAN

BAY CITY, MICH.—United Carbon Products Co., 508 McGraw St., has been incorporated with $15,000 capital to manufacture carbon and related products, by Lynn Brooks, 900 Cass Ave., Bay City.

DETROIT—Miracle Cooler Container Inc., 623 Barlum Tower, has been incorporated with $3000 capital to manufacture liquid dispensing cooler containers and accessories, by Gerald Denomme, 1129 Wayburn St., Grosse Pointe Park, Mich.

DETROIT—Michigan Screw Products Corp., 2-135 General Motors Bldg., has been incorporated with $100,000 capital to manufacture tools, dies, fixtures, jigs and screws, by Clark D. Matthews, at above address.

LANSING, MICH.—Atlas Drop Forge Co., 112 East Allegan St., has been incorporated with $100,000 capital to do general manufacturing, by Brown-Lipe Gear Co., 4100 Bennett Rd., Toledo, O.

MARYSVILLE, MICH.—Detroit Edison Co., 2000 Second Blvd., Detroit, has plans for a 100,000 hp turbogenerator and boiler house addition to Marysville power plant, estimated to cost about $3.

STURGIS, MICH.—Marvel Trailer Parts Co., 14608 East Seven Mile Rd., Detroit, plans a plant to cost about $100,000.

STURGIS, MICH.—Mid-West Tool & Cutlery Co., 403 South Jefferson St., has been incorporated with $50,000 capital to manufacture tools, cutlery and similar products, by E. W. Smiley, 401 South Nottawa St., Sturgis.

WYANDOTTE, MICH.—Candela-Carolin Inc., 3715 Eleventh St., has been incorporated with $1000 capital to conduct a general foundry and manufacturing business, by Joseph Candela, 328 North Dr., Wyandotte.

ILLINOIS

CHICAGO—National Steel Cabinet Co., 2415 North Pulaski Rd., plans a one and two-story plant, 75 x 125 feet. Dubin & Dubin, 127m North Dearborn St., are architects.

CHICAGO—Semi-Steel Test Foundry Co., 901 Kilpatrick Ave., has let contract to Freeol-Smedberg Co., 5807 West Chicago avenue, for a one-story 39 x 135 and 144 x 237-foot plant, to cost about $95,000. A. E. Krieg, 180 Maplewood St., Riverside, Ill., is architect.

CHICAGO—Central Pattern & Foundry Co., 3737 South Sacramento Ave., lost its plant by fire, with damage of $50,000.

DANVILLE, ILL.—Consolidated Products Co. will build a one-story factory building 100 x 350 feet, costing $35,000, adjoining its present plant.

GALESBURG, ILL.—Victor Casket Hardware Co., 560 South Chambers St., has let contract to Howard R. Fox, 75 Maple Ave., for a two-story 45 x 160-foot plant addition costing about $60,000. J. A. Scribbins Jr., 504 Bondi Bldg., is architect.

WEST FRANKFORT, ILL.—City, City Hall, has preliminary plans for a sewage disposal plant and increased collection facilities to cost about $500,000. E. G. Hurst, Hillsboro, Ill., is engineer.

INDIANA

NEW ALBANY, IND.—Gunnison Homes Inc., subsidiary of United States Steel Corp., will build a $1 million plant for manufacture of prefabricated steel houses, according to Foster Gunnison, president. Output is planned for 1650 houses annually by early 1946.

TIPTON, IND.—Kingston Products Co., B. M. Guthrie, president, will build plant for manufacture of commercial and domestic stokers, beginning production Jan. 1.

MARYLAND

BALTIMORE—Maryland Steel Products Co. is building a one-story addition 80 x 171 feet

for fabrication of structural steel.

BALTIMORE—Crown Cork & Seal Co. plans additional machine shop facilities here at cost of $1,250,000; new plant at Atlanta, Ga., costing $1 million and new plant near San Francisco costing $1,250,000.

BALTIMORE — Brooklyne Chemical Works, Ninth St., Brooklyn, manufacturer of copper sulphate, has bought five acres adjacent to its plant and is building an addition 60 x 202 feet.

