STEEL
FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW

Contents

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As the Editor Views the News

AUTOMOBILE output has turned the corner and orders for materials and parts are being placed with mills and manufacturers, but these bookings materialized too late to prevent a noticeable sag in the rate of steelworks operations. Steelmaking activity last week dropped to 66 per cent of capacity (p. 62), reflecting the fact that the old backlogs melted away faster than new business was scheduled. Developments during the next few weeks will show whether general demand, accumulating around the nucleus of automotive requirements, will be sufficient to support a sustained fall expansion of business. Last year's drive (p. 74) got under way early in October.

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Contributing to the bulk of this issue of STEEL is a 104-page section (pp. 137-240) devoted to the nineteenth National Metal Congress and Exposition. This annual event, sponsored by the American Society for Metals and participated in by the American Welding society, the Wire association and divisions of the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers, has become the outstanding function of its kind in the metalworking industries. This year's event at Atlantic City will reflect in technical programs and the displays of 230 exhibitors contemporary progress in a period of unusual technological and commercial achievement.

All Ready for Metal Congress

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The business of gathering, preparing, classifying and selling iron and steel scrap has been undergoing drastic changes in recent years. Increasing production of alloy irons and steels has made it necessary to refine the methods of handling scrap material (p. 55) and this has presented new problems to iron and steel consumers, to scrap dealers and to those who purchase scrap for consumption. Alloy scrap—once considered a nuisance—today demands a premium when it can be sold with a reasonable guarantee of its alloy content. In the larger fabricating and manufacturing plants, scrap now is segregated and sold so as to attract the highest going prices. It is quite possible that more systematic sorting and handling in some smaller establishments would yield higher returns and at the same time would provide new sources of supply for certain grades.

Evolution in Scrap Business

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Machine tool dealers in the Detroit area recently held a dinner which might well serve as a pattern for similar events in other important market centers. The 150 in attendance comprised (p. 57) not only dealers and their salesmen but also machine tool salesmen who sell direct. As pointed out by Tell Berna, general manager of the National Machine Tool Builders' association, machine tool builders buy from each other and thus are customers of one another, as well as competitors. In an industry as closely-knit as the machine tool industry, it is desirable that salesmen develop the same co-operative, friendly spirit which is characteristic of the builders. Incidentally, Mr. Berna's message to the Detroit area sales corps is well worth reading.

Two Kinds of Salesmen Meet

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Few transactions in the metalworking industries involve as many potential grounds for misunderstandings as the purchase of sheet metal stampings. Most of the chances for difficulty arise from problems in connection with the dies in which the stampings are formed. No one can read the 12-point discussion of this subject (p. 76) by an automotive purchasing official without realizing that a clear-cut, fully understood contract is the key to harmonious relations between buyer and seller . . . . Members of the Farm Equipment institute last week were told that sales of farm equipment in 1937 may equal if not exceed the 1929 total. Important factors (p. 59) are a sharp decrease in farm indebtedness, an increase in farm income and a trend toward smaller equipment such as "baby" tractors and combines. In this, automotive farm equipment is retracing the steps of the standard passenger automobile.

Good Contract Saves Trouble

E. L. Shaner

Remember...seamless steel tubing CUTS MACHINING COSTS

Machining costs often can be cut remarkably by using PITTSBURGH Seamless Steel Mechanical Tubing instead of solid stock or forgings for the manufacture of small machine parts. A tubular blank saves much unnecessary and wasteful cutting, and besides, provides the added advantage of strength with lightness.
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STEEL MECHANICAL TUBING

How Producers, Consumers Are Solving Problem of Alloy Steel Scrap

INCREASED production of alloy steels in recent years has brought great changes in the handling of scrap. This trend has become pronounced as a result of the tight situation in the scrap market recently.

The changes come under two heads—those dictated by producers of scrap, and those dictated by consumers.

Many large metalworking companies have given to scrap the same attention that they give to manufacturing operations. Many of them now are handling and preparing their scrap and selling it direct to consumers.

A large autobody plant which formerly shipped 200 cars of loose sheet clippings per month for preparation and reshipment to consuming plants now is shipping the same tonnage of hydraulic bundles in 50 cars a month, and direct to consuming plants. Additional switching charges thus are eliminated and the company is receiving a greater revenue for its scrap.

All automobile and parts companies now prepare their scrap. This also is true of a great many other metalworking companies.

The other important change has come about because consumers must know the analysis of scrap before they can use it. In the early days of the present alloy steel era alloy scrap was considered a nuisance factor. It was mixed with plain carbon scrap, a practice that eventually had to be eliminated because it interfered with consumers' control of product analyses.

Today alloy steels are separated carefully from the ordinary run of scrap, classified in accordance with analyses and sold as such. This is a simple matter in connection with the scrap produced at metalworking plants. Producers have made great progress in classifying their scrap by analyses acceptable to consumers. In many instances, as with stainless steel, high-speed tool steel and other grades, they return the scrap direct to the mills from which they bought the material.

An example of the trend toward classification by analyses is found in the experience of one large company in handling its sheet scrap. It bundled this scrap without respect to silicon content, with the result that the disposal of the bundles became a problem.

Analysis Guarantee Brings Premium

Now it is keeping the high silicon separate from the plain carbon sheet scrap and is selling two classifications of hydraulic bundles. Because the analysis is guaranteed, the high silicon bundles are bringing a premium from mills that can use them.

Classification by analysis is practiced by many companies to a high degree. One large automobile company which formerly sold "turnings" now offers "low phosphor and low sulphur" and "high sulphur" turnings and gets a better price by so doing. It classifies flashings as "alloy free," "analysis not guaranteed," "½ nickel minimum" and "3 per cent nickel minimum."

In no branch of the scrap market have these changes been more significant than to the scrap dealer. A knowledge of metallurgy now is vital to the dealer who keeps abreast of changing requirements and customs. Out of this condition has come a new type of dealer, the specialist, who fills an essential purpose in the effective distribution of scrap.

An example of how these specialists function is reflected in stainless steel scrap. Much of this stainless scrap is new material produced in the fabrication of stainless steel products, and shipped back to the

Bundled scrap: Many large metalworking companies now are preparing and shipping their scrap direct to consumers. A larger proportion of scrap is being separated and prepared, according to analysis

mills at prices agreed upon by mill and customer.

But a lot of scrap stainless steel comes to the market both in rolled and cast form and here is where the specialist comes in. The rolled scrap usually averages 0.06 to 0.15 carbon and must be sorted into such classifications as 18-8, 25-12, 25-20 chromium-nickel. There are the various straight chromium analyses with different carbon contents. There are stainless steel castings of various analyses and with carbon ranging from 0.20 to 0.50 or more.

Some of the specialists sort the material as far as practicable and then melt the miscellaneous stainless steel scrap, reducing the carbon and pouring the metal into ingots which, because their analysis is known and guaranteed, command a good price.

The specialists serve in many other ways. An example is the proper sorting of high-speed tool steel which, due to the present surge in the tungsten market resulting from the hostilities in China, is an active grade. Some high-speed tool steel contains cobalt, an item which brings a premium if the amount of cobalt contained is known.

Difficulty With Auto Scrap

A good many problems remain to be solved in the classification of scrap by analysis. This is particularly the case with automobile scrap. Whereas the automobile and parts manufacturers are able to get full prices for their scrap because they are able to guarantee analyses, the story changes when the worn out cars are dismantled at wrecking plants all over the country.

Some of this scrap can be classified. Motor blocks, once considered as off-grade cast, recently have found a number of outlets at premium prices. But many parts running high in nickel and other alloys, such as gears, shafts and axles, currently are mixed with No. 2 melting steel. This is because no economical method for classifying these parts by analysis in the scrap yard yet has been uncovered.

The problem is made more difficult by the fact that there is nothing uniform or stable about the alloy specifications of the automobile and parts companies. Hence, effective disposition of alloy scrap from worn out automobiles is a problem. At present its inclusion in No. 2 melting steel frequently is cause for complaints by buyers.

Nickel steel scrap is another grade which requires careful sorting. Much of it is classified at metalworking plants and is shipped back to the originating mills. Much comes to the market from miscellaneous sources. As a rule this scrap brings the No. 1 heavy melting steel price plus a differential for each unit of nickel contained. Domestic buyers usually insist that nickel steel must not contain more than 0.05 to 1 per cent chromium. On the other hand, foreign buyers vary the chromium maximum.

Manganese steel scrap at all times is in good demand. The minimum manganese content is 13 per cent or more and easily can be determined by the fact that a magnet will not pick it up.

Some consumers now are buying scrap for vanadium and molybdenum contents. One mill is paying premiums for molybdenum scrap of guaranteed content. The market on such alloy scrap is not clearly defined.

Cast iron borings no longer are in a blanket classification. Many consumers require special borings to meet individual process or product requirements. This now is a business for special handling.

One large automobile company, for example, classifies cast iron borings for chemical use. These are free from oil and cutting compounds and are kept dry and clean by covering them with tarpaulins.

One of the changing trends in the scrap iron and steel industry is reflected in railroad scrap. The railroads at one time were the biggest sources of alloy free scrap. With the increasing use of alloy steels by the railroads the scrap emanating from such sources has to be watched carefully for correct sorting.

One of the existing problems in the scrap field for which there is no apparent solution is tin contamination. New tinned scrap is sent to detinning plants where the tin and steel are separated and sold as such. But it does not pay to detin old scrap and no consumers will accept tin contaminated scrap. As a result, old tin cans, tinned refrigerator parts, tinned milk cans and similar scrap eventually go to refuse dumps and are lost.

Copper Must Be Segregated

A problem also exists in reference to copper. This element is present in copper bearing steel and finds its way into scrap mixtures in the form of copper rivets, copper clad steel sheets and in other ways. Where the scrap can be segregated so that its copper content is definitely known it finds a market with the steel companies that produce copper bearing steel. When such segregation cannot be effected headaches result.

Another problem exists in respect to terne plate scrap. Usually there is not sufficient lead on the terne plate to warrant the expense of recovery. On the other hand, when terne plate is melted in an open-hearth furnace, the lead causes deterioration of the furnace bottom. As a result much of this group goes to the dump.

Another scrap item which represents a problem is porcelain enameled sheet and strip steel. In some European countries it is the practice to have men chip off the enamel with a hammer. This practice is too costly in the United States. Here porcelain enameled scrap has no outlet and goes on dump piles where it represents a total loss.

Power plant of the Schiavone-Bonomo scrap preparation yards in Newark, N. J. Photo courtesy Esso Oilways

Predicts Pacific Coast Steel Production

"The day is not far off when steel will be produced on the Pacific coast," said R. C. Allen, Cleveland, president, American Institute of Mining and Metallurgical Engineers, on a visit to San Francisco to confer with mining leaders regarding plans for the industry's participation at the 1939 Golden Gate international exposition.

Although steel manufacturing will never become a major industry in the West owing to the light and scattered deposits of iron, it is none the less inevitable that some production will take place on the West coast, due to cheap electric power, according to Allen.

Machine Tool Distributors Hear of "Perfect Examples"

MEMBERS of the Detroit Area Associated Machine Tool Dealers held a dinner Friday, Oct. 1 at Dearborn Inn, Dearborn, Mich. They invited not only the dealers and salesmen who handle machine tools in that district, but also machine tool salesmen who sell direct. With over 150 present, the meeting represented practically the entire personnel that distribute machine tools in the Detroit area.

Tell Berna, general manager, National Machine Tool Builders' association, spoke of the distinctive character of the machine tool industry that made possible a meeting of that kind. He pointed out that in some industry gatherings, all of those who come are competitors with each other, and that it is sometimes difficult for them to realize how much is to be gained by developing a community of interest. Machine tool builders, however, buy from each other, and consequently are not only competitors but customers and friends, which has developed among machine tool builders a co-operative spirit that might be developed among their salesmen as well.

He stressed the fundamental importance of the machine tool industry, pointing out the fact that although it is relatively small compared to other large giants of the American industrial structure, all other industries depend on machine tools for the better.

"Propaganda issued from time to time by those who are swayed by surface indications and do not think through to the logical result of the installation of new equipment, is likely to lead to serious misunderstanding, and if it wins popular support, to harmful legislation that will handicap the very industries to whom we must look for continued employment and an extension of a higher standard of living," he said.

"If we want a perfect example of what the handcraft system can do for a nation, we need only look to India or to China, where mechanization is practically an unknown factor. If we want an example of what happens with government regulation of wages, hours and prices, with government bureaus checking closely on the detailed policies of manufacturing industries, we have only to look at Germany and Italy.

Points to Results

"If we want an example of the logical extreme in this direction, with government not only directing but possessing factories and mills and setting up in detail the conditions of life for workers and managers of industry alike, we need only look at Russia, and it is a significant thing that in all of these nations government is having an extremely difficult time in affording to the average citizen decent clothing, good housing and good food, to say nothing of the luxuries of life which American citizens have come to regard as indispensable."

Mr. Berna further pointed out that responsibility of machine tool salesmen, whether they be dealer salesmen or direct salesmen, in furthering an understanding of the importance of the industry and in developing a better sales technique in handling machine tools.

"We are extremely watchful of manufacturing costs," he said. "We are not only prepared to consider changes in the improvement, in the design and manufacture of our machines, but confidently expect these changes and look forward to them as a perfectly normal part of our work.

"There is no reason why there should not be a corresponding watchfulness on the cost of selling, as well as a readiness to admit that improved sales methods are not only desirable but inevitable.

"The salesman serves a double function. He must not only bring information to the customer, bring it accurately and quickly and in convenient form and must understand his customer's work well enough so that he can co-operate in a constructive way to increase the profits that his customer can earn, but he also serves as a liaison officer to bring to the factory that he represents an understanding of the customer's problem and of the customer's needs, and of the actual experience that the customer has had with machine tools after installation, so as to keep the machine tool builder fully informed of conditions in the field."

A.S.M.E. Elects Officers

American Society of Mechanical Engineers announces the election on Sept. 28 of Dr. Harvey N. Davis, president, Stevens Institute of Technology, Hoboken, N. J., to the presidency of the society for 1938. Dr. Davis will succeed James H. Herron, president, James H. Herron Co., Cleveland.

Other officers elected included five vice presidents and three managers, whose nominations were reported in STEEL, June 7, page 33.

At the American Gear Manufacturers Association's Semiannual Meeting

The meeting, Sept. 20-22, was in Wawasee, Ind. Full report in STEEL, *Sept. 27, p. 42*

Metal Plants Win Safety Awards

TWELVE of 231 steel and metalworking plants entered in the National Safety council's safety contest completed the year ended June 30 without a disabling injury.

More than 345,000 employes worked 760,295,268 hours for an average frequency rate of 9.240 disabling injuries per million hours worked. Contestants in the light machine shops division had the lowest rates, averaging 7.333. Foundries had the highest with an average of 16.170. Where contestants in divisions were divided into groups A and B on basis of size, the largest—group A—easily had the best records except in the steel mill division.

Trophies To Be Awarded

Bronze trophies will be awarded to first place winners in the various divisions and certificates for second and third places at the National Safety congress in Kansas City, Mo., Oct. 14. Where two or more contestants tied for first place with perfect records, equal ranking and awards were given.

Winners are:

Steel Mills Division

Rank Group A

1—Republic Steel Corp., South Chicago works, South Chicago, Ill.
2—Republic Steel Corp., Massillon, O.
3—Republic Steel Corp., Canton, O.

Group B

1—Youngstown Sheet & Tube Co., South Chicago works, South Chicago, Ill.
2—Great Lakes Steel Corp., Michigan steel division, Ecorse, Mich.
3—Bethlehem Steel Co., Los Angeles.

Rolling, Fabricating and Finishing Div. Group A

1—Republic Steel Corp., Niles, O.
2—Chase Brass & Copper Co. Inc., Euclid, O.
3—J. G. Brill Co., Philadelphia.

Group B

1—Republic Steel Corp., Moline, Ill.
1—Lehigh Structural Steel Co., Allentown, Pa.
1—Pullman-Standard Car Mfg. Co., Baltimore.

Foundries Division

1—Haynes Stellite Co., Kokomo, Ind.
1—American Rolling Mill Co., Sixth St. foundry, Ashland, Ky.
3—Union Carbide Co., Niagara Falls, N. Y.

Heavy Machine Shops Division Group A

1—Henry Vogt Machine Co., Louisville, Ky.
2—United Shoe Machinery Corp., Beverly factory, Beverly, Mass.
3—Gilbert & Barker Mfg. Co., Springfield, Mass.

Group B

1—C. Hager & Sons Hinge Mfg. Co., St. Louis, Mo.
1—Emsco Derrick & Equipment Co., D & B Pump & Supply Co., Los Angeles.
3—United States Rubber Products Inc., shoe hardware division, Waterbury, Conn.

Light Machine Shops Division

1—Republic Steel Corp., Berger Mfg. Co., Canton, O.
1—The Perfect Circle Co., Hagerstown, Ind.
1—The Koster Solder Co., Chicago.
1—Republic Steel Corp., Canton culvert division, Canton, O.

Labor

AUGUST STEEL EMPLOYMENT IN EXCESS OF 603,000

MORE than 603,000 employes were on steel industry payrolls during August, according to the American Iron and Steel institute. A total of 594,000 was employed by the industry in July.

The increase reflects steel operations in August, averaging 83.6 per cent of capacity, were higher than in July when operations were at 78.5 per cent. In September, the industry operated at about 75 per cent of capacity.

Payrolls in August amounted to $92,663,000, which compares with $90,550,000 in July. In August, 1936, 522,000 were employed and payrolls totaled $66,338,000, indicating an increase in one year of 16 per cent in the number of employes and 40 per cent in monthly payrolls. Over the same period the volume of steel output increased 16 per cent.

Of the total number of steel employes in August, 541,000 were wage earners receiving hourly, piecework or tonnage rates. Hourly earnings of this group averaged 86.1 cents per hour in August, compared with 86.8 cents in July and 66.8 cents in August, 1936.

Wage earners worked an average of 37.9 hours per week in August, compared with 37.3 hours in July and 39.7 hours in August, 1936.

MORE U. S. STEEL CORP. WORKERS INSURED

Increases in both payrolls and the number of employes of United States Steel Corp. and subsidiaries in the past several years resulted in a monthly gain in the subscriptions of employe group insurance to $474,874,500 through June 30 last.

Under the plan, inaugurated July 1, 1935, more than $5,700,000 has been paid in death claims, or an average of $1733 on each of the 3298 claims adjusted. During the plan's last fiscal year, ended June 30, such claims amounted to $3,344,500, or an average of $1772 for each of the 1887 claims paid. This compares with $2,373,200, or an average of $1681 for the 1411 claims in the preceding like period.

By the close of the second policy year, there were roughly 240,000 participants in the plan, or more than 88 per cent of all workers then employed. When the group insurance went into effect, 177,737 employes took out $293,277,000 of protection.

1650 ARE ENROLLED IN FACTORY TRAINING SCHOOL

International Business Machines Corp. has resumed its factory training school for employes at the main plant in Endicott, N. Y., with 1650 enrolled in 30 different courses. This is the largest enrollment and the most courses offered in the history of the school which was organized by Thomas J. Watson soon after he became president of the company in 1914. Approximately 4000 persons are employed at the Endicott plant.

Instructors are drawn from the company's executive and supervisory staff. Enrollment is voluntary. Courses are free and all lesson material is provided by the company, which also maintains a complete reference library for use by employes.

1938 Officers Nominated By Automotive Engineers

Society of Automotive Engineers announces the nomination of C. W. Spicer, vice president, Spicer Mfg. Co., for president of the society for 1938.

Nominees for the 2-year terms as councilors are: W. J. Davidson, general sales manager, Winton Engine Corp.; L. J. Grunder, automotive engineer, Richfield Oil Co. of California; and B. J. Lemon, tire engineer, United States Rubber Products Inc. David Beecroft, Bendix Products Corp., is named to the post of treasurer.

Nominated for division vice presidents are the following: *Aircraft,* F. W. Caldwell, engineering manager, Hamilton Standard Propellers; *aircraft engine,* R. N. DuBois, experimental engineer, Aviation Mfg. Corp., Lycoming Division; *diesel engine,* Carl Behn, Superior Engine Division, National Supply Co. of Delaware; *fuels and lubricants,* B. E. Sibley, chief technologist, Continental Oil Co.; *passenger car,* C. R. Paton, chief engineer, Packard Motor Car Co.; *passenger car body,* Frank S. Spring, engineer, Hudson Motor Car Co.; *production,* E. N. Sawyer, Cleveland Tractor Co.; *tractor and industrial power equipment,* C. E. Frudden, chief engineer, Allis-Chalmers Mfg. Co.; *transportation and maintenance,* F. L. Faulkner, automotive engineer, manager, automotive department, Armour & Co.; *truck, bus and railcar,* H. E. Simi, chief engineer, Twin Coach Co.

Farm Equipment Institute Receives "Banner" Reports

DOMESTIC sales of farm equipment this year may equal, if not exceed, the 1929 volume and possibly approximate that of 1920, the industry's largest year of record.

This statement, made by Harry G. Davis, director of research, Farm Equipment institute, before the forty-fourth annual convention of that organization at the Palmer House, Chicago, last week, is indicative of the favorable business enjoyed by the industry thus far in 1937.

The convention attracted about 400 representatives of the manufacturing and distributing departments of farm implement and tractor manufacturers.

Improvement in business this year was explained by Mr. Davis as resulting from several factors. The backlogs of equipment needs accumulated during the depression is making itself felt and many replacement machines are being sold, he pointed out. The need for mechanical equipment to supplant the loss of animal power is resulting in the largest tractor sales in history. New machines, such as the small tractor and the little combine, and the use of rubber tires on tractors and other machines are bringing a new dollar volume to the industry.

Interesting figures were cited by Mr. Davis to illustrate the close relationship between agricultural prosperity and good business in other endeavors.

"A study of non-agricultural and farm income over a period of years shows that decreases in farm income usually precede general business declines while increases in farm income usually are the forerunner of increased activity in other business undertakings."

Labor And Farm Incomes Related

"Farm income declined more rapidly in 1930, 1931 and 1932 than did non-agricultural income, and it held at a lower point in 1932, 41 per cent of 1929, before it started to climb. Non-agricultural income declined from 1930 through 1933 before it started on an upward trend," according to the speaker.

This lag is taken to indicate that non-agricultural income in 1930 and 1931 was supported by the higher farm income of 1929 and 1930, while the effects of the larger 1933 farm income did not manifest themselves on non-agricultural income until 1934.

Mr. Davis pointed out the importance of evaluating farm income on the basis of real income rather than the nominal dollar volume.

"Starting with June, 1933 and continuing, with only two exceptions there have been steady increases in the 12-month nominal income of agriculture," Mr. Davis explained.

Price Index Increasing

"There also has been a steady increase in the index number of prices paid which to some extent offset the effect of increases in nominal income. The increase in the former, however, has not been as great as the increase in nominal income, and real income for the 12 months ending August, 1937 was $6,500,000,000 compared with $6,800,000,000 for the 12 months ending January, 1930."

Other favorable developments in the farm situation pointed out by Mr. Davis include a 17 per cent reduction in volume of mortgage indebtedness between 1930 and 1935 and a 27 per cent decrease in annual interest charges. During the same period the number of farms free from mortgage indebtedness increased nearly 700,000 or about 175,000 more than the total increase in the number of farms. From 1930 to 1935 there also was a reduction in taxes payable of about 35 per cent. In 1929 the farmer required 12.2 per cent of his total cash farm income to meet interest payments on indebtedness and taxes. In 1932 this had increased to nearly 35 per cent, but by 1935 it required only 11.3 per cent to meet these payments.

Eight years ago farmers spent 4.9 per cent of their cash income for equipment, reducing this percentage to 2.5 per cent in 1932 but increasing it to 4.7 per cent in 1935.

The decrease since 1925 of about 6,500,000 in number of work animals on the farm has been accompanied by a rapid increase in use of mechanical power. As a result, whereas in 1922 tractors represented only 24 per cent of the farm equipment industry's total volume, in 1936 they represented 42 per cent.

In conclusion Mr. Davis stated that there is one trend in the industry likely to exert tremendous influence on its future—the present trend toward the building of smaller machines for use on farms less than 100 acres in size. He indicated this opened a new market of nearly 2,000,000 farms where the need for low cost production is imperative. Supplying new equipment to such farms, in addition to further mechanization of larger farms, it is expected, will lead the industry to new sales volumes and permit it to carry the benefits of mechanization to all farmers.

Type of Furnace Used 150 Years Ago, in Parade

THIS paper mache reproduction of a pre-Revolutionary war blast furnace won first award in its class for Bethlehem Steel Co. in a Constitution day parade in Bethlehem, Pa. Remains of this type stack still are seen in eastern Pennsylvania. Located on banks of streams, on which they depended for water power, and near ore deposits, some of the early furnaces were capable of producing 1000 tons of pig iron annually, for both export and domestic trade

Meetings

FOUNDRY EQUIPMENT GROUP ARRANGES PROGRAM

WAGE and employment conditions are to be considered at the fall meeting of the Foundry Equipment association at the Greenbrier hotel, White Sulphur Springs, W. Va., Oct. 18-19. The organization recently completed a study of this subject. Attention will be given to activity which might be undertaken to increase the supply of skilled labor.

Among other subjects scheduled for discussion are business conditions and prospects, administrative and selling costs, and credit interchange service. The association's credit service is to be expanded shortly through a plan arranged by a committee headed by O. C. Sabin, Steelblast Abrasives Co., Cleveland. Numerous standing committees will submit reports.

Tuesday morning will be devoted to meetings of committees and product groups. At a group luncheon to follow, W. F. Piper, Beardsley & Piper Co., Chicago, who has just returned from a world tour, will present pictures and comments on "Foundries Around the World."

BLAST FURNACE AND COKE OVEN MEN PLAN PROGRAM

Two round table discussions dealing with blast furnace and coke oven operation will feature the joint meeting of the Eastern States Blast Furnace and Coke Oven association and Blast Furnace and Coke Oven Association of the Chicago District at the University club, Cleveland, Oct. 15. These discussions will be held in the afternoon and will be conducted separately by the blast furnace and coke oven groups.

J. H. Slater, Republic Steel Corp., Cleveland, and H. W. Johnson, Inland Steel Co., Indiana Harbor, Ind., will preside as co-chairman at the blast furnace session; while W. R. Pendry, American Steel & Wire Co., Cleveland, and C. L. Waggoner, Interlake Iron Corp., Chicago, will officiate at the coke oven session.

The meeting will begin with a luncheon at noon and end with a dinner meeting at which E. C. Barringer, editor, *Daily Metal Trade*, Cleveland, who has just returned from abroad, will speak on the general European situation.

ELECTRICAL ENGINEERS TO HOLD SESSION ON STEEL

One session of the Middle Eastern District meeting of the American Institute of Electrical Engineers in Akron, O., Oct. 13-15, will be devoted to iron and steel. Three papers will be presented as follows: "Some Highlights in the Use of Electricity in Steel Mills," by E. G. Fox, Freyn Engineering Co., Chicago; "Carbon Brushes for Steel Mill Equipment," by W. C. Kalb, National Carbon Co., Cleveland; and "Tension Measurement and Control in Cold Strip Rolling," by C. M. Hathaway and F. Mohler, General Electric Co., Schenectady, N. Y.

Inspection trips will be made to the Babcock & Wilcox Co., Barberton; B. F. Goodrich Co., Akron, O.; Nela Park plant, General Electric Co., Cleveland; and Ohio Brass Co., Barberton, O.

Dr. W. E. Wickenden, president, Case School of Applied Science, Cleveland, will preside at the dinner on Oct. 15 at which Commander C. E. Rosendahl, United States naval air station, Lakehurst, N. J., will discuss lighter-than-air craft.

Convention Calendar

Oct. 11-12—Porcelain Enamel institute. Seventh annual meeting at Congress hotel, Chicago. George P. MacKnight, 612 North Michigan avenue, Chicago, is managing director.

Oct. 11-15—National Safety council. Twenty-sixth national safety congress at Muehlebach hotel, Kansas City, Mo., W. H. Cameron, 20 North Wacker drive, Chicago, is managing director.

Oct. 13-15—Porcelain Enamel institute. Second forum at Ohio State university, Columbus, O. George P. MacKnight, 612 North Michigan avenue, Chicago, is managing director.

Oct. 13-16 — Electrochemical society. Seventy-second meeting at Hotel Chase, St. Louis. Dr. Colin G. Fink, Columbia university, New York, is secretary.

Oct. 15—Eastern States Blast Furnace and Coke Oven association and Blast Furnace and Coke Association of the Chicago District. Joint meeting at University club, Cleveland.

Oct. 18-19—Foundry Equipment Manufacturers association. Fall meeting at Greenbrier hotel, White Sulphur Springs, W. Va. Arthur J. Tuscany, 632 Penton building, Cleveland, is executive secretary.

Oct. 18-21—National Wholesale Hardware association. Forty-third annual convention at Palmer House, Chicago. George A. Fernley, 505 Arch street, Philadelphia, is secretary.

Oct. 18-21—American Hardware Manufacturers' association. Semiannual meeting at Palmer House, Chicago. Charles F. Rockwell, 342 Madison avenue, New York, is secretary.

Oct. 18-22—American Society for Metals. Nineteenth annual national metal congress and exposition at Auditorium, Atlantic City, N. J. W. H. Eisenman, 7016 Euclid avenue, Cleveland, is secretary.

Oct. 18-22—American Welding society. Eighteenth annual meeting at Hotel Traymore, Atlantic City, N. J. Warner S. Hays, 33 West Thirty-ninth street, New York, is managing director.

Oct. 18-22—Wire association. Annual meeting at Ambassador hotel, Atlantic City, N. J. Richard E. Brown, 17 East Forty-second street, New York, is secretary.

Oct. 19—National Association of Sheet Metal Distributors. Semiannual meeting at Palmer House, Chicago. George A. Fernley, 505 Arch street, Philadelphia, is secretary.

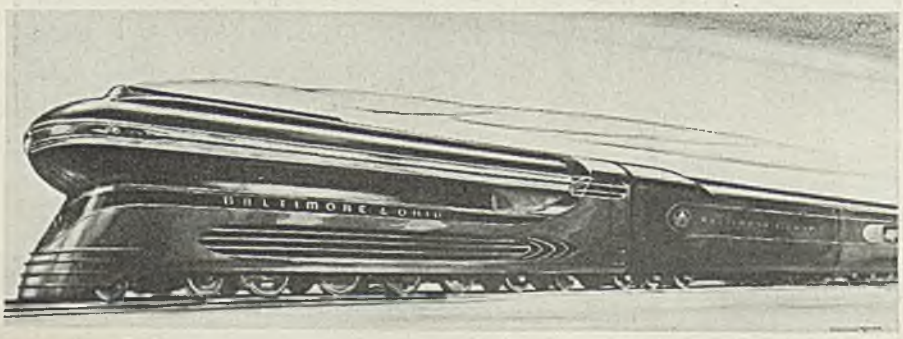
Oct. 19-21—American Institute of Mining and Metallurgical Engineers. Fall meetings of Iron and Steel and Institute of Metals divisions at Ritz-Carlton hotel, Atlantic City, N. J. Louis Jordan, 29 West Thirty-ninth street, New York, is assistant secretary.

Oct. 27-29—American Institute of Steel Construction. Fifteenth annual meeting at Greenbrier hotel, White Sulphur Springs, W. Va. V. Gilmore Iden, 200 Madison avenue, New York, is secretary.

Oct. 27-29—American Society of Mechanical Engineers and American Institute of Mining and Metallurgical Engineers. Joint coal meeting in Pittsburgh. Headquarters of the two societies are at 29 West Thirty-ninth street, New York.

Oct. 29-30 — American Foundrymen's association. Second annual foundry conference with Quad City chapter at State University of Iowa, Iowa City, Iowa. D. M. Avey, 222 West Adams street, Chicago, is secretary.

New Locomotive Is Radically Different



THIS 16-cylinder, constant torque locomotive just designed by Baltimore & Ohio railroad represents radical departure from the conventional type but embodies proven mechanical principles. Rated at 5000-horsepower, it is believed capable of handling 10 Pullman cars at sustained speed of 100 miles per hour on straight, level track. Its thirty-two power impulses for each revolution of the steam motors gives it the smooth running qualities of a multicylinder automobile. Absence of all reciprocating parts eliminates vibration and track poundage

August Exports At High Level

IRON and steel exports from the United States in August continued at a high level despite declines of 11.6 per cent in quantity and 8.9 per cent in value compared with the record trade in July, according to the metals and minerals division of the department of commerce.

In August, iron and steel exports, excluding scrap, aggregated 403,023 gross tons, valued at $24,117,363, in comparison with 461,421 tons, valued at $26,487,190, in July, and 95,692 tons, valued at $6,271,903, in August, 1936. Against trade in August, 1936, increases of 326.4 per cent in quantity and 284.5 per cent in value were registered.

Since January when exports totaled 128,843 tons, valued at $9,327,749, the monthly average has been following a sharp upward curve. Against January, August exports showed increases of 216.7 per cent in quantity and 158.6 per cent in value and represented the second highest level this year, having been surpassed only by July shipments.

Iron and steel exports, excluding scrap, in the first eight months of 1937 totaled 2,239,521 tons, valued at $136,493,916, in comparison with 749,320 tons, valued at $54,827,760, in the corresponding period of 1936, increases of 198.9 per cent in quantity and 149 per cent in value. Outstanding product shipped was pig iron whose aggregate of 588,424 tons was in sharp contrast with only 1369 tons shipped in the like period of 1936.

Scrap exports in August continued at a record-breaking level, aggregating 478,296 tons, valued at $9,305,239, in registering 11.7 per cent higher in quantity and 4.2 per cent higher in value than in July when the totals were 428,047 tons and $8,931,694. Against August, 1936, shipments aggregating 199,649 tons, valued at $2,561,635, increases of 110 per cent in quantity and 239 per cent in value resulted.

In the first eight months, scrap exports reached the previously unequaled level of 3,079,003 tons, valued at $61,263,858, in surpassing the corresponding 1936 total of 1,468,564 tons and $18,075,581 by 110 per cent in quantity and 239 per cent in value.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Articles	Aug. 1937	July 1937	Jan. thru Aug.'37
Pig iron	114,035	168,538	588,424
Ferromanganese and spiegeleisen	120	169	1,625
Other ferroalloys	167	112	1,448
*Ingots, blooms, etc.:			
Not containing alloy	68,467	46,015	173,342
Alloy incl. stainless	834	303	4,998
Bars, iron	108	432	1,818
Bars, concrete	964	1,617	11,085
*Other steel bars:			
Not containing alloy	13,291	16,829	79,438
Stainless steel	9	13	171
Alloy, not stainless	392	491	4,320
Wire rods	7,853	3,775	35,997
Boiler plate	344	2,285	4,887
*Other plates, not fab.:			
Not containing alloy	51,083	45,382	223,672
Stainless steel	3	4	28
Alloy, not stainless	33	122	2,335
Skelp	6,666	11,568	58,167
Sheets, galv. iron	567	273	3,570
Sheets, galv. steel	7,258	6,915	48,268
*Sheets, "black" steel:			
Not containing alloy	27,118	30,822	178,832
Stainless steel	450	83	881
Alloy, not stainless	507	1,239	3,551
Sheets, black iron	957	557	7,109
*Strip steel, cold-rolled:			
Not containing alloy	3,153	3,097	21,077
Stainless steel	31	62	293
Alloy, not stainless	40	44	416
*Strip steel, hot-rolled:			
Not containing alloy	4,458	5,164	54,600
Stainless steel		3	100
Alloy, not stainless	21	41	498
Tin plate, taggers' tin	29,170	34,439	213,267
Terne plate	430	193	3,688
Tanks, except lined	2,566	3,664	20,910
Shapes, not fabricated	16,636	22,379	98,719
Shapes, fabricated	2,361	3,897	23,011
Plates, fabricated	3,571	2,613	15,987
Metal lath	164	93	1,320
Frames and sashes	320	297	1,074
Sheet piling	1,180	144	3,475
Rails, 60-lb.	5,009	4,075	44,994
Rails, under 60-lb.	708	635	7,983
†Rails, relaying	2,173	2,090	16,010
Rail fastenings	791	1,423	7,352
Switches, frogs, etc.	216	262	1,605
Railroad spikes	273	234	2,067
R. R. bolts, nuts, etc.	140	146	769
Boiler tubes, seamless	1,290	1,195	8,606
Do welded	59	31	306
Pipe:			
S'ml's cas'g, oil line	5,419	7,406	48,713
Do welded	535	797	4,947
Do seamless black	1,155	1,540	9,488
Pipe fittings:			
Mall. iron screwed	359	624	3,477
Cast iron screwed	313	347	2,122
Pipe and fittings for:			
Cast iron pressure	1,312	1,360	14,921
Cast iron soil	524	259	5,119
Pipe, welded:			
Black steel	1,542	3,357	15,331
Black wrought iron	485	182	3,561
Galv. steel	1,570	2,282	13,509
Galv. wrought iron	167	172	1,409
Pipe and fittings:			
Riveted iron or steel	90	32	500
Wire:			
Plain iron or steel	3,131	4,552	24,772
Galvanized	2,967	3,023	17,341
Barbed	3,861	2,460	25,191
Woven wire fencing	231	329	2,449
*Woven wire screen:			
Insect	58	121	437
Other	43	98	790
‡Wire rope	1,119	599	4,471
‡Wire strand	469	61	807
†Card clothing	7	4	42
Other wire	748	774	6,337
Wire nails	398	1,760	13,372
Horseshoe nails	77	102	612
Tacks	37	67	253
Other nails, staples	261	173	2,018
Bolts, etc.	731	969	7,640
Castings:			
*Gray iron, semi-steel	782	454	4,168
Malleable-iron	266	660	3,502
*Steel, not alloy	215	255	1,516
Alloy, incl. stainless	130	149	1,111
Car wheels, tires, axles	1,717	1,094	10,934
Horseshoes, calks	4	6	167
*Forgings, n. e. s.:			
Not containing alloy	1,189	1,510	5,779
Alloy, incl. stainless	120	78	622
Total (gross tons)	408,023	461,421	2,239,521
Scrap iron and steel	473,933	420,097	3,028,795
Scrap, tin plate	1,105	1,678	12,190
†Tin plate circles, strips, cobbles	1,870	1,772	10,400
Waste-waste tin plate	1,388	4,500	27,618
Total scrap	478,296	428,047	3,079,003
GRAND TOTAL	836,319	889,468	5,318,524
Iron ore	201,725	211,336	909,063

*No comparisons available. †New classes.
‡No distinction prior to 1936.

Activities of Steel Users and Makers

POWER PIPING CORP., subsidiary of Blaw-Knox Co., Pittsburgh, has been awarded a contract to design, engineer, and construct all the steam and high pressure hydraulic piping, including a boiler plant and a heating system, for the new molded plastics plant being erected in Cambridge, O., by the Reynolds Spring Co., Jackson, Mich. This new plant will manufacture a large variety of plastics for household, industrial, and automotive use. A research laboratory for the study and development of new uses for molded plastics will be included in the plant.

♦ ♦ ♦

Burns Mfg. Co., Syracuse, N. Y., is placing on the market a new line of stainless steel knives with solid hard rubber handles. Included are seven different models for use in the preparation of food.

♦ ♦ ♦

Brennan Motor Mfg. Co., Syracuse, N. Y., has developed and placed in production a quality small boat engine known as the Imp. It is designed for outboard boats, yacht tenders and other small craft.

♦ ♦ ♦

Moraine Products division of General Motors Corp., Dayton, O., is now occupying its new building on Wisconsin boulevard, which affords increased manufacturing and business facilities.

♦ ♦ ♦

United States patent No. 2095223, covering the manufacture of rubber and flexible bladed fans was awarded Oct. 5 to A. O. Samuels, president, Samson-United Corp., Rochester, N. Y. A radically different change from the first electric fan introduced by Dr. Schuyler S. Wheeler, Ampere, N. J., in 1886, the rubber bladed fan was placed on the market in the spring of 1936. Since then thousands of these fans have been manufactured.

♦ ♦ ♦

Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, has signed a contract for the occupancy of a new fireproof office building at 729 North Pennsylvania street, Indianapolis. The new building, to be ready for occupancy about Nov. 1, will provide space for the Linde district office and a repair and service station for Oxweld oxyacetylene welding and cutting apparatus. The Linde office, now located at the Prest-O-Lite Co. Inc. speedway plant outside Indianapolis, will be transferred to the new quarters.

Production

SHARP curtailment in operating schedules in practically all steelmaking centers last week reduced the national steelworks rate to 66 per cent, a loss of 8 points. This is the lowest level for the year to date and compares with 75 and 52 per cent, respectively, in the like weeks of 1936 and 1935.

Cincinnati—Down sharply to 70 per cent, a loss of 19 points from the previous week.

New England—Held at 65 per cent.

Detroit—Down 8 points to 92 per cent, with one open-hearth furnace off for the full week and another down half a week.

Youngstown—Down 5 points to 60 per cent, as a result of a sharp reduction in operating schedules at the Ohio works of Carnegie-Illinois Steel Corp. A blast furnace and four open hearths were dropped, leaving 19 blast furnaces and 51 open hearths active.

Birmingham—Off 6 points to 77 per cent, as Tennessee Coal, Iron & Railroad Co. dropped a third unit from its active list.

Pittsburgh—Down 9 points to 62 per cent, a decline somewhat sharper than anticipated a few weeks ago, but closely in line with incoming business. The recent drop in blast furnaces is partially offset by the blowing in of an independent producer's second furnace which had been idle since early in the summer.

Chicago—Off 10½ points to 65 per cent, lowest rate since March, 1936, with the exception of the June strike period. Pig iron production also has declined with the shutting down of an additional stack at Gary, giving the district 29 active stacks out of 39.

St. Louis—Declined 4 points to 60 per cent last week.

Cleveland-Lorain—Down 4 points to 63 per cent, as National Tube Co. at Lorain took off one furnace to operate 11, and Otis Steel Co. operated 8 units the first part of the week and 7 the remainder.

Wheeling—Operations were down 8 points to 74 per cent last week.

Buffalo—Off 4 points to 70 per cent, as a result of Bethlehem Steel Co. shutting down two open hearths at its Lackawnna plant.

Central eastern seaboard—Decreased 4½ points to 55½ per cent.

District Steel Rate

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Oct. 9	Change	Same week 1936	Same week 1935
Pittsburgh	62	—9	77	48
Chicago	65	—10.5	75	58
Eastern Pa.	55.5	—4.5	49	37
Youngstown	60	—5	80	56
Wheeling	74	—8	92	81
Cleveland	63	—4	82	59
Buffalo	70	—4	84	52
Birmingham	77	—6	64	55.5
New England	65	None	70	68
Detroit	92	—8	95	88
Cincinnati	70	—19	90	†
St. Louis	60	—4	†	†
Average	66	—8	75	52

†Not reported.

Auditorium Named for Pioneer Minnesota Miner

To commemorate the man who opened Minnesota's first iron mine 53 years ago, the city of Tower, Minn., dedicated the Elisha Morcom auditorium Oct. 2. Son of an English mining captain, Morcom received his early training in a Cornwall coal mine. He came to the United States in 1854, became a mining captain in Michigan, and in 1878 was placed in charge of underground work at Quinnesec on the Menominee range, later becoming superintendent.

He was named superintendent for the Minnesota Mining Co. in 1884 and began operations at Tower. Workers were imported from Michigan, across the ice to Duluth and thence overland to Tower, which then had no railroad. Although the original workings now are closed, the Soudan mine on the same formation still is active.

Captain Morcom's services as a mining expert were in great demand and S. P. Ely sent for him on several occasions to open mines in Cuba. He also opened mines at McKinley on the Mesabi range. Many prominent mining officials received their early training under him.

Captain Morcom was active and held city, county and state offices. He was in charge of Minnesota's mining display at the Chicago World's fair in 1893.

He died in Tower Nov. 21, 1908, at the age of 73.

Government Pump Priming Unnecessary, Says Roper

Priming of the government pump to stimulate business is unnecessary, Secretary of Commerce Roper said at a press conference last week.

Referring to the steel industry, he stated: "Heavy spring production was prompted by accumulated needs and continued into the summer when schedules were adjusted more to current demand."

He made no reference to present steel production or prediction for the future.

Cummings Sees Need for Antitrust Law Revision

Revision of antitrust laws ha been necessitated by increase in th number of identical bids receive by the government in recent months Attorney General Cummings an nounced at a press conference las week. He admitted identical bids ar not conclusive evidence of trust la violation and pointed out he ha been unable to find evidence to justi fy prosecution for identical stee bids.

Rubber tire identical bids receive recently, however, have aspects th steel case did not have, he said.

Japanese Embargo Not To Include Iron, Steel

Iron and steel products are no included in the proposed Japanes import embargo, according to a unofficial report received by the de partment of commerce last week The embargo was to become effec tive Oct. 10.

Develops Color Chart For Marking Steel Bars

A simple and practical color chart known as the "S A E-namel Chart, has been developed and copy righted by Mill Service, Spring field, O. It illustrates in detail th color code for marking steel bar recently promulgated by the depart ment of commerce, division of sim plified practice, national bureau o standards, as approved by the Na tional Association of Purchasing Agents.

The chart is 22 x 36 inches, an lists by SAE numbers with corre sponding code colors and color com binations all of the 89 SAE steel included in the color code as off cially promulgated.

Strike in New York Scrap Yards Settled

A strike which tied up all scra iron yards for a week in Albany Troy, Schenectady and other citie within a radius of 75 miles fron the capital of New York, was set tled Oct. 4 when the scrap yard reopened under an agreement wit the American Federation of Labor Benjamin Schwartz, director genera of the Institute of Scrap Iron an Steel, took charge of negotiation at the request of members.

The agreement with the federatio provides for a minimum wage o 45 cents per hour, a 10 per cent in crease for those receiving abov the minimum, and a 48 hour week.

Undistributed Profits Tax Brings Increases in Corporate Spending

IMPORTANT changes in policies by a growing number of corporations, both large and small, have resulted from the enactment of the undistributed profits tax in 1936, according to Willard L. Thorp and Edwin B. George in *Dun's Review* for September. The appraisal is a result of a survey of 700 companies.

They report slowly increasing use of noncash dividends, a definite percentage increase in total dividend payments, a tendency to increase advertising expenditure, salaries and wages in order to keep down immediate tax liability.

"The record clearly demonstrates that the alternatives to cash dividends are somewhat and increasingly in use," say the authors. "Business policy may still be overly influenced by inertia or by unfamiliarity with recommended devices. Perhaps another year will take care of that and corporate directors will choose between cash or stock or notes with the nonchalance which the law seems to expect.

"The long range answer as to the significance of these alternatives, while speculative, probably lies between the extremes described by those who battle over the problem. Much will depend on administrative and judicial severity in allowing or refusing dividend-paid credits for specific offerings."

Advertising expenditures of the companies studied are up about 5 per cent as a direct result of the desire to keep down tax liability. Salaries and wages are up 6 to 7 per cent. Expenditures on plant maintenance, repairs and replacements also are higher for the same reason.

In considering the artificial impetus of the tax on expenses the authors look ahead to the future consequences of the forced spending programs. Certain of these expenses, they say, should result in increased income to the corporations in later years, thus setting up tax problems for the future.

Dividend Distribution Vs. Surplus

A different type of objective would be to make such expenditures in years of large earnings, reducing them in the leaner years.

"What effect will the tax have on prosperity and depression?" ask the authors. Agreeing that there is room for much argument, they hold that the disagreements are not solely matters of theory but are in large measure differences as to what facts properly may be assumed. The varied designs of thinking emerge primarily from unlike ideas as to what actually happens when dividend distribution replaces the building of corporate surplus.

"Such differences easily are understood," they say, "when one considers that 'corporate surplus' merely is the residual accounting item which makes assets and liabilities of cash. It is the result of the difference between all the assets and all the other liabilities.

The depression years showed a reduction in assets of $32,300,000,000, they say, and point out that the increase in assets between 1926 and 1929 was primarily in plant equipment and partially in notes and accounts receivable. The reduction in assets from 1929 on was largely in lowered valuations.

All this has a bearing on the question of whether a large surplus is necessary as a financial cushion during cyclical changes.

"One cannot help but conclude that the problem is not as simple as the theoreticians would picture it," say the authors. "It is difficult to say that the surplus item was clearly responsible for the size of any of the other items.

"Obviously cash is helpful in facing a depression but fixed investments in capital assets may also provide a cushion. The man whose machinery is in perfect condition can cut maintenance. If he owns his factory he can disregard capital charges for a period. The 'cushion' problem is much more than a question of having a large surplus item in the balance sheet.

"On the other side of the analysis it is hardly necessary to discuss the nonregimentation of dividend receivers. Given additional dividends some certainly will hasten to satisfy their wants for consumers' goods. Others will seek to augment their income through speculation and others will invest their dividends so that they return to industry once more."

After pointing to the findings of the Brookings Institution which indicate that corporate expansion made only a minor contribution to the recent depression the authors express the opinion that neither attack nor defense of the tax on the ground of its tendency to increase stability can be very convincing.

"Not only does the transferable part of corporate savings represent a relatively small item among the total factors bearing on stability," they say, "but the part which it plays are none too clear. Until more and better facts are available, this section of the discussion should be classed as falling in the realm of entertaining argument."

In passing upon opinions currently held as to what should be done to clear up existing problems of taxation the authors warn that it is absurd to attempt to pass final judgement on any separate element in our present total tax system, which has grown by the process of addition and repair.

Stainless Steel Gains Favor in Hospitals

STAINLESS steel's increasing popularity for hospital uses was indicated by displays on many new products and equipment at the American Hospital association's annual convention in Atlantic City, Sept. 13-17. Republic Steel Corp., Cleveland, exhibited 24 products of stainless steel, for old and new applications. Hospital experts say stainless meets all requirements, easy to clean, is sanitary and always looks bright and shiny

Men of Industry

JOHN HOWE HALL, technical assistant to the president, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has resigned to establish his own consulting metallurgical practice with headquarters for the present at High Bridge. Mr. Hall was educated at Harvard, receiving his bachelor degree in 1903 and his master's degree in 1904. With the Taylor-Wharton company, he has at various times been in charge of the laboratory, heat treating and steelmaking departments. Mr. Hall has written many papers for various technical societies and the technical press. He is a coauthor of the *A.B.C. of Iron and Steel*, and the author of *The Steel Foundry*. He is a member, British Iron and Steel institute, Electrochemical society, American Society for Testing Materials, American Society for Metals, American Institute of Mining and Metallurgical Engineers, and an honorary member, American Foundrymen's association. He was the first recipient of the J. H. Whiting medal awarded for outstanding achievements in metallurgy in the iron and steel industry.

♦ ♦ ♦

H. McE. Patton has joined the staff of the research and development division of Jones & Laughlin Steel Corp., Pittsburgh. He was formerly with Pittsburgh Steel Co.

♦ ♦ ♦

F. B. Lockhart resigned as a vice president and director, Hillman Coal & Coke Co., Pittsburgh, Sept. 30, but for the present will continue his former duties with the company.

♦ ♦ ♦

Harry G. Ford has been appointed superintendent of production and shipping at the Irvin works of Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Ford formerly was assistant general superintendent at the New Castle works.

♦ ♦ ♦

J. A. Slater, vice president in charge of railway sales, National Malleable & Steel Castings Co., Cleveland, has been elected a director of the company to fill the vacancy on the board caused by the death of Oliver W. Loomis on Aug. 19.

♦ ♦ ♦

H. R. Cravenstreter, master mechanic at the Shenango works of Carnegie-Illinois Steel Corp., New Castle, Pa., has been appointed assistant to the general superintendent. He has been associated with subsidiary companies of the United States Steel Corp. since 1917.

John Howe Hall

♦ ♦ ♦

V. B. Fowler, in charge of the Detroit office of the public relations department of General Motors Corp., has been transferred to the staff of R. K. Evans, vice president, to supervise public relations activities and advertising in connection with the corporation's diesel developments. His headquarters will continue in Detroit.

Donald Hogate and Felix Bruner, assistants to Mr. Fowler, will continue in their present posts.

♦ ♦ ♦

William C. Carter and Edward J. Burnell have been elected vice presidents, Link-Belt Co., Chicago. Mr. Carter, a mechanical engineering graduate of the University of Illinois, joined the Link-Belt organization in 1902 as a draftsman. He has consecutively held the positions of engineering department supervisor, construction superintendent, plant superintendent, plant general manager, and in recent years has been in charge of company production.

Mr. Burnell, a mechanical engineer, from Lehigh university, joined the company in 1913 as a draftsman. He has consecutively held the positions of salesman, district manager at Boston, district sales manager at Pittsburgh, general sales manager of western division territory with headquarters at the Pershing road, Chicago, plant, and more recently has been general manager of this plant.

♦ ♦ ♦

J. A. Henry, vice president, Weirton Steel Co., Weirton, W. Va., announces the following changes in personnel of the sales department: W. R. Cunnick, district sales manager, Detroit, has been made assistant vice president, with offices in Detroit; L. P. Lane, district sales manager, Philadelphia, has been appointed district sales manager at

Five With Service Records of 50 Years

WHEN 27 veteran employes of Joliet works of Carnegie-Illinois Steel Corp. were awarded United States Steel Corp. service medals recently, honored guests were five men, who can each boast of 50 years of steelmaking experience. Left to right in the photograph are William Isaac, who was with the company from 1875 to 1929; Thomas Perkins, who began in 1881 and retired in 1932; Cornelius Dillon, who served from 1875 to 1927; Ernest H. Jones, who began at Joliet in 1885 and is still at the plant; Timothy F. Sullivan, who was connected with the corporation from 1870 to 1931 and W. E. Hadley, general superintendent, Gary works, who presided at the service medal breakfast

Detroit; R. B. Sanders, assistant manager of sales, sheet and tin plate department, has been made district sales manager, Philadelphia; R. S. Meighen, manager, tin plate order department, has been named assistant manager of sales, sheet and tin plate department; J. W. Taylor, assistant to manager of the order department, has been made manager of the tin plate division, order department; L. W. Briggs, formerly manager of sales, West Leechburg Steel Co. and the Superior Steel Co., has become associated with Weirton as assistant manager of sales, strip steel division.

♦ ♦ ♦

J. H. Robinson, for many years active in the Wheeling Corrugating Co., Wheeling, W. Va., was elected

J. H. Robinson

vice president in charge of sales at a meeting of the board of directors Sept. 27. In January, 1899, Mr. Robinson started in the billing department of the company; in 1906 he went to Detroit as a salesman and in 1907 opened the Detroit sales office. In 1911 he was transferred to the St. Louis territory as assistant manager and in 1923 became manager. He returned to Wheeling in 1931 as secretary of the company, and held that position until the present.

♦ ♦ ♦

Charles R. Hook, president, American Rolling Mill Co., Middletown, O., has accepted chairmanship of committee on personnel of the seventh International Management congress to be held in Washington next September, under the presidency of Viscount Leverhulme of Great Britain. About 2500 authorities on management as applied to industry, commerce, finance, agriculture and the home from 40 countries, are expected to attend.

♦ ♦ ♦

A. R. Johnson has been named manager of the merchandising sales division, Cutler-Hammer Inc., Milwaukee, in charge of distributor

A. R. Johnson

sales. Mr. Johnson joined the Cutler-Hammer organization in 1917 as a member of the sales department. In 1924 he was transferred to the company's Chicago office and in 1928 moved to Detroit as manager of that sales office.

♦ ♦ ♦

Irwin P. Rieger has been appointed district manager of sales in the Chicago district for the Standard Tube Co., Detroit, with headquarters at 326 West Madison avenue, Chicago. A graduate of Northwestern university, Mr. Rieger has been identified with the steel industry for a number of years.

A. R. Schumann, formerly purchasing agent of Standard Tube, is now identified in a sales capacity for the company, with headquarters in Detroit.

♦ ♦ ♦

Herbert V. Thaden has been appointed sales engineer in the stainless steel division of Carnegie-Illinois Steel Corp., Pittsburgh. An aeronautical engineer with a long and comprehensive experience in the design, manufacture and operation of lighter and heavier-than-air craft, Mr. Thaden will devote his efforts to the technical and business development of stainless steel products for aircraft use. He had previously been an executive in General Aviation Corp. and in his own all-metal airplane manufacturing establishments. He holds the rank of major in the Air Corps Reserve and is an active pilot of military and commercial aircraft.

Herbert V. Thaden

Died:

CLARENCE R. FALK, 67, secretary-treasurer, Falk Corp., Milwaukee, in that city, Sept. 29. Mr. Falk was a member of one of Milwaukee's pioneer families and was interested in many types of civic advancement. During the war he was connected with the ordnance department in Washington. A brother, Otto H. Falk, is chairman of the board of Allis-Chalmers Mfg. Co. Mr. Falk was a former president and director, National Metal Trades association.

♦ ♦ ♦

George L. Short, a director, Sharon Steel Corp., Sharon, Pa., in Johnstown, Pa., Oct. 4.

♦ ♦ ♦

Walter T. Keller, 49, manufacturers' representative in Detroit and brother of K. T. Keller, president of Chrysler Corp., in Detroit, Sept. 28.

♦ ♦ ♦

Fred P. Van Kicklin, 47, general manager of McLaren Screw Products Co., Detroit, in that city Sept. 28. He had been associated with the company for the past 25 years.

♦ ♦ ♦

A. F. Knotts, 81, who bought 25,000 acres and laid out the city of Gary, Ind., while acting as attorney for the United States Steel Corp., at Yankeetown, Fla., Oct. 3.

♦ ♦ ♦

Horace E. Grant, former Pittsburgh industrialist, Sept. 20 in Baltimore. He was president of the Air Tight Steel Tank Co. For the past seven years he had lived in St. Petersburg, Fla.

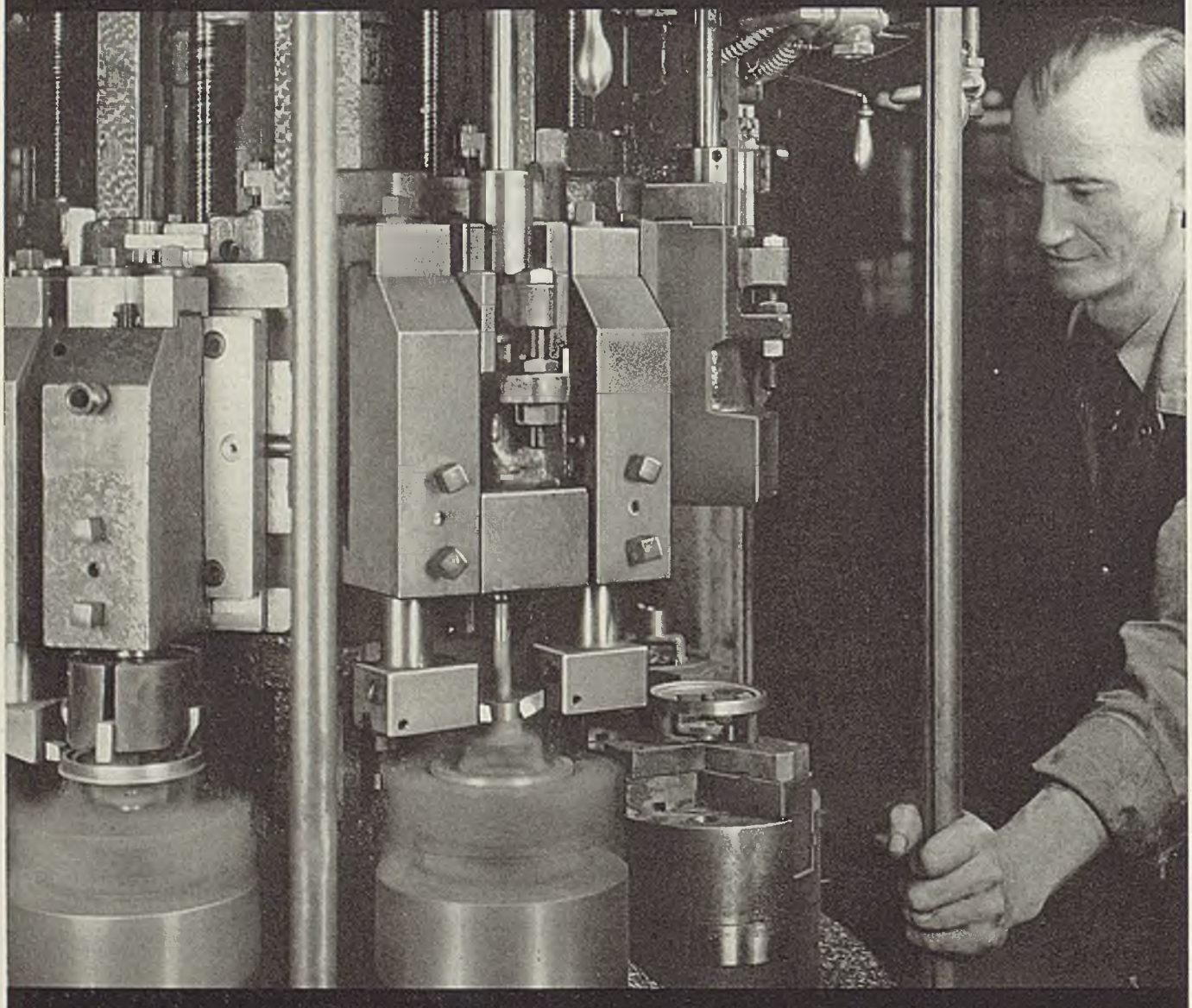
♦ ♦ ♦

Harry Richard McMahon, 64, Pittsburgh industrialist and recently retired president of Standard Steel Spring Co., Coraopolis, Pa., Oct. 3 at his home near Pittsburgh. He organized the Standard company in 1914 and was its president until last year.

♦ ♦ ♦

Richard W. Douglass, 60, former sales manager, Ingersoll-Rand Co., New York, in Madison, Wis., recently. Twenty-seven years with the company, he managed its Seattle, Wash., office before going to New York as sales manager in 1920. In 1929 he became a special representative, the position he held at the time of his death.

HERE'S NEWS



FOR the medium quantity runs, Bullard Mult-Au-Matics with standard type of tooling set high standards of Versatility and Effective Savings.

Just for instance . . . Here's an installation on which the user runs separately 9 different designs of work, each design having a run of approximately 6,000 pieces.

Times on the 9 different set-ups range from the shortest time of 13 seconds to 47 seconds the longest time.

Previous to this Mult-Au-Matic installation, several other machines did not adequately care for the production volume.

Now . . . Type "J" Mult-Au-Matic has replaced the several machines previously used for the 9 different jobs, and additional work is already being scheduled for this one machine.

Therefore, we say, "If Others can Profit by the Mult-Au-Matic Method, so can You". Ask Bullard Engineers to outline the Mult-Au-Matic possibilities on your work, and we suggest that you send in prints or samples for time and cost estimates.

Bridgeport THE BULLARD COMPANY Connecticut

MIRRORS OF MOTORDOM

BY A. H. ALLEN
Detroit Editor, STEEL

DETROIT

ARTERIAL highways throughout the city between the hours of 3 and 6 in the afternoon are jamming up with traffic again and present a good barometer of returning activity in automobile and parts plants. To a person driving these avenues it seems that there must be at least one car for every person in the city, but merchants and others catering to the mass rub their hands in glee over the return of the normal swarm of drivers.

At the low point of the swingover to new models, weekly production kept its head just above the 28,000-mark and the past week marked the second successive 7-day period in which an increase was made from the low. Chevrolet assemblies resumed and accounted for the bulk of the 25,000-odd increase which brought production for the week to an estimated 69,000, subject to minor last-minute revisions.

September Output 192,000

Indicated production for September totaled about 192,000 and represented an output 37 per cent ahead of the same month for last year, when production likewise was at the seasonal low. Final figures for August production in this country and Canada show a total of 405,064, approximately 45 per cent ahead of the same month in 1936 and bringing the 8-month total for this year to 3,779,393, contrasted with 3,321,648 last year. Add in the preliminary estimate for September and you have a figure for the first three-quarters of the year just under 4,000,000. Anticipated output for the last three months this year may eclipse 1,250,000 which would mean a five and a quarter million year—nothing to sing the blues about!

Despite these favorable figures, despite the fact 1938 designs have been put through with a minimum of capital expenditure, despite the enthusiasm and hurrah of recent dealer meetings in this city, there is a distinct tone of pessimism heard in many quarters, which will not be downed. It appears in varying degrees. Some maintain the industry is on the verge of a reaction which will go far beyond the mere corrective stage. They will tell you there is a buyers' strike in full swing, that purchasing agents are cutting commitments to a minimum and covering only immediate needs.

Gloom May Be Good Sign

These same dispensers of gloom suggest the possibility of lower prices to come on materials, being the cause of tightening up by purchasing departments, or, if you refuse to believe such an eventuality, the dour-faced prophets will recount a few of the difficulties automobile sales departments are going to meet when they try to administer the latest dose of higher retail prices. If you are still unmoved, they will tell you the dire effects to be felt from curtailment of government spending on the unemployment rolls this fall.

Other observers are less inclined toward being so lachrymose. They feel the current slump merely reflects the consumption of inventories and is nothing to become greatly concerned over. One large steel company here reports new business in October coming in at a good rate, and its representatives feel the month will show appreciable improvement over September.

Perhaps the fog of despair which drifts around this area at the mo-

GM Officers at Chevrolet Sales Banquet

TABLE microphones are set aside to show, left to right, W. S. Knudsen, president of General Motors Corp.; Donaldson Brown, vice president and chairman of the finance committee; and R. H. Grant, vice president in charge of sales, as they appeared at a recent Chevrolet sales banquet in Detroit. Chevrolet is President Knudsen's favorite son in the GM family, since he once directed this division to outdistance Ford in sales and knows the personnel intimately

MIRRORS OF MOTORDOM

ment is after all a good sign. Business here is notorious for crying when things are in good shape and laughing when the crack-up starts.

AUTOMOBILE builders were not fooling when they let out whispers of sharp price increases this summer. They made good initially at the end of the 1937 runs with markups averaging around 5 per cent, and with the appearance of the 1938 jobs another 5 per cent or so has been tacked on price tags. For example, Buick figures are up from $7 to $97; Cadillac-La Salle from $60 to $260; Packard from $75 to $215; Willys from $25 to $35; Pontiac from $22 to $98; and the rest assuredly will follow suit.

Pontiac softened the blow of its higher prices by absorbing in the delivered price some $65 which in 1937 models was a separate charge for accessories and other incidentals. Thus an increase in list price of one model from $815 to $900 is not actually $85 as it would appear, but only $22 since the 1938 price includes the extras.

While it must be granted the higher prices probably still do not compensate for increased labor and material costs, at the same time there has been little test of public reaction, and it is safe to say that sales departments probably have their fingers crossed.

Ford continues to be the big question mark on prices and with the start of final assemblies at the Rouge still at least a week off it is too early to know for sure just what the policy will be. Plenty of guesses are heard, however, one to the effect the price of the small 60 model will be cut, the 85 model continued about as it is now, and a third larger model introduced later on, to be marked up in price sufficient to keep Ford on the same competitive level with other producers.

Strangely enough this year there is no pressure from the Rouge for deliveries on material. Usually an order has no sooner been placed before the heat is turned on for shipment, but this year orders have been placed, some weeks ago, and since that time there has been no word on shipping date. The same situation holds true with nearly every other automobile builder.

One explanation of the delay at Ford is that a number of last-minute changes have been effected and it has taken time to readjust production facilities for them. Mr. Ford himself has been back of many of these changes and holds meetings one afternoon every week with his production staff to examine in detail every last nut and bolt to be used in the new models.

A second version of the present apathy is the uncertainty over the course to be pursued by union labor. If the UAW proposes to engineer further disturbances to automobile production this fall, managements are not going to permit themselves to be sniped at while production is in full swing. They will wait the situation out until they can see the green light as far as labor is concerned.

OFFICIAL release of details of the new Oldsmobile confirms the fact its automatic transmission will be offered optional on both 6 and 8-cylinder models as intimated in this department several weeks ago. Built in the new $5,000,000 transmission plant at Flint, the mechanism first appeared on the Olds 8 and now will be available on all Olds models as well as on the Buick 40 series.

Olds fenders are of heavier-gage steel and have headlamps mounted in the crown. The latter can be removed for economy's sake in a case of fender damage. A new type of hood louvre preserves unbroken hood lines and provides concealed outlets for escape of engine heat. This is accomplished by carrying the body molding forward along the hood and extending it slightly out from the side, the louvre opening being concealed in the under side of this molding extension.

An important change in the new Olds is the location of the battery under the hood, where batteries should be, incidentally, in the opinion of many. Convenient and accessible for service, the new location alongside the engine also permits use of short battery cables with corresponding reduction in line loss. The battery is of a new "end to end" type developed to fit in the narrow space available.

MARCH 1 will see motors turning over on a 60-inch slabbing mill which Great Lakes Steel Corp. is installing in a new building which also will house four new 250-ton open-hearth furnaces, tapping 200-ton heats. The corporation also is making extensions to finishing capacity in other departments, including installation of several new box annealing furnaces. All this in addition to a new blast furnace and new batteries of coke ovens will considerably reinforce this producer's flat-rolled steel capacity for next year. The corporation currently is melting at practically 100 per cent capacity in its 12 open hearths.

An interesting new development in automotive accessories is the subject of much speculation behind the scenes here inasmuch as the details have not been formally announced as yet. Briefly it is a new type of oil filter for attachment to engines, particularly truck engines, which passes oil through fuller's earth to remove all traces of carbon sludge and then returns it to the crankcase. Tests are reported to have been made with a fleet of Dodge trucks using the device, and if you can believe the claimed results, are supposed to show the oil in better condition as far as cleanliness and viscosity are concerned after several thousand miles of driving than it was when originally placed in the engines.

Plans are said to be under way to begin manufacture of the device on a production basis and it is reported by one observer that the manufacturers will guarantee oil for the life of the car.

Automobile Production

Passenger Cars and Trucks—United States and Canada
By Department of Commerce

	1935	1936	1937
Jan.	300,335	377,244	399,634
Feb.	350,346	300,810	383,698
March	447,894	438,943	519,177
April	477,059	527,625	553,415
May	381,809	480,518	540,357
June	372,085	469,368	521,139
July	345,297	451,206	†456,909
Aug.	245,075	275,934	405,064
8 mos.	2,919,900	3,321,648	3,779,393
Sept.	92,728	139,820	*192,400
Oct.	280,316	230,049	.....
Nov.	408,550	405,799	.....
Dec.	418,317	518,958	.....
Year	4,119,811	4,616,274	.....

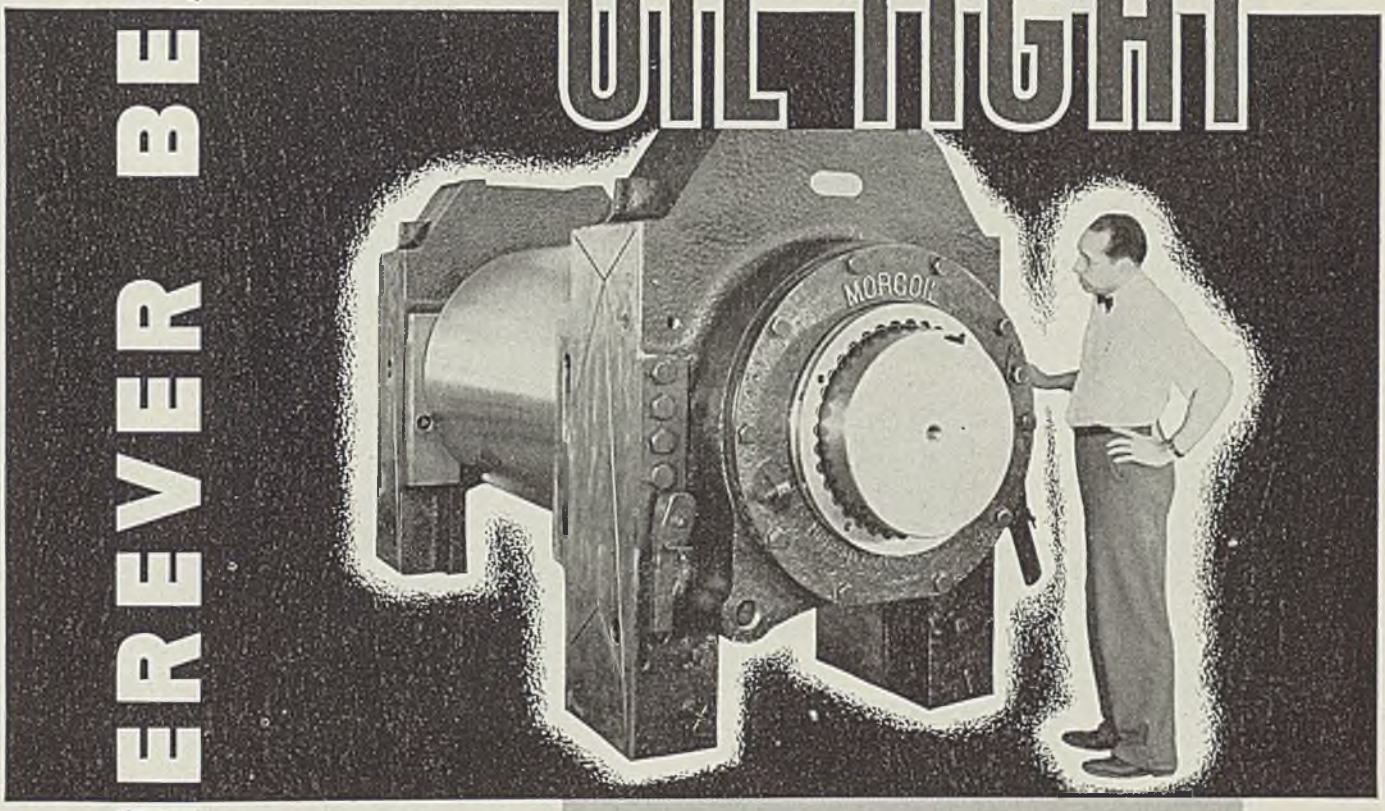
Estimated by *Ward's Automotive Reports*

Week ended:	
Sept. 11	59,017
Sept. 18	30,150
Sept. 25	28,030
Oct. 2	†45,830
Oct. 9	‡69,000

	Week ending Oct. 9	Oct. 2
General Motors	‡35,500	15,500
Ford	.....	.....
Chrysler	‡18,500	†16,550
All others	‡15,000	13,780

*Estimated. †Revised. ‡Preliminary.

WHEREVER BEARINGS MUST BE OIL TIGHT



Steel rolling mills are faced with one of the most difficult sealing problems in industry. Steel rolls are heavy duty equipment . . . they are expensive to produce and expensive to maintain. Any lubricant leak from a roll neck bearing falling on the stock being rolled will quickly ruin the face of the roll. Likewise, insufficient lubricant in the bearing housing will damage the roll neck bearing itself. The Morgan Construction Company, one of the outstanding manufacturers in this field, equip all their Morgoil Bearings with Chicago Rawhide "Perfect" Oil Seals in order to prevent lubricant leakage and also the entrance into the housing of foreign matter . . . scale, moisture, or dust.

If you have a difficult bearing protection or lubricant retention problem, ask Chicago Rawhide engineers for suggestions.

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SPRINGS ARE AN IMPORTANT FACTOR IN TODAY'S LIFE - WITH A FULL REALIZATION OF THIS FACT, B·G·R COMBINES THE SKILL OF CRAFTSMANSHIP WITH THE BEST IN ENGINEERING PRACTICE FOR ONE RESULT—"SPRING PERFORMANCE"

BARNES • GIBSON • RAYMOND TWO PLANTS **DETROIT, ANN ARBOR, MICHIGAN**

DIVISION OF ASSOCIATED SPRING CORPORATION

WINDOWS OF WASHINGTON

BY L. M. LAMM
Washington Editor, STEEL

WASHINGTON

OFF THE RECORD talks and conferences by government officials apparently have become the mode here in the past several months. This, of course, is an obvious copy of the President. It may be right and proper for the Chief Executive to handle certain news matters this way—but it is entirely different when most of the minor government officials try to hide behind a similar cloak.

J. Warren Madden, chairman of the national labor relations board, made a talk at the National Press club recently which he said was "off the record." He said nothing he had not already said for publication and probably called it an "off the record" conference to arouse the interest of newsmen.

Tries To Justify Hearings

Call it what you will, Mr. Madden made a feeble attempt to justify some of the methods used by the board in its hearings. He made such a smooth speech that he might have fooled "the very elect," except for the fact many of his audience had sat through some of the board's hearings and perceived much exaggeration in what the chairman had to say about the entire fairness of the board.

He was accompanied by the Smith brothers, Edwin S. and Donald Wakefield, who, the president of the Press club facetiously said, controlled the board. Madden, of course, rules with an iron hand.

The chairman spent the most of his time telling what a fair deal industry gets at the board's hearings and explaining why it is being attacked.

Among other things he said some 200 hearings have been held and only recently has there been criticism. The facts are the newspapers have paid little attention to the board hearings in the past. Unfairness of the board and its examiners to industry has been repeatedly mentioned here but only recently has the press really assailed them.

Referring to the newspaper attacks, Mr. Madden asserted they were "oppressive rather than constructive" and that "there is something phony about the criticism." He charged some industrial firms have hired attorneys whose sole purpose is to irritate trial examiners and prompt them to make statements of interest to newspapers.

The chairman also briefly referred to amendments which might and should be made to the act. It is easy, he said, to say conditions should be equalized as between labor and the employers in the act but it is not so easy to draft a law to accomplish this.

To labor leaders' criticism, he retorted that if they didn't like the act, they should take steps to have it repealed. He referred briefly to the situation between the board and the American Federation of Labor and the CIO, saying, in most cases the employers seem to favor the former organization.

Mr. Madden said the board has not arrived at any definition of collective bargaining. The best he could offer was the sitting down at a table by employers and employes in good faith in an effort to reach an agreement.

Believes Sitdowns Are Illegal

He stated his personal opinion is that it is illegal for an employer to express his opinion either through posters or booklets of unions and their rights. Asked if this were not a curtailment of free speech guaranteed by the constitution, he answered it might be but he "felt its illegality just the same."

He said the board has no policy on sitdown strikes but expressed a personal opinion they are illegal. However, a sitdown strike "is not a sin against the Holy Ghost."

Answering a further question he said the labor board has no authority under the law to initiate charges but merely must act on charges made to it.

SPECIAL SESSION OF CONGRESS STILL UNCERTAIN

Whether the President intends to call a special session of congress continues a matter of speculation here.

Arguments both for and against such a session appear sensible. One high government official indicated the other day he knew such a session had been contemplated for Nov. 9 but said it definitely had been called off. On the other hand, there are rumors from other sources that the President has not made up his mind and there is a chance it will be held.

Only certainty is that the President must decide soon.

FATHER-SON COMBINATION CAUSES SOME ANNOYANCE

Abundant speculation is heard concerning the future of James Roosevelt, No. 1 secretary to his father.

Young Roosevelt is the first man in the secretariat only because it seems perfectly natural that he should be the one to get the ear of the chief, morning, afternoon and night. Many believe he will go far; yet near the end of the last congressional session many good politicians apparently were getting tired of having young James say "father would like to have" thus and so done.

For example, the postmaster general always has handed out the patronage at the federal communications commission. Came time to appoint a new secretary. The job paid some $9000—not a bad plum.

Mr. Farley got in touch with the commission chairman, named the man he wanted appointed. Later that day, James called up and told

the chairman that father wanted someone else appointed. This put the chairman "on a spot" because the first man had been offered the job. Result was he had to be taken care of in some other way.

This is typical of some of the things that happen behind the scenes. Matters of this kind annoy some of the older politicians. It is not playing the game quite according to Hoyle.

However, many think young James is going a long way. He is genial and likeable and is making many friends in the capital.

PREFERENTIAL ACTION ASSAILED BY CHAMBER

A comprehensive statement has been issued by the United States chamber of commerce which sets forth in considerable detail the chamber's policies.

Among other things it takes up government-business relations; the judiciary; government competition; distribution; taxation and expenditures; money, banking and securities; foreign trade; tariff; transportation and communication and industrial relations.

Of industrial relations the chamber says: "With regard to all employment relations, the federal government should always refrain from preferential action. Attempts, through legislation or administrative action, to encourage utilization of any particular method of employer negotiation, to lead employes of any employer to take any particular action, or to foster the interests of any organization against another, are unjustifiable departures from proper governmental functions.

"The right to picketing should be limited to giving information and should not be permitted to include any actions that will cause reasonable apprehension in the mind of any person that there will be injury to himself, or any members of his family, personally, or with respect to property, business or employment."

HARDER STEEL RAILS NEEDED IN BRAZIL

Because the steel in wheels of the new electrified trains of the Central of Brazil Railway is much harder than present rails, the rails are wearing rapidly, A. W. Childs, acting American commercial attache, Rio de Janeiro, who recently observed the equipment, reports.

Along the electrified line, which has been in operation only a short time, was a noticeable quantity of steel dust ground from the rails. On certain curves where the wear is greater, actual rail shavings of some size were found, Mr. Childs reported.

Excessive wear is thought to be due to the difference in hardness of rail and the train wheels, with the length of cars, sharp curves, and other factors contributing.

There is apparently no doubt that many of the rails in use at the present time on the electrified sections of the Central Railway will be replaced, possibly by American manufacturers.

SOUTH AFRICA WANTS CONSTRUCTION MACHINERY

In keeping with the five-year program for the development of national roads throughout South Africa, now in its second year, tenders have been invited by the South African provinces for the supply of considerable amounts of additional equipment, reports F. J. Cunningham, assistant American trade commissioner, Johannesburg.

Included among the machinery for which bids will be opened are: 40 all-steel dump trucks with hydraulically-operated power hoists; three full diesel 70/80 horsepower tractors; crawler-type tractors with pneumatic tires; road graders, rotary wheel scrapers, mechanical shovels, portable air compressors, concrete mixers, road rollers, crushing plants, and other machinery.

Interested American firms are advised they should be represented in the Union of South Africa in order to bid on these items with any degree of success, it was reported to the commerce department.

SUPREME COURT TO STUDY INDUSTRIAL QUESTIONS

The United States Supreme Court last week held the first session of the October term, which probably will be one of its most historic sessions.

