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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 118. NO. 4 JAN. 28, 1946

NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

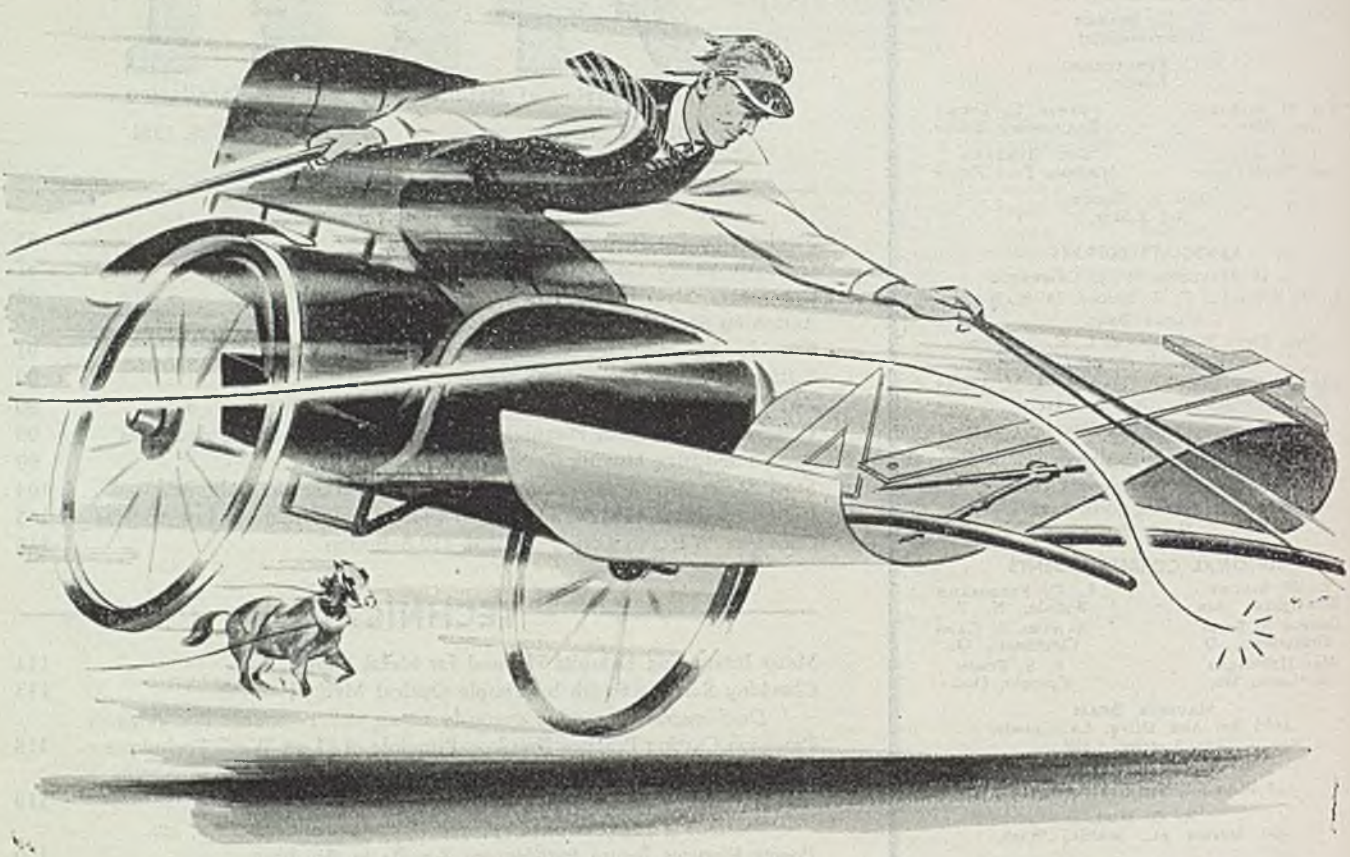
Million Amp Butt Welders Join Pipe

Designing Welded Machinery Parts

Simple Rig for Making Blast Furnace Tuyeres

Metal-Spraying Magnesium Melting Pots

Precision Casting Practice—Part II



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As the EDITOR VIEWS the NEWS

Kremlin-on-Potomac

To those few thousands of conscientious American citizens who took the pains to wade dutifully through the 25,000-odd words of President Truman's combined message to Congress on the state of the union and the budget the most ominous burden of that labored effort was found in these words:

"There is no question in my mind that the government, acting on behalf of all the people, must assume the ultimate responsibility for the economic health of the nation. There is no other agency that can. No other organization has the scope or the authority, nor is any other agency accountable to all the people."

This pronouncement is significant and disconcerting. It means that the President, who immediately after V-J Day went on record as favoring taking the government out of its "mother knows best" role, now has reversed himself and is committed to a program of projecting the federal government into situations which heretofore in peacetime have been free of push-button control from Washington.

This policy tends to insulate national affairs from the effect of natural and economic influences and to make them responsive only to the whim of political dictation from Washington. For instance, under present circumstances, the question of what is a fair wage for steelworkers is not to be determined by an honest weighing of social and economic factors. Instead, it is to be determined by the edict of White House advisers who say that an increase of 18.5 cents in wages is exactly right. This is the correct answer, because Mother Washington knows best.

Under this kind of policy, the country will thrive or suffer according to the wisdom of the administration's political alliances. Today the policy will be dictated by CIO. Tomorrow, under a different administration, the whip may be cracked by some other minority pressure group. In any event, this policy will put the nation entirely at the mercy of political expediency and deprive it of the safeguarding checks which heretofore have been provided by natural economic and social influences.

In short, Washington—once the citadel of democracy—becomes a Kremlin from which the judgment of the prevailing political administration assumes the prerogatives of a dictated national policy.

This is an evil omen. It constitutes a perversion in the management of national affairs that was not contemplated by the Constitution nor by the representatives of the people in Congress. It calls for decisive action by the people of the nation.

STEEL

January 28, 1946

WHO HAS TRUMP CARD? Both sides in the steel wage dispute hold good cards which have not been played. Mr. Murray has agreed to the 18.5 cents suggested by President Truman. Mr. Fairless has raised his offer to 15 cents. He has stopped there because the offer represents a very substantial increase, because to go beyond it would necessitate price increases of an amount that would be dangerous to the nation's economy and because a wage increase in excess of that figure would bring real hardship to many smaller companies.

But steel prices depend upon costs. Labor is a big factor in costs. During the war 16 hours of labor produced a ton of finished steel. Just before the strike started from 20 to 22 hours of labor were required per ton of finished steel.

What do you think would happen if Mr. Murray were to go to Mr. Fairless with a sincere offer on the part of CIO to try to reduce the hours per ton

(OVER)

from 20 or 22 to 16 as soon as possible? If Mr. Murray could assure Mr. Fairless of CIO's good faith on this score, the latter could quit worrying about costs and prices and the two might make a deal.

Unorthodox? Perhaps—but it is the very essence of true bargaining. —pp. 85, 87, 90

° ° °

CAN STRIKES PAY OUT? This nation is just beginning to realize the extent to which strikes now in progress will cripple the national economy if they are permitted to continue long. The loss of glass production had begun to be felt in automobile circles just as the loss of steel production began to affect plants where steel is fabricated and consumed. The loss of a week or two in steel production will result in a tie-up that will cause a disastrous delay at a critical period in reconversion.

Aside from these losses are those borne directly by the workers. One of the impressive points brought out in the radio address by Mr. Fairless was that a steelworker would have to work nine months at the higher wages to make up for the pay lost in a week of idleness. General Motors employees already have lost pay that cannot be made up in more than a year of steady work.

These and other losses soon will impress upon everybody the futility of strikes as an effective means of settling disputes. They may lead to more enlightened techniques in labor relations.

—pp. 85, 88.

° ° °

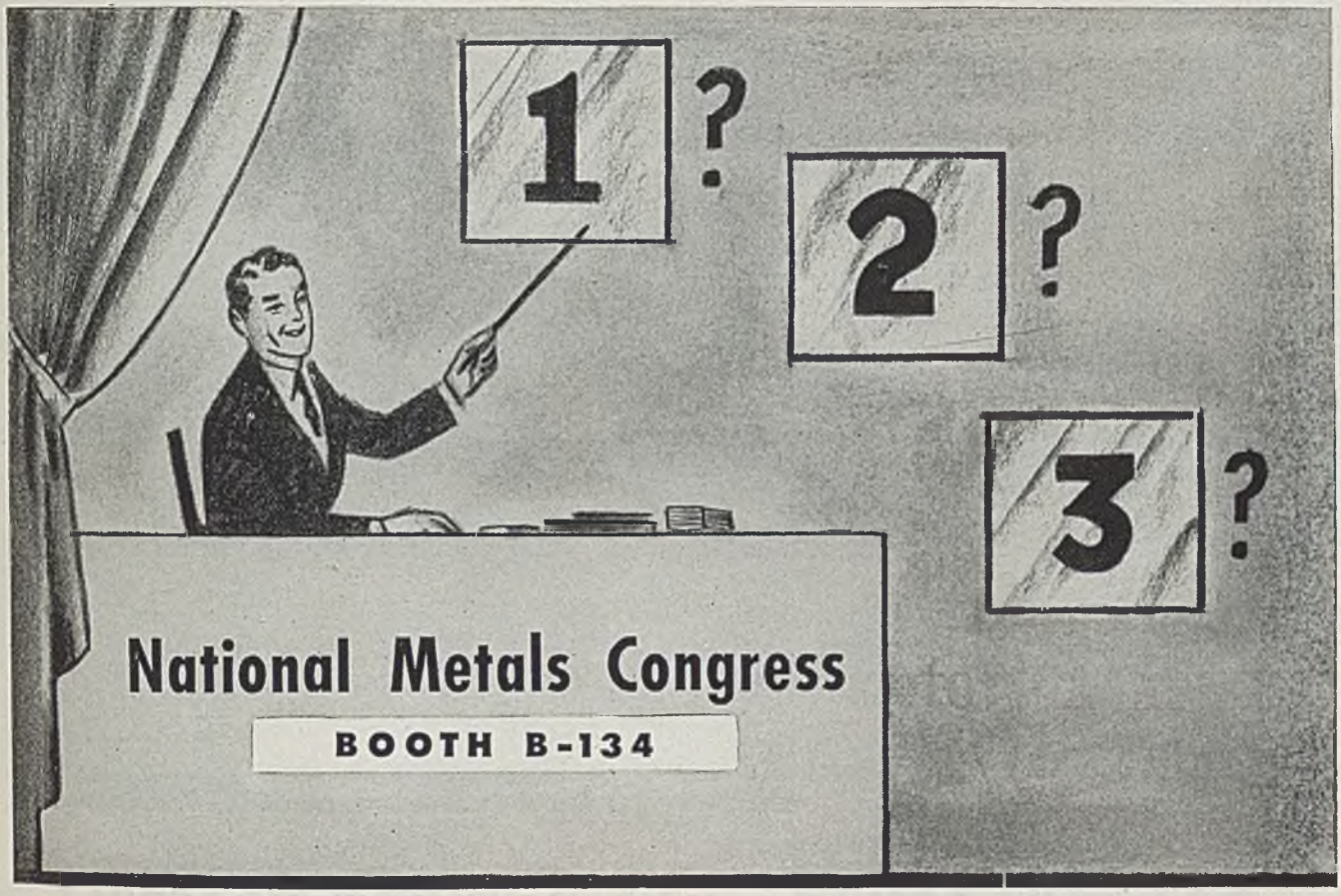
METAL SHOW PREVIEW: First major exposition pertaining to the iron, steel and metalworking industries to be held after V-J Day is scheduled for Cleveland Feb. 4-8. It is the twenty-seventh National Metal Congress and Exposition, sponsored by the American Society for Metals.

The program for the week includes not only the display of materials, supplies and equipment by about 400 exhibitors in Cleveland Public Hall but also the well rounded technical sessions of the American Industrial Radium and X-Ray Society and the American Society for Metals. Included in the program of the latter are numerous round table discussions, educational lectures, awards and other functions.