BALTIMORE—Revere Copper & Brass Inc., 1301 Wicomico St., has let contracts for additions, including a charcoal storage building.

BALTIMORE—Rustless Iron & Steel Corp., 34 East Chase St., will spend about $400,000 for enlargement and rearrangement of its cold-rolled shape mill, in addition to other projects already announced, bringing its program to $2,440,000.

BALTIMORE—Standard Gas Equipment Corp., Bayard and Hamburg Sts., manufacturer of gas ranges, water heaters, etc., has let contract for a one-story 138 x 140-foot warehouse.

BALTIMORE — Maryland Engineering Co., 1326 Reiserstown Rd., manufacturer during the war of portable radio towers, cabinet cases, etc., is building a one-story 96 x 120-foot addition to its woodworking plant.

MISSOURI

ROLLA, MO.—Missouri University takes bids Oct. 9 on construction and equipment of a heating and power plant for School of Mines and Metallurgy here. Mann, Koelle & Carroll, 318 North Eighth St., St. Louis 1, are architects.

ST. LOUIS—American Fixture & Mfg. Co., 2300 Locust St., through its subsidiary, Amfesco Investment Co., has let contract to L. O. Stocker Co., 806 Olive St., St. Louis, for a one-story factory building 200 x 251 feet, 26 feet high, at 5400 Bircher Blvd.

ST. LOUIS—Fruehauf Trailer Co., 2122 Chouteau Ave., has let contract to Collins Construction Co., Kansas City, Mo., for a one-story trailer plant 122 x 420 feet, to cost over $180,000.

OKLAHOMA

BARNSDALL, OKLA.—Great Lakes Pipe Line Co. will build 600 miles of 8-inch pipeline from Barnsdall to Kansas City, Mo., and Sioux Falls, S. Dak. Contract has been let to D. C. Bass & Son, Enid, Okla., for terminals.

WISCONSIN

CUDAHY, WIS.—Reynolds Machine Co. has bought a plant on South Packard Ave. which will be remodeled for its plant, to which it will remove gradually.

MADISON, WIS—Schoelkopf Mfg Co., manufacturer of automatic door operators, plans one-story plant 60 x 160 feet. Livermore & Samuelson are architects.

MILWAUKEE—Blatz Brewing Co., 1120 North Broadway, Frank M. Gabel, president, has plans for $3,500,000 expansion program to increase from 1,100,000 to 2,250.000 barrels per year, including five-story bottling plant and three storage buildings. Machinery and equipment will cost an additionl $1 million.

MINNESOTA

MINNEAPOLIS—Douglas Co., 1126 South Seventh St., manufacturer of metal specialties, has let contract to Holm-Johnson Co. for a one-story machine shop addition 40 x 55 feet.

MINNEAPOLIS—Champion Portable Mill Co., 2107 Como Ave. SE, manufacturer of portable feed mills, has let contract to W. A. South Co. for a one-story plant addition.

MINNEAPOLIS—Minneapolis Plastic Moulders Inc., 2300 East 31st St., will let contract soon for a one-story plant 90 x 200 feet at 4411 Hiawatha Ave.

MINNEAPOLIS—Minneapolis Brewing Co., Charles E. Kiewel, president and general manager, 1215 Northeast Marshall St., plans an addition to its bottling plant.

MINNEAPOLIS—Northwestern Bell Telephone Co., Frank Bracelyn, vice president and general manager, has plans for a $45 million expansion and improvement program in Minnesota and adjoining states, $9 million each for five years.

MINNEAPOLIS—Twin City Adjusta-Post Co., 2438 Bloomington Ave., has been organized to manufacture adjustable posts for supporting floors, by R. W. Russell, formerly in charge of Rockford, Ill., branch of Steel Warehousing Corp., Chicago.

MINNEAPOLIS—Northern States Power Co., H. C. Cummins, vice president in charge of operations, has plans for extensions and improvements costing $25 million over five years, including new power plants in Minnesota and Wisconsin.