Many industrial questions will be before the court, dealing with various kinds of legislation. The court adjourned, with nothing but routine action, until Oct. 11.

MANY IRON, STEEL CONTRACTS UNDER WALSH-HEALEY ACT

Five hundred and fourteen contracts were entered into for iron, steel and its products during the past year under the Walsh-Healey government contract law totaling $20,863,277.55 which was 8.46 per cent of the total value of contracts signed during the year under the act, according to the department of labor.

Reader Comments

(*Concluded from Page* 49)

000 injuries per 1,000,000 people as result of automobile or street vehicle accidents. Thus he infers the factory is 7.33 times safer than the street or highway.

In homes last year, 43,800 injuries per 1,000,000 population would indicate the modern factory is 31.7 times safer than one's dwelling. Even excluding those under 15 and over 64 years of age, the injury rate is 12,590 per 1,000,000, making the factory still nine times safer than the home.

Credit for this remarkable, and to many people almost unbelievable, progress goes to industrialists who have striven earnestly to guard their employes' welfare. Despite the higher-speed machinery and the increased chances for accidents, they have made the modern factory a safe—as well as a clean and pleasant—place to work.

Safety programs, however, must be unrelenting. If vigilance were relaxed, we would slip back to a high-injury rate rapidly. It is the responsibility of industrialists to carry forward toward an even lower rate.

SAFETY ENGINEER

Cleveland.

Alloy Now a Word Denoting Improvement

"Laggard lexicographers" are taken to task in International Nickel Co.'s *White Metal News Letter* for this traditional definition of "alloy" as a word of derogation, in current editions of standard dictionaries.

One dictionary gives as synonyms "deterioration, debasement, adulteration (in the bad sense)." Another defines the noun as "admixture of anything that lessens the value or detracts from the quality; an alien or impairing element or part."

"But while lexicographers have nodded, Man has gone on apace, acquired new acceptances, developed new attitudes," the *News Letter* says.

"He now seeks his satisfactions and finds his happiness in terms of the new alloys which have become an integral part of his daily life—the nickel steels which have brought him the modern automobile; monel and "Inconel" which protect the purity of what he eats and drinks; the stainless steels and aluminum alloys which have made possible the stream-lined trains; the nickel-chromium alloys which provide the heating elements for electrical appliances in the home, and so on through an infinity of applications.

"There are, indeed, some 8200 separate alloys of sufficient merit to be trade-marked, and of these more than 2300 contain nickel.

"Alloyed has changed from an adjective of debasement to one denoting improvement, the pundits notwithstanding; whereas 'lousy' has retained its meaning undeviatingly from Elizabethan days."

Editorial

Everyone Can't Have Every-Thing He Wants Now

IF IT were possible to make an inventory of the major difficulties which beset the world at this time, it would be found that most of them are caused by suspicion, greed and impatience. Moreover, these three traits seem to be characteristic not only of nations and of the political subdivisions of nations, but also of public and private organizations of all kinds, and of individuals.

Discussion of these three traits in this publication is justified by the fact that they have a direct bearing upon business. Today every company is confronted with problems which would not exist if it were not for the fact that a nation or nations, states or provinces, associations, unions, corporations and individuals are obsessed with the idea that somebody other than themselves is getting more than his share of this world's goods, that they want a greater share for themselves and that they want it today and not tomorrow. In other words they are suspicious, greedy and impatient.

This is true of Japan, Germany and Italy. Their leaders think other powers have cheated them out of certain rights. Vindictively, they are out to get all the traffic will bear. They can't wait for a peaceful settlement of their differences. They must have their pound of flesh now.

Political Leaders Encourage Hopes for Larger, Sometimes Disproportionate, Shares

In the United States, we have similar situations. Employes, farmers and so-called underprivileged persons have been told by high authority that they have not been receiving their share of the nation's goods and income. In some instances they have been encouraged to hope for a share that is disproportionately large in relation to their ability to contribute and in relation to the nation's ability to provide. Also, these persons have been persuaded by their leaders that they must demand their share now, not tomorrow.

While the federal government is bending every effort to increase the share going to this group, state, county, municipal and village governments are pressing hard to obtain a larger share of the taxpayers' money.

At the same time, other groups, witnessing the universal tendency toward suspicion, greed and impatience, feel forced by circumstances to demand their rights. Shareholders are more eager for a big return on their investments. Executive officers want more compensation for their work. Harassed by increasing costs all along the line, company heads demand more profits so that they may combat the increasing pressure from directors and stockholders for dividends and from employes for wages and salaries.

The net result of this is a twentieth century civilization that is perilously close to disintegration. So many of the politically powerful leaders in the world are preaching and practicing the doctrine of suspicion, greed and impatience that millions of persons who normally are tolerant, unselfish and willing to allow a reasonable time for the righting of admitted wrongs are beginning to wonder whether it pays to be fair and honest. The examples placed before them by eminent leaders tempt them to say, "Oh, what's the use? If everybody else is out to get his now, why shouldn't I get mine now?"

Suspicion, Greed and Impatience Fail To Bring Success, Prosperity or Peace

Today the world needs leaders who will halt this universal movement toward a dog-eat-dog-and-the-devil-take-the-hindmost attitude. We need administrators who advise tolerance instead of hate and vindictiveness, moderation instead of greed and patience instead of direct action.

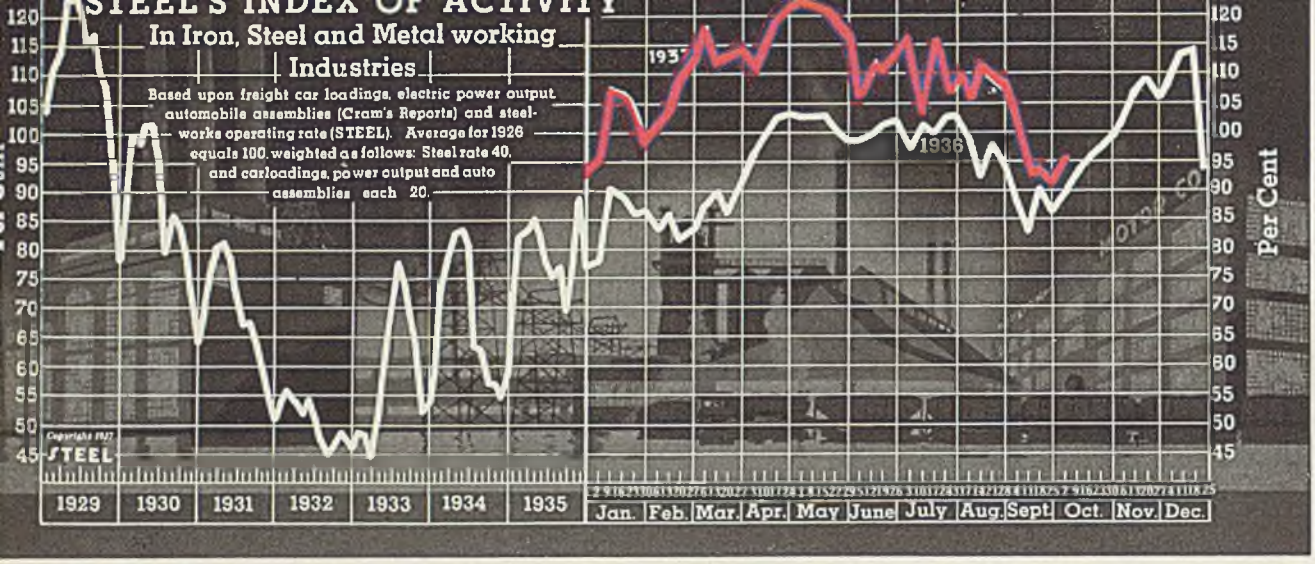
Fortunately such leaders will arise because it is becoming clearer each day that the reign of vindictiveness, greed and impatience is failing.

Look the world over to see where people are happiest and most contented. They will be found in the Scandinavian countries, in Holland and in Switzerland—in nations which are tending to their own knitting.

Among companies, which are the most successful? Those which are devoting their energies to promoting their own interests, not those who are trying to ruin a competitor or are carrying chips on their shoulders.

In the rank and file of your own company, who are the men who are getting ahead? They are the ones who are attending to their own jobs, not the ones who are suspicious that someone else is receiving too much pay.

Now is a good time for governments, companies and individuals to concentrate on constructive effort and to avoid that trinity of suspicion, greed and impatience which has done so much damage. To do so is good politics for governments, good business for companies and good policy for individuals.



STEEL'S index of activity gained 3.3 points to 96.3 in the week ending October 2:

Week ending	1937	1936	1935	1934	1933	1932	1931	1930
July 24	108.0	102.1	80.8	66.4	78.8	51.5	69.7	78.7
July 31	109.1	102.6	78.4	64.6	75.8	46.1	68.9	79.2
Aug. 7	107.3	98.7	64.6	73.4	74.7	45.1	67.0	85.6
Aug. 14	113.8	92.6	71.5	61.4	74.2	44.6	67.4	86.2
Aug. 21	110.3	97.9	77.0	60.3	71.6	44.9	67.3	88.5
Aug. 28	108.5	94.0	77.3	55.1	70.3	45.2	66.5	87.4
Sept. 4	104.8	87.5	70.9	53.5	65.5	45.4	65.3	79.0
Sept. 11	94.3	83.1	70.1	58.7	69.1	44.9	60.9	85.9
Sept. 28	95.0	90.1	69.4	58.1	68.2	47.8	65.6	86.2
Sept. 25	93.0†	86.2	68.5	59.3	66.9	48.0	65.2	83.8
Oct. 2	96.3*	89.0	73.3	54.7	67.4	47.7	62.4	81.0

†Revised *Preliminary.

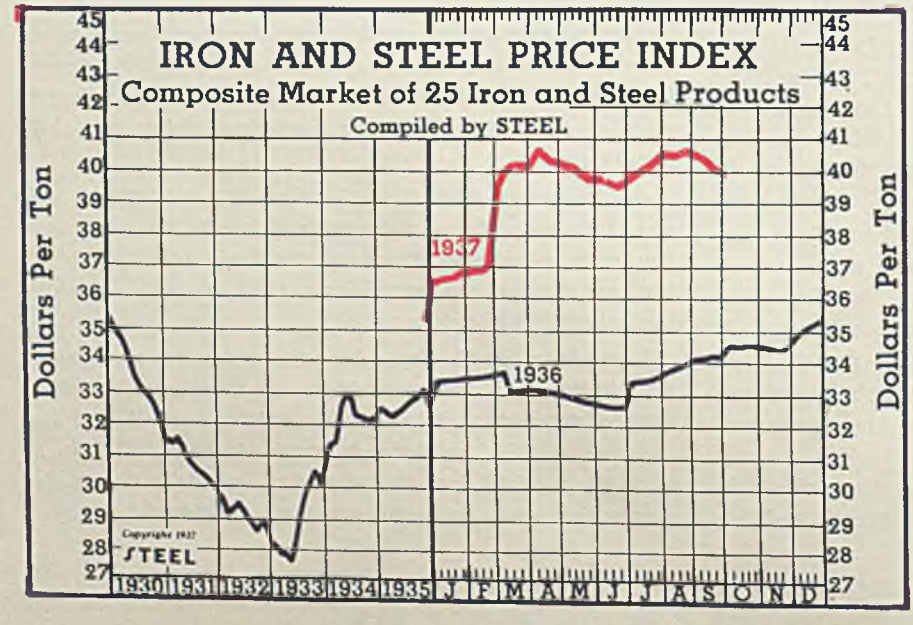
Index of Industrial Activity Shows Modest Gain

NOW that the turning point in automobile production has been passed, the prospect for an upward trend in general activity in the iron, steel and metalworking industries is somewhat brighter.

STEEL'S index for the week ending Oct. 2 is up from 93.0 to 96.2, an increase of 3.2 points, which represents the largest gain in any week since that ending Aug. 14. Incidentally, this upswing in the trend line of activity again confirms the point we have been emphasizing in recent weeks, namely, that the fluctuations in the last half of 1937 are likely to follow closely those of the corresponding period of last year.

The rise in the index resulted from a further gain in revenue freight car loadings and a substantial increase in automobile output, which factors more than compensated for a 2-point drop in steelworks operations and a continuing contraseasonal weakness in electric power output.

Developments in the next few weeks should indicate whether or not business is prepared to go through with the expected fall rally. Further postponement will cause many barometers to fall below corresponding 1936 levels for the first time this year.

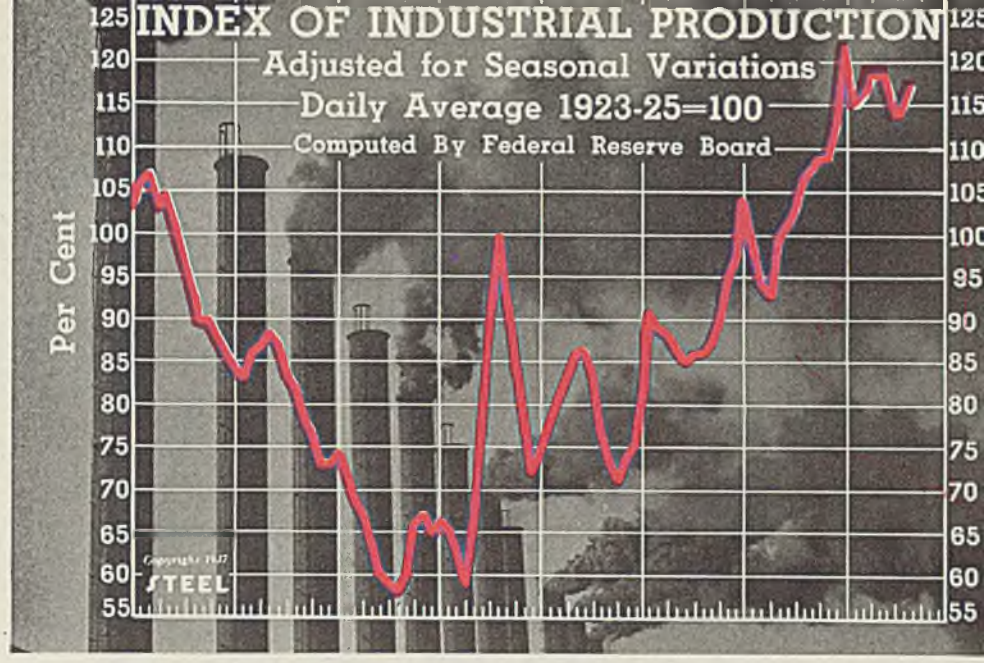


	1937	1936	1935
Oct. 2	$39.81	$34.62	$32.82
Sept. 25	39.98	34.19	32.83
Sept. 18	40.19	34.22	32.83
Sept. 11	40.21	34.10	32.81
Sept. 4	40.27	34.10	32.79
Aug. 28	40.36	34.03	32.78
Aug. 21	40.36	33.94	32.72
Aug. 14	40.32	33.88	32.68
Aug. 7	40.32	33.82	32.64
July 31	40.27	33.72	32.59
July 24	40.11	33.51	32.55
July 17	40.04	33.49	32.42
July 10	39.89	33.48	32.40
July 3	39.83	33.48	32.39

BUSINESS TREND

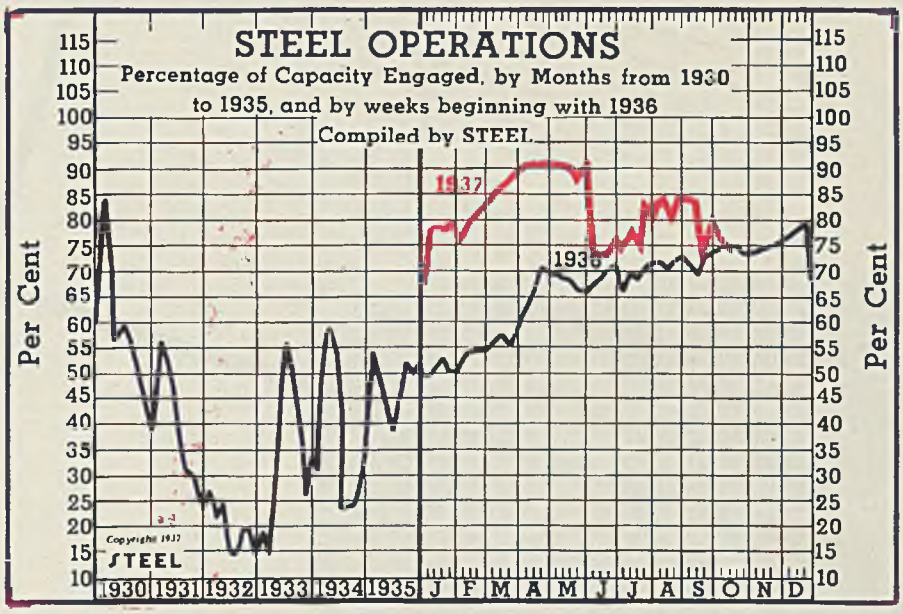
Industrial Production Index Up 3 Points to 117 Per Cent

January	115	98	91	78
February	116	94	89	81
March	118	93	88	84
April	118	98	91	78
May	118	101	85	86
June	114	103	91	78
July	114	107	86	75
August	117	108	87	73
September	...	109	89	71
October	...	109	95	73
November	...	114	98	74
December	...	121	104	86



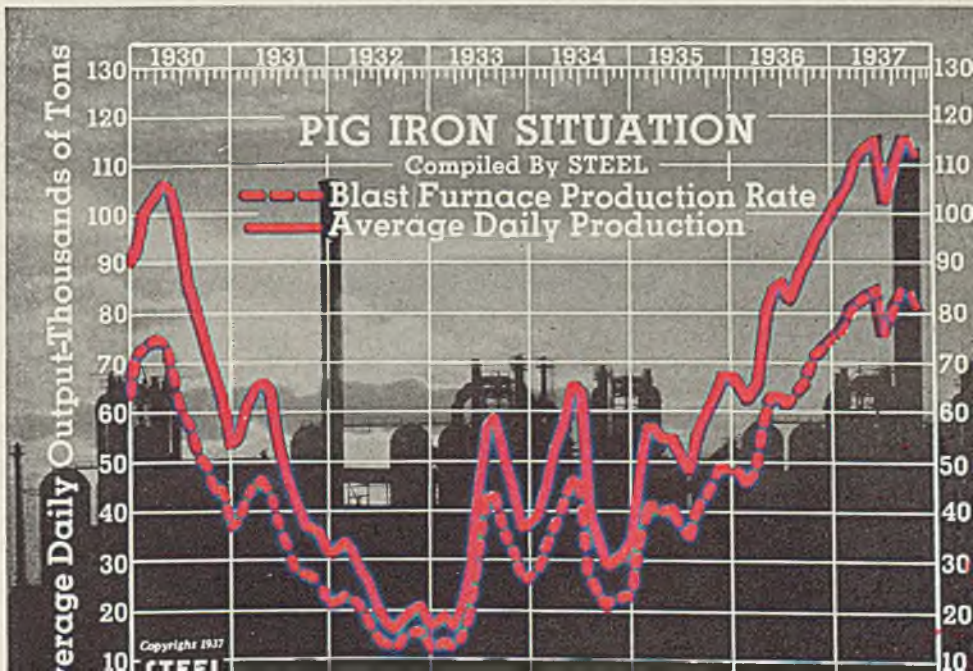
Steelworks Operations Off Slightly to 74 Per Cent

	Per Cent		
	1937	1936	1935
Oct. 2	74	74.5	53.5
Sept. 25	16	73	51
Sept. 18	80	72.5	52
Sept. 11	72	69.5	54.0
Sept. 4.....	83	71.5	52
Aug. 28.....	83	73	52.5
Aug. 21.....	81	72	52.5
Aug. 14.....	84	70.5	51.0
Aug. 7	84.5	71.5	48
July 31	84	71.5	47
July 24	81	70.5	45

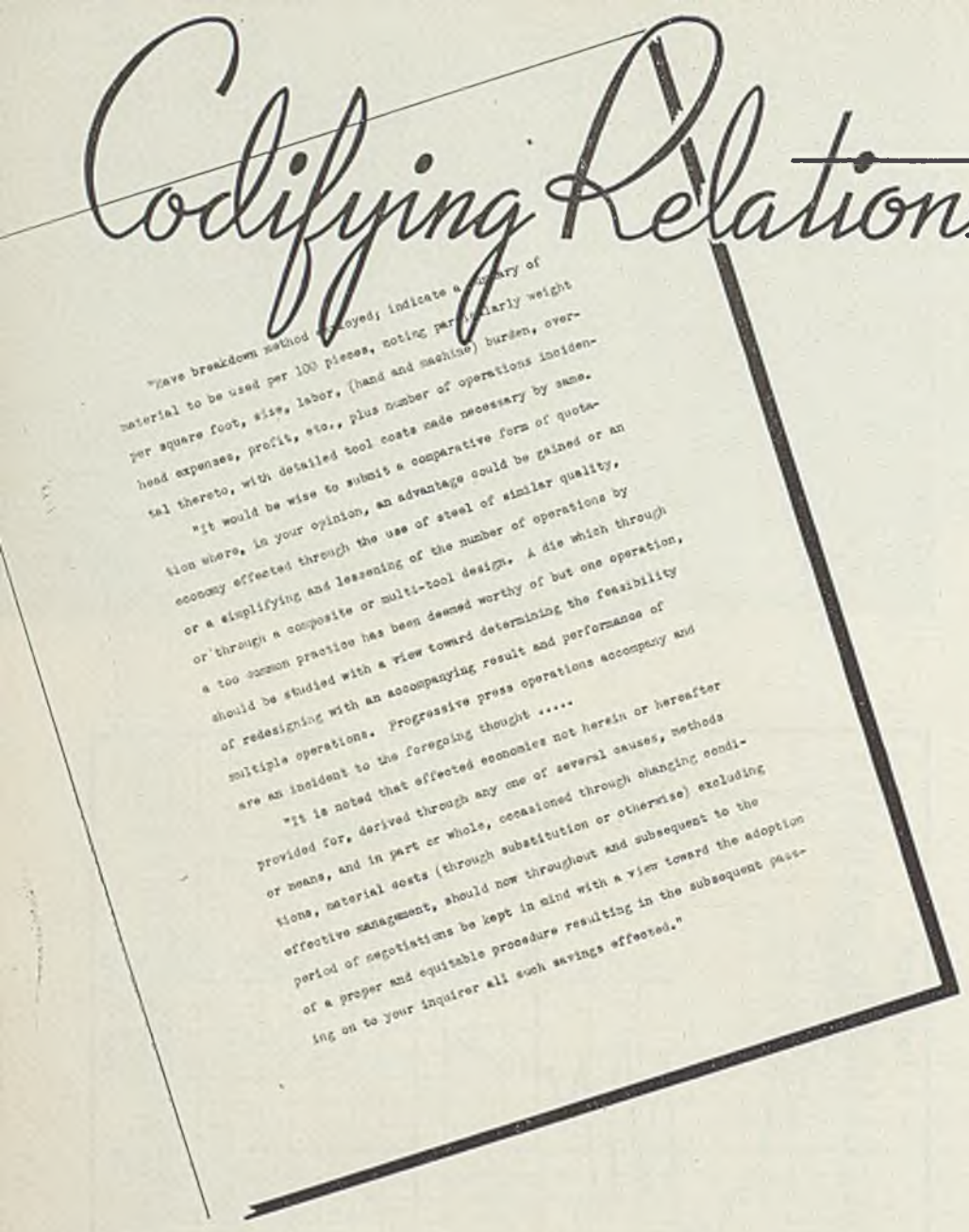


September Iron Output Down 2.3 Per Cent

	Daily Average, Tons		Blast Furnace Rate, Per Cent	
	1937	1936	1937	1936
Jan.....	103,863	65,461	76.6	48.2
Feb.....	107,857	63,411	79.5	46.6
March...	111,951	66,004	82.5	48.5
April ..	113,354	80,316	83.7	59.1
May ...	114,360	85,795	84.3	63.1
June ...	103,843	86,551	76.6	63.6
July ...	112,947	83,735	82.9	61.5
Aug.....	116,676	87,475	85.7	64.3
Sept....	113,937	90,942	83.8	66.9
Oct.....	.....	96,509	....	71.0
Nov.....	.....	98,331	....	72.3
Dec.....	.....	100,813	....	74.2



Codifying Relations Between


"Have breakdown method employed; indicate a summary of material to be used per 100 pieces, noting particularly weight per square foot, size, labor, (hand and machine) burden, overhead expenses, profit, etc., plus number of operations incidental thereto, with detailed tool costs made necessary by same.

"It would be wise to submit a comparative form of quotation where, in your opinion, an advantage could be gained or an economy effected through the use of steel of similar quality, or a simplifying and lessening of the number of operations by or through a composite or multi-tool design. A die which through a too common practice has been deemed worthy of but one operation, should be studied with a view toward determining the feasibility of redesigning with an accompanying result and performance of multiple operations. Progressive press operations accompany and are an incident to the foregoing thought .....

"It is noted that effected economies not herein or hereafter provided for, derived through any one or several causes, methods or means, and in part or whole, occasioned through changing conditions, material costs (through substitution or otherwise) excluding effective management, should now throughout and subsequent to the period of negotiations be kept in mind with a view toward the adoption of a proper and equitable procedure resulting in the subsequent passing on to your inquiror all such savings effected."

■ Between the buyer of stampings on a contract basis and the manufacturer of such stampings are apt to arise numerous points of dispute and conflict, and at present there is little basis for meeting on a common ground to determine equitable adjustment of such points as ownership of dies, die maintenance, insurance, time limits on production, inspection limits, costs and a host of other details in the transaction. Based on a wide experience in buying stampings, the accompanying article has been prepared in an effort to set forth in an unbiased manner recommendations for the reasonable solution of problems which arise between buyer and seller of stampings.

Reproduced here is an excerpt from an actual letter of inquiry for stampings. Representing probably the ultimate in purchasing department efficiency, it no doubt caused the supplier to throw his hands up in dispair.

Mr. Worth's observations speak for themselves and comprise what we believe is the first attempt to analyze these problems

PURCHASE of dies to produce stampings usually is a necessary concomitant to the buying of stampings, since in most instances the purchaser wishes to own all tools outright. Finished dies, of course, are in a true sense equipment, and like presses, motor or any other machine, they are assets of the purchasing company, to be entered as such on the latter's records. To simplify property records, the builder of dies should furnish the purchaser with an accurate breakdown of die costs.

The property record of dies ordinarily is kept by separate dies; that is, the various dies to produce a finished stamping must be listed and priced separately, such as: Blank die, pierce die, form die and the like.

All dies should be marked with numbers by the die builder and, in case the purchaser likewise wishes to assign his own die numbers, the dies should carry both sets of numbers to facilitate ready and accurate identification.

When a seller quotes on dies to produce a certain stamping, he should be responsible for these dies producing a satisfactory stamping, definition of the latter being a point upon which there must be mutual agreement. In most cases, the matter of die design is left to the seller, but in order that the latter may design suitable dies intelligently he must have certain fundamental information upon which to base his design and to quote a fair price.

The buyer and seller should discuss and understand the following points which have much to do with the cost of a die:

1. The approximate quantity of stampings to be produced from the dies governs to a major degree the type of die to be built, which in turn governs the cost of the dies. The purchaser should keep in mind that die quotations can cover a wide range as to price. Thus, an inexpensive cast iron die will produce good stampings of a certain type, but not for long. If the run is to be large, the buyer should ascertain that all those quoting figure a quality of die which will carry through for as long as the part is to be in production.

2. On the matter of die maintenance, it should be understood no die can be run over a period of time without repairs, such as replacing worn parts or building up certain parts of the die to maintain a sharp, clean stamping. This is an expense item and should be covered in the die cost or in the piece price of the stamping.

3. Dies should be covered by in-

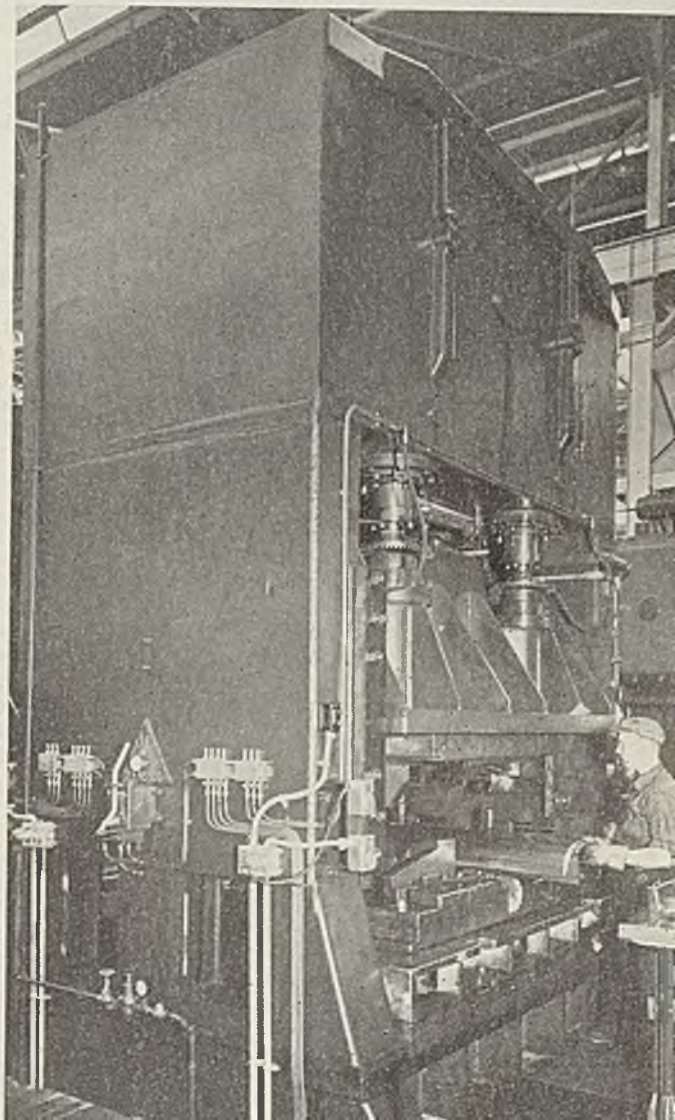
Buyer and Seller of Stampings

BY L. M. WORTH
Purchasing Department, Graham-Paige Motors Corp.
Detroit

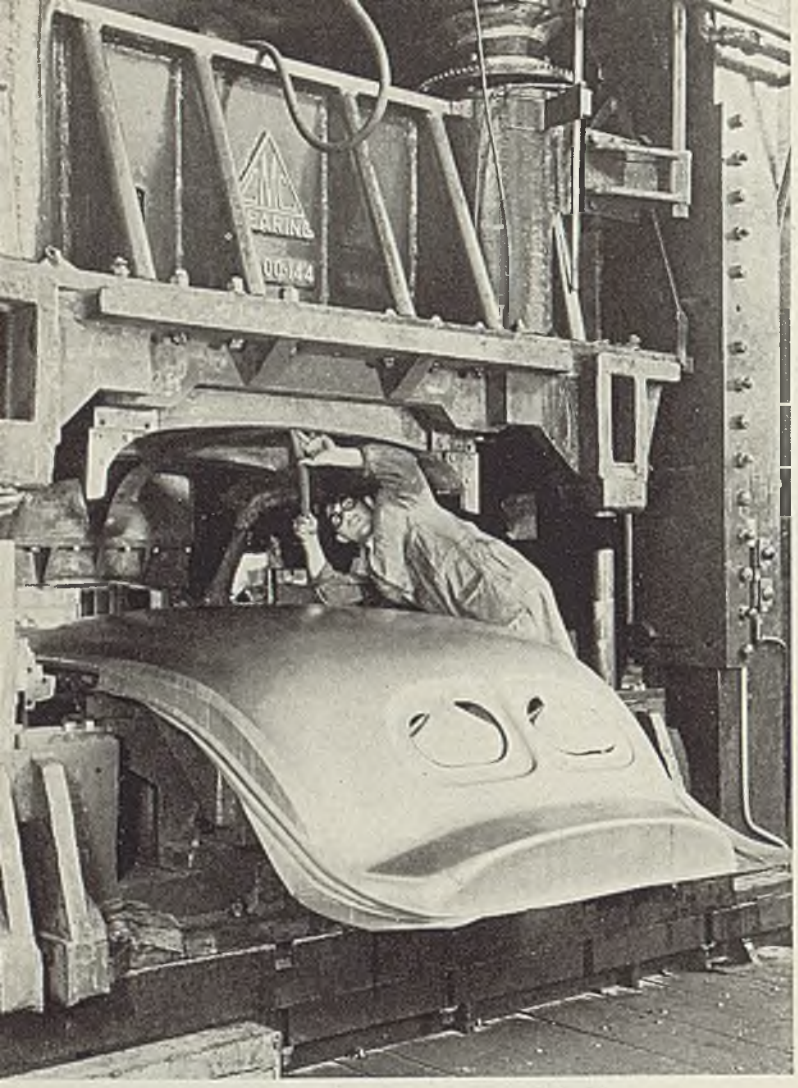
surance in the same manner as any other equipment, and this insurance should cover the period the dies remain in the seller's plant.

4. Time limit on die production is a most important item. By far the major portion of die costs is labor, and when quoting in competition the seller naturally figures costs on a straight time basis. If overtime is required to meet the desired time limit, this fact should be understood before the business is placed. The buyer also should keep in mind that the time required to build dies is calculated carefully and usually is surprisingly accurate, but after the dies are built they must be tried out for accuracy. Tryouts also require time, and unfortunately there appears to be no way in which this can be anticipated; therefore. there should be some understanding on the matter of tryout time.

The purchaser should also guard against exaggerated promises of competing suppliers given without hope of fulfillment. It is impractical to remove a partially completed die to some other plant for finishing; therefore, it is advisable to discuss completion dates openly and fairly if it is to be necessary to allow overtime to meet the required date. If the part has been delayed by the purchaser's plant, such overtime should be the latter's responsibility; if the seller falls behind in his schedule he should assume any such expenses.



Workmanship and material should be in strict conformance with blueprint specifications, and the finish part subject to the approval of the purchaser. Photo courtesy De Soto division, Chrysler Corp.



In quoting on dies to produce a certain stamping, the seller should be fully responsible for these dies producing satisfactory stampings. Photo courtesy De Soto division, Chrysler Corp.

5. In many instances, purchasing and inspection departments of companies buying stampings are increasing costs unnecessarily by demanding too close limits on inspection, where such limits are not required in the part. Where these limits affect die costs, there should be some agreement on them, a matter in which the buyer's engineering department should co-operate to the fullest extent.

Where a formed or pierced stamping is to be checked over a fixture, the latter should be checked carefully by the buyer's inspection department if it is to be built by the seller. If, on the other hand, the purchaser builds the fixture, he should allow the seller to check his tryout over this fixture.

6. A sufficient number of blueprints should be supplied by the purchaser, with enough copies for all departments of the producer. Certain dies require models for Keller machines and in some cases these models show contours which cannot be indicated on blueprints. As a rule, these models are furnished by the purchaser.

7. Engineering changes introduced after dies have gone into production often increase or decrease die cost, and also may affect the finish date. Responsibility for such changes logically rests with the purchaser who should promptly notify the die builder of their introduction into the program. The die builder should, in turn, promptly notify the purchaser of additional time required to make changes.

8. The toolroom of the average stamping company does not operate on a profit basis on dies for intraplant use on outside business; therefore if the purchaser of dies intends to remove them after tryout or after the initial run, by all means he should so state in his request for quotations. Furthermore, in such cases, he should advise as to the type of press equipment on which the dies will be installed. This will result in an eventual saving, since the dies can be adapted to the specified press equipment without unnecessary expense.

The stamping company should keep in mind that when dies are completed they are the property of the purchaser, and will be left in the supplier's plant as long as he produces on a reasonable schedule. If he cannot maintain such a schedule or if he cannot produce the stampings at a competitive price, he should not stand in the way of removal of the dies from his plant. Open and fair discussion of this point between buyer and seller is advisable.

9. Payment for dies, unless otherwise agreed upon, is made on approval of a sample off the dies. The buyer should be fair in this matter to see that the sample is checked as soon as possible after it has been received.

10. As mentioned before, die costs should be broken down according to individual dies for the buyer's property record. If, for example, in the original proposal it is agreed upon to build four dies—blank, pierce, form and flange—at a specified cost, that is the basis upon which the business is placed. Suppose now that the seller finds he can combine the blank and pierce die in one operation which will result in eliminating one press operation and in a consequent reduction in piece price. This does not mean the purchaser should eliminate the cost of either the blank or the pierce die, since the cost of combining these dies is in some instances even greater than the separate cost of each. Such combinations also require open and fair discussion by both parties.

11. When standard riser plates, pedestals or shoes are to be used, the seller's quotation should so state if these die parts are to belong to and be paid for by the purchaser, in which case they should carry a die number.

12. Obsolete dies are a growing source of trouble to the stamping producer. Each year a large number of the parts he produces become obsoleted, making the matter of die storage increasingly difficult. While certain dies must be held for service requirements, the buyer should go over his die lists carefully and scrap all possible obsolete dies.

Breakdown of Costs

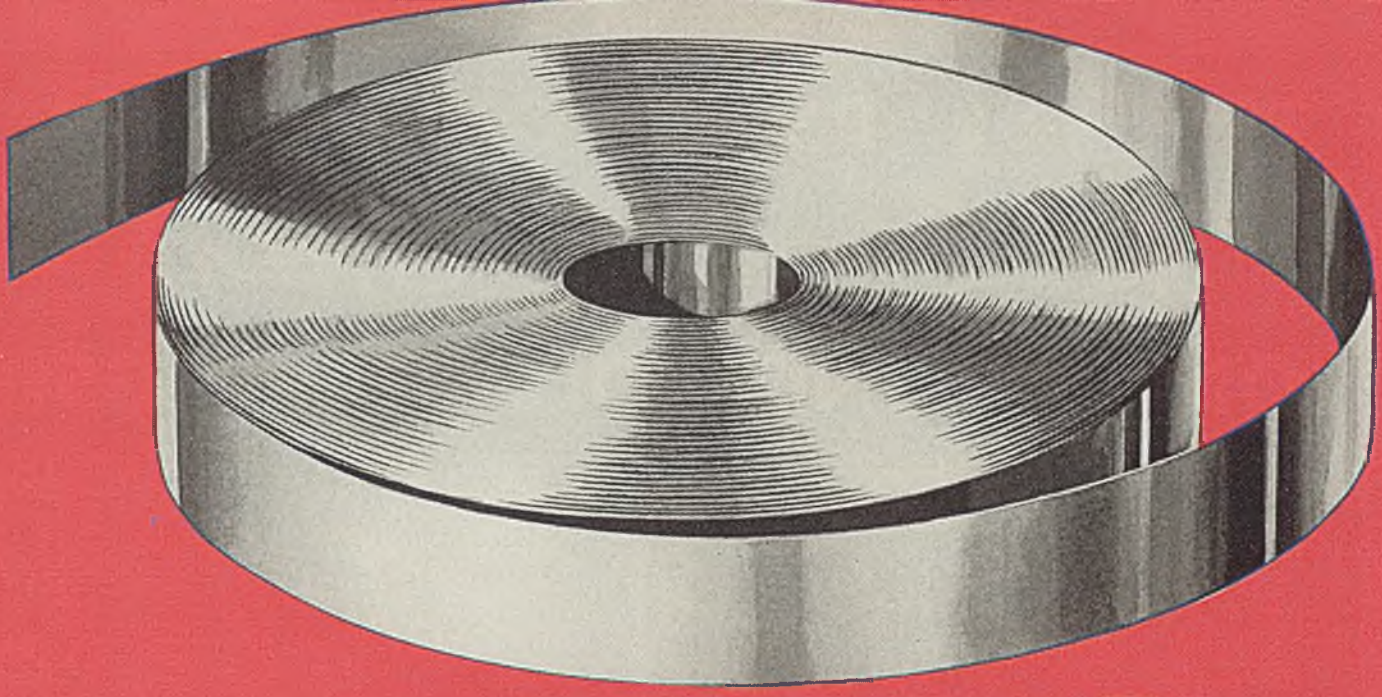
Turning now to the matter of stamping costs, the following classification suggests itself: Material, labor, setup, burden, profit and transportation. In submitting a quotation the seller should break down each item.

Material: Type, gage, quality and finish should be indicated, such as: 20-gage, hot-rolled, pickled and oiled. Blank size should be indicated in some such fashion as:

$20 \times 36 = 1$ or $38 \times 36 = 2$

It should be borne in mind by both parties that the blank size used in the original quotation is an estimate and is subject to revision when the dies are completed or after the in-

(*Please turn to Page* 124)



Superior STAINLESS STRIP Steels

Above *the Fog*

Manufacturers sometimes find themselves in a fog of perplexities incidental to creating a product that can be sold readily at a profit.

Many manufacturers have pierced this low vision area and have seen standing out above it—not a visionary thing—but a very real answer to their problem—SUPERIOR STAINLESS STEEL.

SUPERIOR STAINLESS STEEL is made by a producer of hot and cold rolled carbon strip with nearly 50 years' experience. If your product requires carbon strip you can get the best in quality, workability and service from Superior. And if you want to impart added attractiveness and salability to your product—try SUPERIOR STAINLESS.

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SUPERIOR STEEL CORPORATION

GENERAL OFFICE: GRANT BLDG., PITTSBURGH, PA. **WORKS: CARNEGIE, PA.**

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BRACE-MUELLER-HUNTLEY, INC.

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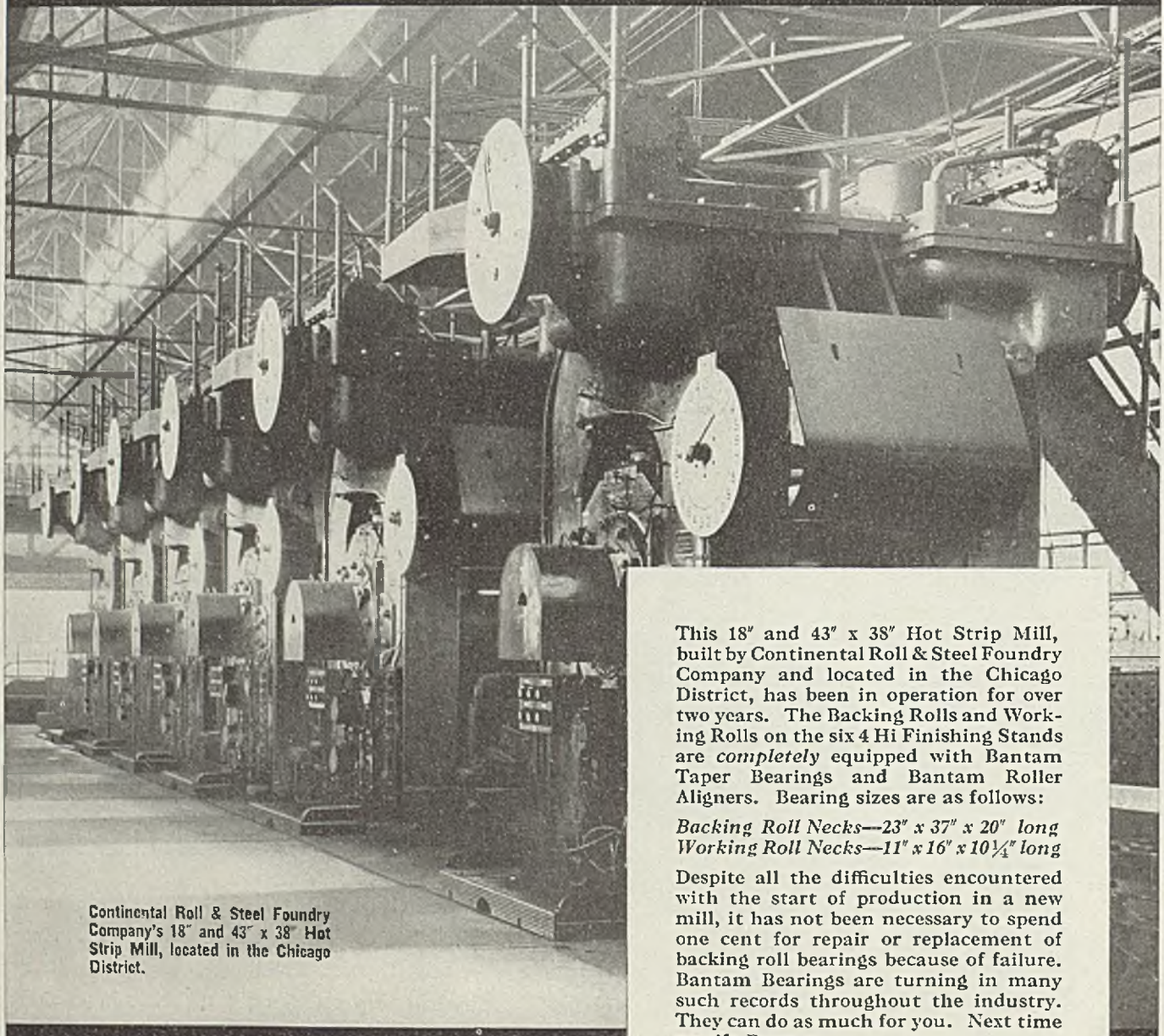
Not One Cent Spent

ON BACKING ROLL BEARINGS



Continental Roll & Steel Foundry Company's 18" and 43" x 38" Hot Strip Mill, located in the Chicago District.

This 18" and 43" x 38" Hot Strip Mill, built by Continental Roll & Steel Foundry Company and located in the Chicago District, has been in operation for over two years. The Backing Rolls and Working Rolls on the six 4 Hi Finishing Stands are *completely* equipped with Bantam Taper Bearings and Bantam Roller Aligners. Bearing sizes are as follows:

Backing Roll Necks—23" x 37" x 20" long
Working Roll Necks—11" x 16" x 10¼" long

Despite all the difficulties encountered with the start of production in a new mill, it has not been necessary to spend one cent for repair or replacement of backing roll bearings because of failure. Bantam Bearings are turning in many such records throughout the industry. They can do as much for you. Next time specify Bantam.

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SOUTH BEND - - - INDIANA
Subsidiary of
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Torrington, Conn.

BANTAM
BEARINGS

TAPERED ROLLER • • • STRAIGHT ROLLER • • • BALL BEARINGS

MATERIALS HANDLING

Boxing Automobiles for Overseas Is Scientific Materials Handling Job

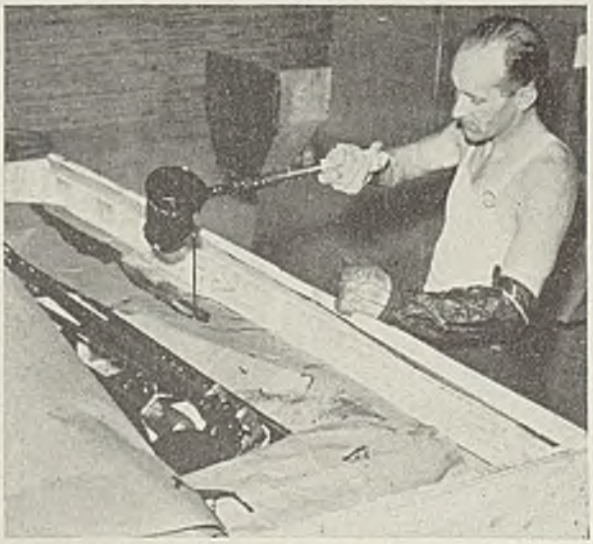
ONE of the familiar sights along the waterfront at the Port of New York is the apparently ceaseless movement from shore to ship of boxed automobiles for export to all parts of the world. Figures recently compiled by the Automobile Manufacturers' association show that last year foreign sales of cars and trucks numbered 508,226 units. This proof of the popularity of American-made vehicles suggests the importance of this class of products as a significant factor in our commercial life.

One of the most interesting industrial plants within a short distance of the New York waterfront, the Chevrolet export boxing plant at Bloomfield, N. J., is devoted entirely to this single activity of packing automobiles for export. Its operations may be classified as "100 per cent materials handling" for there is no manufacturing whatever in its confines. To the plant's receiving docks flow chassis and body parts from various producing centers in the widespread General Motors empire, and from the moment of their receipt until they are moved out again in freight cars for the short rail movement to shipside, they are subject to handling operations of various types.

In this movement through the boxing plant, electric hoists, roller and power conveyors and floor trucks all play important parts, and on the final transfer from the end of conveyors to the gondolas, two overhead electric traveling cranes perform the heavy lifting. The entire plant is an unusual example of a combination of scientific planning and efficient use of mechanical aids whenever the latter may be utilized to simplify tasks of the hundreds of skilled workmen who do the actual packing jobs.

Briefly, the C. K. D., or "Completely Knocked Down" method of packing and shipping consists of shipping a sufficient number of cases, containing enough of one or more types of materials to assemble a specified number of automobiles. At the Bloomfield plant, the unit of

LAYING out parts in jigs permits rapid visual inspection and insures against packing of wrong number or type

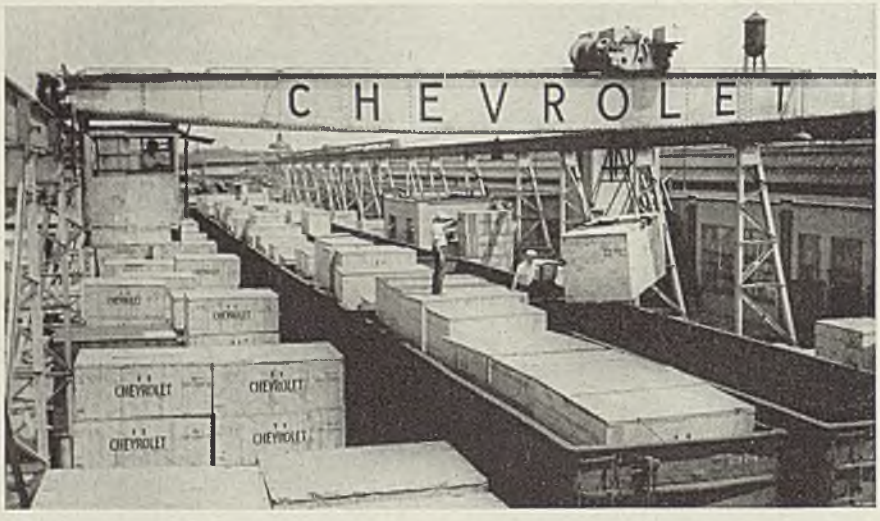


TAR is used to seal the waterproof envelope. Careful operatives do not permit the tar to damage contents

MATERIALS HANDLING

shipment is 24. Accordingly, in one case are boxed sufficient rear axles for 24 cars; in another would be enough body hardware for a like number and so on. As there are certain limitations as to size of boxes, certain items are packed in smaller quantities. For example, engines are too heavy and bulky, and so these are packed in groups of eight to a box, three such boxes making up a complete unit.

Two buildings constitute the Bloomfield plant. Each follows the same principles of layout. Each is rectangular and has both an inbound and an outbound side. On the incoming side of each building are spur tracks, from which material is unloaded from freight cars onto a platform which traverses the entire length of the building. This platform is covered. At the motor unloading points are short lengths of monorail, which are arranged to swivel at the supporting ends and which can be moved in and out of box cars. On these rails are attached electric hoists, with pendant controls. Incoming engines are lifted by the hoists, run out a few feet on the rail and deposited on special trucks which transport them immediately to their packing stations where such parts are to be used.



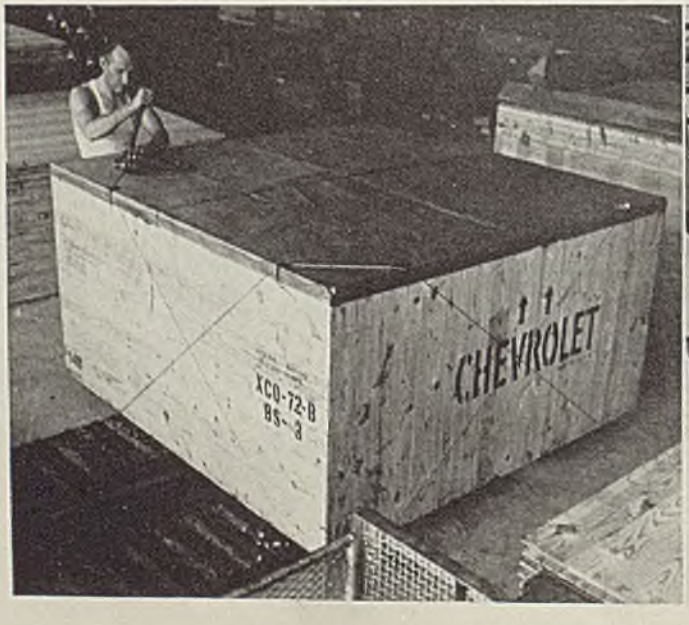
FROM ends of conveyor lines boxes are loaded into gondolas for journey to waterfront. This crane runway is located between two packing buildings and serves both

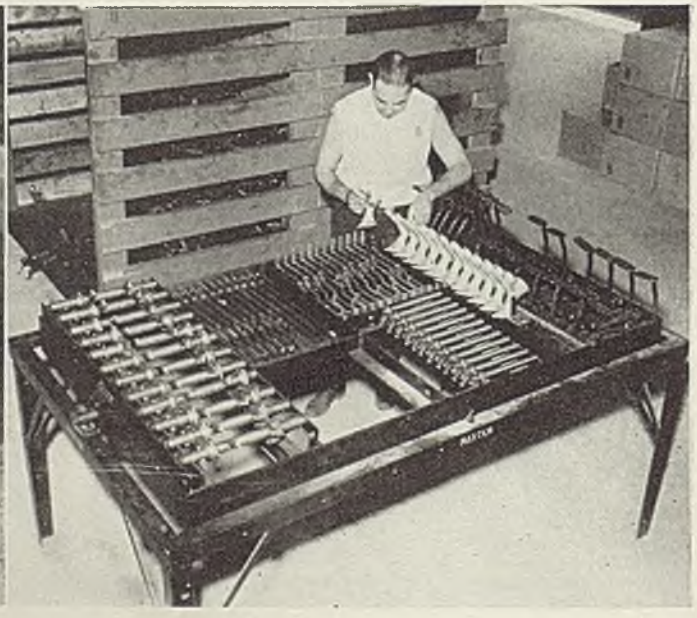
There are 17 floor level conveyor lines, each assigned for one packing operation. These run crosswise through each building, starting from the receiving ends and stopping at the ends nearest, respectively, to the crane yard. There is a motor packing line, an axle line, a body metal line and so on down through the list.

Packing is done on these conveyors. The latter are made up of two sets of parallel rollers. Some of these are power driven and have between the rollers a line of drag chains, a dog from which engages the bottom of the back end of a packing case and pushes it along the rollers as the operations proceed.

Packing cases are assembled from pre-built sections at the beginning of each line. Sides, ends and bottoms are lined with waterproof paper. As the cases progress down the conveyors, parts are put in and firmly held in place by two-by-fours and wooden blocks and wedges until finally the entire assortment is packed. After this, the case is hand-nailed, stencilled, strapped and has sealed on a waterproof top covering. It then rolls out on the conveyor to

(*Please turn to Page* 134)





AFTER asphalt coating has been applied, fibreen paper is sealed with tar and, shown at left, the steel strapping is applied. In the axle line shown at right, the jig has a pivot arrangement which permits it to be turned over. One side fits right hand drive parts, the other left

The above Hardness Figures indicate Rockwell B Scale tests.

The relation between temper numbers, description and Rockwell readings are frequently altered to conform to tempers or thicknesses consistent with various existing specifications.

Physical properties of Cold Rolled Strip or Flat Wire are measured by hardness . . . the ability to resist indentation, rather than by breaking load. Strip used for deep drawing or severe bending must be extremely ductile and is indicated by a low Rockwell reading. On the other hand clock spring steel must show a high reading as proof of its tensile strength and stiffness. Proper hardness of Flat Wire is vital to its satisfactory functioning. In the Wickwire Spencer Mills all Strip is thoroughly tested for hardness. From records of constant tests we know the proper Rockwell reading of Flat Wire best for your purpose. Write us and we will gladly advise you.

• •

WICKWIRE SPENCER STEEL COMPANY

New York City, Buffalo, Chicago, Detroit, Worcester. Pacific Coast Headquarters: San Francisco. Warehouses: Los Angeles, Seattle, Portland. Export Sales Dept.: New York

Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire — Valve Spring — Music — Clip — Pin — Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—Dent Spacer Wire — Reed Wire — Clock — Pinion — Needle-Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wissco technical man on your wire problems, however large or small.

WISSCO WIRE
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SPEED · UNIFOR

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● These three steels are guaranteed to produce a stronger and better part at less cost than any other steel of the same carbon content. SPEED CASE X-1515, SPEED TREAT X-1535 and SPEED TREAT X-1545 fulfill every non-alloy steel requirement below .50 carbon.

SPEED CASE X-1515

Monarch's first successful cold drawn, free machining, carburizing steel, containing .15-.20 carbon and .20-.30 sulphur—permitting maximum machinability without any loss in strength or ductility. This steel is the fastest machining open-hearth case hardening steel made, rating over 200 surface feet per minute. SPEED CASE X-1515 has a tensile strength of 85,000 lbs. (Note severe test made on 1-inch round cold drawn bar at bottom of page.)

SPEED TREAT X-1535

Monarch's higher carbon steel (.30-.40 carbon) which, like SPEED CASE, is an open-hearth steel using the same exclusive SPEED CASE process. This steel, with its higher carbon, develops considerably more strength—yet machines practically as fast as SPEED CASE or SAE 1112 and is extremely ductile. This grade has a tensile strength of 100,000 lbs. and will machine at over 150 surface feet per minute.

SPEED TREAT X-1545

Monarch's third and most recent development. It, too, is an open-hearth steel but with a .40-.50 carbon range and with a tensile strength of over 110,000 lbs. SPEED TREAT X-1545, like its two predecessors, is in a class by itself as far as free cutting is concerned as it will machine at approximately 140 surface feet per minute.

May we mail you complete particulars on any one or all three grades of steel listed?

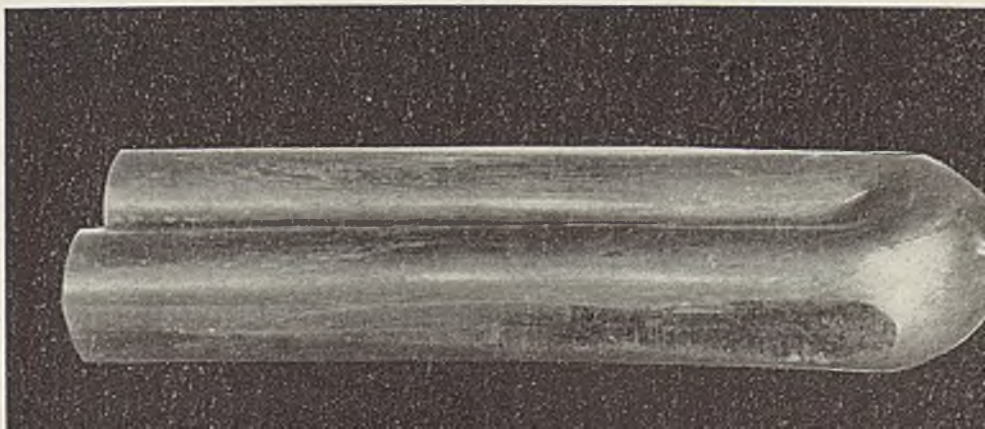
ROUNDS • SQUARES • HEXAGONS • FLATS

MONARCH STEEL COMPANY

Indianapolis, Ind. **Hammond, Ind.**

Manufacturers of cold drawn turned and polished and turned and ground steels in all carbon and alloy analyses in addition to X-1515, X-1535 and X-1545.

Despite .24 per cent sulphur content, this 1-inch cold drawn, free machining, .15 to .20 carbon, carburizing steel bar was bent back on itself in a 150-ton press without sign of fracture. While this specimen is SPEED CASE X-1515, SPEED TREAT X-1535 and SPEED TREAT X-1545 are both more ductile than other steels in the same carbon ranges. Photo is unretouched.



Technical Developments Interest Iron and Steel Engineers

IN LAST week's issue, STEEL brought you summaries of some of the papers presented at the Chicago convention and exposition of the Association of Iron and Steel Engineers. Other papers of interest are presented herewith in abstracted form.

Complete control systems for recuperative and regenerative soaking pits were described by A. E. Krogh, market development department, Brown Instrument Co., Philadelphia. Individual parts of control systems must necessarily be adapted to meet conditions for each job, but in each case it is important to remember that if automatic control is to be attempted it should be complete and unified, with each part working in co-operation with all others to achieve the desired results. For instance, the best conceivable pit pressure control could not accomplish the desired ends if the furnace were being fired with a "feast and famine" type of temperature controller, nor can satisfactory economy be secured by a temperature controller if the pressure of the fuel ahead of the valve is allowed to fluctuate, etc.

The difference in cost between a soaking pit with miscellaneous controls and a pit with a completely engineered instrument control system is not great in dollars and less in terms of per cent, but the difference in service and satisfaction is great measured in both terms.

Agreement seems to be general that complete control of soaking pits involves the following:

1. Control and indication of pit pressure or draft.
2. Control of atmosphere or fuel-air ratio. This frequently also involves control of fuel and air pressures ahead of the controlling valves and control of air preheat temperatures. Preferred forms record and integrate fuel flow and record waste gas analysis.
3. Control of temperature.
4. Control of reversal periods for regenerative pits.
5. Control of fuel limit.
6. Shut-off control of fuel and air when pit is opened.

A number of other controlling equipments could be included in this line-up, but diminishing return can generally be expected as additional niceties are introduced.

The desirability of pit pressure or draft control need hardly be stressed. It saves fuel by preventing air infiltration, and tends to maintain the furnace temperature more constant. The control equipment must be sensitive, independent of temperature fluctuations, anti-hunting, and of a quick-acting type in order to respond quickly and correctly to the many upsets that occur while the pit is being charged and drawn.

A number of installations, involving a bank of pits, have been made wherein the pressure at the base of the stack was controlled for all pits. This can be successfully accomplished only when proper means are taken to assure that the damper is not made to hunt in any position.

Effect of Atmosphere Control

Control of pit atmosphere is one of the chief contributing factors to the remarkable evenness of heating and reduction of metallic loss which has resulted from these new pit designs. By keeping the atmosphere surrounding the steel at desired values, washing of the ingots can practically be eliminated, especially when atmosphere control is combined with temperature control. Here again it is important that the sensitivity of the control system be satisfactory, both for the heating and the soaking periods. The radically differing amounts of fuel required in the two instances require a control system especially adapted to avoid hunting at all rates of fuel flow.

In selecting temperature control equipment for soaking pits, the first problem is to determine a suitable point of temperature measurement. Generally, temperature measurement must be confined to a temperature sensitive device, such as a radiation pyrometer or a thermocouple, measuring the temperature within a refractory tube built into the wall of the pit. Excellent results have also been secured by installing thermocouples in the outlet flues and controlling these to a given value found to correspond to desirable conditions.

Modern pits are being equipped with control instruments that definitely limit the rate of fuel input. The old days of heating ingots in "a hole in the ground" by simply sticking a burner in and "giving her all she could take" are gone. The resultant saving in fuel easily pays for the initial investment in a short period of time. The additional saving in avoiding ingot washing is pure profit.

An incidental but important feature of modern control systems for soaking pits is the use of a safety shut-off system which automatically shuts off fuel and air to the burners as soon as the cover is lifted, preparatory to opening the pit.

On paper, these controls appear somewhat formidable, and, indeed, they can be if each strives to do its job regardless of the others, but when all are combined and engineered into a unified whole, properly tuned in for the particular furnace, the result will be efficiency and satisfaction of a high order. On such systems, it matters little what the operating medium may be —whether electric, hydraulic, or pneumatic. Each type is good and has its place.

Importance of suitable protective atmospheres for annealing furnaces in steel mills can hardly be over emphasized, and while the use of such atmospheres is being rapidly extended, yet, there is much useful information which has not been put in such form as to be readily available to those who actually use the apparatus, according to A. N. Otis, General Electric Co., Schenectady, N. Y.

The largest single application in the mills today is for annealing bright sheets and strip. This is of great economic importance, and fortunately it is one of the simplest of the processes using protective atmospheres.

This apparatus, although introduced only a few years ago, has come into wide use through the ad-

vantages which it offers, namely a cleaner and better product, at lower cost and with greater safety, than is possible by the use of raw gas formerly employed. It is a splendid example of contributions from those outside the industry, since it was developed for quite a different purpose.

Even though these equipments are used widely there appears to be some confusion as to the requirements, particularly as to the permissible or desirable moisture content for bright annealing steel, as evidenced by inquiries received. Some of these specify the use of absorption dryers to remove the moisture content to a low value, others specify refrigerated coolers to remove it to a moderate value, while others get entirely satisfactory results without the use of either.

Annealing Problems

For annealing high carbon steel, two problems are presented, (1) for bright or clean materials, such as cold rolled strip, and (2) for hot rolled materials, such as bar stock or strip, having mill scale on the surface. Gases having reducing properties are desirable for the former, in order to prevent discoloration, but for materials with mill scale, neutral gases are required, since the reaction of reducing gases with the mill scale, at annealing temperatures, produces decarburizing elements on these materials.

(1)—For bright materials. Coke oven gas purified of oxygen and water vapor is suitable for protection against decarburization, but the methane content (it contains approximately 55 per cent H_2 and 35 per cent CH_4) tends to decompose, leaving a carbon deposit on the work, particularly at high annealing temperatures. At 1300 to 1350 degrees Fahr., the usual annealing temperature for carbon steel strip, the carbon deposit is not exclusive, and is entirely satisfactory to some users. If work is to be done at higher temperatures however, a considerable carbon deposit must be expected.

Purified coke oven gas has one decided advantage, namely, that it tends to carburize rather than decarburize, and therefore offers definite protection against loss of carbon from the steel.

Surges and their effect on transformers was discussed by H. Weichsel, consulting engineer, Wagner Electric Corp., St. Louis, Mo.

This paper states since it is impossible to control natural lightning, methods of producing and recording the effects of artificial lightning have been devised to study ways and means of delivering more constant and uniform electrical energy to the customers of generating stations.

Protective means now in general use include some form of lightning arrester as a primary protector, and a rod gap as a secondary protector. The rod gap is also used for the measurement of the voltage to which the transformer is subjected during a test.

When an impulse of sufficient magnitude and energy is applied to a transformer to cause a flashover of the secondary means of protection, (rod gap or bushing) follow current may or may not flow depending upon the part of the power wave struck by the surge. The percentage of the power cycle which is vulnerable is dependent to some extent upon the value of ground resistance at the transformer.

In all transformers of modern manufacture, the insulation is designed so that the protective gap across the bushing is the weakest point. If this gap flashes, little, if any damage occurs to the transformer but of course a system outage takes place. This so-called coordination of insulation does not stop with the transformer itself, but should be and generally is extended to the lines feeding the station and carrying the power away from the station.

Carbon may be produced in fabricated forms, such as brick, without addition of foreign bonding agents. In addition to being chemically inert in practically all conditions, this material also is machinable by grinding or tools, and in forms such as are used for tank linings, it can be handled as ordinary brick would be without danger of breaking or chipping, according to L. C. Werking, National Carbon Co. Inc., Cleveland.

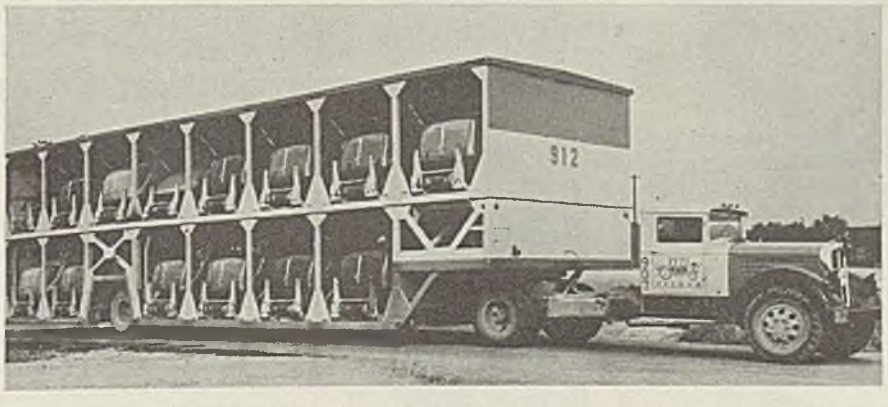
Unfortunately, there is no immediate prospect of producing monolithic tanks of the size required by the steel industry, and even more disappointing to many tank users is the fact that this material can't be melted and poured into place or applied with a brush.

A masonry wall must be built using carbon in some suitable shape properly cemented together to form a strong, rigid mass. While reasonably large slabs can be produced for tank lining work, regular brick shapes adapt themselves most readily and present less difficulty in laying up than the slabs. Fortunately adhesion between carbon and any cement suitable in the particular chemical conditions involved is satisfactory. For nitric-hydrofluoric acid combinations, sulphur-base cements containing carbon fillers have proven themselves to be entirely satisfactory. Excellent progress in the use of plasticizers in these cements in recent years has done much to improve tank lining practice, and to increase cement life.

The requisites for a perfect carbon lined tank are not materially different from those of other masonry lined jobs. The shell must be sufficiently heavy to provide rigidity, and is almost universally of steel, concrete, or masonry construction. This, in turn, should be coated with an impervious coating chemically suited to the work involved, and inside of these a carbon brick lining of sufficient thickness to provide final protection should be applied.

Actual operating experience in

Largest Trailer Hauls Fourteen Bodies



THIS special job is believed to be the largest body handling trailer ever built. It moves 14 completed bodies at a time from the Fisher plant, Lansing, Mich., to the Olds assembly plant 2 miles away. A private road had to be built to accommodate the trailer's 12-foot width. Two men load and unload the bodies, each unit being mounted on a special steel cradle which, at the loading station, is rolled into the trailer from a double-deck loading ramp. Trailer, 48 feet long and weighing 56,000 pounds unloaded, is built from structural plates and shapes, riveted, bolted and welded. Far sides and ends are covered with plywood; roof is of specially treated canvas. Small steel wheels at side of trailer front and rear facilitate lining up the carrier at the platforms, the wheels traveling on raised rails set farther apart than the trailer tires. Trailer has dual rubber-tired wheels at rear only, front being carried by the hauling tractor. It was designed and built by Mechanical Handling Systems Inc., Detroit

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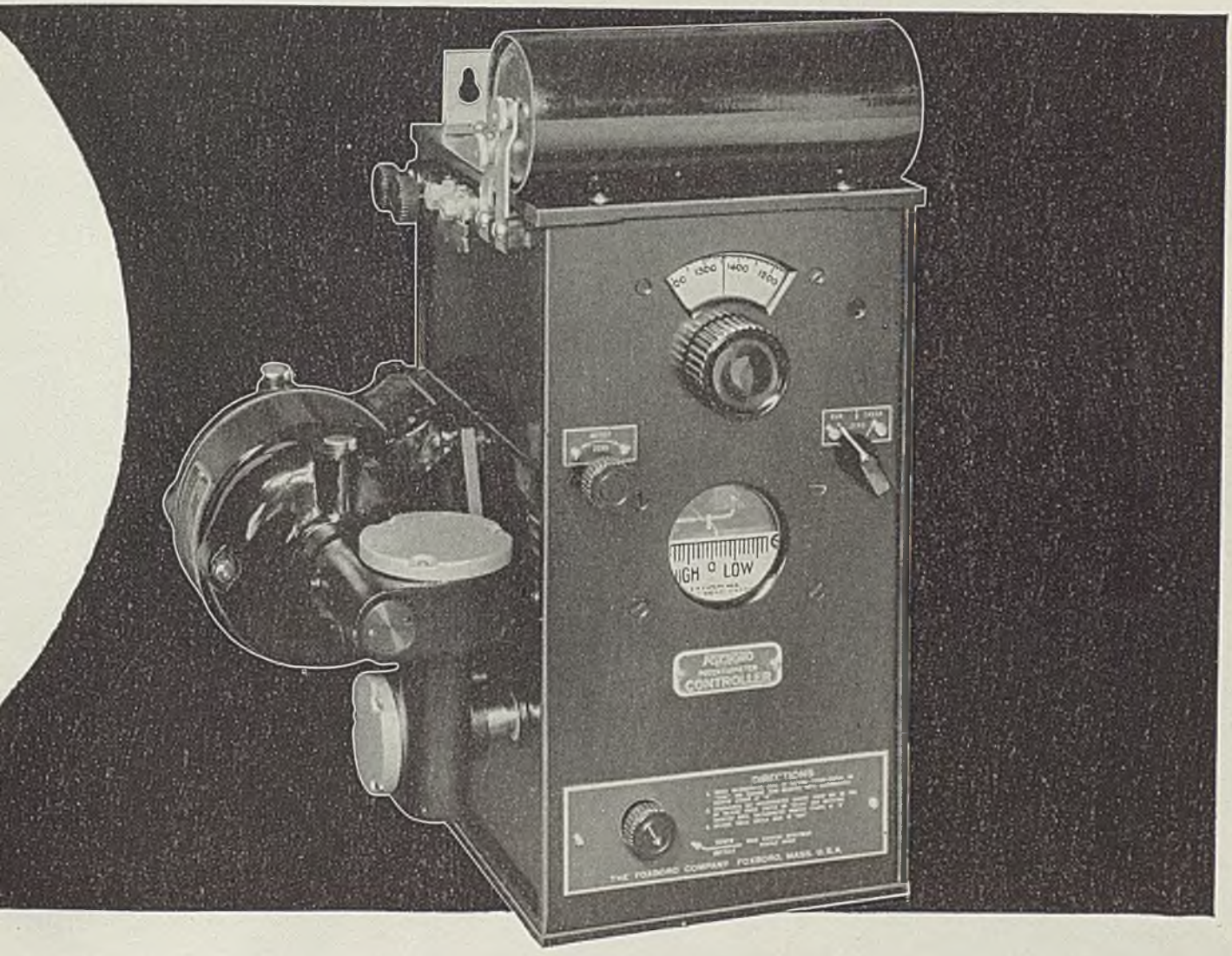
NATIONAL METAL EXPOSITION



FOR fuel-fired furnaces and ovens where sm-o-o-th temperature control is necessary, Foxboro now offers this *Throttling* Potentiometer Controller. Furnace pressure and atmosphere conditions are held more uniform because no sudden temperature changes can occur—the temperature is held constant within a narrow control band. In controlling, it accelerates or decelerates the rate of fuel flow—just as you, in driving your car, gradually accelerate up to the highway speed and gradually slow down for a stop. By avoiding quick, abrupt changes in fuel flow, the Throttling Controller avoids upsetting the surface-finishing conditions within your furnaces or ovens.

This Controller is designed primarily for heat-treating processes where the load is constant, fuel pressure is steady and B.t.u. content is stable—and under these conditions it has operated with 100% success in a number of plants during the past two years. Where these factors are not constant, *Manual Reset* is provided to compensate for changes in operating conditions.

Added to the many other types of Foxboro Control Instruments, this Throttling Potentiometer Controller makes available from one source a most complete line of temperature controllers for making and treating metals.

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CONTROLS

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AT THE
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OCTOBER 18-22

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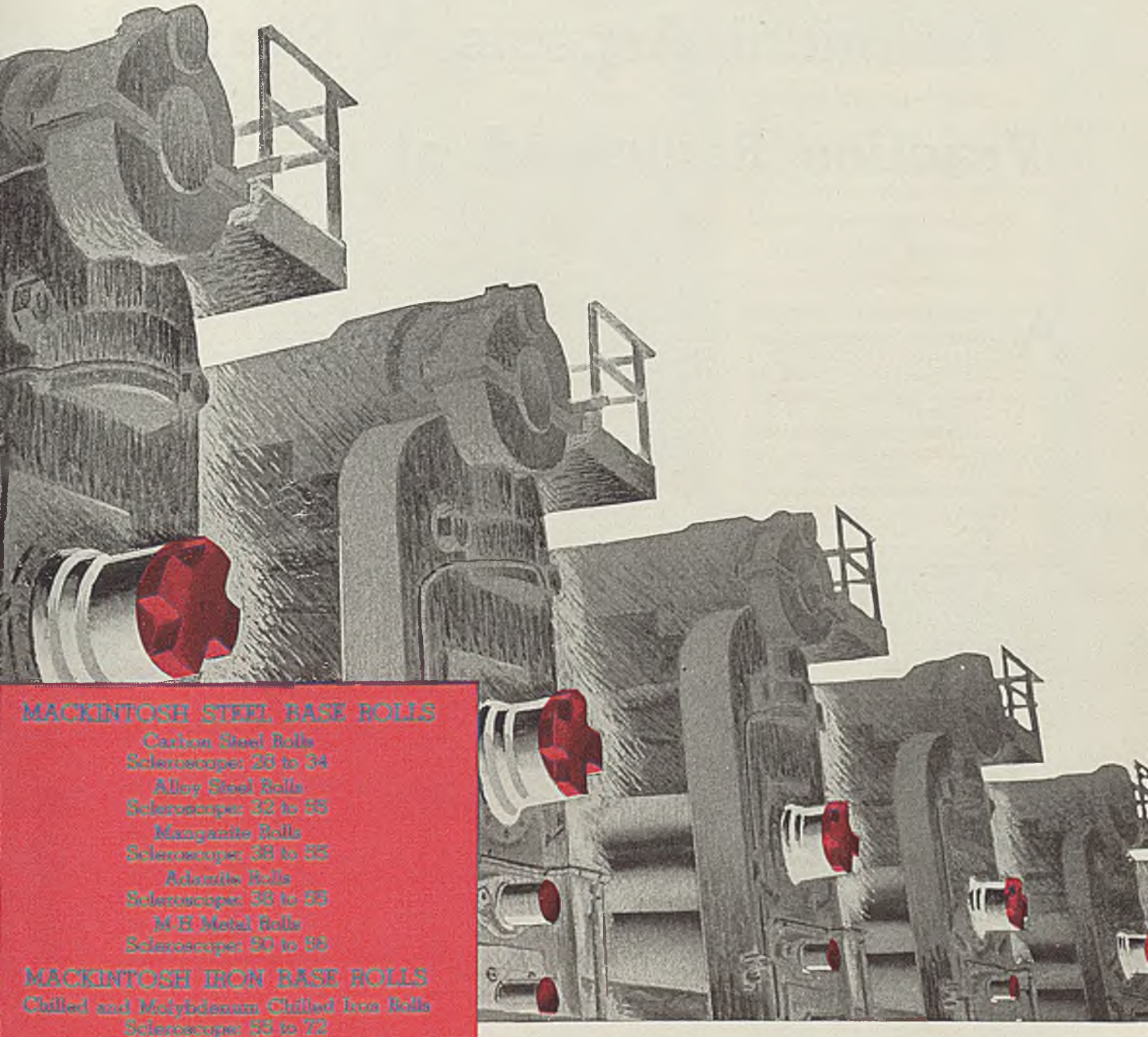

MACKINTOSH STEEL BASE ROLLS

Carbon Steel Rolls
Scleroscope: 28 to 34

Alloy Steel Rolls
Scleroscope: 32 to 38

Manganite Rolls
Scleroscope: 38 to 53

Adamite Rolls
Scleroscope: 38 to 58

M-H Metal Rolls
Scleroscope: 90 to 98

MACKINTOSH IRON BASE ROLLS

Chilled and Molybdenum Chilled Iron Rolls
Scleroscope: 58 to 72

M-H Special Chill Rolls
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M-H Deep Condenser Grain Rolls
Scleroscope: 40 to 70

Chilled Adamite Rolls
Scleroscope: 60 to 70

Chilled Manganite Rolls
Scleroscope: 40 to 70

Sand Iron Rolls
Scleroscope: 35 to 45

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PRACTICE . . . . CLEAN, TRUE TO PATTERN AND TO CHEMICA
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Technical Aspects of Foundry Practice Reviewed at Columbus

AN EXCELLENT program, covering the technical phases of nonferrous, steel and gray iron foundry practice, featured the fall technical foundry conference held at Columbus, O., Sept. 30 and Oct. 1, under the joint sponsorship of Battelle Memorial institute and the American Foundrymen's association. The attendance exceeded expectations with approximately 200 present. The territory represented by those attending the meeting was exceptionally large, extending from the Atlantic seaboard to the Mississippi, and from Northern Michigan and Wisconsin to Birmingham, Ala. Robert E. Kennedy, technical secretary, American Foundrymen's association, Chicago, opened the meeting Thursday afternoon on behalf of the A.F.A. and Battelle.

The Thursday afternoon meeting was devoted to the discussion of nonferrous problems with Dr. H. W. Gillett, chief technical advisor, Battelle Memorial institute, Columbus, O., presiding.

Dr. Bruce Gonser, supervising metallurgist, Battelle Memorial institute, led the first discussion on "Effects of Chromium in Copper-Base Alloys." Dr. Gonser explained that there are two factors in connection with the chromium problem, the first dealing with the use of the alloy to secure certain properties in the nonferrous casting, and the second the methods used to remove chromium from the alloy when it is present in scrap used and not desirable in the finished casting. In making an alloy to which chromium is to be added, the metal is melted down first, is deoxidized, and the chromium is added last. The addition is made in the form of a copper-chromium alloy with about 6 to 10 per cent chromium. Recovery is low when the pure chromium is added, tests indicating a recovery of approximately 40 per cent.

Since chromium oxidizes easily, it is best to use a slag on the melt. This may be made of glass, fluorspar, borax, boracic acid, salt, etc. The speaker mentioned that charcoal was not recommended, but in the discussion several of those present stated that charcoal was being used with entirely satisfactory results. The solid solubility of chromium in copper is only 1 per cent. Experimental work has shown that phosphorus and chromium do not work together readily and that it is best to have as little iron in the mixture as is possible.

Since a chromium copper alloy looks dull when heated, usually the pouring temperature is on the hot side. In taking a temperature reading with a pyrometer, it is necessary to push the slag back to secure an actual reading of the surface of the metal. The chromium-copper alloy should be held the shortest possible time in the furnace after addition of the chromium and it should be poured at low temperature to secure the highest recovery.