This first postwar opportunity to see and hear about new improved products and methods and to appraise their peacetime applications in the metalworking field is expected to attract 30,000 visitors to the convention city. —pp. 114, 127

SIGNS OF THE TIMES: Pending in the Senate is S. 1419, known as the National Mediation and Arbitration bill (p. 97) which would provide for presidentially-named fact-finding boards, create a Conciliation and Mediation Division in the Department of Labor and establish a United States Board of Arbitration. . . . Czechoslovakia, Poland, Holland, Belgium, France, Bulgaria, Hungary, Rumania and Turkey wish to elevate the plane of living for their people by expanding manufacturing activities. Their reasoning is based upon the experience of the United States (p. 98) where about $75 worth of primary raw materials increases in value to $600 in the case of automobiles, $1000 in electrical goods and $2000 in machine tools. . . . Of 590,000 machine tools in France, 5000 are over 50 years old, 370,000 are over 20 years old and the remainder average 12 years of age. The government is planning to replace 260,000 of the oldest (p. 99) by building 140,000 in France and importing 120,000 largely from the United States and Great Britain. . . . In spite of strikes and other difficulties Ford Motor's January schedule for 56,000 Fords, Mercuries and Lincolns (p. 101) probably will be equalled or even exceeded by a slight margin. . . . First showing of the Kaiser and Frazer models at the Waldorf Astoria in New York attracted large crowds (p. 102) and order-takers reported a brisk business. . . . Last year 4683 corporations with aggregate capital of more than $1 billion (p. 105) were granted permission to operate in California. More than two-thirds of these new corporations chose sites in Southern California. . . . Warner & Swasey Co., Cleveland machine tool builder, is entering the road machinery field with a new grading machine (p. 107) which will be ready for the market in mid-1946. . . . At the sixteenth annual convention of the Institute of Scrap Iron & Steel at Chicago (p. 92) Edwin C. Barringer, president and executive secretary, pointed out that since V-J Day scrap prices, with few exceptions have held at ceiling prices with demand as pressing as at any time during the war, whereas within five months after the end of World War I prices dropped to one-half wartime ceilings and demand was off sharply. . . . Action of OPA on pending requests for higher prices of certain steel products (p. 90) is being postponed until after the steel wage dispute is resolved, according to an administration spokesman.

EDITOR-IN-CHIEF



See These Three at the Ryerson Exhibit

1. "Clean Cut" Plates. That's their trade-name—"Clean Cut!" A plate that machines just about twice as easily as ordinary steel. Takes a beautiful finish with ordinary machining. Also welds easily and smoothly without special technique. And case hardens readily.

Actual demonstration of the superior machining qualities of "Clean Cut" Plates will be made at the Ryerson Booth. Be sure to see it.

2. Movie of Ryerson Alloy tests. These tests make possible the complete data furnished on every alloy in every Ryerson shipment, including the accurate heat-treating information.

3. Nitralloy—produces the hardest metal surface known when properly heat-treated (nitrided). Samples of nitrided parts made from Nitralloy will be exhibited.

May we have the pleasure of showing you the above three features of the Ryerson Exhibit at the National Metals Congress? Remember the Ryerson Booth is B-134.

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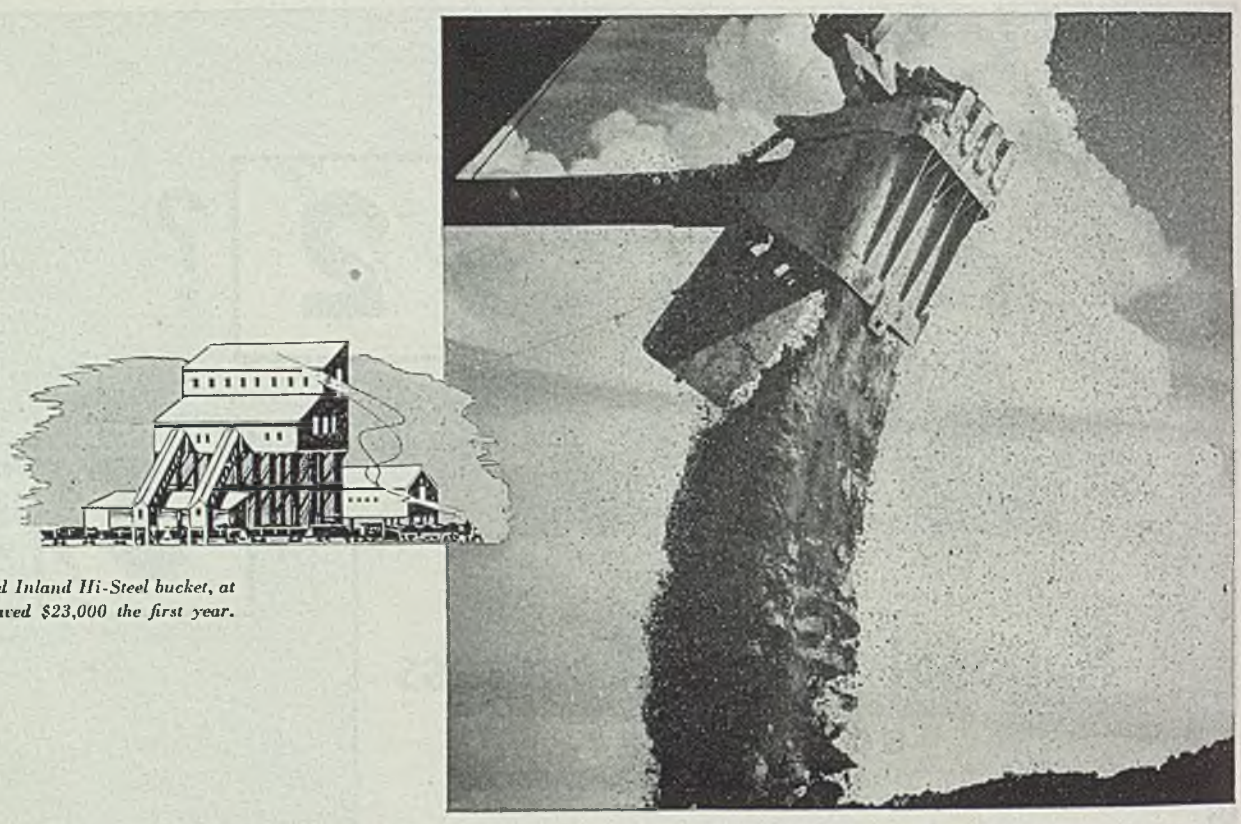
RYERSON STEEL



This 23 yard Inland Hi-Steel bucket, at the right, saved $23,000 the first year.

$23,000 Saved . . . with Inland Hi-Steel

Facts and Figures Prove Advantages of Using Inland Hi-Steel Where Light Weight and High Strength are Needed.

The records maintained at Maumee Collieries show that when Inland Hi-Steel replaced material formerly used these important advantages were gained:

(1) The first cost was 40% lower.

(2) Maintenance was cut in half.

(3) Weights were decreased as much as 32%.

(4) Capacities went up an average of 51.6%.

The cost logic behind the use of Inland Hi-Steel was summed up by a Maumee official when he said, "We estimate that our 23 yard Inland Hi-Steel bucket saves three tenths of a cent a yard over the bucket previously used. In one year this 23 yard bucket moved 7,671,000 cubic yards of overburden at a total saving of $23,000."

Scores of products and processes are utilizing the corrosion-resistant, abrasion-resistant, high-strength and light-weight characteristics of Inland Hi-Steel. Write us if you would like further information.

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INLAND
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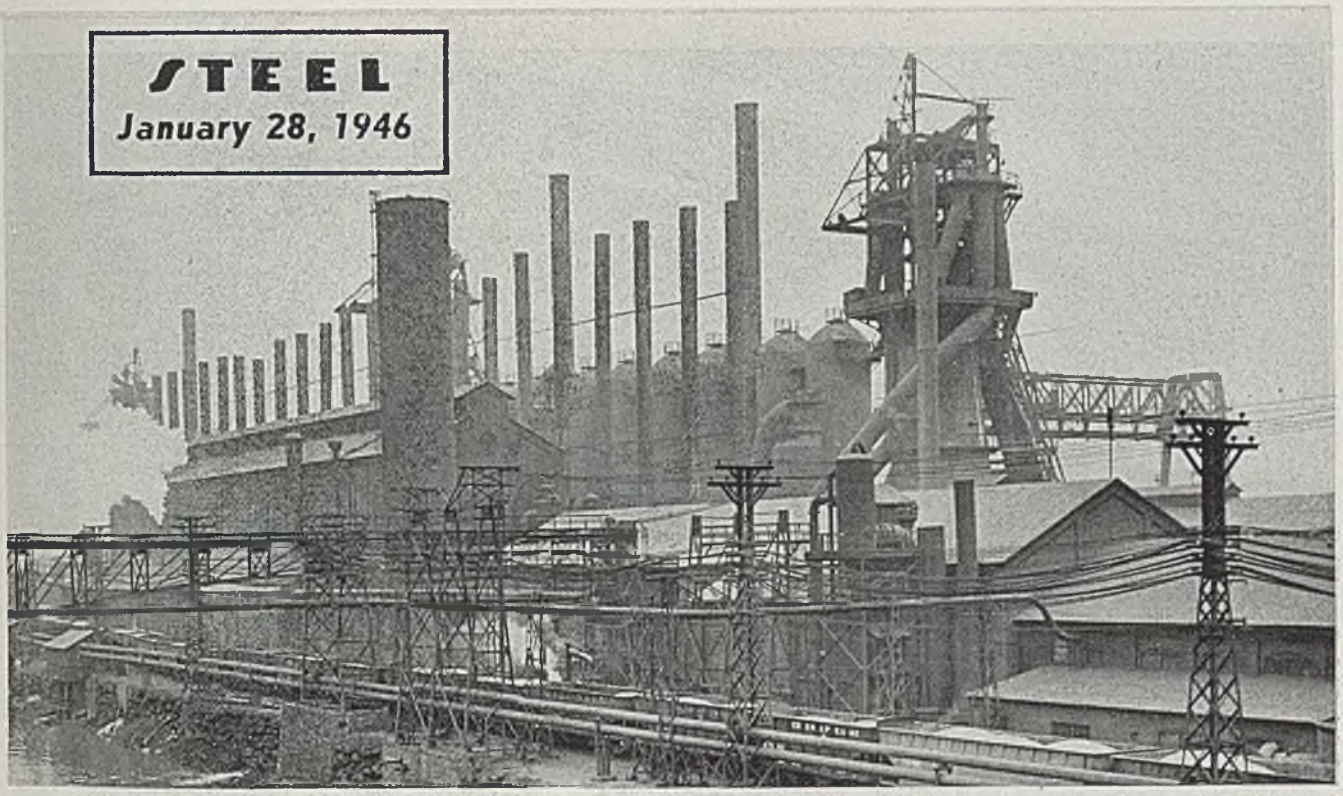
STEEL
January 28, 1946



Empty smoke stacks characterize America's steel districts as the industry is virtually closed down by the strike of United Steelworkers. Above view is of Republic Steel Corp.'s plant at Youngstown. NEA photo

Steel Strike Paralysis Spreads

Industry's operations at lowest point in 300-year history. Consumers' inventories low and bulk will be forced to close soon if stoppage continues. President says government seizure not contemplated at present time

PARALYZING effects of the nationwide steel strike were spreading through all manufacturing industry at week's end, threatening to blockade effectively practically all reconversion activity.

No solution to the stalemate, which has reduced steel operations to the lowest point in the 300-year history of the industry and tonnage production to the lowest level in 53 years, was in sight.

The United Steelworkers gave no indication they soon would budge from their demand for an 18½-cent hourly wage increase. Steel producers were equally adamant in refusing to go beyond their offer of a 15-cent raise. President Truman said the government had no plans to seize the industry at present, although intimating this might be done eventually.