TEXAS

EL PASO, TEX.—El Paso Natural Gas Co., El Paso, has plans for gas compressor station at Hobbs, N. Mex., costing $750,000; dehydrating station at Jal, N. Mex., costing $1 million; gas purification plant at Jal, costing $5,500,000.

SOUTH DAKOTA

HURON, S. DAK.—Dakota Distilling Co., V. E. Britton, president, will convert industrial alcohol plant to beverage alcohol and whiskey, at cost of $250,000, including bonded warehouse 100 x 300 feet, grain dryer and elevator of 250,000 bushels capacity, cistern room with four 6000-gallon stainless steel vats, rectifying plant, bottling plant and 70-foot conveyor to boiler room.

NEBRASKA

LINCOLN, NEBR.—University of Nebraska, board of regents, will open bids Oct. 4 for a 3000 kw steam turbine generator and surface condenser.

IOWA

DUBUQUE, IOWA—Virginia-Carolina Chemical Co., Richmond, Va., plans erection of a chemical plant here this fall.

FOREST CITY, IOWA—City, W. C. Haugland, clerk, will open bids Oct. 11 for addition and equipment at municipal power plant, including diesel generating unit and auxiliaries. Stanley Engineering Co., Muscatine, Iowa, is engineer.

CALIFORNIA

BURBANK, CALIF. — William Vaughan is building a machine shop at 249 North First St., 50 x 84 feet, to cost about $10,000.

LONG BEACH, CALIF.—Coast Aircraft Co. has been incorporated with $75,000 capital by Kenneth L. Houston and associates. Philip W. McCaughan, Heartwell Bldg., Long Beach, is representative.

LOS ANGELES—Trojan Metal Products is building a shop at 1550 East Slauson Ave., Florence District, 43 x 50 feet.

LOS ANGELES—Seaboard Coil Spring Co., 1731 South Wall St., has let contract for a plant addition 98 x 146 feet, to cost about $45.000. Buttress & McLellan, 1013 East Eighth St., are contractors.

SAN DIEGO, CALIF.—National Iron Works, 2625 East Belt St., is rebuilding its steel shop to enlarged dimensions of 60 x 180 feet, at cost of $10,000.

VAN NUYS, CALIF.—A. H. Russell is building a sheet metal shop at 15011 Oxnard St., 25 x 75 feet, to cost $5000.

OREGON

PORTLAND, OREG.—California Asphalt Corp., subsidiary of Standard Oil Co. of California, plans construction here of a refinery with capacity of 4000 to 5000 barrels, to cost $1 million.

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The more than one thousand Schneible Multi-Wash Dust Collectors now installed, if operated simultaneously, would completely remove dust and fumes from 12,000,000 cubic feet of air per minute.

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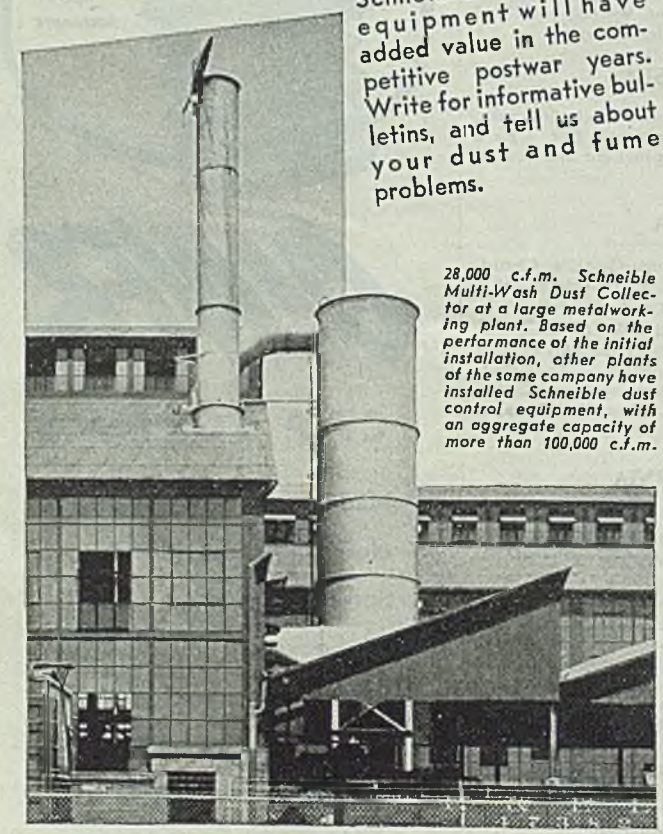