Eliminating Chromium

To eliminate chromium from a melt, the opposite procedure is followed. Oxidizing through superheating will remove the greater portion of the alloy. Each time that an alloy containing chromium is remelted, a good portion of chromium is lost. However, greater difficulty is encountered when the amount of chromium is exceptionally small.

The second portion of the Thursday afternoon program dealt with "Melting Methods in the Nonferrous Casting Industry," with Harry M. St. John, metallurgist, Detroit Lubricator Co., Detroit, as discussion leaders. Mr. St. John suggested that the problem is divided into two sections, the first that of securing metallurgical results to make possible sound and satisfactory castings. The second portion to be considered is economy in melting. Mr. St. John stressed the fact that given sufficient skill and experience, any type of melting equipment in commercial use can be used to make as good castings as can be produced by any of the other methods. Conversely, lacking sufficient skill and experience, regardless of equipment, satisfactory castings cannot be made. Incidentally, this thought was elaborated upon by practically every man who took part in the discussion.

Mr. St. John pointed out that all factors in connection with the melting operation have to be recognized and kept under control. He stated that economy in loss of metal has been a point of advantage in melting electrically. At the same time he brought up the disadvantage in that those things which are put into the furnace as part of the charge, and which are not desired in the casting, still are in the metal when it is poured into the mold. Most cases of failure in any type of melting equipment may be blamed on lack of proper supervision, lack of experience, prejudice, etc.

The session on Friday morning was devoted to steel castings with E. W. Campion, president, Bonney-Floyd Co., Columbus, O., presiding. Walter Crafts, Union Carbide & Carbon Co., Niagara Falls, N. Y., led a discussion on "Effects of Alloys on Cast Steels." Mr. Crafts stated that in the low alloy field, alloys are added to affect the strength and ductility by cutting down the mass effect. The speaker presented a number of slides to show the effects of various alloy combinations on the properties of the castings.

In the second section of the Friday morning session, C. E. Sims, supervising metallurgist, Battelle Memorial institute, led the discussion on "The Effects of Aluminum on Physical Properties of Steel Castings." Mr. Sims stated that aluminum has been used as a deoxidizer as far back as 1859. While in steel foundry practice the use of the alloy does not always prove beneficial, nevertheless foundrymen are willing to suffer the disadvan-

Fortieth Year

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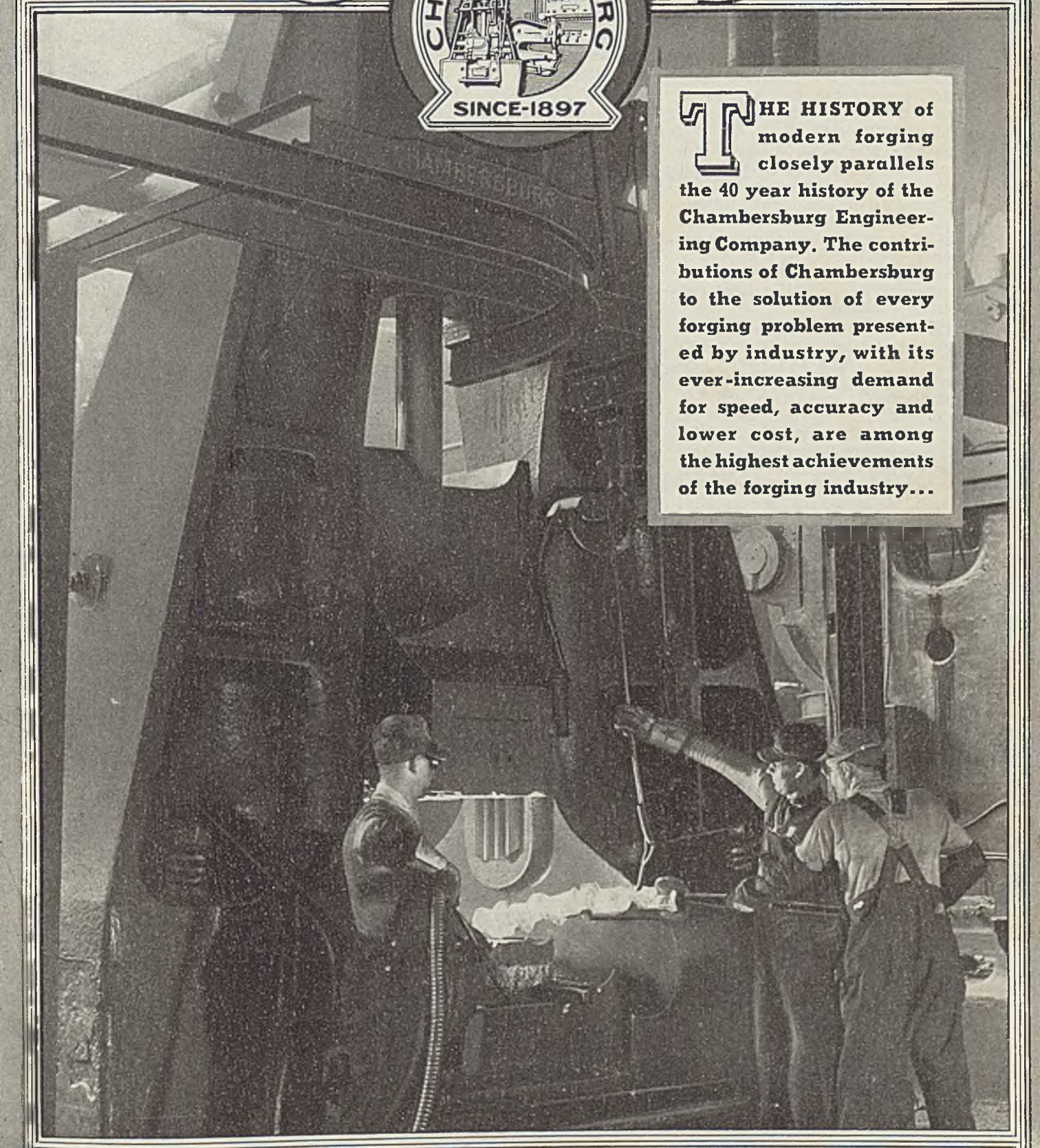

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tages to obtain the benefits derived from its use. The speaker discussed a study started a year ago at Battelle on aluminum additions.

Aluminum acts to lower the ductility through the effect on the distribution and arrangement of the sulphides. In the discussion, Fred A. Molmoth, vice president, Detroit Steel Casting Co., Detroit, presented the opinion that aluminum affects the silicate as well as the sulphide inclusions.

Battelle Memorial institute provided a complimentary luncheon on Friday noon at Pomerene hall, on the campus of Ohio State university. Both Friday sessions were held at Campbell hall since the attendance at the meeting was greater than could be handled in the auditorium in the Battelle Memorial institute building.

The Friday afternoon session was devoted to "Relation of Structure to Properties of Cast Iron," with Hyman Bornstein, president, American Foundrymen's association, and director of laboratories, Deere & Co., Moline, Ill., presiding. John W. Bolton, metallurgist, Lunkenheimer Co., Cincinnati, was the discussion leader on "Cupola Cast Irons." He stated that the so-called strength properties depend on three things, namely microstructure, density and degree of freedom from internal stresses.

Electric Furnace Iron

Richard Schneidewind, University of Michigan, Ann Arbor, Mich., was discussion leader for the second section dealing with "Electric Furnace Iron." The speaker discussed frankly the advantages and disadvantages to electric melting. Under advantages he listed versatility; close chemical control after the operator has learned the characteristics of a particular furnace; temperature control; ability to superheat;—ability to produce low carbon, high strength cast iron and the possibility of using low grade raw materials. Under disadvantages he indicated higher cost, for equipment, fuel, refractories, although duplexing tends to cut this down; limitation on charge, dearth of good melters; and oxidation. However, if properly handled the disadvantage of oxidation may be turned to an advantage. Mr. Schneidewind discussed at some length results on work which has been done during the past year in connection with electric furnace irons.

The final presentation of the afternoon program was entitled "Fundamental Structures of Gray Cast Iron," with Alfred Boyles, metallurgist, Battelle Memorial institute, as discussion leader. Mr. Boyles discussed with the aid of slides the structure which is developed upon solidification as the metal passes from the liquidus to the solidus.

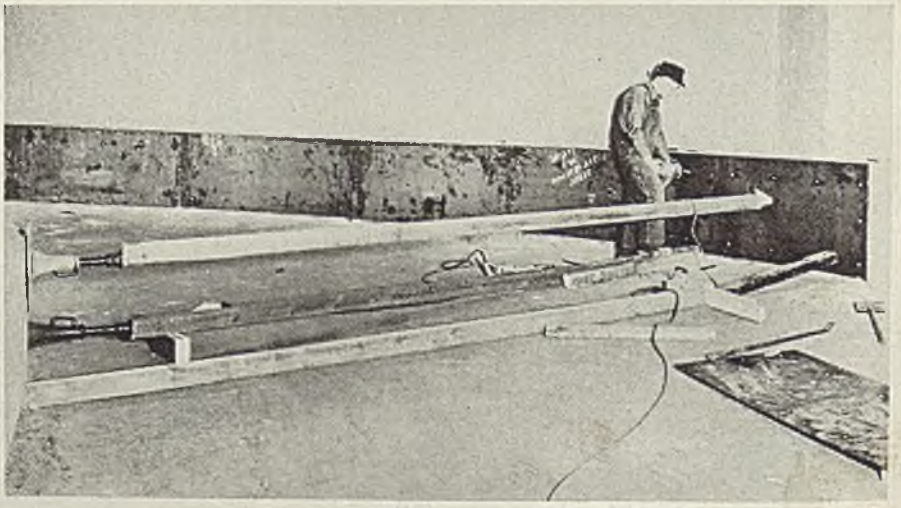
Clyde E. Williams, director, Battelle Memorial institute, presided at the dinner Friday evening at the Deshler-Wallick hotel. Brief talks were made by Dean Charles E. MacQuigg, Ohio State university; Mr. John Howe Hall, consulting engineer, High Bridge, N. J.; Robert E. Kennedy, technical secretary, American Foundrymen's association, Chicago, and Frank G. Steinebach, editor, The Foundry, Cleveland. C. H. Lorig of Battelle, who arranged for the various programs and sessions of the conference also was introduced.

Sprung Plates Anchored To Wall by New Type Bolt

Interesting problem of anchoring steel plates was presented during repair of a ramp in city auditorium, St. Louis, recently. Ramp, leading from street to second floor, had such sharp turns side walls were being demolished by passing trucks and it was found advisable to place protecting steel plates ⅝-inch thick, 6 feet long and 31 inches high on both sides. Curves of the walls being irregular it was necessary to bend the plates directly into position and anchor them there regardless of the pull.

Artistic Metals Mfg. Co., St. Louis, contractors, accomplished this by using two house jacks, placed behind 4 x 4-inch timbers, to spring the plates into place and shape. Problem of anchoring plates was solved by use of Rawl-Drives, new expanded bolt product of Rawlplug Co., New York. Bolts of this type, ⅝-inch x 2-inches were driven through ⅝-inch drilled holes in plates and into the concrete walls. Timbers and jacks removed, the plates remained rigidly in shape.

HOUSE jacks and timbers are used by Artistic Metals Mfg. Co., St. Louis, to spring into place steel protecting plates for ramp in city auditorium



Designs New Disk Harrow

Bucher & Gibbs Plow Co., Tacony, Philadelphia, has developed a new rope controlled disk harrow. Designed to overcome stalling and bogging of tractor and harrow in sandy and mucky soils, it is especially desirable to those wanting quick action staggering and straightening of gangs with the least amount of energy. With the new rope control, one pull of the rope automatically straightens all four gangs of disks while the tractor is moving forward. One pull of the rope releases a latch which enables the tractor, by moving backwards, to set all gangs at any desired angle regardless of previous setting. Adjustments are provided so that rear gangs can be set at different angles than those in front.

Design features include an angle frame, heat treated ground blades, semisteel castings, interlocking hubs, hinged front frame, swinging tandem connection for flexibility. The larger sizes have enclosed bearings fitted with grease cups or high pressure lubrication fittings.

Vises Grip Post

For situations where it is more convenient to take the vise to the job than to cut pipe at the shop, Armstrong Mfg. Co., Bridgeport, Conn., is manufacturing new vises that grip tightly to pillars, columns or posts by means of a chain and locking handle.

Other features of the new vises include broad jaws, frictionless disk between upper jaw and base of screw, four-point slide bearing for easy adjustment, and I-beam structure.

PROGRESS IN STEELMAKING

Recent Steel Plant Experience With Metal Encased Basic Brick

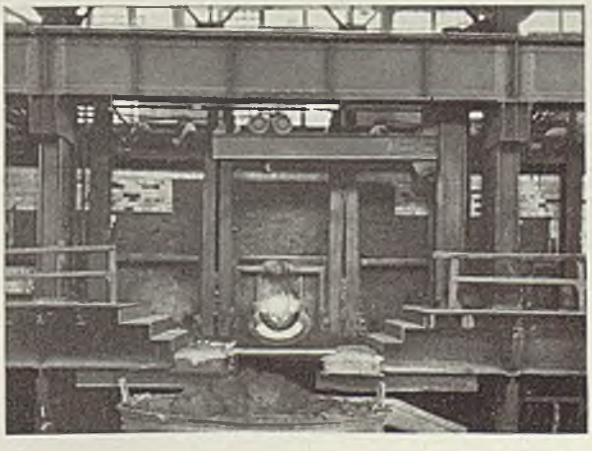
BY H. S. ROBERTSON
Harbison-Walker Refractories Co.
Pittsburgh

AS THE primary standard for judging a refractory is its ability to last, there is an inevitable time lag between product development and service results which confirm its practical worth. The real significance of any improvement usually comes to light only as a new brick continues to serve beyond the normal life span previously secured with other refractories, in furnaces varying widely in design and operating conditions. Thus, service experience in steel-plant furnaces acquired since the introduction of a new form of metal-encased basic brick in December 1935 is now of increasing general interest.

The principle of the "magnesite plus metal" refractory wall as originally introduced in this country some 20 years ago, is quite simple and generally familiar. In the bulkheads and exposed walls of open hearth furnaces, silica brick have always had obvious shortcomings where operating conditions are severe. In spite of the fact that an acid brick is inherently out of place in the walls of a basic furnace, however, ordinary types of basic brick proved to be of limited usefulness, due to their inadequate resistance to spalling. Dead-burned magnesite or chrome brick of commercially practical composition, used alone, were only occasionally able to justify themselves very convincingly in this service. Shrinkage and loss of strength at high temperatures, as well as weakness under sudden thermal changes within the furnace, generally led to serious spalling and shortened service life.

The problem was originally met by packing dead-burned magnesite in open-end metal jackets of mild steel. For open-hearth bulkheads, tubular units 3 inches in diameter and 13½ inches long were generally laid up honeycomb fashion with special magnesite bonding mortar. For other furnace walls, rectangular "brick" with a 2½ x 2½-inch cross-section steel jacketed on four sides, were widely used. Tubular brick of this same general construction still meet with considerable demand.

In service, the edges of the steel casings exposed to furnace temperatures fuse with the adjacent magnesite to form a monolithic surface highly resistant to the cutting action of hot dust-laden gases and to corrosion by slags. Back from the exposed face, however, the steel re-



BACKWALL of 18-inch metal encased basic brick in a new 100-ton oil-fired basic open hearth furnace

mains intact, adding greatly to the strength of the wall at high temperatures and to its resistance to sudden thermal changes. Shrinkage is offset, and spalling tendency is considerably decreased.

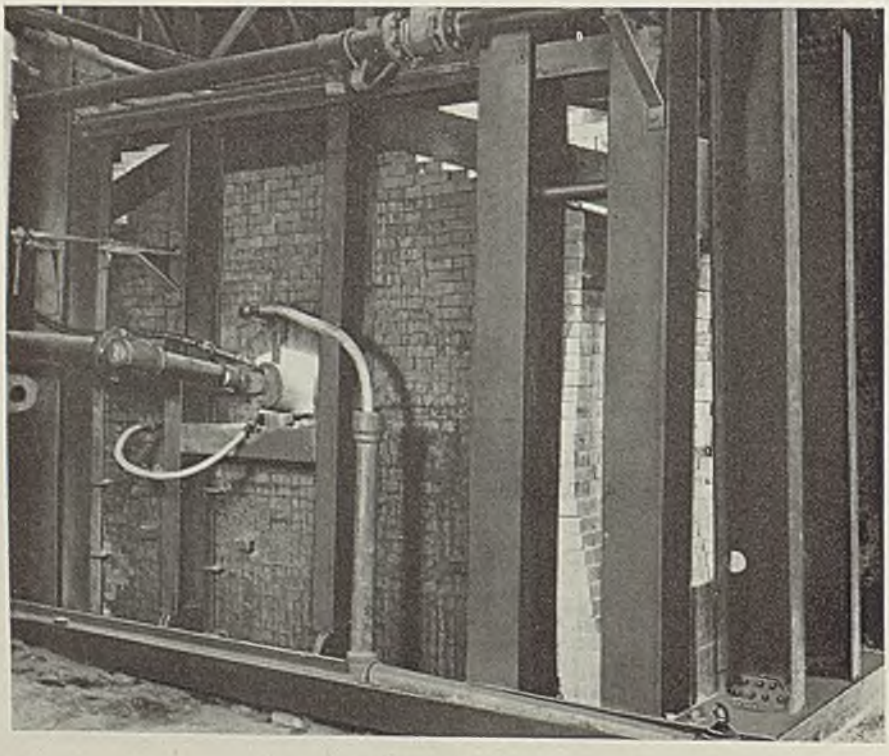
Service records established by this original type of metal-encased basic brick in open-hearth bulkheads generally showed definite economy over silica brick in furnaces where operating conditions were unusually severe and where the life of silica brick was comparatively short. Usually, this meant that service life had to be extended to three or more times the former service period to balance the higher costs of the metal-encased brick. It is difficult to generalize on an economic balance of this kind, of course, as the real cost of production losses during repair or rebuilding vary so widely with the plant set-up and with general business conditions. In any event, the metal-clad brick was applied chiefly in furnaces operating under what might be called "abnormal" conditions, which due to furnace design, "forced" operating rate, type of charge or fuel, or other unusual factors, required unusually resistant refractory walls. In one sense, it was "the brick of last resort." More recently, this so-called "abnormal" severity of furnace conditions has become increasingly general. Temperatures have gone higher, charging rates have been stepped up, and the general trend of operating conditions is such as to sacrifice refractories for the sake of additional output or for steel of higher quality. Today, the furnace operating "normally," by former standards of refractory life, is in itself becoming rapidly abnormal.

About a year and a half ago, a new refractory brick was introduced, employing the same principle, but adapted both in price and in service characteristics to more general application under modern steelplant furnace conditions. The refractory portion of this new brick is a magnesite-chrome combination, incorporating the improvements in spalling resistance and the elimination of shrinkage which has recently given chemically bonded magnesite an expanded field of usefulness. After being formed under high pressure, the standard brick shapes are enclosed on two or three sides with a jacket of mild steel. The brick are then so laid that the furnace wall is completely "bonded" with the steel jackets between adjacent brick.

In its present form, the metal-encased brick has found wide application in open-hearth furnaces for back walls, front walls, division walls of the uptakes, bridge walls, and the like, as well as in the bulkheads or furnace ends. In addition, it is being utilized on an increasing scale in electric furnace sidewalls, from the slag line to the roof, with economy as compared either with silica brick or with other forms of basic brick.

In one open hearth in a southern plant, operated under particularly severe temperature conditions, the new brick were installed in the entire end wall, 18 inches thick from floor line to the roof. The end wall so constructed went through 326 heats, completing the furnace campaign without a repair. This service compares with a normal life of 75 heats for an end wall of silica brick, 18 inches thick. For fourteen open-hearth furnaces in the Cleveland district which are regularly operated on an "overload" basis, the new metal-encased basic brick has been adopted as the standard end wall refractory. This followed tests in which walls of this brick 9 inches thick lasted 300 to 400 heats without repairs, exceeding by several times the service of silica brick end walls 18 inches thick. Moreover, in several instances of "forced output" furnace operation, accumulation in the slag pockets due to the molten silica from the end walls became so great that it eventually restricted the flues leading to the regenerators to a point where a shut-down was necessary. Substitution of the metal-encased basic brick for the silica where such a condition arose has added from 25 to 50 heats to a furnace campaign—an economic gain entirely apart from the relative service life of the end wall refractories themselves.

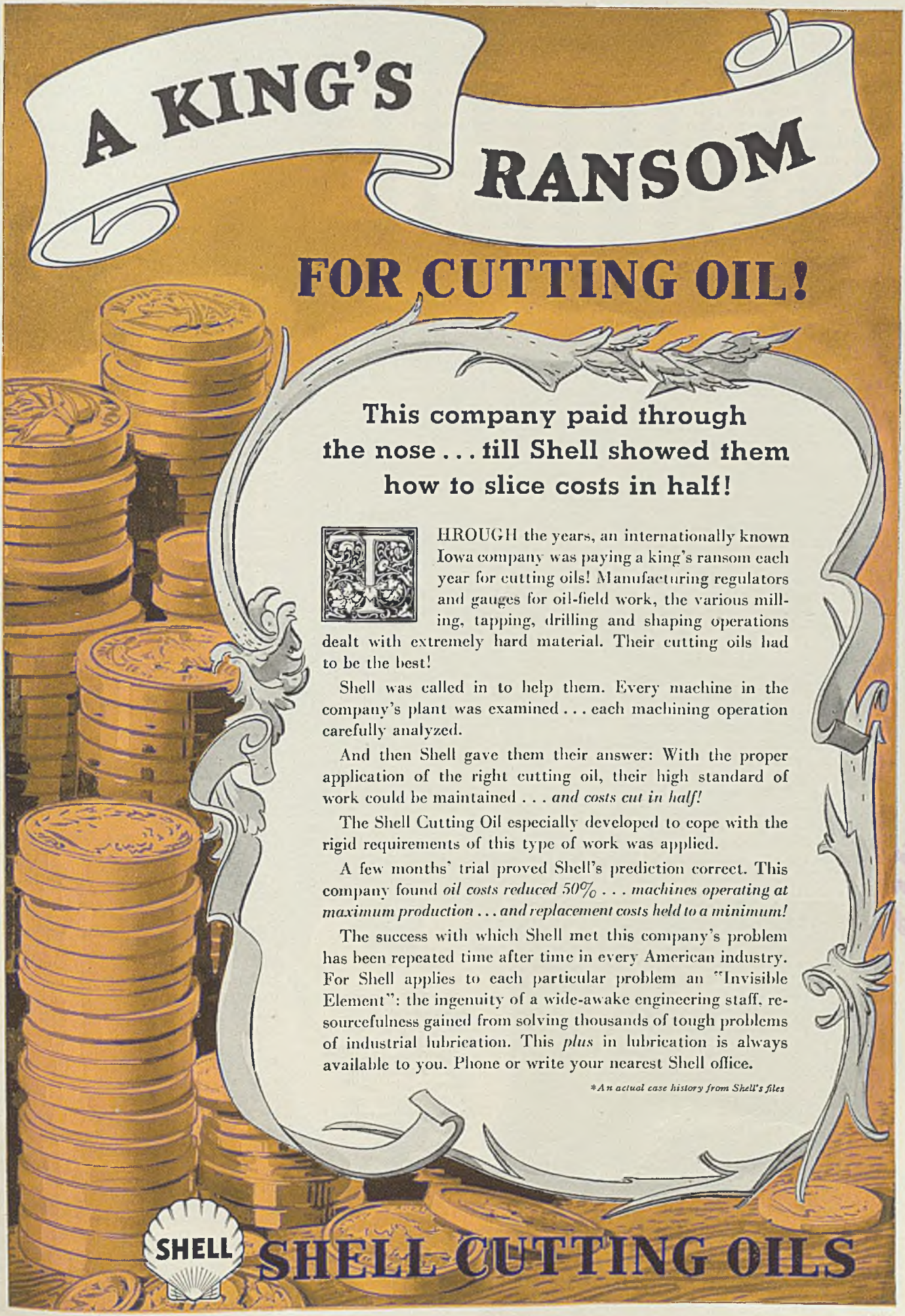
COMPLETE endwall of metal encased basic brick, 18 inches thick, on a 100-ton basic open hearth oil-fired furnace, a new installation



Aids in High Output

The economic possibilities of designing an open-hearth furnace on the basis of the higher resistance of the new type of "metal plus magnesite" wall have also recently been put to test. For example, a 150-ton furnace erected about a year ago was originally provided with bulkheads 18 inches thick of the new basic brick. This furnace finished a campaign of 450 heats, plus burning in of a new bottom, early last month. At that time, no end wall repairs were required, the original bulkheads still showing an average thickness of 12 inches and a minimum of 9 inches—despite the fact that the furnace had been designed for high output operation at the expense of refractory life.

While end walls in open-hearth furnaces can generally be repaired without very much lost furnace time, back wall and front wall repairs are much more serious from the standpoint of lost production. As a result, factors in the economic balance between metal-encased basic brick and silica brick have somewhat different importance. In end walls—the basic brick must give three to five times the actual service life of silica brick to be economically justified, and thermal conditions here are so severe that this is frequently the case. In back and front walls—silica brick may be able to stand up fairly well, and the metal-encased magnesite brick may extend the life only twice, and thus be seemingly more expensive on a "cost-per-day-of-operating-life" basis. However,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This company paid through the nose . . . till Shell showed them how to slice costs in half!
THROUGH the years, an internationally known Iowa company was paying a king's ransom each year for cutting oils! Manufacturing regulators and gauges for oil-field work, the various milling, tapping, drilling and shaping operations dealt with extremely hard material. Their cutting oils had to be the best!
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*An actual case history from Shell's files
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the balance will usually swing in favor of the basic brick when proper weight is given to the cost of lost production during repair and replacement, to savings in installation labor, and to the elimination of damage to the banks and slag line of the furnace hearth caused by the acid reaction of molten silica from the walls. Elimination of this corrosive action has invariably reduced bottom delays, cut the loss of time between heats necessary for building up the slag line, and cut the amount of refractory magnesite and dolomite required to maintain the slag line and banks. Judging by recent purchasing decisions of several steel plants where the situation has been carefully analyzed, the metal-encased magnesite in front and back walls can justify its higher first cost when the actual increase in service life is 50 per cent or more.

Actual service experience at a large plant in the Pittsburgh district was well above this limit. Here the new brick were used for the entire front-wall, 18 inches thick, from the door sill to the roof skew. The furnace then operated for 176 heats without repairs to the wall, in contrast to 150 heats for ordinary basic brick and a normal life of 35 to 50 heats for silica brick.

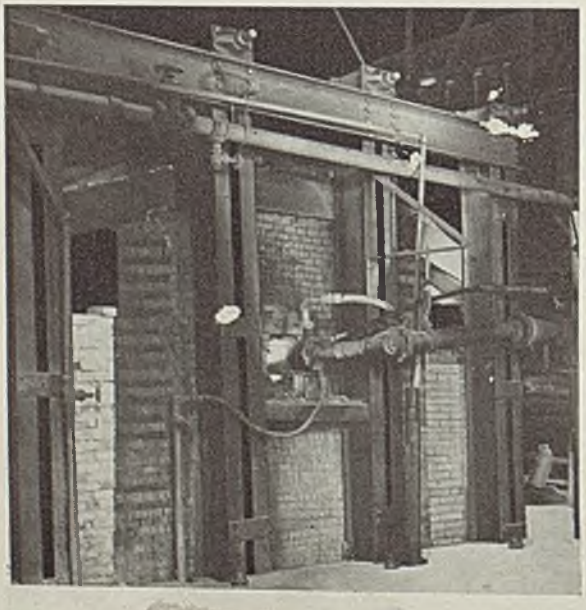
Application of the new refractory to electric furnace side walls has been particularly rapid, on the basis of favorable service experience by more than 20 different organizations producing electric furnace steels. Several of the companies have adopted the new brick as standard either for panels or for complete side walls, where operating conditions are severe. A major factor favoring a basic side wall has been elimination of the corrosive action which takes place as molten silica from the wall runs down upon the basic hearth. However, in view of the severe spalling conditions which exist, the increase in service life obtained with ordinary magnesite or chrome brick has frequently failed to justify the extra first cost except in furnaces of small capacity. On the other hand, the metal-encased brick is now justifying itself in a number of furnaces where ordinary basic brick without the steel "bond" has shown no overall economic benefits in comparison to silica brick.

At the present time, however, it seems safe to say that the use of acid brick side walls in a basic furnace is definitely headed toward obsolescence. In part, this trend may be attributed to a wider recognition of the original merit of the "metal bond" principle in overcoming the spalling tendencies of basic brick. A franker analysis suggests that the improvement in the magnesite-chrome refractory composition, combined with the simpler method of encasing the brick on two or three sides, has finally put its cost and performance on sound basis for wide practical application.

Install Two New Roller Hearth Brazing Furnaces

Two leading manufacturers of automobile heaters, Sunday Products Inc., Detroit, and Novi Equipment Co., Novi, Mich., have installed roller hearth, electric furnaces for copper brazing heater cores. The furnaces are duplicates, 100 feet long, rated at 258 kilowatts, designed to operate at 2050 degrees Fahr. and were furnished by General Electric Co., Schenectady, N. Y. Output of these two companies is used mainly by one large manufacturer in its cars. The electric furnace brazed assemblies have uniformly tight, strong and ductile bonds free from stresses caused by localized heating. In fact, the units are well annealed as they come from the furnace. Surfaces are left clean and bright because of absence of flux and because of maintenance of a controlled atmosphere in the heating and cooling chambers of the furnaces.

The assemblies to be brazed are loaded on lightweight carriers such as small cast alloy rails of L-beam or T-beam section or on light trays. Thus there is the least possible deadweight to heat and the smallest conveyor replacement. When replacements in the conveying system are necessary the rolls in the hot zone generally are the only ones affected. The ribbon resistors used in these furnaces, containing 80 per cent nickel and 20 per cent chromium, are long lived. Radiation pyrometers used on these furnaces represent an improvement,. Leeds & Northrup Rayotube assemblies having taken the place of ordinary thermocouples. They have an advantage in that their thermocouple elements are outside the furnace, hermetically sealed in heads in which the temperature never exceeds 150 degrees Fahr. Thus the hot junctions of the systems are isolated from attack by the heat and the reducing atmosphere within the furnaces. These lens-type pyrometers remain accurate and dependable over a long period of use, according to statements of the manufacturer.



COMPLETE endwall of 18-inch metal encased basic brick on a 100-ton basic open hearth furnace, oil fired. This wall has been in service 347 heats. Best performance of any previous wall in this installation — 250 heats

South African Duties Prevent Steel Dumping

Minimum c.i.f. prices on iron and steel imports into the Union of South Africa will be effected by the local government, according to an official announcement of the minister of finance and reported to the department of commerce by American Commercial Attache Samuel H. Day, Johannesburg.

This action by the South African government is stated to be in accordance with the steel marketing agreement inaugurated last year with the European cartel to afford the local industry adequate protection against dumping of foreign suppliers, the report states.

Under the new regulation the South African government has the authority to fix a price below which no steel may be landed. Any attempt at dumping will be automatically met by increased duties to maintain constant this "fair average world price."

In connection with invoices under the new plan the various classes of rolling mill products must be fully described. Dumping duties will be displaced by a fixed c.i.f. price for every class of iron and steel product.

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POWER DRIVES

Special Mounting Maintains Tension on Dual Drives

TENSION is maintained in both V-belts on the double-reduction press drive, shown in an accompanying illustration, by the use of two pivoted motor bases.

The jackshaft is mounted on one large base which also carries the mounting for the motor on the smaller pivoted base. In this way both drives operate to maintain tension independently of each other.

This press is driven at 26 revolutions per minute by a ¾-horsepower, special, high-slip motor operating at 765 revolutions per minute through a jackshaft at 128 revolutions per minute. On the first reduction, 3 V-belts drive from a 3-inch pulley to an 18-inch pulley, pitch diameters, on 18.2-inch centers. The jackshaft, which is mounted in pillow blocks with antifriction bearings, drives from 7-inch to 36-inch pulley on 39-inch centers.

Attempt to make this drive in a single reduction would have required increasing the press flywheel to prohibitive dimensions, as the total reduction is approximately 30 to 1. Even to obtain this in the two reductions, a paper pulley rim or lagging is used to increase the diameter of the flywheel pulley by about 8 inches. This rim is split and clamps over the flywheel. This increases diameter and driving value with only slight increase in weight.

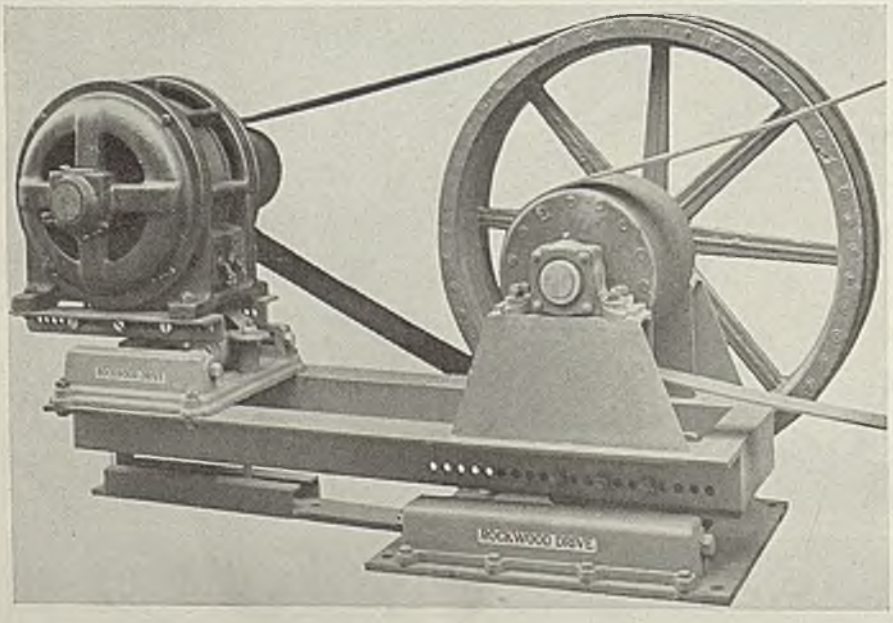
The entire drive is not only compact and space-saving but is mounted above the floor level, out of the dust and dirt. The larger base for the countershaft is attached to the press by braced angle irons. In both cases inverted channels or flat steel bars are used as cross spacers or mountings for the pivoted bases.

Arranged in Tandem

On double-reduction drives where space-saving is not so important, the drives are arranged in tandem, as shown in an accompanying photo of a motor and countershaft. In this case the arm of the jackshaft-pivoted base is considerably longer, thus permitting longer belt centers and greater reduction in the first drive.

This double reduction drive is used on a special drive to a pumping unit, although it has many other applications such as replacing the jackshaft on lineshaft drives. The entire unit may be floor-mounted or placed overhead as desired.

This particular drive illustrated is



WHERE space-saving is not so important, this type of pivoted base is used for motor and jackshaft on double reduction drives. Photo courtesy Rockwood Mfg. Co., Indianapolis, Ind.

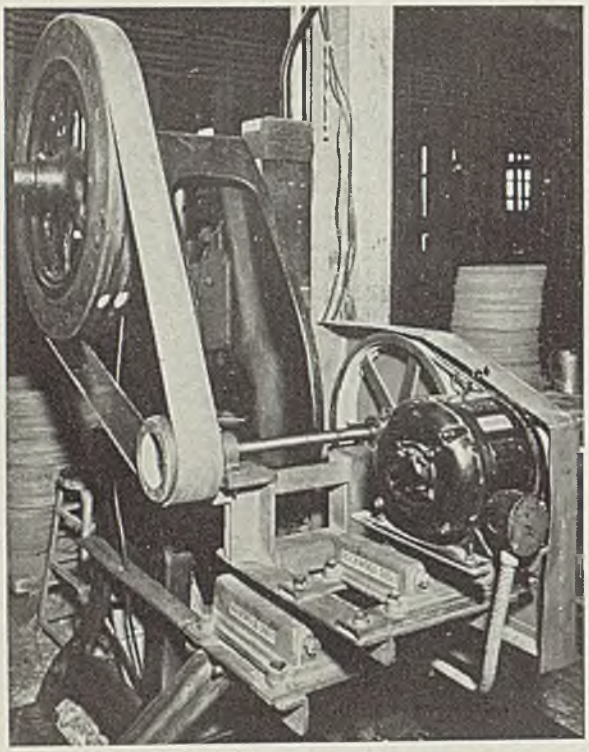
● This Yearbook issue has served well and is continuing to serve through 1937. It has occasioned a great many comments of which the following are typical:

. . . . . *"Your 1937 STEEL Yearbook seems to surpass all of your previous Yearbook issues. Our copy will be kept handy for reference until the issuing of the 1938 issue."*

. . . . . *"With reference to your 1937 Yearbook of Industry issue, I am particularly glad to see that you have continued the same general format from last year, which I feel is highly successful. Getting so much information between two covers without having it somewhat jumbled and difficult to locate is rare. Last year's setup arranged the material admirably and you were wise to continue it."*

. . . . . *"I expect to keep this 1937 Yearbook of Industry issue of STEEL on my desk until it is replaced by the 1938 issue."*

STEEL'S 1938 Yearbook issue will soon be a fact. Arrange now for adequate representation.



THIS compact double-reduction unit uses two pivoted motor bases to maintain tension in both motor and jackshaft drives. Diameter of the flywheel is increased by a split paper-pulley rim

for a 15/35-horsepower, 3-speed motor giving 15, 25 or 35 horsepower at speeds from 575 to 1150 revolutions per minute. The motor pulley is 12½ inches in diameter by 11-inch face, and drives a 54-inch countershaft pulley. The smaller jackshaft pulley is 20 inches in diameter by 13 inches wide driving a 144-inch pulley. Belts 10 and 12 inches wide are used.

Rubber snubbers are installed in the motor-pivoted base to deaden the shock of uneven load. At times, with this particular drive illustrated, it is desired to operate for short periods with an excessive overload to obtain maximum output, and special attachments are provided to tighten up the pivot arm. This increases the initial tensions beyond normal during these special operating periods. The pivoted base for the jackshaft is of all-steel welded construction.

♦ ♦ ♦

Motor Bearings

TO A large extent electrical repairs to commutator armature or windings of motors are necessitated by the overflow of oil or grease from the bearing.

On bearings with inadequate seals to retain the lubricant, maintenance department heads estimate that about 50 per cent of their troubles result, or at least start from leaking lubricant.

With supervision to see that too much lubricant is not supplied and so break the seals, the use of anti-friction bearings prevents this leakage and damage. Much can be accomplished along this line in connection with plain bearings by proper grooving and providing of a return passage to the oil chamber for excess oil as it works toward the end of the bearings.

Proper provisions for retaining lubricants without waste materially reduce the amount and cost of lubricants required. Also, inspections may be more easily and quickly made because of the absence of a coating of grease which must be removed before the equipment can be checked over properly. With a large number of motors, the saving in time required for periodic inspections and for the replenishment of lubricants often amounts to the full time of one man.

♦ ♦ ♦

Determining Power Costs

COMPARISON of power consumption is a good method of judging the relative qualities of different tools when time and work performed are considered as factors.

In most instances power consumption of individual units is guessed or, more often, not even given consideration. Frequently, however, it pays to check up on individual unit consumption even though the use of a meter all the time would not be worth while.

In one case a sales engineer interested in introducing a new cutting tool used a graphic recording meter to show a prospective customer the relative power consumption and time required to perform a definite cutting operation with the tools which had been in use and the new tool that he was trying to sell. The results of the test clearly demonstrated both time and power savings in the operation of the new tool and naturally resulted in a sale.

Users of many cutting units, more especially those requiring considerable power in operation, might make similar tests to good advantage and with worthwhile economies. Momentary load readings are not sufficient, as the varying consumption throughout the cycle, as well as the comparative lengths of the cycle, are necessary to make a complete comparison. This is best obtained by graphic records.

♦ ♦ ♦

Life of Universal Joints

UNIVERSAL joints in lineshaft or countershaft drives are no longer widely used. However, some earlier models of equipment still in use in many plants are designed with a universal joint to drive the countershaft on machines set at an angle, such as screw machines.

In these a belt on long centers is connected to the main lineshaft driving a short shaft and pulley. The countershaft is connected to this pulley shaft by a universal joint and drives down to the machine.

Ordinarily such machines are set at an angle of 15 degrees from the main driving pulley shaft. If the four bearings of the countershaft are correctly aligned so the centerlines of the two shafts intersect exactly in the center of the universal joint, such installations operate satisfactorily. However, even a slight misalignment, either in installation or in operation, will cause excessive pressure and wear on the joint and the shaft bearings.

In one plant the universal joints had been giving a life averaging 8 months. By shifting machines so the angle was approximately 10 degrees instead of 15 degrees, the life of these joints has been extended to about 5 years, or 7½ times. No greater care is taken in checking installation and operation alignment than before; the only change is in the decrease of the angle of transmission.

♦ ♦ ♦

Using a portable blower for cleaning motors has the advantage over using compressed-air lines in that the air is free from moisture. Sometimes condensate forms in air lines.

♦ ♦ ♦

Lineshafts which groan or squeal when starting or stopping usually indicate misalignment.

♦ ♦ ♦

A good coat of white paint on the factory ceiling and top side walls will produce better illumination at low cost and prevent much dissatisfaction in a place of work.

SURFACE TREATMENT AND FINISHING OF METALS

Finishing of All-Metal Air Liners Requires Special Polishing Equipment

PROSPECTIVE airline passengers can hardly fail to be impressed and inspired with a feeling of confidence at the sight of a sleek, efficient appearing air liner as it glides smoothly into an airport to pick them up. The fact that every mechanical and scientific precaution is taken to insure safety in flight is not alone sufficient to create this confidence. Passengers must be impressed by visible but unostentatious means that they are riding in sturdy, mechanically perfect equipment. Efficient, smartly uniformed personnel and extreme solicitude for passengers' personal comfort play a major part in creating an atmosphere of security and safety but all these factors would be of little avail if the equipment did not look efficient.

The modern air liner is a thing of gleaming metallic beauty and fairly radiates the fact that it is as mechanically perfect as human ingenuity can make it. While most observers are not conscious of the fact, it is the finish of the plane which is largely responsible for this atmosphere of smooth running efficiency.

Commercial air liners are almost entirely of all-metal construction and finishing consists largely of polish-

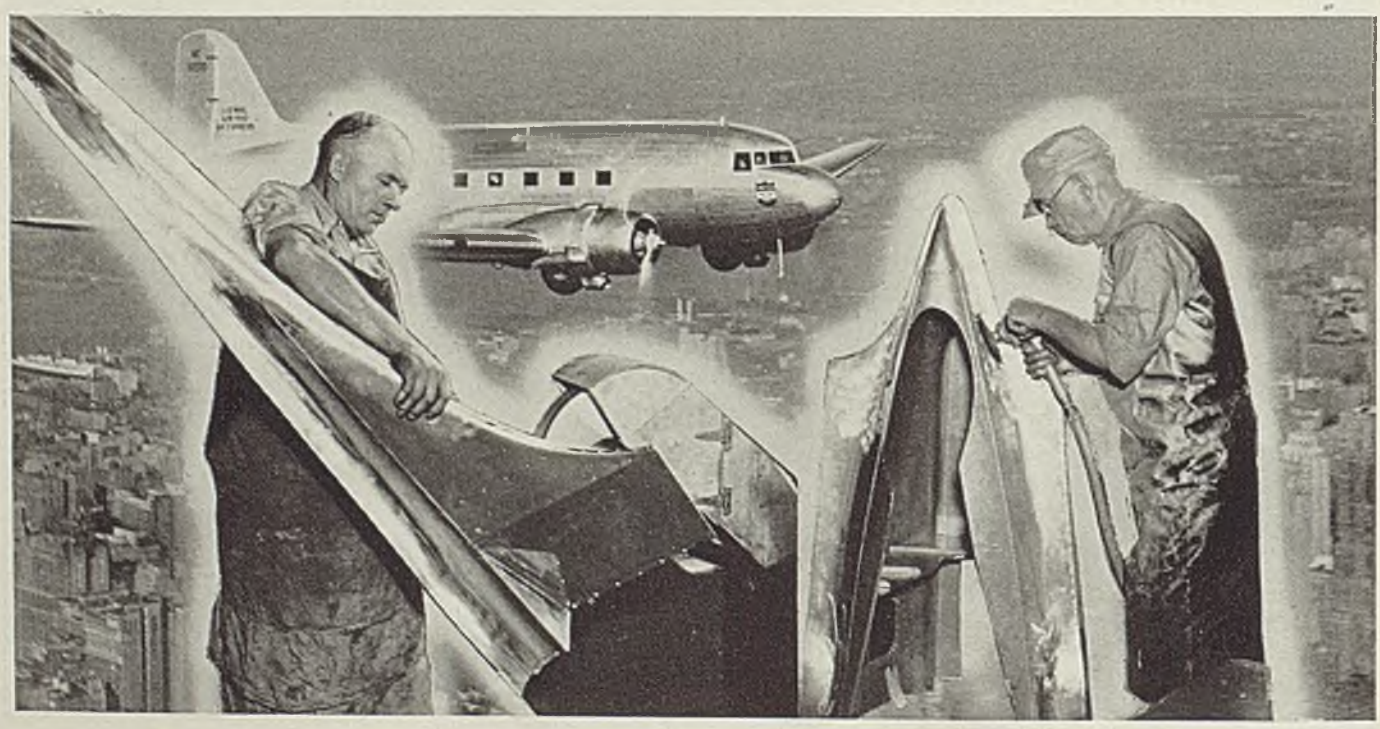


FIG. 1—Light weight of bulky parts permits buffing on wheels as shown left below. Operator at right is removing hammer and die marks with portable hand tool

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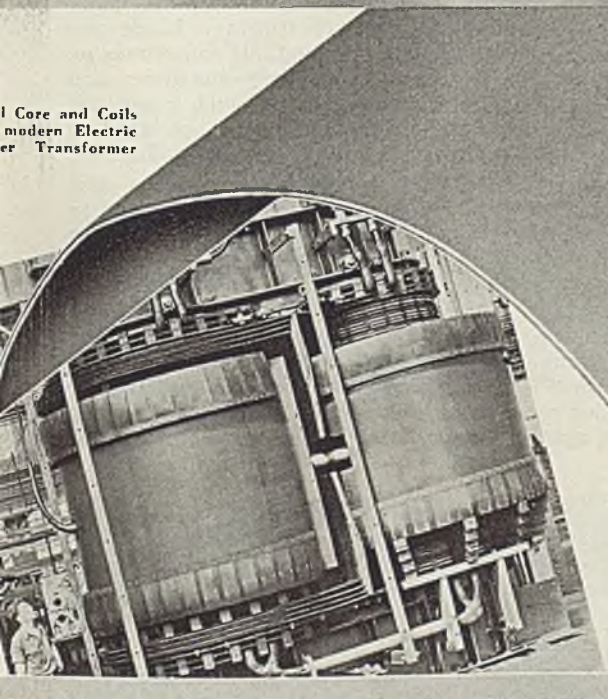

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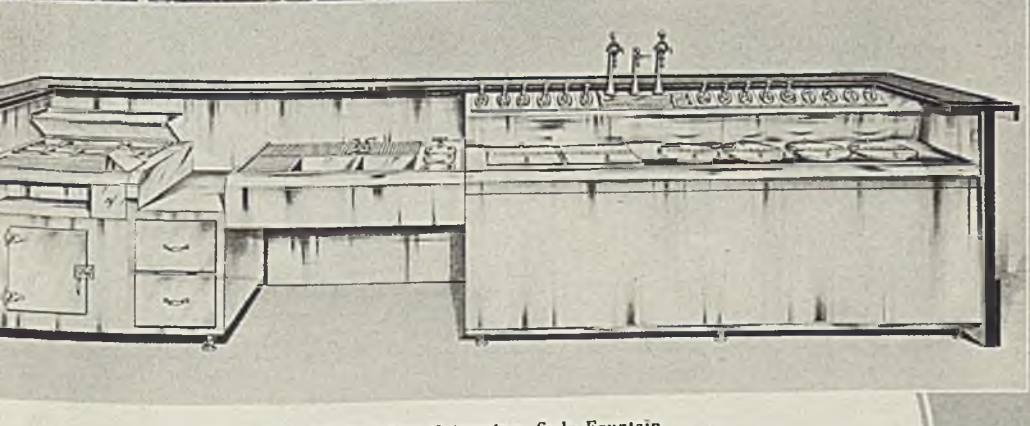
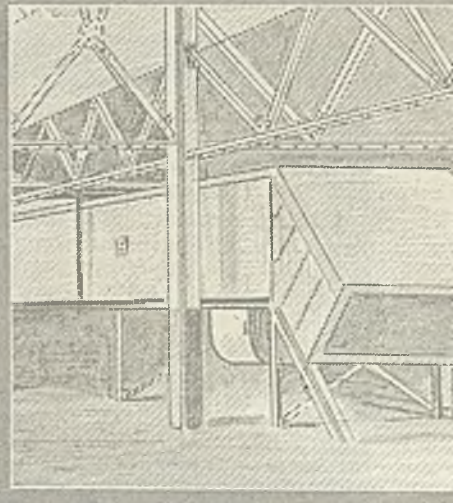


New All-Steel United-American Soda Fountain



J. O. Ross Engineering Corporation

Main Office—350 Madison Avenue, New York

FIG. 2—Vibrating sanding block simulates the action of hand sanding but does the work much more efficiently

ing and buffing the metal to a bright finish. Since the area to be polished on each plane is tremendous, airplane manufacturers require very efficient polishing equipment to keep costs within reason.

Production runs in airplane manufacture are not long and much of the work is of a comparatively bulky nature. To complicate matters further almost all surfaces are curved and streamlined, making automatic polishing methods impracticable if not impossible. Consequently many special machines have been developed to mechanize as far as possible polishing operations which would otherwise have to be done by hand.

Special Equipment Is Required

Such is the case at the plant of Curtiss Aeroplane division, Curtiss-Wright Corp., Buffalo. In this plant are built all-metal planes as well as other types and the special apparatus required to finish these planes is typical of American practice.

One operator in Fig. 1 is using a portable polishing device for smoothing the surfaces on an aluminum alloy cowl. As can be seen, a device of this kind is held at a slight angle to the work and gets into radii readily. This is clearly shown by examining the surface at the left where the results of this initial polishing are shown. This operation removes irregularities and levels the surface by removing all die and hammer marks.

The equipment used is a rotary air-driven sander furnished by William H. Keller, Inc., Grand Haven, Mich. The tool rotates at a spindle speed of 1500 revolutions per minute and uses an aluminum oxide fiber-back disk as the abrasive.

This preliminary polishing is followed by buffing or, in some cases, scratch brushing. In Fig. 1 is shown the manner in which bulky parts are buffed on polishing lathes. These lathes carry a stitched muslin buffing wheel 14 inches in diameter, 2-inch face, operated at an approximate surface speed of 9,000 feet per minute. The buffing agent is tripoli, applied to the wheel in cake form. No other color buffing beyond this operation is necessary. This operation appears to be awkward but the aluminum alloy from which these parts are constructed is so light that the operators can handle them with ease.

Another type of polishing instrument is the vibrating sanding block shown in Fig. 2. This device, manufactured by Sterling Products Co., Detroit, carries a sheet of aluminum oxide, 4½ x 11 inches. The ends of the cloth fold over the ends of the block and are secured by a clamp. In operation, the lower part of the device carrying the abrasive cloth vibrates rapidly, simulating the action of hand sanding but doing the work much more efficiently. The part shown in the illustration is an aluminum alloy auxiliary gas tank.

Other sheet metal parts made from steel are welded assemblies requiring dressing and trimming operations which come under the general head of polishing. In addition to the equipment described above, heavy disk grinders mounted on lathe stands are used to produce level surfaces for welding. These disk grinders are also used to apply the final finish to many flat surfaces.

Metal propellers, also manufactured in this plant, present an especially intricate polishing problem. Present day perfection in the design and manufacture of aluminum alloy airplane propellers represents a gradual development covering some 25 years, dating from the days of wooden propellers and light planes. The perfected propellers of today are of two types, fixed pitch and controllable pitch. These propellers range in diameter from 8 to 15 feet. As the name indicates, a fixed pitch propeller maintains a constant blade angle, while the controllable pitch propeller may have its pitch changed either manually or automatically to provide the most efficient blade angles under various flight conditions.

Propellers Are Drop Forged

Propeller blades are fabricated from a special aluminum alloy formed by drop forging. Blade contours are roughed out sometimes on a special profiling machine and sometimes by hand with rasps and files. Elaborate gages are used to check blade angles at all points.

What might be termed the first polishing operation is illustrated in Fig. 3. This is an ingenious machine admirably adapted to this type of work. As shown, the operator passes the polishing belt over the work by hand. To prevent fatigue on the part of the operator the mechanism is supported on a counter-balanced arm and slides back and forth in ways. The polishing head can be

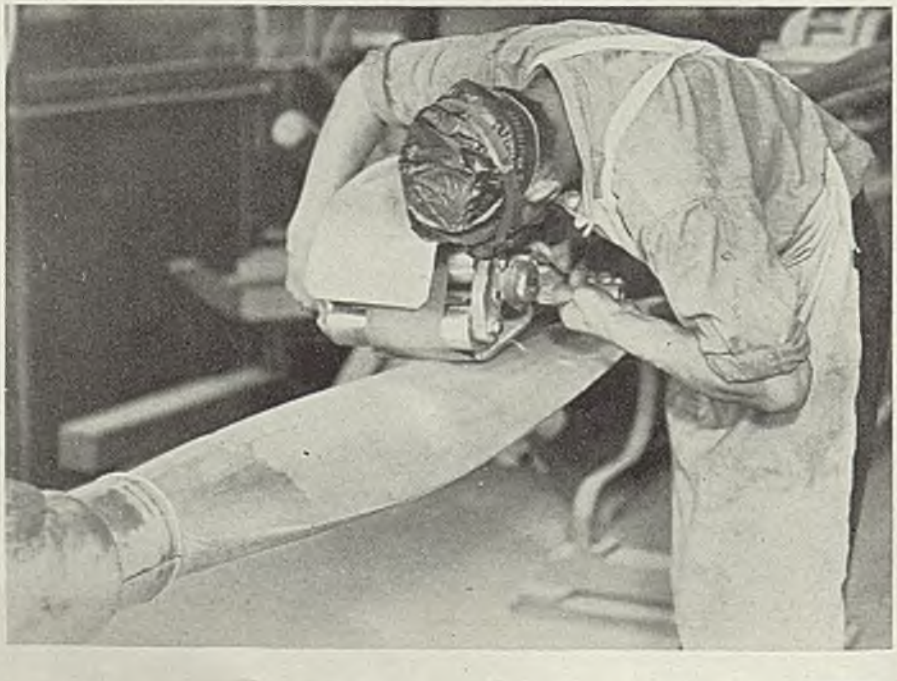
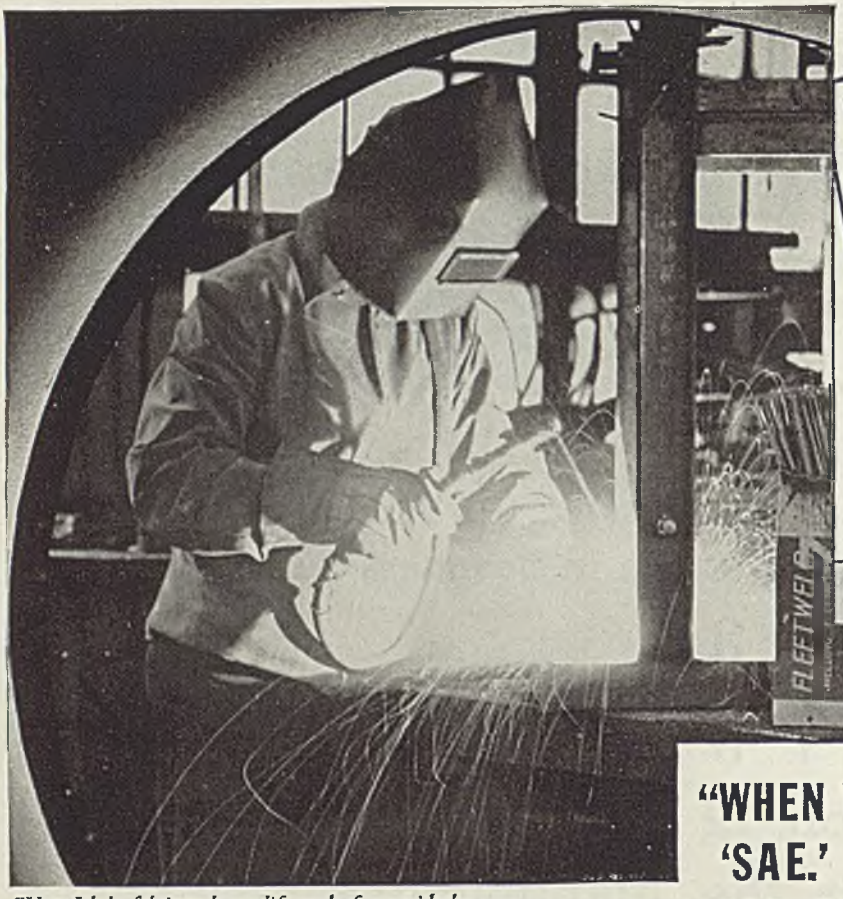


FIG. 3—Belt sander mounted on counterbalanced arm permits operator to reach all surfaces of propeller blade without fatigue. Polishing head can be swung radially as well as traversed across work



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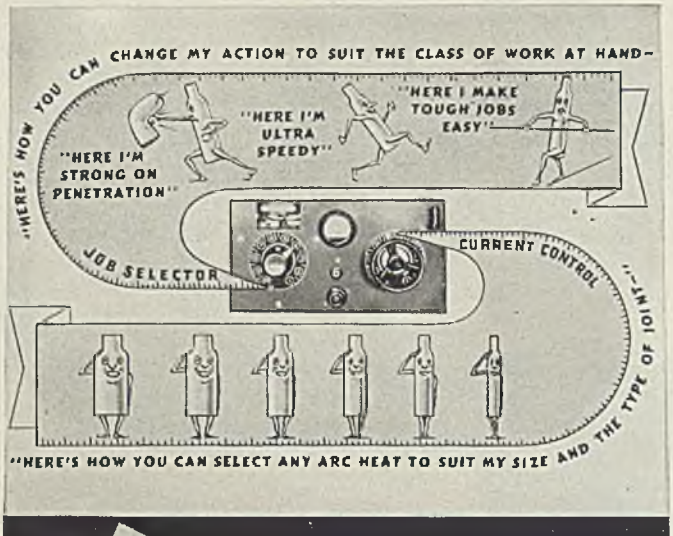

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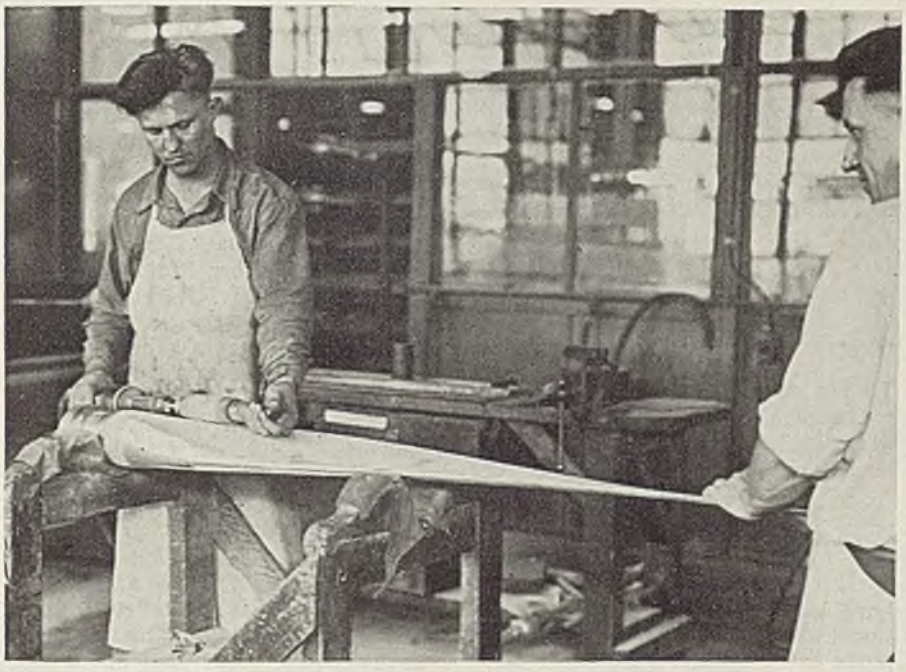


FIG. 4 — Air-driven portable polishing drum is very effective for reaching propeller blade surfaces which can not be polished with belt sander. Drum is rubber faced and covered with polishing cloth

swung radially as well as traversed back and forth permitting the belt to cover practically the entire propeller surface. The abrasive belt is cloth, 10 feet long and 5 inches wide. Three grades of manufactured alumina are used, Nos. 80, 90 and 120. The machine is manufactured by Curtis Machine Corp., Jamestown, N. Y.

In places where the belt sander will not polish effectively other types of special machines are used. One type is a disk sander similar to the one shown in Fig. 1 with the exception that it is driven by a flexible shaft. Fiber disks, 9 inches in diameter and coated with manufactured alumina (16, 80 and 120 grits), are used. The disks are flexible and held at an angle so that about one-third of the disk is in contact with the work.

Air Drives Are Used

Another polishing operation in which special equipment is used is illustrated in Fig. 4. Here the operator is using a portable polishing drum driven by an air drill manufactured by William H. Keller Co., Grand Haven, Mich. The abrasive arm is 2½ inches in diameter and 7 inches long. The drum is rubber faced. The abrasive used is manufactured alumina cloth, No. 150 grit. As can be seen in the illustration this type of instrument is very effective for polishing certain surfaces of the propeller blade.

Hand polishing is necessary on all propeller blades before buffing. For this operation blades are mounted in a felt lined wood rack of the type shown in Fig. 5. The operator uses No. 150 and 2-O manufactured alumina cloth over a wood sanding block. This removes scratches left by previous operations and prepares the surface for color buffing.

Color buffing is carried out on an ordinary wheel in the conventional manner with the exception that two operators are required. As illustrated, one holds and guides the work against the wheel while the other supports it by means of a harness hung around his neck. The wheel is muslin, 18 inches in diameter, 2 inch face operated at an approximate peripheral speed of 7000 feet per minute. The abrasive is tripoli applied to the wheel in the usual manner. No coloring is required after this operation which is the final finishing operation.

The result of these numerous polishing and buffing operations is a smooth surface of correct contour which is necessary to cut down air resistance to a minimum. This is true of the wing and fuselage portions of the plane as well as the propellers.

The natural protective film which forms on the surface of aluminum alloys upon exposure to the air preserves the bright appearance of all-metal planes with a minimum of effort on the part of the maintenance crew. All that is required to keep the ships clean and bright is an occasional washing with a special soap and water. The low maintenance cost soon balances the high original cost of producing this type of finish.

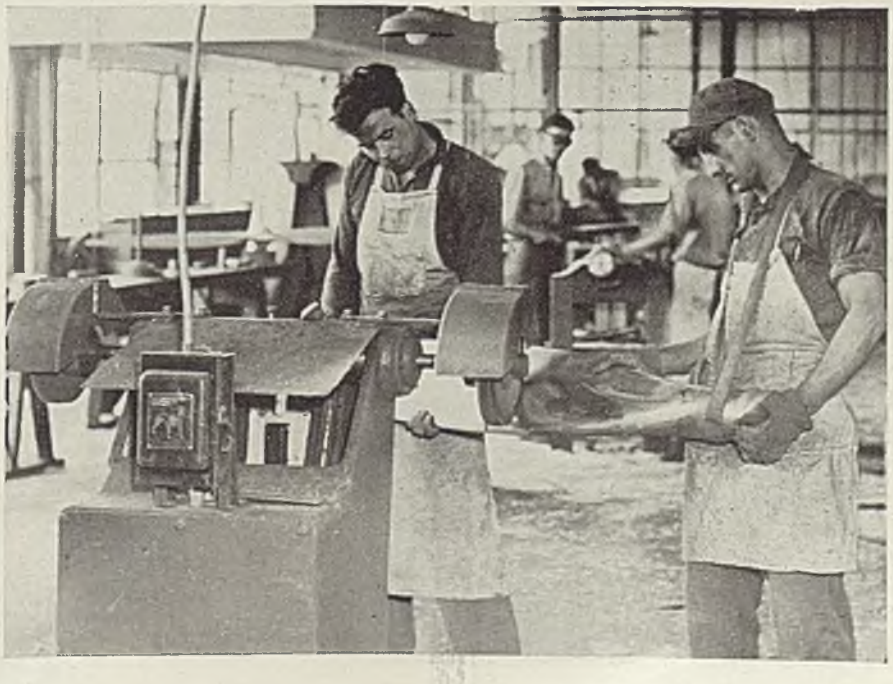


FIG. 5—Color buffing requires two operators as shown here. The high finish produced is necessary to cut down air resistance to a minimum

Porcelain Enamel Institute Proceedings Are Published

Proceedings of the first annual Porcelain Enamel Institute Forum have been published in booklet form and are ready for distribution. The booklet contains a complete record of the forum held at the University of Illinois, Urbana, Ill., May 5-7. Copies have been distributed to those who attended and registered at the forum. Additional copies may be obtained at 50 cents per copy from Porcelain Enamel Institute, 612 N. Michigan Ave., Chicago.

WELDING, ETC.

BY ROBERT E. KINKEAD

Issue Hard Surfacing Data

THERE are few uses of welding where the saving is so immediate and large as in the case of hard surfacing.

Service life by hard surfacing in many cases increases in the ratio of 25 to 1, and 10 to 1 is common and usual. Listed in the fourth edition of *Hard-Facing with Haynes Stellite Products,* just issued by the Union Carbide and Carbon Co., are 494 ways to save money by hard surfacing.

Among the engineers and operators of gas and arc welding, hard surfacing is well known. Machinery designers are not so familiar with the latest developments in this rapidly advancing field. The above mentioned book will suggest valuable ideas to any machine designer no matter how experienced he may be in hard surfacing, since it gives the experience of hundreds of engineers in many different fields.

Hard surfacing is the forerunner of vast changes in making and using steel. As practiced at present, the user of machinery and equipment buys the product made of ordinary steel and uses it until it fails to service. Then with his own welding equipment and facilities, he applies hard surfacing metal and gets many times as much life out of the worn parts as he obtained from the original parts that came with the machine. The hard surfacing material could have been applied at less cost in the factory and would have avoided the first shutdown for repairs.

IN this column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

A Question of Method

CONSIDERABLE amount of discussion is going on in the steel industry as a result of the charitable distribution of the major portion of the estate of the late A. W. Mellon.

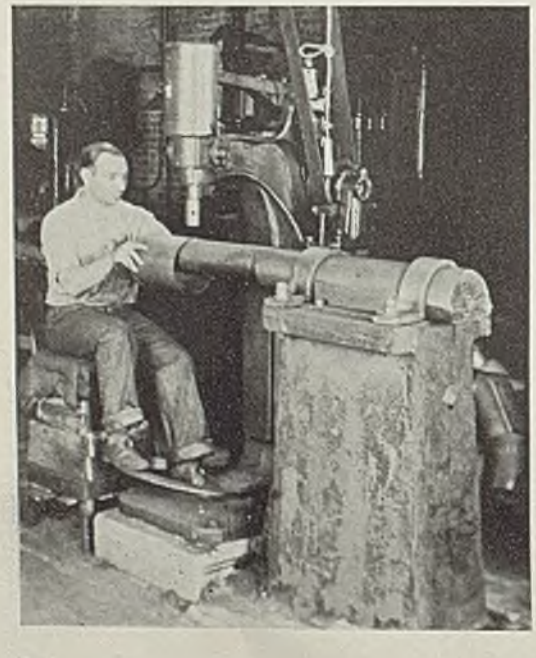
Bitterly prosecuted by Mr. Roosevelt's subordinates in the later years of his life, his death and magnificent bequests in the interests of humanity raise some questions which may best be answered by each one for himself.

It is undoubtedly true that Mr. Mellon had known for many years he would distribute practically all of his fortune to humanitarian uses. On the other hand, Mr. Roosevelt's administration, by all of the means at its disposal in a legal sense, tried to get as much of Mr. Mellon's money away from him as possible. Granted that Mr. Roosevelt is actuated by the most beneficient thoughts and that all the money he could get away from Mr. Mellon would be spent for the good of the people, there still remains the question of whether or not Mr. Mellon might be able to spend the money in the interest of humanity more wisely than Mr. Roosevelt.

After all, Mr. Mellon got the money by his courage and will to build up great industrial enterprises. Presumably in his long life he learned a great deal about people and he must have been in sympathy with the struggles of human beings. Perhaps he knew and embodied in his vast trust foundation the best way of placing his great financial resources so that the greatest good for the greatest number would be accomplished.

Mr. Mellon probably knew as much about how to redistribute wealth as Harry Hopkins, Henry Wallace or Madam Perkins — perhaps more. But a whole political social philosophy is involved in the question of whether a man may distribute his own wealth or must pay it into the hands of politicians for them to distribute as they see fit. Mr. Mellon never yielded an inch to the politicians without a struggle, yet at his death he gave practically all he had acquired for humane purposes. Financially this amounted to more than the sum total ever earned by many generations of Roosevelts, Hopkinses, Wallaces and Perkinses. After all, the people got the money — it is a question of which is the best way.

Riveter Flattens Welds



WHERE wall is thicker than original metal, riveting machine is used to flatten welds on metal containers. Uniform thickness results, and no crevices in which dirt may enter. Used here is a No. 5½B machine, product of High Speed Hammer Co., Rochester, N. Y. With riveting capacity of ¾-inch solid rivets, unit strikes a heavy blow, shaded to a nicety by foot treadle

Iron Sign Indestructible

A practically indestructible, malleable iron stop sign is being made by Michigan Malleable Iron Co., Detroit, for use at through high way intersections.

The sign is designed to be located directly in the center of the highway or street. It is plainly visible to drivers yet when run over by a vehicle flattens out, returning to a vertical position when released. Installations at busy intersections in Chicago and Detroit are said to prove a satisfactory solution to the problem of providing an effective and long-lasting stop sign.

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Cr. 4% to 6%

4%-6% Mo.
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Cr. 15%

Cr. 18%

Cr. 28%

Cr. 18% Ni. 8%
C. under .07

Cr. 18% Ni. 8%
Si. 2½%

Cr. 18% Ni. 8%
Mo. 2½%

C. under .07

Cr. 25% Ni. 12%

Cr. 25% Ni. 12% Ti.
Cr. 25% Ni. 12% Si.

Cr. 29% Ni. 9%

Cr. 15% Ni. 35%

Cr. 15% Ni. 60%

Cr. 20% Ni. 80%

Cr. 25% Ni. 18%
Si. 2½%

Cr. 20% Ni. 25%
Si. 2½%

See you at the Metal Show in Atlantic City, October 18-22—*Whitey*

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MAURATH, INC., CLEVELAND

BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

Technical Papers Heard at Chicago A. I. S. E. Meeting

(*Continued from Page* 87)

tanks operating over a period of years shows that ample thermal and chemical protection is afforded to backing or sealing materials by carbon linings using only a 2½-inch thickness of carbon under temperature conditions normally existing in nitric-hydrofluoric pickling baths, i.e., up to 170-180 degrees Fahr.

There are now in service, tanks ranging in size up to 60 feet long with linings ranging from 2½ inches to 10 inches of carbon. Obviously, when there is likelihood of heavy loads being dropped into a tank, the construction must be heavier than that required for continuous strip or light sheet.

It is not necessary to have a backing material which is absolutely inert in the bath itself, since if any seepage occurs, it will be little and quickly dissipated. It is important, however, to provide a material for this use which will remain flexible throughout the entire range of temperature to which it is subjected, and which, if thermoplastic in character, is not thick enough to increase appreciably in volume on heating. If a poured sulphur cement is used, the body of the backing must be heavy enough to prevent boring by the hot cement. Rubber, heavy asphalts painted on, and asphalt membranes are all giving good service. In general thicknesses of the thermoplastic type of backing do not exceed approximately ¼-inch.

The choice of cement for bonding the brick is principally chemical. Since the greatest field for carbon in steel pickling tanks seems to be in nitric-hydrofluoric tanks, many cements used extensively in the chemical industry are not applicable and the poured sulphur-base cement is, as far as we know, the only commercially satisfactory material to use.

The electrical testing department of a steel plant should come under the supervision of the electrical engineering department, in the opinion of Birger Thele, testing engineer, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. By separating it from the operating department, the besting engineers will be least restricted in carrying out their work according to their best engineering knowledge. It is, however, necessary that the closest co-operation be maintained between the testing and the operating department.

The personnel of the electrical testing department should be recruited from technically trained men. Previous experience in the operating department of a steel mill is desirable, and so is experience in the testing department of any of the large electrical manufacturers.

It has been found practical to distribute the cost of the electrical testing department to the various departments of a steel company in proportion to the amount of electrical energy which is used by each of them. This method of distribution of the cost encourages the operating superintendents of the various departments to make full use of the services of the testing department, since they have to pay their pro rata share of the expense.

It is very important that the electrical testing department should have a well-equipped shop and an expert machinist, who can understand the requirements of the test and can construct the required apparatus without the necessity of making drawings.

It should be the duty of the electrical testing department to keep all meters, instruments and delays in good repair. Thus the cost and delay of having to return the instruments and relays to the factory for repairs are avoided.

The monthly distribution of all energy used by the various departments and branches of departments should be made by the electrical testing department, and for this purpose, tests and studies of the different operations should be made frequently to insure an accurate distribution. Periodical tests should be made on all watthour meters used in this distribution in order to insure reasonable accuracy.

An electrical testing department, if properly used, will pay for itself by safeguarding the expensive electrical equipment, thus preventing many costly failures and delays. In case of a failure it can save the expense of unnecessarily long shutdowns by correct analysis of the trouble or by prompt location of the fault.

It can also effect a saving for its company by keeping a constant check on all power requirements and by discovering wasteful practices.

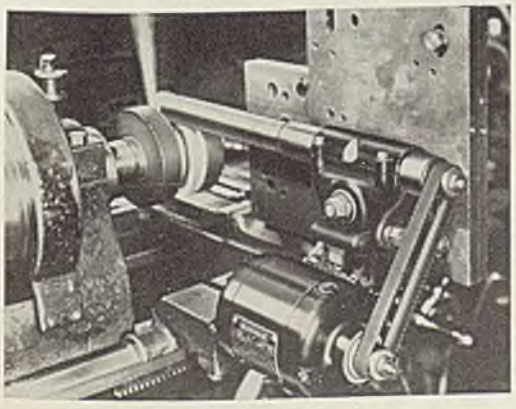
Using Pressure Lubricants

Use of extreme pressure lubricant was described by Ralph C. Walters, Penola Inc., Chicago. Although extreme pressure grease was developed primarily for large heavy-duty roller bearings, it is definitely a general purpose grease, according to Mr. Walters, working equally well on either plain or antifriction bearings and at speeds and temperatures generally encountered in mill operations. This characteristic offers many possibilities for simplified mill lubrication, particularly in conjunction with centralized pressure systems.

Factors determining the use of extreme pressure lubricants in mill drives are of course loads and operating conditions, but for proper and economical lubrication these loads and operating conditions must be carefully analyzed to definitely determine whether they are necessary or whether the efficient yet low priced regular gear lubricants will handle the job. This can be done readily because approximate calculations are comparatively simple and loads under actual operating conditions can be readily and easily checked.

This development of the application of extreme pressure lubricants to the gears of mill drives has led many builders of drives to take advantage of the heavy load carrying capacity of these products and they are now designing drives utilizing a higher tooth pressure figure. This permits a more compact design of unit with a better load distribution

Solves Problem of Expenses



TO reduce the cost of producing forming rollers, a manufacturer of pump tubing used the illustrated set-up, involving the vertical mounting of a No. 5 lathe grinder, product of Dumore Co., Racine, Wis., and accurate to 0.0001-inch

on the gear teeth and more efficient bearings.

However, a unique characteristic of extreme pressure lubricants opens a field of applications which is perhaps broader than that covered by load considerations alone. This characteristic is its efficiency as a bearing lubricant. By using these products bearings will run as cool or cooler than with an oil of the same viscosity and in general they also carry the approval of the antifriction bearing manufacturers.

We are all familiar with the more or less general difficulty experienced with mill drives using a gear lubricant on the gears and a lighter oil on the bearings, due to contamination. An extreme pressure lubricant offers an ideal solution of this problem, for with its high film strength a viscosity light enough to suit the bearing clearance and speeds will still give adequate tooth protection as well as perfect bearing lubrication.

While extreme pressure lubricants have less variations in viscosity at different temperatures than the ordinary gear shields or gear lubricants, it is advisable where gears are operating at tooth pressures in the danger zone to provide cooling for the lubricant during the hot weather or when the drive unit is subject to heat radiation from the mill and to provide heating in the extreme cold weather in order to maintain the lubricant at its highest operating efficiency. The viscosity should be checked at regular intervals and the product adjusted to the proper viscosity.

In addition to this check the lubricant, if used in circulating systems, should be periodically filtered or centrifuged, the frequency depending upon operating conditions in the plant.

With a proper extreme pressure lubricant in use, with the gears in proper alignment and tooth pressures below the limit of strength of the material in the gears, I have never seen a gear failure from pressure alone. Misalignment seems always to be the basic cause when failure occurs under proper lubricating conditions.

Installs New Facilities For Making Welded Tubing

CONSTANT changing goes on in every industry and the tube industry is no exception. In many applications where seamless steel tubing was formerly used exclusively, it has been supplanted by electric welded tubing. Most of this change has come in the mechanical field, the one to which the Ohio Seamless Tube Co. has particularly catered. For this reason it has been necessary for this company to adapt itself to the changing conditions by going into the manufacture of electrically welded tubing, for which it has installed the latest type of equipment and is now able to put on the market a high quality product.

Recognizing the trend to electrically welded tubing for certain applications, the company acquired a license to produce this type of tubing under the Johnston process. Strictly on a cost basis, electrically welded tubing has proved itself more applicable in certain cases, notably thin wall tubes. In order to compete in this field a portion of the plant has been set aside, modernized, two units for producing tubing from carbon steel strip set up, and provision made for future expansion along these lines as soon as possible.

Founded some thirty years ago, the company during that period has pioneered the processing of many different alloys and by so doing developed a technical staff trained and experienced in the art of working out the proper chemical and physical properties of a steel tube to meet the particular requirements of the application. This is a service that the Ohio Seamless Tube Co. is in position to give to the user of electrically welded tubing today.

At this point the output of the plant in welded tubing is confined to carbon steel in the more popular sizes and weights. Production on each welder runs from 40 to 70 feet per minute, depending upon requirements and material used. Only mechanical tubing is being supplied under the present setup. It is expected the plant will eventually be enlarged to produce all types and sizes.

In addition to straight tubing, the plant is equipped to produce odd sizes and shapes as well as bent tubing to any specification. For use on both welded and seamless tubes, a bright annealing furnace has been installed. This will allow the company to supply scale-free tubing, stress relieved. This is an important factor in production of welded thinwall tubing for decorative uses which must take a high finish, and similar applications where a scale-free surface is required.

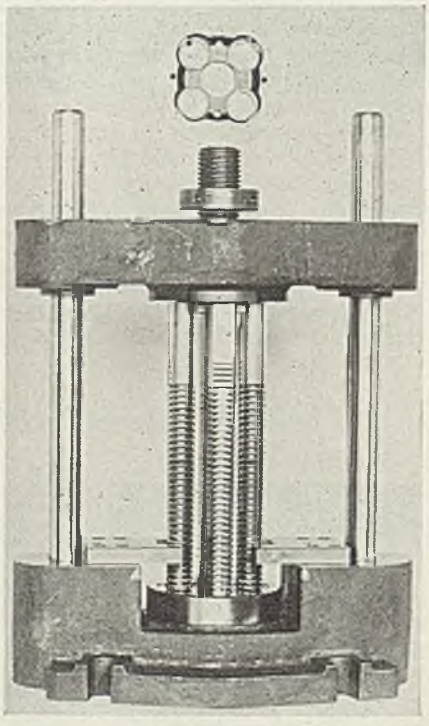
Issues Booklet of Steel Mill Pictorials

A booklet of instructive photographs which pictorially tell the story of steel from iron ore mine to finished products has just been published by Youngstown Sheet & Tube Co., Youngstown, O.

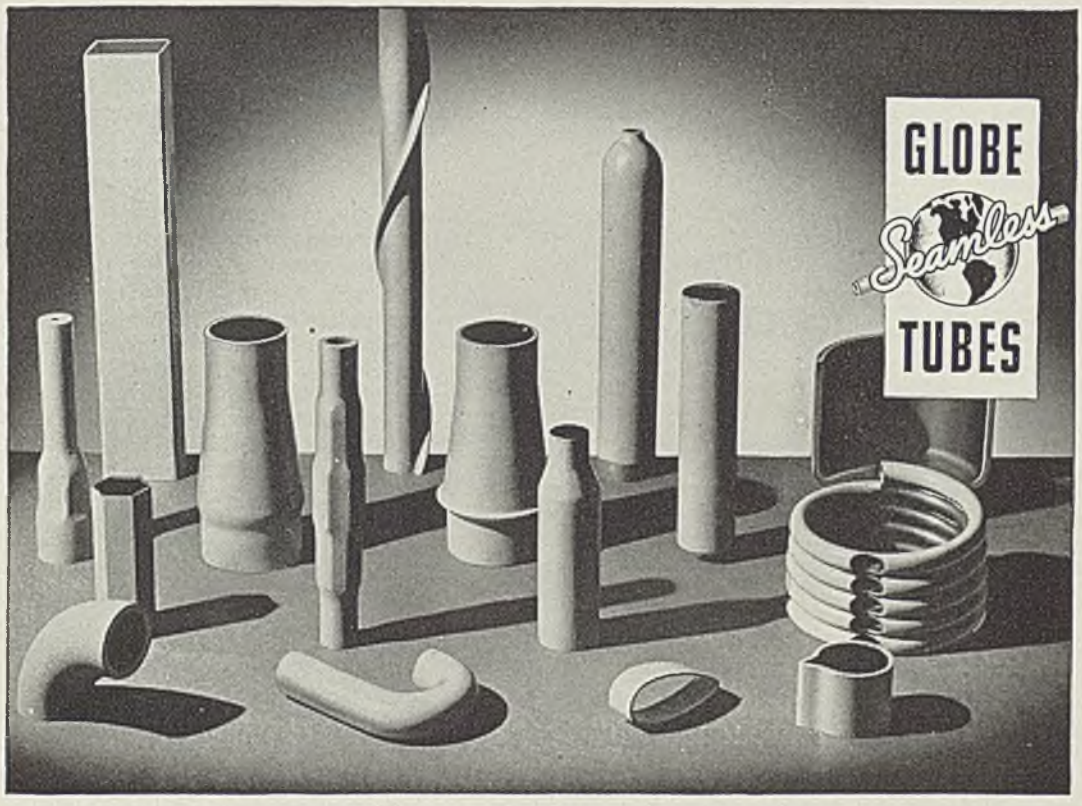
Compiled in the style of popular picture-story magazines using action photographs and brief, to-the-point captions, the booklet contains 115 pages of basic steel information including a total of 135 action photographs taken in the company's mines and mills. The publication is entitled "What We Make and How We Make It," and is of loose-leaf binding and leatherette cover, pocket size.