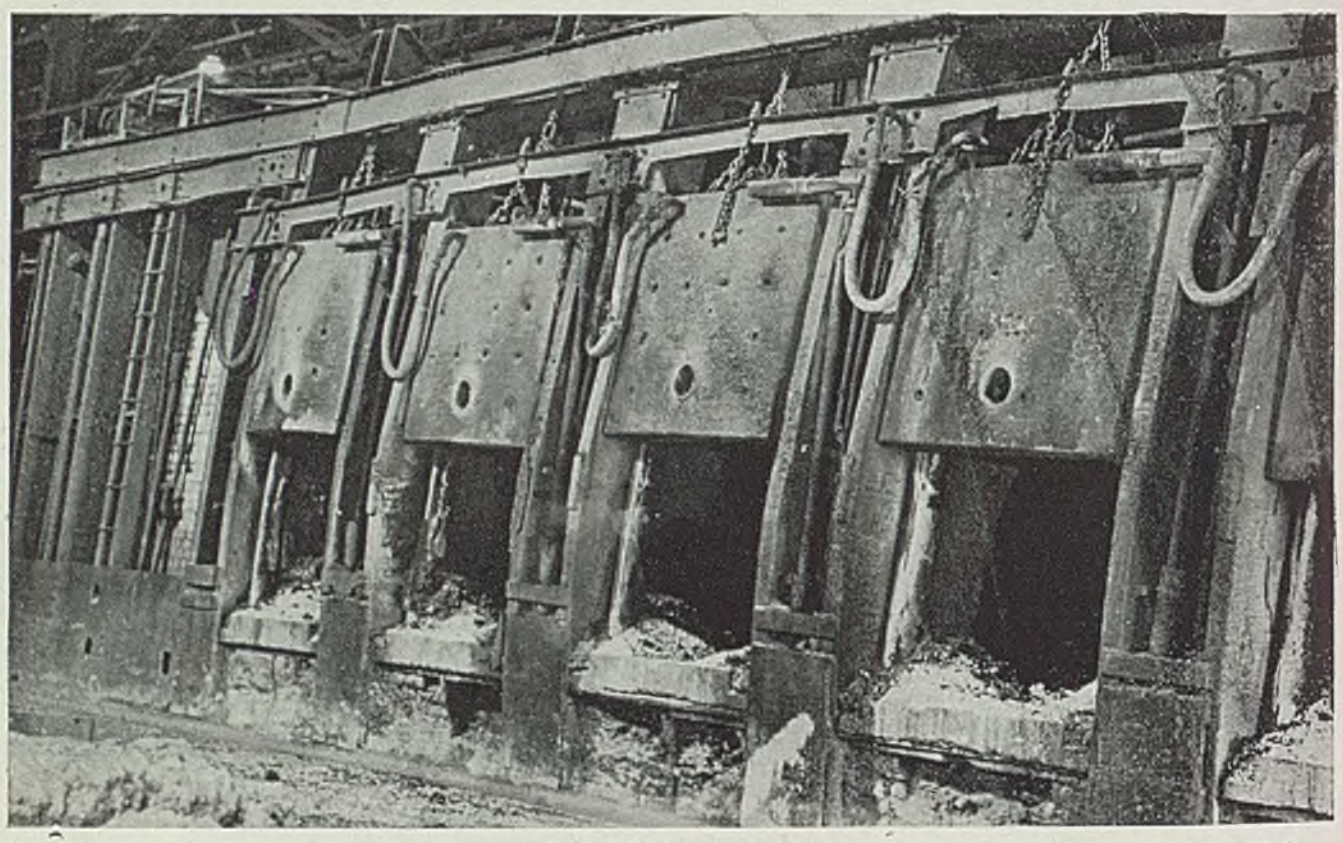
Meanwhile, industries dependent on steel for the products they build were inventorying their scant stocks of steel and either closing down or making preparations to do so if the steel strike continues. Consumers' inventories are lower than normal, owing to difficulties of building up stocks in the face of the heavy demand that has prevailed since V-J Day. This situation was made more difficult by the coal strike last fall which adversely affected steel operations.

Throughout the country all the major producers were closed, with an estimated 750,000 men in basic steel producing plants and in fabricating and converting plants having contracts with the steelworkers' union idle. Only a handful of basic steel producers, most of which have contracts with unions other than the United Steelworkers, were in production. These included Weirton Steel Co. at Weirton, W. Va., and Steubenville, O., American Rolling Mill Co. plants in Ohio, Ford Motor Co., Wisconsin Steel Co., International Harvester Co. subsidiary, and scattered smaller plants and specialty producers. Henry J. Kaiser, operator of the Fontana, Calif., plant bearing his name, signed a contract with the United Steelworkers providing for the 18½-cent increase and was not struck

The steel stoppage grew out of a campaign started last September by the United Steelworkers for a $2-a-day wage increase. This was refused by the industry, spokesmen for which pointed out that most carbon steel products were being produced at a loss under OPA-imposed ceiling prices. Earlier the industry had asked for price relief but in November this was refused by the OPA. Late in November the steel workers' union conducted a strike poll and called a nationwide walkout for Jan. 14.

On Dec. 31, President Truman appointed a fact-finding board to study the dispute and asked OPA to determine by Feb. 1 whether any price increase could be granted.

On the eve of the scheduled strike on Jan. 14, administration officials asked Benjamin F. Fairless, president of United States Steel Corp., whether a $4-a-ton increase in prices would enable his company to offer a wage increase. Mr. Fairless promptly went to Washington for conferences with Philip Murray, president of the United Steelworkers, and administration officials. Mr. Fairless offered an increase of 12½ cents an hour;



Cold open hearth furnaces provide mute testimony to the reconversion blockade. Last week only 5 per cent of the country's steelmaking furnaces were operating. NEA photo

Mr. Murray asked 20 cents. Later Mr. Fairless raised his offer to 15 cents an hour and Mr. Murray eased off to 19½ cents, the raise recommended by the President's fact-finding board in the General Motors case. The strike was postponed for one week and the following week the conferences between Messrs. Fairless and Murray were resumed in Washington, but no further compromises were suggested.

The President then called both parties to his office and proposed a wage increase of 18½ cents an hour retroactive to Jan. 1. This was accepted by the union and was rejected by the industry. The strike officially started at 12:01 Jan. 21, although more than 50,000 workers jumped the gun and walked out of the plants earlier.

The stoppage generally started peaceably and practically no violence was reported. Disputes over selection of maintenance men were common, but picketing was orderly. Industry spokesmen made clear that no operations except maintenance and minor operations where necessary to supply local utilities would be attempted.

What eventual solution to the dispute will be evolved was a matter for speculation at week's end.

The union contented itself with a demand to Secretary of Treasury Vinson that the carryback provisions of the tax laws be eliminated, asked President Truman to seize DPC-owned plants and put "someone like Henry J. Kaiser" in charge, and suggested the Federal Bureau of Investigation investigate the union's charges of a conspiracy to break the unions.

Mr. Fairless in a radio address explaining the issues of the strike proposed that President Truman call a conference of "experienced executives from representative companies which are now directly involved in strikes. This should include representatives from steel and other industries. These men could discuss frankly with the President and give him the benefit of their advice on what kind of a wage increase the economy of this country can endure without incurring the danger of an inflationary spiral with a constant race between mounting wages and prices."

Asked at a press conference to comment on Mr. Fairless' proposal, President Truman replied that he has had such conferences but that he does not make appointments over the radio or through the press. He said he would be glad to see anybody who came to him in the regular way.

When asked whether he thought the steelworkers should go back to work Mr. Truman said he thought they ought to go back at his recommended pay boost of 18½ cents an hour.

The industry contends the strike is a direct violation of the no-strike provision contained in the labor contracts between the union and the companies which have expiration dates in the autumn. Advertisements in leading newspapers, sponsored by the American Iron & Steel Institute, last week stressed this aspect. The provision generally reads: "During the term of this agreement, neither the union nor any employee, individually or collectively, shall cause or take part in any strike, or other interruption or any impeding of production at any plant of the company covered by this agreement."

In addition to the basic steel producers, some 750 steel fabricators, converters and other users of steel, which had signed contracts with the United Steelworkers, were closed down by the union's action.

These companies contend they have been forced into the dispute by a shotgun wedding and they want a divorce.

They contend they are being squeezed from both sides. Should the administration's proposal to swap a steel price increase for a wage boost for the union be successful, fabricators would have to pay higher prices for the steel they buy and also pay the increased wages. Many of them contend they are in urgent need of price relief on their products at the present level of steel prices and wages.

CPA Moves To Conserve Stocks of Iron and Steel During Strike

WITH work stoppage in the steel mills threatening a drastic curtailment in vitally needed steel supplies to consuming industries—it is estimated stocks in the hands of consumers at most do not exceed 30 days' supply and in most cases less—government reconversion authorities last week moved to conserve available stocks for emergency use during the strike.

All outstanding preference ratings on iron and steel products were suspended by the Civilian Production Administration, and to the extent a steel warehouse voluntary rationing system, which went into effect Jan. 21, cannot handle emergency needs, the CPA plans to utilize directives or the AAA emergency rating.

Direction 13 to priority regulation No. 1, issued Jan. 21, suspended all outstanding preference ratings for steel, including the MM military rating, the CC civilian rating for bottleneck items, and outstanding AAA emergency ratings issued prior to Jan. 21.

CPA Administrator John D. Small said steel warehouses have been instructed to ration all deliveries on a voluntary basis so that no consumer will receive more than is needed for immediate use. Also, when stocks of steel mill products ordinarily used for maintenance and repair drop to 50 per cent of a warehouse's normal inventory, such warehouses must reduce deliveries to a point where only emergency maintenance and repair uses are met. This includes hospitals, public utilities, transport facilities and other extremely essential maintenance and repair items.

Under the CPA policy suppliers can reject or defer deliveries in whole or in part on any orders (except orders covered by specific directions or by new AAA emergency ratings) which, in the opinion of the supplier do not conform to the steel warehouse rationing plan.

In its statement of policy the CPA emphasized it is depending upon the cooperation of steel mills and local labor agents to make possible the release and shipment from strike-bound steel mills of finished items not available elsewhere and which are needed for emergency purposes. Requests for release of such steel will be made only when such shipments have been certified by CPA.

Kaiser Signs with Steel Union; Holds Unique Position in Industry

Henry J. Kaiser, West Coast steel producer who signed a contract with the union granting the 18½-cent hourly wage increase proposal by President Truman, occupies a unique position in the steel industry.

His Fontana, Calif., plant is a war baby, financed by a $111 million loan by the Reconstruction Finance Corp. During the war the plant supplied plates, structurals and bars for shipbuilding on the West Coast. The plant includes one blast furnace with 388,800 tons annual capacity, six open hearths with 720,000 tons capacity and one electric furnace with 30,000 tons annual capacity.

After the war, RFC loaned $11.5 million to the company for improvements.

During the past year, the Kaiser Co. has been seeking a write-down in the original RFC loan. The write-down sought was reported to be in the neighborhood of $40 million to $45 million.

During the war, the Kaiser Co. was permitted by the Office of Price Administration to charge premium prices for its products. Kaiser's price for carbon plates was $3.20, compared with $2.80 for most other producers for Pacific Coast delivery, and $2.25 at eastern production centers. Kaiser was permitted an extra of $10.64 a ton on semifinished items. Geneva Steel Co. was allowed the same extras as Kaiser.

Late last year, however, Kaiser Co. officials announced they were selling at competitive Pacific ports prices and asked STEEL to drop the listing of premiums allowed them by OPA. These, so far as known, are still in effect, however, and can be utilized by Kaiser if he so desires.

Accompanying photo shows Mr. Kaiser, right, with Philip Murray, head of the CIO and the United Steelworkers, on the White House steps announcing his signing up with the steel union to reporters.

Consumers' Steel Inventories Low

Practically all metalworking companies will be forced to suspend operations if strike is continued for several weeks. Over five million face idleness

INVENTORIES of steel in plants of consuming industries are low and should the steel strike be prolonged for several weeks virtually all of these plants will be forced to close.

Should this occur, an estimated five and a half million employees in these metalworking shops would be thrown out of work, despite the fact they are not affected directly by the current labor disputes. More than 40 per cent of all factory workers in the United States are employed in plants which use steel as a basic raw material.