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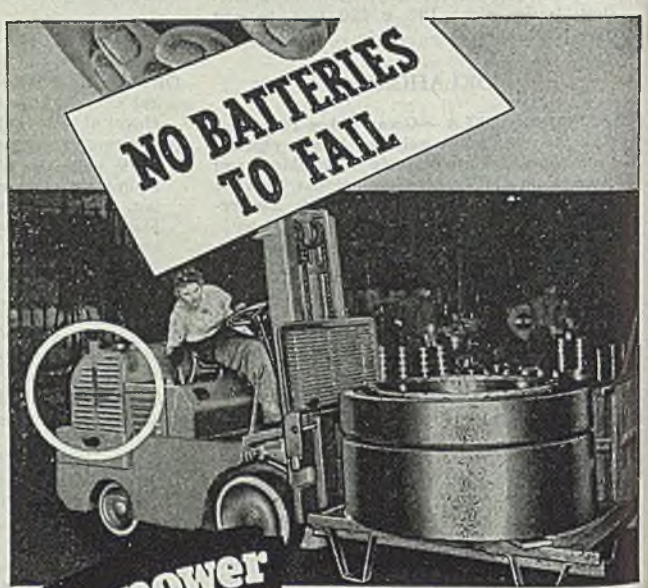

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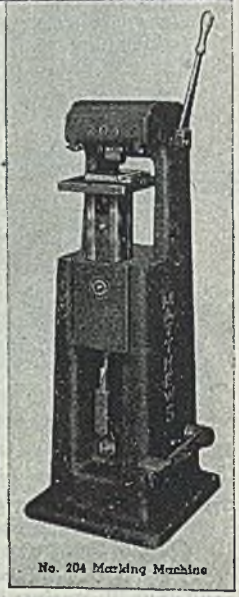

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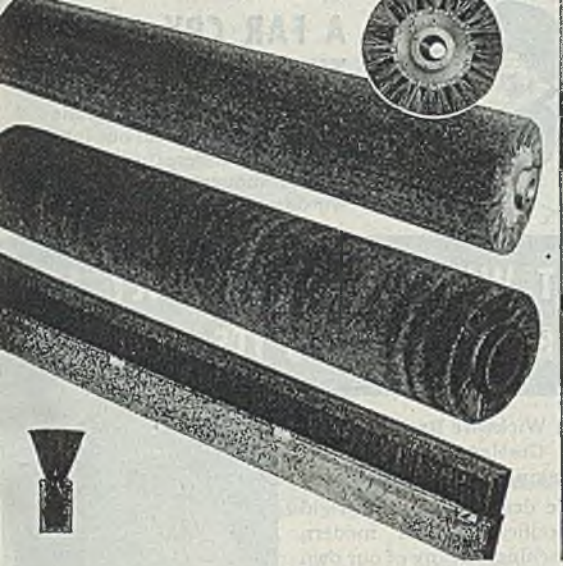