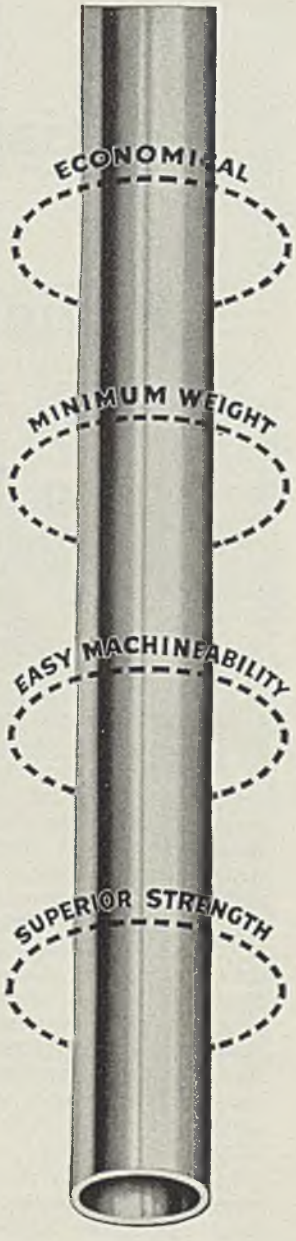
First section of the booklet covers the story of steel from iron ore mining to pouring of ingots and the butting of billets. Thirteen other sections illustrate the manufacture of flat rolled steel, flat rolled steel in the lighter gages, tin plate, butt weld pipe, lap weld pipe, seamless pipe, electric weld pipe, electrical conduit, rods and wire, wire nails, bars and shapes, railroad tie plates and forged steel unions.

Broaches Irregular Holes



FOUR irregularly shaped holes are broached internally at one time by the high-speed broaches developed by Colonial Broach Co., Detroit. Plan view of the holes broached by this device is shown above





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GLOBE Seamless Mechanical Tubing, hot finished and cold drawn, is available in sizes and wall thickness to meet a wide range of requirements.

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The Globe Steel Tubes Co. specializes exclusively in the manufacture of seamless steel tubing. This concentration of facilities provides a dependable source of supply and assures a consistently uniform quality of product. Globe engineers are at your service to assist in the selection of tubing of the exact characteristics you require.

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British Steel Institute Reviews 57 Years of Basic Bessemer Process

HOLDING the 1937 autumn meeting of the British Iron and Steel institute in Middlesbrough, Yorkshire, Sept. 15-17, marked the fourth visit of the organization to that district. The institute first met there when it was under the presidency of William, seventh Duke of Devonshire. The next visit took place in 1883, at a time when great interest was being displayed in the then recently-discovered basic bessemer process. Many other developments in manufacture of iron and steel occurred between the second and third and since the third visit to Middlesbrough.

In extending a welcome to the institute at the opening session, the Lord Mayor of Middlesbrough referred to many outstanding achievements of the industries of the Middlesbrough and Tees-side district, particularly the Sydney Harbor bridge, which was erected by Dorman, Long & Co. Ltd., Middlesbrough, and the bridge recently completed in Denmark and opened Sept. 26 by King Christian of Denmark, this bridge being one of the longest and largest in the world and having taken four years to build.

Ten papers and two reports of special subcommittees were presented at the two technical sessions. Prof. W. A. Bone, chairman of the blast furnace reactions research subcommittee, submitted a report upon field tests of a furnace smelting principally Lincolnshire ores at the Frodingham works of Appleby-Frodingham Steel Co. Ltd.

When this investigation was commenced, the furnace was making basic iron and had been blowing for nearly nine years, consequently the lining was somewhat worn. The report contained a description of furnace operation, ores used, analysis and properties of cokes, and operating data in the form of work sheets and tables. On no occasion did the investigation interfere with working of the furnace. The study was carried out during a period of about a year—from June, 1935, to June, 1936.

Frank W. Harbord, past president of the institute, contributed a paper on the Thomas-Gilchrist basic process, 1879-1937, in which he gave an account of the early life and training of Sidney Gilchrist Thomas and of the development of the Thomas-Gilchrist process from the early experiments carried out by Percy Gilchrist and himself in the 6-pound converter to the present-day production of 90,000,000 tons of basic steel per year.

This paper dealt with the influence which the basic process has had on the railway, shipbuilding and engineering industries, and on the world as a whole, and pointed out that the present world production of basic steel involves the mining of not less than 250,000,000 tons of phosphoric ore per year.

Hot metal practice in five melting shops on the North-East coast was reviewed in a paper by W. Geary, Dorman, Long & Co. Ltd., Middlesbrough. The furnaces involved varied from 55 to 250 tons capacity. Certain observations were made concerning points that experience indicates to be of prime importance or of special interest, such as the supply of materials, effect of furnace design or shop layout, and fuel.

H. E. Blayden, W. Noble and Prof. H. L. Riley, Newcastle-Upon-Tyne, presented a paper describing some experiments in a small-scale cupola. In this paper, performances of some commercial and experimental oven cokes and several carbons (electrode and retort carbon, petroleum coke, carbonized anthracite) were compared under similar conditions, following their use in the experimental cupola with a shaft 9 inches in internal diameter and giving a melting rate of 220-250 pounds per hour of iron at about 1330 degrees Cent.

It was found that rate of combustion and of melting were markedly affected by coke size and rate of air supply. Metal temperatures appeared to be more sensitive to variation in coke size than to variation in air blast above certain limits, which probably were fixed by cupola dimensions and design. Use of highly-graphitized carbons in the cupola tended to the production of increased metal temperatures. The experiments suggest that differences in performance of cokes under practical conditions are attributable largely to differences in the mechanical strength of the cokes.

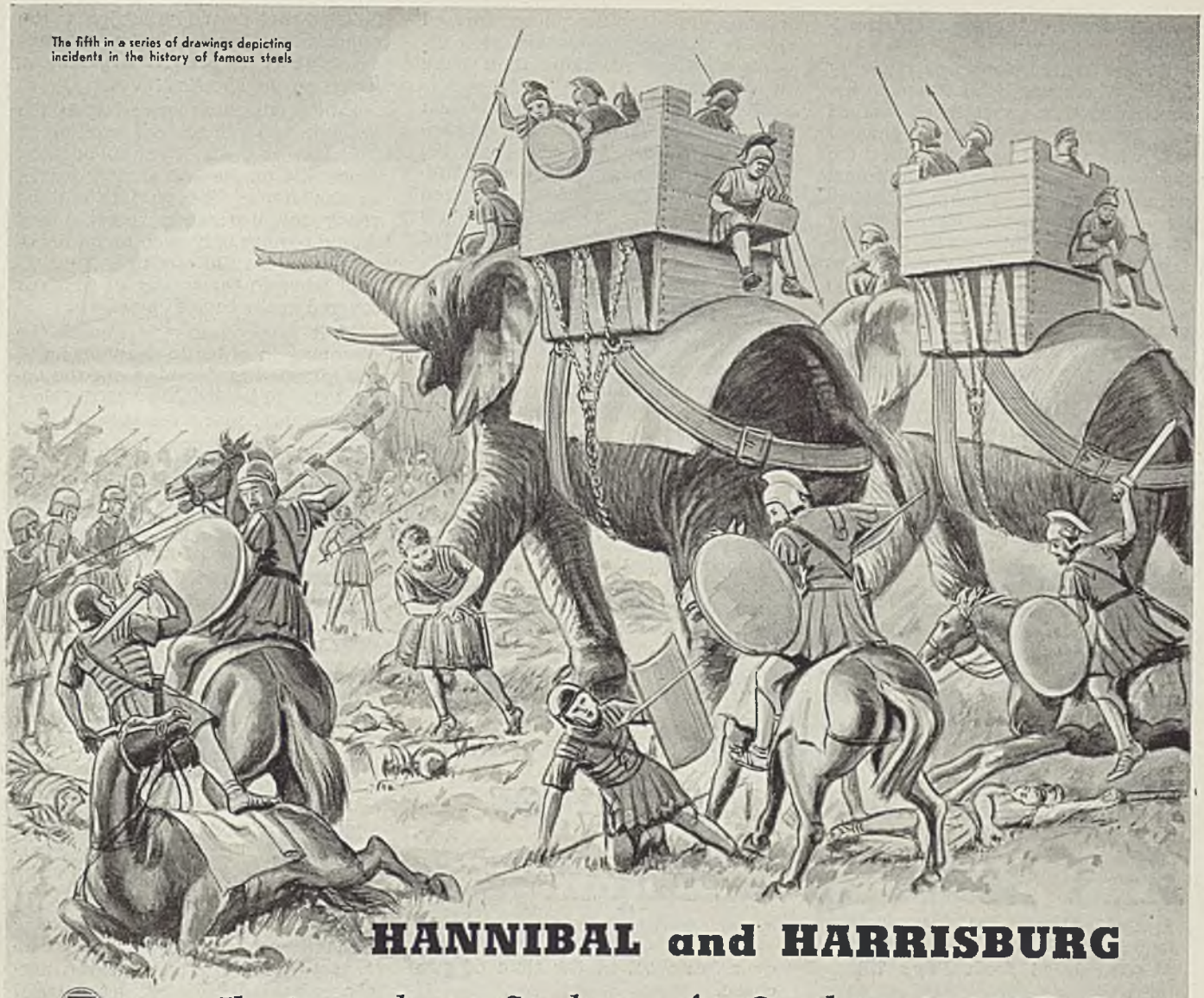
The same authors contributed another paper on the influence of carbonizing conditions on coke properties in which they dealt specifically with mechanical pressure. Further investigations will follow eventually. Two Northumberland non-coking coals were carbonized under mechanical pressures ranging from 0.2 to 20 pounds per square inch, and the effect of coal size was studied with one of these coals. Relative strengths of the cokes prepared were measured by a new apparatus devised for the purpose.

Discusses Coke Strength

It was found that increase in carbonization pressure produced a pronounced increase in the strength of the resultant coke. In certain cases, the strength index of the coke was raised from zero to that given by metallurgical cokes. Effect of pressure on coke strength was shown to depend on coal size and grading. It was shown also that coke strength decreased with decrease in size at low pressures and increased with decrease in size at higher pressures with the coal examined.

In the past, a number of British blast furnace slags have not been marketable, largely because of their liability to disintegrate when air cooled, which renders them unsuitable for use in tar-macadam or as concrete aggregate. In 1935 the matter was referred to a panel of the blast furnace committee which was commissioned to examine methods of rapid testing of air-cooled slags, particularly with reference to disintegration, and to examine whether by suitable methods of foaming, unstable slags could be stabilized. Extensive research was undertaken in both directions by investigators at the Building Re-

The fifth in a series of drawings depicting incidents in the history of famous steels



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Products of Harrisburg Steel will win for you in 1937

Following his crossing of the Alps—most memorable military feat of ancient times—Hannibal cut his way southward to Cannae, where in 216 B.C. he annihilated the Roman legions. Rome tottered!...As commonly, up till the days of gunpowder, victory went to the troops with the best steel. Hannibal's arms were of Iberian steel—the most famous in ancient Europe....Iberian steel was made especially for weapons. Harrisburg steels are made especially to meet the metal requirements of each product. We welcome an opportunity to show you how units of our custom-made steels will better meet the tests to which you put them—how Harrisburg metallurgists and mechanical engineers collaborate in providing products that are correct both in design and metal analysis.

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search station, Watford, Hertfordshire.

Report of this work was made by Dr. T. W. Parker, who stated in his conclusion that strength of foamed slag concrete varies in a general way with weight per cubic foot. On the whole, the materials examined gave concretes showing higher strengths than concretes made with other light-weight aggregates, although the weights per cubic foot were higher than those of the lighter types of light-weight aggregate. Such properties as thermal insulation, moisture movement, ease of plastering, etc., were comparable with those of the lighter types.

A paper discussing a new method for judging behavior of iron ores during reduction was presented by Dr. N. J. Klarding, Dortmund, Germany. After making a brief reference to reactions occurring during the reduction of iron oxide by carbon monoxide and a method and apparatus for investigating them, the author showed reduction curves for pure Fe_2O_3 obtained by Schenck and Dingmann, and indicated the influence of temperature on the conversion of carbon monoxide into carbon dioxide. The phases formed in the iron-oxygen system as a result of these reactions then were enumerated.

Some further experiments on nitrogen hardening of high-chromium and austenitic steels were discussed in a paper by B. Jones, University college, Cardiff. The nitrogen hardening properties of these steels were examined after treatment of the surfaces by copper plating and with phosphate reagent. Regular hardening by these methods was obtained.

Richard R. Sillifant, London, contributed notes on some recent experiments in connection with spraying of steel by the wire-fed metal-spraying pistol, which explained some work in connection with fuel gases, such as compressed coal gas, hydrogen and dissolved acetylene, with respect to the deoxidizing effects of reflames. Use of nitrogen as an impelling medium in place of compressed air, to minimize oxidation, also was described. Results of heat treatment of sprayed steel, using dissolved acetylene as a fuel gas and compressed nitrogen as the impelling medium were explained.

Relations Between Buyer And Seller of Stampings

(*Concluded from Page* 78)

itial run. Steel cost should be based on the published price of steel, plus freight and extras. Blank weight and scrap allowance used to determine this weight should be clearly indicated.

If the seller furnishes this information on material, it will remove future argument over price changes in steel, a factor over which the seller has no control. Data on blank size and weight also give the purchaser a better understanding of the stamping cost, and also avoid the possibility of one seller having an advantage over another because of errors in blank sizes.

Labor: As a matter of comparison of quotations from various bidders, labor costs should be summarized in detail.

Setup: If die setup is not included in burden figures, this cost should be indicated over a certain number of stampings, agreed upon at the time of quotation.

Burden and Profit: These items are essential to balance out to the piece cost.

Transportation: This figure likewise is necessary to balance out to the piece cost, and should be figured on a basis set at the time of purchase.

Specifications on Finish

When the seller quotes on a set of dies he is making an intelligent estimate on the following points:

1. Time required to build dies
2. Cost of building dies
3. How dies will operate when built

The latter point has an important bearing on the cost of the stamping. As an illustration, consider a part produced from the following dies: Blank, pierce, form and flange. Assume the part to be produced from CRXDDO steel, for use on the outside shell of an automobile body. When the die estimator figures this part he may not be sure just how a certain section of the part will come off the dies; therefore if he is forced to protect himself by figuring a cost of metal finish he knows nothing about he is apt to over or underestimate his costs. In such cases, open discussion by the stamping company to show exactly what costs for finish in this particular part might be will lead to a fair adjustment.

Workmanship and material should be in strict accordance with blueprint specifications at all times. The finished part should be subject to the approval and acceptance of the purchaser's inspection department, based on the specifications.

Unless otherwise agreed upon, the stamping should be free from burrs (bandsaw trim etc.,), waves, buckles, dings, die marks and chatter marks in the steel. The part should be ready for use when received and should require only such metal finish as applied on the assembly line, except wherein the matter of finish is covered at the time of purchase.

If it is necessary to anneal the stamping in order to draw or form, the question of finishing out the anneal should be discussed at the time of purchase, whenever possible.

Any power hammering or bumping to eliminate loose metal or wrinkles should be of good workmanship and should be averaged over the run. Discussion should cover the matter of finish after such operations.

Precautions should be taken to protect stampings against rust in transit and storage by oiling.

As outlined previously, a die sample should be submitted for the purchaser's approval before making the run. In the case of a sample requiring finish or where a certain high quality is to be maintained, the seller should have a quality sample approved to act as a guide for production. A like sample can be retained by the buyer to check on incoming parts.

Material received by the buyer which is not up to prescribed standards will be rejected. If the purchaser has sufficient correct material on hand to continue production, the rejects should be returned to the seller who should be notified before such returns are made. Transportation costs on such rejects are the seller's responsibility.

In case stock conditions do not permit return of material, the seller may be expected to co-operate with the purchaser by standing the expense of putting the rejected material in suitable condition for use. Cost for this work should be submitted to the seller before it is started. At the buyer's option, the seller may be permitted to perform minor repairs in the former's plant, to save transportation expense.

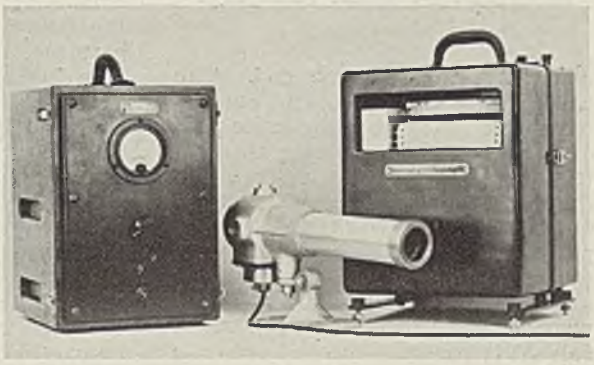
The stamping supplier should carry sufficient steel to maintain a reasonable fluctuation in the buyer's requirements, but he should not exceed the steel releases as furnished by the buyer.

While the supplier should make shipments of sufficient quantity to maintain an even flow of material for production requirements, the matter of storage of stampings in the purchaser's plant also must be considered. This will require strict adherence to shipping sched[illegible]

NEW EQUIPMENT

Temperature Recorder—

Bristol Co., Waterbury, Conn., will include among its displays at the Metal Show the new Electronic Instagraph. This equipment to be demonstrated is for accurate reading of rolling mill temperatures and consists of three units—a thermophotronic tube, a potentiometer amplifier and a recording instrument. The photronic cell in the tube or gun is affected by the thermal spectrum only, radiated from a heated body, when the gun is aimed at the mass. An instantaneous reading of the temperature is thus obtained and recorded on a small strip chart. The small electromotive force generated by the photronic cell is potentiometrically measured, amplified and recorded by the Instagraph in terms of temperature. Because of the high sensitivity of the instrument and speed of response to temperature changes, it is especially adapted for use in measuring the temperature of moving bodies.

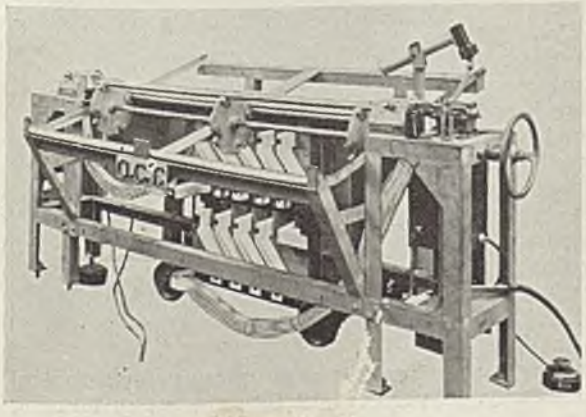


Bristol Electronic Instagraph for accurate reading of rolling mill temperatures will be demonstrated at the Metal Show

♦ ♦ ♦

Electric Heaters—

American Car & Foundry Co., 30 Church street, New York, will display four a.c.f. Berwick electric heaters at the Metal Show. Illustrated is the six-foot bar heater for heating bars 6 feet long from ⅜ to 1-inch diameter, although this unit can also be built to heat longer or shorter bars. It heats a ½-inch diameter bar, 6 feet long, in 30 seconds; heats 1-inch diameter bar, 6 feet long, in 75 seconds, to 2000 degrees Fahr. Three other units to be displayed include the No. 2 two-electrode rivet heater for heating rivets, ⅜, ½ and ⅝-inch diameter, from ¾-inch to 6 inches long. This unit is built in nine sizes to heat any diameter or length rivet from 3/16-inch to 2 inches in diameter and from ¾-inch to 13 inches under the head. It is said to provide a quick, economical and clean method of heating, eliminating heat, smoke, odor, and reducing scale to a minimum. The two-electrode forging heater is a fully-automatic unit built in two sizes designated as LA No. 3 and LA No. 4. No. 3 heats from ¼-inch to 1-inch diameter, while No. 4 heats, on the set of blocks furnished, from ⅝-inch to 1¼-inch, but thick copper blocks can be furnished which will permit stock to be heated from ¼-inch to 1-inch. Many advantages are claimed for electric heating. By the contact resistance method, each b.t.u. in a kilowatt hour must enter the piece being heated. Only loss is by radiation; the more quickly the piece is heated, the lower is the electrical consumption. No current is consumed until the piece is gripped by the electrodes; the current is immediately shut off when the piece reaches the temperature to which the photoelectric controller has been set. Fourth unit to be displayed is the No. type C horizontal heater for spot heats on rounds or flats. It is equipped with an electric eye for temperatures as low as 1100 degrees Fahr. and also with an electric time clock to give a soaking heat from a split second up. It is used for heating, normalizing, and hardening.

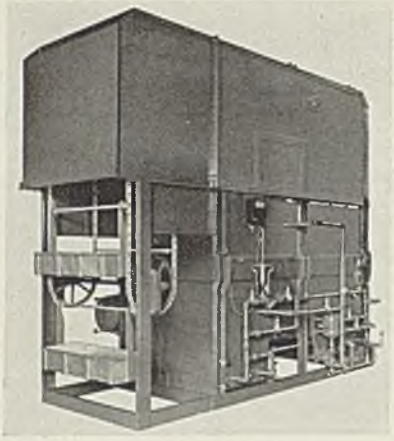


Six-foot bar heater is one of a.c.f. Berwick electric heaters to be displayed at the Metal Show

♦ ♦ ♦

Degreaser—

Detroit Rex Products Co., Detroit, is manufacturing a large, completely automatic degreaser for use in cleaning miscellaneous metal stampings. This special vapor-spray-vapor machine is equipped with a two-strand, cross rod type conveyor arranged for loading and



Detroit Rex degreaser is completely automatic and used for cleaning miscellaneous metal stampings

unloading at the same end. The work is placed in perforated baskets which are hung from the cross rods of the conveyor. In passing through the degreaser, work is lowered into the hot solvent vapors which thoroughly wet the work and remove part of the heavy contamination. As the conveyor moves horizontally along the machine beneath the water jacket condenser, clean warm solvent is pressure-sprayed onto the work from banks of spray nozzles. This mechanical action forcibly removes and drives off the solids. A final cleaning in pure solvent vapors assures complete removal of oil and grease. Returning back overhead to the loading and unloading station, work emerges clean, warm and dry, ready for finishing. Rated production cleaning capacity is 3000 pounds of work per hour at a normal conveyor speed of 6 feet per minute. Conveyor speeds can be increased to 12 feet per minute, doubling hourly production. Overall dimensions of the unit are: length approximately 13 feet, width 7 feet, height 11 feet. Solvent capacity is 120 gallons.

♦ ♦ ♦

Automatic Work Stop—

Landis Machine Co., Waynesboro, Pa., has designed an automatic work stop applicable to all Landis standard threading machines employing model A carriage front. A bracket fastened to the end of the carriage front supports a horizontal shaft on which a stop arm is mounted. Stop arm is adjustable on the shaft for any distance up to the length of the carriage travel of the machine. The end of the shaft nearest operator is fitted with a pinion gear that engages in a vertical rack gear. A cam fastened to the bed of the machine is used to actuate the movement of the stop arm as the carriage moves forward or backward. A roller on the end of the rack gear operates on the cam to reduce friction between cam and rack gear. Cam has elongated slots making it adjustable to any position. When carriage is back, stop arm is down. After the piece to be threaded is gripped in the vise, the cam is set so stop arm raises with the first forward movement of the carriage, eliminating possibility of arm striking head and causing damage.

Automatic work stop is available for all Landis standard threading machines with model A carriage front

♦ ♦ ♦

Gas Welding Rod—

Air Reduction Sales Co., Lincoln building, New York, has developed the Airco No. 1, a new, high ductility, alloy steel, gas welding rod designed for increased ductility and improved quality of both single and multi-layer steel welds. A feature of the rod is claimed to be its ability to withstand considerable heating without burning. Welds produced by the new rod show the following physical characteristics: free bend ductilities of single layer welds range from 20 per cent to 30 per cent depending on composition of the steel; free bend ductilities of multi-layer welds range up to 40 per cent on low and medium carbon steels; ultimate tensile strengths in excess of 60,000 pounds per square inch; specific gravity of welds, 7.80-7.86; Charpy impact values on keyhole notched specimens at 70 degrees Fahr., from 15 to 30 foot pounds; Rockwell hardness of weld metal from B60 to B85, depending on carbon content of base metal and type of weld.

♦ ♦ ♦

Pyrometer—

Pyrometer Instrument Co., 103 Lafayette street, New York, has announced the Pyro Bi-Optical, combined color pyrometer, design based on the use of light filters and color wedges which are transparent to a number of colors simultaneously. By using filters with a number of transparencies for both separation and for mixing and toning down, a simple temperature measuring device in the form of colored disks is created. Temperature of the black body and the actual temperature may be ascertained simultaneously. Instrument is furnished with scale ranges from 900 to 1900 degrees

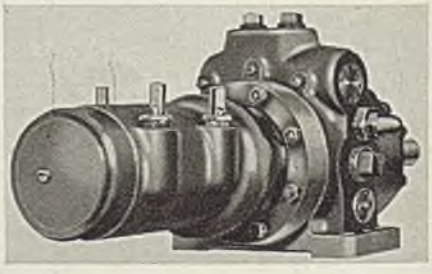
Pyro Bi-Optical pyrometer ascertains both black body and actual temperatures simultaneously

Cent. or 1700 to 3500 degrees Fahr. This instrument will be exhibited at the Metal Show.

♦ ♦ ♦

Pump Units—

Sundstrand Machine Tool Co., Rockford, Ill., has announced a new line of hydraulic pump units with the control valves built into the pump housing. These compact units are made in two sizes, the larger being the model 10PWX and the smaller the 5PWX. Feature in the 10PWX is a variable displacement piston pump which can be furnished with three different feed rates: fast, medium and slow feed, each of which is independently ad-



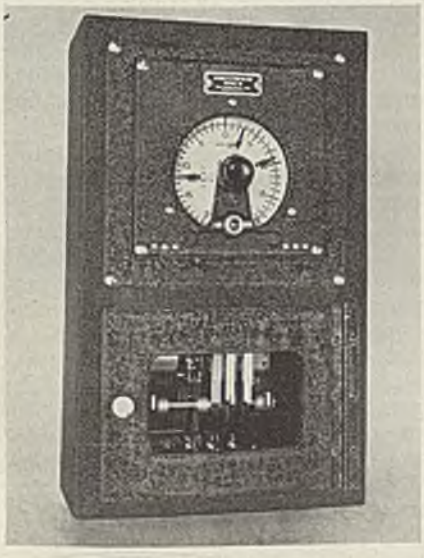
Sundstrand pump units have control valves built into the pump housing

justable. In addition there is a constant volume pump in this unit which provides rapid traverse. Both pumps are driven by a single shaft. The main control mechanism is in the pump housing and may be actuated by a simple hydraulic remote control valve which is tripped by dogs on the moving member. An alternative control comprises electrical switches and trip dogs in conjunction with solenoid valves. Either the hydraulic remote control or the electrical switches provide the three pre-set rates of feed and rapid traverse in either direction. This same control arrangement is used for the model 5PWX unit which, like the standard model 10PWX, has two independently adjustable feed rates in addition to rapid traverse. The small size of these units together with simple and flexible control makes them adaptable to machine tool feeds and other applications. The pumps are driven at motor speed of 1200 revolutions per minute and are quiet in operation. Smooth feeds are obtained due to the multiple piston pump design, it is claimed.

♦ ♦ ♦

Furnace Timer—

American Temperature Control Co., 34 East Logan street, Philadelphia, has announced a new timer designed to control, on a time basis, the firing of furnaces which are fired at each end, such as soaking pits and open hearths. On the instrument is a dial having two pre-set pointers and one pointer which moves during timing operations. Each fixed pointer is controlled by a separate knob and is set for the desired firing time on the right and left ends of the furnace respectively. In the illustration the right pointer is set for nine minutes and the left for eleven minutes. Total firing cycle of the furnace is then the total of the two pointer readings. On reaching the right fixed hand the traveling pointer reverses and comes back to 0 in 9 minutes, at which time a contact is made which starts the cam timer, shown through the window. The moving pointer continues to the left, makes contact with the left fixed hand and comes back to 0 in 12 minutes, at which time the contact is again made to start the cam timer, and the cycle is continued. The cam timer shown controls two separate load circuits. Each time contact is made by the moving hand above, the cam timer makes a half-revolution, energizing one or the other load circuit, depending on direction of motion of the dial hand. Energizing these cam load circuits starts the train of operations necessary to reverse the firing, shutting down the burners on one end, reversing dampers and starting the burners on the opposite end, together with any other operations which may be necessary for the reversal. This cam unit can be arranged to operate



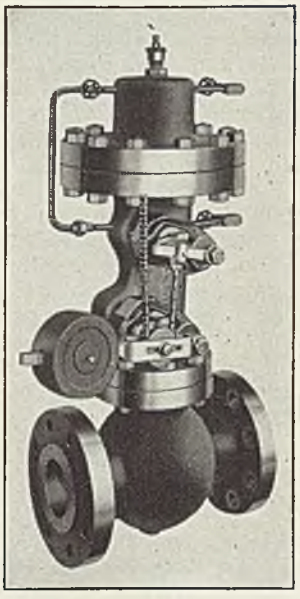
New timer is for furnaces fired at both ends such as soaking pits or open hearths

each valve or damper directly if desired, and for this purpose can be equipped with any required number of load circuits.

♦ ♦ ♦

Boiler Regulator—

Northern Equipment Co., Erie, Pa., has announced a new two-element steam-flow type of boiler feed water regulator known as the Copes Flowmatic regulator. It is designed for accurate feed water control on modern high-rating boilers and on other units subjected to rapid, wide load fluctuations. It feeds the boiler according to the rate of steam flow and provides the water level characteristics that give best operating results on the individual unit, it is claimed. A higher water level can be provided on heavy loads than on light, or a practically constant level can be maintained for all ratings. The regulator has two control elements. The steam flow controller measures the rate of steam flow by taking the pressure drop through the superheater. The water level thermostat, with tension type expansion tube responds instantly to changes in the boiler water level. These two control elements are connected mechanically to the feed water control valve in such a way that the valve is positioned by the resultant of the two forces. The feed control valve may be direct-operated or hydraulically-operated, depending on the service conditions. It may be installed at any position in the boiler feed line. It can be equipped with a motor operator permitting repositioning of the valve by pushbutton from the operating panel. The Copes Flowmatic regulator is furnished in all pressure standards from the 250-pound upward. Valves are furnished in 2 to 6-inch sizes inclusive.



Copes Flowmatic regulator is designed for accurate feed water control on modern, high-rating boilers

♦ ♦ ♦

Tapping Machine—

Procunier Safety Chuck Co., 14 South Clinton street, Chicago, has announced a new tapping machine to tap a wide range of materials and sizes. The new unit has five operating speeds from 385 to 2240 revolutions per minute. Two interchangeable tapping heads afford a capacity from No. 8 tap to ⅝-inch inclusive. An arrangement of long helical springs, adjustable over a wide range, maintains preset tapping and reversing pressures independent of the operator and is claimed to facilitate precision tapping at high speeds with maximum protection for taps and work. Automatic continuous lubrication of the tap only while tapping is provided. Through convenient timing and volume adjustments, lubrication can be set to give correct volumes as well as automatically start the flow as desired. Additional chuck spindles are available for external threading. Additional features of the

Procunier Universal include precision hand screw height adjustment for working table, precision depth stop adjustment, and offset foot

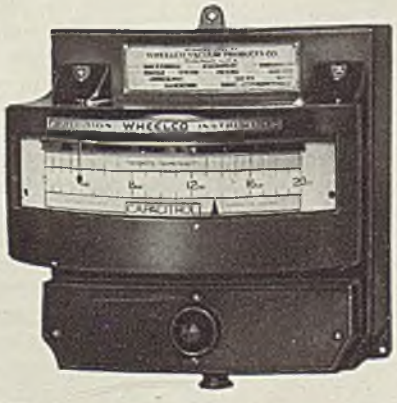
Procunier Universal tapping machine handles a wide range of materials and sizes

pedal which permits operator to sit directly facing work table without endangering knee.

♦ ♦ ♦

Proportioning Control—

Wheelco Instruments Co., 1933 South Halsted street, Chicago, has announced the Wheelco Proportioning Control, consisting of an electrical device mounted integral with an indicating pyrometer. It is designed to control fuel-fired or electric heating units where continuously variable fuel input is required to maintain constant temperature and eliminate all over or undershooting. The control operates in conjunction with simple valving or contacting equipment. Effect of continuous input variation is achieved by varying the ratio of on time to off time in a time cycle of predetermined length. Length of cycle has been chosen sufficiently small so change in temperature during one time cycle is practically negligible. Fuel input obtains its control and varies as a function of the temperature — input decreases as temperature approaches the desired point. At this point the control automatically functions to proportion the on time to the off time to maintain this desired temperature.



Wheelco Proportioning Control governs variable fuel input on furnaces where constant temperature is required

♦ ♦ ♦

Surface Planer—

Oliver Machinery Co., Grand Rapids, Mich., has announced the No. 261 single surface planer built in 30-inch size. It planes 30 inches wide and up to 8 inches thick, with four rates of feed—20, 30, 40 and 60 feet per minute, although faster or slower speeds can be furnished. Base is a one piece casting with three point floor bearing to assure permanent and accurate alignment of all parts. One piece construction of upper housings eliminates bolted girders and totally enclosed feed mechanism is said to provide maximum safety. Worm gear drive for feed rolls is totally enclosed and running in oil. Complete control, both mechanical and electrical, is from a convenient central location,

and easy accessability is provided to adjustment of all rolls and chip-breaker. A hand brake is provided for quickly stopping the cylinder.

♦ ♦ ♦

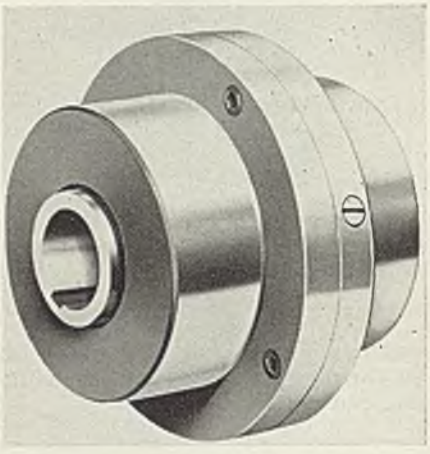
Tool Retainer—

Wodack Electric Tool Corp., 4627 West Huron street, Chicago, has developed a new type of tool retainer made entirely of molded rubber. The retainer fits over the nose of the hammer and holds the cutting tool in place with the right amount of play for rapid drilling or cutting, it is claimed. It also serves as a dust cap to keep grit out of the hammer socket during overhead drilling. The device is standard equipment on Wodack electric hammers.

♦ ♦ ♦

Flexible Coupling—

T. L. Smith Co., 2803 North 32nd street, Milwaukee, has introduced the Rybeck flexible coupling of full-floating, semi-universal joint design. This coupling is claimed to take care of shaft misalignment, offset between shafts, end play and shock without increasing bearing loads, even when all four conditions are present to an excessive degree. Torsional load is transmitted through groups of laminated springs made of heat treated Swedish spring steel. Springs are not subject to wear from endwise motion of the shafts nor from angular or offset misalignment since they are confined in a housing that eliminates any motion except deflection. Special alloy steel driving pins, heat treated, are pressed into steel hubs and fit into holes drilled into the torque sleeves. Sleeves are held in alignment by the housing which is securely bolted together and which also holds the springs in position between the jaws on the torque sleeves.



Smith flexible coupling is of full-floating, semi-universal joint design

♦ ♦ ♦

Hand Operated Bender—

Wallace Supplies Mfg. Co., 1310 Diversey parkway, Chicago, has designed the No. 11 hand-operated bender for bending smaller sizes of wire and round, square, and flat steel bars as well as all other ductile metals. Main frame is of chrome-nickel iron, and banding and pressure dies of hardened tool steel. Rigid construction is said to provide ample support under maximum loads and to assure smooth bending operation with uniform pressure and production of accurate bends. The machine can be operated either right or left and permits of a great variety of bends. Convenient gages for both right and left hand bending, and for adjustable stop screw to regulate the degree or angle of bend, are provided. Standard tools will produce sharp bends up to 90 degrees. Bending blocks are available for material from 1/16 to ½-inch with increments of 1/16-inch. Offset bends can be made with a minimum distance of ½-inch and shape bends with a minimum of ¾-inch between bends.

RECENT PUBLICATIONS OF MANUFACTURERS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing STEEL, in care of Readers' Service Department, 1213 West Third Street, Cleveland

Hack Saw Blades—Clemson Bros. Inc., Middletown, N. Y., is distributing catalog No. 51 covering its complete line of Star hack saw blades.

Welding — Harnischfeger Corp., 4400 W. National avenue, Milwaukee, has released a new folder describing the characteristics of a modern arc welder.

Motor Pinion Drives—Boston Gear Works Inc., North Quincy, Mass., has issued folder D-1 listing twenty-five new sizes of Boston non-metallic motor pinion drives.

Welding Electrodes — Champion Rivet Co., Harvard avenue and 108th street, Cleveland, has issued a new 56-page catalog describing its complete line of welding electrodes.

Pickling Equipment—Bronze Die Casting Co., Franklin street at Ohio river, Pittsburgh, has issued a circular on B.D. drain outlets and steam jets for modernization of pickling tanks.

Water Gages — Yarnall-Waring Co., Chestnut Hill, Philadelphia, has published a revised edition of its bulletin WG-1805 covering the Yarway line of water columns and water gages for boilers.

Trucks—Lansing Co., Lansing, Mich., has published a new 100-page calalog 8 x 11 inches, giving complete specifications and data on its line of two and four-wheel trucks, trailers, scrapers, wheelbarrows and hand carts.

Water Heaters — American District Steam Co., North Tonawanda, N. Y., is distributing revised, six-page, illustrated bulletin No. 35-76 on its water heaters for industrial and institutional installations, including type E and type F heaters.

Pyrometers — Brown Instrument Co., Philadelphia, has published catalog No. 1102 covering the complete line of Brown potentiometer pyrometers—indicating, recording and controlling—and including records clearly illustrated by chart section reproduced in actual size.

Heating Method — Airtherm Mfg. Co., 1474 S. Vandeventer, St. Louis, Mo., has issued a new bulletin on the "Airblanket" heating method which describes a novel manner of preventing accumulation of high temperatures under the roof of factories heated with unit heaters.

Bearings — Morain Products division, General Motors Corp., Dayton, O., has published a 39-page, deluxe handbook on Durex bearings. Added feature includes a stereoscopic micrograph which, when viewed through a macyscope supplied with the handbook, gives an authentic magnified representation of the structure of Durex metal.

MATERIALS HANDLING

(*Concluded from Page 82*)

the outbound side of the building and is loaded by one of two cranes onto a freight car.

Protection of the contents of the case is of paramount importance. For instance, consider this typical operation. Rear axles are received in assembled form and are disassembled. Twenty-four of them, with their complement of accessories, are packed in a case 94 by 69 by 39 inches, with total cubic contents of 146.5 cubic feet. The cleats are 15/16-inch. First a 60-pound kraft liner is used. Then a fibreen liner follows. On top of the contents is wrapped a double sheet of fibreen paper, then a sheet of 60-pound kraft. After the cover has been nailed on, it is given a coating of cold asphalt and then a sheet of fibreen paper is placed over it. A coating of tar is applied all the way around the top edge of the case and to this the overlapping edge of the paper adheres.

Materials are received in carload lots. Their movement through the packing operations is so rapid that in many instances not more than two or three days inventory of a given item is maintained. Schedules are laid out so that production is rarely held up for want of material. The rapidity with which material moves through the plant may be illustrated by a day's work on the motor line. To provide motors for a day's schedule of 500 cars, approximately six carloads of motors are required. They are lifted out of the freight cars by electric hoist and taken immediately on special 3-wheel floor trucks and placed on a stripping conveyor, another electric hoist with push-button control being used for this purpose. On the stripping conveyor, they are prepared for shipment, and again an electric hoist comes into use for dropping the motors into the cases, which proceed down a power conveyor line. So rapid is the flow that sometimes the first motors out of a freight car are stripped, picked up, packed and loaded before the last car is even opened.

One of the many interesting sights that greets a visitor to the plant is the big sample boards suspended from walls and storage racks at all packing stations. On each board is hung a sample of every part which goes into a complete assortment at that particular station. This makes it simple for inspectors to make a physical check of material.

To avoid errors of count or identity, the inspection department has devised its ingenious system of jigs and fixtures to make the layouts. These are shaped to make it impossible to put in more than the proper number of parts, or to put in wrong parts. Trays are marked off into squares for laying out very small parts. These facilitate counting and also detection of errors. When fixtures are not provided, a standard layout is made which permits the inspector to visualize the correct units and to avoid any errors.

In addition to mechanical aids, a recheck group works at random to check the accuracy of inspectors by following through frequently.

In advance of the actual insertion into cases, motors are placed on a special conveyor line which carries them past a special automatic oiling device, which shoots a quantity of oil into each of the cylinders to insure against rust during the journey overseas. Motors, and other parts, too, are so securely blocked that they will ride with maximum safety whether right side up or otherwise. Seventy-five per cent of the blocking is prepared from salvaged lumber in which materials are received.

Helping the metals industry steer its course

1918
1937
A S M

With the opening of NATIONAL METAL CONGRESS in Atlantic City next Monday, the AMERICAN SOCIETY *for* METALS enters on its twentieth year of service to the association's membership and the entire metals industry.

A voluntary not-for-profit group such as AMERICAN SOCIETY *for* METALS cannot continue in existence for nineteen years unless, at all times, it gives liberally to its members in exchange for the time, energy and money they give it. The fact that "A. S. M." today enjoys the largest membership in its history is adequate testimony to the increasing service it is rendering each successive year.

AMERICAN SOCIETY FOR METALS

A DIGEST OF A. S. M. ACTIVITIES

ACTIVE CHAPTERS in 50 industrial centers meet at regular intervals to hear selected speakers discuss technical subjects, hold round table meetings or make plant inspection trips. Many Chapters sponsor comprehensive courses in metallurgy.

The association publishes and distributes to members—METAL PROGRESS, a monthly technical magazine; TRANSACTIONS, a scientific quarterly; METALS HANDBOOK, a biennial data book; THE REVIEW, a tabloid monthly newspaper; and PREPRINTS of Convention papers.

The association produces, in connection with National Metal Congress, NATIONAL METAL EXPOSITION, the greatest annual event in the metal industry.

Other functions include educational work, book and library services and employment service.

●

Certain of the 50 active chapters have a few vacancies available to men actively engaged in the metals industry. A letter on company letterhead, stating the nature of your work, will bring you complete information as to the benefits of membership. *Address American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio.*

FINE STAINLESS

—*plus* the Armco Mark of popular national acceptance

When you buy Armco Stainless you are assured a definite plus-value: the confidence that reposes in a well-known and trusted name. For twenty-three years this name has been advertised to a critical public.

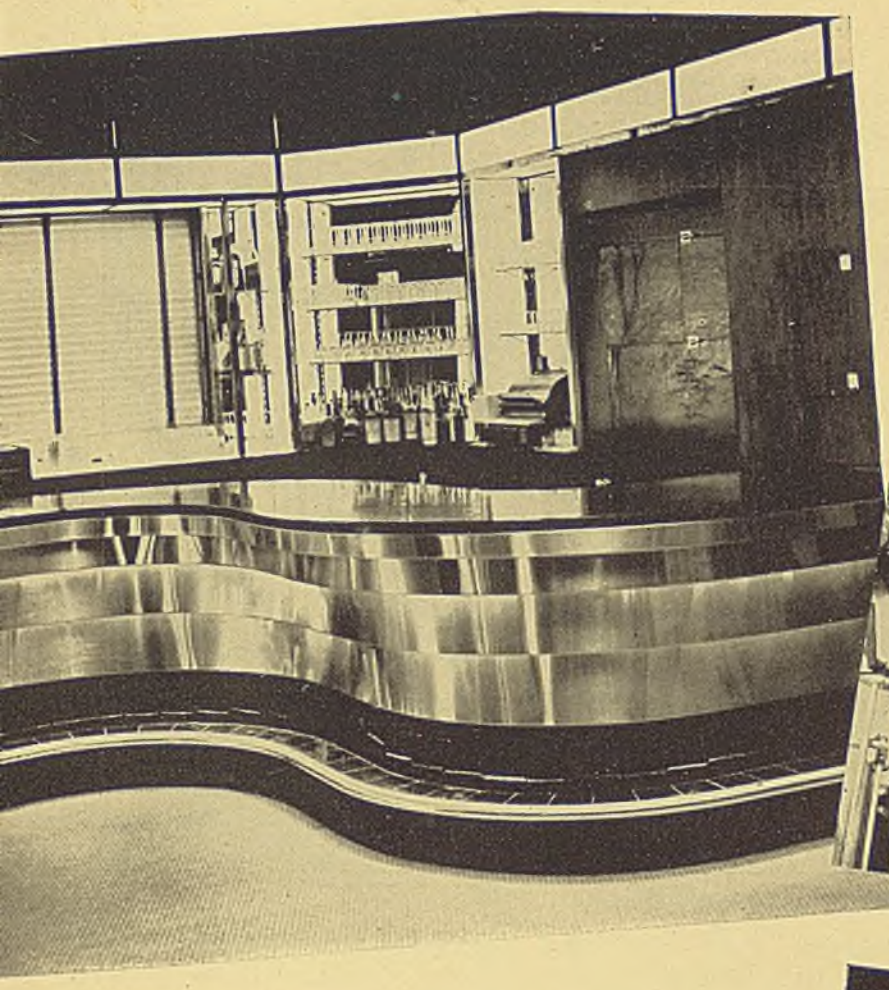
You will get stainless steel sheets, strip or plates that will do whatever you want them to do; but beyond this is the precious ingredient of popular national acceptance.

Not only does this apply to consumer products sold largely for style-and-appearance reasons, but equally as well does it apply to utilitarian industrial equipment. The familiar Armco trademark is just as valuable to you on a furnace conveyor as it would be on stainless hollow ware. The plant engineer and the purchasing agent know it and believe in it, even as does the housewife.

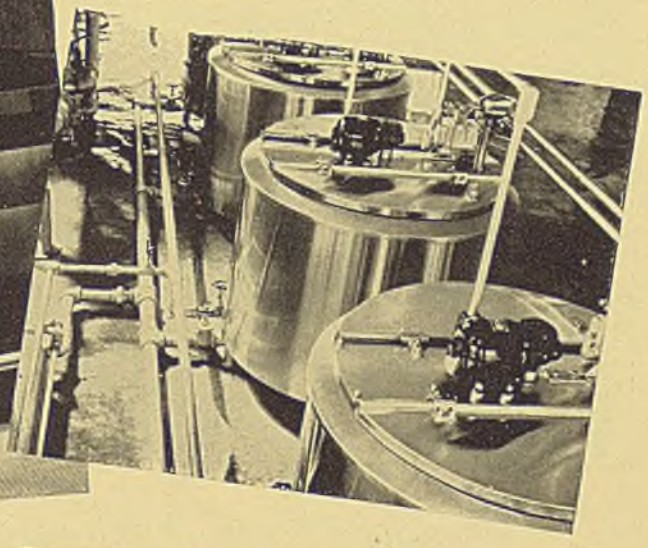
Armco makes a grade of flat-rolled stainless for every conceivable need, from fine stainless of jeweler's quality to the largest sheets and light plates for industrial tanks. The requirement may be eye-arresting beauty, it may be heat and corrosion resistance or any condition in between. You can obtain the right grade for the right purpose from Armco.

We have accumulated a great deal of application-data on stainless that we shall be glad to share with you. Just write and explain your needs. The American Rolling Mill Co., 2340 Curtis St., Middletown, O.

ARMCO



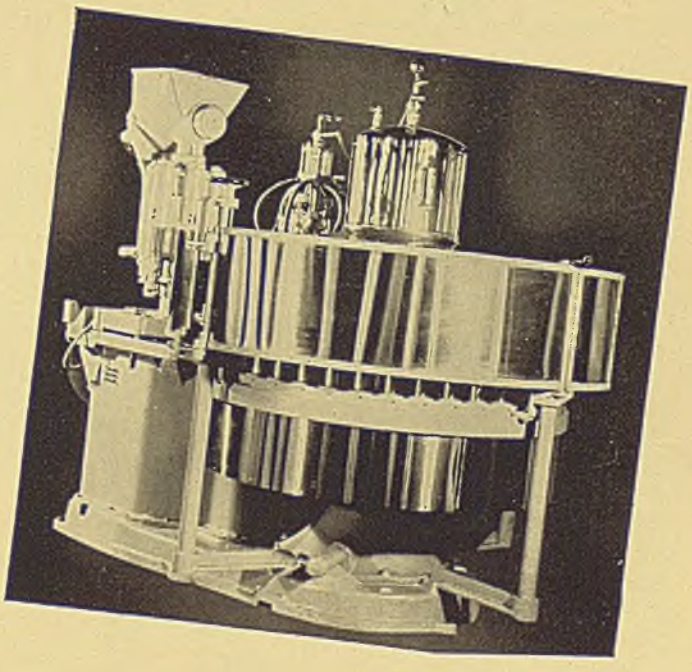
This battery of milk pasteurizers made of Armco Stainless Steel are gleaming guardians of public health.



Above: This streamlined bar was made from Armco 18-8 Stainless of high-luster polish. Note the evidence of fine finish and beautiful design.

Left: Many parts in milk-bottling machines can better be made of Armco Stainless for sanitation, ease of cleaning and attractive appearance.

Right: In the soft-drink industry Armco Stainless Steel is deservedly popular as this large bottling and crowning machine clearly indicates.



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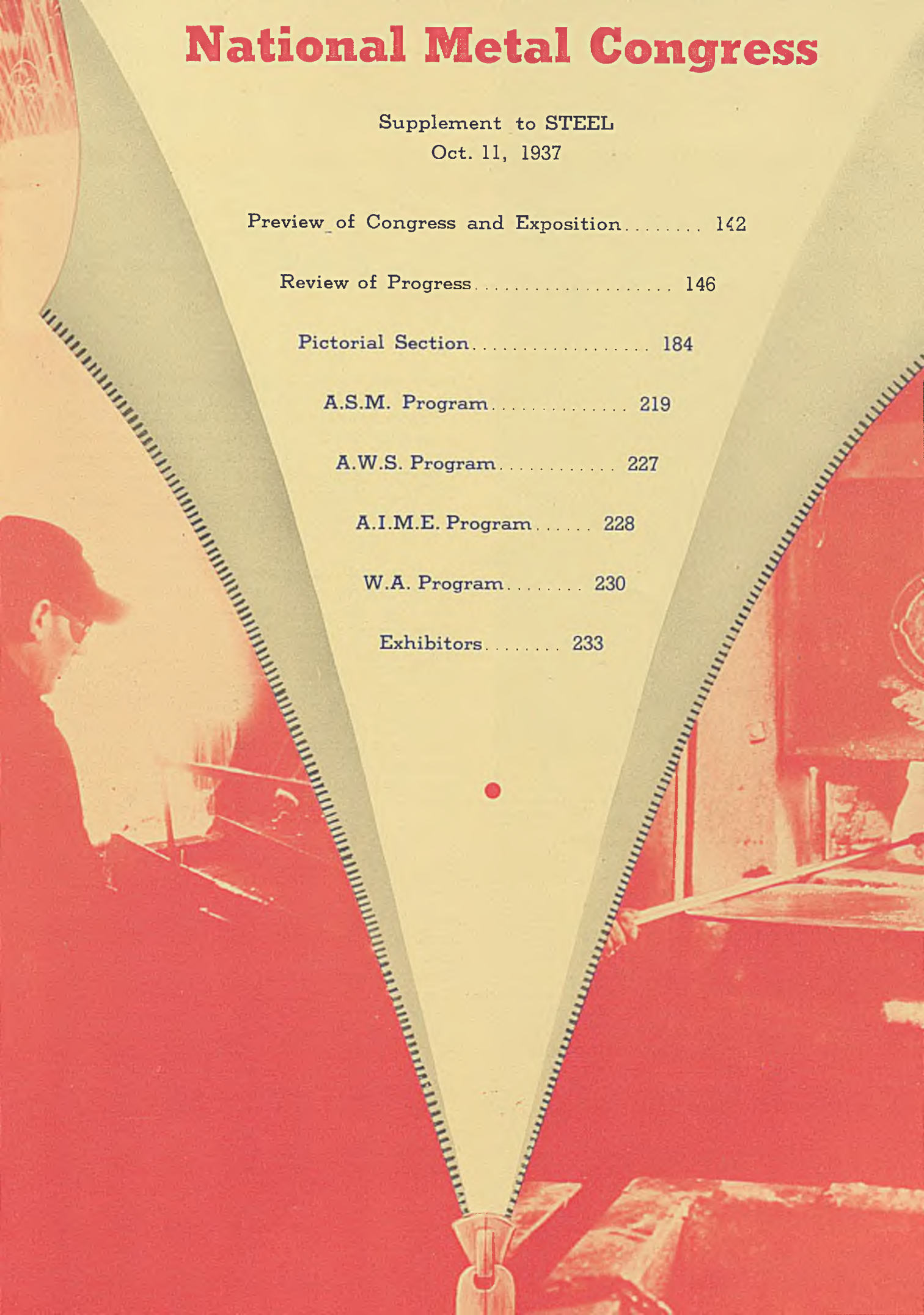
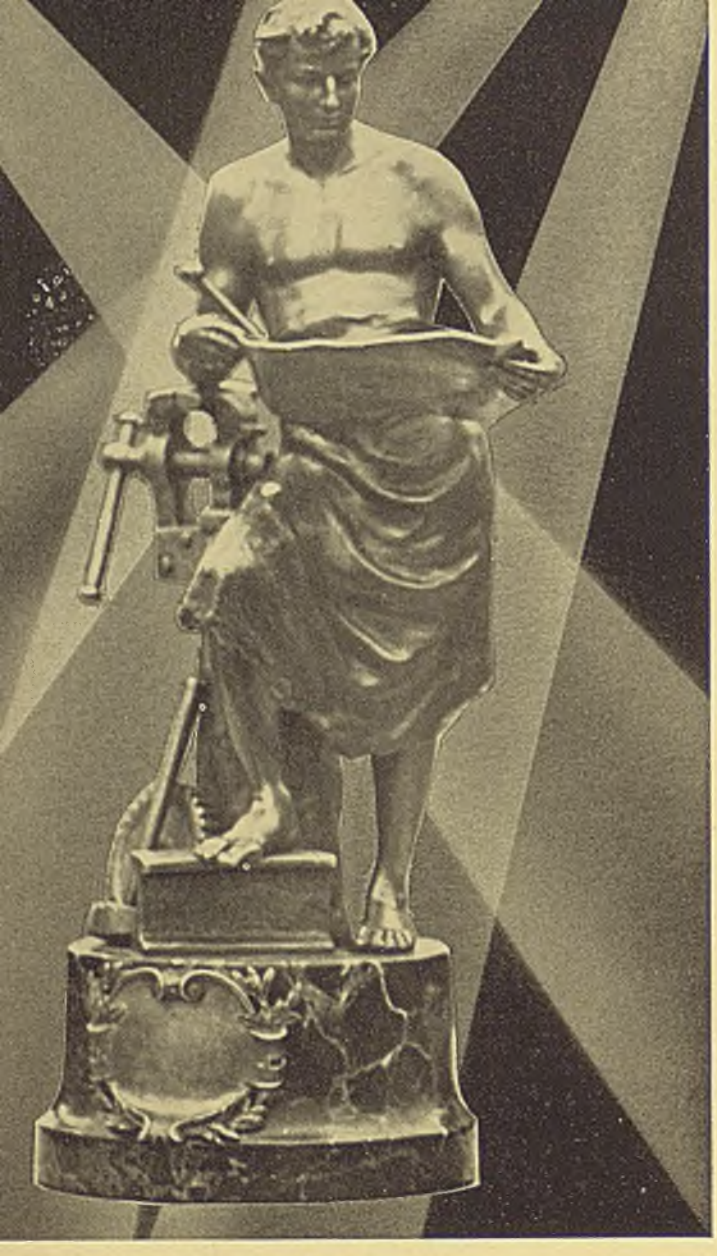
ARMCO STAINLESS STEELS

National Metal Congress

Supplement to STEEL
Oct. 11, 1937





Symbolic of industries represented in the American Society for Metals, this 12-inch bronze statuette of "The Metal Man" reposes in the society's national office. A 10-foot replica, specially illuminated, will occupy a prominent position in the "Metal Center" of the Nineteenth National Metal exposition

Preview National

ACTIVITY at or near capacity in all branches of the iron and steel, metals and metalworking industry throughout much of the past year has set the stage for the Nineteenth Annual National Metal congress and exposition in Atlantic City, N. J., Oct. 18-22. With this industry having regained the ground which was lost through several years of adversity, it now is in a position to contemplate recent developments in materials, processes and equipment squarely from the point of view of production maintenance instead of production restoration.

Atlantic City assumes the role of host to the several thousand executives, metallurgists, engineers and technicians for the first time; the congress and show previously always having been held in an eastern or midwestern city closely associated with the production or use of iron, steel and nonferrous metals. Possessing excellent convention facilities, the resort city for 1937 should be a happy choice.

Principal sponsoring group for the week's activities is the American Society for Metals, originator of the congress idea. Participating also are the American Welding society, American Institute of Mining and Metallurgical Engineers, the Wire association, and American Society of Mechanical Engineers.

THE exposition, to occupy the main chamber, lobby and stage of the Auditorium, said to be the largest convention hall in the world, will be the third largest in the series of 19 shows. Exhibitors will number approximately 230, slightly more than the 220 in Cleveland last year, but individual allotments of floor space are about 9 per cent larger. Exhibit space will aggregate over 80,000 square feet.

Headquarters of the American Society for Metals will be at the Ambassador hotel and here all morning sessions will be conducted. Afternoon sessions will be at the Auditorium to give easy access to the exposition. A total of 43 papers will be presented at 14 sessions. A feature of the program will be a four-session symposium on carburizing. Following the custom of the past two years, two educational lecture courses are scheduled.

Officers of the society will submit their reports and new officers will be elected at the annual business meeting on Wednesday morning. At the adjournment of this session, W. P. Sykes, Cleveland Wire Works, General Electric Co., will deliver the annual Campbell memorial lecture on iron-cobalt-tungsten alloys. The annual banquet is Thursday evening.

American Welding society will hold its eighteenth annual meeting at Hotel Traymore, activities extending through five days. Thirty papers will be presented at eight technical sessions, simultaneous sessions being arranged for Tuesday afternoon.

The welding convention will open with the annual business meeting on Monday morning. Officers will make reports, new officers will be elected, and awards of the Samuel Wylie Miller and Lincoln medals will be announced. Annual dinner of the society will be served on Thursday evening.

Participation of the American Society of Mechanical

OF NINETEENTH

Metal Congress and Show

Engineers in the Metal congress will consist of a session which the society's Machine Shop Practice division has arranged jointly with the American Welding society. This session to be held Tuesday afternoon, provides three papers.

Fall meetings of the Iron and Steel and Institute of Metals divisions comprise the program arranged by the American Institute of Mining and Metallurgical Engineers. Headquarters will be at the Ritz-Carlton hotel where five technical sessions will be held. Sixteen papers are to be presented. In addition to this, the institute is to hold a roundtable on physics of metals at the Auditorium Monday evening.

Of the five technical sessions, one is sponsored by the Institute of Metals, one by the Iron and Steel division, and two will be held jointly. The fifth has been arranged by the Open-Hearth committee of the iron and steel group. The two divisions will join in the annual dinner on Wednesday evening.

The Wire association will hold its annual convention at the Ambassador hotel, Monday through Thursday. Its program provides for eight technical sessions with 15 papers. The ferrous and nonferrous divisions will conduct simultaneous sessions Wednesday morning and afternoon.

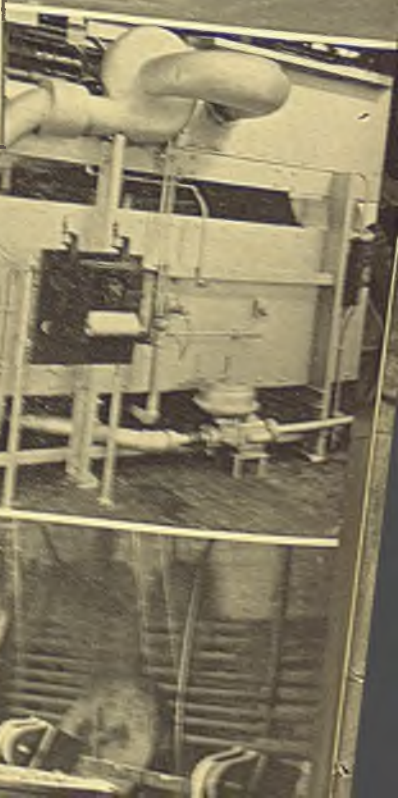
Late Wednesday afternoon has been set aside for the annual meeting of the association. At this time, officers will make their report and the Wire association medal award will be announced. The annual dinner will be served that evening.

NEW developments in the iron and steel and metalworking industries have been numerous during the past year, despite the fact that major attention has been devoted to meeting congested production schedules. Many of these developments were conceived in research during the depression and for economic reasons were held back until normal activity could afford a fair trial and passing of judgment. Today, numerous of these innovations are commercial.

Because these developments and improvements in metals, processes, and equipment are having and will continue to have a profound influence on the manufacture and utilization of metals in the period ahead, STEEL devotes a number of succeeding pages to a comprehensive review of the past year. Introducing this section are statements of progress contributed by 33 authorities in the fields of metals, heat treating, welding and wiremaking. Following this is a series of pages showing pictorially a few of the recent developments in metal production, fabrication and use.

Atlantic City's $15,000,000 Auditorium fronting on the Boardwalk is the large structure shown in the foreground. In this building, the National Metal exposition will be held. This intriguing skyview was flown and photographed by H. H. Harris, president, General Alloys Co., Boston

...inevitably



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Today's Metals Are Meeting

Authorities in Metal Producing, Processing and Fabricating Industries Appraise the Progress Made in the Past Year

New Developments Utilized With Diminished Time Lag

BY E. C. BAIN

Assistant to Vice President, United States Steel Corp., New York, and President, American Society for Metals

A SURVEY of trends in the metal industry could be made more easily after the National Metal congress and exposition for many new developments come to light at this annual event. However, one may consider in what directions progress seemingly is taking us. With considerable aid of the editorial office of the American Society for Metals, some observations are presented.

Beginning with the material of greatest tonnage—low carbon steel—recent construction of modern continuous sheet mills has resulted in an improved quality of goods. Copper, a second staple metal, with its numerous alloys has enjoyed an advance in application. New applications are well met with such alloys as the silicon bronzes.

The third staple metal, aluminum, continues to be vigorously and successfully promoted. Magnesium is being utilized increasingly for parts wherein weight, above all, is the criterion. Die castings are increasingly popular for household equipment and many necessarily portable machines. Aluminum, and secondarily, magnesium, maintain a dominant position in aircraft. As airplanes are built larger, steel becomes increasingly competitive and in many cases corrosion may become a more important factor.

Not only is the old art of hardening steel now better understood and simplified, but "hardening" is almost universally applicable to all metals. Hardening of copper, aluminum, monel, magnesium and even lead, now is commonplace and responsible for considerable new industrial consumption.

Grain size control is now applied to large tonnages of low carbon, medium and high carbon steels as well as to low alloy steels with immeasurable benefit. Carbon steels or lower alloy steels, thus controlled, sometimes replace more expensive steels and meet more exacting requirements. The common alloying elements are now more fully utilized up to known, rather than supposed, limits.

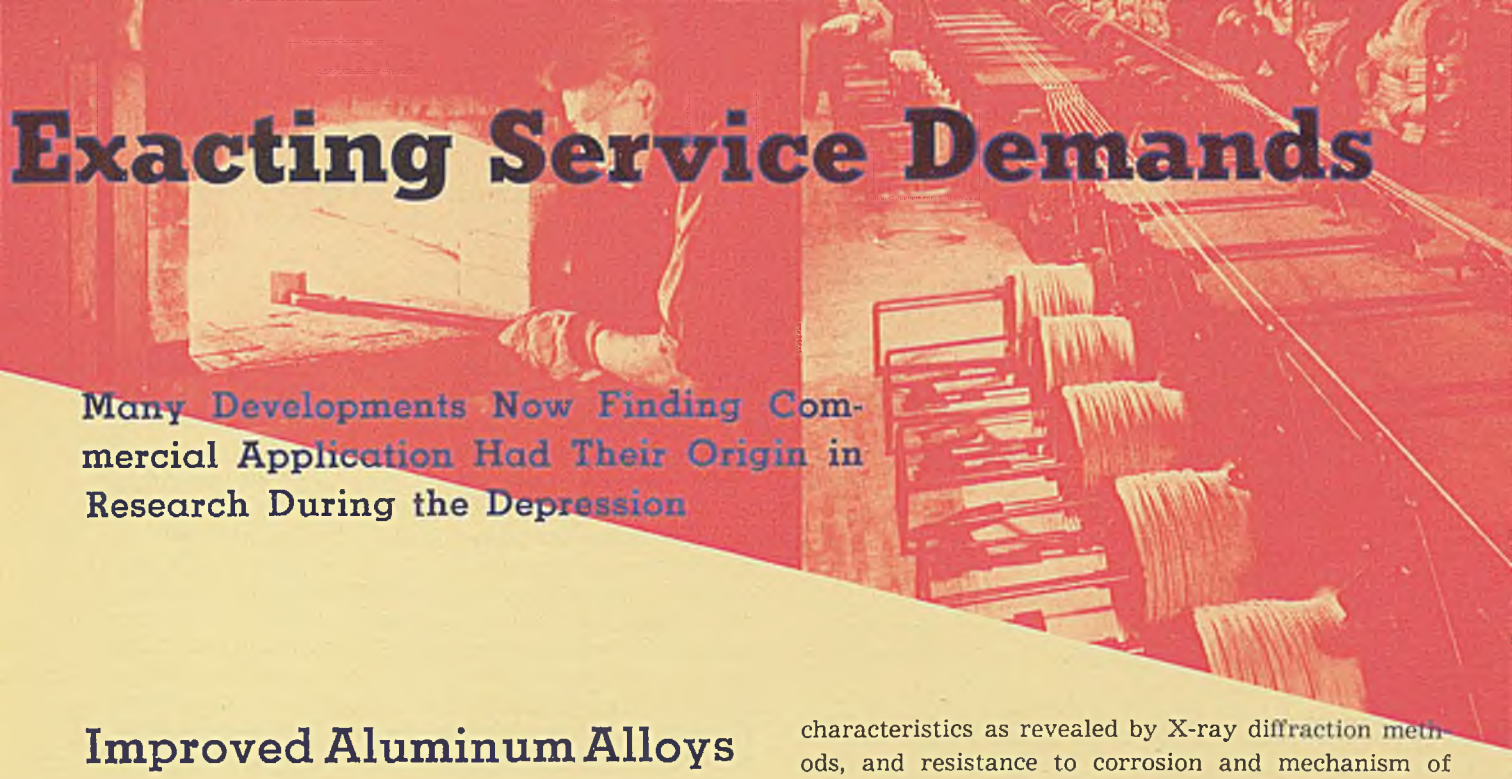
Satisfactory high speed cutting tools have been developed in which much of the tungsten is displaced by molybdenum. From the standpoint of wartime shortages, this might prove of first magnitude importance, since domestic sources of molybdenum are almost unlimited. This element, is being utilized in large total amounts as a relatively small addition to carbon steel. Somewhat higher proportions are utilized with or without other elements in steels for elevated temperature service because of the high creep resistance imparted.

Available capacity for production of stainless steel has been occupied, not so much with new steels, as with meeting the expanding demand for familiar alloys. Reliance is justified in the stabilized alloys and in other modifications.

A significant trend is widening use of special atmospheres in furnaces, in which low carbon steel and copper remain substantially unaffected, thus eliminating much subsequent surface cleaning. The problem of hardening steel with neither a decarburized nor a scaled surface is difficult, but praise-worthy approximate solutions have been developed. Intentional deep carburization by a gaseous atmosphere is now a familiar commercial practice.

The broad trend in metals, one might say, is utilization of technical developments with a diminished time lag, and the general commercial fulfillment of the promise in previous scientific advances.

Exacting Service Demands



Many Developments Now Finding Commercial Application Had Their Origin in Research During the Depression

Improved Aluminum Alloys Speeding Up Fabrication

BY E. H. DIX Jr.
Chief Metallurgist, Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.

THE past year may be characterized as a trial period for the many new alloys and applications developed during the period of industrial slackness. Abnormal demand and anxiety for forward coverage put these new developments in a critical position because of the stress of high production.

Of the aluminum alloys successfully meeting this crucial test may be mentioned especially the free-cutting alloy, 11S, which greatly speeded up automatic screw machine operations; and the intermediate-strength wrought alloy, 53S, which has found many new applications because of its high-resistance to corrosion and easy formability.

To single out individual processes or products which have been particularly successful during the year is difficult because sheet, rod, bar, forgings, pressings and castings of all kinds have been in heavy demand. Use of the "Alumilite" process for producing a surface of pleasing appearance, with high resistance to abrasion and corrosion, has become increasingly popular. Aluminum alloys for stressed and unstressed members of airplanes, railroad cars, trucks and busses have maintained and improved a position established through past performance. Aluminum automotive and aircraft pistons and other aircraft engine parts continue to be preferred.

In the more scientific fields, increased interest in the age-hardening phenomenon, internal structural characteristics as revealed by X-ray diffraction methods, and resistance to corrosion and mechanism of corrosion have held the spotlight.

Metallurgical trend points toward greater attention to control of alloy and fabricating procedure with increasing use of the newer scientific tools, such as X-ray diffraction methods as an adjunct to microscopic examination for control of structure and the spectograph for closer control of composition.

In respect to alloys, refinements are to be expected rather than radically new compositions. Ease of handling and fabrication to meet higher production schedules probably will be demanded rather than higher mechanical properties. Alloys with special properties to meet specific new uses probably will be developed also.

■

Special Nonferrous Alloys Developing Scientifically

BY C. J. ZAISER
President, Ampco Metal Inc., Milwaukee

OF MARKED importance is the activity in the nonferrous industry, which, for many years comparatively dormant, has suddenly awakened to possibilities of alloy constituents. New special purpose alloys, for example, hold many possibilities for longer service life, greater economy, and engineering redesign.

Because of accurate control and better facilities required for special alloy production, the days of mixing nonferrous alloys by rule of thumb and by hit-and-miss methods are passing rapidly. Old mixtures handed down through generations are being anti-

quated by scientifically prepared alloys. Recent years have shown a decided turn toward scientific control in progressive nonferrous foundries. We are alloying intelligently with a purpose, not hoping that estimated proportions of several metals may give the desired physical properties.

Problems to be solved embrace choice of materials, composition, atmospherically controlled melting, scientific casting both by the sand and centrifugal casting process, sand control, forging, fabricating, heat treating; all with the purpose of developing a better metal product.

Of equal importance with scientific control of production is the co-operation existing in the metallurgical industry as evidenced by the volumes of technical literature and scientific data which are so freely published in technical and trade journals. These technical articles along with the transactions of our various technical societies are indispensable. Without this published information much work would be unnecessarily duplicated.

We are now pouring heat treatable aluminum bronzes, which are alloyed from virgin metal; beryllium copper, and high conductivity alloys covered by the Corson patents, as well as the two metals known as Trodaloy No. 1 and Trodaloy No. 7 which were recently developed and pioneered by the General Electric Co. We are working satisfactorily toward the development of a superior high lead bearing bronze.

■

Developments Numerous In Copper and Its Alloys

BY H. P. CROFT
Chief Metallurgist, Chase Brass & Copper Co., Cleveland

MANY developments in copper and its alloys now becoming commercial were worked out on a laboratory scale during the depression. Bright annealing of copper, previously confined to deoxidized copper tubing, has been extended to electrolytic or oxide-bearing tubing, sheet and strip. Formerly this was avoided due to danger of hydrogen embrittlement when annealing in a reducing atmosphere, but with proper balance between atmosphere, temperature and time, it has been found possible to effect this operation commercially. In the past, furnaces handled copper sheet and strip only in flat form, but now these products are being successfully bright annealed in coils up to 250 pounds.

Proper atmosphere may be obtained either by use of an extraneous reducing gas or by regulating the products of combustion into the heating burners to produce the desirable reducing condition. Some brasses, particularly those rich in copper, now are being bright annealed.

Water-cooled copper-lined molds for castings are becoming general in use, advantages being a longer mold life and the sounder metal produced. Several methods for producing semifinished or finished copper alloys direct from the melt are in use, the continuous production of strip or sheet from the molten bath having been in the development stage several years. The process for continuous casting of rod and bar shapes from melt by withdrawal through a die or forming chamber should be commercial soon.

Welding of copper alloys and use of copper alloys for welding equipment is making steady progress. Addition to the brasses of certain third metals, such as manganese, increase resistivity and accordingly greatly facilitate welding.

Employment of various precipitation hardening copper alloys for welding contacts has made rapid strides. These contacts include tips for spot welding and rollers for seam welding. In the past copper was used for this purpose but was not resistant to deformaton at the high temperatures at which these parts operate. By use of chromium, cadmium, zirconium and other elements, alloys have been developed which harden either by formation of solid solutions or by a precipitation from such solutions. These embody not only high thermal and electrical conductivity but also resistance to deformation and oxidation at elevated temperatures.

In fabrication of copper alloys, cost of saws always has been an expensive item. Saw life has been increased considerably, both breakage and wear being reduced by application of chromium plate. Such a plating operation reveals internal stresses which, if not detected, might lead to premature failure.

New uses for copper and its alloys which have been developed in the past year include steel-tipped tubular ground rods, rod and tubular automobile antennae and "through-the-wall" copper flashings for protection against termites.

The tendency is toward use of copper-rich brasses and bronzes due to their increased resistance to corrosion, higher physical and special properties and development of technique for their fabrication.

■

Die Cast Zinc Alloys Gain In Functional Applications

BY H. W. SMITH Jr.
Market Development Division, New Jersey Zinc Co., New York

PROGRESS in die casting the past year has been marked, not so much by new metals, new casting methods or new users as by a more extensive exploitation of virtues of die castings by old users. New zinc alloy die castings of 1937 disclosed two dominant trends in the application of metal and methods of fabrication to manufactured products.

First, an increasing acceptance of zinc alloy die castings is indicated for load-carrying, functional and operating elements. Use of die castings for static, ornamental, and housing parts also is growing, but not

so rapidly as the newer use where wear, shock, stress and vibration must be sustained.

Second, is a trend toward designing many types of products principally in zinc alloy with corollary parts of other materials, rather than principally in other materials with an occasional zinc alloy casting. Many new designs of outstandingly intricate products show complete assemblies almost exclusively comprised of zinc alloy die castings.

Latest model Ditto duplicator, for example, weighs 73 pounds, of which 42 pounds is composed of 39 zinc alloy die castings. These 39 range in size from a tiny lever arm, 0.014-pound, to a massive and intricate 9-pound end frame covered on the inside with ribs, bosses, positioning lugs and cored holes.

Another example is the complete line of automobile lubricating devices and automatic grease and oil dispensing units produced by the Gray Co. Its ten key hand tools are assembled from 36 unusual zinc alloy die castings, seven steel-tube grease chambers, and a few incidental springs and screw machine parts. Many of the zinc parts sustain grease pressures up to 10,000 pounds per square inch, and several include pressure cylinders, accurate to 0.0002-inch, in which the ground steel pistons ride.

Store and coin-operated retail machinery, light machine tools, electrical equipment, locks and hardware are other fields in which uses of zinc alloy die castings have increased, and at the same time have been redesigned for almost complete die cast constructions.

Industrial designers, engineers, production men and executives have worked with zinc alloy castings long enough to realize the worthiness of the metal and method of production, and are prepared for broader application of this type of part. It appears the use of zinc alloy die castings has far from attained its full stature.

■

Alloy Steels and Irons Become More Competitive

BY V. A. CROSBY
Metallurgical Engineer, Climax Molybdenum Co., Detroit

AMONG developments in cast iron, substitution of high-strength alloy irons for parts formerly made of plain carbon steel forgings has been outstanding. Savings resulting from a change to the new alloy irons has tended to accelerate this trend during a year in which so much pressure has been exerted in an effort to cut costs. This trend is well established and should continue.

Similarly, high-test alloy irons have found wide application as a substitute for steel castings. Improved strength as compared with unalloyed irons and reduced shrinkage, together with the growing tendency to cast intricate shapes, have been contributing factors.

There has probably been a greater appreciation during 1937 than ever before of the economic value of small alloy additions to cast iron. For example, the greater density of cast iron and comparative freedom from rejects because of leakage has resulted in wide acceptance of alloy castings by the compressor and refrigerator industries. This trend, based as it is on sound economics, will, no doubt, continue to grow, especially in industries where intricate casting shapes and comparatively high pressures are a factor.

Another development has resulted from the improvement in technique for hot quenching alloy cast iron which is said to develop a structure containing more austenite than the usual quench. Excellent wearing properties are attributed to the needle-like type of structure (sometimes referred to as Bainite or acicular pearlite or pseudo-martensite) which is developed by the hot quench.

New developments in alloy steels have probably been somewhat less spectacular. Successful application of chromium-molybdenum carburizing steels would probably rank close to the top of a list of outstanding alloy steel developments in 1937.

Another advance worthy of comment has been the increased use of the SAE 4100 steels, so-called, of the oil and water-hardening types. This development seems to rest on a sound basis although the present trend has probably been accelerated during 1937 by a favorable price differential.

A trend in steel, which usually characterizes periods of good business, is again prominent. That is to say, the tendency to use plain carbon or low alloy steels rather than the high alloy type has been unmistakably evident during 1937, especially in the motor industry. This trend is part of a recurring cycle and will probably continue until demands for light-weight motor cars and lower operating costs become persistent again. Meanwhile, demand for low-weight transportation equipment—both on railroads and highway—is growing. A condition tending to limit the substitution of plain carbon for alloy steels is the fact that the price paid for steel continues, as always, to be a comparatively small part of the cost of most manufactured products.

■

Improve Ferrous Metals by Analysis Control of Alloys

BY W. J. PRIESTLEY
Vice President, Electro Metallurgical Co., New York

UNUSUAL progress has been made the past year in development of new alloys, new metal applications and new manufacturing methods. Use of special ferroalloys and nonferrous scavenging, deoxidizing and alloying additions to control grain size and other physical properties, and analysis control of ferroalloys are important developments.

Many recently developed types of steel, both plain

and alloyed, are being placed on the market, and others are being studied and improved. Semikilled steel with its more uniform chemical composition is replacing open steel for automotive parts requiring deep drawing properties. Recent studies of effect of sulphur in rimming steel may lead to further improvements.

Advances in steels made with low alloy additions include a noteworthy advance in production of 1.5 per cent manganese steel—often containing various combinations of chromium, nickel, vanadium and molybdenum. Another steel, containing 0.30 to 0.35 per cent carbon, 0.90 to 1.10 per cent chromium, and 0.30 to 0.40 per cent molybdenum, gives excellent results in cast gears weighing up to 800 pounds.

Applications of other low-alloy high-tensile steels in light-weight railroad equipment and other mobile assemblies have expanded. Most popular of these are the low-alloy high-tensile steels having improved resistance to corrosion. Tendency to replace rolling mill rolls with rolls of low-carbon, low-alloy steels is noted, giving improved service.

Development of stainless steels is featured by improved production methods, new analysis modifications and new uses. The use of various alloying additions with 18-8 chromium-nickel stainless steels apparently is increasing their popularity. Advantages of columbium, particularly when used in stainless fabricated by welding, are becoming more widely recog-

nized. Higher silicon content is used in columbium-bearing steels intended for oxyacetylene welding.

Another desirable change in 18-8 is raising manganese content above that formerly thought desirable. This improves hot-working properties without adverse effect on resistance to corrosion. Still another modification is molybdenum-bearing 18-8, with or without columbium or titanium. Its popularity has rapidly increased for applications requiring resistance to certain acids.

More foundrymen are adding chromium to 12 per cent manganese steel to improve durability of certain castings. Steels containing from 3 to 30 per cent chromium are gaining in importance. Castings of 3 per cent chromium steel containing approximately 0.50 per cent molybdenum are used increasingly where abrasion and shock resistance are important. Both plain and molybdenum-bearing 4 to 6 per cent chromium steels are being made with columbium to prevent air-hardening and to promote retention of toughness at room and subzero temperatures after a wide variety of heat treatments. Nitrogen in high-chromium steels, added in nitrogen-bearing ferrochrome, helps meet demand for fine-grained, heat-resisting steels.

Emphasis on special alloys probably will result in many special high-tensile cast irons. Iron foundrymen desirous of improving castings are turning to ferrosilicon briquets plus low-silicon pig iron instead of high-silicon pig iron.