A spot survey by STEEL's editors indicates stock in consuming plants seldom exceed 30 days and in many cases are considerably less. Some plants closed down immediately after the steel strike started, others suspended during the latter part of last week and still others at the close of the week.

Effects of the strike also are being felt in industries further removed from the steel industry. Automobile tire manufacturers had only two to three weeks' supply of steel bead wire when the strike started. Some chemical manufacturers were forced to suspend operations, because their product goes to the steel industry and also because they are unable to obtain tubing for replacements. Producers of lubricants and drawing compounds and many other suppliers to the steel industry are affected.

A summary of the situation in leading metalworking districts follows:

Four-Week Strike Would Close Nearly All Plants

CLEVELAND

If the steel strike lasts a month, practically every large consumer of that metal in this district will be forced to halt operations. At the start of the strike, many companies in the household appliance, automotive parts, agricultural implement and similar industries had only one week to ten days' supply and planned to sharply curtail or halt operations beginning Jan. 28. Generally, consumers had no more than a 30-day supply and planned to maintain operations only as long as economically feasible.

Pickets patrolling the main gate of Bethlehem Steel Corp.'s plant at Bethlehem, Pa., in a driving snowstorm pause for coffee. Picketing at steel plants generally was peaceful. NEA photo

The strike is affecting operations of some companies indirectly, as well as directly shutting off the flow of steel to their plants.

While some companies will maintain operations in their various departments as long as possible, others will close down their entire plants as soon as the supply of material for any one department is exhausted. All companies will stop production before their supplies are depleted so that they will have a safe reserve on which to draw when normal operations are resumed at the end of the steel strike.

Chicago Metal Plant's Stocks at Low Levels

CHICAGO

Consumers of steel in this district will be forced to curtail or suspend operations within a period of from one to three weeks if the strike at steel producers' plants becomes prolonged. The severe shortage of steel which has existed since shortly after V-J Day, caused by demand exceeding output by a wide margin and aggravated by last fall's coal strike which resulted in loss of about a month's production and slowdowns at many producing points, finds inventories at an abnormally low level.

Generally speaking, larger users are better supplied than smaller. Although CPA allows a maximum inventory of 60 days on carbon steel—45 days in the case of sheets—few consumers have been successful in acquiring anywhere near these quantities. With some products, consumption has been almost on a hand-to-mouth basis.

Some manufacturers are contemplating reducing or suspending operations ahead of steel inventory depletion, this

to insure having some material in hand when a flow of steel from mills is resumed.

Bundy Tubing Suspends; UAW Moves Against GM

DETROIT

First large suspension of fabricating operations by an important automotive supplier was that of Bundy Tubing Co., employing 1500 in its plant at Center Line, Mich., and an additional 200 in offices and laboratories. With the exception of a few salaried employees, all were laid off Tuesday, due to shortage of steel strip, which is purchased from Thomas Steel Co. and Allegheny Ludlum Steel Corp. Further, all salary payments will cease, according to present plans, as of Jan. 31.

The UAW-CIO has attempted to bring additional pressure on General Motors in the current strike by ordering all its members in tool and die shops to stop work on GM projects. Just how this will be implemented is not clear, since it does not call for a strike in tool and die shops, but rather a selective cessation of work.

New York Plants to Be Forced To Suspend Soon

NEW YORK

While various steel consuming plants are down in the New York and northern New Jersey metropolitan area as a result of the nationwide steel strike, a number are still continuing. Another week or ten days, however, should witness numerous additional suspensions, as a result of dwindling steel supplies. Some consumers have more than 30 days' supply on hand, but they are the exception, and even where inventories are relatively good there will be an increasing disposition to conserve stocks as time goes on.

Strike in the electrical industry which preceded the steel strike by a week and which is still in effect is contributing to restricted consumer operations in this district. Also certain units in the area are inactive, as a result of the General Motors strike which began last November.

Philadelphia Consumers' Stocks Average 30 Days

PHILADELPHIA

Steel consumers in the Philadelphia district are estimated to have about 30 days' steel supply on hand. Various concerns have less, and in relatively few cases does it appear as if consumers have an inventory of 60 days, the limit under government regulations on even the products which have been in free supply.

At present, it is estimated that 60 industrial establishments in the Philadelphia area, employing at least 50,000 CIO steel workers, are out of production. According to a survey by the United States Employment Service shortly after the nationwide steel strike became effective, close to 1000 steel consumers, including the very small establishments, will be closed by the end of this month, should the strike continue.

The district's largest steel consumer, the Baldwin Locomotive Works, employing an estimated 12,000 men, is down, along with various others.

Several steel consumers, with CIO employees, have agreed to meet the union's demand for an 18.5 cent wage increase, including the ACF-Brill Co., with 1200 workers, the Reading Screw Co., Norristown, Pa., the Philadelphia Pipe Bending Co. and the George W. Swift Jr. Machine Co., Bordentown, N. J.

The three SKF ball bearing plants, large consumers of steel, are continuing in operation, pending negotiations on a new contract to take the place of the previous agreement which expired early in December. Florence Pipe & Foundry Co., Florence, N. J., is operating on a union contract agreed upon some time before the steel strike.

Fifty-Five New England Fabricating Shops Close

BOSTON

While metalworking industries in New England are curtailed by strikes and all primary steel producing capacity is down, production is far from totally halted. Three steelworks, approximately 55 fabricating and converting plants and scattered foundry operations have come to a stop affecting about 25,000 employees, exclusive of the large number involved in the electrical equipment plants, but scores of steel fabricating plants are producing and also some converters.

Steel inventories at plants still operating range from 30 to 60 days with 45 days, or slightly under, the general average.

Individual contract settlements have been made or are in progress with approximately 20 companies. Increases of 18½ cents an hour have been granted in some cases while in others contracts have been negotiated under that level. Most are relatively small consumers of steel.

Present, Past and Pending

■ KOPPERS CO. SELLS HOLDINGS IN ALAN WOOD STEEL

PHILADELPHIA—Koppers Co. Inc., Pittsburgh, has sold its entire holdings of common stock of Alan Wood Steel Co., Conshohocken, Pa., consisting of 110,000 shares, or 55 per cent of the total outstanding, it was announced last week by the latter company.

■ TENNESSEE COAL AWARDS CONTRACT FOR COKE OVENS

BIRMINGHAM—Koppers Co. Inc., Pittsburgh, will start work in the spring on a battery of 63 new coke ovens for the Tennessee Coal, Iron & Railroad Co.'s Fairfield Steel Works, this city. Koppers also will rebuild battery No. 7.

■ "MOTION TRANSFORMER" PASSES EXPERIMENTAL TESTS

WASHINGTON—"Motion transformer," new mechanical movement which eliminates crankshafts, wrist pins, connecting rods, etc., has met experimental tests successfully, opening up a new field in mechanical design. This was revealed in a 58-page report issued last week by the Civilian Production Administration.

■ GENERAL CAMPBELL GETS INTERNATIONAL HARVESTER POST

CHICAGO—Lt. Gen. Levin H. Campbell Jr. has been elected a vice president of International Harvester Co., this city. General Campbell will retire Feb. 13 as chief of ordnance of the Army.

■ BIRMINGHAM MADE BASING POINT FOR COTTON BALE TIES

BIRMINGHAM—Tennessee Coal, Iron & Railroad Co. has established Birmingham as a basing point for the sale of cotton bale ties.

■ AMERICAN BRAKE SHOE BUYS JOLIETTE STEEL LTD.

NEW YORK—American Brake Shoe Co. has purchased Joliette Steel Ltd., Montreal, one of the largest producers of manganese and alloy steel castings in Canada.

■ OPENING OF GENEVA PLANT BIDS EXTENDED TO APRIL 1

WASHINGTON—Opening of sealed bids or proposals for purchase or lease of the government-owned Geneva, Utah, steel plant has been extended 30 days to April 1.

Action on Steel Price Advances Seen Deferred

Government holding all its cards in wage dispute, including increase in steel prices, for use at opportune time

COLLAPSE of the administration's recent efforts to compose the steel wage dispute has eliminated entirely the possibility of any early price increase on steel products, it was said in official quarters in Washington last week.

For one thing the administration realizes that the steel industry operated at a loss in many cases during the fourth quarter, but it feels that such losses do not demand immediate action since government price policy looks at the results of operations over a year's period rather than at the earnings results in each quarter.

For another thing the administration has no thought of allowing the country's economy to be paralyzed by indefinite continuance of the steel strike. It is holding all its cards, including an increase in steel prices, for use when opportunity presents itself. Just when this will occur is not yet known. The administration is studying its position to decide what its next move will be in the steel strike.

As an administration spokesman told steel, "The matter of steel prices now is entirely academic. No steel is being made at the present time so that no harm will be done by postponing further consideration of increases in steel prices."

Rumors of Increases Prevalent

All last week there was a lot of talk regarding possible steel price action floating around in government and steel industry circles. Most of this was rumor. One rumor was that price ceilings would be increased by the end of this month regardless of the outcome of the present wage controversy in the industry and would be based on December operating data. This action, it was said, had been indicated by the officials of the Office of War Mobilization and Reconversion. However, this report was said to be without foundation and it was pointed out such suggested action was contrary to established government policy.

Actually, it is recognized that some increase in price will be allowed the steel industry. Just how much still is a matter to be decided. Talk has ranged all the way from an increase of $2.50 to $7 a ton. However, it is said that the top figure has been considered only in connection with the position of the small nonintegrated steel producers.

Prompt Sale of Surplus Machine Tools Urged

Prompt, equitable disposal of surplus government-owned machine tools, already totaling more than $300 million in original cost, to provide employment and increase peacetime production was placed at the top of current surplus disposal problems recently by the Surplus Property Administration in Washington.

It is estimated that, in addition to the $300 million worth declared by owning agencies as of Nov. 30, tools costing almost $1500 million will be available for surplus disposal by July 1, 1947. Tools costing $81 million had been disposed of by Nov. 30, leaving an inventory of some $223 millions.

It was pointed out that on Nov. 30, more than 100,000 machine tools of all types were included in the surplus inventory.

This Nov. 30 inventory was made up of: 27 per cent lathes, 21 per cent boring machines, 18 per cent milling machines, 13 per cent grinding machines and smaller percentages of other types.

White Charges that Bias on Part of Government Is Responsible for Strikes

CHARGING bias on the part of government boards and bureaus and state, county and local officials, and even on the part of the higher courts themselves as largely responsible for present labor disturbances, Charles M. White, president, Republic Steel Corp., Cleveland, in New York recently outlined briefly the history of labor legislation in this country and suggested a program for the development of more stable industrial relationships.

He spoke at the 275th general session of the National Industrial Conference Board at the Waldorf Astoria on a forum as to "What Causes Strikes?" Other speakers were Leo Wolman, professor of economics, Columbia University, New York, and Thomas I. Parkinson, president, Equitable Life Assurance Society of the United States, also of that city.

CHARLES M. WHITE

Mr. White reviewed steps by which "organized labor arrived at a point where it can safely defy the government, impress its own demands upon the nation as a whole and set itself up as a great political power which has dominated our legislative processes for more than a decade."

Asserting there was an absolute lack of any broad co-ordinated labor policy or program by the government "other than one designed generally to further labor's cause," Mr. White said that the employer today is left with no guide in connection with labor problems.

Labor, he further contended, has been given privileges denied to the rest of the country. "It was freed from legal penalties for acts which were criminal on the part of the rest of us. Labor was not only given the legal right to do certain things, but was definitely encouraged by the administration to follow a course of action which not only skirted the edge of law making, but frequently broke the law. Conversely, the employer was frequently punished for acts beyond his control and for which he had no moral liability."

Declaring that World War II brought favors to labor in addition to those previously granted, he recalled labor's pledge not to strike during that period, in return for a pledge that labor be granted maintenance of membership and check off on the theory that it would be unable to control its members unless given this hold over the individual worker. He asserted that labor's pledge was violated many times. In the case of Republic alone, he pointed out, the company has had 412 strikes since it signed a no-strike contract with labor.