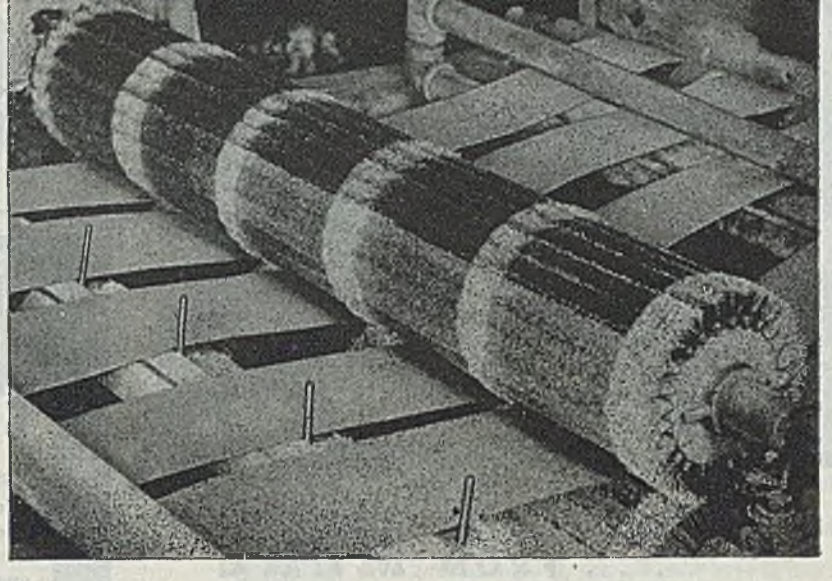

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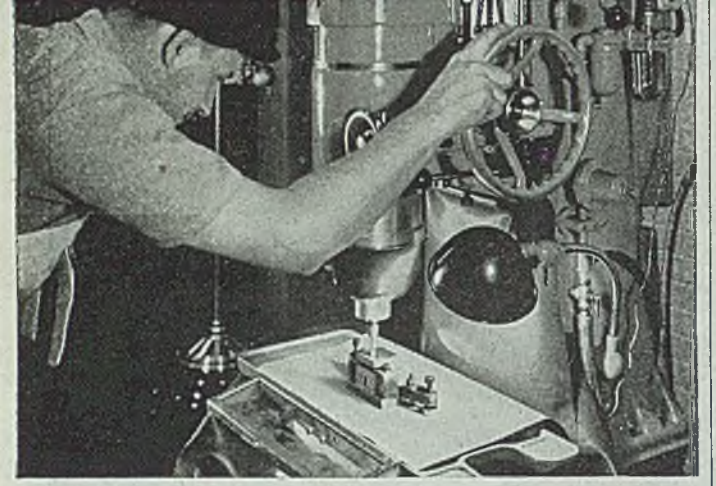

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Mechanical Engineers, Designers and Draftsmen, experienced in material handling, crushing, power plants, hoisting, and problems peculiar to mining and smelting.

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WANTED: FINISHING ROOM SUPERINTENdent. Southwestern Steel Foundry. Address Box 190, STEEL Penton Bldg., Cleveland 13, O.

WANTED: CONSTRUCTION SUPERINTENdent-General Foreman-Carpenter Foreman. Give references and salary requirement. Address Orval Wessner, P. O. Box 2057, Milwaukee, Wis.

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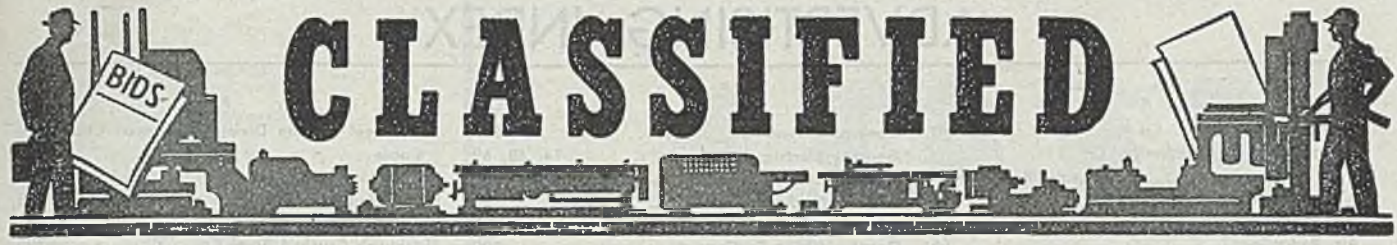

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