A new alloy of chromium, cobalt and tungsten—Haynes Stellite 2400—is offered for use in red hard cutting tools requiring increased transverse strength.

■

Applications of Induction Hardening Are Increasing

BY G. T. WILLIAMS
Metallurgist, Cleveland Tractor Co., Cleveland

THE most interesting recent development in heat treating has been the induction hardening process and the amazing acceptance it is receiving in a still widening variety of applications. Economy and precision of the method make it attractive for many jobs now done by less satisfactory procedures, or not done at all because of previous limitations.

Present activity in the field of liquid heating baths gives promise of further developments and a broader future for these media, aided by the new electric internal heating method.

Atmosphere control for clean hardening is of great interest, especially for gear hardening, for which equipment is available now to carburize to a predetermined light case without soot as the parts are heated. The broad subject of controlled atmospheres is being studied in detail, and in the near future we may have a clear picture which will permit "controlled" to be a fact rather than a hope.

■

Deep-Case Gas Carburizing Constitutes Major Advance

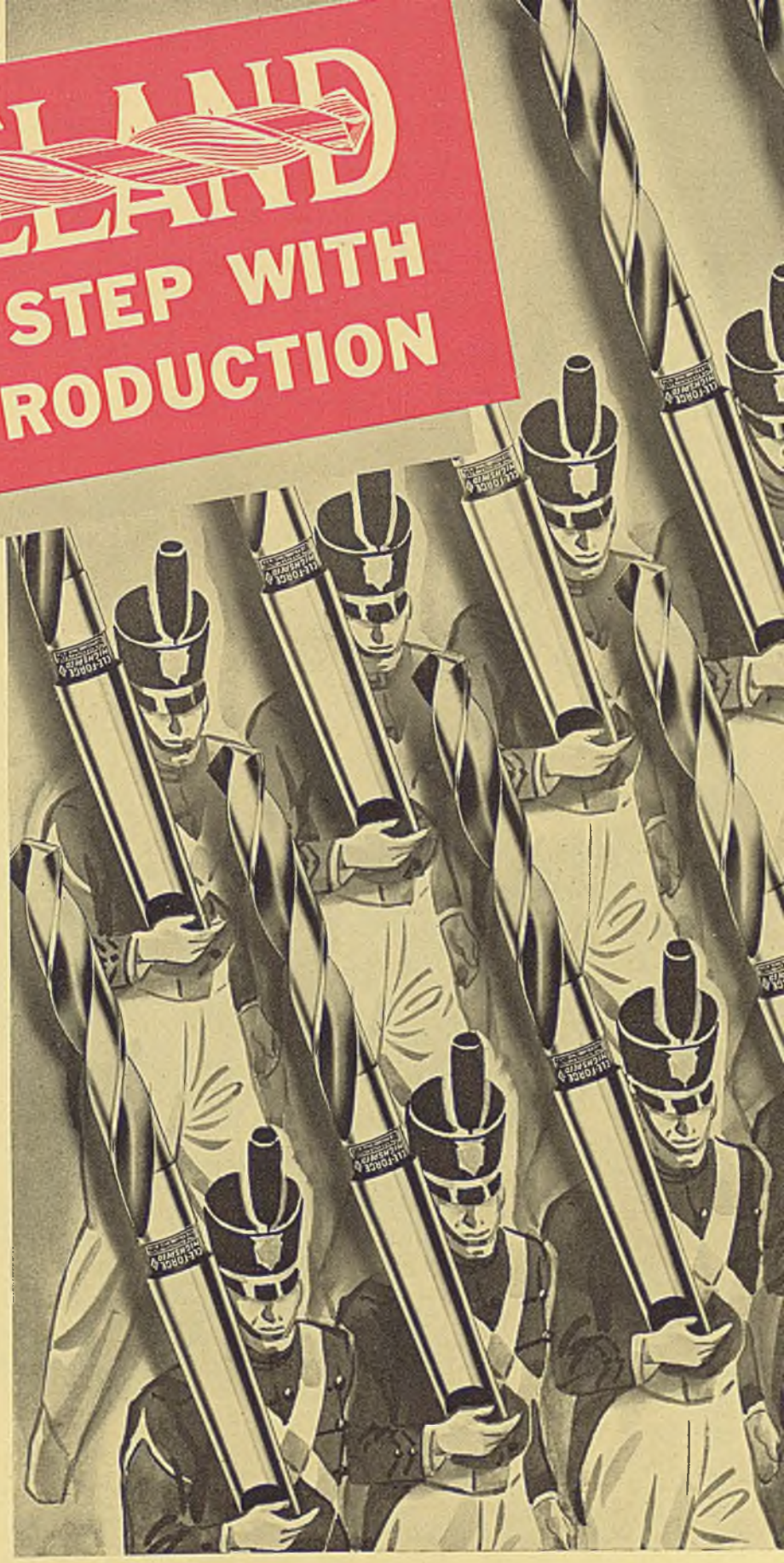
BY W. H. GRAVES
Chief Metallurgist, Packard Motor Car Co., Detroit

INSTALLATION of gas curburizing furnaces for deep case carburizing is a major advance in heat treating. This year, for the first time, deep case carburizing by gas has been applied to automobile transmission gears, rear axle ring gears and pinions.

Before end of the year, Packard expects to be hardening forged steel camshafts by the induction process, a method adopted for crankshafts last year. This is believed to be the first application of this treatment for automobile camshafts.

Viewing heat treating changes in the automobile industry for the next year or two, it is probable the trend will be away from cyaniding and toward gas

CLEVELAND HAS KEPT STEP WITH MODERN PRODUCTION



As a perfectly trained army unit swings past, the first thing on notice is its precision of motion—men, arms, legs, guns. Keeping step and keeping up to the minute in technique is the secret.

So, too, with the rapid progress that has been made during the past few years in the mass production of parts, "Cleveland" Twist Drills and Reamers not only have "kept step" but have necessarily been several steps in advance of industry. What with new metals and new production methods, it *has been necessary* for us not merely to meet your requirements, but to *anticipate* them.

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carburizing. Also, older type hardening furnaces will be replaced by atmosphere controlled hardening furnaces to eliminate scale and, of course, subsequent cleaning operations.

One important problem has been uncovered, or at least made more distinct, since adoption of deep case gas carburizing; namely, weakness of welds on 35 per cent nickel, 15 per cent chrome and other heat-resisting alloys. This problem is acute at present and will become more so as this equipment increases in use. Co-operative study of this problem is needed.

■

Swing to Low Alloy Steels In Bolt and Nut Industry

BY C. L. HARVEY
Chief Metallurgist, Lamson & Sessions Co., Kent, O.

CERTAIN trends in the nut and bolt making industry are pronounced. The past year has seen a decided swing to use of medium-carbon, low-alloy steels of the manganese and molybdenum types in place of steels of higher alloy and more expensive types. This is particularly noticeable in the large consuming trade. A general tightening of specifications has taken place, which, in many cases, has necessitated close grain size control of the raw materials.

In the field of heat treating, local hardening by means of high-frequency electric current or by gas flame seems to be the outstanding development. As yet this type of treating has not reached the bolt industry, but it does seem to offer tremendous possibilities in the field of tool hardening.

■

New Steels Are Machinable Following Heat Treatment

BY A. E. FOCKE
Research Metallurgist, Diamond Chain & Mfg. Co., Indianapolis

DURING the depression it was possible to make substantial improvements in quality and reductions in processing costs through development of steels with peculiarly uniform fabricating or heat treating characteristics. Many of our problems the past year have arisen because of difficulty in maintaining these characteristics in the face of near-capacity output of our sources of supply.

From the standpoint of steel acceptance, the McQuaid-Ehn test has created several problems. No sooner had we proved that a McQuaid-Ehn specification and acceptance test assured more uniform carburizing results than we found out that the result could be different on individual coils from the same mill heat, and, finally in one case, opposite ends from the same coils showed different McQuaid-Ehn results. Fortunately, in our experience so far, these differences apparently are not reflected in the final quality of the part, but obviously the problem of acceptance on the basis of the McQuaid-Ehn test remains confused.

In the heat treating grades of steel, one of the most interesting developments has been production of special alloy steels which can be machined commercially in the relatively high hardness range of Rockwell C 30-40. Through use of these steels, heat treated before machining, we have found it possible to eliminate distortion which formerly was a serious problem in production of intricate parts with high strength or reasonable wear resistance.

For tools, it seems probable that if the Chinese tungsten situation remains as it is, we shall have to determine where the molybdenum high speed steels can be employed profitably. As the price of tungsten is increased, possibilities of the molybdenum steels will be investigated more thoroughly.

■

Flame Hardening Process Demonstrating Usefulness

BY R. L. ROLF
Metallurgical Engineer, Lakeside Steel Improvement Co., Cleveland

MECHANIZING of the oxyacetylene blowpipe gave the metallurgist a tool which opened a new field in heat treating—that of localized hardening of parts which, because of size, shape, distortion and expense, could not be heat treated in conventional manner. Early equipment was nothing more than a crude laboratory instrument, with its applications limited mostly to simple shapes.

Little was known of head design, gas flow, tip angles, and location of quenching medium to the flame. These problems are not yet completely solved but sufficient progress has been made to permit practical hardening of many sections and shapes.

At the outset, little or no attention was given to core structure. Parts were machined in the as-cast or as-forged state and surfaces flame hardened without subsequent normalizing or heat treatment. When flame hardened untreated material was substituted for heat treated material, fatigue failures resulted. This was overcome by heat treating the components in the rough, machining and finally flame hardening desired surfaces.

Several users of flame hardened parts report increase in service life of the different components from four to eight times, depending upon the application. Heavy industries have been the largest consumers

of flame hardened material; success in this field has led others to focus attention on the process. Recent hardening of several types of aircraft parts indicates this industry may be a candidate.

Weight no longer is a prime factor; if the part is of proper analysis and can be handled, it may be flame hardened. The writer has engineered flame hardening of machined parts from 4 ounces up to castings weighing 10,000 pounds.

With this process, there is neither scale nor distortion, the parts may be machined to size and hardened, and penetration may range from a skin to approximately ¼ inch. Cost is about the same as treatment by the conventional method. On large heavy sections, hardening cost usually is far less, while light sections having a large area to be hardened will show a somewhat higher cost; however, this is offset by elimination of distortion and extra machining.

Machine tool designers have given the mechanizing of this process serious attention recently and this probably will culminate in the appearance of six or seven automatic or semiautomatic hardening machines in the near future.

■

Welding Is Building Better Products at a Lower Cost

BY A. E. GIBSON

President, Wellman Engineering Co., Cleveland, and President, American Welding Society

ACCEPTANCE of welding as a major method of fabrication is evident on every hand. Ships, refrigerators, diesel engines, material handling machinery and a vast assortment of mechanical equipment have been redesigned for welding. There is only one reason for this development, which in the last year has outstripped the progress of former years, and that is the fact that we are building better products by welding and generally building them at a lower cost.

Welding apparatus and electrodes are being improved constantly. Gas cutting machines, without which little progress could be attained, have made possible not only cutting of the heaviest sections of steel, but cutting with machine accuracy and at low cost. Forming of metal on large capacity presses and brakes, tools which today are indispensable to a weldery, permits fabrication with minimum of welding.

Development and widespread use of the new low-alloy, high-strength steels have made possible designs of extremely low weight and high strength. These materials are playing an important part in building equipment having long life, low upkeep and lessened operating cost. The low alloy steels are the finest contribution of the steel mills to industry in many years.

Now that industry realizes the value and efficiency of welding in so many fields, better design and lowered cost are two great factors to be recognized which will lead to its more widespread use.

Modern design is essential to welding progress. Spurred on by the possibility of better equipment at lower cost, young engineers—and most welding engineers are young—are meeting the challenge which welding presents, and their developments are revolutionizing design. Automatic gas cutting, automatic welding, fixtures for quick assembly of parts, and positioning tools to facilitate welding are recognized as essentials in a modern welding plant.

To reduce costs, further research and experimentation are needed greatly. Hundreds of welding engineers and fabricators now are occupied with this phase of the subject, and it is certain that where so much widespread constructive thought is concentrated on one problem, definite advancement will result.

A third factor to be mentioned, which is perhaps less in evidence, though equal in importance to the other two, is the contribution of scientific societies on fundamental research, and the formation of new codes and the revision of existing ones, so that proper methods of control will govern welding fabrication.

This past year has produced outstanding results in these lines. In that time the American Welding society has contributed to industry a series of new codes covering welding of buildings, bridges, and storage tanks, qualification tests for welders, filler metal specifications, and a code of standard welding symbols. The society also is carrying on extensive fundamental research in conjunction with the engineering foundation.

Progress made in the past year has been remarkable; that of the coming year will dwarf anything heretofore attained.

■

Heat Treatment Necessary For Pressure Vessel Welds

BY H. L. R. WHITNEY

Chief Engineer, Fabricated Products Division, M. W. Kellogg Co., Jersey City, N. J.

CONSIDERABLE progress has been made the past year in welding and subsequently necessary heat treatment of alloy and special carbon steels both in fabricating shops and in the field. In the public utility field, installation of large 50,000 and 60,000-kilowatt, high-pressure steam-electric generating units, operating at 1200 pounds pressure and 950 degrees Fahr. total temperature, has been made possible by using carbon-molybdenum seamless tubing, with all joints between boiler and turbine welded. As many joints as possible are welded and heat treated in the fabricating shop, but many field joints are necessary, and these are being successfully welded and heat treated in the field.

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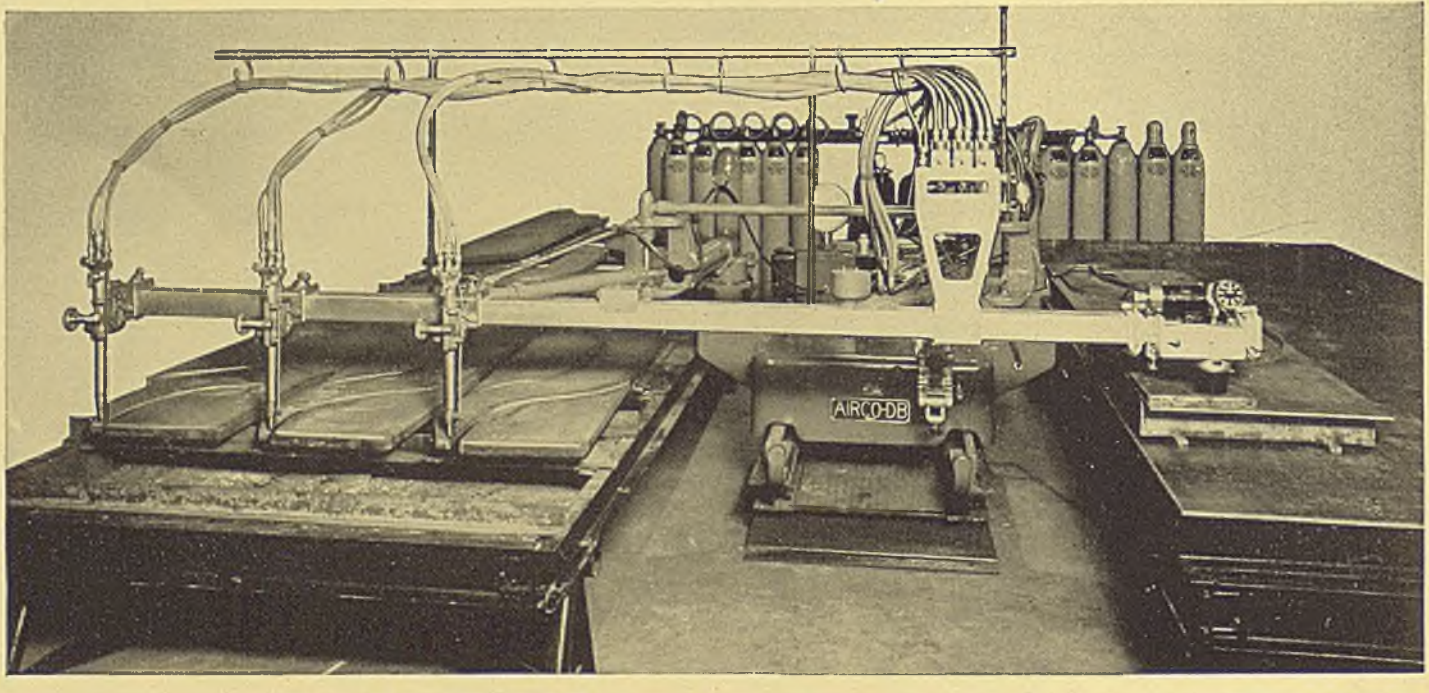

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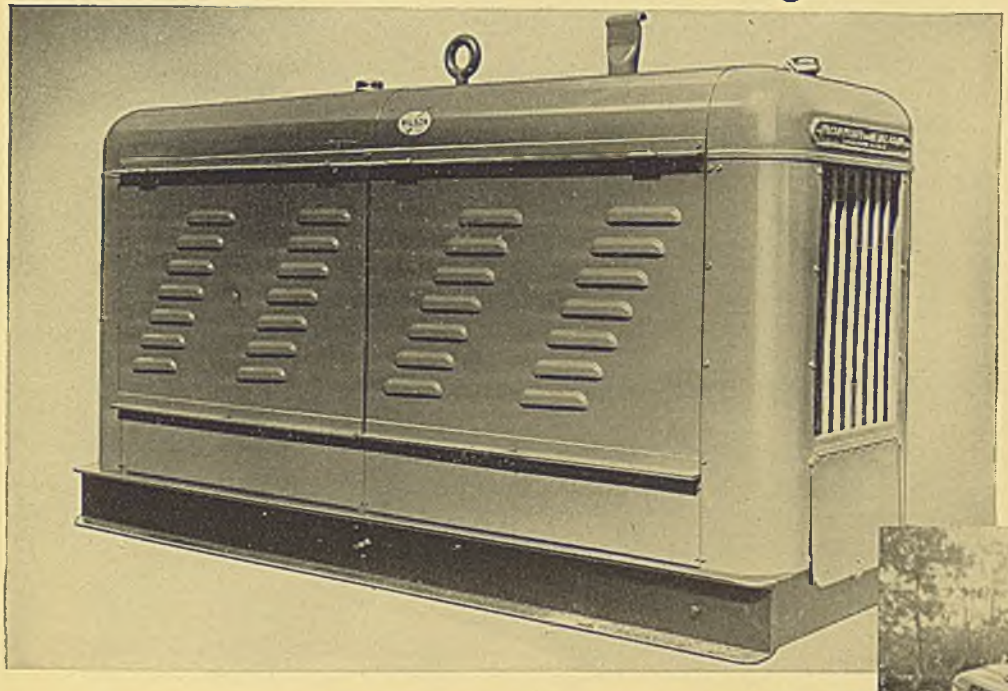

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with columbium or molybdenum additions has resulted in the construction of most satisfactory pressure vessels. In fact, the boiler code committee of the A.S.M.E. has issued cases covering the construction of code vessels made from both these materials.

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■

Welding More Extensively Used on Aluminum Alloys

BY G. O. HOGLUND
Welding Engineer, Aluminum Co. of America, New Kensington, Pa.

PROGRESS in welding aluminum and aluminum alloys the past year has paralleled general development of the welding art. While new and radically different processes have not been invented, there has been steady progress in applying standard methods to new products and in extending the range in size of welded products.

Production of welded vessels for brewery applications has been increasing. Additional aluminum cooling and storage capacity for beer was placed in production and over 100,000 welded aluminum barrels for shipping beer now are in service. Similarly, welded construction has found new applications in the chemical, dairy and rayon industries. Technique and field methods for fabricating large aluminum vessels have been developed and tanks up to 28 feet diameter and 30 feet high are being produced. Methods also have been devised for welding vessels up to 1 inch thick. These limits have been achieved under production conditions and it is now apparent that even larger and heavier equipment can be produced to carry greater loads or pressures.

An important phase of this work concerns development of methods to control welding operations to comply with regulations promulgated by insurance companies and state or city regulating bodies. Methods and codes for qualifying both welding processes and operators have been established for welding aluminum alloy plate, and acceptance of these codes by various regulatory bodies and engineering societies is anticipated in the near future.

The electric resistance welding process has been used to a much larger extent during the past year than previously. Equipment suitable for welding aluminum alloys is being used in production for assembling aircraft parts which do not carry the primary load. This equipment also is being employed to obtain design data to permit fullest utilization of the economies that this method makes possible in the more highly stressed parts of aircraft. Both spot and seam welding are being used to assemble airplane and bus gasoline tanks, railroad car parts, refrigerator pans and evaporators, and many other applications.

Special equipment for particular jobs has been developed. In one application, aluminum foil 0.002-inch thick is being seam welded in production. In another case, a machine to make up to 24 spot welds in one operation of the machine and timer has been developed.

Another interesting application of resistance welding concerns the production use of butt flash welding for aluminum parts. This method had found some application previously for repairing breakage in wire during drawing operations, but it is now available for making finished parts where the number of pieces and size justify the equipment and die costs. An interesting development in this connection concerns the welding of aluminum to copper. This combination of metals is useful for fusing heavy-duty electrical circuits and to permit construction of high-speed rotary electrical equipment where use of aluminum parts alone reduces centrifugal stresses. A connection must be made to the copper current distribution system on such equipment and a butt welded joint has been found to be a satisfactory solution.

Use of metallic arc welding has expanded during the past year. More welding operators are available who have obtained the proper technique, and use of this process is becoming widespread.

■

Higher Tensile Steels for Welded Pressure Vessels

BY A. J. MOSES
General Manager, Hedges-Walsh-Weidner Division, Combustion Engineering Co., Chattanooga, Tenn.

EFFORTS in the fusion welding of pressure vessels the past year have been centered on summarizing and analyzing knowledge gained in preceding years, a necessary stage in the development of a new process. The submerged arc process and other welding processes not exactly new have been introduced into other fields of welding, but are not yet generally accepted in pressure vessel construction. No new methods of testing have been adopted, but 500,000-volt X-ray equipment, enabling inspection of 6-inch plate, is expected to be available shortly.

Work accomplished in the study of welding the past year puts the industry in a much better position to make further advancement. In the pressure vessel field the trend is to greater plate thickness and to use of much higher tensile steels. In Europe, fusion welded vessels have been built from 100,000 pounds per square inch minimum tensile steel. The welding industry in this country is about ready to produce such high-tensile steel boiler drums.

To do so, it may be necessary for our code authorities to lower their present minimum ductility re-

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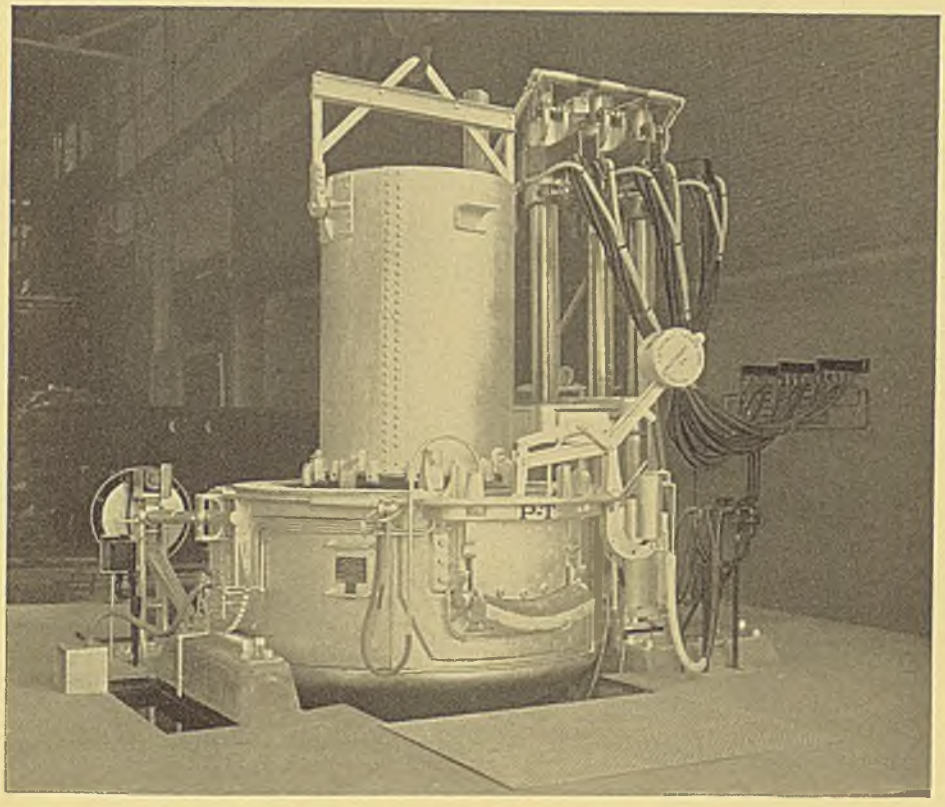

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quirements—a safe step, since safety of pressure vessels would not be endangered. The great danger in pressure vessels resides in the possibility of discontinuities in the welded seams or adjacent parent metal. Such danger is more surely eliminated or discovered by stress relieving and radiographing than by physical testing of extremely small samples.

■

Fundamental Research Need of Welding Industry

BY C. A. ADAMS

Consulting Engineer, Harvard University, Cambridge, Mass., and Director, American Bureau of Welding

NATURE of progress in welding the past year has been mostly in the way of extension and refinement of technique, application and knowledge of the subject rather than any startling or revolutionary inventions.

First applications of any new art usually are made by so called practical men and, as a rule, are exceedingly crude in nature. The next step involves a little more careful experimentation, often made in an effort to solve practical problems arising in connection with new application or to stringent specifications. It is at this stage that services of scientific engineers are in demand to inaugurate research of a really fundamental nature.

A number of the larger corporations, as well as many small ones, are constantly engaged in some form of what is called "welding research." However, most of the problems involved are those demanding some immediate practical solution and experimental work is dropped as soon as some fairly satisfactory practical result is obtained. The fact is that a really thorough scientific analysis of a problem coupled with the fundamental research work necessary for a real solution often is beyond the resources of even the larger corporations.

The stage in the development of the welding art has been reached where this type of research is absolutely essential for the rapid and safe application of welding to new and more difficult fields. This can only be done by co-operative research, the cost of which to an individual corporation is negligible as compared with its value.

Attention should be called to the welding research committee of the Engineering Foundation sponsored jointly by the American Welding society and American Institute of Electrical Engineers. Work of this committee is divided into three divisions—literature division, fundamental research division, and industrial research division. The literature division makes comprehensive surveys of the world literature covering welding and publishes them as supplements of the *Journal* of the American Welding society. Several subscribers to the main committee have stated that the work of the literature division alone is worth more to them than their contribution.

Under auspices of the fundamental research committee more than 50 projects already are under way in universities and engineering schools. An appreciable number of these projects have yielded original and valuable results.

The industrial research committee has for its objective the co-operation of industry in the solution of those large and far-reaching problems which do not involve secret or patentable processes. The membership of this committee and its subcommittees comprises more than 100 of the best welding and metallurgical experts in this country. Other countries are following in this field and co-operative relations are being established with the British Institute of Welding.

Progress in the welding art will be measured largely by the degree in which industry is willing to co-operate in the solution of the increasingly difficult problems.

■

Welding Entrenched In Tank Fabrication Field

BY H. C. BOARDMAN

Research Engineer, Chicago Bridge & Iron Co., Chicago

IN THE class of field-erected tanks, welding during the past year has continued to grow so rapidly that now approximately 90 per cent of all oil storage tanks shells of the conventional type, and practically all special pressure tanks of spherical and spheroidal shapes, are welded. Oil storage specialties such as steel balloons, balloon roofs, breather roofs and floating roofs are invariably welded unless located where welding would be dangerous.

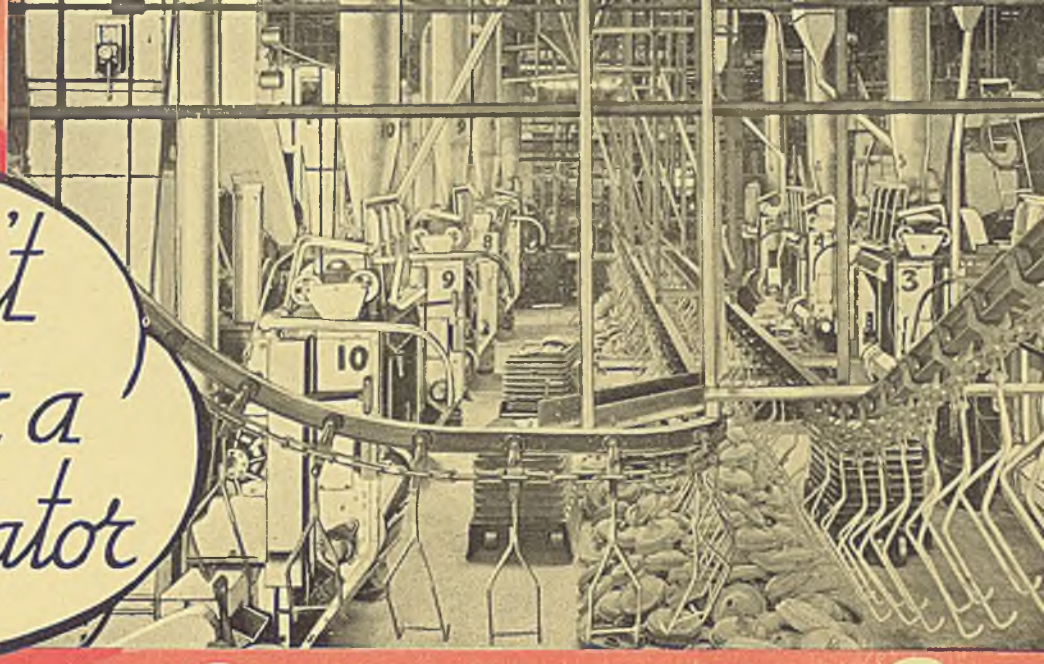
In the elevated tank field, welded construction has become firmly established during recent months. Welded tanks up to 2,000,000 gallons capacity can now be purchased and built without exciting much comment. Field connections of the tower usually are riveted, but many of the shop details are welded.

Similar statements may be made about welded standpipes, barges, smokestacks, and large pipe lines, the number of which has steadily grown.

In the realm of shop-assembled tanks, the Union electric welding process has lately aroused interest and promise. This process transmits welding current from the electrode to the plates through a powdered flux which is a poor conductor when cold and a good conductor when hot. Thicknesses up to 3 inches can be welded with a single pass.

The past year has witnessed a rapid development in methods of assembling and holding shell plates without use of fitting-up holes, and in welding procedures and sequences which nearly eliminate distortions.

Lately New York has adopted a code permitting welding in building construction, and Chicago probably will do likewise. These steps symbolize the capitulation of those ultraconservatives who have



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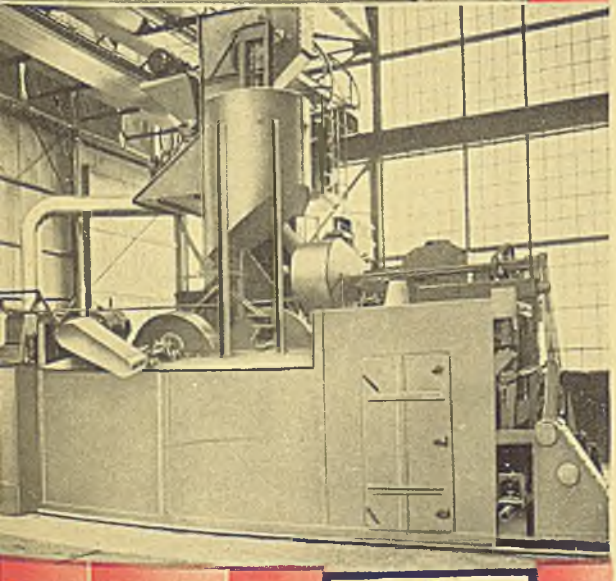

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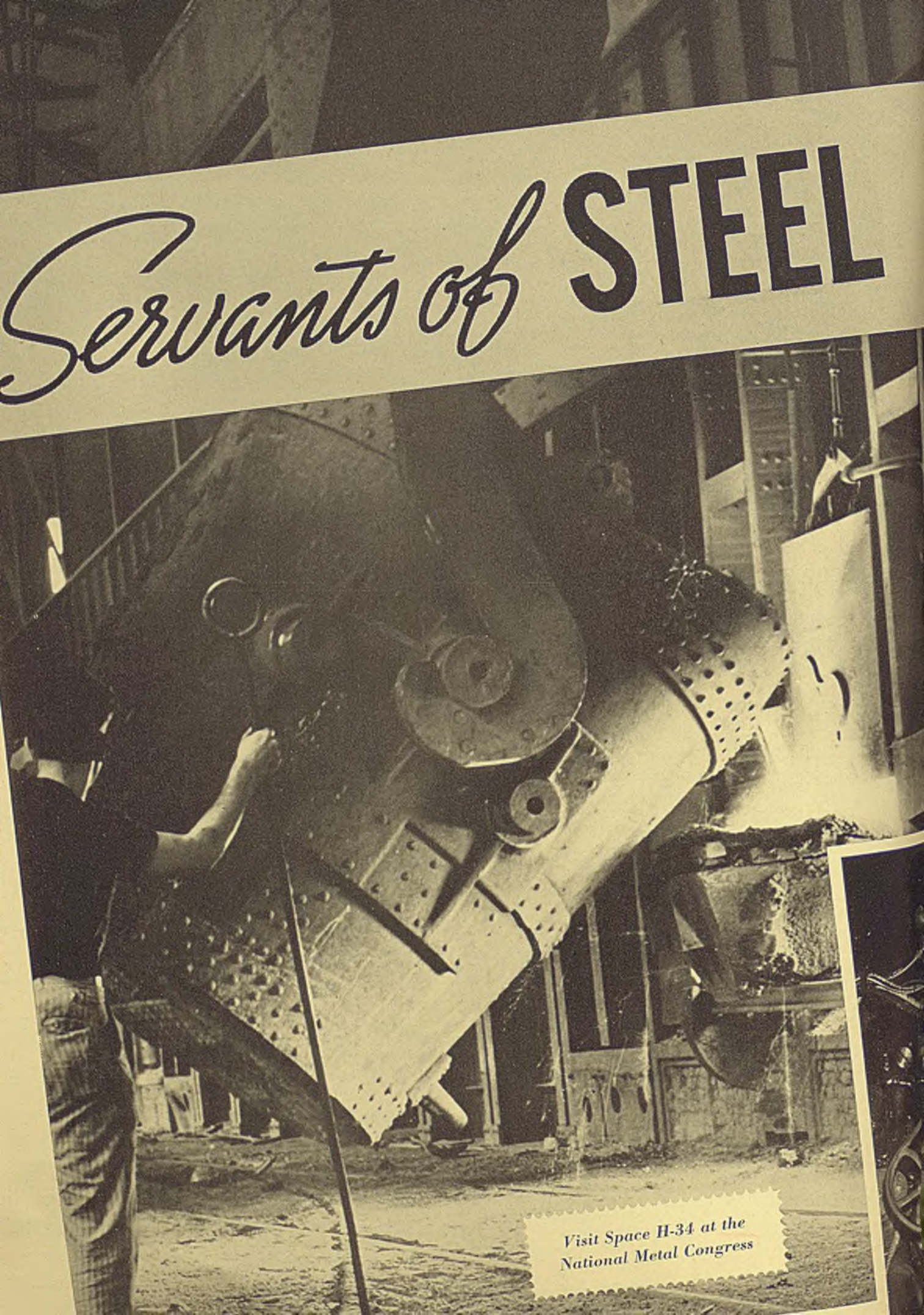

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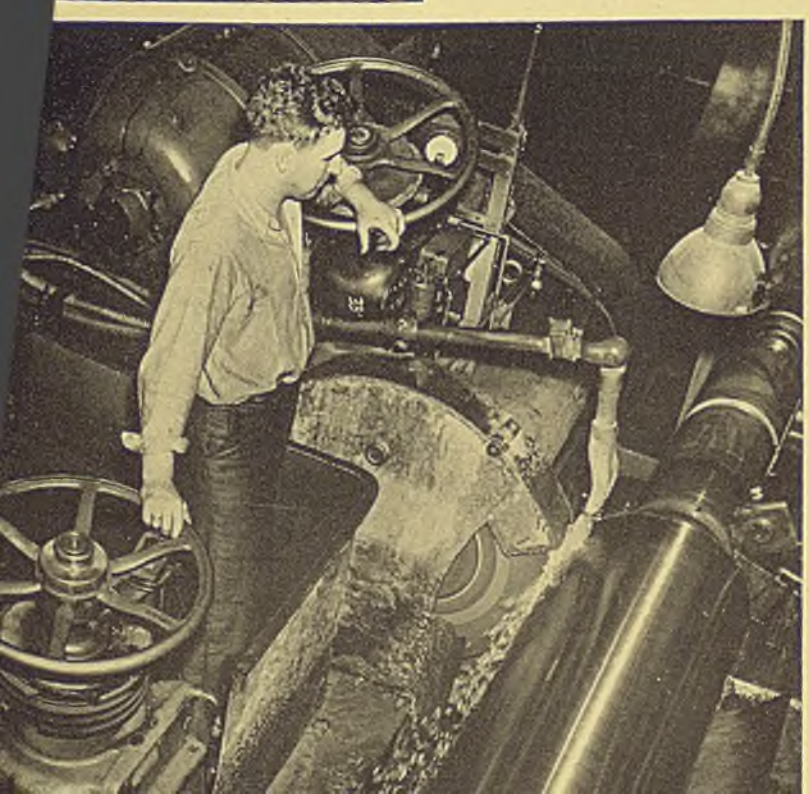

consistently opposed welding on the ground that it is unreliable. Welding now is so firmly entrenched that its proponents need no longer be zealots.

■

Research Program Aiding Welding of Copper Alloys

BY I. T. HOOK
Research Engineer, American Brass Co., Ansonia, Conn.

WELDING problems in copper alloys are being given consideration in both commercial and non-commercial organizations. For the first time, the welding research committee, functioning under the Engineering Foundation, has given a subcommittee a general research program on copper alloys. At least two educational institutions have joined in this work —Michigan College of Mines and Technology has undertaken a project on the fusion welding of copper and Rensselaer Polytechnic institute is planning to work on resistance spot welding of copper alloys. In addition, three or more large copper alloy manufacturers are co-operating in this research program. Their published reports should prove valuable to industry.

Data collected by the literature division of the welding research committee already has furnished a good starting place for research on copper alloys.

Beryllium copper because of its highly desirable physical properties is finding its field of usefulness. It is not an easy metal to braze or fusion weld. However, methods of fusion welding by the carbon arc and resistance spot and seam welding have been worked out and published.

Progress is being made this year in the improvement of fluxes for brazing and welding copper alloys and in the development of flux coatings for copper alloy metallic arc electrodes. There is still considerable superstition and little scientific information concerning the use of various flux ingredients but a number of able investigators are gradually evaluating the effect of each flux component. Other investigators are at work on flux coatings for copper alloy metallic arc welding rods with promising initial results.

Wide-spread use of copper alloys in the air conditioning industry has developed some acute problems in welding. These problems include fabrication of large, low-pressure containers of thin copper silicon sheet; sealing of copper tubes in a copper alloy header; in some designs it is necessary to weld copper to steel. Most problems have been worked out satisfactorily.

Economy and versatility of resistance spot and seam welding has created a demand for the extension of such connections to copper alloys. This is quite possible for any of the copper alloys, excepting copper itself, where the spot welding machine is equipped with modern time and pressure control. Moreover, special alloys, such as silicon low brass, which have characteristics especially pointed toward this type of connection have been developed.

■

Higher Speeds Are Sought In Spot and Seam Welding

BY H. W. ROTH
President, Roth Welding Engineering Co., Detroit

NO OUTSTANDING developments in resistance welding have occurred the past year. However, present methods and various types of production machines have been improved, and fields of application have been broadened. In spot welding, the trend is toward multiple welds. Projection welding is frequently replaced by other methods of multiple spot welding, especially multiple hydromatic welding, which appears to be the most efficient method for high production purposes. Equipment has been simplified, and a number of new designs have been brought on the market.

A new method of multiple spot welding is just being developed, but has not as yet been tried in production. It appears promising, however, and may become of considerable importance to the automotive, railroad, and similar industries.

Portable welding equipment still covers a large area of applications. Many new welders have been installed, especially in the automotive industry. Even the oldest style of portable welder, the so-called "one-point welder," or "push-rod welder," has been unburied again, and is used in low production spot welding of coaches, trucks, and trailers.

No important developments have been made in seam welding. Increased application of synchronous interruption can be noticed. For higher welding speed, the Thyratron and Ignitron are more frequently used, where for lower speed, mechanical synchronous interrupters have proven satisfactory up to 150 kilovolt-amperes capacity. The trend in seam welding, however, is to higher speed, which in many instances will make it unnecessary to use artificial interruption.

In the automotive industry, flash welding has been replaced by spot welding for many applications. This does not mean that the advantages of flash welding are overlooked, but the seasonal change in the design of automotive equipment seems to justify installation of more flexible equipment, especially for long

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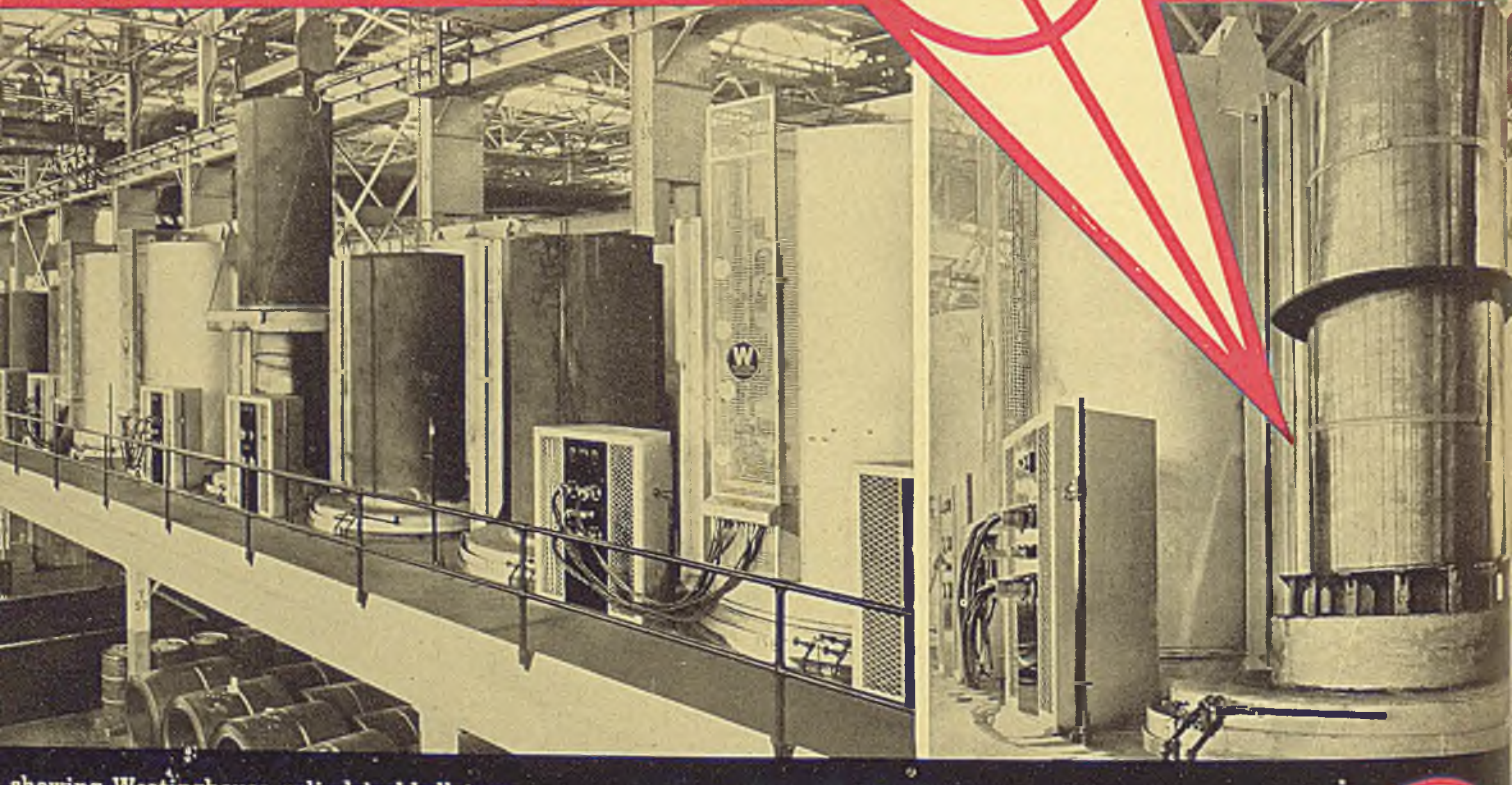
You are cordially invited to Westinghouse exhibit B-19—beside the stairs leading to the meeting room. See the demonstration of the new alloys developed by Westinghouse—also various types of welding equipment . . . all in actual operation. Make our booth your headquarters.



showing Westinghouse cylindrical bell-type aling furnaces installed in the Ford Steel Mill iver Rouge, Michigan.

Westinghouse

WESTINGHOUSE ELECTRIC

joints, where flash welders are rather expensive and difficult to service. Flash welding and butt welding have conquered new fields; the railroad and heavy steel industries, especially, promise to open new possibilities which may provide extensive applications for these types of welding.

Resistance welding cannot be reviewed without paying attention to welding controls, which in some instances determine the production value of welding equipment to a considerable extent. A number of new tube controls and high speed contactors have been developed, which make it possible to increase efficiency, especially of spot and projection welding equipment. It seems, however, that some of the new developments complicate design and installation of controlling equipment. There is still need for controlling equipment, which is simpler to operate and easier to install and service.

■

Demand for Products Boon To Fabrication by Welding

BY C. G. WATSON
Vice President and General Manager, Youngstown Welding & Engineering Co., Youngstown, O.

THIS year has not been outstanding in new welding developments, but it has been outstanding as one in which developments of preceding years were put into use. Upturn of business somewhat checked experimental work but brought into general use the developments of the lean years. Sudden demand forced manufacturers to recognize advantages of welded products. Progressive engineers have switched their skeptical attitude and now favor welded construction in a great many new applications in the metal fabricating field.

In the last year, our sales of monel metal pickling equipment greatly increased. Welded crates and baskets have proved themselves superior. Special welding wire has made welds even more resistant to acid than the parent metal. Sale of welded pipe fittings is far ahead of previous years and water works engineers are recognizing the advantages of welded fittings. Heating engineers are specifying welded installations, and welded pipe seems to have become generally accepted.

Welded construction in alloy metals is greatly in demand. Present-day knowledge of parent metals and the great advancement in welding wire have removed the fear of welding alloys. Welded machine parts are no longer new or unusual, but have come into use more than ever before. Machinery manufacturers and their customers have recognized welded construction as standard in a wide range of machinery applications.

Future of welding looks exceptionally bright, although we must realize we have a long way to go and many problems to solve. Recognizing and acknowledging all of the developments of the past 25 years, the field and need appear practically as large as ever.

■

Welding Acceptance Gains As Technique Is Mastered

BY C. L. HALPIN
Factory Superintendent, Fruehauf Trailer Co., Detroit

RECOGNITION recently given welding by New York City's department of building engineering and safety illustrates the solid and substantial growth of the process. Welding has increased structural strength, reduced weight, simplified design, and reduced cost of manufacture. It is practical, the necessary technique is being acquired, and more and more it can be expected that welding will become the accepted mode of fastening, in final assembly, the parts making up items of metal.

In steam generation the high pressures of today, which require the use of alloy steels to obtain high safety factor, would be impractical without welding. In the chemical industries, welding has simplified both construction and maintenance of necessary vessels. Transportation equipment, with its streamlining, minimum weight and ability to stand highly concentrated stresses and vibration, has been made possible by welding.

Like all other methods, welding has been abused through the lack of proper materials, skill, and good workmanship in its application. However, the trend is toward a fuller application and a greater refinement in welding technique, materials, and equipment. Possibilities of the process are unlimited.

■

Simple Resistance Welding Units a Significant Trend

BY M. L. ECKMAN
Chief Engineer, Welding Divison, American Coach & Body Co., Cleveland

RESISTANCE welding is enjoying the steady growth of a well established industry that has passed the adolescent period. Use of complicated welders specially designed to perform multiple operations seems to be passing. The extreme intricacy of these machines combined with costly rebuilding necessitated

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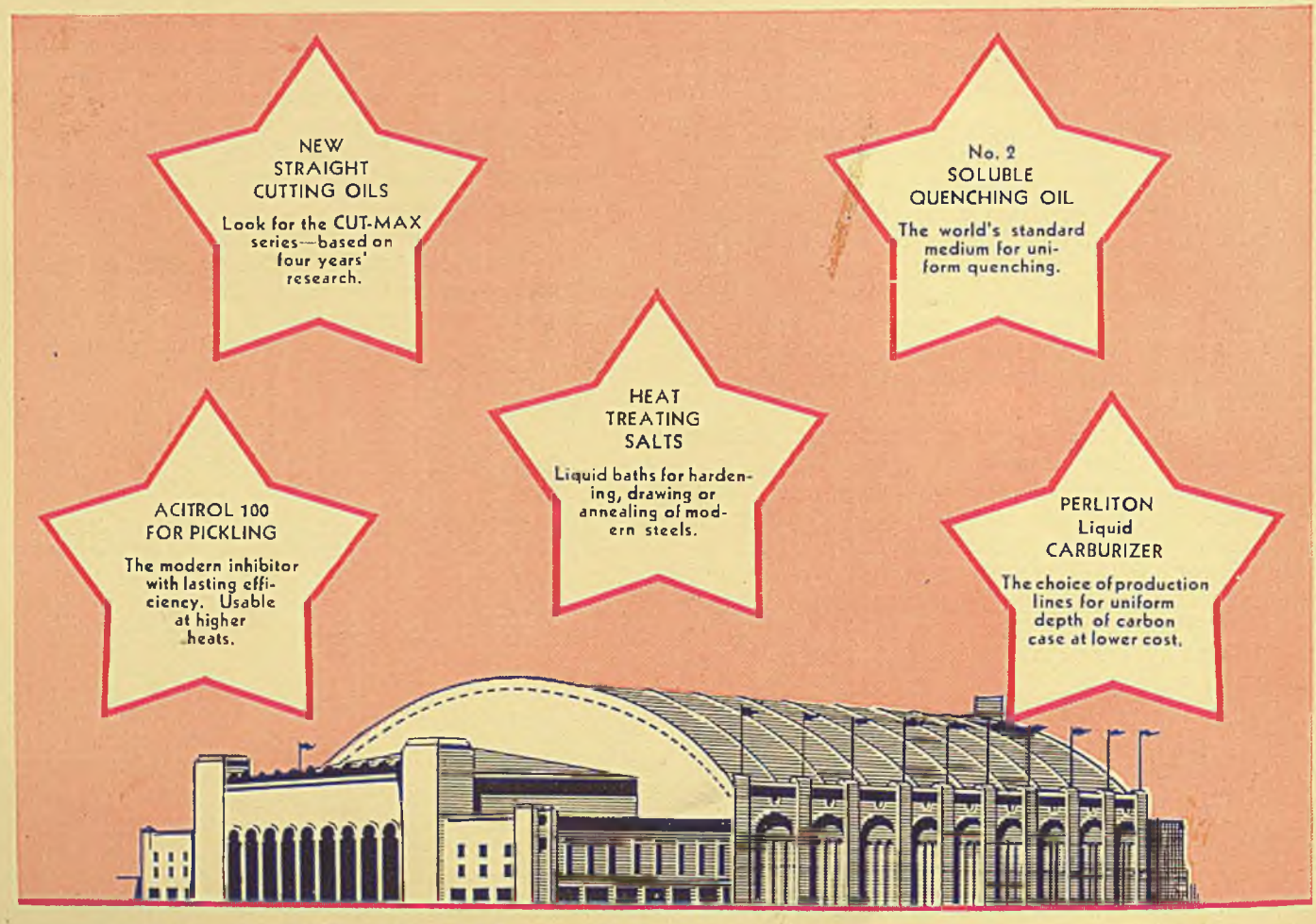


See them shine at Booth B-95 (*near the stage*) Atlantic City

by model changes are prime factors in this change. It has been found that 2 or 3 simple type welders will produce nearly as much as special machines with a minimum of lost time for repairs and maintenance, and if one machine does go down 50 to 65 per cent of production still goes on.

Designers are beginning to consider their products from the welding standpoint. In the past, many parts were welded even though the designer had not intended such connection and in many cases even when the design was entirely unsuited to welding.

Welding timers have been greatly improved in the last year or two but they still are too costly and cumbersome. Simplicity and accuracy seem difficult to attain without losing sturdiness. However, progress is being made.

Public utility service on welding equipment is improving with time. Twenty years ago a 100 kilovolt-ampere welder was considered a prohibitive load in one large industrial district. Now 1000 kilovolt-amperes causes no worry and smaller units can be installed in almost any plant.

Future of resistance welding looks good. Young engineers graduating from welding schools are enthused with the process as a prime method of assembling all products fabricated from sheet steel, structural members and tubing.

■

Railroad Industry Seeking Best Welding Procedures

BY K. T. NYSTROM
Production Engineer, Chicago, Milwaukee, St. Paul & Pacific Railroad, Milwaukee

WELDED design in the railroad field is advancing rapidly with various railroads developing their own designs. Waviness or buckles no longer are tolerated by a streamline-conscious public from an appearance standpoint. Great care, therefore, must be taken in setting a sequence and type of welding to produce minimum distortion. The almost instantaneous heating effect and rapid heat dissipation in spot welding result in minimum distortion and are being used with good results on light work.

Probably the trend will be to concentrate arc welding to heavier portions of the car and develop spot welding procedures for sides, ends and roof sheet assemblies. In welded designs, the center sill forms the backbone, with the balance of the car actually molded to it. This condition differs from riveted design, where there is a movement between joints that produces a snubbing action in shock loads. Welded designs must be made conservative until more knowledge is gained along these lines.

Errors will be made and corrected, and gradually will be evolved an increasingly perfect design that will incorporate all known welding technique to produce a more eye-appealing product with maximum strength. At the same time, lower fabricating costs will be realized by using a minimum of heavy pressings and practically eliminating punching operations. Designers will become more cognizant of mill tolerances and re-shearing reduced to a minimum.

■

Oxyacetylene Process In New Fields of Usefulness

BY A. B. KINZEL
Chief Metallurgist, Union Carbide & Carbon Research Laboratories Inc., New York

RECENT developments have focused attention on the versatility of the oxyacetylene process in production, demolition and repair. The process is used in welding for joining, rebuilding and hard facing metals; in cutting for shaping or scrapping plain or alloyed irons and steels; and in heating for bending, forming, and more recently for metallurgical operations such as surface hardening.

The year has seen improvements in welding apparatus, in techniques, and in procedures for applying welding more efficiently. Typical of the latter is the new "stove-pipe" method of pipe line construction in which the lengths of pipe are progressively lined up over the ditch, tack welded, and then welded by two operators working simultaneously.

Development of austenitic alloy steel welding rods for ferritic air-hardening steels, of low-alloy rods for structural steels, and of new rods and flux for welding Everdur plate and castings, is typical of work on new or improved techniques. Industrial applications have been marked by wider use of columbium-bearing rods in welding stainless steel, and of different types of special wear-resistant alloys in building-up rail ends and hard facing valve seats, respectively.

Operating economies and improved cuts resulted from introduction of a new series of cutting blowpipes designed particularly for machine operation; and easily operated machines have been developed that are small, readily portable, and characterized by great flexibility and wire cutting range. For certain production cutting operations on steel plate, the output of the larger automatic cutting machines has been multiplied by the recently developed process of stack cutting.

A new procedure for cutting stainless-clad and nickel-clad steel facilitates preparation of this type of steel for fabrication. It is essentially a flux-cutting process, in which cutting is done from the carbon steel side of the plate.

An interesting method, known as "wrinkle'" bending, has been developed for making sharp bends and sags in welded pipe lines for gas. At the point of bend, the welding blowpipe flame is used to heat several narrow bands at right angles to the pipe length and extending about half way around the pipe. The pipe then is bent by a tractor, causing these heated sections to wrinkle.

Outstanding progress was made in flame harden-

ing. Flame-hardened surfaces on tough, ductile cores can be produced with many steel parts that would be difficult, costly or impossible to heat treat by other methods. Typical applications include gear teeth, mill rolls, spindles, cams and camshafts, crane wheels, sheave wheels, dies, tappets, valve stems, and similar parts.

■

Education, Codes Spur Acceptance of Welding

BY P. G. LANG Jr.
Engineer of Bridges, Baltimore & Ohio Railroad, Baltimore

WHILE it is not the intention to deny the value of private welding research which has been carried forward in some quarters, it is obvious that the ends of uniformity, standardization and avoidance of wasteful duplication of labor can be achieved only by co-ordinating all efforts through one central organization. The American Welding society is the national organization best qualified for the development of this subject, and, in the interests of technical progress, should be recognized as the supreme American welding authority.

Value of this society's published codes of practice and specifications has been extensively recognized. During the past year the City of New York has accepted its building code, which was designed to cover application of welding to building construction. This action is likely to be followed by other large cities throughout the country and should stimulate

interest of engineers and create an increased demand for welding knowledge.

A similar case exists with regard to the society's bridge specifications, published in 1936, which have already been put to practical use on a large scale. They have been endorsed by the American Association of State Highway Officials and American Railway Engineering association.

Use of welding is attended by economy of material. A majority of efforts designed to effect economy of material in the recent past culminated in extensive experiments in the field of light-weight structural alloy steels. This has been especially marked in the transportation field, where it concerns the design and construction of railroad passenger and freight cars, electric trolley cars, automobiles and trucks, aircraft and ships. This tendency extends into such widely diversified fields as refrigerators, metal furniture, pressure vessels and many other types of metalworking.

With the vast fields opening to welding, the importance of research is obvious. Among the outstanding subjects requiring investigation, the following may be specifically cited:

1. Determination of residual or "locked-up" stresses. While it appears impossible to hope for complete elimination of such stresses, it is apparent that they can be controlled and minimized.
2. Determination of the strength of welded connections under fatigue load.
3. Determination of the effect of dynamic loading (impact) on welds.
4. Determination of the weldability limits for various steels under diverse conditions and for different types of service.
5. Formulation of practicable and economic procedure for nondestructive strength and homogeneity tests on welded connections.
6. Investigation of the practicability and value of welding processes which are not in general use nor widely known.
7. Formulation of educational curricula for technicians and operators. Engineers as well as operators require specialized instruction in the technicalities of welding, which are becoming increasingly complex, and comprehensive courses should be included in technical schools, colleges and universities.

■

Wire Producers Make Use Of Technical Research

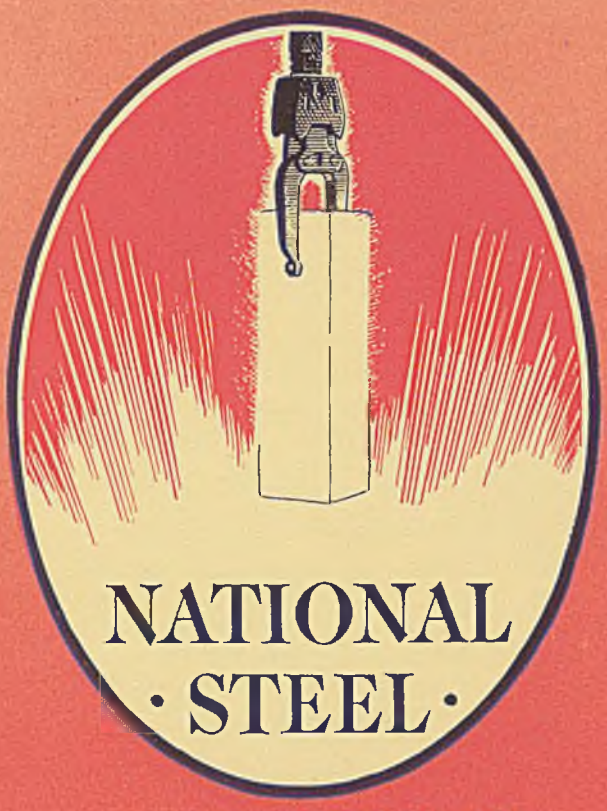
BY R. K. CLIFFORD
Works Manager, Continental Steel Corp., Kokomo, Ind., and President, Wire Association

KEEPING pace with continued improvement in general business this year, the wire industry has shown increased activity to the extent that physical equipment of mills is no longer able to keep abreast of scheduled orders. This condition already has resulted in considerable increase in production facilities, several new rod and wire mills recently having gone into service, while appropriations have been authorized for numerous other alteration and expansion programs.

It has been stated aptly that the past decade has seen more rapid development in wire production methods than the entire past century. It is equally true that within the present year more attention has been paid to engineering development and technical research than in the preceding ten years. This has been brought about largely by customer demands for better quality and by the necessity for reduced costs.

New wire rod mills going into service this year are all of the continuous type, and so designed as to hold finished rods to much closer size tolerances. Finishing speeds are higher and coil weights greater with each succeeding year. Closer regulation of fin-

(*Please turn to Page* 177)



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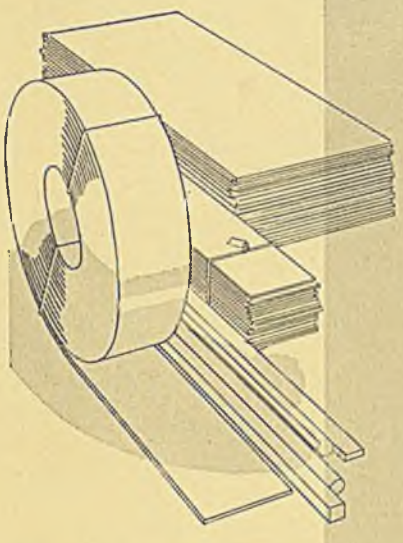

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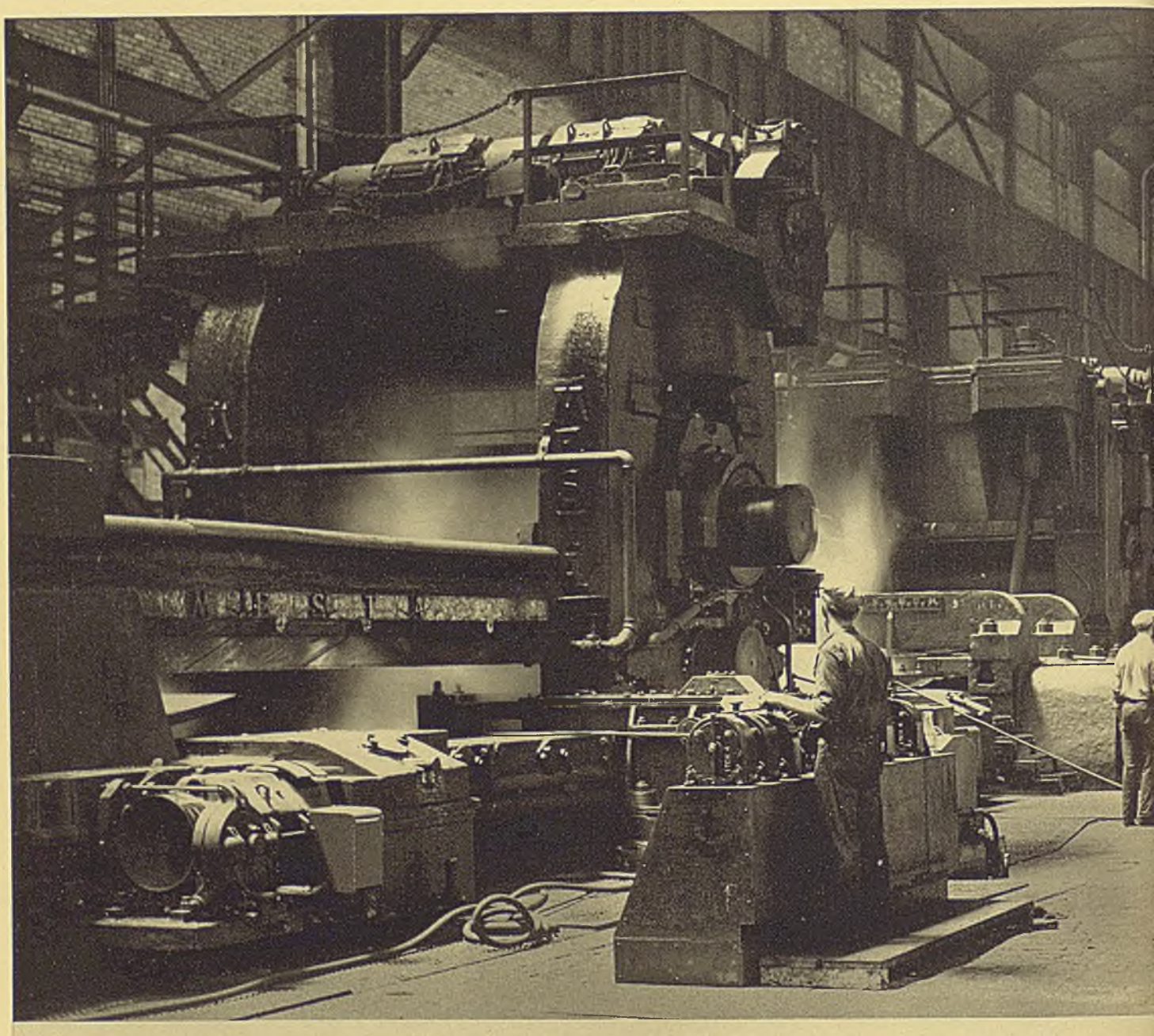

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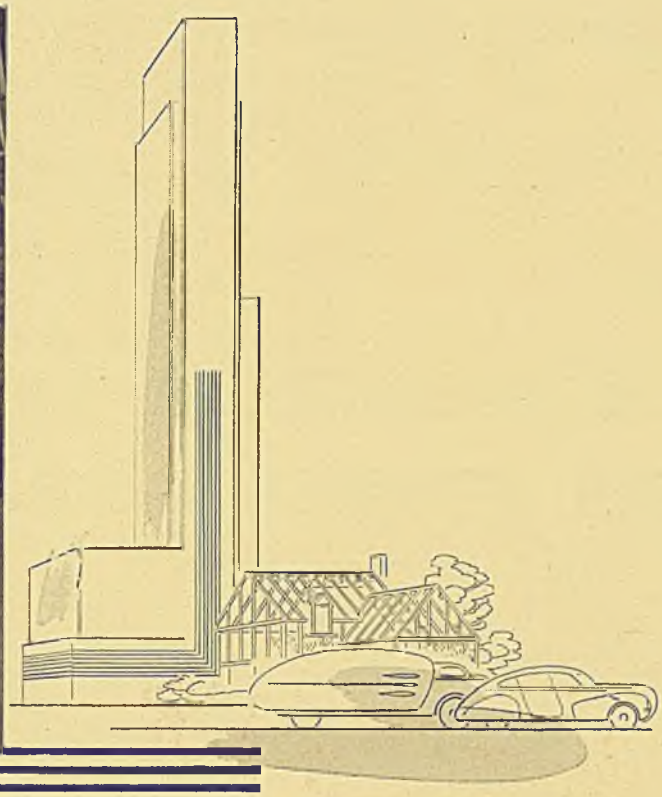

GREAT LAKES KEEPS STEP WITH THE TEMPO OF TODAY

IN the spring of 1936, Great Lakes pioneered the world's fastest and largest continuous 4-high mill producing hot- and cold-reduced strip. And the steel rolling out of that mill was the best product of latest advances in steel manufacture.

Today that new Great Lakes mill continues to work in three important ways to the advantage of steel users:

1—The sheet, strip and plate produced are of the finest uniform quality obtainable.

2—Steel in 20 gauge and heavier — and of widths up to and including 90 inches—can be produced faster than ever before was possible.

3—The finished hot- or cold-rolled product is accurately dimensioned to closer tolerances than formerly were permitted.

Born only eight short years ago, Great Lakes Steel Corporation is truly modern—its products squarely in line with the quality demand of today's steel users.

Completely integrated, Great Lakes combines product quality with engineering cooperation and service to a better and more flexible degree than previously has been possible.

Great Lakes invites your inquiry on any of its products—and will be glad to discuss with you any problem of design or re-design.

Why not make it of steel?

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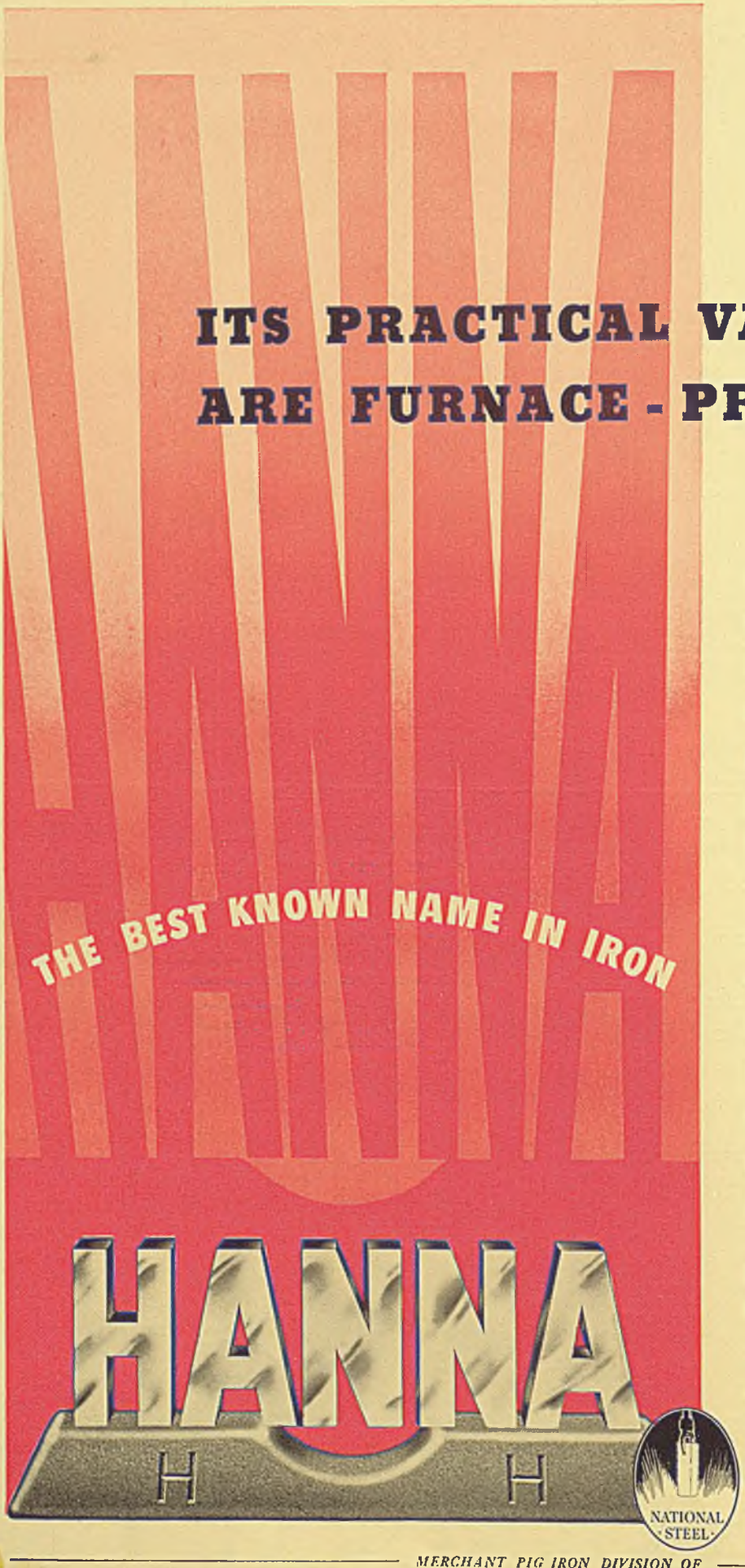

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MERCHANT PIG IRON DIVISION OF

NATIONAL STEEL CORPORATION

(*Continued from Page* 170)

ishing temperatures and cooling conditions have permitted more careful control of those physical properties which later show their effects in the cold drawn wire. Increasingly strict requirements of users of wire for manufacturing purposes have resulted in amazing reduction in commonly expected physical defects.

In cleaning houses or pickling rooms of more modern mills, "straight-line" arrangement of equipment is almost universally accepted, resulting in lower labor costs. Tanks of acid-proof materials have replaced the older type of wooden tubs. The further application of inhibitors, adoption of automatic temperature regulation, and close chemical control of pickling solutions have brought returns in acid saving and better wire finishes.

Whereas the past few years have seen the old style direct-fired rod bakers largely supplanted by recirculating air driers, the new "flash" baker, introduced in 1937, employing a combination of air recirculation and high temperatures, bids fair to revolutionize this phase of rod preparation. Advantage of this baker is that it fits in nicely with the "straight line" pickling equipment.

Pin-type power trucks have come into use for delivering rods from baker to draw benches, eliminating the use of buggies.

Most of the cold drawing equipment installed this year has been of the variable-speed, individually-

powered type, with continuous machines, capable of higher finishing speeds, to take care of smaller sizes. Dry drawing is carried to smaller gages than formerly.

More successful application of butt welding, together with faster drawing speeds, have introduced die and lubrication problems which have been successfully met. Dies are, as a rule, of sintered carbides, operated with water cooling. Lubricants have been the subject of extensive research, and in most mills are being handled by specialists in place of permitting the wire drawer to prepare his own drawing compounds.

Newly developed galvanizing processes are aimed at production of heavier and more adherent coatings. For annealed wire, batch-type controlled-atmosphere furnaces are replacing or supplementing existing equipment.

In general, the trend has been toward greater diversification of products, improvement in finishes and physical characteristics, closer adherence to size and more careful application of methods calculated to satisfy customer requirements. Rule of thumb methods have been replaced with scientifically controlled practices. This rapid development of wire process and equipment has been greatly aided by the closer spirit of co-operation manifested between the mill men, research workers and engineering forces connected with the industry.

Improved Dies, Drawing Equipment Are Adequate

BY E. W. CLARK
Mechanical Engineer, Wire & Cable Division, General Electric Co., Schenectady, N. Y.

MANUFACTURERS of diamond and tungsten carbide wire drawing dies have met demands of wire makers to furnish dies with a shape and finish that will permit drawing a good quality copper wire at high speeds. Wire drawing machinery manufacturers now are furnishing machines with minimum slip that will operate satisfactorily at speeds limited only by the physical qualities of material being drawn or economical operation of the machines.

Spooling machines, attached to the drawing machines with adjustment for any wire tension desired now are in general use. Automatic stops, which operate when wire breaks or at any predetermined spool diameter, are available. Finishing die and final drawing roll, outside the enclosed part of machine where dies and rolls are in drawing solution, permit delivery of clean dry wire to the spooler.

With proper control of processes, it is now possible to draw, wind, anneal and ship wire on a spool or reel without rewinding and with every assurance that the customer will receive a clean bright wire that can be unwound without difficulty.

The most urgent need of the wire drawer today is a more uniform raw material from his various sources of supply.

■

Trend in Rod Preparation Is Toward Flash Baker

BY H. C. BOYNTON
Metallurgist, John A. Roebling's Sons Co., Trenton, N. J.

RECENT as well as early advances in the art of wire manufacture show that useful life of a piece of wire is a function of its smoothness and freedom from all surface defects throughout every inch of its length. This has been verified by numberless fatigue and endurance tests. A wire with a rough surface may have an endurance limit of only about 20 per cent of the tensile strength, but a machined and polished wire will show a ratio as

high as 60 per cent of its strength in tensile tests.

From the steel melter to the wire drawer, all are striving for this perfection of surface. All departments are working to eliminate "rolled in" scale, seams, overfills, guide scrapes, pits and other defects.

Keen interest now is centered on zinc coating of iron and steel wire. Electrozinc platers are producing any desired coat up to 3.2 ounces of pure zinc which will not flake on bending.

It seems to be the opinion that a coarse-grained steel is better for wire which is to be heavily drafted to give high tensile properties. On the other hand, for a wire to be hardened by oil or lead tempering and demanding a wide hardening range of temperatures, say from 1450 to 1600 degrees Fahr., demand is building up for a fine-grained steel deoxidized to produce a McQuaid-Ehn grain size of 5 to 8.

Demand for 18-8 stainless steel is increasing steadily, but the rope manufacturer is hesitating to recommend it for running ropes, except where corrosive conditions are extreme and price is a secondary factor.

An extremely important advance in wiremaking is invention of a rapid baker and drier which is claimed to "flash bake" rods and wire in from 20 seconds to 2 minutes. The principle involved is air under pressure at 750 degrees Fahr.

■

Machines Are Designed for Faster Drawing of Wire

BY F. A. WESTPHAL
Superintendent Wire Mills, Sheffield Steel Corp., Kansas City, Mo., and Vice President, Wire Association

ABOUT 15 years ago the wire industry in America commenced continuous drawing of ferrous wires from the rod. Since then wiremaking has progressed principally in four directions. Metallurgical and metallographical research has determined a finer control in the making of steel or alloy steels for wire, starting at the charge in the open-hearth furnace through subsequent rolling operations to the wire rod; material handling systems that dispatch the steel in process have been developed with consequent labor saving and cost; machinery and equipment have been designed for faster speeds and labor saving devices; and, tungsten-carbide dies have increased speed of drawing either high or low-carbon wire on single draft, double-deck or continuous machines.

Future trends in the wire industry indicate that the demands may be as follows:

1. Further research in progressively finer control in steelmaking and rolling, and in adding and using more alloys in comparatively common grades of steel.

2. Increment loads and weights of single units for processing will be larger due to progress in construction for material handling. This will mean heavier weight billets will be rolled in rod mills that will finish heavier weight coils of wire rods. Today 200-pound coils of rods are widely used on old mills; more up-to-date mills are designed to handle 600-pound coils. Progress in the future may demand 2000 or 3000-pound continuous length coils of rods.

3. Problems of corrosion and length of workable life of wire products, combined with finishes that give modernistic eye appeal, may be solved economically and practically by research, or by trial and error method, or by the use of alloy steels.

■

Galvanizers Make Progress In Control of Coating

BY K. B. LEWIS
Consulting Engineer, Worcester, Mass

WIRE drawing is so simple an art that revolutions in practice cannot now be expected oftener than about once a century. Progress as gaged from year to year consists of a slow and methodical whittling away at costs and tightening of control over quality. Such has been the progress in wire manufacture the past year.

Advancement in rod storage, pickling, and baking, has followed earlier trends. A number of new cleaning houses have been laid out, chiefly of the straight-line and gantry-crane type. In baking, the new "flash baker" seems at first to be a little revolutionary, but it is really only a rather long jump in a well-marked trend toward higher temperature and velocity of baker atmosphere. It does, however, eliminate baking as a separate handling operation, by getting the baking chamber right up under the cleaning crane.

In the drawing room the trends followed have been: (1) Almost complete adoption of carbide dies; (2) heightened appreciation of advantages of continuous drawing; (3) experiments in higher speeds and in the butt welding of flipped bundles for nonstop operation. These have lapped over into the high-carbon field; (4) tentative steps toward the elimination of that profit eater, the wire mill buggy. It is becoming more widely appreciated that, within reasonable limits, excessive heat generated in wire at high speeds is an evil in itself rather than a symptom, and artificial cooling is increasing.

In operations beyond the drawing room, greatest

Material IS AS IMPORTANT AS DESIGN

In product development, *material* is just as important as design. Failure to sense this has prevented public acceptance of many a good basic idea. Every detail of a machine or appliance should be as nearly right as expert engineering can make it—and to place performance or appearance at the mercy of doubtful material, to save a few cents here and there, may turn out to be not a gain but a loss—the game may not be worth the candle! Insurance against this is often the use of Seymour Nickel Silver or Phosphor Bronze instead of less dependable alloys.

Absence of any of the following qualities in a produ

CAN SERIOUSLY HANDICAP ITS CHANCES OF SUCCESS

PREDOMINANT QUALITIES OF SEYMOUR NICKEL SILVER

DUCTILITY | TEMPER | NON-CORRODIBILITY | WHITENESS | MACHINABILITY

PREDOMINANT QUALITIES OF SEYMOUR PHOSPHOR BRONZE

FATIGUE RESISTANCE | FRICTION RESISTANCE | NON-CORRODIBILITY | RESILIENCY | MACHINABILITY

SEYMOUR NICKEL SILVER—An alloy of copper, nickel and zinc. Its even grain makes it ideal for silver plating, and its silvery white color is scarcely perceptible when exposed by wear of plate. Ideal also for other plating, especially chromium, no underplate being necessary. It is capable of a wide range of hardness, from dead soft to a lively spring temper. In its ductile stages, it is superb for deep draws and difficult spinning. When properly leaded, it machines freely. In all its forms, it is practically corrosion proof.

SEYMOUR PHOSPHOR BRONZE—An alloy of copper, tin and phosphorus. Principal characteristics: non-corrodibility, toughness, and extreme fatigue and friction resistance. Subject to a considerable degree of hardness—therefore excellent for springs that must stand long, constant flexure. Practically indifferent to sudden thermal change, will not "arc" when charged or spark appreciably when struck. Very free cutting when leaded. Efficient in electrical instruments, and in all devices used in damp areas. (Test samples of either alloy on request.)

THE SEYMOUR MANUFACTURING COMPANY, 51 FRANKLIN ST., SEYMOUR, CONN.

SEYMOUR

NICKEL SILVER—PHOSPHOR BRONZE

"CONTROLLED GRAIN" NICKEL ANODES

EXHIBITING BOOTH F92, NATIONAL METAL CONGRESS, ATLANTIC CITY, OCT. 18-22

activity has been in galvanizing. The new electrogalvanizing processes continue to set the pace, though competition is closing in. Weaknesses have showed up, at least to the extent of furnishing "talking points" and hot galvanizers have started to tighten up. New hot processes have appeared, at least one of which seems good enough to challenge the electros. These new hot processes all aim at establishing an extremely thin and flexible bonding layer of alloy, covered by a layer of pure zinc of controllable thickness.