The speaker said there has been much agitation for labor legislation based on

the pattern of the Railway Labor Act. However, Mr. White said the Railway Labor Act fundamentally differs very little from the fact-finding "cooling off" legislation proposed by President Truman, and he added that "any railroad executive will tell you that the Railway Labor Act has prevented labor upheavals only because concessions and silly featherbedding concessions have been given to the Brotherhood in virtually every dispute. There can be no doubt but what the railroads have been free from strikes because the railroad employees have received substantially what they have demanded."

Ideally, he said, the country should get back to fundamental bargaining between men and management. By that, he said, he didn't mean that there shouldn't be unions. There should be unions, but strong and responsible unions, he declared.

"Then," he said, "let the government watch, if it will, and correct injustices, but refrain from taking an active, partisan part on the side of one or the other. There are no problems arising that a strong union and a strong company cannot settle through discussion if both sides are on an equal basis. But we cannot reach decisions through collective bargaining if one side has the tacit or outspoken support of the federal government in making its demands."

New Program Recommended

Mr. White said that he realized this was perhaps too visionary. Consequently he suggested a second program, briefly as follows:

"(1) True collective bargaining between employer and employee; (2) amendment of the Wagner act or its replacement with a new labor law, fair to employers and employees alike, which would impose responsibilities and penalties upon labor for wrongful conduct, preserve the rights of free speech, penalize both unions and strikers for felonies or mass picketing, insure union responsibility through secret ballots; and (3) amendment of the federal anti-trust laws so that labor unions and their members would be subject to ordinary criminal laws for extortion and other crimes, just as you and I are."

He believed also there should be an end to compulsory unionization, and that an employee should be permitted to join or not to join a union as he might see fit; further that there should be an end to compulsory check-off of union dues on the basis that unions should be "bought" by their members on merit and not on compulsion. He thought too, there should be no unionism of supervisory employees.

Considerable Increases Needed In Output of Building Materials

Report indicates production boosts of from 33 per cent for brick to 275 per cent for cast iron radiation are necessary to meet construction requirements in 1946. Data also cover cast iron soil pipe and bath tubs

INCREASES in production of critical construction materials ranging from 33 per cent for brick to as high as 275 per cent for cast iron radiation will be needed to meet 1946 construction requirements, the Construction Division, Department of Commerce, has reported.

Construction materials for which estimates of 1946 requirements have been made are brick, structural tile, clay sewer pipe, gypsum board including lath, lumber including millwork and flooring, cast iron soil pipe, cast iron radiation, and bath tubs. Requirements, made up on consumption and minimum working inventories, are based on 1946 construction amounting to $7½ billion for new building and $5 billion for maintenance.

Comparative data on current annual production of construction materials based on output in November or later, percentage of increase needed to meet 1946 requirements, and past production in reasonably good years as a yardstick of production capacity was released by the Construction Division. Those data show that estimated 1946 requirements of cast iron soil pipe are 390,000 tons, or 55 per cent more than the most recent production rate of 251,000 tons. Plant production capacity of cast iron soil pipe has currently been 550,000 tons.

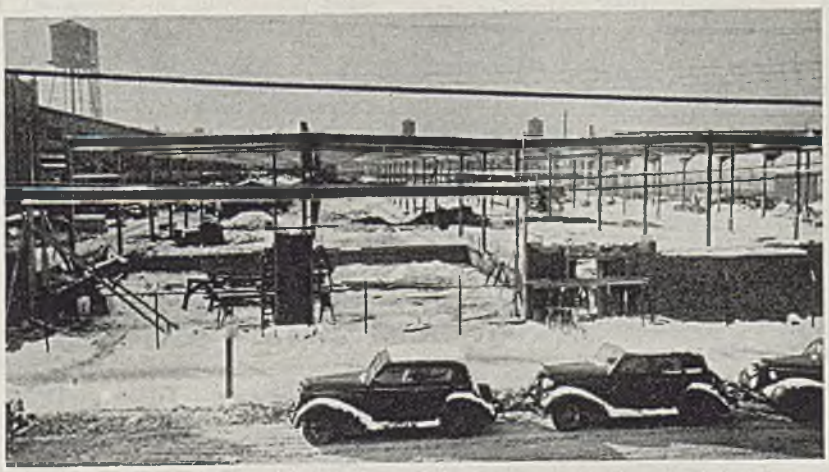
Estimated 1946 requirements of cast iron radiation are 60 million sq ft, or 275 per cent over the most recent production rate of 16 million sq ft. In 1941 the output of 16 plants was 84 million sq ft.

The report shows also that estimated 1946 requirements for cast iron and steel bath tubs are 960,000 units, or 78 per cent more than the current annual rate of 540,000 tubs. In 1937, when only cast iron tubs were made, output was 887,000 tubs.

Chicago Industrial District May Lease Huge Dodge Plant

Early action is expected by Reconstruction Finance Corp. on a proposal made by Chicago Industrial District for leasing the Dodge Chicago plant which manufactured airplane engines during the war. The plan is that space would be subdivided and occupied by small industrial firms. Approximately 60 per cent of the space is said to have been spoken for by miscellaneous industries, including metalworking, machine, paper, woodworking, and others.

The plant, described as the world's largest factory, cost $170 million of which $70 million was for land and buildings and $100 million for tools and machinery.



MORE FLOOR SPACE: Addition to Reliance Electric & Engineering Co., Cleveland, is located next to the company's main plant and will provide an additional 48,000 square feet of floor space

Lifting of Scrap Controls Deferred

OPA executive tells scrap convention wage crisis makes consideration of price ceiling suspension unlikely before mid-summer. Controls needed until supply meets demand

WAGE crisis which has developed in American industry since V-J Day will prohibit consideration of any lifting of price controls on basic raw materials until mid-summer at the earliest, Warren M. Huff, price executive, Metals Price Branch, Office of Price Administration, declared last week addressing the eighteenth annual convention of the Institute of Scrap Iron & Steel at Chicago.

Further, the OPA official declared, even though steel prices are advanced, suggested as an early possibility in Washington circles, this does not mean that a corresponding increase in prices on raw materials purchased by the steel industry, such as scrap, will be effected. Actually, said Mr. Huff, it is the intention of OPA to maintain raw material prices as close to existing price ceilings as possible until such time as supply is in better balance with demand.

Price control as a general thing must continue in effect until wages and profits are brought into better balance, Huff said. He pointed out that this does not mean OPA is seeking indefinite extension of price control. Rather, it simply aims at preventing runaway inflation pending settlement of economic conditions. He asserted that following the ending of the war with Japan it had been the expectation of OPA that it could lift price control on certain basic products, including scrap, by mid-January, 1946. However, the wage crisis which has arisen in recent months has created a price crisis which necessarily has caused a revision in the price control calendar.

Raw Material Costs To Decrease

The OPA official told the scrap men that OPA's position with respect to steel prices is that the period since V-J Day is not a satisfactory one on which to base price policy. He was of the opinion steel production costs will decline through a reduction in raw material costs, such as coal and scrap. Assuming resumption of normal labor relationships he thought scrap prices might decline later this year with better collections. In event this should take place, Huff said, the matter of lifting price control on scrap then can be taken up. Whatever action is taken will be predicated on the volume of scrap moving in the market, there being little possibility controls will be modified unless the tonnage available is sufficient to prevent a price spiral.

Battle scrap from overseas war theaters will be returned to the United States only in limited quantities, due to high cost of handling and lack of personnel. Shown above are wrecked vehicles at a scrap depot in the European theater

The speaker emphasized that in his opinion an increase in basic raw material prices at this time would act as an electrifying force on the entire economy. In existing circumstances, therefore, price control is more vital today than ever and must be continued until the wage crisis is definitely over.

Bright outlook for the scrap industry was painted for the convention delegates by Edwin C. Barringer, president and executive secretary of the Institute.

He pointed out that since V-J Day scrap prices, with few exceptions, have held at ceiling levels with demand as pressing as at any time during the war. This situation contrasts with experience after World War I when the price of scrap within five months after that war, collapsed to practically one-half wartime ceilings, and operation of steel mills and foundries likewise fell to about 50 per cent of wartime peak.

"Once labor difficulties are resolved in the principal steel-consuming industries," said Mr. Barringer, "industrial scrap will flow. But the wastage in processing steel for civilian goods is substantially less than that for producing materiel for war, hence while in point of tons industrial scrap will loom large, in proportion it will be measurably less than in the past six years.

"If it will take 25 million automobiles and trucks to satisfy pentup demand for automotive transportation, this indicates four to five years of capacity manufacture at Detroit. It also means that almost 25 million overage and civilian-weary cars and trucks will be surface-interred at automobile graveyards. It may safely be assumed that the tonnage of scrap that will become available at auto graveyards will increase substantially."

This is only one source from which the scrap industry can be expected to generate material. The railroads, however, are expected to prove a substantially larger source of scrap over the next few years as obsolete equipment is replaced and normal maintenance of track is resumed. Then, said Barringer, a new source of scrap will be in shipbreaking though it will be some time before tonnage from this direction will be sizable.

Termination and surplus material is a source of scrap which the speaker said is difficult to fathom at the moment.

According to Barringer, the foregoing sources of scrap represent a standoff so far as prospective increase or decrease in tonnage is concerned. The real base of the scrap pyramid, he said, will continue to be the collector and small dealer. While the tonnage these sources yield is not the largest, their yield is the one most susceptible to increase; theirs is the margin of safety, the final per cent which largely determines the market.

"Under the sponsorship of the national administration the level of wages is in a rising cycle," said the speaker, "and so, inescapably, is the cost of living because wage levels and the price of commodities

are Siamese twins. The issue in all recent major labor difficulty has not been the principle of an increase in wages but the extent of such increase. It is a foregone conclusion that wages generally are going to be increased; scrap yards, large and small, inevitably will have to follow. The cost of labor is the largest single item in the collection, movement and preparation of scrap, and if increased cost is a deterrent to the collection and preparation of scrap then this situation must be given consideration."

The speaker, alluding to postwar problems, said that specifications for iron and steel scrap are in need of revision, and, in fact, the early stage of this project has been initiated.

Brig. Gen. David N. Hauseman, director, Readjustment Division, War Department, outlined to the convention the Army's plans for scrap disposal. He said it was the Army's policy to get its surplus and its salvage into the hands of people who can use it as fast as possible. All critical items needed in the civilian economy are being released from stocks, and supplies not needed for military purposes are being cleared out.

From June 1, 1944, to Dec. 1, 1945, the War Department declared surplus a total of $8.4 billion worth of goods. That included $821 million of consumers' goods; $2.45 billion of capital and producers' goods; $4.9 billion of aircraft; $103 million of marine goods, and $72 million of food. Eliminating aircraft it made $3.5 billion of property available for civilian consumption during that period.

Scrap Symposium Presented

Prominent on the convention program was a symposium on "What's Ahead for Iron and Steel Scrap and Its Consuming Industries," participated in by Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., speaking for the foundry industry; Newman Ebersole, American Rolling Mill Co., Middletown, O., speaking on blast furnace use of scrap; James D. Sloan, Youngstown Sheet & Tube Co., Youngstown, O., speaking on openhearth use of scrap; and Herman Schultz, Carnegie-Illinois Steel Corp., Chicago, speaking on electric furnace scrap consumption.

All of the speakers urged better housekeeping in the scrap industry pointing out the necessity for greatest possible segregation of grades. Most of the difficulties between consumers and sellers of scrap, the speakers pointed out, stem from the failure of scrap yards to ship material to consumer specifications.

Surplus property and contract termination scrap disposal also was discussed by Lt. Comdr. Howard Gould, head of material disposition, Property Disposition Branch, Office of Assistant Secretary of the Navy; Lt. Col. Richard J. Spurr, chief, Salvage Section, Military Disposal Branch, Readjustment Division; Capt. Leonard J. Abrams, Readjustment Division; C. R. Van Etten, Readjustment Division; Henry W. Cornell, deputy director, Capital and Producers Goods, Office of Surplus Property, Reconstruction Finance Corp.; Guy P. Norton, director, Materials Branch, Surplus Property Administration; and Charles H. Lipsett, publisher, *Waste Trade Journal.*

Collection of scrap industry statistics will be continued in peacetime by the government but collection will be less onerous to the scrap yard operator than during the war, Thomas H. Miller, assistant chief, Economics & Statistics Branch, Bureau of Mines, Department of the Interior, told the convention in an address in which he explained a revised reporting procedure for the industry. The monthly questionnaire which it is planning to send out from now on is much simplified from that used during the war and, further, the number of firms to receive the form has been cut down from some 12,000 to 2000, it being felt that comprehensive figures can be received from the 2000 to permit an accurate and representative cross-section monthly statistical survey of the industry.

The convention, largest in the history of the Institute with more than 700 delegates registered, was welcomed to Chicago by Harold Weinstein, president of the Chicago chapter, following which Thomas W. Lippert, editor, *Iron Age,* spoke on the general industrial and economic outlook. At the annual banquet Vincent Gottschalk served as toastmaster, the principal address being given by Edward Blythin, vice president and secretary, Western Reserve University, Cleveland, and former Mayor of Cleveland. At the dinner Mr. Barringer was presented with the Institute's Award of Merit for 1945, presentation being made by Philip W. Frieder, Philip W. Frieder Co., Cleveland.

All officers were re-elected as follows: President and executive secretary, Edwin C. Barringer; first vice president, Philip W. Frieder; second vice president, William J. Wolfe, Wolfe & Co., Hamilton, O.; secretary, Walter Erman, Erman-Howell & Co. Inc., Chicago; treasurer, Samuel G. Keywell, Samuel G. Keywell Co. Inc., Detroit; and comptroller, Thomas F. Kelly, Flushing, N. Y.

Overseas Scrap Disposal Policy To Restrict Shipments to U. S.

AFTER intensive study of the problem, including a survey by the Overseas Scrap Advisory Committee, a group composed of representatives of the iron and steel and scrap industries, the Army has adopted a policy with respect to the disposition of overseas scrap, it was announced last week by the War Department.

Brig. Gen. David N. Hauseman, director, Readjustment Division, ASF, speaking before the eighteenth annual convention of the Institute of Scrap Iron & Steel at Chicago, briefly described the disposal plan which was decided upon after conferences with the State Department, the Office of War Mobilization and Reconversion and other federal agencies.

Under the plan all ferrous scrap, except that located in United States-occupied Germany and Japan, will be returned to this country from overseas only to the extent required for ship's ballast. However, scrap one-eighth inch in thickness and heavier will be returned from Germany where adequate manpower is available to handle it. In Japan such material will be held pending further study of the problem.

Overseas scrap in the various war theaters ranges from battlefield waste to worn and obsolete weapons, aircraft, vehicles and other equipment.

Recommendation by the Overseas Scrap Committee that a greater amount of ferrous material be returned from these other countries as a conservation element was considered by the War Department. It was decided in general, however, that the cost of assembling, sorting, and transporting this scrap to the United States would exceed anticipated returns. Because of the rapid demobilization program, moreover, overseas theaters are handicapped by a shortage of personnel which would prevent the collection and handling of large quantities of material.

Total amount of scrap was considered to be insignificant when compared to the annual rate of consumption in the United States. Further, shipments could not be made of quantities sufficient to help alleviate the current tightness in the ferrous scrap supply in this country.

The plan, as finally adopted, calls for local sales of scrap in the best interests of the Army by Army theater comm-

(*Please turn to Page* 208)

Truman Seeks Wider Legislative Program without Boost in Debt

President reiterates requests for action on legislation he previously recommended and adds to list of requested measures. Predicts that 1947 fiscal year beginning next July 1 will bring first reduction in national debt in 17 years

INCREASED output of lower-cost goods by higher-paid workers would result, President Truman declared, from a broad legislative program for which he has asked congressional support.

His program was outlined in a 25,000-word combined state-of-the-union and budget message last week to Congress. That report also pointed out that government expenditures in the fiscal year beginning next July 1 would be $35,860,000,000, or $4,347,000,000 above anticipated income. By drawing on the treasury's cash balance, he said, the national debt actually can be reduced for the first time in 17 years—from an expected $275 billion next July to $271 billion a year later. The President added, however, that he can recommend no further tax reductions now.

Elaborating on production, President Truman said: "If we manage our economy properly, the future will see us on a level of production half again as high as anything we have ever accomplished in peacetime. Business can in the future pay higher wages and sell for lower prices than ever before. This is not true now for all companies, nor will it ever be true for all, but for business generally it is true."

The President asked Congress to act on a revised 21-topic legislative program, all of which he had recommended on various dates since last September. In addition, he urgently recommended these additional measures: 1—Extension of the price control act for one year from next June 30. 2—Extension of second war powers act, including priority and inventory controls, beyond June 30. 3—Continuation of food subsidies beyond June 30 with the provision that they stop if the cost of living declines below present levels. 4—Legislation creating a permanent housing agency. 5—Extension of the Selective Service Act beyond the present expiration date of May 16, if the present campaign for volunteers does not produce the needed numbers of men.

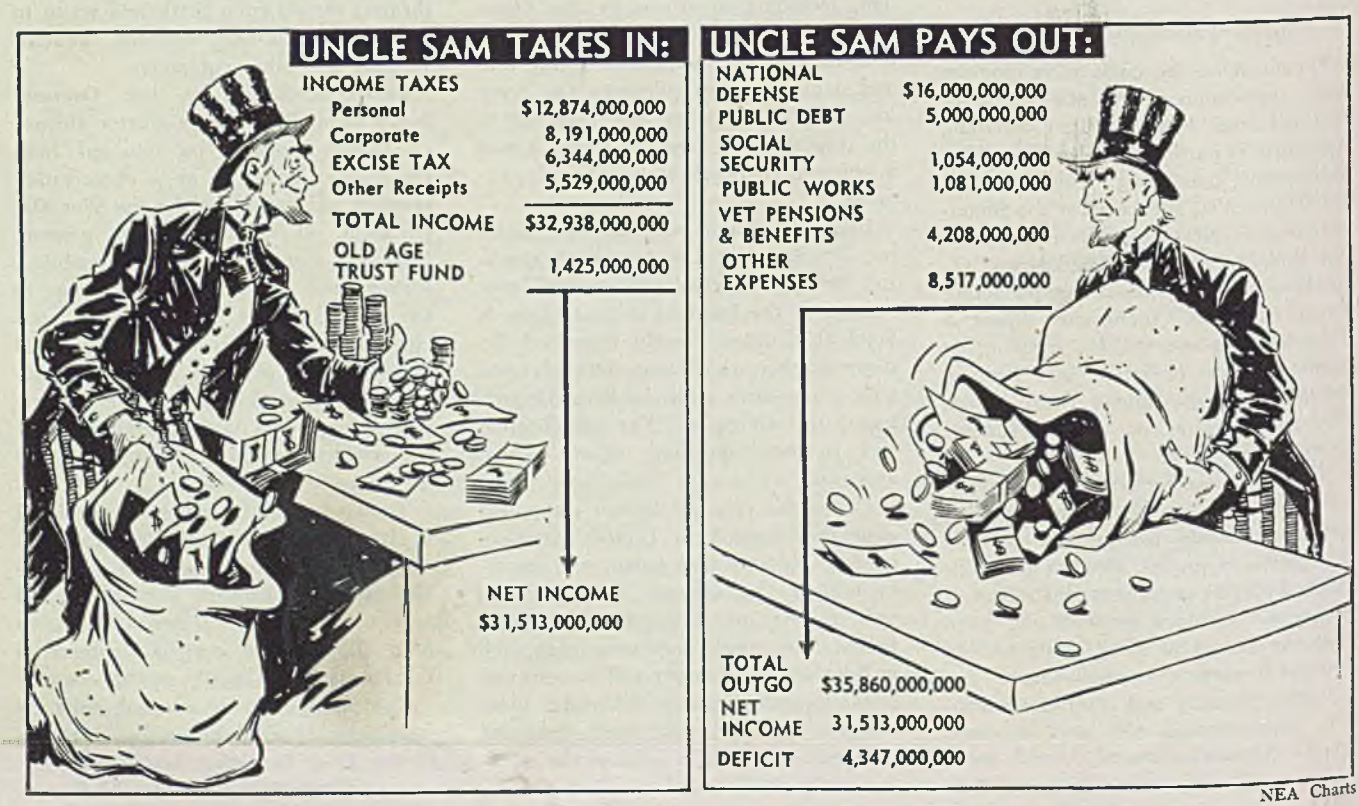
Most serious difficulty in the path of reconversion and expansion, President Truman's message declared, is establishment of a fair wage structure. He added that, "The ability of labor and management to work together, and the wage and price policies which they develop, are social and economic issues of first importance." Labor and management, he said, must establish "better human relationships. No government policy can make men understand each other, agree, and get along unless they conduct themselves in a way to foster mutual respect and good will. The government can, however, help to develop machinery which, with the backing of public opinion, will assist labor and management to resolve their disagreements in a peaceful manner and reduce the number and duration of strikes."

In calling anew for action on his entire domestic program he again included his proposal that strikes be held in abeyance while fact-finding boards investigate labor-management disputes.

Among his recommendations was one calling for major steps by the government to enforce antitrust laws, suspended in a number of fields during the war, to "encourage new and competing enterprises in every way."

Asserting that inflation is "still our chief worry," President Truman said that because of its "dangerously powerful" pressures and because future governmental costs call for large revenues he cannot recommend any further tax reduction now.

Discussing aftermath-of-war expenditures, the President said the 1946-1947 budget allocates $16 billion for war



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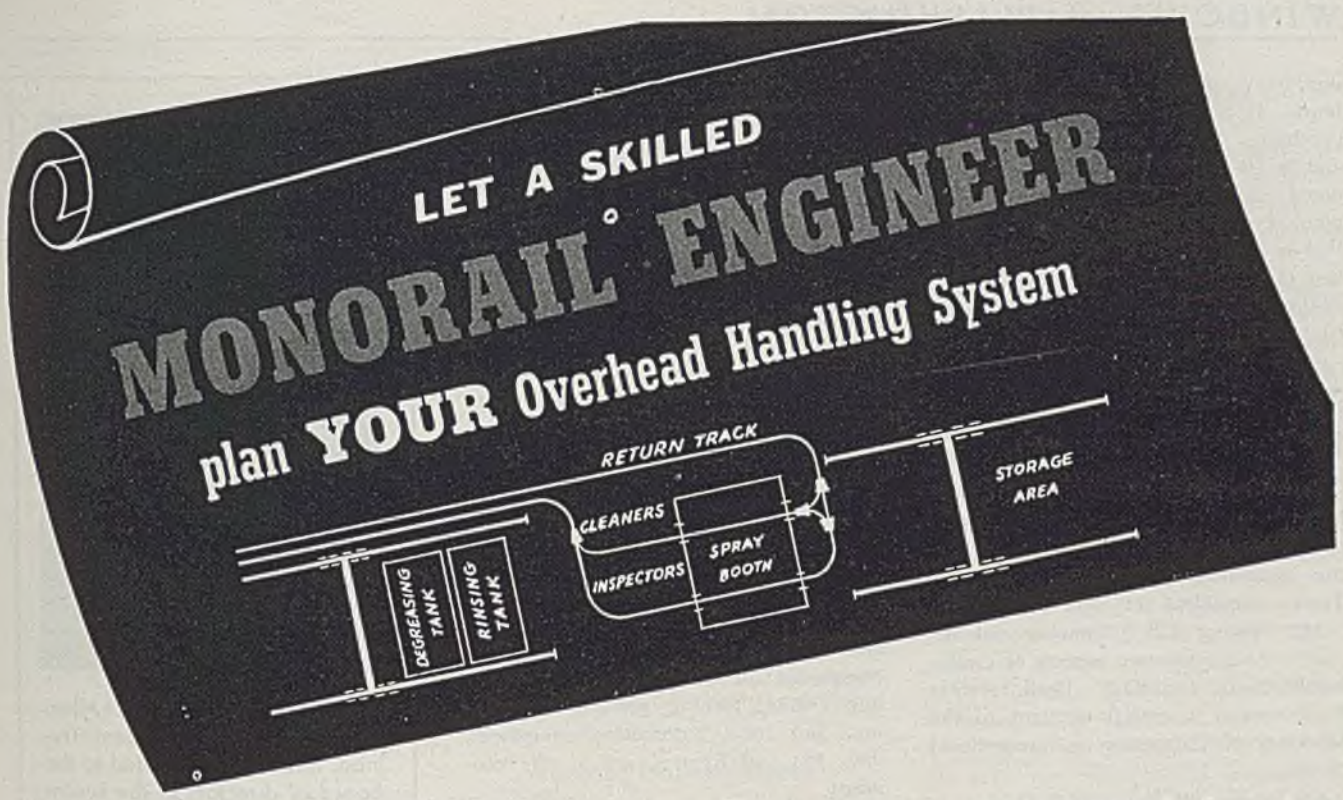