Controlling Shape of Die Affords High Physicals

BY K. R. BEARDSLEE

General Sales Manager, Carboloy Co. Inc., Detroit

WIRE specifications that ten years ago were considered impossible now are being accepted as common practice. Some specialty wires today are heavy drawn within a tolerance of 0.0005-inch. Special bright finishes that result in lower costs and a better finished product, now are considered ordinary production. Increased physicals have been made possible by not only the longer life but a more easily controlled shape of a tungsten carbide die. Tungsten carbide dies have made commercial drawing of stainless and alloy steels possible.

All low-carbon, alloy, stainless, copper and brass tubing can be drawn through this type die with closer tolerances and a more uniform surface finish. Many grades of alloy tubing now are being drawn over mandrels made of this material with more uniform inside surface finish as well as exacting wall tolerance.

Many parts formerly machined or ground to size, are being sized in carbide dies. For special sizing operations these dies now are produced as large as 5 inches inside diameter and larger sizes soon will be available.

Burnishing nuts and extruding bolts with this type die have resulted in a closer tolerance and an improved finished product.

Improved mill equipment has eliminated shock and provided adequate cooling of dies, enabling producers to draw at higher speeds with economical die life. Many mills have installed cooling on present equipment and are obtaining lower die costs and a better finished product.

Straight-Line Production Favored by Wiremakers

BY B. L. McCARTHY

Chief Metallurgist, Wickwire Spencer Steel Co., Buffalo

STRAIGHT-LINE production from rod to wire with minimum delay between processes appears to be the modern trend in the wire industry. Most changes are the result of improvements in machinery and equipment, which, however, have been prompted by advances in technical knowledge of wire drawing. These developments have been definite savings in handling and equipment costs, and orders, which in the past would require two or three days for completion, now can be finished the same day they are started.

In the cleaning house, circular arrangement of cleaning tubs gradually is being replaced by a straight line set-up. Perhaps the most important recent development is the flash baker which provides a continuous flow of stock from cleaning house to drawing room.

Use of tungsten carbide as a die material has become almost universal. In the drawing room, the trend is toward the multiple draft machine for tonnage sizes. Improvements in cooling dies as well as the wire have accounted for some of this development in wire drawing equipment.

In the patenting room, the multiple-burner, 3-zone, furnace seems to be the desired type and there is a decided trend toward higher patenting temperatures and speeds. Use of salt baths for annealing is becoming more common, but as yet application seems to be limited to small lots of special material. Indications are that in the near future pot-type annealing equipment must give way to the newer annealing equipment which provides for atmospheric control and wherein the furnace in the form of a hood is placed over the stock.

In line with these developments, technical knowledge of wire manufacture is going forward. Today, because of a better knowledge of the metallurgy of wire drawing, more attention is given to proper making and selection of heats of steel and more importance is attached to the study of the heat treatment of wire prior to cold working. As a result, rejections are decreased and a more economical practice prevails.

25 to 80% Savings

with B&W Insulating Firebrick

Low heat-conductivity, low heat storage capacity and ability to withstand rapid temperature changes when directly exposed to the furnace atmosphere, are features of B&W Insulating Firebrick. Savings in fuel consumption of 25 to 80 per cent have been reported by users of these brick for industrial furnaces of many types.

When used as "backing up" insulation, they have structural stability under continuous heating which results in permanently high insulating value, and a high factor of safety. Such stability is not always found in insulators suitable only for "backing up".

Write for list of applications and typical performance data.

For Longer Life—
B&W 80 and Junior Firebrick

Considerably longer refractory life under severe operating conditions—hence lower maintenance costs—have made these refractories the first choice in billet and bloom furnaces, forging and welding furnaces, plate and angle furnaces and many other types.

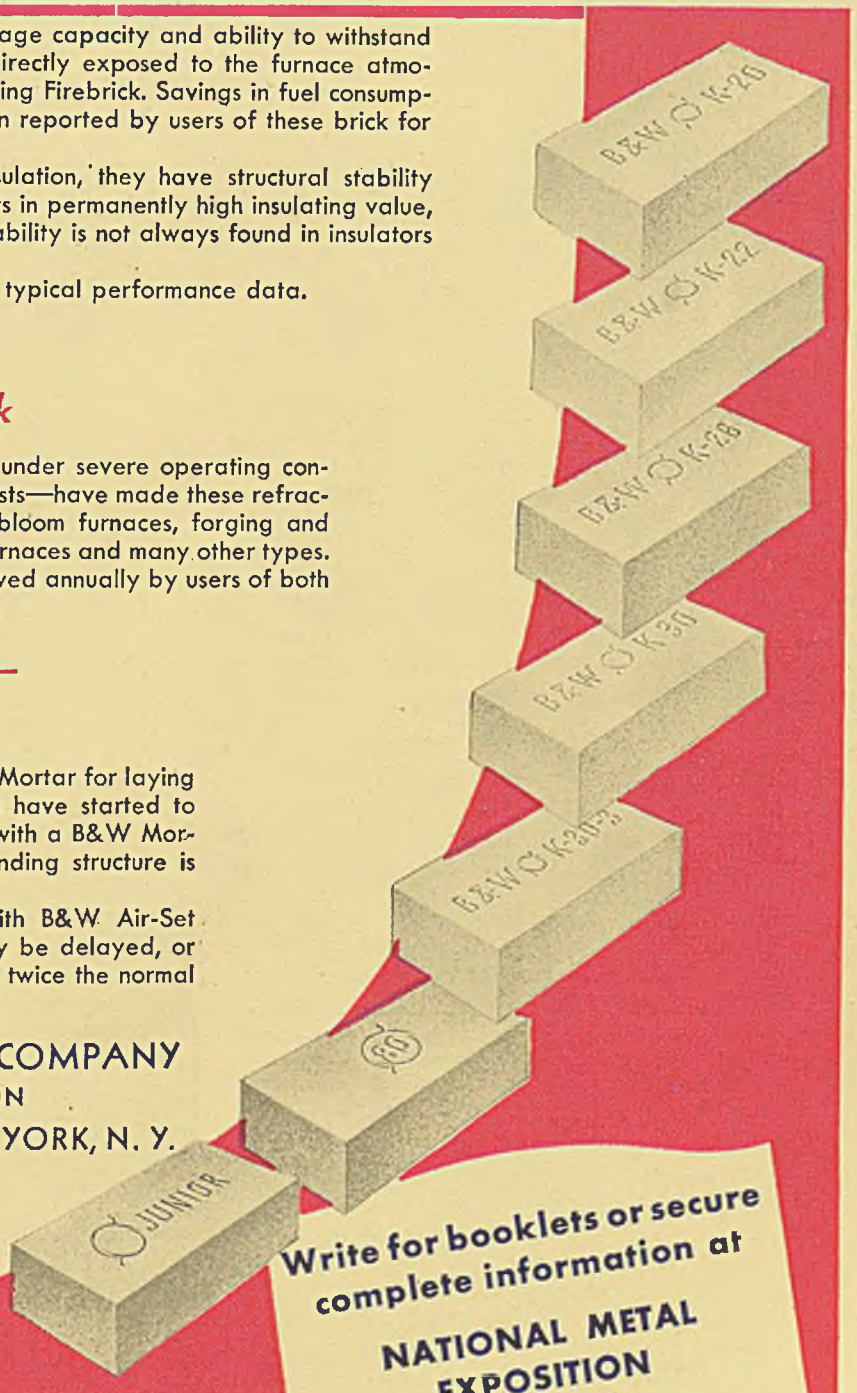
Thousands of dollars are being saved annually by users of both B&W 80 and B&W Junior Firebrick.

For Reduced Maintenance Cost—
B&W Mortars and Plastics

To increase furnace life, use a B&W Mortar for laying up new brickwork. If sections which have started to deteriorate are promptly repaired with a B&W Mortar or Plastic, failure of the surrounding structure is prevented.

By coating spalled brickwork with B&W Air-Set Mortar, a complete relining job may be delayed, or even eliminated entirely, resulting in twice the normal life of the brickwork.

THE BABCOCK & WILCOX COMPANY
REFRACTORIES DIVISION
19 RECTOR STREET NEW YORK, N. Y.



Write for booklets or secure complete information at

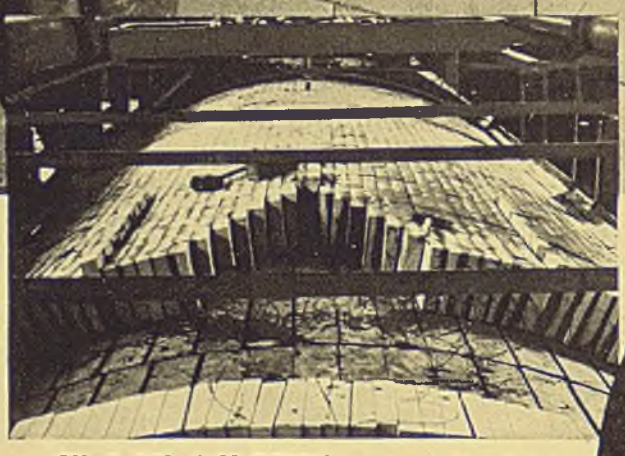
NATIONAL METAL EXPOSITION
Booth B-14

BABCOCK & WILCOX

R-59

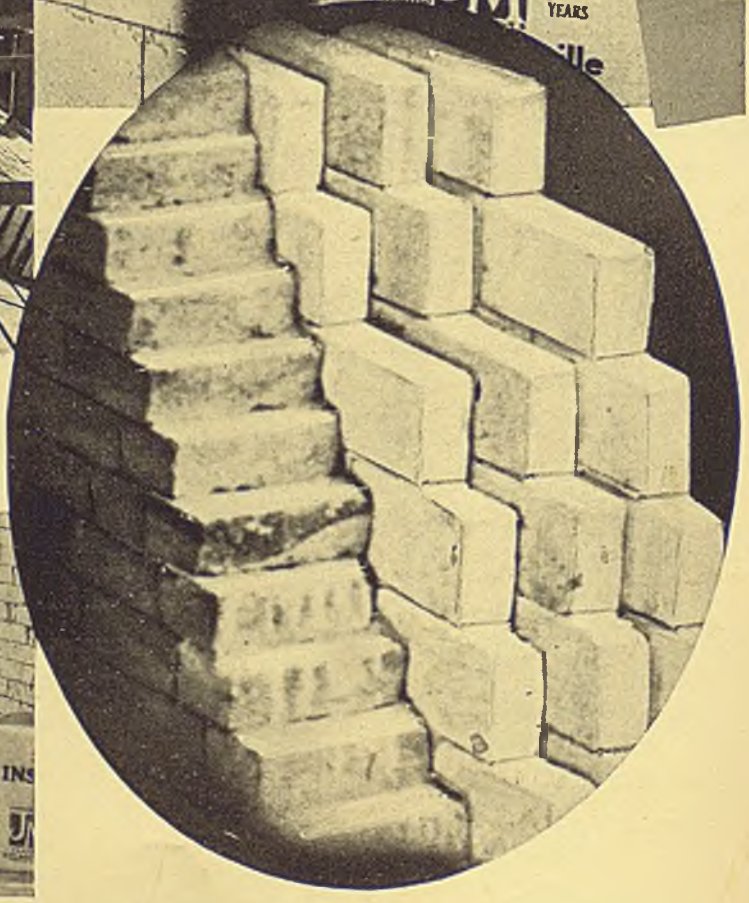
HELPING INDUSTRY

J-M SUPEREX BLOCKS are recognized as the outstanding block insulation for use behind refractory linings in service up to 1900° F. They are particularly suited for the insulation of hot-blast stoves, producer-gas mains, open-hearth regenerators and flues, soaking pits and all types of re-heating and heat-treating furnaces.



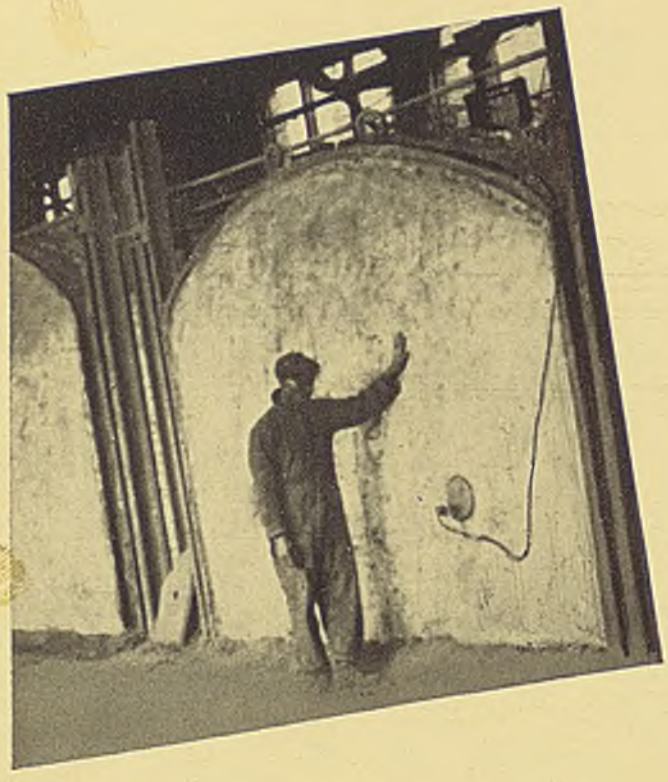
SIL-O-CEL C-22 BRICK, as a combination insulation and refractory lining in walls and roof of this normalizing furnace, makes possible thinner walls and improved operating efficiency.

JM-20 BRICK is equally effective as a back-up insulation material or as an insulating refractory for operating temperatures up to 2000° F.



SIL-O-CEL NATURAL BRICK is the most efficient insulating brick obtainable for use behind refractory linings where subjected to temperatures up to 1600° F.

HARNESS *Heat*



SIL-O-CEL C-3 CONCRETE for lining furnace doors and bases conducts less than one-third as much heat as firebrick; weighs less than half as much. It is also the ideal material for insulating open-hearth flues and those sections of the regenerator system below ground.

For Every Operating Temperature . . . for Every Type of Furnace . . . There's a J-M Insulation that Will Give Maximum Efficiency and Economy

BACK of the complete line of Johns-Manville Insulations is an engineering and research organization that has specialized for years in the science of heat control. Experienced in the solving of every steel-mill insulation problem, J-M engineers have developed specialized insulating materials and insulation methods that have helped the iron and steel industry improve performance and lower operating costs on every type of heated equipment.

Five of the most widely used J-M Insulations are shown here. Each is designed to do a specific job, efficiently and economically. And for boilers, steam lines and other insulation requirements, there are additional J-M Insulations that are equally effective in the service for which they were designed.

For complete information on all Johns-Manville Insulating Materials, visit Booth C-43 at Atlantic City. Or write Johns-Manville, 22 East 40th Street, New York, N. Y.

See Our Exhibit at
NATIONAL METAL EXPOSITION
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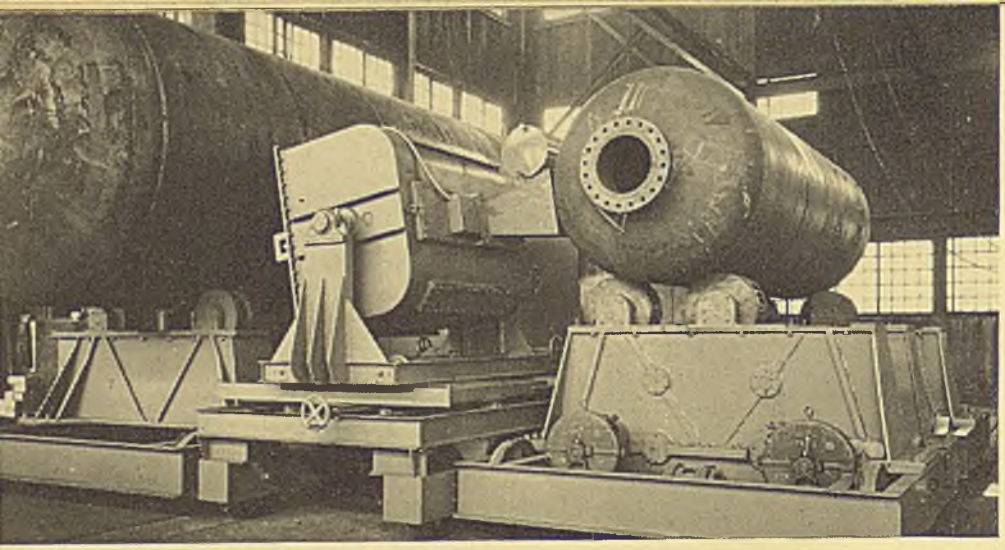
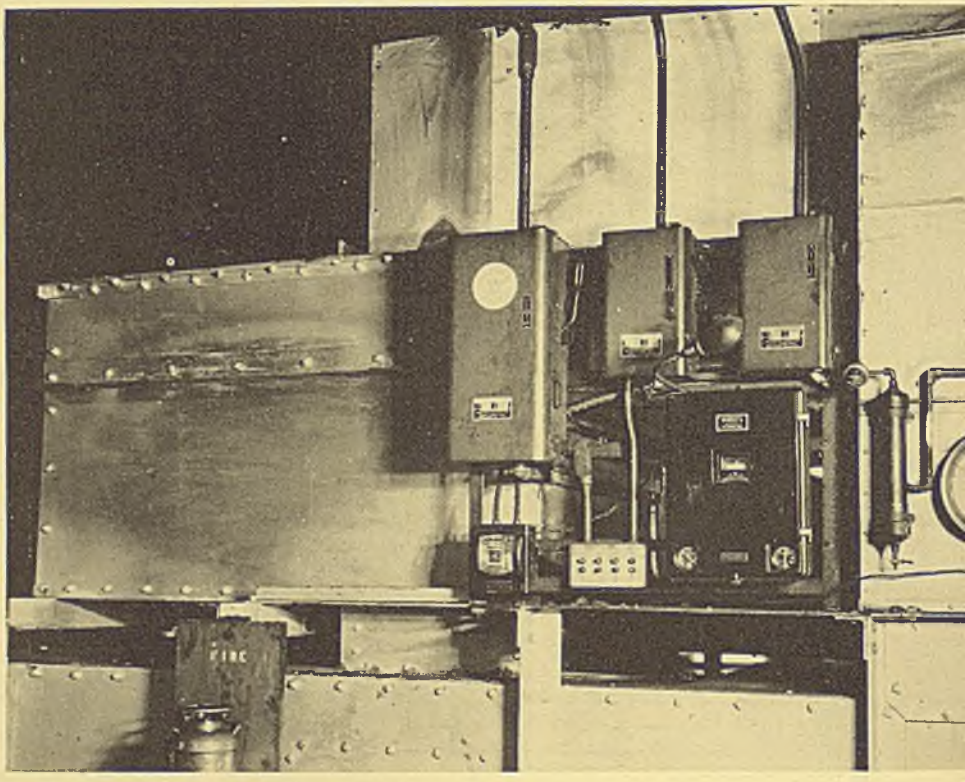
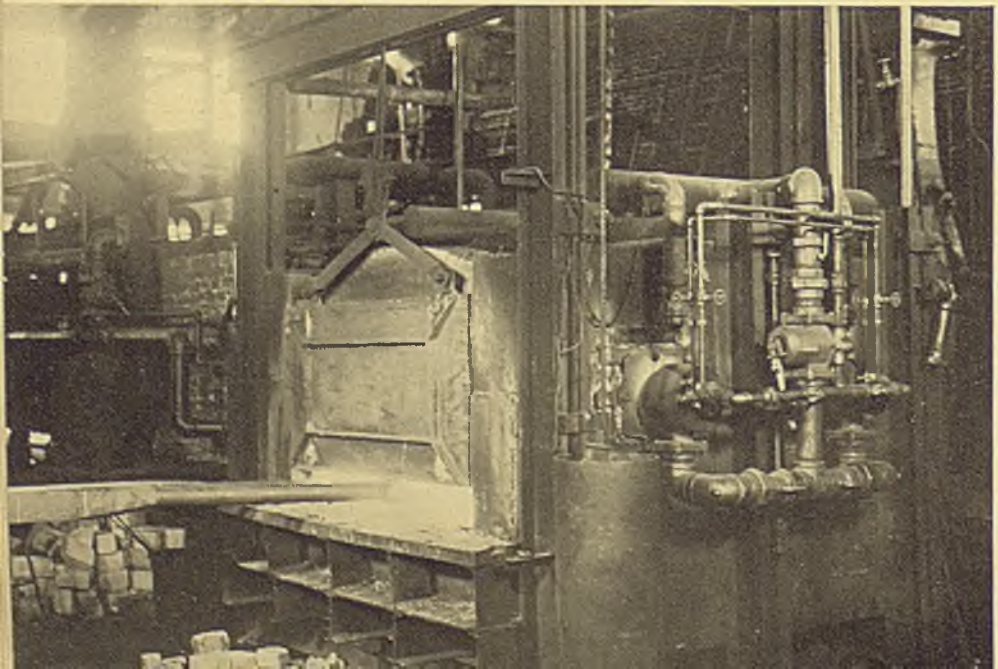
Johns-Manville
INDUSTRIAL INSULATIONS
An insulating material for every temperature . . . for every service condition



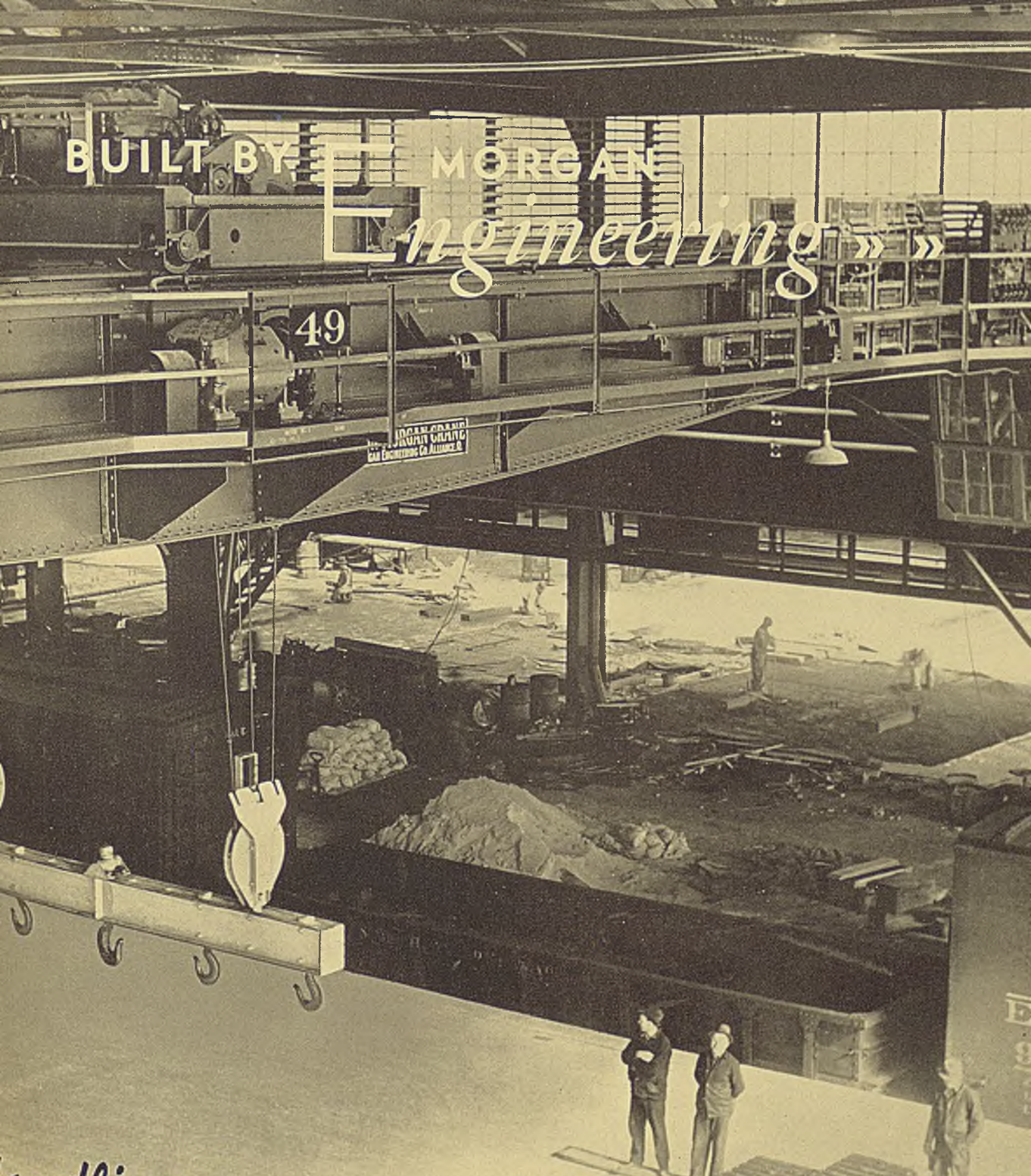
■ Nondestructive testing of Class I welds in 5-inch rolled steel plate is possible with this 400-kilovolt, 5-milliampere machine built for Blaw Knox Co., Blawnox, Pa., by General Electric X-ray Corp., Chicago. Apparatus permits making of radiographs on either of two vessels by rotation of X-ray head, making it possible to work on one vessel while the other is being inspected



■ Full floating control of high temperatures is assured in the heat treatment of flat automobile spring stock steel at the plant of Eaton Spring Co., Detroit. Controller, known as the Stabilog, is of the potentiometer type manufactured by Foxboro Co., Foxboro, Mass., and has a maximum range of 1800 degrees Fahr.



■ Commercial forgings of all types can be heated in this furnace equipped with four luminous flame burners and two air-gas proportioning valves manufactured by North American Mfg. Co., Cleveland



andling COILS OF STRIP WITH MORGAN CRANE

• Here is one of an installation of six Morgan 15-ton, double hook, Coil Handling Cranes in a large steel mill. One group of three has a span of 105′2″ each, the other group of three has a span of 110′6″ each. All are equipped with welded fabricated trolleys and bridge trucks, most efficient type hoist, magnetic friction

known safety device. In building cranes for 55 years, Morgan Engineering has acquired through close association with the steel industry a thorough knowledge of how important to profit it is that there is no skimping in any detail of construction. Morgan does not build all the

★

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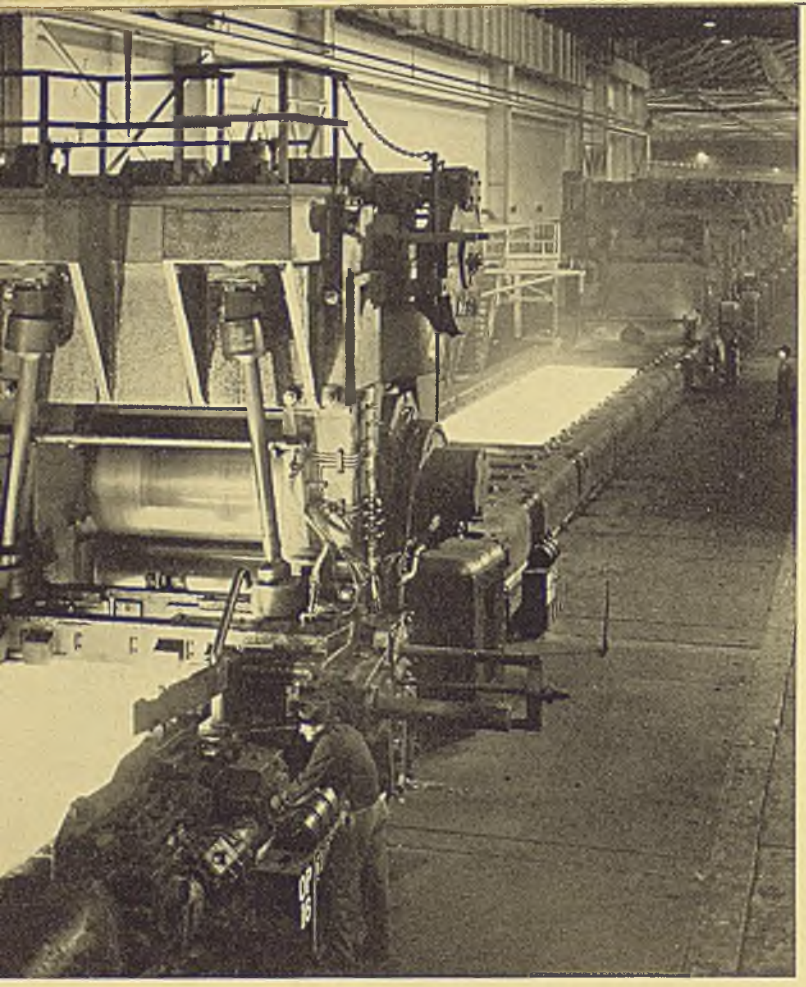
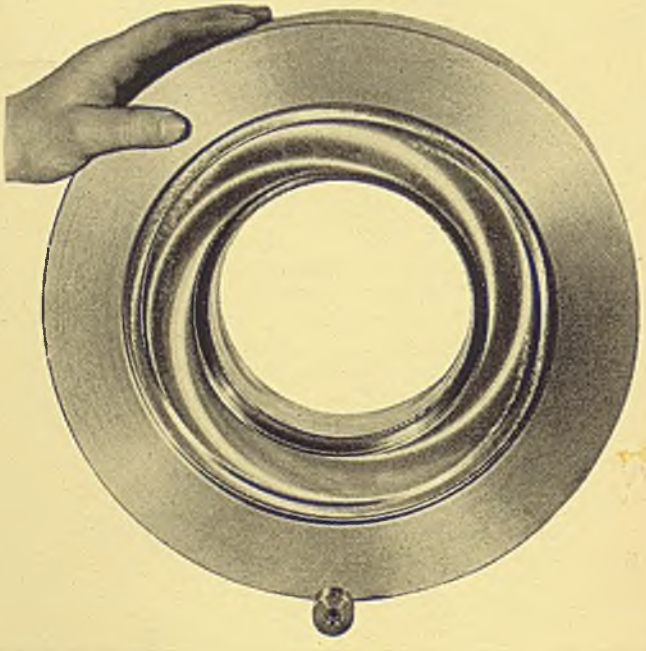
DESIGNERS • MANUFACTURERS • CONTRACTORS

Blooming Mills • Plate Mills • Structural Mills
Electric Traveling Cranes • Charging Machines
Ingot Stripping Machines • Soaking Pit Cranes
Electric Welded Fabrication • Ladle Cranes
Steam Hammers • Steam Hydraulic Forging
Presses • Special Machinery for Steel Mills

THE MORGAN ENGINEERING CO.



■ Advanced design of equipment for the production of sheet and strip steel is reflected in Jones & Laughlin Steel Corp.'s new 96-inch continuous mill. Shown is the No. 4, 4-high roughing stand and 100-foot roller table, with finishing stands in background. Large parts are required for such mills. Large back-up roll in foreground weighs 55 tons



■ Largest tungsten carbide die made to date, for sizing large metal cylinders, has internal diameter of 4¾ inches and was made in six parts. Wire drawing die shown at bottom, with internal diameter of 0.325-inch, is believed to be the smallest. Both were made by Carboloy Co. Inc., Detroit

■ In assembling soda fountains at its Grand Haven, Mich., plant, Bastian - Blessing Co., Chicago, employs electric arc and oxyacetylene welding, despite the fact that the company manufactures a line of gas cutting and welding equipment. The gas welding unit used on production work on soda fountains and freezer equipment consists of a lightweight torch with 2-stage regulator and a gas economizer

EXPERIENCE

ACI Quality Coals can stand the spotlight of experience, for they give complete fuel satisfaction with the utmost economy. Nature has endowed these finest bituminous coals in the world with many **plus** factors.

In addition, these standardized products are properly prepared and are backed by the fine engineering service available from our Fuel Engineering Division and the trained fuel engineers representing our 134 constituent companies. You, as a user of industrial coals, are entitled to ACI engineering service. These coal technologists are ready to help you choose the **ACI Quality Coal** that is best suited to your particular needs; ready to advise you concerning the best methods of utilizing high volatile coals from the ACI mines in eastern Kentucky, eastern Tennessee, southwestern Virginia and southern West Virginia.

ACI Quality Coals, due to the nature of their volatile content and low sulphur, are important aids to the iron and steel industries. They contain heavy hydro carbons which distill into tar vapors in the gas producer, giving high luminosity, high visibility to the flame, which flame readily transfers heat to the steel bath, helping to melt the steel in the shortest possible time.

Write to the address given below for more information on the use of **ACI Quality Coals** in the successful, economical operation of blast furnaces or steel plants. Also, ask for "Where to Buy ACI Quality Coals."

APPALACHIAN STABILITY W VA VA KY TENN ACI QUALITY · SERVICE COALS INC

Appalachian Coals, Inc.

TRANSPORTATION BUILDING •• CINCINNATI, OHIO

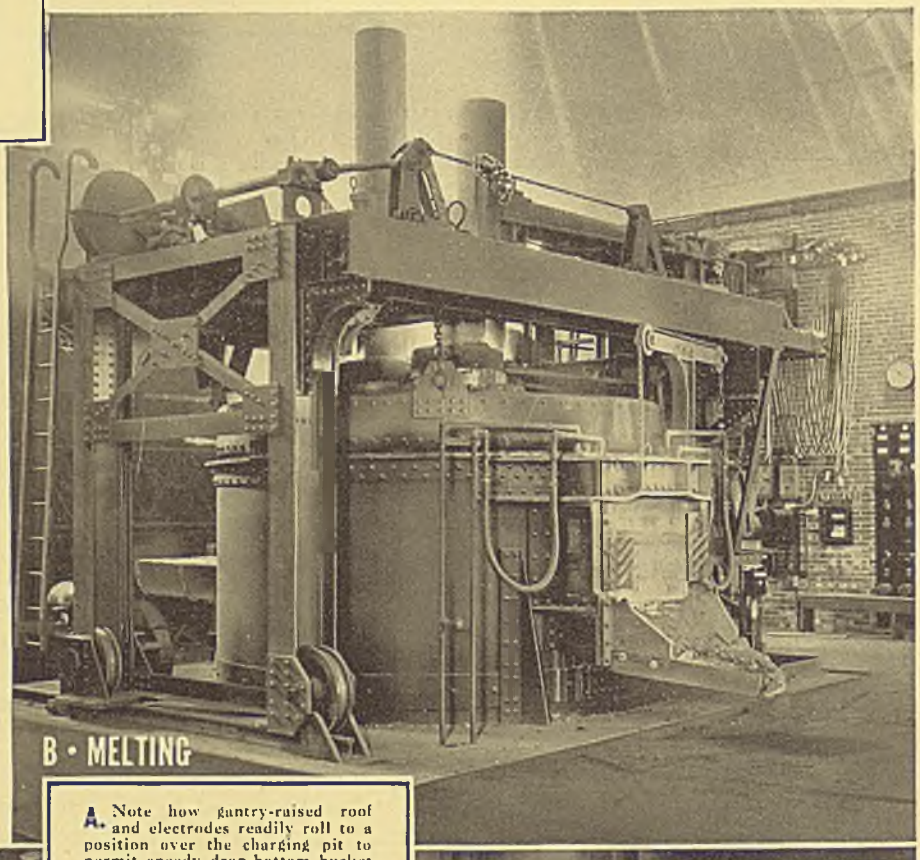
Now.. 5 NEW MAJOR FEATURES IN Heroult ELECTRIC FURNACES

1. Gantry-type removable roof.
2. Lightweight, corrosion-resistant roof coolers.
3. Improved wedge-type electrode holders.
4. Water-cooled, current-carrying copper tubing arranged to prevent hysteresis and eddy current losses.
5. Attached floor, tilting with shell when pouring.

THESE, and other recent innovations, give you an efficient, modern production tool with excellent metallurgical and low-cost operating performance.

Heroult Electric Furnaces have gained a remarkable reputation by efficient melting and refining of ferrous materials — alloy, tool, and stainless steels; iron or steel castings. These improved furnaces are sturdily built with simple, effective tilting mechanisms. Dependent on size and operating requirements, they are adaptable to hand, chute, machine or drop-bottom bucket charging. Capacities range from ½ to 100 tons.

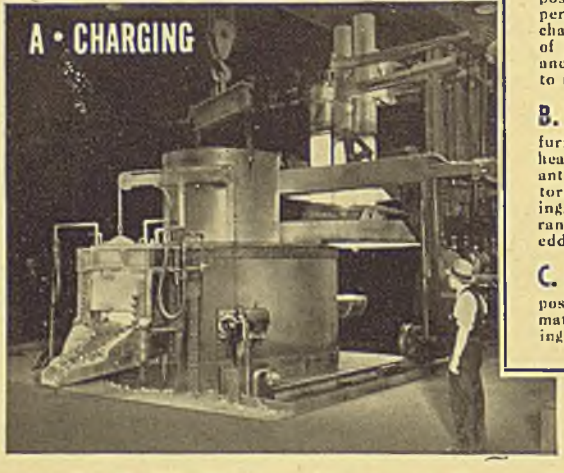
To meet your specific requirements, American Bridge offers complete facilities for design and construction of these unusually efficient, easily operated electric furnaces.

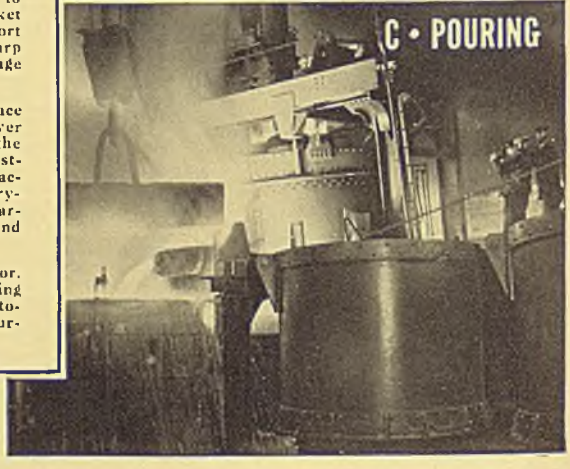


A. Note how gantry-raised roof and electrodes readily roll to a position over the charging pit to permit speedy drop-bottom bucket charging how four-point support of the raised roof eliminates warp and consequently reduces damage to refractories.

B. Here is the improved furnace in action with gantry frame over furnace and roof lowered for the heat. Lightweight, corrosion-resistant roof coolers save roof refractories; water-cooled, current-carrying, copper tubing is uniquely arranged to prevent hysteresis and eddy current losses.

C. As if one unit, furnace, floor, gantry, and roof, still in melting position, tilt together in an automatic, electrically controlled pouring action.





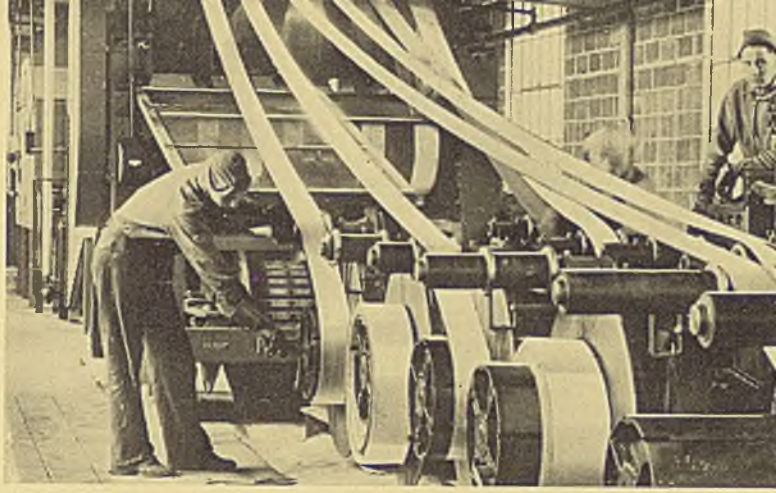
AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

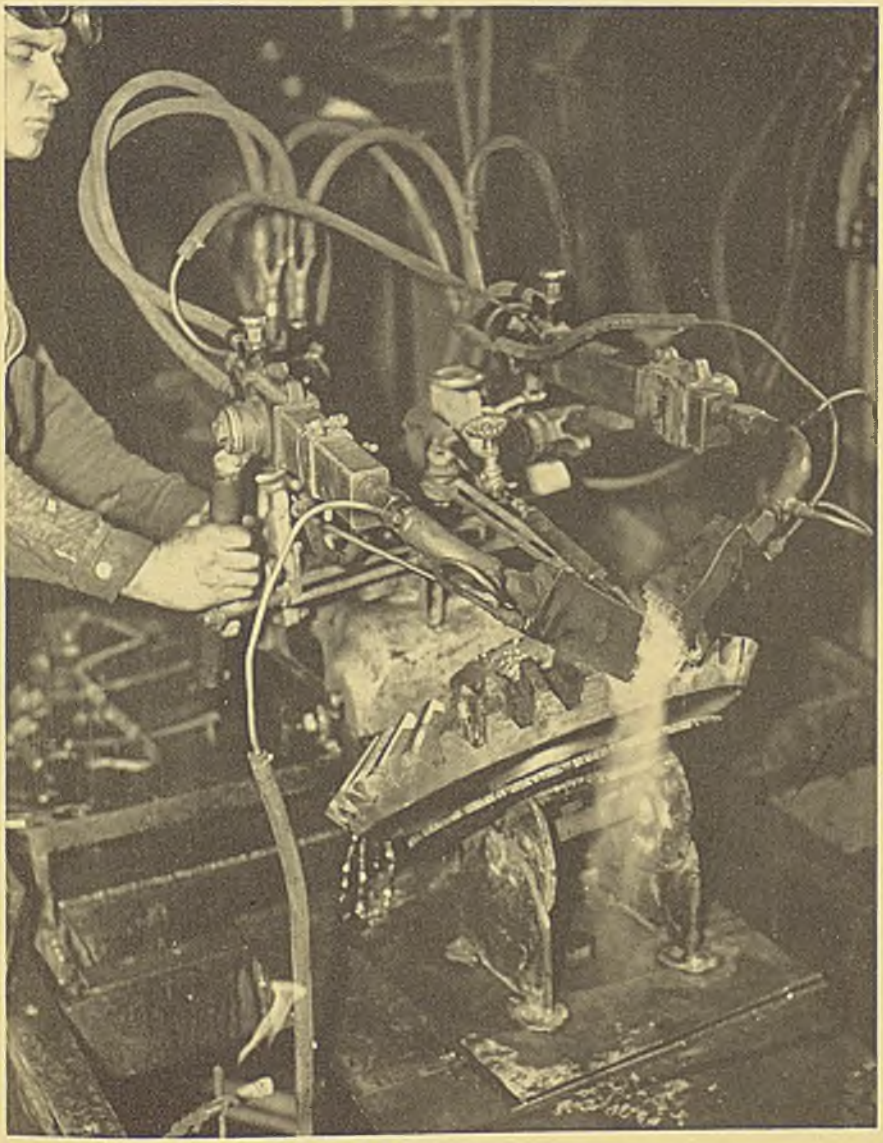
Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

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

UNITED STATES STEEL

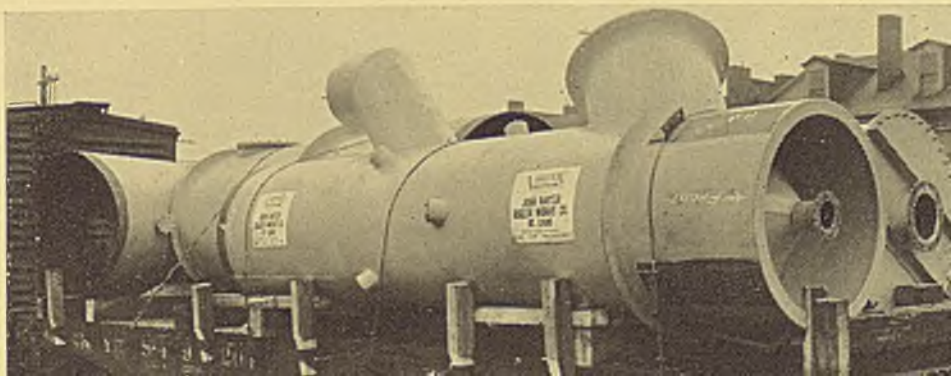


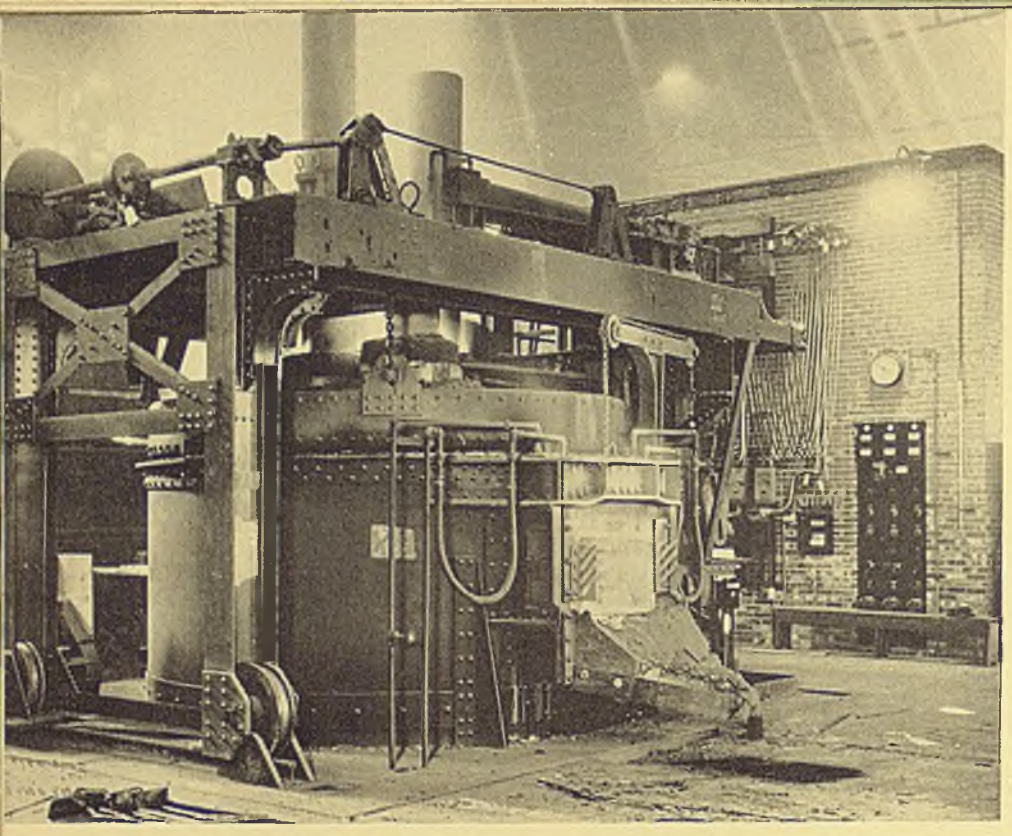
■ Electrocoating of cold rolled strip steel is carried on as a continuous process by Thomas Steel Co., Warren, O. Among the protective or decorative coverings applied are zinc, copper, nickel and brass



■ Use of twin oxyacetylene torches in a gear hardening operation hardens both faces of the tooth simultaneously, cutting down time of operation as well as minimizing possibilities of tooth distortion. Lakeside Steel Improvement Co., Cleveland, is applying flame hardening to an increasing number of products

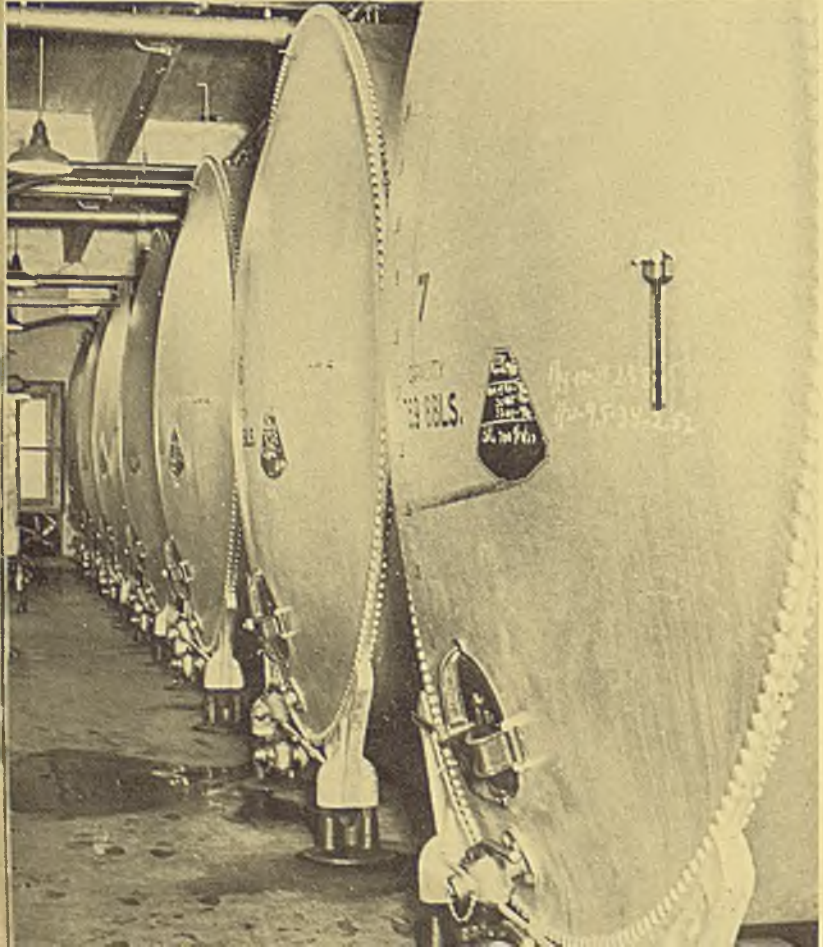
■ Installed in the spring of this year in the fertilizer plant of Tennessee Valley Authority at Wilson Dam, Ala., this all welded dehydrator unit was fabricated by John Nooter Boiler Works Co., St. Louis, using 33,000 pounds of ⅜ and ½-inch stainless clad steel made by Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago

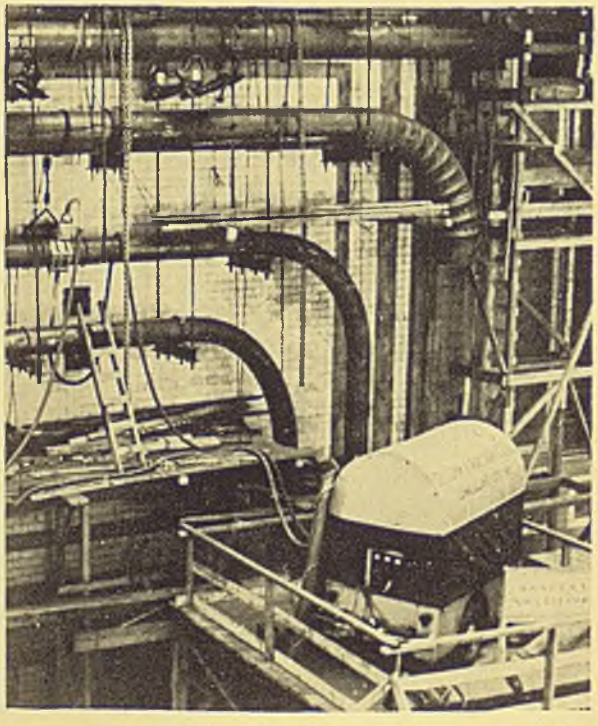




■ New gantry-type removable roof for Heroult electric furnace has been developed by American Bridge Co., Pittsburgh. An automatic, electrically-controlled mechanism raises roof and, while supported by gantry frame, both gantry and roof are rolled to a position over charging pit, clearing the furnace to permit charging by means of a drop-bottom bucket. For pouring, furnace, with roof in place, gantry and floor are tilted as one unit

■ No riveting or welding entered into this battery of glass lined tanks built by Pfaudler Co., Rochester, N. Y., for Koppitz-Melchers Inc. brewery, Detroit. Known as ring tanks, a type used prior to the advent of welding, they are made of flanged sections bolted together. Heads are bolted to the end rings. Capacity of any tank may be increased by adding new rings





■ Improvements in inspection equipment have been made during the past year. This portable X-ray unit, developed by St. John X-Ray Service Inc., Long Island City, N. Y., is set up for inspection of a field welded pipe joint in a power house under construction. Connection with generating equipment is through 30-foot cables. Shock and ray-proof tube is shown on one side of the pipe; film holder on the opposite side

UP goes the Curtain

Holden Exhibit

at

Atlantic City

Booth No. B-32

A NEW PROCESS

¶ THIS PROCESS is a product of Holden Research which has required more than two years of study and development.

¶ IT APPLIES to operations which range in temperature from 1500° to 2500° F, where work free from scale and decarburization is a problem.

¶ EQUIPMENT can be fuel fired or electric electrode

¶ ASSURED SAVINGS of 10 to 30 per cent

¶ NO SCALE, Maximum Hardness

• • •

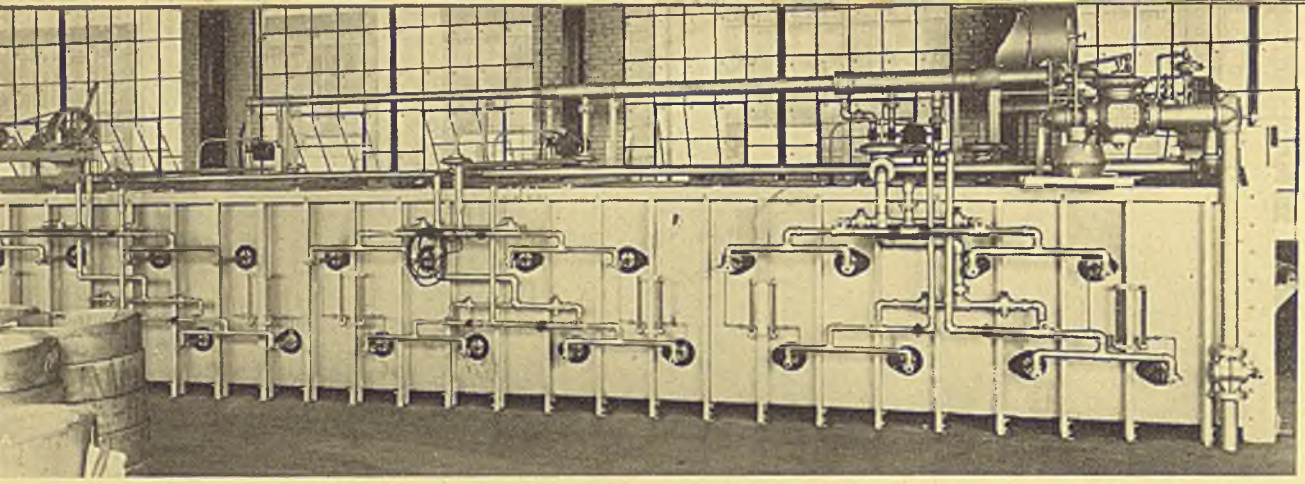
COME
LOOK
AND BE
CONVINCED

• • •

Reduces Processing Time **50** *per cent*

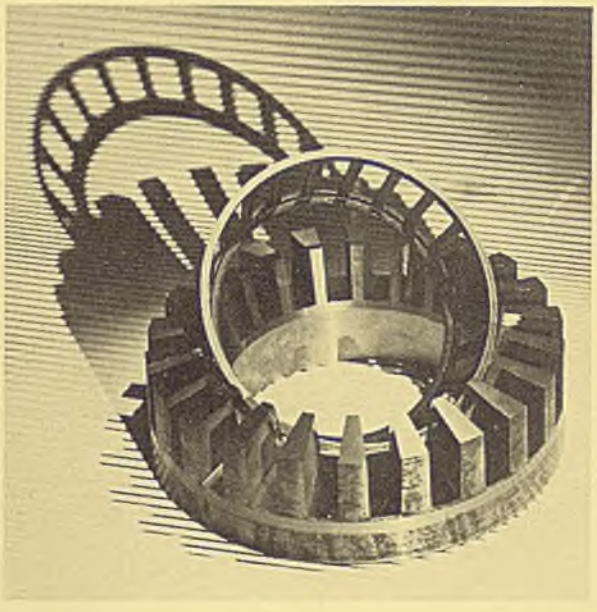
HOLDEN Baths

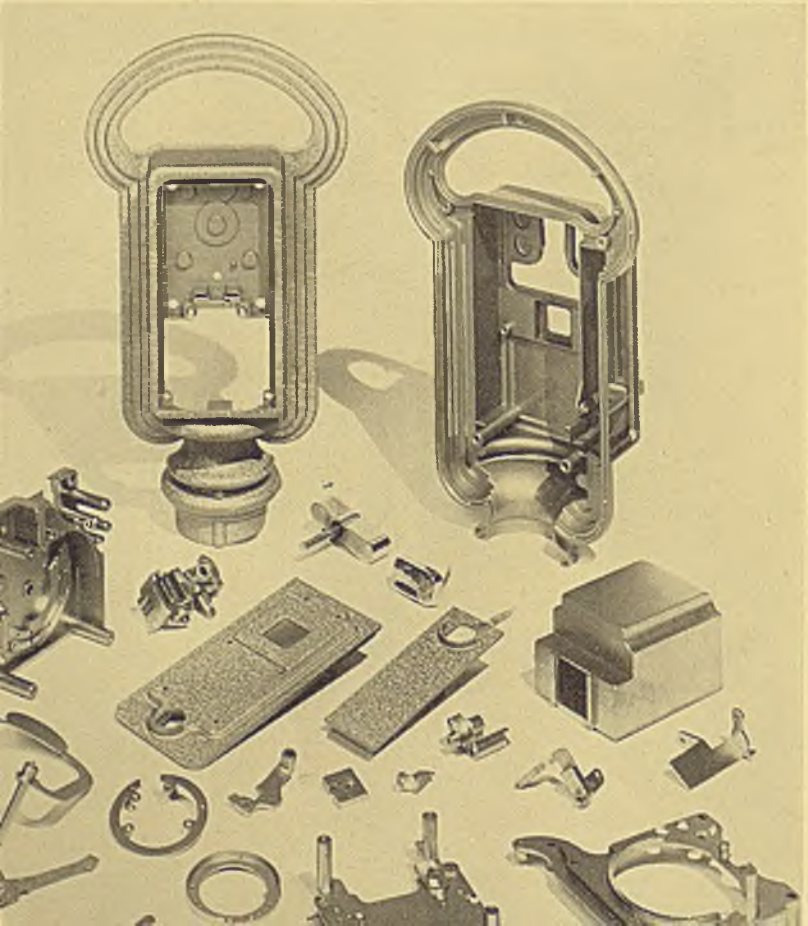
A. F. HOLDEN COMPANY
NEW HAVEN, CONN.
Developers of Heat Treating Baths



■ Relatrol temperature control equipment of Automatic Temperature Control Co. Inc., Philadelphia, is utilized with this continuous gas-fired furnace built by W. S. Rockwell Co., New York, for heat treating 27-inch stainless steel strip. Furnace temperature is controlled in three zones by valves having a finely-graduating incremental movement proportional to temperature deviations

■ Graphitic steel is a new development by Timken Roller Bearing Co., Canton, O., whereby free machining qualities, high resistance to wear and good frictional properties of cast iron are combined with uniformity, ease of hot or cold working, ready response to heat treatment and good physical properties of steel. Illustration shows application of this steel to dies used in making tapered roller bearing cages





■ Coin operated machinery manufacturers are turning toward complete assemblies of die castings as typified by these parking meter parts. Virtually the entire meter is composed of 23 zinc alloy die castings. Note the many functional parts as well as the intricacy attained through die casting to save machining and assembly costs. Photo courtesy New Jersey Zinc Co., New York

STOP...

AT BOOTH G-11 FOR THE STORY OF THESE NEW, TESTED AND PROVEN

Corrosion-Preventives

This announces a completely revolutionary series of Corrosion Preventives developed and manufactured by the ALOX CORPORATION of Niagara Falls, New York. Compounded from ALOX formulas, with ALOX patented Bases, they have shown in exhaustive and conclusive tests that they OUTLAST BY WIDE MARGINS all other similar materials used in anti-rust and anti-corrosion applications. • In addition to their sensational "staying" qualities, these new anti-rusts are available for the widest possible range of applications. Thin filmed, long lived, non-toxic, they stay put—and yet they clean easily. They act as lubricants when forming metal. They are easy to apply—by brush, spray or dip. AND, IN THE LONG RUN THEY COST LESS—BECAUSE THEY GO FARTHER AND LAST LONGER.

ALOX CORPORATION

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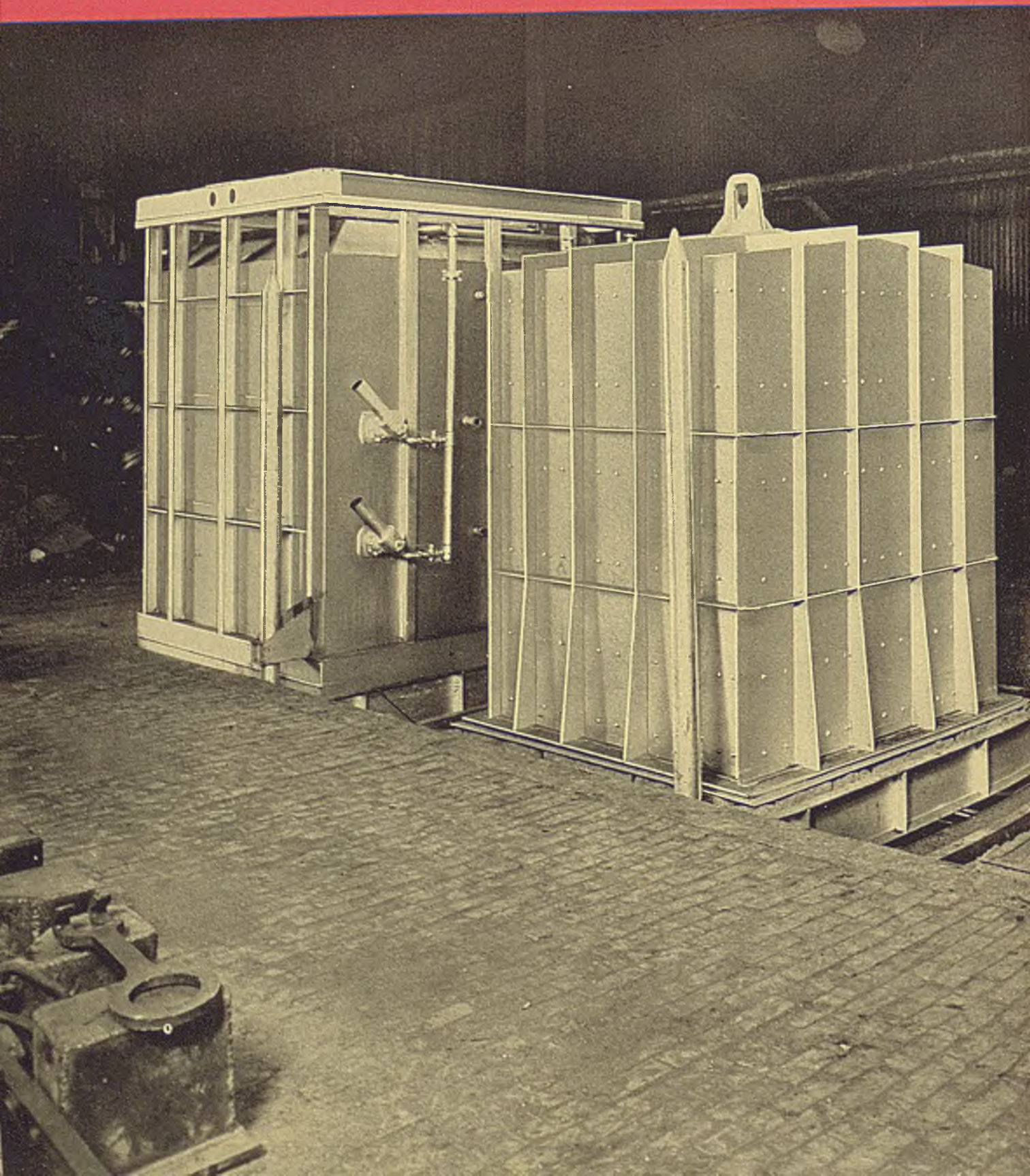
Check up on these claims made for ALOX. We will furnish samples and data for testing purposes to responsible concerns.
Check up on unusual anti-corrosion, anti-rust and slushing compound problems with ALOX chemists.
Let ALOX hear from you—whether you come to the booth or drop us a note from your office.

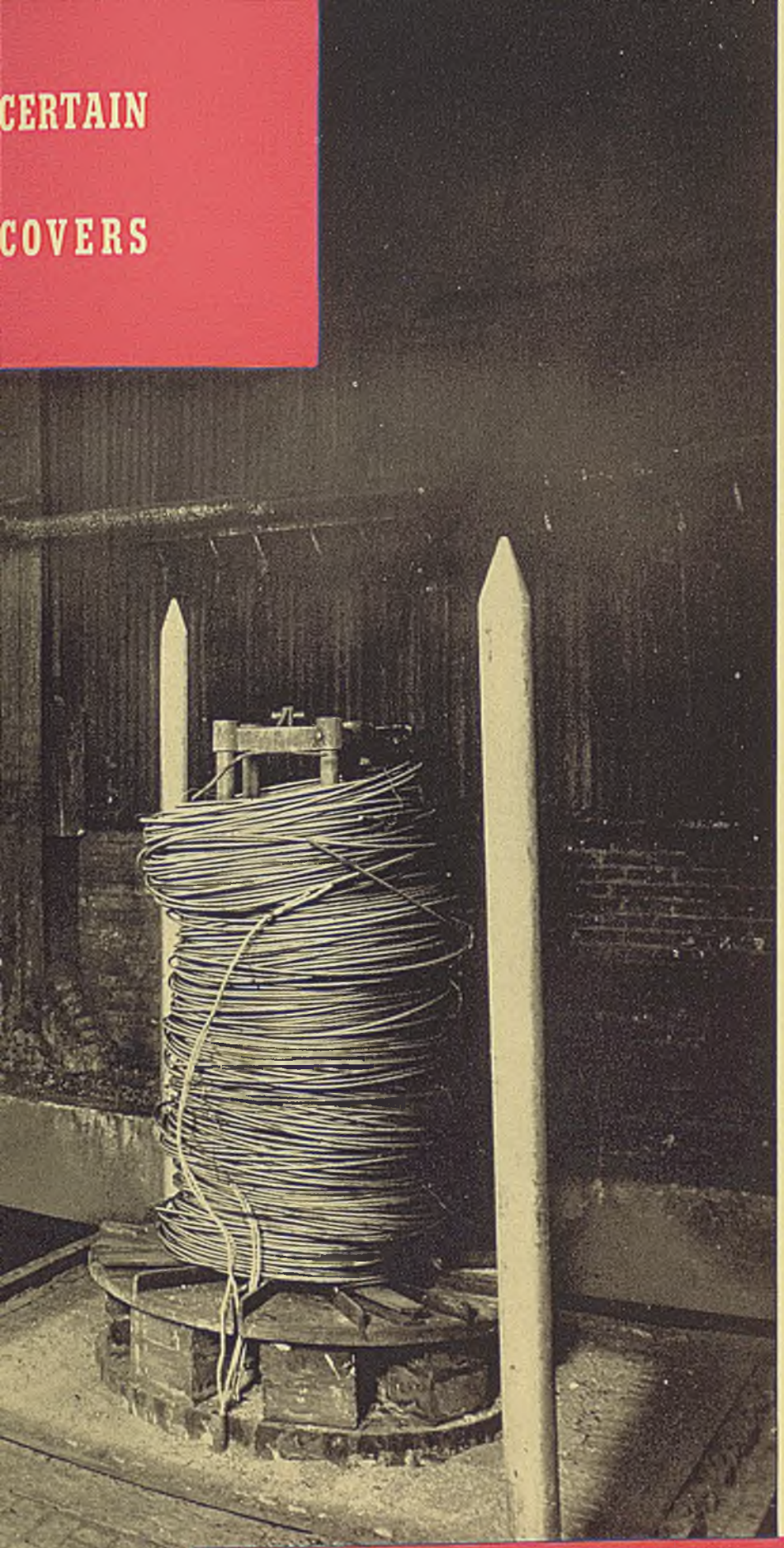
ANNEALING **ROD AND WIRE** MORE UNIFORMLY I

WITH SC SINGLE STACK RADIANT TUBE HEATIN



CERTAIN

COVERS



This is the latest type SC fuel-fired *radiant tube* annealing cover, equipped with recirculating fan-in-base, used for both annealing and spheroidizing rod and wire in coils. An insulated cooling cover, shown in center, used when spheroidizing, is placed over the inner cover after the heating cover is removed.

For more rapid and uniform heating, radiation and convection heating are combined in this new type heating cover. Formerly, work was heated entirely by radiation, and heating of coils proceeded mainly from the outside surface of the stack.

In this new SC heating cover, recirculating fans in the base maintain forced recirculation of the hot atmosphere gas around both inside and outside of the coil resulting in very uniform and more rapid heating through. Obvious economies are effected in fuel saved.

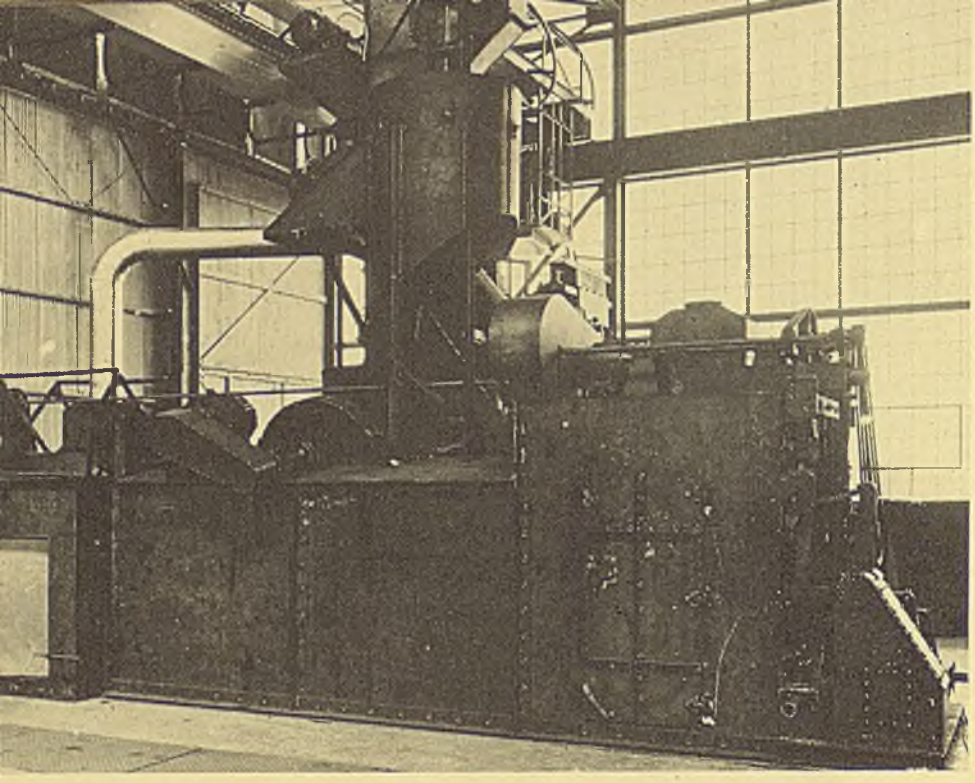
Plants using rod and wire as well as those producing it are rapidly becoming aware of this more modern and efficient method of annealing and spherodizing, and production costs drop rapidly wherever SC heating covers are installed, while improvement in quality rises sharply.

Investigate this now. Ask an SC engineer to call, or send for a copy of "MODERN ANNEALING PRACTICE"—a booklet just published to bring you up-to-date on the most modern methods of annealing.

SURFACE COMBUSTION CORPORATION, Toledo, Ohio.

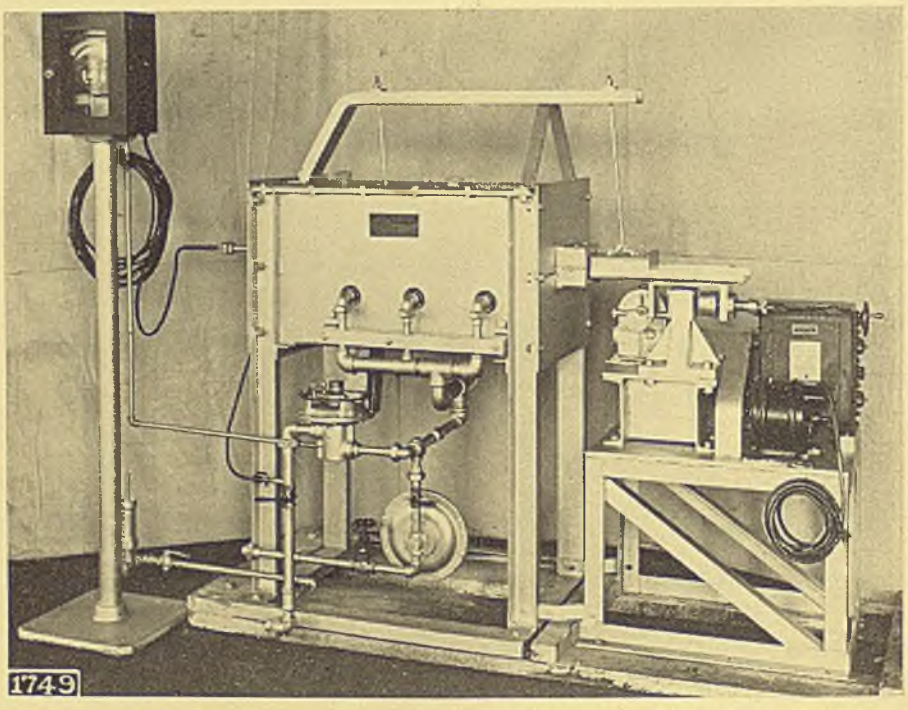
SURFACE COMBUSTION

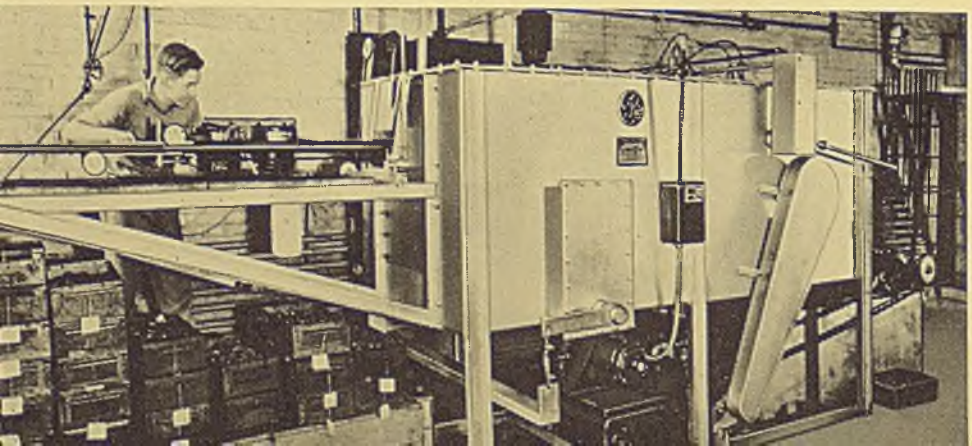
Builders of... ONE WAY F
SOAKING PITS, BILLET HEATERS,
OR PAIR, ANNEALING, CONTRO
ATMOSPHERE FURNACES, NORMAL



■ Blast cleaning of metal products has seen the development of many special machines. This one, a Wheelabrator, recently was built by American Foundry Equipment Co., Mishawaka, Ind., for the purpose of renovating steel drums. Drums are carried through by two rollers, and rotated by two more, thus getting full effect of the blast

■ For a large variety of small parts, this reciprocating heating machine employs a full muffle rather than the open hearth of former designs. Any desired atmosphere can be carried in the furnace and work is advanced by its own inertia. The unit is a product of American Gas Furnace Co., Elizabeth, N. J.





■ Complete electric furnace equipment for scale-free hardening and drawing of drill chuck sleeves has been provided for Jacobs Mfg. Co., Hartford, Conn., by General Electric Co., Schenectady, N. Y. The installation includes the hardening furnace, a drawing furnace and degreasing equipment

after all...

IS MACHINERY A GOOD THING

ONE THING SURE, the world of today wasn't made by hand . . . it was made by machinery. If we had fought this thing out just with our hands, the apes would have licked us long ago.

In the beginning the only animal in the jungle who had sense enough to seize and to use the materials and forces around him was Man. And with this one slight edge he has turned the rest of them into meat for his table, leather for his feet, and circuses for his amusement.

It PAYS to think! It pays to invent! It pays to seek the newer and better way! Don't ever do *anything* with your own two hands that you can do better with your BRAIN!

◆ ◆ ◆

We hear a lot these days about the *evils* of mechanization. Some say machines throw people out of work . . . that, because of machines, millions are unemployed . . . that we are being ground to death by the Frankenstein monster of steel which we, ourselves, have built.

If this is true, then we ought to get out our sledge hammers and smash all this machinery to pieces.

But before we wreck it, let's look at the facts . . . is or is not machinery a good thing?

The job of machinery is to end drudgery, and it's making headway . . . particularly here in America where there is less backache than anywhere else in the world. If you doubt it, just take a trip to Europe. Machinery does not enslave . . . it emancipates! It doesn't empty pockets and stomachs and hearts . . . it *fills them!*

It releases women from soapsuds and washtubs and makes better sweethearts, sisters, daughters, wives and mothers out of them. It has lifted the farmer off a horse and put him on a tractor. And, as for the shopman, it has taught him how to drill a thousand holes *right*, in less time than it used to take him to drill one hole *wrong . . . and to get more money for it.*

"But how about the men that these drill-presses displace?" Don't say "displace" . . . say "*promote.*" Machinery has lifted these men into better jobs. They themselves will tell you so. They'll go even further . . . they'll tell you that, before machinery, anybody who would have dared to suggest a shorter day, a shorter hour week, and a bigger wage, would have been plain crazy.

The fact is that machinery has at last made it possible for the forgotten man to begin thinking in terms of daylight and fresh air and sunshine and LEISURE.

Is or is not that a bad thing?

Without machinery, there could be no volume. Without volume, things would cost more and they wouldn't be anything like as good. Without better goods for less money, only the favored *few* could have modern homes and live modern, full-lunged lives.

This means that without better goods for less money there could be no mass markets . . . meaning no mass employment . . . meaning PERMANENT DEPRESSION! Would we like to see THAT happen?

◆ ◆ ◆

No . . . machinery is NOT a bad thing! It is the best of man-made GOOD things!

We are on our way . . . marching onward and upward to the music of whirring wheels. And LINK-BELT is furnishing its share of the music.

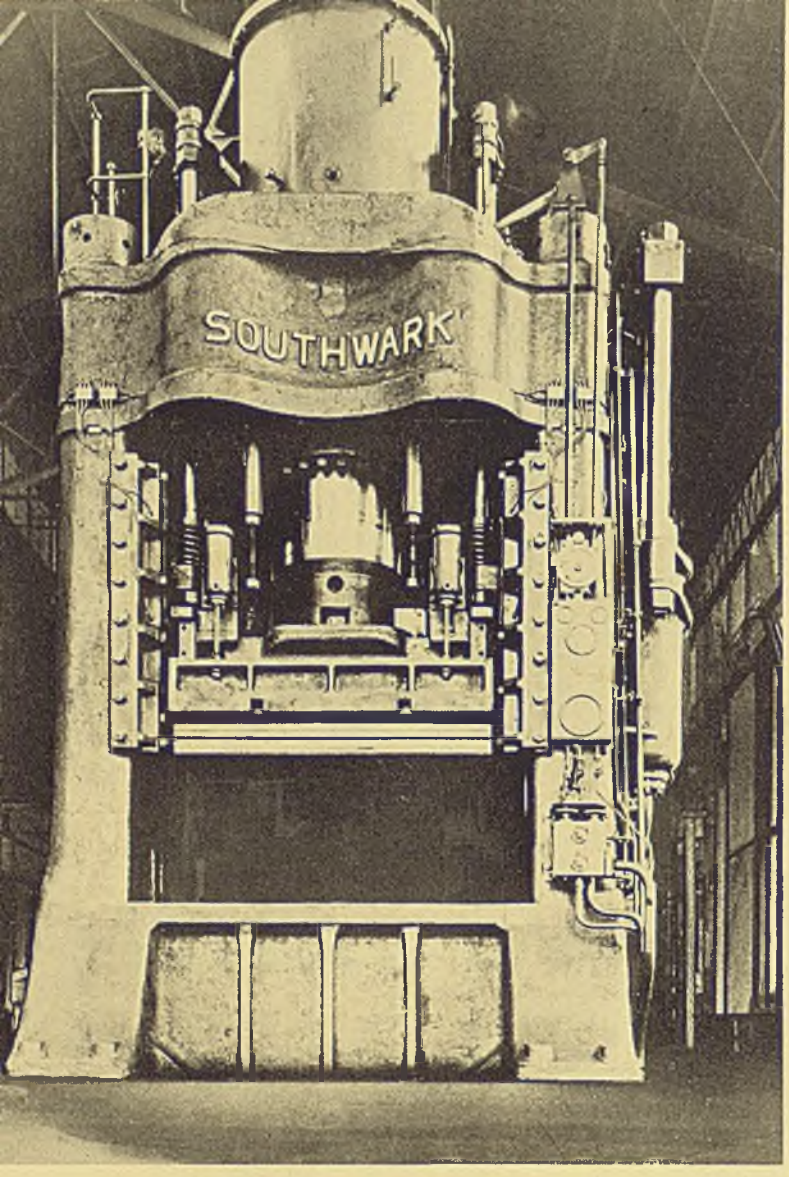
In most machinery, today, LINK-BELT engineering and LINK-BELT manufacturing are playing an increasingly vital and important part.