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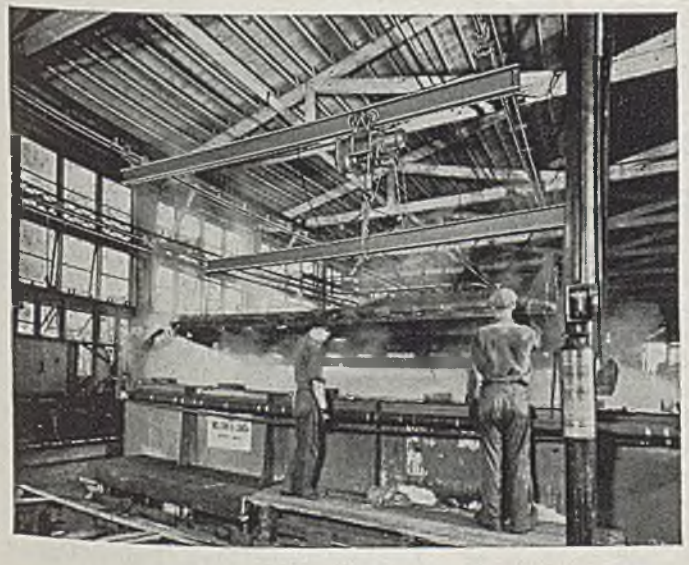

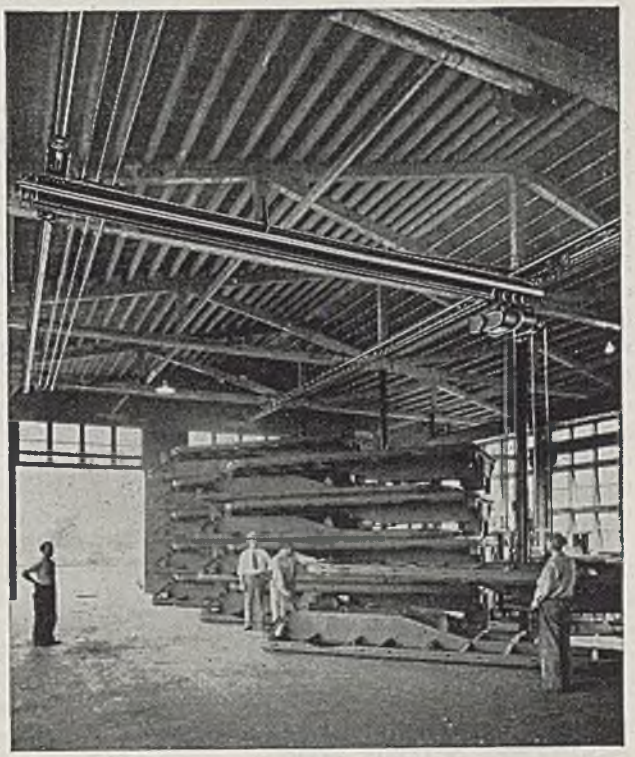

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liquidation, occupation, and national defense. It is ten times the nation's expenditures for defense before the war and is 10 per cent of the expected national revenue. "This estimate," he pointed out, "reflects the immense job that is involved in winding up a global war effort and stresses the great responsibility that victory has placed upon this country."

Two Appointments Made By Export-Import Bank

Appointment of Frank A. Waring and Norman T. Ness to the economic staff of the Export-Import Bank, Washington, was announced recently by Wayne C. Taylor, president of the bank.

Mr. Waring will become special advisor on the economic aspects of credits involving the Far East. Until recently he has been a special assistant to the Secretary of Commerce on international affairs.

Mr. Ness will be special advisor on the economic aspects of credits involving Latin America. Until recently he was assistant director, Division of Monetary Research, Treasury Department.

Construction Machinery Price Increase Extended

Extension to May 15 of the 5 per cent interim increase in ceiling prices granted Sept. 28, 1945, to manufacturers of basic construction machinery, equipment and parts has been announced by the Office of Price Administration. The increase is applicable to more than 100 classifications of machinery items urgently needed in postwar public works, highway and home construction and maintenance programs. The list includes cranes, dredges, drills, graders, concrete mixers, loaders, road maintainers, pavers, rollers, street sweepers, track-laying type tractors, half-track trucks and crawler wagons.

Manufacturers of the items involved in the extension order who are still suffering financial hardship even while operating under the interim price increases may apply to OPA for individual price adjustments.

Additional Surplus War Plants Offered for Sale

War Assets Corp., a subsidiary of the Reconstruction Finance Corp., is offering for sale or lease the automobile parts plant near Muncie, Ind., operated by the Warner Gear Division, Borg-Warner Corp., for the Army.

The property consists of three buildings with a total area of 114,000 square feet. Lathes, grinders, milling and radial drilling machines, presses, tapping, threading, broaching, shaping, finishing and hobbing machines, furnaces, cranes, conveyors and a quantity of portable tools are on the premises.

Other plants offered by WAC for sale or lease include: Kodak Optical Works machine shop in Rochester, N.Y., having 36,480 square feet of floor area. A quantity of tools and machinery used in making optical components is on the premises.

WAC is also offering for sale or lease the Syracuse, N. Y., plant where Lipe-Rollway Corp. manufactured truck clutches and machine tools for the Army. There are five buildings with total floor area of 93,150 square feet. Machinery and equipment for drilling, washing, handling, cutting, turning, pressing and milling, and some automotive equipment, dies, jigs and fixtures, are on the premises.

International Conference On Foreign Trade Called

An international conference on foreign trade has been called by the U. S. State Department, to be held in Europe some time in early spring.

Invitations have been sent to 14 nations. Purpose of the conference, it was stated, is to break ground for a later and more general meeting to be held in the summer, under sponsorship of the United Nations.

However, a part of the work planned for the earlier meeting, it is understood, involves negotiation of trade agreements looking to reduction of trade barriers.

In this connection, the department states, the usual preliminary notice to interested business and industries will be sent in advance of any negotiations.

Subjects to be considered include imperial preferences, the sterling area and sterling area dollar pool, exclusive agreements between two countries, state trading and state monopolies of foreign trade and individual products, intergovernmental arrangements and cartels.

DIRECTOR: George E. Allen, close adviser to President Truman, has been appointed to the board of directors of the Reconstruction Finance Corp. NEA photo

Steel Executive Heads Business Advisory Council of U. S. Commerce Department

ELECTION of G. M. Humphrey, Cleveland steel executive, as chairman of the Business Advisory Council for the U. S. Department of Commerce for 1946, has been announced by the department.

Mr. Humphrey is a director of subsidiary and affiliated companies of the M. A. Hanna Co., Cleveland, chairman of the executive committee of National Steel Corp., vice president of Susquehanna Collieries Co., and an officer or director of numerous banks.

He succeeds Thomas B. McCabe as chairman of the council.

Vice chairmen of the council for the coming year include: W. Gibson Carey Jr., president, Yale & Towne Mfg. Co., New York; Marion B. Folsom, treasurer, Eastman Kodak Co., Rochester, N. Y.; John L. Collyer, president, B. F. Goodrich Co., Akron; and Harrison Jones, chairman, Coca-Cola Co., Atlanta.

New members elected for the year are: J. T. Cecil, president, Interstate Hardware Co. Inc., Bristol, Va.-Tenn.; Jacob France, president, Mid-Continent Oil Co., Baltimore; Henry F. Grady, president, American President Lines Ltd., San Francisco; Robert E. Gross, president, Lockheed Aircraft Corp., Burbank, Calif.; W. H. Harrison, vice president, American Telephone & Telegraph Co., New York; William E. Levis, chairman, Owens-Illinois Glass Co., Toledo, O.; A. Q. Peterson, president, Wesson Oil & Snowdrift Co. Inc., New Orleans; and Walter M. Ringer, president, Foley Mfg. Co., Minneapolis.

Senate Bill Would Provide Means For Settling Labor Controversies

Measure would give subpoena powers to presidentially-named fact-finding boards. Conciliation and Mediation Division would be established in Department of Labor, and a U. S. Board of Arbitration would be created

A BILL to help solve labor problems, many of which arise from the National Labor Relations (Wagner) Act, is pending in the Senate Committee on Education and Labor.

Drawn to protect commerce by providing means for prompt and orderly settlement of controversies between employers and employees, the measure, S. 1419, is known as the National Mediation and Arbitration bill, and in effect would to some degree be a countermeasure to the Wagner act.

The bill has been highly commended by William M. Leiserson, who has served the government in important labor relations capacities, and who last year declared there is need for a countermeasure to the Wagner act. At the request of the Senate Committee on Education and Labor Mr. Leiserson soon will submit to it any revisions he deems advisable to the new National Mediation and Arbitration bill. The measure was introduced by Brien McMahon (Conn.), Carl Hayden (Ariz.), Elbert D. Thomas (Utah), and James M. Tunnell (Del.).

President Would Appoint Board

The pending bill provides for: 1. Presidential appointment of fact-finding boards; 2. creation of a Conciliation and Mediation Division in the Department of Labor; 3. formation of a United States Board of Arbitration. Purpose of these three groups would be to encourage "the acceptance of collective bargaining and voluntary conciliation, mediation, and arbitration agreements, thereby disposing of controversies between labor and management by peaceful means and discouraging avoidable strife through strikes and lock-outs."

The bill specifies that the Department of Labor and the U. S. Board of Arbitration shall be the only federal agencies to engage in conciliation, mediation, and arbitration of labor controversies as defined in the act. However, the National Labor Relations Board would not be prohibited or limited from attempting to settle any labor controversy pending before it.

The fact-finding boards which the President would be empowered to appoint to hear facts and issues in any labor controversy would have power to subpoena witnesses, books, papers, contracts, and other documents. However, the President's power to send a fact-finding board into a controversy would be limited by a clause stating, "that the appointment of such board of inquiry shall not otherwise interfere with any action undertaken or to be undertaken by either party." Compensation of members of a fact-finding board would be not more than $100 a day.

Mediation Division's Duties

The Conciliation and Mediation Division would have as its duty the encouragement of employers and employees to exert every reasonable effort "(1) to make and maintain agreements concerning rates of pay, hours, and working conditions, including, wherever possible, provision for the final adjustment of grievances or questions regarding the application or interpretation of such agreements; and (2) to settle all differences, whether arising out of the negotiation, interpretation, or application of such agreements or otherwise, with all expedition, wherever possible, in conference in the first instance."

Service of the Conciliation and Mediation Division could be invoked by the parties, or by either party, to any labor controversy affecting commerce and not adjusted by the parties in conference in the first instance. Whether the division is called upon or not it would be the duty of the division to communicate promptly with the parties and use its best efforts, by mediation and conciliation, to bring them to agreement. Heading the division would be a presidentially-appointed administrator whose salary would be $12,000 a year. The administrator would be empowered to appoint experts, mediators, conciliators, assistants, and clerical personnel. Also, the administrator would have the power to adopt, amend, and rescind such regulations and rules as may be necessary for administration of the division's functions.