7146A

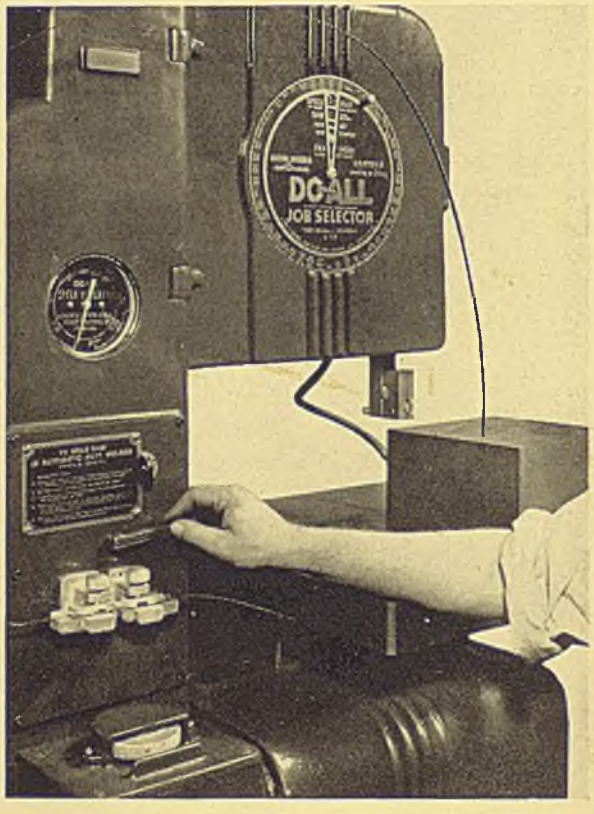
LINK-BELT COMPANY

The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power

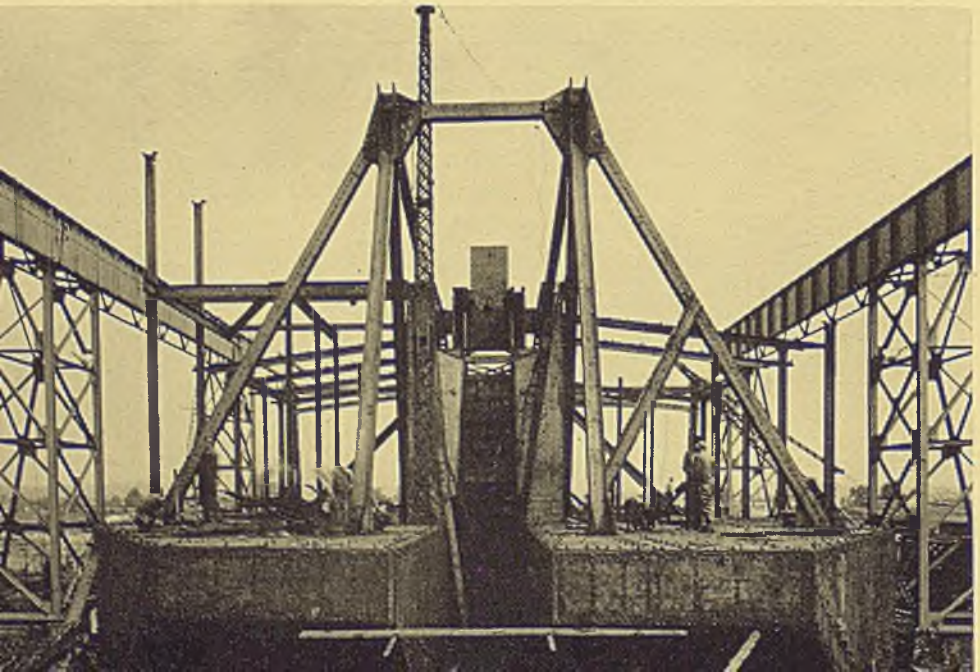
INDIANAPOLIS • PHILADELPHIA • CHICAGO • ATLANTA
SAN FRANCISCO • TORONTO



■ Large tonnages of sheet and strip steel find their way to the forming presses of the automobile industry. Here is shown a 2250-ton, double-acting, high-speed, hydraulic press used in the production of automobile body parts. The press was constructed by Baldwin-Southwark Corp., Philadelphia

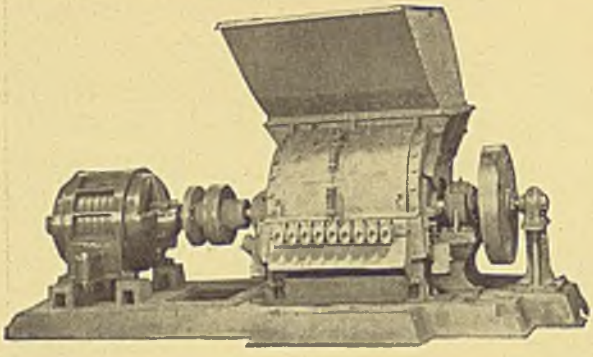


■ Instant automatic butt welding of saws and dial control are new developments in this contouring sawing machine made by Continental Machine Specialties Inc., Minneapolis. Saws are inserted in the starting hole, then quickly welded to form a continuous cutting medium

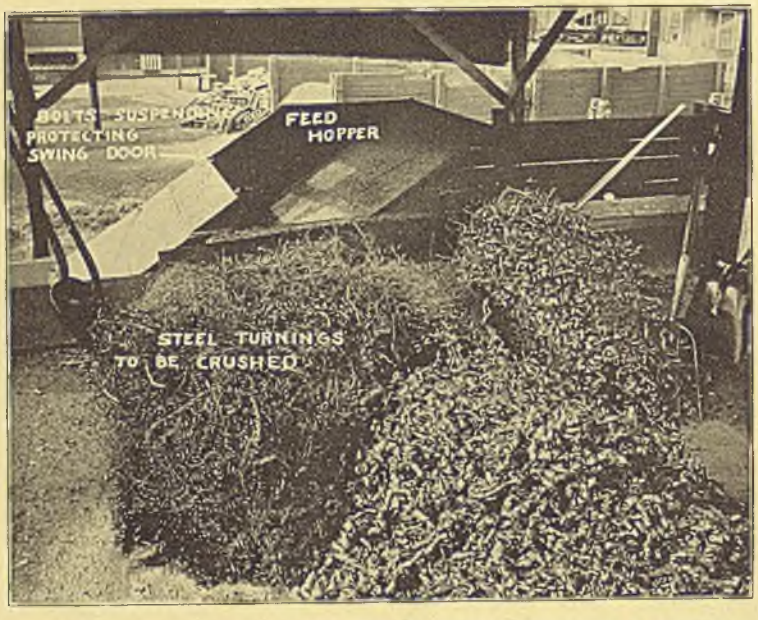


■ Exacting standards were followed by Ingalls Iron Works Co., Birmingham, Ala., in building this dredge for Pacific Metals Corp., New York, for use in South America. It is the second of two, each requiring 800 tons of steel and was shipped knocked down after pre-assembly

BIG RETURNS
ON A SMALL INVESTMENT



No. 3800 American Steel Turnings Crusher with hopper mounted on bed plate. (Patented)



Feed Platform with Steel Turnings

Many shops and manufacturing plants are making extra profits by crushing their turnings into chips with AMERICAN RING STEEL TURNING CRUSHERS. Chips not only bring a higher price but are easier to handle, require less storage space and are easier to ship.

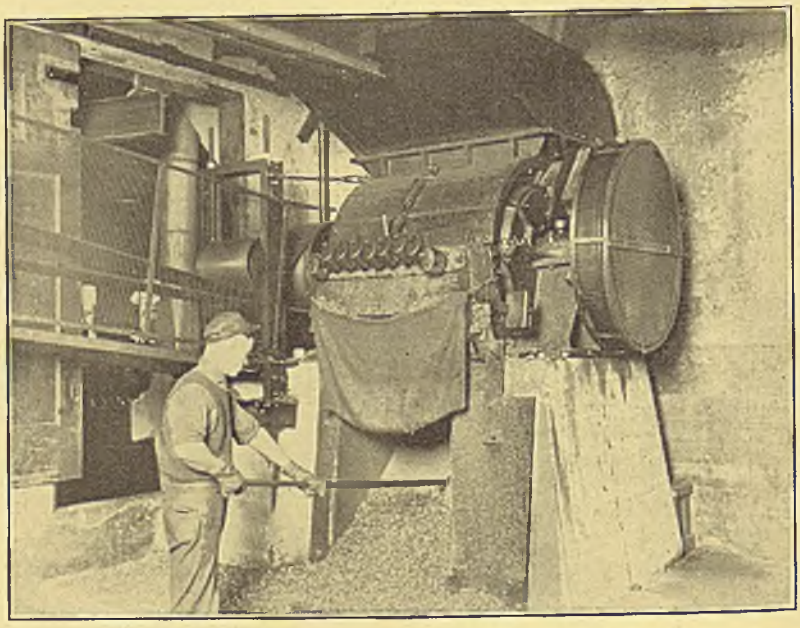
Your long turnings will cease to be a nuisance after you put an AMERICAN RING CRUSHER on the job. It will pay for itself in a very short time after which it will pay you a steady profit.

Do you want this EXTRA profit?

Write us for full particulars.

American Ring Crushers are crushing run of mine coal to stoker size at maintenance cost as low as 1/10 of a cent a ton.

We manufacture a complete line of reduction equipment. Put your problems up to us.

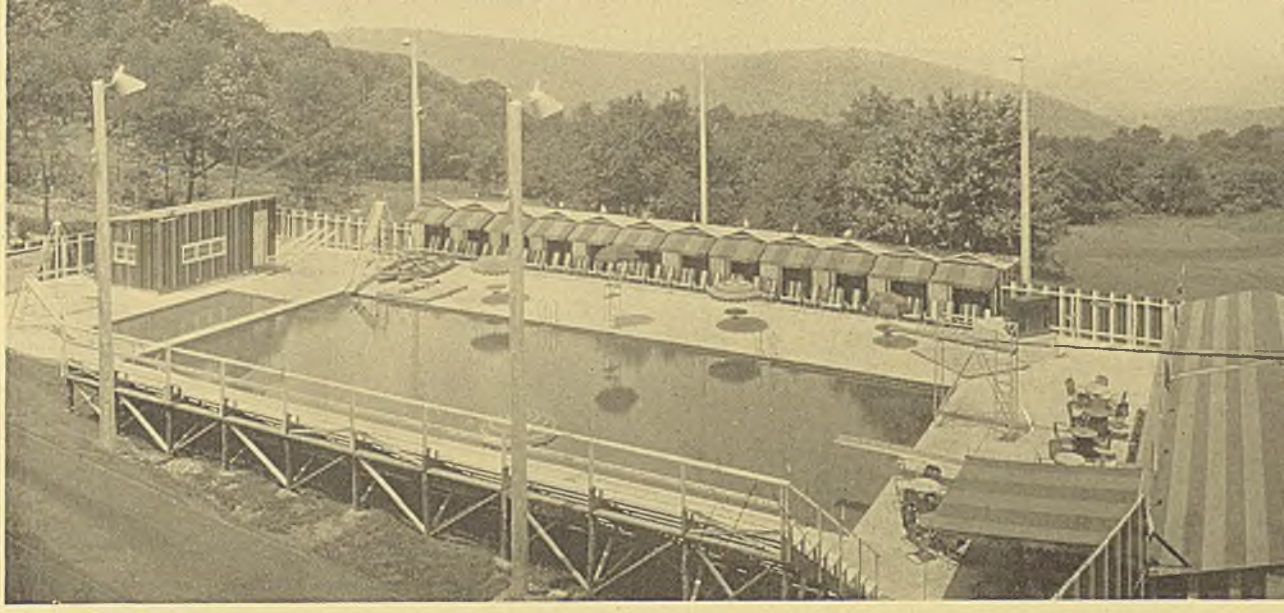


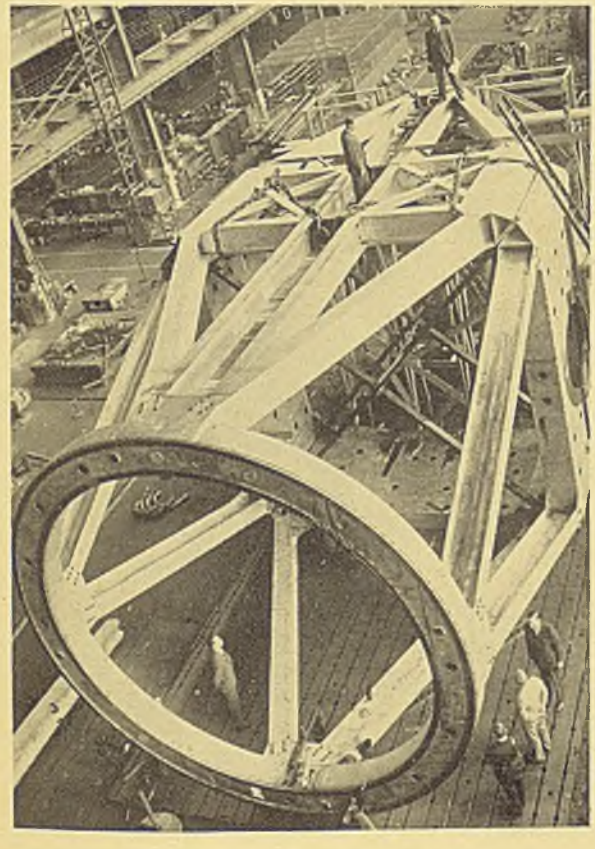
A Typical Installation

ORIGINATORS OF THE ROLLING RING CRUSHER PRINCIPLE

AMERICAN PULVERIZER CO.

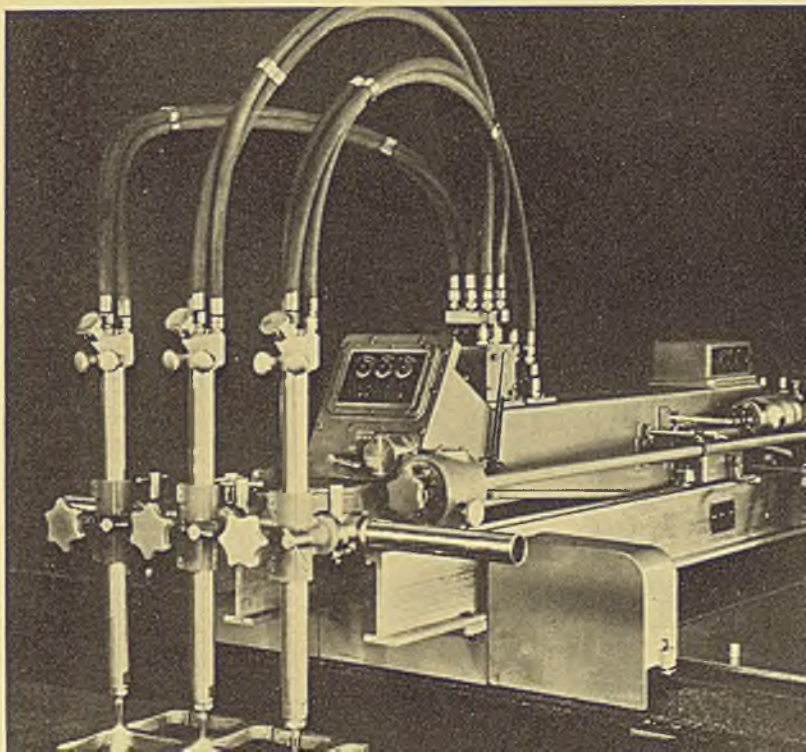
1539 Macklind Ave., St. Louis, Mo.



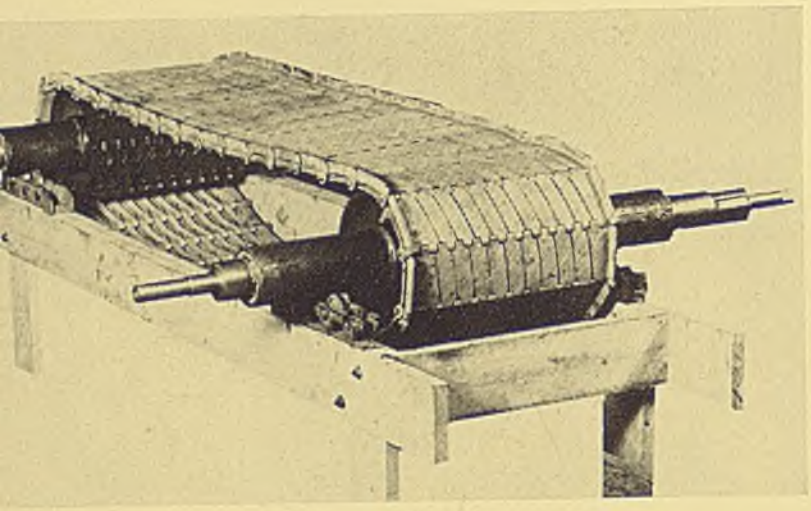


■ Steel swimming pools, a development of Pittsburgh-Des Moines Steel Co., Pittsburgh, the past year, require 30 to 50 tons each, according to size. Of all-welded construction, the pools are covered externally with asphalt paint and internally with a coat of rust-resisting paint. Freedom from cracking and spalling are advantages of these pools

■ One of the world's largest precision jobs was carried out in welding the low carbon steel tube which will carry the 200-inch reflecting mirror in the world's largest telescope. This work, accurate to extreme limits, was performed in the South Philadelphia works, Westinghouse Electric & Mfg. Co.

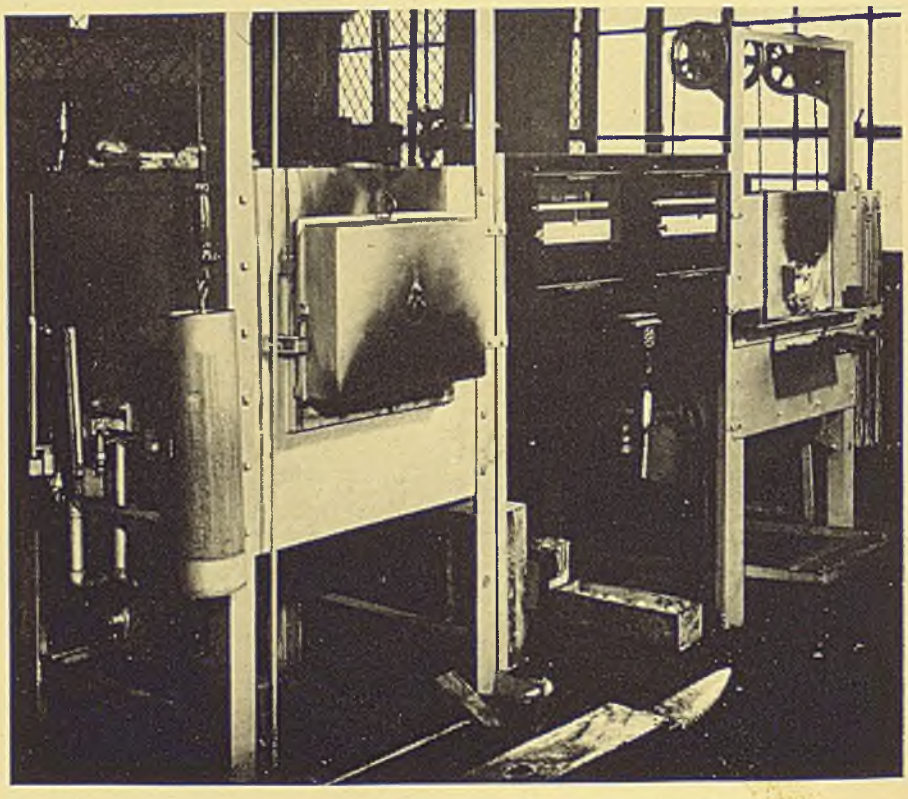


■ Multiple flame cutting on the machines of the type pictured here has become increasingly important from cost as well as accuracy standpoints. Plates can be cut, guiding the machine either by hand or automatically, following a templet. Practically any thickness of plate can be cut. The Linde Air Products Co., New York, built this unit

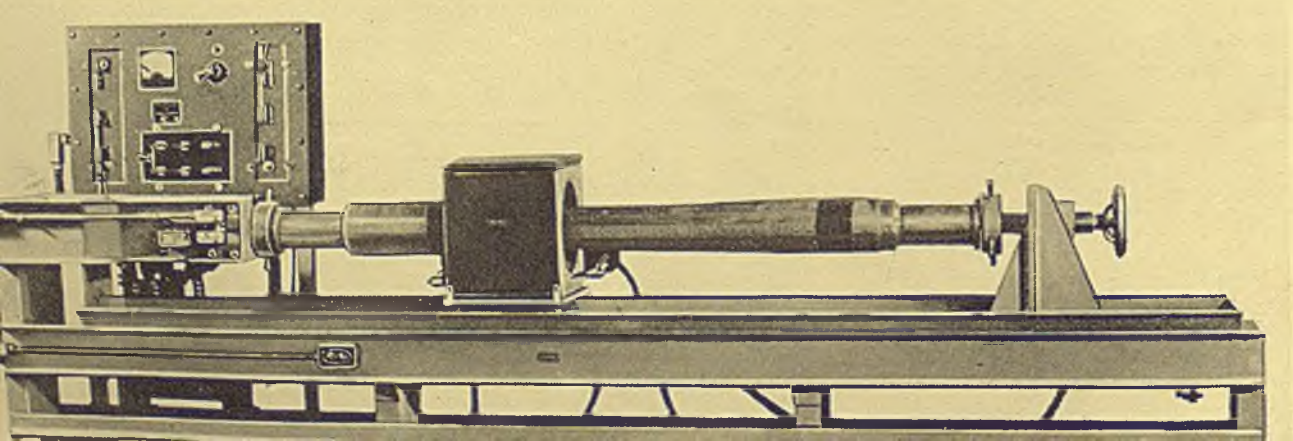


■ Chrome-nickel iron alloy is used in this Spiralink conveyor belt developed by General Alloys Co., Boston, for service to 2000 degrees Fahr. No machining of castings is required prior to assembly. Such belts present a comparatively solid surface and do not stretch; the load is distributed transversely

■ Between the two tool hardening furnaces, shown at the right, are to be seen the potentiometer controllers that indicate and control the temperatures. This installation is in the plant of Cleveland Tractor Co., Cleveland. Instruments are products of Brown Instrument Co., Philadelphia



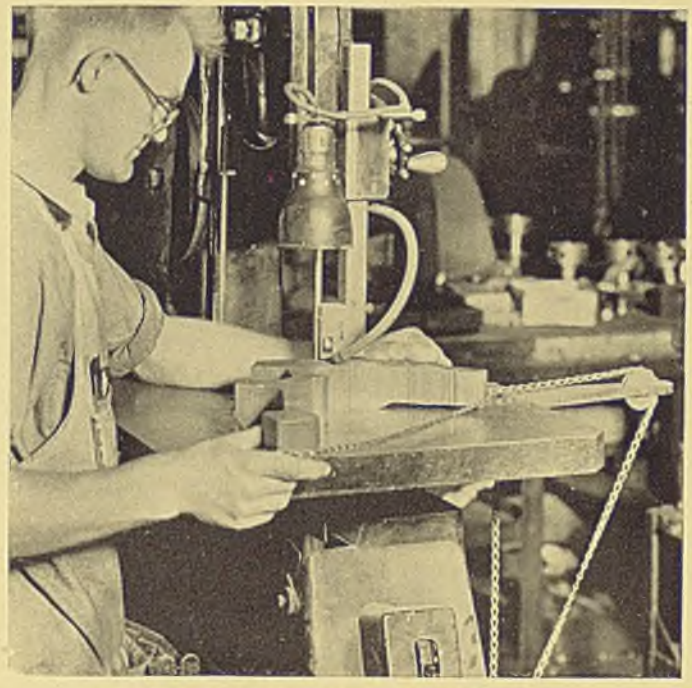
■ This magnetizing unit is adapted to inspection of railway axles. Manufactured by Magnaflux Corp., New York, it is a transformer unit mounted on a welded frame capable of suppporting approximately 3000 pounds. It provides for examination of axles in which location of both transverse and longitudinal defects is important



DOALL

The Tool of Tomorrow

IN USE TODAY



SAWING SAMPLE FORGINGS

The Rockford Drop Forge Company prepare sample forgings by sawing them on their DOALL CONTOUR MACHINE. By this method they can quickly and inexpensively secure samples for testing and experiment. Intricate shapes and contours are easily handled with DOALL's narrow precision saws and table tilt features.

DOALL SAVINGS IMPORTANT

Clean, precision cutting in material up to 8″ thick provides practical methods of savings in many fields of metal working. Time savings of 50% to 75% are usual—allowing not only better production but overcoming the shortage of skilled labor. With DOALL, the ordinary mechanic has the output of an expert one.

Every DOALL User Secures these Advantages

Combination sawing—filing—polishing in one machine: Inexpensive maintenance because of low cost of saw blades; sturdy precision construction assuring long life and heavy duty; Exclusive DOALL features widening the scope of contour machining.

DOALL DEMONSTRATED

The development of contour machining and "25 Ways DOALL Saves for Users" will be featured at the National Metal Congress in Atlantic City. The late model Metalmaster will be demonstrated as well as a startling new filing machine. Booth B-18

FOR ACTION—

Your request for a DOALL representative will be immediately answered as there is an experienced factory representative near you. He can demonstrate DOALL savings right in your plant on your own parts. Request his call today—no obligation.

BLUE RIBBON DOALL USERS

A. B. Dick Company
Aluminum Co. of America
American Can Company
Bethlehem Steel Co.
Curtiss-Wright Corporation
Ford Motor Company
General Electric
General Motors
International Business Machines Corp.
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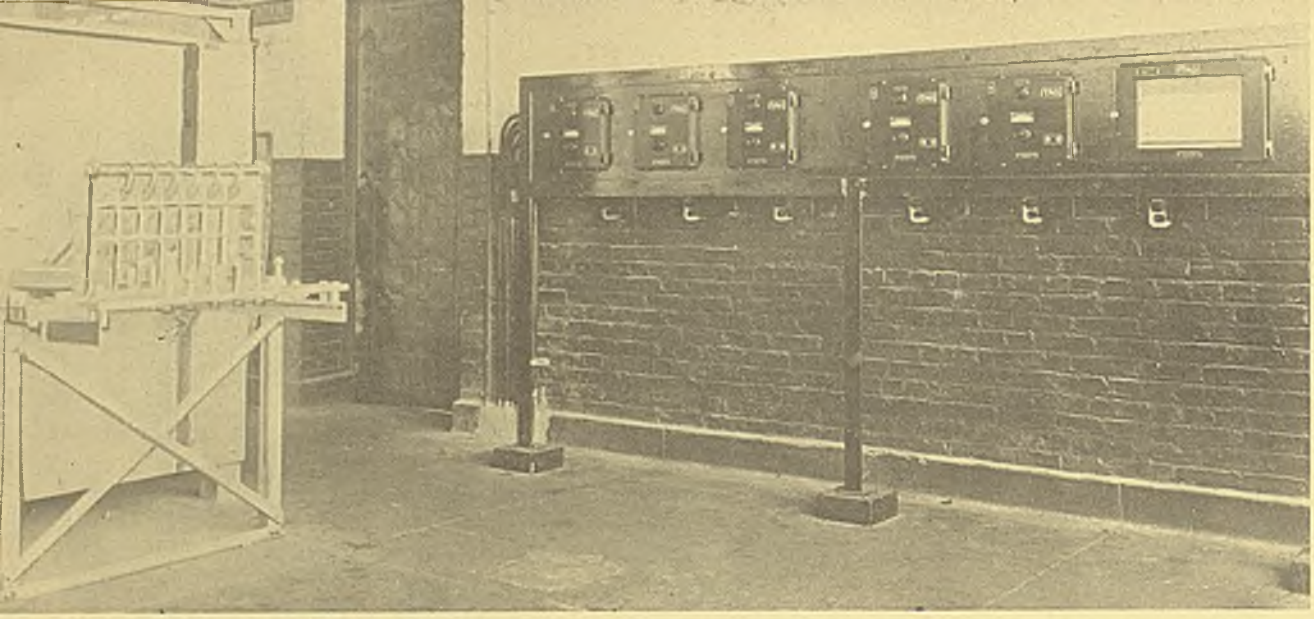
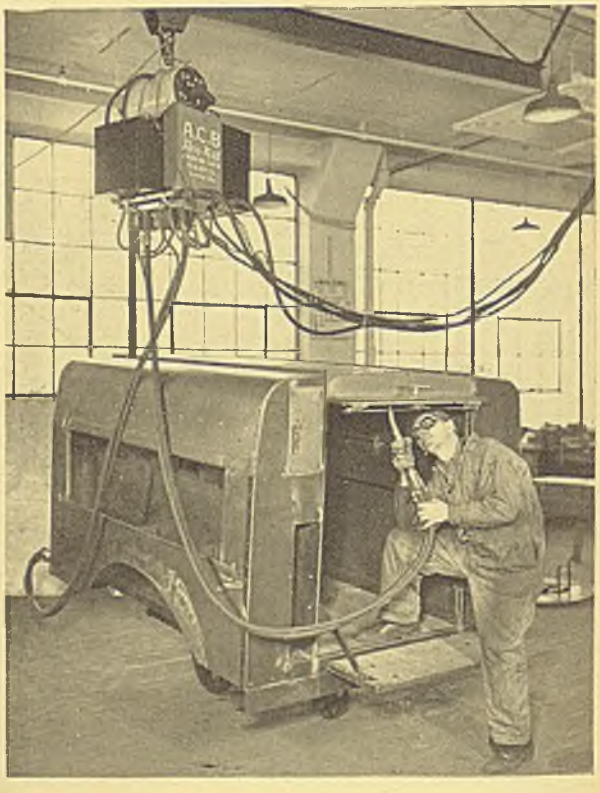
CONTINENTAL MACHINE SPECIALTIES INC.

1301 Washington Avenue South

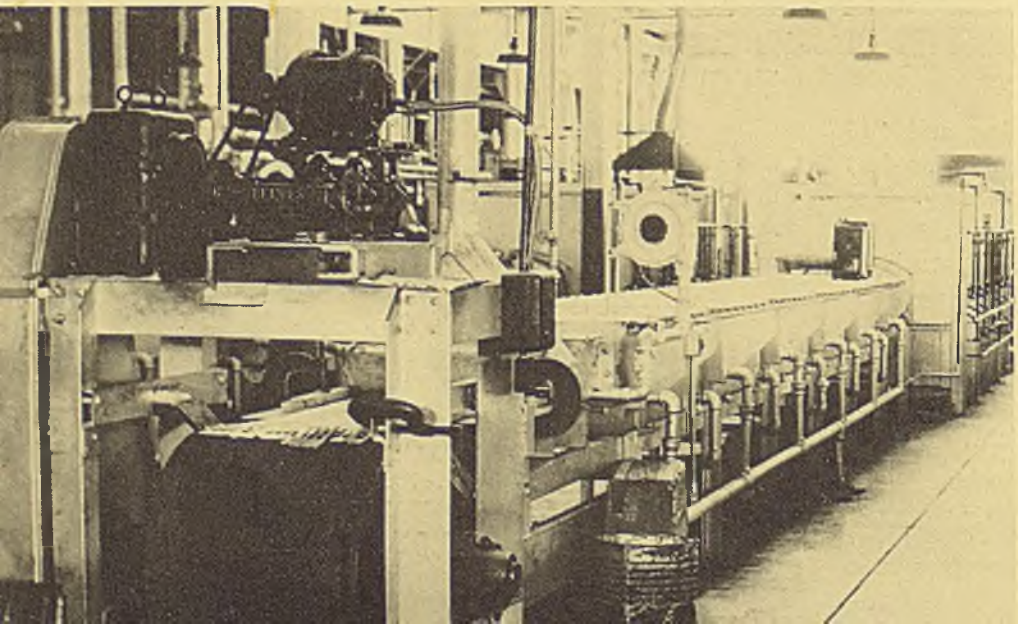
MINNEAPOLIS, MINNESOTA



■ Indicating potentiometer controllers for this gas-fired continuous-type hardening furnace in the plant of Washburn Wire Co. Inc. New York, were supplied by C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. Shown also is a potentiometer controller for a continuous lead drawing furnace. The TAG multiple recorder records temperatures on both furnaces



■ Resistance welds are made with separate twin electrodes on a new Flexiwelder machine built by American Coach & Body Co., Cleveland. One electrode is attached to the steel framework in any convenient location while the other is manipulated by the operator. A weld is timed and made when the operator pushes a button



■ Flexible metal belting furnished by Cambridge Wire Cloth Co., Cambridge, Md., is used for the conveyor belt on this Surface Combustion furnace for bright annealing silverware blanks. This same type belt construction is also used in furnaces for silver soldering and copper brazing

MODERN HEAT TREATING EQUIPMENT

for

GAS CARBURIZING
CLEAN HARDENING
CLEAN ANNEALING
CLEAN NORMALIZING
TEMPERING
"NI-CARB"

The importance of atmosphere control has long been recognized by us. As far back as 1902 our rotary continuous machines were provided with a special burner to achieve this very purpose.

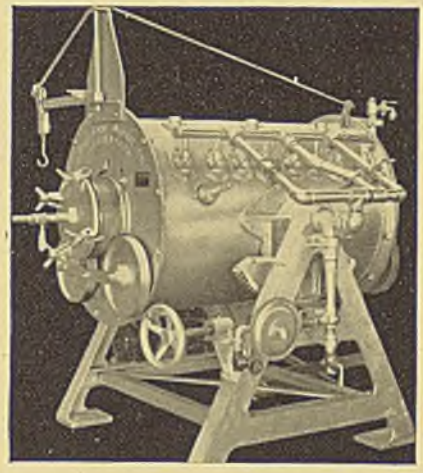
May we tell you more about our original developments and latest designs.

Our latest development will be shown at the

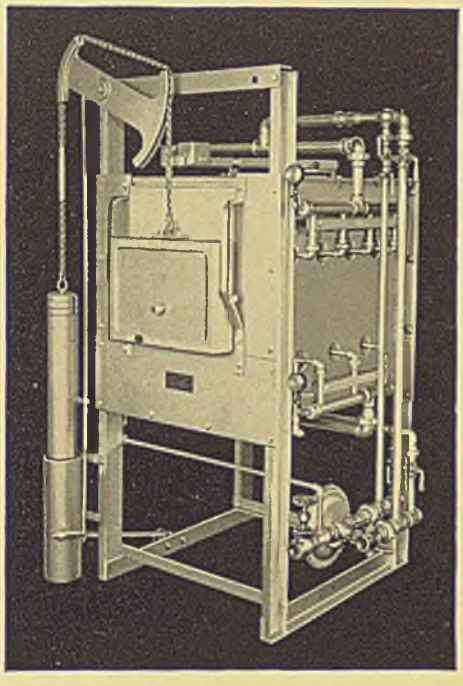
A.S.M. Exposition.
Atlantic City, Oct. 18 to 22

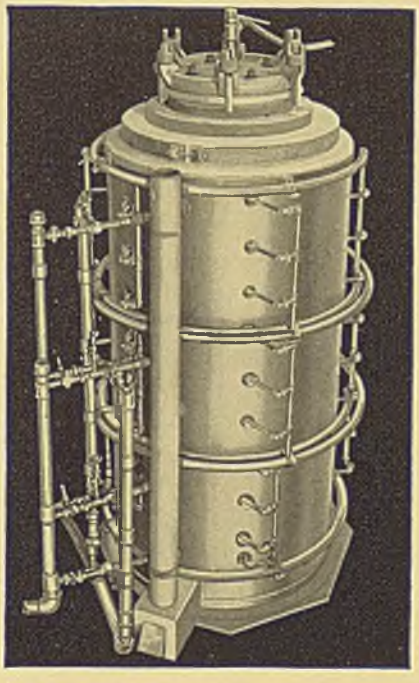
●

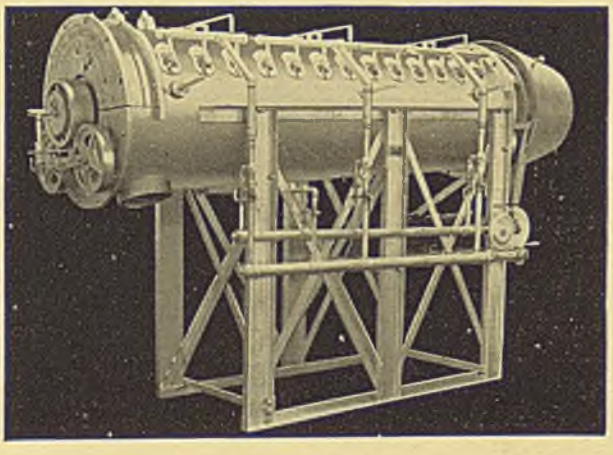
● (Right) Atmosphere control in this machine recommends it for clean hardening and annealing, etc., as well as quality carburizing at minimum cost.



● (Below) Atmosphere control in this Oven Furnace of advanced design gives clean hard work.







● (Above) Any desired atmosphere can be carried in the retort of this Vertical Furnace for annealing, hardening and gas carburizing with high quality and low labor and overall cost.

● (Left) Atmosphere control in this continuous rotary produces highest quality work on a tonnage basis with low labor and overall cost.

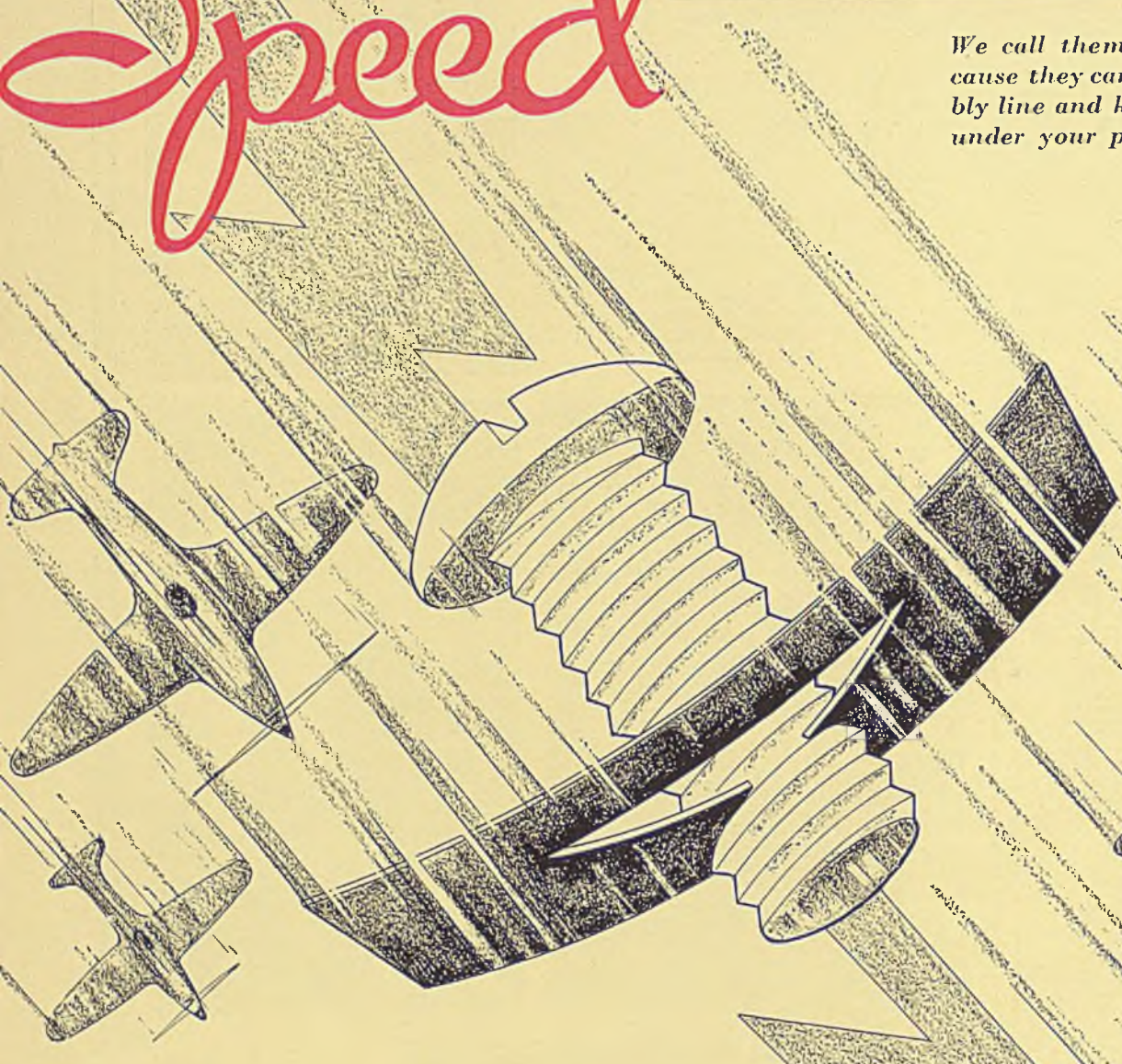
American Gas Furnace Co.

Elizabeth, New Jersey

Engineering Representatives in Principal Cities

Speed

We call them "SPEED NUTS" be
cause they can speed up your assem
bly line and knock the props from
under your present assembly cost



SPEED is essential . . . but no more so than EFFICIENCY. The permanent holding of any SPEED NUT assembly under spring tension will add greatly to the EFFICIENCY of your product.

The time saved in handling just one piece . . . a SPEED NUT . . . instead of two pieces . . . a nut and lock washer . . . will reduce your cost.

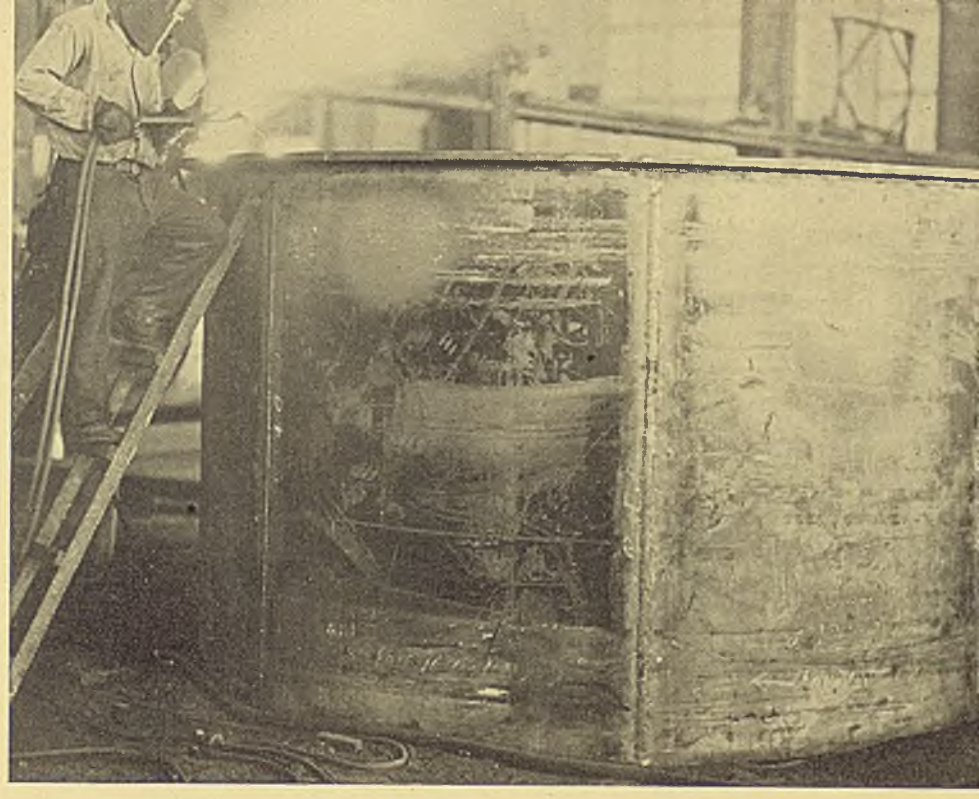
Also, SPEED NUTS can be designed to your requirements to take the place of three pieces, a stamping, a nut, and a lock washer and in many instances even a greater number of pieces can be combined into one special SPEED NUT.

Our Experimental Development Department will welcome an opportunity to work out your assembly problems. Send them to us and ask for a card of assorted samples.

SPEED NUT DIVISION
TINNERMAN STOVE & RANGE CO. • CLEVELAND, O.

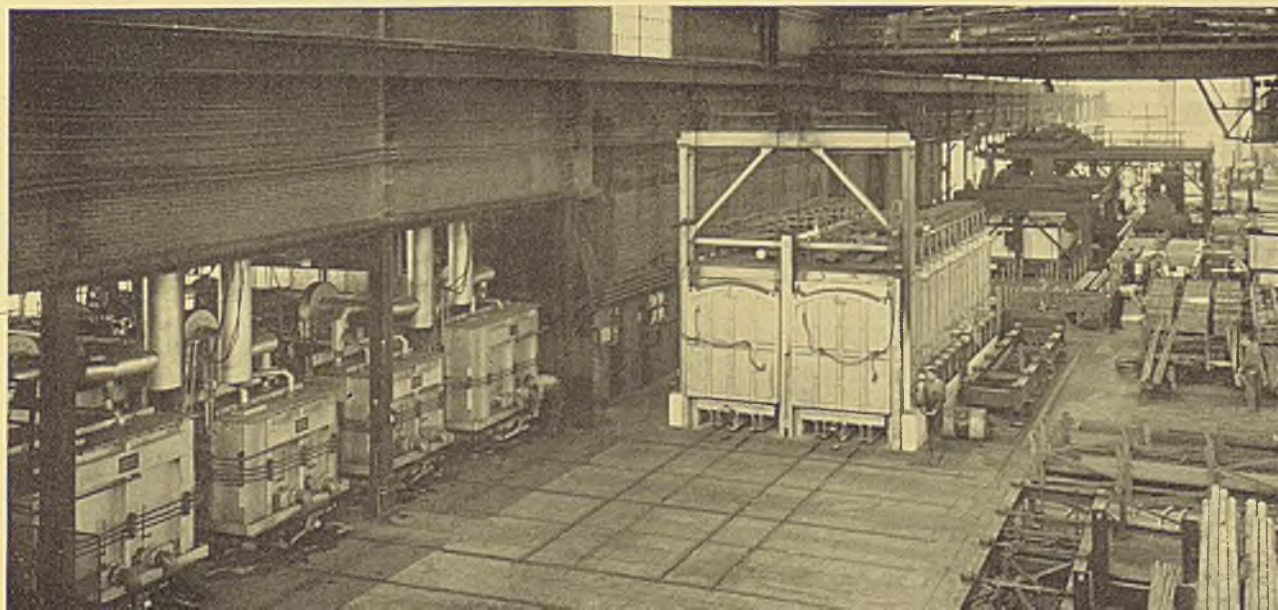
Nuts

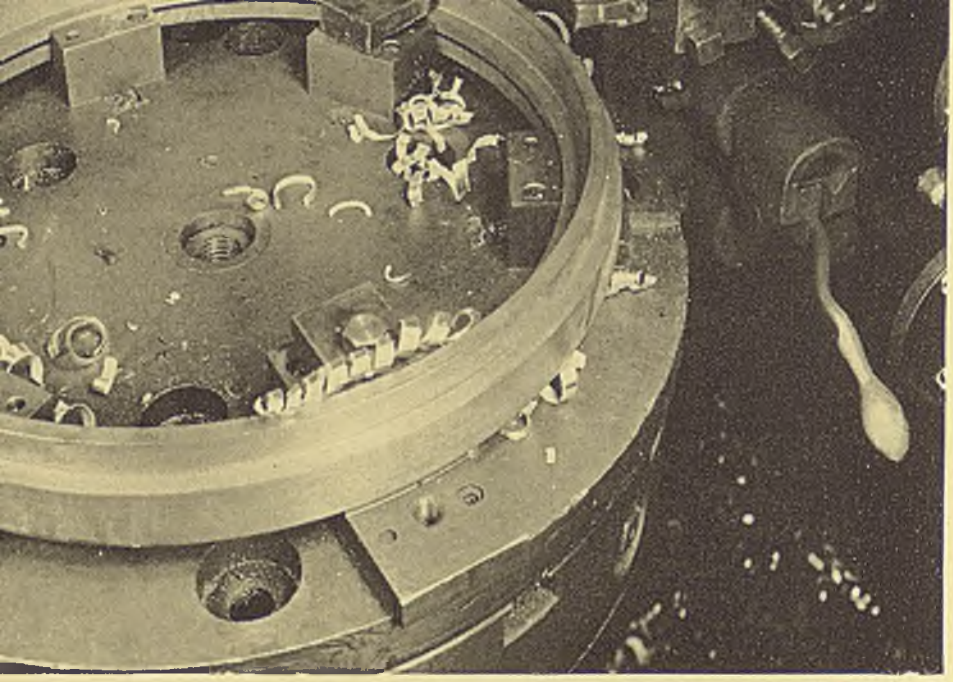
■ This large benzol recovery tank was built of welded Herculoy sheets furnished by Revere Copper & Brass Inc., New York. It is successfully withstanding corrosion. Plates were rolled, dished and flanged by Worth Steel Co., Claymont, Del., then shipped to Ross Heater & Mfg. Co., Buffalo, who manufactured nozzles and welded them to heads



■ A Micromax recording controller and a Homo tempering furnace developed by Leeds & Northrup Co., Philadelphia. With such units the rate of heating, depth of hardness and furnace atmosphere are controlled accurately

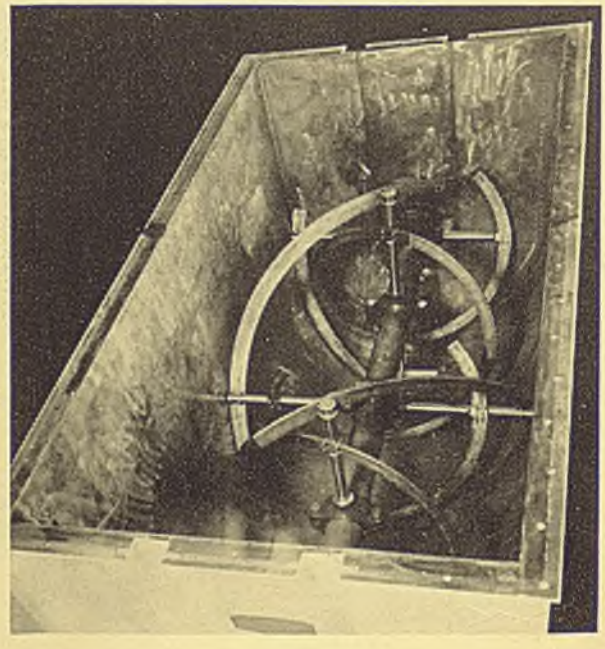
■ Bethlehem Steel Co. recently increased its electric heat treating capacity at Bethlehem, Pa., by 1200 tons monthly. Four bell-type car-bottom furnaces, two twin-type car-bottom furnaces, two pit-type annealing furnaces with a strain relief oven between them, a 3-chambered roller hearth quenching and normalizing furnace are some of the units shown in the illustration below





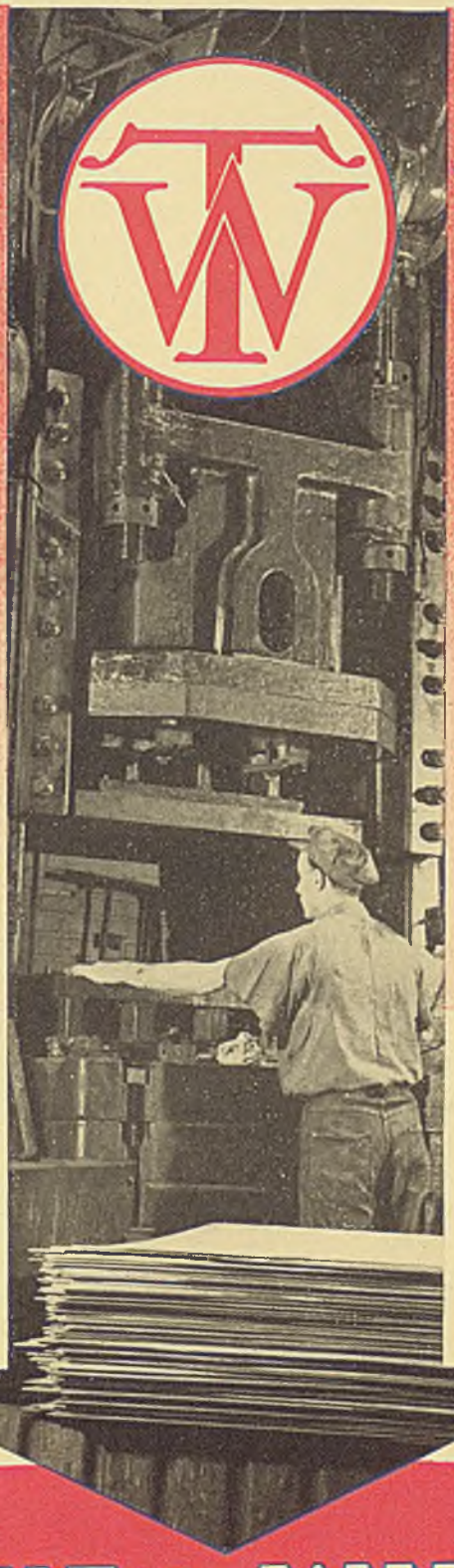
■ Machining hard steels with increased speeds, greater accuracy and longer tool life has been accomplished with new tantalum carbide tools produced by Vanadium-Alloys Steel Co., Latrobe, Pa. The tool cutting this 22½-inch diameter SAE 3135 unannealed steel forging at 220 feet per minute produces over 100 pieces per grind

■ In accordance with recent trends in alloys, this plastic kneader is made of columbium-bearing 18-8 stainless steel and was welded with columbium-bearing stainless steel welding rod. Photo courtesy Electro Metallurgical Co., New York



■ Having high insulating value and covering as much as 3 square feet at a time, block insulation made by Johns-Manville, New York, withstands temperatures up to 1900 degrees Fahr. behind refractory linings. Suitable for many types of furnaces, it is here being applied to a soaking pit

WE'RE BUSY



But Not Too Busy

Due to its attractive combination of strength and lightness, there is a definite trend today toward pressed steel in the design and redesign of products and parts.

Due to our experience in the deep drawn stamping field and our facilities for both designing and producing, this tendency toward a greater use of stampings is keeping our presses busily working for many different industries.

Our engineers, however, are never too busy with production to neglect creation. Do not hesitate to call on us to work with you in the initial stages of a new product. Allow us, without obligation, to show you the advantages and economies of deep drawn stampings.

TRANSUE & WILLIAMS

ALLIANCE, OHIO

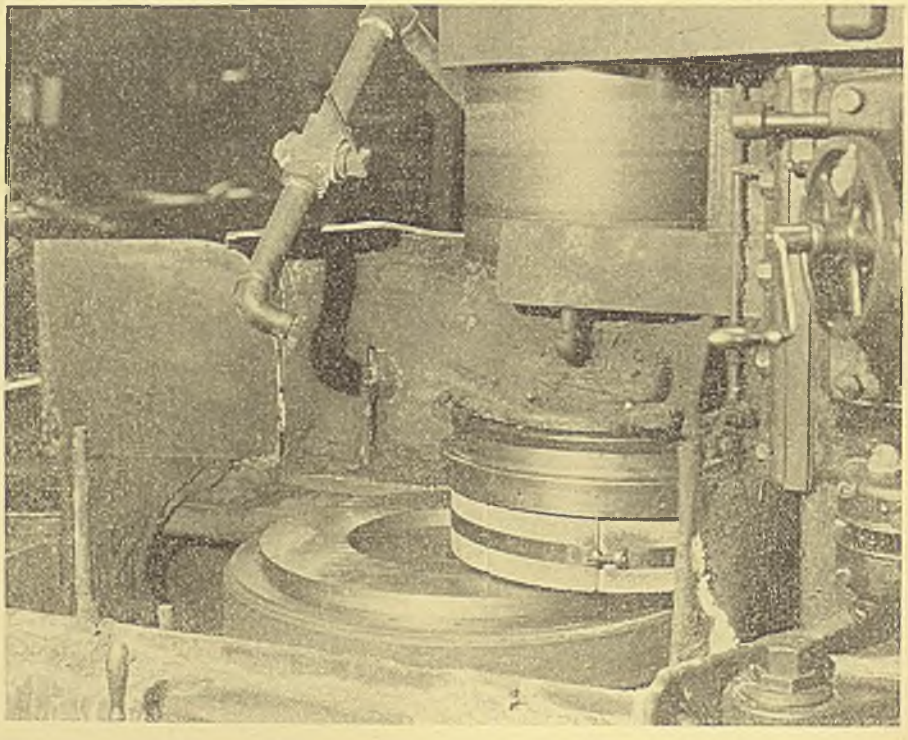
DESIGNERS AND MANUFACTURERS OF

DEEP DRAWN STAMPINGS

SALES OFFICES: NEW YORK · PHILADELPHIA · CHICAGO · DETROIT · INDIANAPOLIS · CLEVELAND

■ Unity power factor at full load and leading power factor at lighter loads, as well as extremely high efficiency, constant setting and an unusually fast arc, feature welding machines used by Gar Wood Industries Inc., Detroit, in fabricating heavy road building machinery. The welders were built by Ideal Electric & Mfg. Co., Mansfield, O.

■ In finishing metals by grinding, segmental wheels offer advantages. Here are shown a new type chuck and segments, products of Sterling Grinding Wheel Co., Tiffin, O., mounted for grinding. Segments fit firmly into prelocated positions in the chuck



■ Originally developed for use on stoves, Speednuts manufactured by Tinnerman Stove & Range Co., Cleveland, have found widespread use in other fields. A new type has been adopted by two leading automobile makers for fender assembly on 1938 models

FULL SPEED AHEAD!

WHAT are the problems which confront industry today: foreign competition . . . the ever-increasing burden of taxation . . . the never-ceasing urge for more abundant living . . . the economic cry for increased production at lower costs? Yes. These and countless others which clamor equally for solution.

History supports our confidence that American industry will solve these problems as it has solved countless others before . . . by going full-speed ahead, by fearlessly abandoning old ways for new, by adopting new standards, new formulae, and by placing its reliance on tireless research, on science and invention.

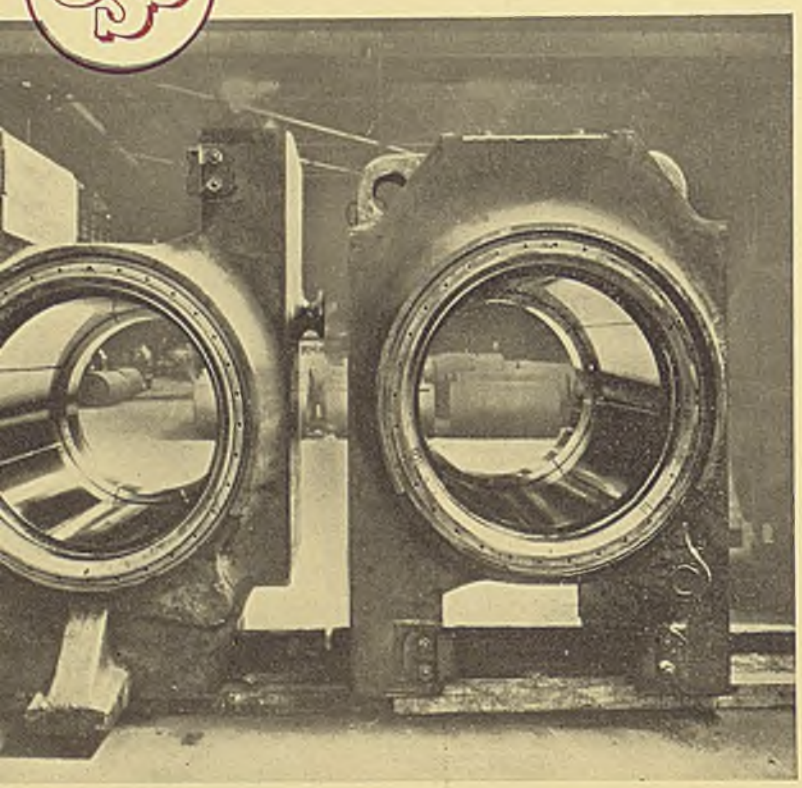
Nowhere is this more noticeable than in the metal trades. The story of progress in the industrial arts is largely the story of improvements in steel. Out of the steel laboratory has come the means needed by designer, engineer, builder to fashion new products . . . to improve machinery . . . to speed transportation . . . to add to the comfort and well-being of everyone. For it is *steels* today, not just steel. Steels of a thousand properties. Steels with the peculiar qualities needed for any part . . . for any task.

Within the Subsidiaries of United States Steel more than 1700 technical experts—chemists, metallurgists, engineers—working in our 89 laboratories, continue their never-ceasing search for better steels to make industry's job easier and more profitable. From their endeavors have come the steels featured on the following pages . . . will come countless others, to keep pace with the forward march of industry. These men, we like to think, are your true partners; they face new horizons with confidence.

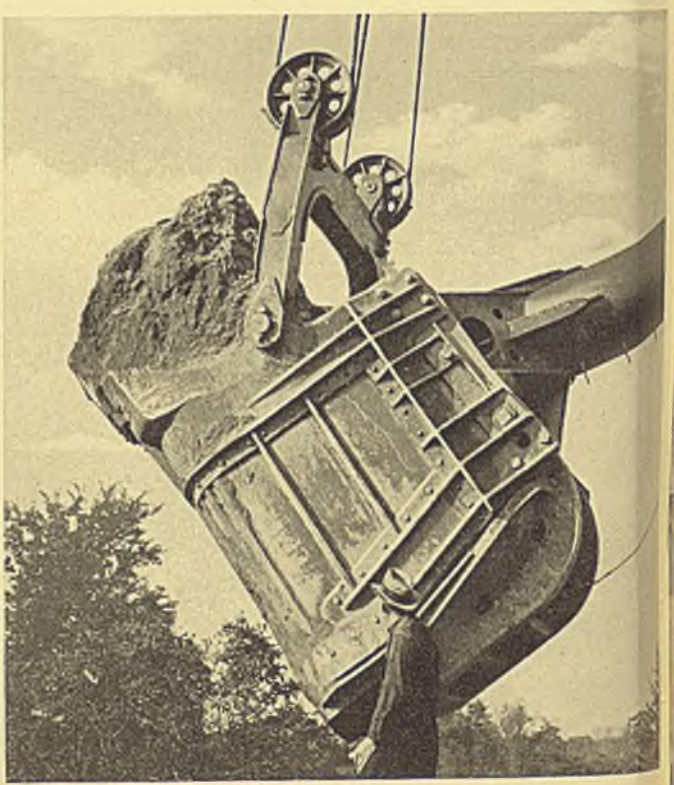
THE WORLD MOVES FORWARD WITH STEEL

UNITED STATES STEEL

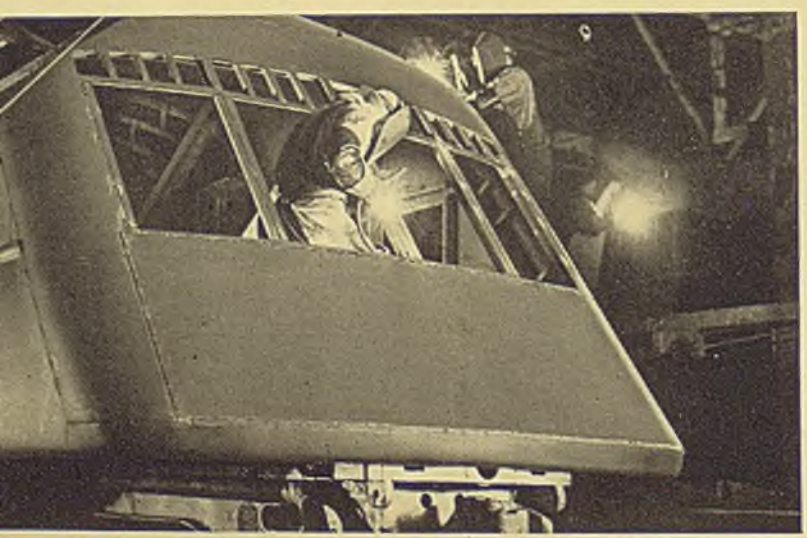
For every job that metal can do . . . there's a steel best suited to do it



WORLD'S LARGEST ROLLNECK BEARING is made of U·S·S Carilloy Alloy Steel as specified and carries a radial load of 5,247,000 lb. It is obvious that nothing but the finest, most dependable alloy steel could be used. U·S·S Carilloy Alloy Steels offer maximum quality with utmost uniformity. Back of the name are Carnegie-Illinois' special mill facilities—craftsmen trained specifically for alloy production—exact metallurgical control.

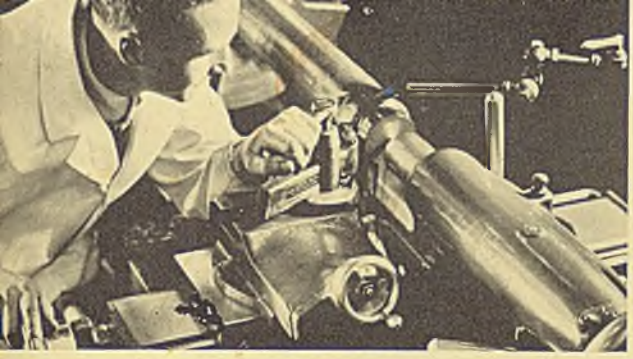


30 CUBIC YARDS AT ONE GULP! U·S·S Man-Ten all-welded construction gives this heavy duty dipper the strength and abrasion resistance to keep it on the job in this grueling service. The thousands of pounds of weight saved by this better, stronger steel have been converted into working capacity. Investigate what U·S·S High Tensile Steels can do for you.

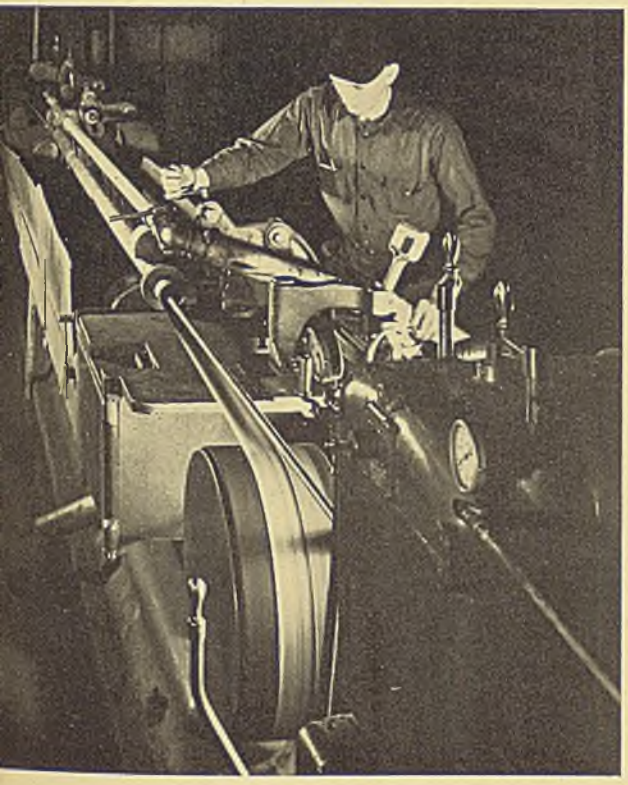


FABRICATION PRESENTS NO DIFFICULTIES WITH U·S·S HIGH TENSILE STEELS You are not asked to pioneer with U·S·S Cor-Ten, Man-Ten and Stainless. The experimental period is over. Practically every question involving shop methods has already been answered. With these steels industry has opened a

ACID DRUMS OF U·S·S STAINLESS, chosen because of their immunity to most corrosive chemicals, cut shipping costs, provide easier handling, reduce storage space, eliminate breakage. Wherever strength, lightness, immunity to destructive wear,



HE'S WORKING U·S·S CONTROLLED STEEL, but what the picture can't show is the saving which is being effected through the use of a comparatively low-cost steel in which all quality factors are definitely predetermined—steel that will perform uniformly under forging, forming, heat-treating and machining, each shipment acting precisely like the last.



FOR FLUID HANDLING—U·S·S STAINLESS tubes, as brilliant inside as out, keep products clean, reduce pressure drops. Seamless tubing of U·S·S Stainless Steel made by National Tube Company is performing a service unmatched by any other metal. From the Subsidiaries of United States Steel Corporation comes U·S·S Stainless in any wanted form.

A-R STEEL CUTS ABRASIVE WEAR Wherever earth, sand, gravel, coal, waste, etc. flow over, through or against equipment, that is the place for U·S·S Abrasion Resisting Steel, a relatively new alloy, which will in many applications last longer than higher-cost steels. Manufactured by Carnegie-Illinois, A-R Steel is explained in a special bulletin which will be sent on request.

THESE SPECIAL PURPOSE STEELS ARE DOING THEIR PART TO SPEED UP INDUSTRY

EACH FAMILY of steels described below owes its existence to a definite need and reveals steel's ability to meet unusual requirements. Each has definitely established its worth in countless applications. These few examples serve to emphasize the readiness of United States Steel Corporation Subsidiaries to furnish whatever steel your job requires and in whatever form you need it—plates, sheets, bars, tubing, wire, etc.

U·S·S CARILLOY: This new name, identifying controlled alloy steels produced by Carnegie-Illinois Steel Corporation, means quality alloy steels made to your specifications. Back of the name are special mill facilities—steel craftsmen trained specifically for alloy steel production—exact metallurgical control. Keep this name in mind. It is your assurance of quality, your guarantee of the dependable performance of your product in service.

U·S·S CONTROLLED STEELS are steels for forging, forming, heat-treating and machining in which all quality factors can be definitely predetermined . . . steels in which the physical properties are consistently uniform. Scientific metallurgical control eliminates those "mysterious differences" which make it so difficult to obtain results with ordinary steels.

U·S·S A-R STEEL There is no better low-cost solution to abrasion problems than U·S·S Abrasion-Resisting Steel. Even though initial cost is comparatively low, it has stood up better in some installations than 11/14% manganese steel and other high priced materials. More than 68% of the present sales volume is repeat business—proof that A-R Steel is doing a real job where abrasive conditions are severe.

U·S·S HIGH TENSILE STEEL

Broadly speaking, U·S·S COR-TEN and MAN-TEN can be applied to effect operating economies, to increase strength or to prolong life, in practically every kind of mobile equipment. What these pioneer High Tensile Steels have done to modernize transportation equipment, through weight reduction, is already a matter of record.

U·S·S STAINLESS STEEL

No other metal can even approach stainless steel in strength and permanence. It makes possible the use of lighter sections and eliminates needless pounds and needless cost. By specifying U·S·S Stainless Steel you can cut depreciation costs, practically eliminate corrosion.

VISIT OUR EXHIBIT AT THE METALS SHOW

A PROBLEM IN STEEL?

Put it up to U·S·S!

SINCE steel became steels, with a thousand variations and properties, the knowledge of its suitability to countless applications has become highly specialized.

What makes this knowledge particularly important is the savings it oftentimes effects in applications. Even though the steel you are using now on a certain job may be performing satisfactorily, there may be a less expensive steel which would serve as well.

Finding ways for our customers to save in steel, finding a better steel for the job, solving problems of cutting, shaping, welding and fabrication, is a task we gladly take upon ourselves. It is our conception of service, and through it we have made many friends.

So we say to you as we say to all industries—Have you a problem in steel? Put it up to us. Send us your blueprints. Let us come into your shop if need be and work with your own specialists to find a solution.

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
COLUMBIA STEEL COMPANY, *San Francisco*
NATIONAL TUBE COMPANY, *Pittsburgh*
TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

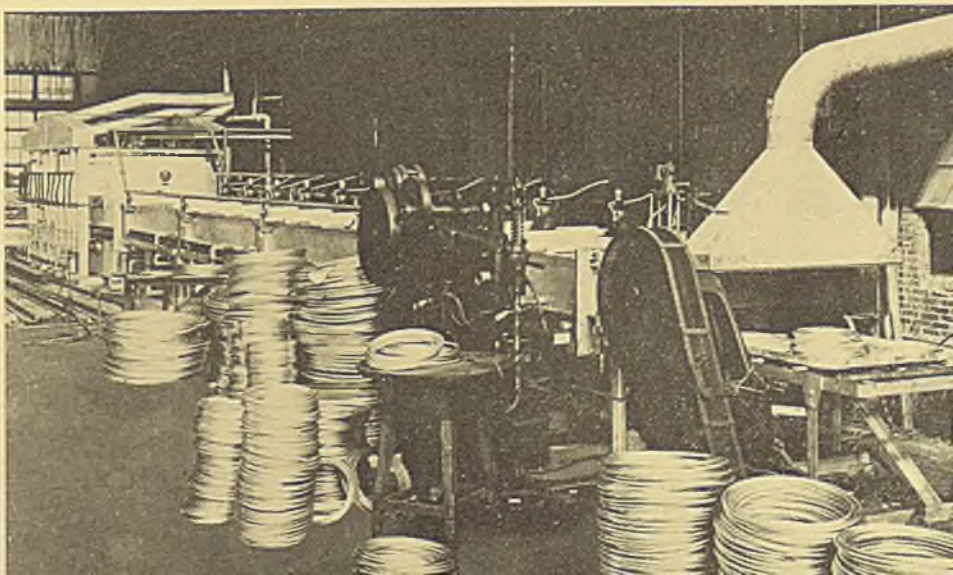
United States Steel Products Company, New York, *Export Distributors*
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

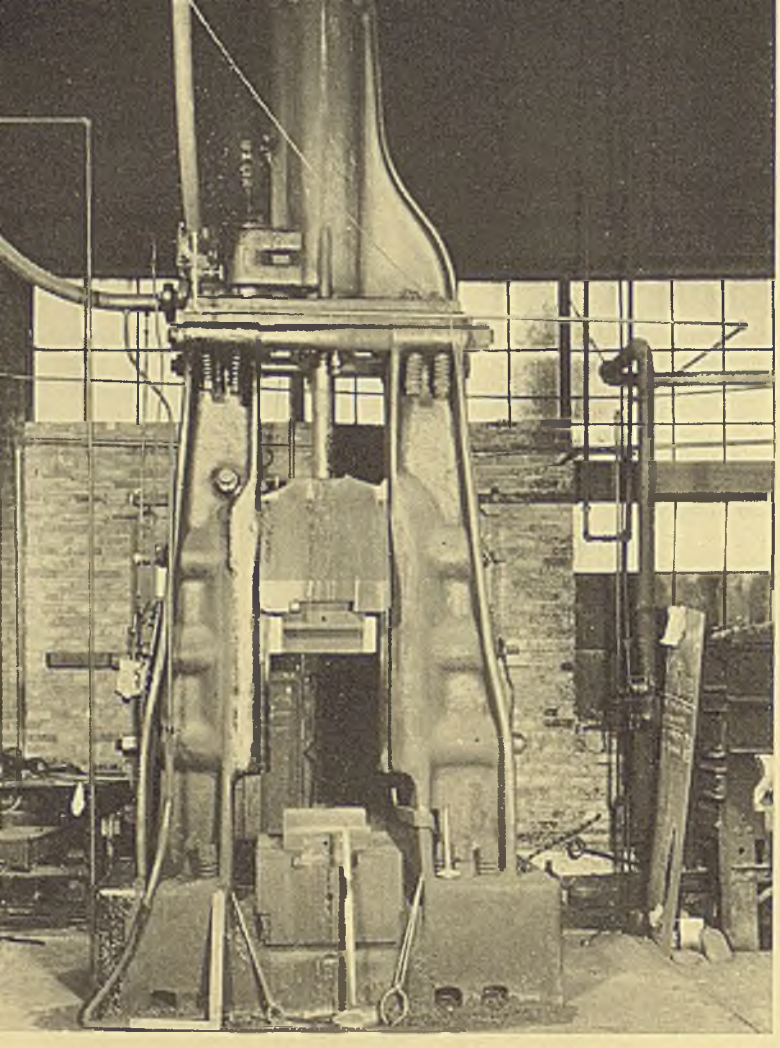
UNITED STATES STEEL

■ Commercial application of bright zinc plating to bolts, nuts and rivets, pioneered by Republic Steel Corp., Cleveland, is resulting in an improved product both as to brightness of finish and corrosion resistance. The deposit is obtained directly from the bath without aid of a bright dip. Production is on a straight-line basis

■ Galvanized steel sheets which can be painted without special surface treatment are finding increasing use for sheet metal work for residences. Gutters and downspouts on this Cleveland house are made from Armco Paintgrip sheets, a new product introduced by the American Rolling Mill Co., Middletown, O., during the year

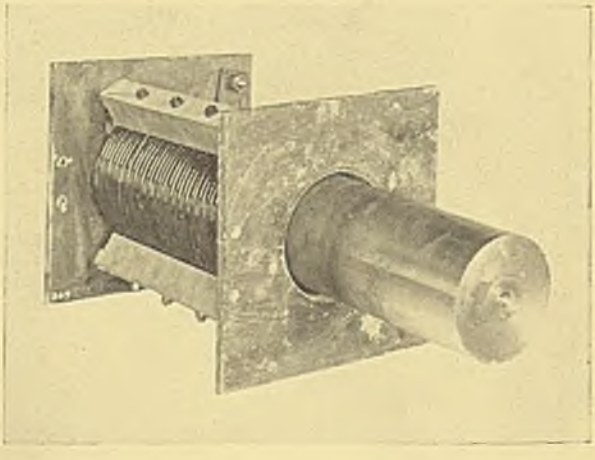
■ The past year has been notable for the large number of installations of gas-fired radiant tube furnaces. Shown at the right is a continuous bright annealing furnace built by the Electric Furnace Co., Salem, O., and equipped with a new type of recuperative radiant tube which utilizes waste gases to heat incoming air



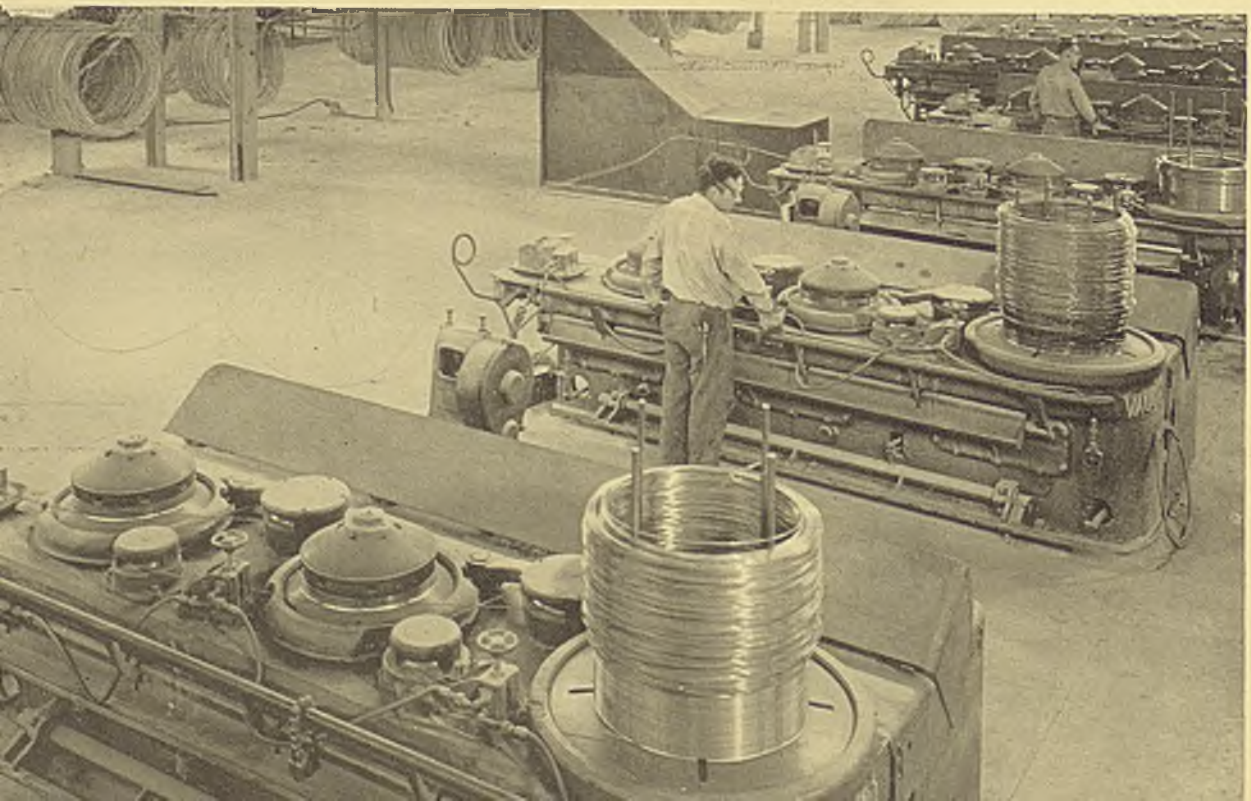


■ Operation of this 6000-pound steam hammer in the plant of the Ajax Steel & Forge Co., Detroit, produced "earthquakes." Placing the anvil on a rubber insulating mounting furnished by United States Rubber Products Inc., New York, provided effective solution of the problem. Vibrations resulting from intermittent shocks are quickly dampened out

■ Heating an end section of a large steel tube by high-frequency current prior to a swaging operation is a new application developed by Ajax Electrothermic Corp., Trenton, N. J. To obtain uniform temperature in the ½-inch wall of a 5-inch tube requires about 1½ minutes. The tube shown is closed on the unheated end



■ Modern wire mills employ high-speed multiple motor-driven draw blocks drawing directly from the rod. The group of blocks shown were manufactured by Vaughn Machinery Co., Cuyahoga Falls, O. Speed of each block is controlled automatically and an effective cooling system is provided for dies and wire



BRING YOUR QUESTIONS TO . . .

BOOTH H-20

If you use alloy steel in any form . . . if you are concerned with melting, forging, rolling, heat treating . . . if you are interested in recent developments in alloy cast irons — make a note, now, to visit Booth H-20, National Metal Exposition.

Members of Vanadium's Metallurgical Staff and representatives of the Development and Research Laboratories will be glad to discuss metallurgical problems and to counsel with you in the selection of steels for definite applications. A complete line of Vancoram Ferro-Alloys and some recent Vanadium Steel applications will be on display.

Drop in Booth H-20. Make yourself at home. Ask questions.

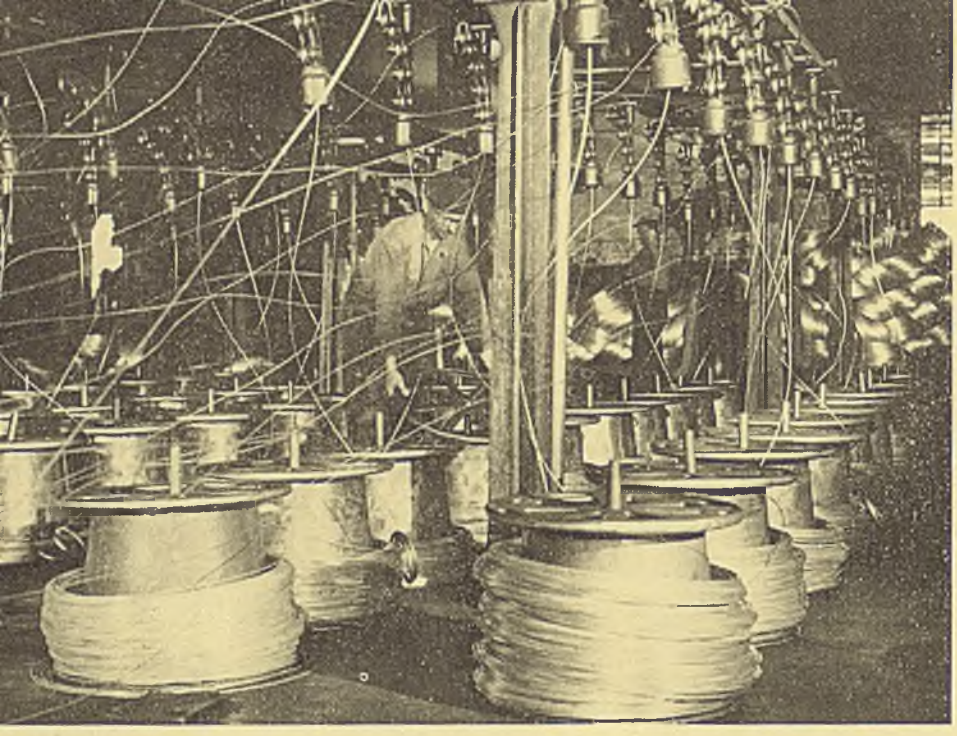
VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK, N. Y.
Plants at Bridgeville, Pa., and Niagara Falls, N. Y.
Research and Development Laboratories, Bridgeville, Pa.

Vanadium Steels

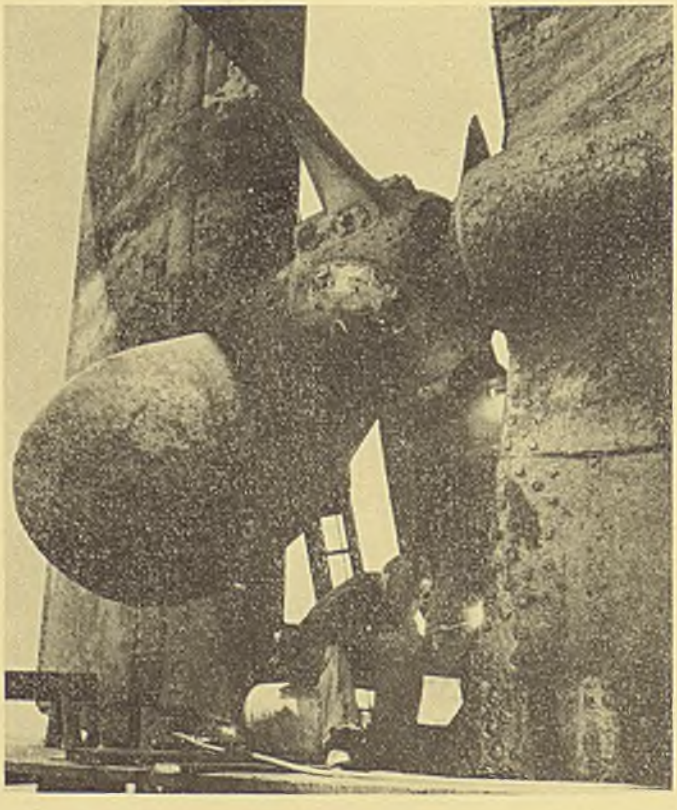
METALS VANCORAM ALLOYS

FERRO ALLOYS
of vanadium, silicon, chromium, and titanium, produced by the Vanadium Corporation of America, are used by steel makers in the production of high-quality steels.

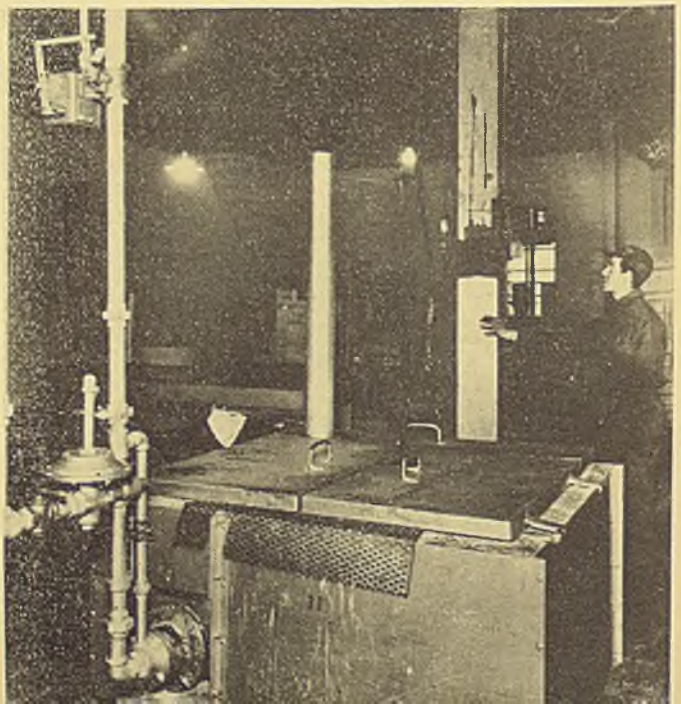
FOR STRENGTH · TOUGHNESS · DURABILITY



■ Improved processes for manufacture and handling of steel wire have greatly expanded uses of the finished product. At the left, wire is shown being uncoiled preparatory to feeding into a fence making machine at the Consolidated Works of American Steel & Wire Co., Cleveland. A confusion of wires is the impression given, but each is in its proper place



■ Welding is growing in importance as a process for effecting major repairs. Here is shown the cargo ship ALABAMAN of American Hawaiian Steamship Co. having its stern frame rehabilitated by arc welding at the Oakland, Calif., yard of Moore Drydock Co. Equipment and electrodes used were manufactured by the Lincoln Electric Co., Cleveland



■ An increasing number of lead and cyanide pots and salt baths for hardening, annealing and drawing are being heated by gas immersion units. The salt bath, shown at the right, is heated in this manner with equipment manufactured by C. M. Kemp Mfg. Co., Baltimore. With the top covered, a high degree of efficiency is obtained in this installation

American Society for Metals Schedules Comprehensive Technical Program

Features Include Four-Session Symposium on Carburizing, Two Educational Courses and Campbell Memorial Lecture

Monday, Oct. 18

10:00 A. M.—Ambassador Hotel

"The Process of Dry Cyaniding," by R. J. Cowan and J. T. Bryce, Surface Combustion Corp., Toledo, O.

"The Mechanism of Steel Hardening and Tempering as Indicated by Coercive Force Measurements," by R. S. Dean, bureau of mines, Washington, and C. Y. Clayton, Missouri School of Mines and Metallurgy, Rolla, Mo.

"Effect of Tempering Quenched Hypereutectoid Steels on the Physical Properties and Microstructure," by C. R. Austin and B. S. Norris, Pennsylvania State College, State College, Pa.

2:00 P. M.—Auditorium

"Effect of Carbon on the Hardenability of High-Purity Iron-Carbon Alloys," by T. G. Digges, national bureau of standards, Washington.

"Precipitation Hardening of Cobalt Steel: A New Tool Material," by R. H. Harrington, General Electric Co., Schenectady, N. Y.

"Quantitative Hardenability," by J. L. Burns, T. L. Moore and R. S. Archer, Republic Steel Corp., Chicago.

2:00 P. M.—Auditorium

"A Note on Rapid Photomicrography," by W. Mutchler and H. O. Willier, national bureau of standards, Washington.

"Effect of Grain Size on the Oxidation of a Low-Carbon Steel," by C. A. Siebert and Clair Upthegrove, University of Michigan, Ann Arbor, Mich.

"Electromagnetic Measurements and Steel Structures Correlated," by Carl Kinsley, consulting engineer, New York.

4:30 P. M.—Auditorium

Educational Lecture

"Steel Making," lecture No. 1, by Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

8:00 P. M.—Auditorium

Educational Lecture

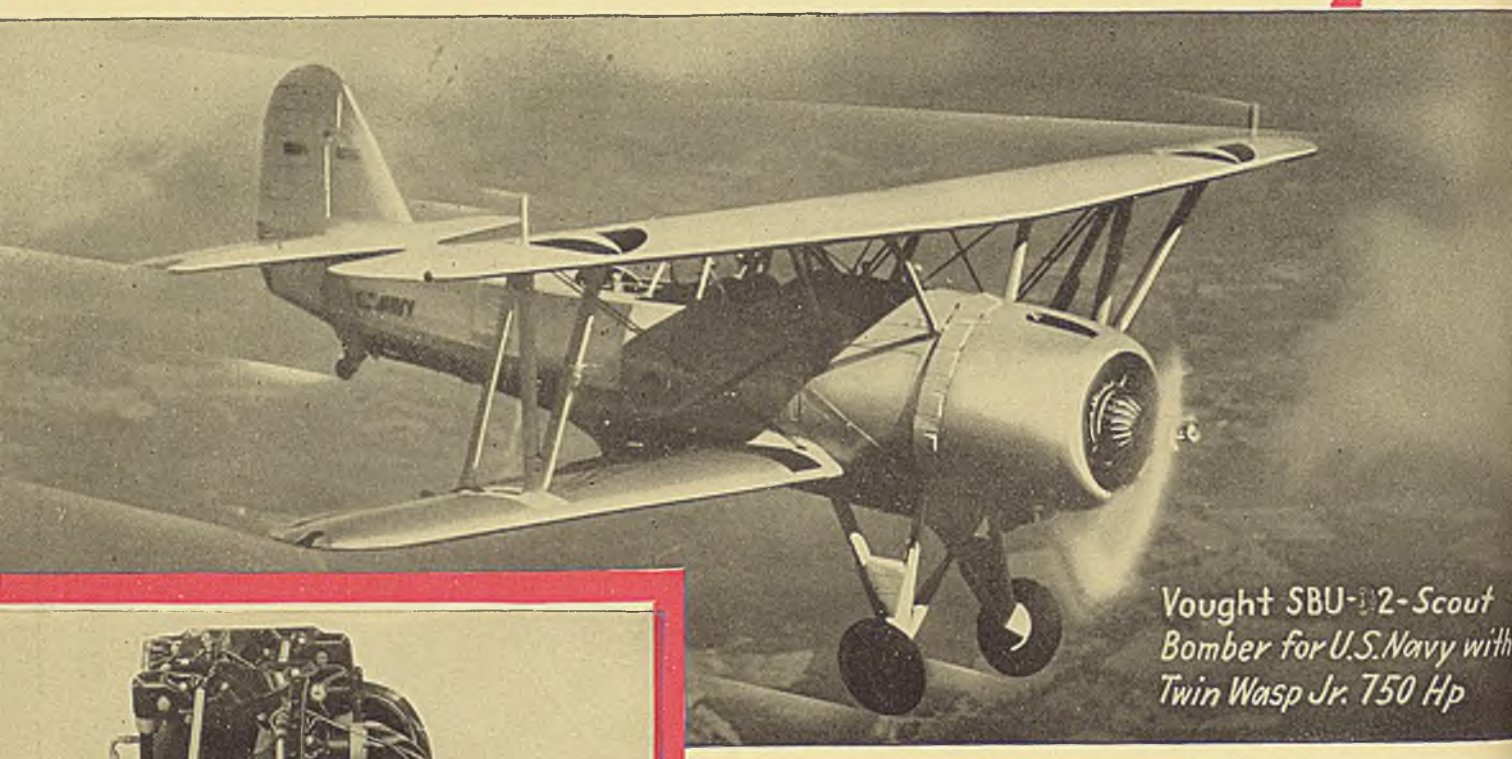
"Metallographic Technique," lecture No. 1, by J. R. Vilella, United States Steel Corp., Kearny, N. J.

Tuesday, Oct. 19

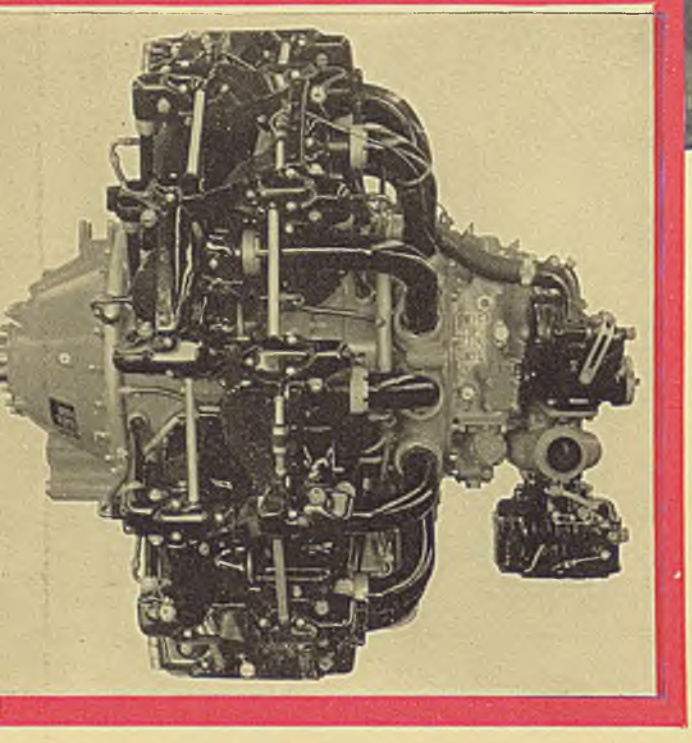
10:00 A. M.—Ambassador Hotel

"Rupture Strength of Steels at Elevated Temperatures," by A. E. White and C. L. Clark, University of Michigan, Ann Arbor, Mich., and R. L. Wilson, Timken, Roller Bearing Co., Canton, O.

Enlist Nitralloy



Vought SBU-2-Scout Bomber for U.S. Navy with Twin Wasp Jr. 750 Hp



Pratt & Whitney 1200 h.p. Twin Wasp—Cylinder barrels of nitrided Nitralloy.

CYLINDER BARRELS

Nitralloy cylinder barrels for Pratt & Whitney engines are nitrided at 975°F for 34 hours and when ground .004 from the surface must have a minimum hardness of 850 Vickers. Before grinding, the surface hardness is over 1000 Vickers. Pratt & Whitney aircraft specifications for core properties of Nitralloy after normalizing, quenching and drawing at not less than 1100° F. call for the following minimum physical tests:

Yield Point	110,000
Tensile Strength	140,000
Elongation	14% in 2"
Reduction of Area	40%
Brinell	286-321

LICENSED MANUFACTURERS OF NITRALLOY

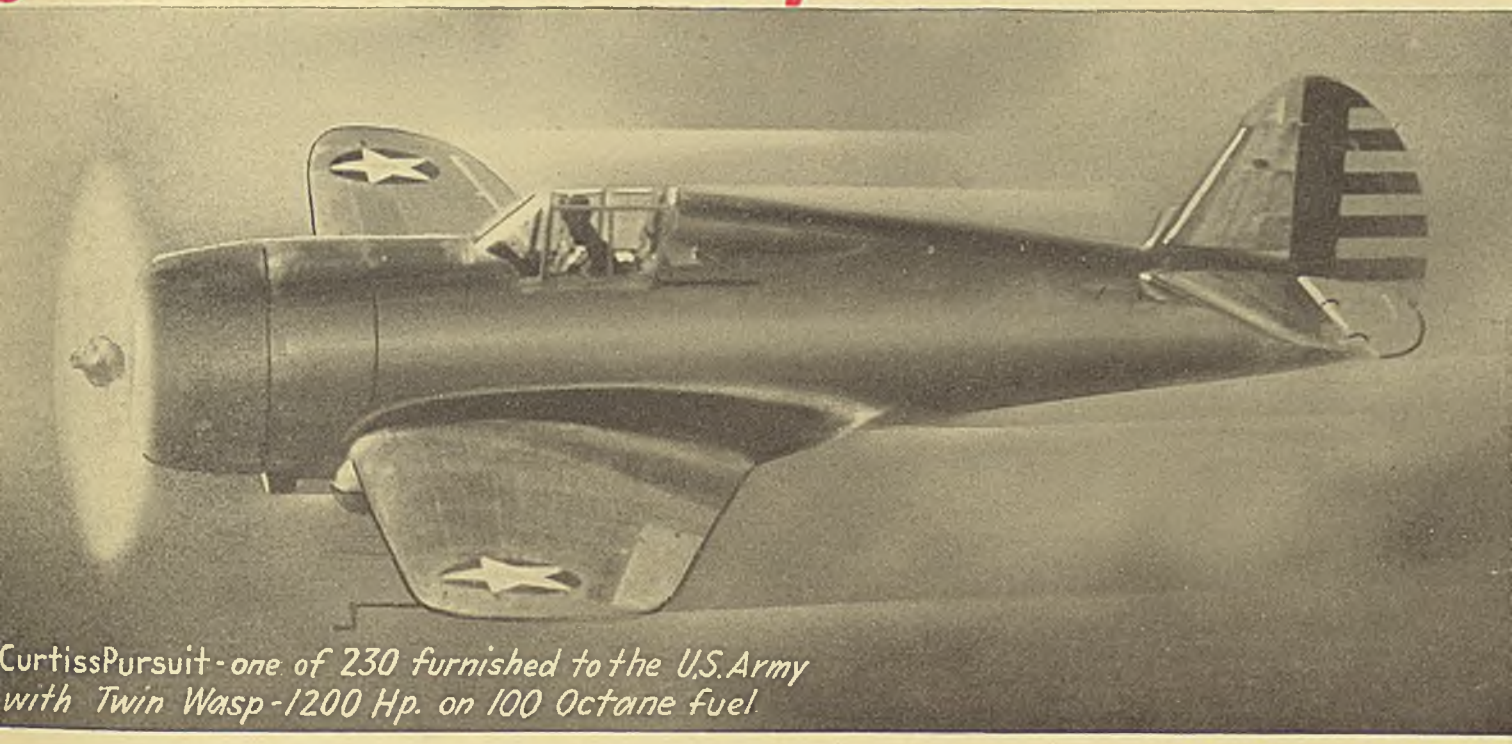
Bethlehem Steel Co., Bethlehem, Pa.
Crucible Steel Co. of America, New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corporation, Youngstown, Ohio
Simonds Saw and Steel Company, Lockport, N. Y.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

LICENSED MANUFACTURERS OF NITRALLOY CASTINGS

Empire Steel Castings Co., Reading, Pa.
Lebanon Steel Foundry, Lebanon, Pa.
The Massillon Steel Castings Co., Massillon, Ohio
Milwaukee Steel Foundry Co., Milwaukee, Wis.
Warman Steel Castings Co., Los Angeles, Cal.

For further NITRIDED NITRALLOY PROCESSES

for the WAR *against* WEAR



Curtiss Pursuit - one of 230 furnished to the U.S. Army with Twin Wasp - 1200 Hp. on 100 Octane fuel

of NITRIDED NITRALLOY INCREASE LIFE . . . REDUCE WEAR OF PRATT & WHITNEY ENGINES

Pratt & Whitney Twin Wasp and Hornet engines for the latest Curtiss Pursuit ships for the Army, the new Vought SBU-2 Scout Bomber for the Navy, and the Lockheed 14, world's fastest transport for Northwest Airlines, are equipped with cylinder barrels of nitrided Nitralloy.

Where utmost stamina and wear resistance must be built into a product, engineers in aviation and many other industries have found that nitrided Nitralloy offers the hardest known steel surface.

Consult the technical departments of the Licensees of The Nitralloy Corporation. Let them specify your steel requirements.

THE NITRIDING PROCESS
AND NITRALLOY ARE PROTECTED
UNDER PATENTS CONTROLLED BY

The NITRALLOY CORPORATION

230 PARK AVENUE NEW YORK, N. Y.

THE HARDEST KNOWN STEEL SURFACE!

Edgar C. Bain

President, American Society for Metals. He is assistant to vice president, United States Steel Corp., New York

"Electrode Salt Bath for Hardening High Speed Steel," by Axel Hultgren, consulting metallurgist, Stockholm, Sweden.

"A New Application for the Short-Time High-Temperature Tensile Test," by C. L. Clark, A. E. White and C. J. Guarnieri, University of Michigan, Ann Arbor, Mich.

2:00 P. M.—AUDITORIUM

"Austenitic Grain Size of Eutectoid Steel," by Harry Tobin and R. L. Kenyon, American Rolling Mill Co., Middletown, O.

"Some Factors Influencing Austenitic Grain Size in High-Purity Steels," by G. Derge and R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, and A. R. Kommel, United Engineering & Foundry Co., Vandergrift, Pa.

"Relation of Pre-treatment of Steels in Austenitic Grain Growth," by J. E. Dorn and O. E. Harder, Battelle Memorial institute, Columbus, O.

4:30 P. M.—AUDITORIUM

Educational Lecture

"Steel Making," lecture No. 2, by Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

8:00 P. M.—AUDITORIUM

Educational Lecture

"Metallographic Technique," lecture No. 2, by J. R. Vilella, United States Steel Corp., Kearny, N. J.

Wednesday, Oct. 20

9:30 A. M.—AMBASSADOR HOTEL

Annual Meeting

Reports of officers.

Election of officers.

Edward De Mille Campbell Memorial lecture: "Structural and Hardening Characteristics of Some Iron-Cobalt-Tungsten Alloys," by W. P. Sykes, Cleveland Wire Works, General Electric Co., Cleveland.

2:00 P. M.—AUDITORIUM

"Effect of Mass Upon the Mechanical Properties of Cast Steel," by C. W. Briggs and R. A. Gezelius, United States naval research laboratories, Washington.

"Fatigue Resistance of Steel as Affected by Some Cleaning Methods," by J. H. Frye Jr. and G. L. Kehl, Lehigh university, Bethlehem, Pa.

"Influence of Heat Treatment on Creep of Carbon-Molybdenum and Chromium - Molybdenum - Silicon Steel," by R. F. Miller, R. F. Campbell, and R. H. Aborn, United States Steel Corp., Kearny, N. J., and E. C. Wright, National Tube Co., Pittsburgh.

4:30 P. M.—AUDITORIUM

Educational Lecture

"Steel Making," lecture No. 3, by Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

8:00 P. M.—AUDITORIUM

Educational Lecture

"Metallographic Technique," lecture No. 3, by J. R. Vilella, United States Steel Corp., Kearny, N. J.

Thursday, Oct. 21

10:00 A. M.—AMBASSADOR HOTEL

Symposium on Carburizing

"A Review of Some Fundamentals of Carburizing," by M. A. Grossmann, Carnegie-Illinois Steel Corp., Chicago.

"A Theoretical Discussion of the Action of Solid Carburizing Agents," by H. W. McQuaid, Republic Steel Corp., Massillon, O.

"Gaseous Media for Carburizing," by G. T. Williams, Cleveland Tractor Co., Cleveland.

10:00 A. M.—AMBASSADOR HOTEL

"The Initial Stages of Graphitization," by H. A. Schwartz and M. K. Barnett, National Malleable & Steel Castings Co., Cleveland.

"An X-Ray Study of the Ar_3 and Ac_3 Points of Iron and Iron-Nickel Alloys," by Sidney D. Smith, Pennsylvania State college, State College, Pa.

"Graphitization in High-Purity Iron Carbon Alloys,"

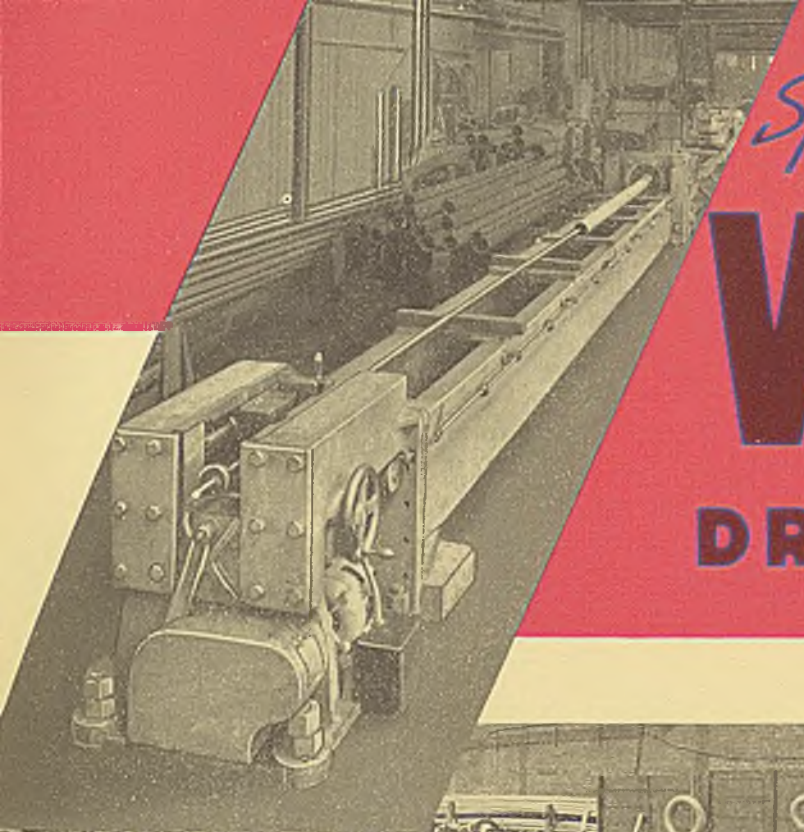
George B. Waterhouse

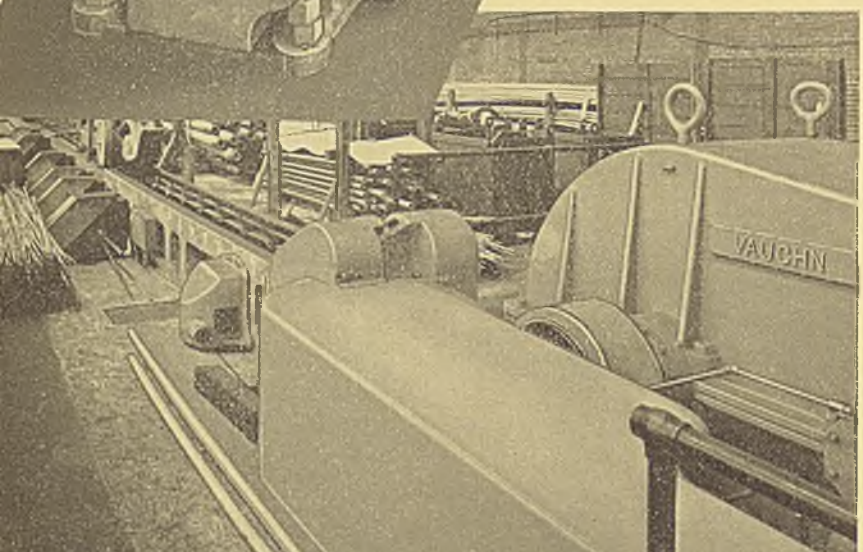
Vice president, American Society for Metals. He is professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

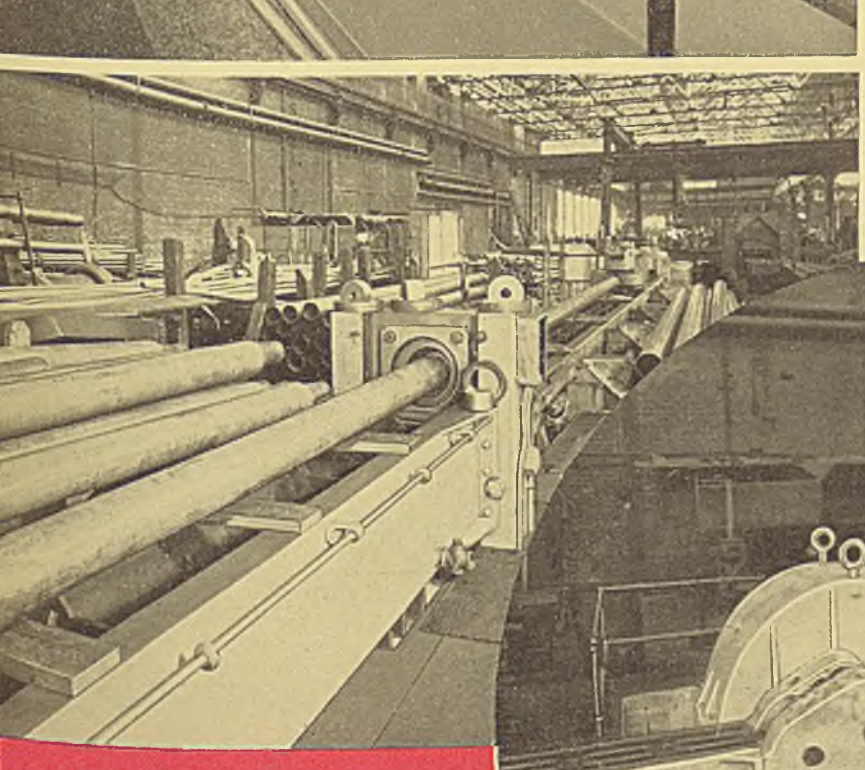
The result of over 50 years o
Specialization and Experienc

VAUGHN

DRAW BENCHES







WHAT a difference "know-how" makes! T
design of Vaughn Draw Benches incorpora
many unique factors directly contributory to th
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the sprocket during drawing, and combines w
fully-enclosed drive, cast steel sprockets and m
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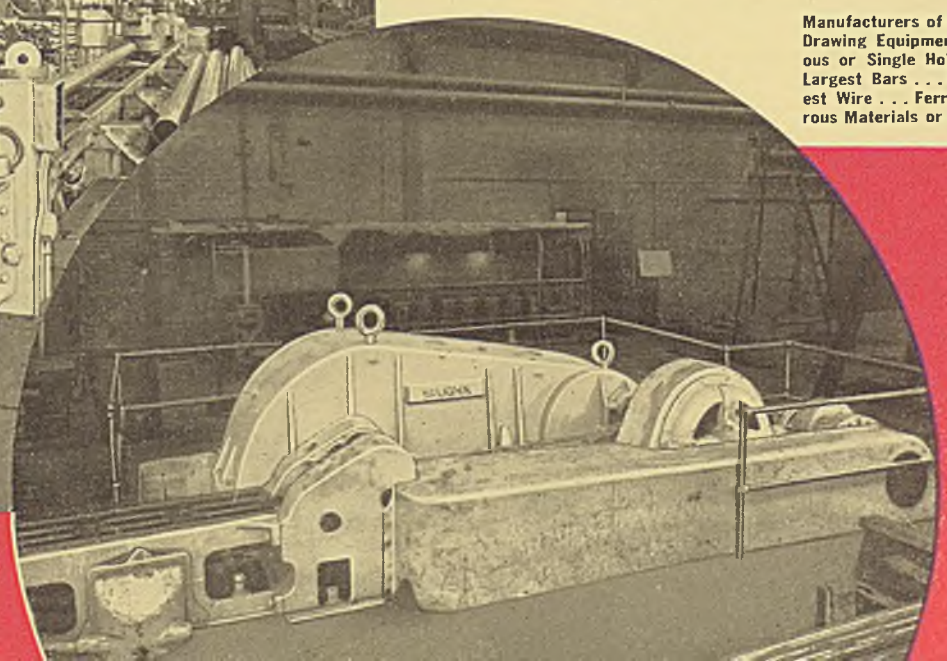
lubrication, self-freeing chain hooks, complet
controlled high-speed carriage return, and au
matic unloading arms to give trouble-free, p
cision service. Ample factors of safety are pres
in every size. • Write for details . . . and if y
have a problem involving *any* type of cold-draw
equipment, *summon a Vaughn Engineer!*

THE VAUGHN MACHINERY COMPAN

Cuyahoga Falls, Ohio

**Manufacturers of Complete
Drawing Equipment . . . Con
ous or Single Hole . . . For
Largest Bars . . . For the Sm
est Wire . . . Ferrous, Non-
rous Materials or their Alloy**



Vaughn Draw Benches are available in ca-
pacities ranging from 10,000 to 200,000
pounds, for tubes and bars; either single
or multiple operation, depending on size

Wesley P. Sykes

1936 Campbell Memorial lecturer, American Society for Metals. He is metallurgical Engineer, Cleveland Wire Works, General Electric Co., Cleveland

by Cyril Wells, Carnegie Institute of Technology, Pittsburgh.

2:00 P. M.—AUDITORIUM

Symposium on Carburizing

"Factors Governing Selection of Type of Carburized Case," by A. L. Boegehold and C. J. Tobin, General Motors Corp., Detroit.

"Furnace Atmospheres and Decarburization," by J. A. Webber, Interstate Drop Forge Co., Milwaukee.

"Steels Used in the Carburizing Process," by O. W. McMullan, Youngstown Sheet & Tube Co., East Chicago, Ind.

"A Hardenability Test for Carburizing Steel," by W. E. Jominy and A. L. Boegehold, General Motors Corp., Detroit.

2:00 P. M.—AUDITORIUM

"Solubility of Copper in the Grain-Boundary Material of a Solid Solution of Copper in Zinc," by G. R. Dean, Miner Laboratories, Chicago, and W. P. Davey, Pennsylvania State college, State College, Pa.

"The Rate of Austenite Transformation in Cast Iron," by D. W. Murphy, W. P. Wood and D. Giradi, University of Michigan, Ann Arbor, Mich.

"Effects of Columbium and Other Addition Agents on Low-Chromium Steels," by Russel Franks, Union Carbide & Carbon Research Laboratories Inc., Niagara Falls, N. Y.

4:30 P. M.—AUDITORIUM

Educational Lecture

"Steel Making," lecture No. 4, by Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

7:00 P. M.—AMBASSADOR HOTEL

Annual banquet.

Friday, Oct. 22

10:00 A. M.—AMBASSADOR HOTEL

Symposium on Carburizing

"Production Carburizing," by Ernest F. Davis, Warner Gear Division, the Borg-Warner Corp., Muncie, Ind.

"A Study of Commercial Carburizing Containers," by R. W. Roush and A. C. Dames, Timken-Detroit Axle Co., Detroit.

"Physical and Chemical Characteristics of Carburizing Compounds and Their Handling in Production," by S. L. Widrig, Spicer Mfg. Co., Toledo, O.

10:00 A. M.—AMBASSADOR HOTEL

"Effect of Longitudinal Scratches on Valve Spring Wire," by F. P. Zimmerli and G. D. Wilson, Barnes-Gibson-Raymond, Detroit, and W. P. Wood, University of Michigan, Ann Arbor, Mich.

"Recovery of Cold-Worked Nickel on Annealing," by Erich Fetz, Wilbur B. Driver Co., Newark, N. J.

"Metal Coloring," by C. B. F. Young, Columbia university, New York.

2:00 P. M.—AUDITORIUM

Symposium on Carburizing

"Commercial Gas Carburizing," by L. D. Gable and E. S. Rowland, Timken Roller Bearing Co., Canton, O.

"Light Cases by Gas Carburizing," by V. T. Malcolm, Chapman Valve Mfg. Co., Indian Orchard, Mass.

"Liquid Bath Carburizing," by B. B. Beckwith, Chrysler Corp., Detroit.

2:00 P. M.—AUDITORIUM

"A Study of Deoxidation Type Inclusions in Alloy Steels," by W. A. Hare and Gilbert Soler, Timken Roller Bearing Co., Canton, O.

"Some Problems in the Production of Low-Carbon Sheets in Noncontinuous Mills," by M. L. Samuels and Alfred Boyles, Battelle Memorial institute, Columbus, O.

"Relation of Size of Spheroids in Tool Steel to Its Machinability and to Holding Edge of Cutter," by D. E. Roda, International Business Machines Corp., Rochester, N. Y.

4:30 P. M.—AUDITORIUM

Educational Lecture

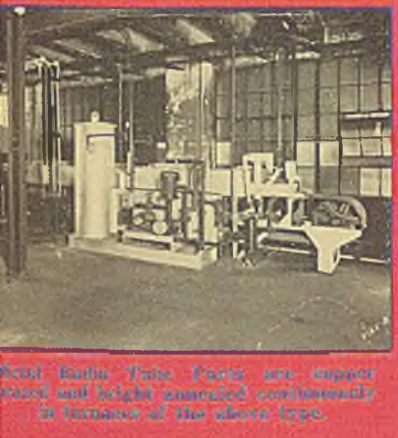
"Steel Making," lecture No. 5, by Earnshaw Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

William H. Eisenman

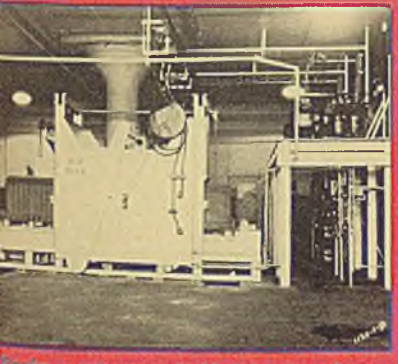
Secretary, American Society for Metals. Mr. Eisenman also is general manager of the National Metal Exposition

LET US SHOW YOU

Bright Annealing Steel Tubing—continuously—5 to 25 foot lengths—2,000 pounds per hour.



Metal Radio Tube Parts are copper brazed and bright annealed continuously in furnaces of the above type.



Engine parts are shown in the above controlled atmosphere furnace—one of several similar installations.

Brass, Bronze and Copper in wire and strip are annealed continuously in this special atmosphere furnace.

At Atlantic City

While you are attending the National Metal Exposition at Atlantic City—Octobe 18-22—permit us to show you some furnace installations we have made in tha vicinity. Several of these are shown at left and below.

See also the large display of photographs and drawings of outstanding electri and fuel fired furnace installations in our booth (D-80—directly in front of stage) The latest developments in special atmosphere equipment for bright and clea annealing various ferrous and non-ferrous products including tubing, wire, strip sheet, stampings and other finished and unfinished products are shown in this display

These pictures also show some of our new continuous furnaces for copper brazing bright hardening and heat treating with complete absence of scale, as well as othe continuous and batch furnaces of various types for normalizing, annealing, forging billet heating and other heat treating processes.

See the large display of actual parts and products handled in these furnaces.

See the Elfurno generators for producing the inexpensive, protective atmospher used in our controlled atmosphere furnaces.

See the new gas fired recuperative type radiant tube—the most uniform and th most economically operated radiant tube yet developed.

See the heavy cast metallic heating elements—the heaviest and most rugged elemen used in industrial furnace heating.

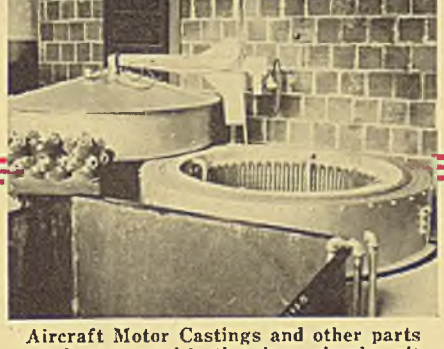
Our engineers will be glad to show you this equipment or work with you on an of your furnace or heat treating problems.

The Electric Furnace Co.

Hotel Headquarters during Exposition—THE AMBASSADOR HOTEL

Salem, Ohio

Exposition Headquarters Booth D-80 (directly in front of stage



Aircraft Motor Castings and other parts are heat treated in the above circular pit type electric furnace.

Gas Fired Radiant Tube Furnace equipped for special atmosphere for bright annealing copper tubing.

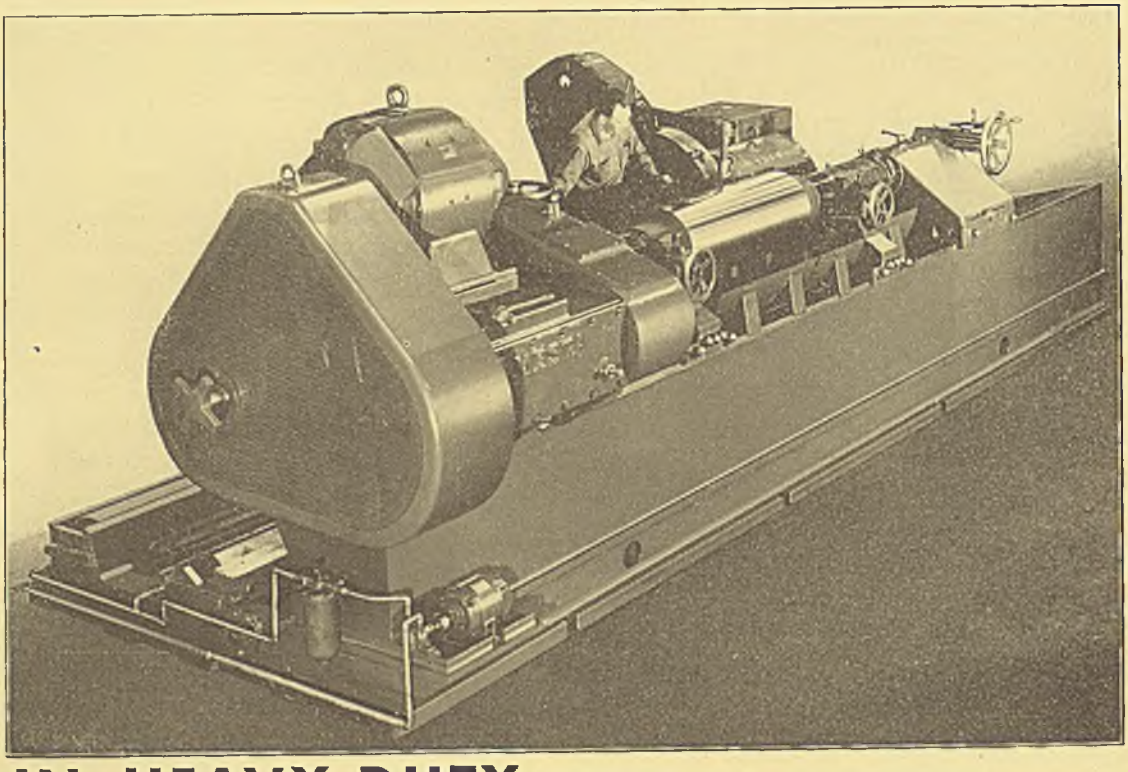
THE ELECTRIC FURNACE CO

Fuel Fired

SALEM, OHIO

Electr

Yes — PRECISION PAYS!



IN HEAVY-DUTY STEEL MILL EQUIPMENT

So Mesta Machine Company of Pittsburgh, Pa., employed NORMA-HOFFMANN PRECISION BEARINGS in the headstock of the 42-inch Roll Grinder here pictured—which is a part of an 80-inch Continuous Hot Strip Mill. * * * * For all heavy-duty service, engineers, designers and builders find that NORMA-HOFFMANN PRECISION stands for all the qualities which make for longer life, lower costs, better performance, and greater freedom from shut-down losses.

The NORMA-HOFFMANN line includes 108 distinct series, embracing over 3000 catalogued sizes—a PRECISION BEARING for every load, speed and duty. Write for the Catalog. Let our engineers work with you.

"NORMA-HOFFMANN"
PRECISION BEARINGS
BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U.S.A.

Welding Society Papers Cover Broad Field

Monday, Oct. 18

9:30 A. M.—Hotel Traymore

Business Session

Address of President A. E. Gibson, Wellman Engineering Co., Cleveland.

Report on welding research activities, by C. A. Adams, Harvard university, Cambridge, Mass.

Review of committee and section activities by chairmen.

Award of Samuel Wylie Miller and Lincoln medals.

Report of Managing Director W. S. Hays, New York.

Election of officers.

"Looking Ahead with the American Welding Society," by President-Elect P. G. Lang Jr., Baltimore & Ohio railroad, Baltimore.

2:00 P. M.—Hotel Traymore

Industrial Research

"Weldability of Low Alloy Steels," by W. L. Warner, Watertown arsenal, Watertown, Mass.

"Spot Welding Characteristics of Some Copper-Base Alloys," by D. K. Crampton and J. J. Vreeland, Chase Brass & Copper Co., Waterbury, Conn.

"Survey of Low Alloy Steels as to Weldability," by J. H. Critchett, Union Carbide & Carbon Research Laboratories Inc., New York.

"Physical Properties and Corrosion Resistance of Nickel-Iron Alloys Formed in Welding Nickel-Clad Steel," by J. H. Deppeler, Metal & Thermit Corp., New York; W. G. Thiesinger, Lukens Steel Co., Coatesville, Pa.; and F. G. Flocke, International Nickel Co., New York.

"X-Ray Methods of Studying Stress Relief in Welds," by J. T. Norton, Massachusetts Institute of Technology, Cambridge, Mass.

6:30 P. M.—Hotel Traymore

Dinner meeting of board of directors.

Tuesday, Oct. 19

9:30 A. M.—Hotel Traymore

Fundamental Research in Welding

"Fatigue Tests of Butt Welds in Plates," by W. M. Wilson, University of Illinois, Urbana, Ill.

"The Heat Effect in Welding," by W. H. Bruckner, United States naval research laboratory, Washington.

"The Electric Industry and the Welding Industry," by A. S. Douglass, Detroit Edison Co., Detroit.

2:00 P. M.—Hotel Traymore

Fundamental Research in Welding

"Welded Girders with Inclined Stiffeners," by Cyril D. Jensen and William F. Lotz Jr., Lehigh university, Bethlehem, Pa.

Alfred E. Gibson

President, American Welding Society. He is president, Wellman Engineering Co., Cleveland

"Welding of Copper," by A. P. Young, Michigan College of Mining and Technology, Houghton, Mich.

"Static and Impact Tensile Properties of Stainless Steel Welds at Ordinary and Low Temperatures," by O. H. Henry, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

"Effect of Welded Top Angles on Beam-Column Connections," by Inge Lyse and G. J. Gibson, Lehigh university, Bethlehem, Pa.

"High-Speed Motion Pictures of Flame Cutting," by H. R. Bullock, Massachusetts Institute of Technology, Cambridge, Mass.

2:00 P. M.—Hotel Traymore

Joint Session with American Society of Mechanical Engineers

"Resistance Welding Fabrication," by J. M. Cooper, General Electric Co., Lynn, Mass.

"Developments in Large Welded Structures," by C. C. Brinton, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Recent Developments in Fusion Welding," by C. W. Obert. Union Carbide & Carbon Research Laboratories Inc., New York.

7:30 P. M.—Hotel Traymore

Conference and meeting of fundamental research committee. Sched-

Wednesday, Oct. 20

9:30 A. M.—Hotel Traymore

Fabrication

"Carbon Arc Welding in Automotive Work," by William Richards. Chevrolet Motor Co., Flint. Mich.

"Automatic Resistance Welding," by Harry Landstrom. Nash-Kelvinator Corp., Detroit.

"Welding—An Aid in Dam Construction," by T. B. Jefferson, United States engineer department.

(*Please turn to Page* 230)

A. I. M. E. To Hold Seven Sessions

Monday, Oct. 18

8:00 P. M.—Auditorium

Physics of Metals Roundtable—Elasticity

"True Stress-Strain Curves for Single Crystals," Discussion leader: S. L. Hoyt, A. O. Smith Corp., Milwaukee.

"True Stress-Strain Curves for Polycrystalline Materials." Discussion leader: R. K. Haskell, Watertown arsenal, Watertown, Mass.

"Internal Dissipation of Energy in Metals for Small Cyclic Strains." Discussion leader: R. L. Wegel, Bell Telephone Laboratories Inc., New York.

Albert J. Phillips

Chairman, Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. He is superintendent of research, Central Research laboratory, American Smelting & Refining Co., Maurer, N. J.

Tuesday, Oct. 19

10:00 A. M.—Ritz-Carlton Hotel

Institute of Metals and Iron and Steel Divisions

Physics of Metals

"A Theory of Diffusion in Solids," by John E. Dorn and Oscar E. Harder, Battelle Memorial institute, Columbus, O.

"Some Fundamentals Concerning Impact Testing," by Earl B. Smith, College of City of New York, New York.

"Problem of the Temperature Coefficient of Tensile Creep Rate," by J. J. Kanter, Crane Co., Chicago.

2:00 P. M.—Ritz-Carlton Hotel

Science Lecture of Institute of Metals Division

"Behavior of Gases at Metal Surfaces," by Arthur B. Benton, school of chemistry, University of Virginia, Charlottesville, Va.

Wednesday, Oct. 20

12:15 P. M.—Ritz-Carlton Hotel

Luncheon meeting of Iron and Steel division executive committee.

2:00 P. M.—Ritz-Carlton Hotel

Institute of Metals and Iron and Steel Divisions

"Diffusion of Carbon from Steel Into Iron," by L. C. Grimshaw, Duo Metals Division, Latrobe Electric Steel Co., Latrobe, Pa.

"Investigations on Lead-Magnesium Alloys for Prevention of Lead Poisoning in Waterfowl," by R. L. Dowdell and R. G. Green, University of Minnesota, Minneapolis.

"Effect of Chromium on Grain Growth of Brass," by Bruce W. Gonser and Carlos M. Heath, Battelle Memorial institute, Columbus, O.

7:00 P. M.—Ritz-Carlton Hotel

Institute of Metals and Iron and Steel Divisions

Annual dinner. Speaker: Harvey N. Davis, president, Stevens Institute of Technology, Hoboken, N. J. Subject: "The Place of the Engineer in Modern Life."

Thursday, Oct. 21

10:00 A. M.—Ritz-Carlton Hotel

Iron and Steel Division

"Effect of Silicon on Steels for High-Temperature Service," by H. D. Newell, Babcock & Wilcox Tube Co., Beaver Falls, Pa.

"Notes on Microstructure and Hardness of Alloys Consisting Essentially of Iron, Chromium and Silicon," by A. G. H. Andersen, Phelps Dodge Corp., New York, and Eric R. Jette, Columbia university, New York.

"An X-Ray Study of the Effects of Adding Carbon, Nickel or Manganese to Some Ternary Iron-Chromium-Silicon Alloys," by Eric R. Jette, Columbia university, New York, and A. G. H. Andersen, Phelps Dodge Corp., New York.

10:00 A. M.—Ritz-Carlton Hotel

Institute of Metals Division

"Age Hardening of Aluminum Alloys. III — Double Hardness Peaks," by W. L. Fink and D. W. Smith, Aluminum Co. of America, New Kensington, Pa.

"Use of Tellurium in Copper-Base Alloys," by H. L. Burghoff and D. E. Lawson, Chase Brass & Copper Co., Waterbury, Conn., and Cleveland, respectively.

"Sulphur, Selenium and Tellurium in Copper-Base Alloys," by Cyril S. Smith, American Brass Co., Waterbury, Conn.

12:15 P. M.—Ritz-Carlton Hotel

Luncheon meeting of Institute of Metals executive committee.

Luncheon meeting of Open-Hearth committee, Iron and Steel division.

2:00 P. M.—Ritz-Carlton Hotel

Open-Hearth Committee

Open-Hearth Steel Practice

"Extensive Control Features Open-Hearth Practice at Lackawanna," by P. F. Kinyoun, Bethlehem Steel Co., Lackawanna, N. Y.

"Basic Open-Hearth Slag Control by Use of the Viscosimeter," by W. J. Reagan, Edgewater Steel Co., Oakmont, Pa.

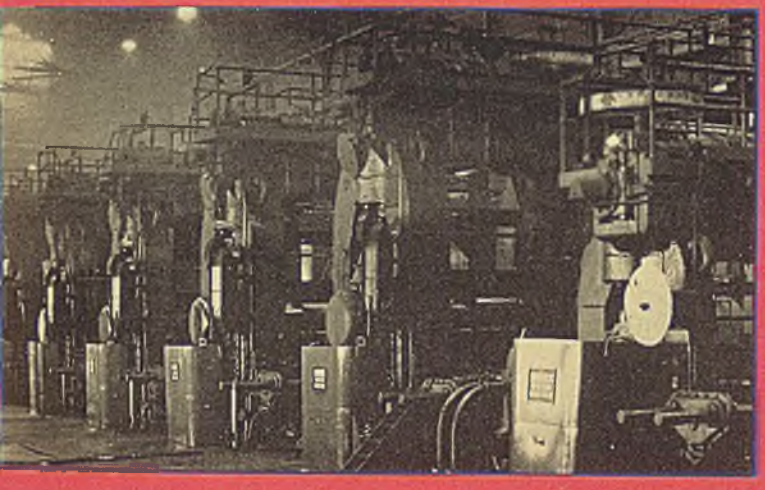
"Combined Carbon—the Controlling Factor in Quality of Basic Pig Iron," by Ralph H. Sweetser, Stuart, James & Cooke Inc., New York.

"Progress Report on Use of Venturi Ports in Open-Hearth Furnaces," by George L. Danforth Jr., Open Hearth Combustion Co., Chicago.

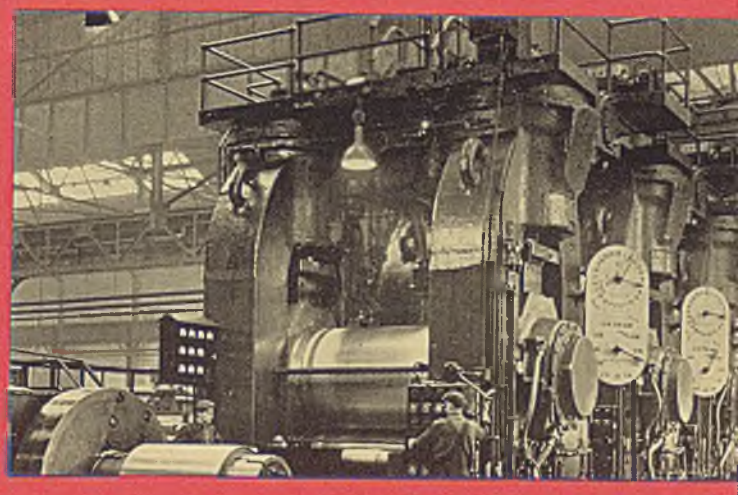
Francis B. Foley

Chairman, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers. He is superintendent of research, Midvale Co., Philadelphia

CONTINENTAL



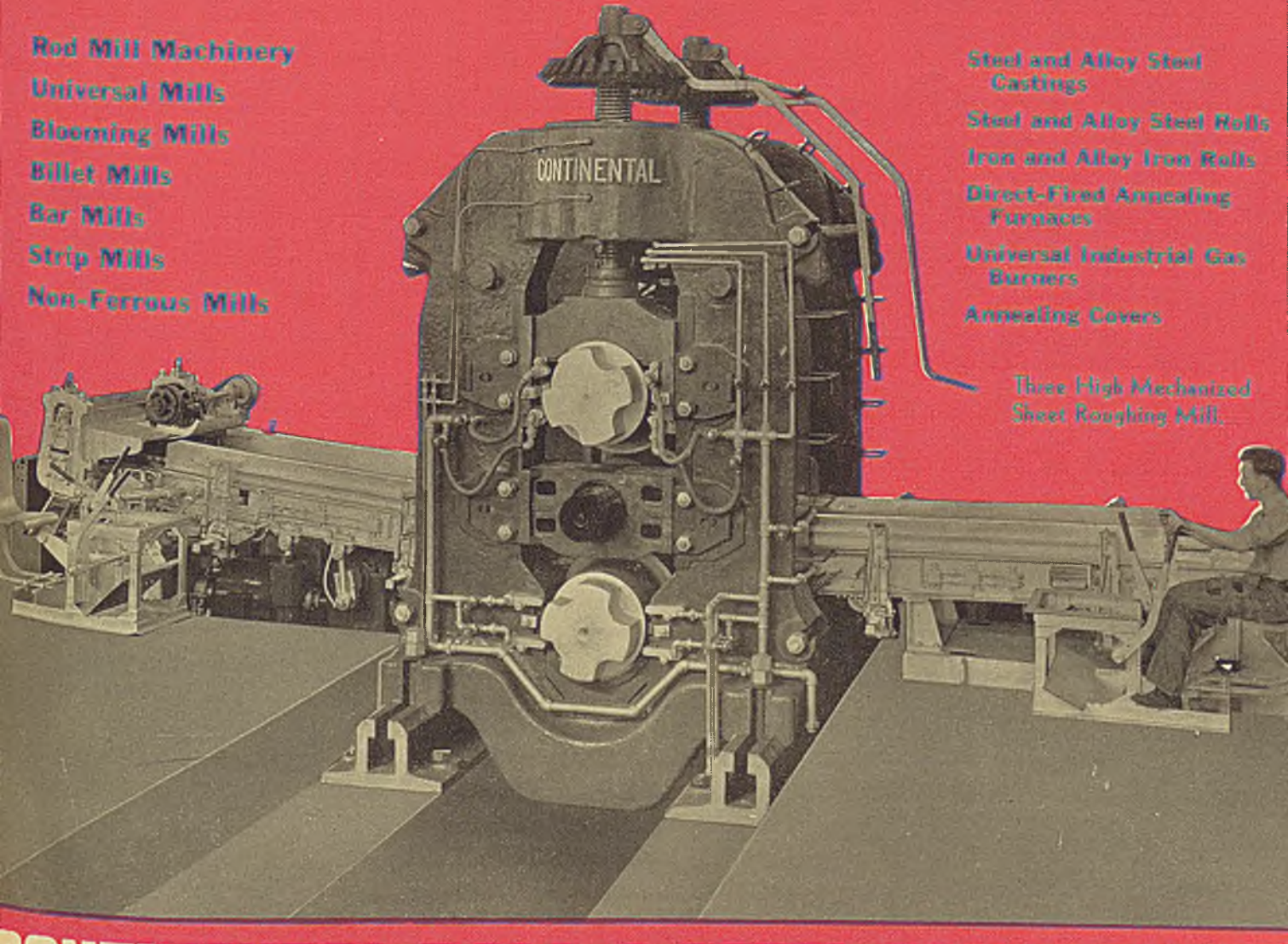
80" Continuous Hot Strip Mill



84" Continuous Cold Strip Mill

Rod Mill Machinery
Universal Mills
Blooming Mills
Billet Mills
Bar Mills
Strip Mills
Non-Ferrous Mills

Steel and Alloy Steel Castings
Steel and Alloy Steel Rolls
Iron and Alloy Iron Rolls
Direct-Fired Annealing Furnaces
Universal Industrial Gas Burners
Annealing Covers



Three High Mechanized Sheet Roughing Mill

CONTINENTAL ROLL & STEEL FOUNDRY CO

Wire Group To Review Progress

Monday, Oct. 18

2:00 P. M.—Ambassador Hotel

"Fatigue Properties of Helical Springs," by R. R. Tatnall, engineer, Morgan Works, Wickwire Spencer Steel Co., Worcester, Mass.

Tuesday, Oct. 19

9:30 A. M.—Ambassador Hotel

"New Developments in Material Handling for Wire Mills," by A. F. Anjeskey, sales manager, Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O.

"Making of Steel,"—a motion picture, by Bethlehem Steel Co., Bethlehem, Pa.

2:00 P. M.—Ambassador Hotel

"Lime in Wire Drawing," by D. E. Washburn, chief chemist, American Lime & Stone Division, Warner Co., Bellefonte, Pa.

"Electrolytic Rod Pickling," by Allan B. Dove, chemical engineer, Canada Works, Steel Co. of Canada, Ltd., Hamilton, Ont.

"Handling Waste Acids from Pickling Operations," by H. E. Klein, engineer, chemical industry, B. F. Goodrich Co., Akron, O.

Wednesday, Oct. 20

9:30 A. M.—Ambassador Hotel

Ferrous Division

"Cold Heading," by L. S. Cooch, metallurgist, Buffalo Bolt Co., North Tonawanda, N. Y.

"The Art of Cold Heading, Past, Present and Future," by A. R. Ryan, industrial engineer, General Electric Co., Schenectady, N. Y.

9:30 A. M.—Ambassador Hotel

Nonferrous Division

"Production of Copper from Mine to Mill," by William H. Bassett Jr., manager, metallurgical development, Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y.

"Noranda Enterprises"—a motion picture.

2:00 P. M.—Ambassador Hotel

Ferrous Division

"Phenomenon of Grain Growth in Low-Carbon Steel Wire," by B. L. McCarthy, chief metallurgist, Wickwire Spencer Steel Co., Buffalo.

2:00 P. M.—Ambassador Hotel

Nonferrous Division

"Metallurgical Aspects of Fourdrinier Wire," by Hugh E. Brown, director of research, W. S. Tyler Co., Cleveland.

"Need of a Better Quality of Copper in Apparatus Manufacture," by L. H. Burnham, engineer, transportation division, General Electric Co., Pittsfield, Mass.

4:00 P. M.—Ambassador Hotel

Annual Meeting

Reports of officers.

Award of Wire association medal.

7:30 P. M.—Ambassador Hotel

Annual dinner and entertainment.

Thursday, Oct. 20

10:00 A. M. —Ambassador Hotel

"A Metallurgical Study of the Factors Affecting the Quality of Galvanizing," by R. W. Sandelin, chief metallurgist, Atlantic Steel Co., Atlanta, Ga.

"High Nickel Alloys in the Field of Wire and Wire Products," by Carl Rolle, development and research division, International Nickel Co. Inc., New York.

"Cold Drawn Bars," by D. W. McDowell, metallurgist, Union Drawn Steel Co., Chicago.

Ralph K. Clifford

President, Wire Association. Mr. Clifford is works manager, Continental Steel Corp., Kokomo, Ind.

"Production of Bolts for Railroads and Bridges," by Charles Fassinger, vice president, Oliver Iron and Steel Corp., Pittsburgh.

"Making of Steel Wire"—a motion picture, by Bethlehem Steel Co., Bethlehem, Pa.

Welding Papers Will Cover Broad Field

(*Concluded from Page* 227)

"Oxyacetylene Welding as a Production Tool," by A. Bell, Haywood-Wakefield Co., Boston.

12:30 P. M.—Hotel Traymore

Luncheon conference of officers and executive committees.

Thursday, Oct. 21

9:30 A. M. —Hotel Traymore

Symposium on Alloy Steels

"Resistance Welding of Low Alloy Steels," by G. S. Mikhalapov, Heintz Mfg. Co., Philadelphia.

"Low Alloy Steels," by A. B. Kinzel, Union Carbide & Carbon Research Laboratories Inc., New York.

"Stainless as Applied to Pressure Vessels," by J. C. Holmberg, Struthers-Wells-Titusville Corp., Warren, Pa.

2:00 P. M.—Hotel Traymore

Shipbuilding

"Welding in Building Tanker Vessels," by T. M. Jackson, Sun Shipbuilding & Dry Dock Co., Chester, Pa.

"Assembly Plant for Welding of Barges," by G. F. Wolfe, Dravo Corp., Pittsburgh.

"Tests and Arc Welding in Ship Structure," by Lieut. Commander W. P. Roop, United States navy, Washington.

"All-Welded Steel Tankers," by A. C. Leigh, Ingalls Iron Works Co., Birmingham, Ala.

7:00 P. M.—Hotel Traymore

Dinner dance and entertainment.

Friday, Oct. 22

9:30 A. M.—Hotel Traymore

Railroad Session

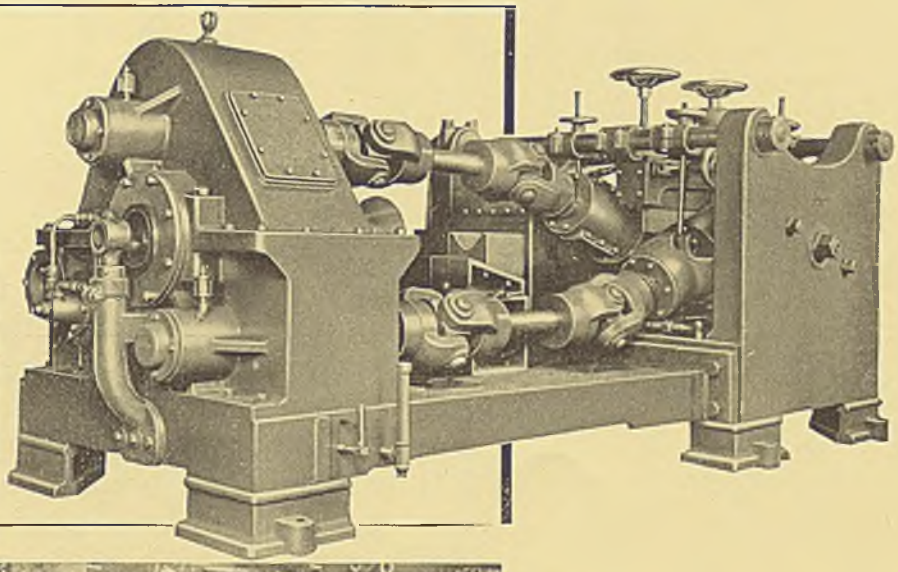
"Building Up Locomotive Driving Boxes," by I. T. Bennett, Revere Copper & Brass Inc., New York.

"Machine Gas Mechanical Cutting in Railroad Work," by H. Bass, New York Central railroad.

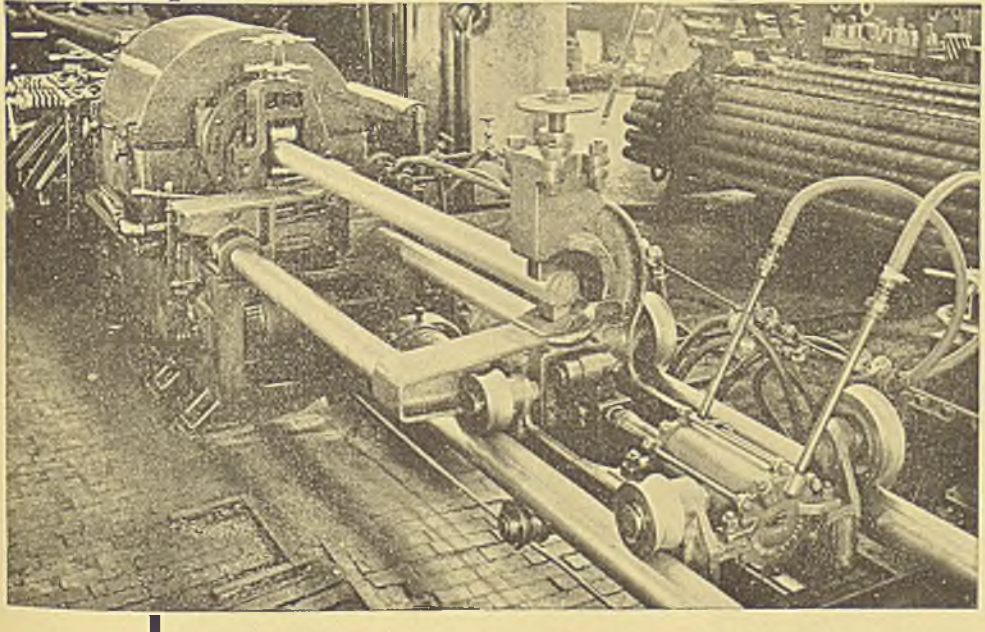
"Welding of Railroad Rolling Stock," by V. R. Willoughby, American Car & Foundry Co., New York.

MEDART

STRAIGHTENING AND TURNING MACHINES



Greater speed and greater capacity has been built into the newly designed Medart Continuous Automatic Straightening and Polishing Machines...Rolls are mounted in Timken-matched units...Improved anti-backlash Universal Joints result in more efficient operation during the polishing and straightening of round, drawn and turned bars...Rolls are made of highest grade alloy tool steel, properly heat treated and tempered. Built in all sizes.



The Medart Turning Machine is a continuous feed, no-gap-between-bars type of high-production, heavy-duty machine. The bars or tubes are automatically fed into two rotating cutter heads by a pair of feed rolls and two sets of grip jaws. The discharge carriage, outgoing clamp and carriage return are all either automatic or mechanical. The machines may be used for precision turning or bar or tube peeling. Built in all sizes.

THE MEDART COMPANY

General Offices and Works: 3520 De Kalb Street, St. Louis, Missouri

Engineering Sales Offices: Cincinnati, Cleveland, New York, Buffalo, Philadelphia, Chicago, Pittsburgh, New Orleans, Charlotte, San Francisco, Los Angeles, Dallas, Denver, Birmingham, Milwaukee, Minneapolis, Atlanta, Detroit, Grand Rapids, Kansas City

MIDVALE

ALLOY STEEL FORGINGS

Have Several Reasons for Excellence

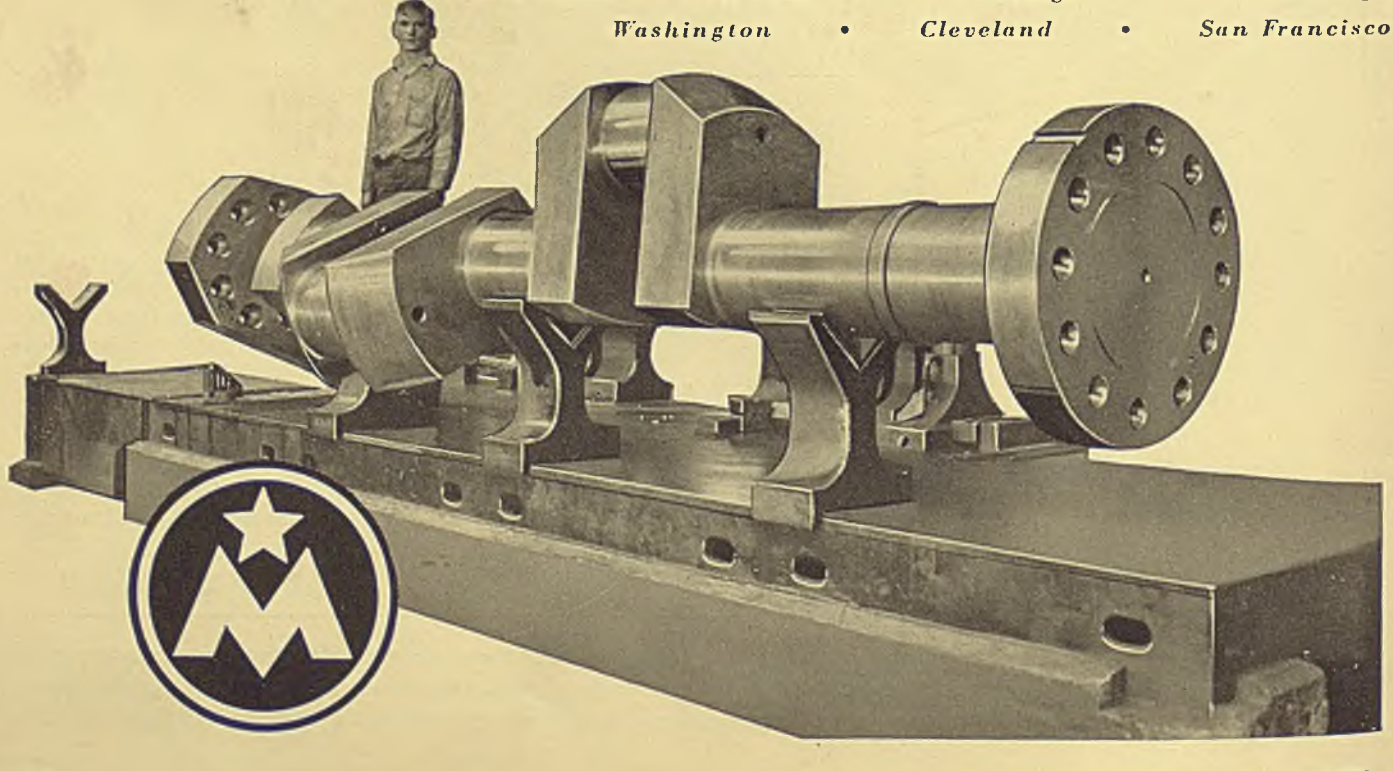
First, they are the product of an integrated plant. From clean, sound metal, through the ingot to the finished forging —every stage is under one central supervision and reverts to one common responsibility.

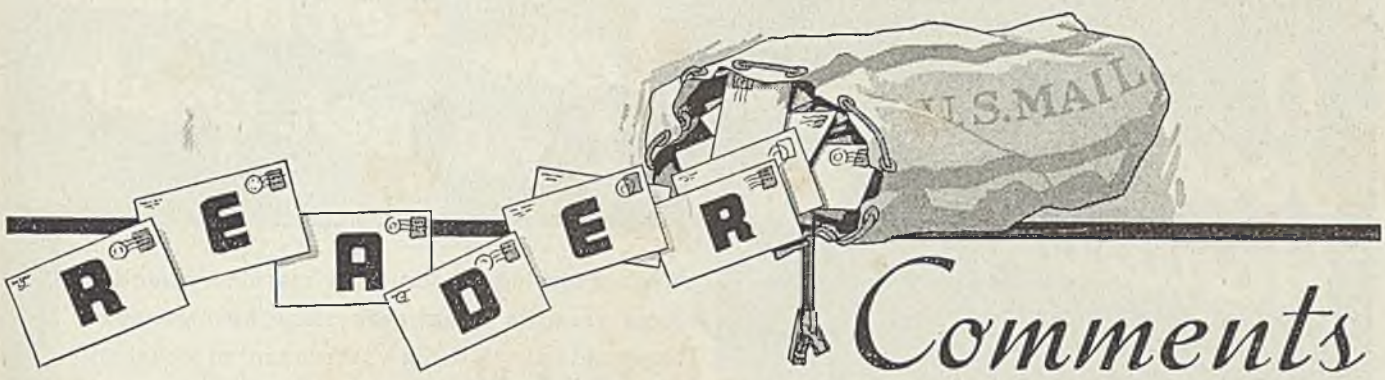
Further, the properties of every type of steel produced by Midvale have been predetermined in our laboratories and tested in our plant before offered for your use.

For heavy duty, for heat, for whatever requirement, Midvale welcomes the opportunity to prove we produce forgings of dependable excellence.

THE MIDVALE COMPANY · NICETOWN · PHILADELPHIA

OFFICES: *New York* • *Chicago* • *Pittsburgh*
Washington • *Cleveland* • *San Francisco*





Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

Puts Heat into Corners

To the Editor:

Our works engineering department here at East Pittsburgh has made the following comments on the articles on unit heaters in STEEL, June 28 and July 5.

We are finding increasing uses for unit heaters, and have installed a considerable number in the past two years. In our old shop buildings with their central fan heating systems, there are many places that are hard to heat. The installation of a unit heater of the correct size and type usually corrects this fault.

New buildings are all heated by means of unit heaters which have the advantage over other systems of handling large volumes of air at low static head and aid in maintaining good ventilation in summer, when they are operated with heat supply shut off, as well as in winter. It is also much easier to maintain comfortable working conditions in winter with the unit heaters as only the necessary units need be operated to maintain even temperatures whereas with central heating fans parts of the shop must be overheated in order to provide high enough temperatures for comfort in other parts.

The largest use we have found for unit heaters, other than for building heating, is in the heating of process ovens. We have installed a large number of ovens heated by this method and found the temperature distribution within the oven much better than with direct heated ovens. Units are usually mounted on the oven roof and temperature is controlled by a modulating by-pass damper, permitting full air flow at all times and eliminating the cycling effect of "on and off" heaters.

J. W. GREVE

Westinghouse Electric & Mfg Co.,
East Pittsburgh, Pa.

Better Writing Needed?

To the Editor:

One of America's most prolific authors, in a text book covering the subject of commercial writing, recently referred to trade publications as containing the driest, dullest and most uninteresting writing known.

To a great extent I believe he was right, although in STEEL I have seen indications that the trend is toward more interesting copy, simpler more understandable sentences and livelier writing in general. Many technical writers alibi their writing by claiming that material dealing with technical subjects has no place for the clever, the lively or the entertaining element, yet there seems to be no reason why this should be true.

Many technical, pictorial layouts have passed the dull, uninteresting stage and are now modernized and pleasing to the eye. Will this modernization extend to the improvement of technical writing?

Understand, however, the suggestion is not being made that technical writing should be livened to the point of being flippant, pseudo-humorous, or detracting from the primary point of the subject. Colorful writing would seem to be the happy medium.

NEW SCHOOL

Unit Heaters in Foundry

To the Editor:

In connection with your very interesting articles on unit heaters in STEEL, June 28 and July 5, we have been using unit heaters on all new construction for eight or ten years, and recently have even replaced some of our radiators and steam coils, which were heating unsatisfactorily, or which were giving us maintainance trouble, with the unit heaters. Our shops are of substantial construction and are kept well heated in winter, almost as a matter of course. While our work is heavy, it requires accuracy. We have never considered whether our production would drop if our shops were not well heated. Possibly there would not be much change, but we know that we would not be able to keep good mechanics under adverse working conditions.

Most of our shops are higher than average, and our principal shop is 44 feet from the floor line to the under side of the roof truss. We have large glass areas in our side walls and most of the roof is cement tile. Consequently our heat losses are high and the heating bill in winter is quite an item. On some new construction recently we are using light weight pre-cast concrete slabs for the roof, with a built up composition roofing. The heat loss through this roof construction should be less than through the cement tile but we have no way of measuring the actual results we are obtaining.

MACDONALD S. REED

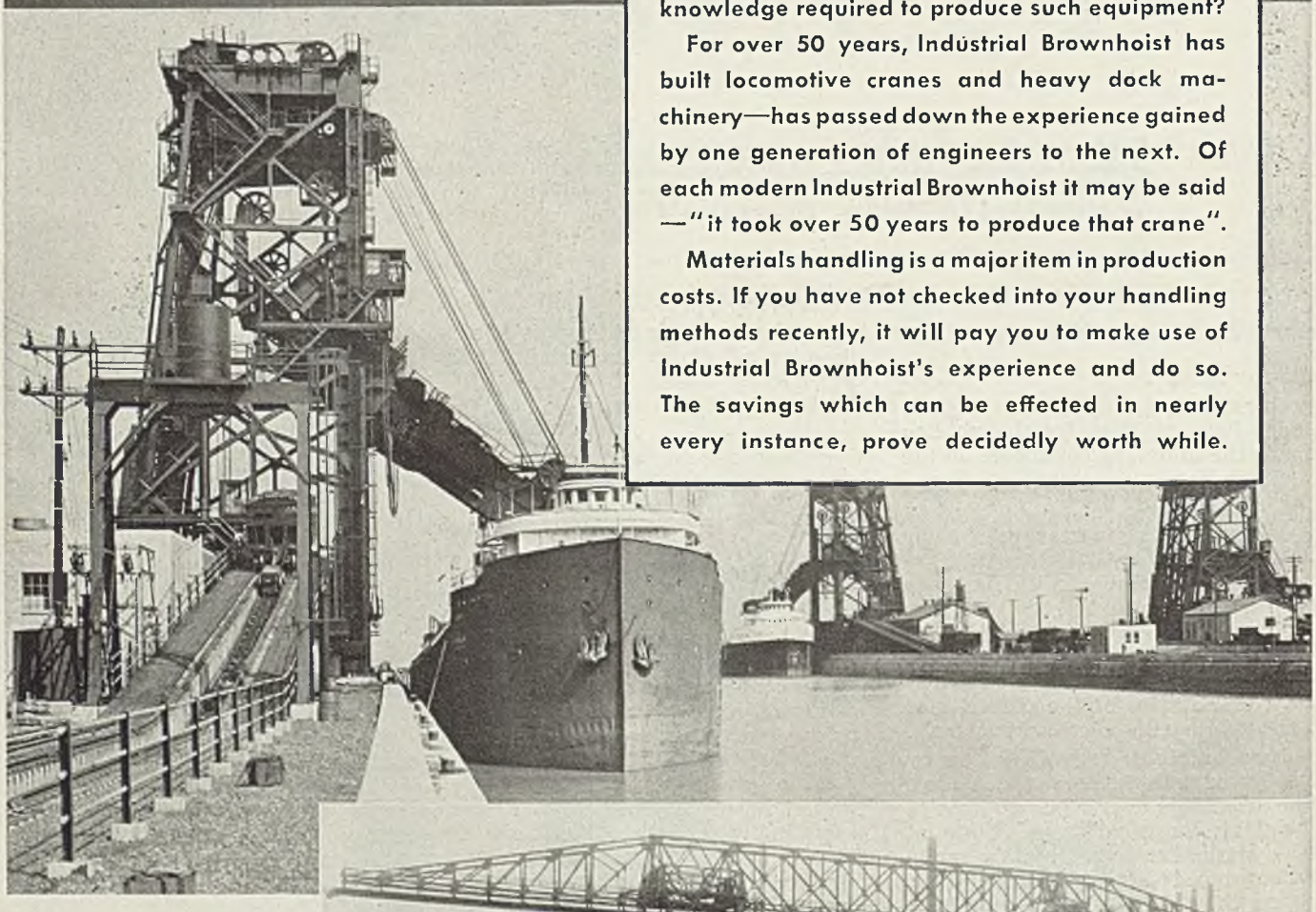
Sales Engineer,
Erie Foundry Co.,
Erie, Pa.

Loading 120 tons of coal per minute
Handling 15 tons of ore per grab

While watching modern dock machinery handle huge tonnages of coal, ore or stone, have you ever stopped to consider the vast amount of technical knowledge required to produce such equipment?

For over 50 years, Industrial Brownhoist has built locomotive cranes and heavy dock machinery—has passed down the experience gained by one generation of engineers to the next. Of each modern Industrial Brownhoist it may be said —"it took over 50 years to produce that crane".

Materials handling is a major item in production costs. If you have not checked into your handling methods recently, it will pay you to make use of Industrial Brownhoist's experience and do so. The savings which can be effected in nearly every instance, prove decidedly worth while.



Each of the three Industrial Brownhoist car dumpers shown above will dump 120 tons of coal per minute. The bridge crane, at the right, has a bucket capacity of 15 tons of ore.

LOCOMOTIVE CRANES, 10 TO 200 TONS CAPACITY
CRAWLER CRANES, 6 TO 25 TONS CAPACITY
ERECTION CRANES, 10 TO 75 TONS CAPACITY
ORE AND COAL HANDLING BRIDGES
CAR DUMPERS FOR COAL AND ORE
CLAMSHELL BUCKETS

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