The U. S. Conciliation Service and any officers and employees of the National War Labor Board whose services in the judgment of the administrator are necessary to efficient operation of the new division would be transferred to that division.

The proposed United States Board of Arbitration would have three members and would be an independent agency in the executive branch of the government. They would be appointed by the President. Each member of the board would receive $12,000 a year. The board would have the power to adopt, amend, and rescind regulations and rules as might be necessary for administration of its functions. All arbitration functions now performed by the Department of Labor would be transferred to the new board.

Upon request from both parties to a labor controversy, the board would be required to co-operate with the parties in forming a board of arbitration in accordance with an agreement to arbitrate. However, failure or refusal of either party to agree to arbitration could not be construed as a violation of any legal duty or other obligation imposed by the act. The board would be required to establish a roster of arbitrators having a reputation for fairness and objectivity from which the board or the parties to a controversy could select arbitrators familiar with the industrial and employment problems in the locality where the controversy arises.

The arbitration board would have power to subpoena witnesses, books, papers, contracts and agreements.

An arbitrator would be compensated by the party selecting him, and each arbitrator selected by the arbitrators or the U. S. Board of Arbitration would be paid by the board.

Steel Container and Can Price Regulation Amended

Manufacturers of steel shipping containers, general line cans, and steel reels or spools have been provided with a procedure for applying to the Office of Price Administration for individual ceiling price increases. To be eligible, an applicant for an increase must show that he is suffering financial hardship and that either his established maximum prices are below the general level of prices of other producers or that they impede production needed for an orderly reconversion to a peacetime economy.

New Commercial Standard Approved for Pipe Nipples

Commercial standard CS5-46 for Pipe Nipples: Brass, Copper, Steel and Wrought Iron has been made effective for new production from Feb. 15, 1946, the Bureau of Standards announced.

Continental Countries Planning To Expand Manufacturing Activities

Holland contemplates shipbuilding industry; France and Czechoslovakia expect to build more automobiles. Poland may become machine tool builder. Germany believed unlikely to regain position as heart of European industry in foreseeable future

NO MATTER what the United Nations eventually agree to do about Germany, that country is unlikely in the foreseeable future to resume her former place as the industrial heart of Europe.

This is the opinion of Alex Taub, former Foreign Economic Administration chief engineer, and now of Alex Taub Associates, 1367 Connecticut Ave., Washington. Mr. Taub's firm, as a result of having been retained by certain European governments in a consulting and advisory capacity, has under way a comprehensive study of economic potentialities on that continent as they may be developed over the next few years.

"All the European countries which have fallen within the range of our investigations want to increase their output of industrial products in relation to their output of farm products," Mr. Taub told STEEL. "Among them are Czechoslovakia, Poland, Holland, Belgium, France, Bulgaria, Hungary, Rumania and Turkey.

"The governments of those countries want to elevate the plane of living for their peoples, and they propose to do that by expanding their manufacturing activities. Their reasoning is based largely on the experience of the United States and other industrial countries where, roughly, $75 worth of primary raw materials increases in value to $600 in the case of automobiles, $1000 in electrical goods and $2000 in machine tools.

"These countries in no sense are planning to get away from their agrarian economies. They simply want to add facilities by which they can convert more of their raw materials into useful products. As a matter of fact their plans envision more effective use of the soil, and their industrialization programs are being evolved with that objective in mind. For example, farm products will get to market faster and in larger volume by means of railroads and modern highways required to serve industry. Fertilizer will be a major product of some of the chemical plants now in the blueprint stage."

Mr. Taub estimates that the countries mentioned above will spend eventually together an average annual rate of some $5 billion on their industrial development programs—or $25 to $35 billion over the next five to seven years. The major portion of these expenditures will be incurred in the purchase of capital goods to produce consumer goods. But there also will be substantial outlays for capital goods to produce capital goods.

"For instance," says Mr. Taub, "a shipbuilding industry in Holland would be highly logical. Production costs would be in line, and the Dutch are a seafaring people and know what to do with ships. Poland has had a machine tool industry in the past and can carry an expanded machine tool industry in the future. Both France and Czechoslovakia could expand their prewar automotive industries. These are just suggestive illustrations. There are many opportunities open to these countries in setting up industries to manufacture capital goods. And they must do that if they are to build their own economies on a healthy basis, and assist each other's development programs."

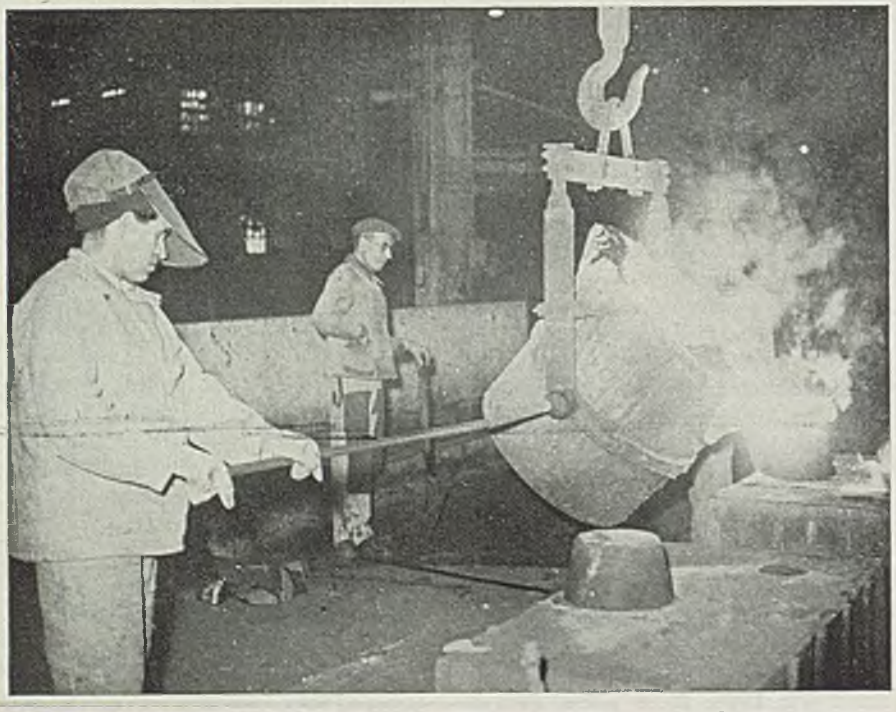
A fortunate by-product of the plans of many of the European countries to expand their industries over the next few years, Mr. Taub says, is that their execution will tend to contribute toward one of the main United Nations objectives—the retarding of a revival of German industry to its prewar proportions.

Would Retard German Growth

"There probably are limitations as to the total amount of industry which Europe as a whole can support," says Mr. Taub, "and if all the other countries expand their manufacturing activities the opportunities for growth in German industry will be slowed down. That would contribute toward the objective of keeping Germany from developing huge manufacturing capacity over and beyond her own needs which could be mobilized for another war."

In these industrialization programs Mr. Taub looks to the United States to provide the greater portion of the needed capital goods. The United Kingdom will figure to a lesser extent, he believes.

"Not only has Great Britain a job of considerable magnitude to manufacture modern equipment for her own manufacturing industries, but Britain historically has favored exportation of consumer goods rather than capital goods. Britain probably will not contribute on a large scale to the establishment of industries in Europe which will be competitive with her own industries. This latter consideration probably will not enter into the calculations of most of the United States manufacturers, since it has been their custom to sell capital equipment to the rest of the world."



Inside the foundry of the huge works at Billancourt, France, a worker is pouring molten steel into a small parts mold. NEA photo

French Industry Moving Toward Nationalization

Program launched by resistance council to undo work of Vichy regime. Renault works now under government control

A shower of sparks attends the pouring of a heat of steel in the now-nationalized Renault Automobile Works. NEA photo

NATIONALIZATION of French industry is getting under way in an attempt to hasten the industrial recovery which it so desperately needs. State control of the basic industries began as a plank in the platform of the *Conseil National de la Resistance* drawn up in 1944 which contained sweeping provisions for social change such as nationalization of the monopolies, banking, insurance and mining.

This program was established to undo the work which had been accomplished by Vichy. It demanded that the French government should take control of all production and should confiscate those organizations which had willingly cooperated with the Germans or had refused to subordinate themselves to national requirements. It planned the reorganization or dissolution of committees established by Vichy to control industry (STEEL, Jan. 7, 1946, p. 348) and took from employers the management of these committees, replacing them by government appointees. Many of the employers, thus ousted, had been permitted no alternative but collaboration when the Germans were in occupation. They had been forced to co-operate with the Germans and had done so, firmly believing that what they did was in the best interests of their country and their employees, most of whom doubtlessly would have been shipped to Germany as slave laborers had the plant managers refused to work for the Germans.

New Government Supports Program

With the national elections in October, 1945, the three parties which emerged victorious, the Socialists, Communists and MRP, were pledged to the CNR program outlined above, and under the Fourth Republic the plans which were a part of the provisional government seem to be in at least partial execution. (STEEL, Jan. 7, 1946, p. 387).

Renault, the great automotive and heavy machinery producer, now a state enterprise, is currently said to be producing sixty trucks a day, compared with one a day in May, 1945, but the factories are still operating at only 50 per cent of capacity, a fact attributable to shortages of coal, manpower and transportation. The manpower lack is a serious drawback and stems from a declining birthrate over the past two or three decades and more recently from enforced labor in Germany. Men returning from prisoner-of-war enclosures and slave labor camps are still too emaciated to contribute appreciably to the labor force, but the situation is beginning to improve as additional Germans are imported in part payment of reparations. In October the number of Germans thus working in France was 450,000, but by June the number is expected to approach 1,750,000.

Steps are being taken to increase the productivity of the coal mines, and at present coal miners are the higest paid workers in the mining area; their rations have been increased to 3750 calories a day—a very attractive proposal in a country where no one knows where the next meal is to come from. As a result of these inducements, by last September there were 175,800 men in the industry, an increase of 13,500 over the total of 162,300 in 1938.

Transportation is slowly being improved, although by July, 1945, it was only 26.5 per cent of its prewar level. Between September, 1944, and July, 1945, the number of locomotives in operation had increased from 2785 to 7480, and the rolling stock had rapidly multiplied from 6500 to 274,800, or more than half of the prewar total.

The machine tool shortage remains acute; of the total of 590,000 tools in France, 5000 are over 50 years old, 370,000 are over 20 years old, and the remainder average 12 years of age. The government is planning to replace 260,000 of the oldest by building 140,000 in France and importing the rest largely from Great Britain and the United States.

mirrors of MOTORDOM

By A. H. ALLEN *Detroit Editor, STEEL*

Little optimism seen in immediate automotive scene. Steel strike expected to tie up those plants still operating, although Ford's steel mills are not affected by stoppage. Chrysler divisions skid to stop as stocks of glass become exhausted

DETROIT

SEARCHING about for something optimistic to report in the automotive industry is a depressing occupation, as the slow strangulation in steel gradually assumes the proportions of a general strike in industry. Probably the brightest spot is Ford, where projected assembly schedules and actual production are coming closer together, but even here the tieup in steel probably will force an early reduction in output, if not a cessation.

January schedules for passenger cars and trucks from Ford, Mercury and Lincoln lines approximates 56,000, for February, 80,000, March, 92,000 and April, 102,000. The first likely will be achieved and possibly exceeded slightly. After that, it is anybody's guess. Practically all parts suppliers which had forced suspension of Rouge assemblies a couple of months ago have been making shipments currently, and arrangements have been made to obtain fuel pumps formerly supplied by AC Spark Plug. Weekly assemblies have moved up to about 12,500 Ford cars and trucks, 100 Mercurys and 200 Lincolns.

Ford Steel Mill Still Producing

The Ford steel mill continues in production, turning out some 14,000 tons of ingots weekly, the bulk of which is processed into sheet, strip and bars. This gives the company a good backlog in these basic semifinished materials, but that is only part of the story. There are 200-odd parts which must be purchased on the outside and which require steel in their making. To some of these fabricators, Ford can supply his own steel, if other sources continue closed; however, to others even this is of no point since the plants themselves are closed because working forces are members of the steelworkers' union.

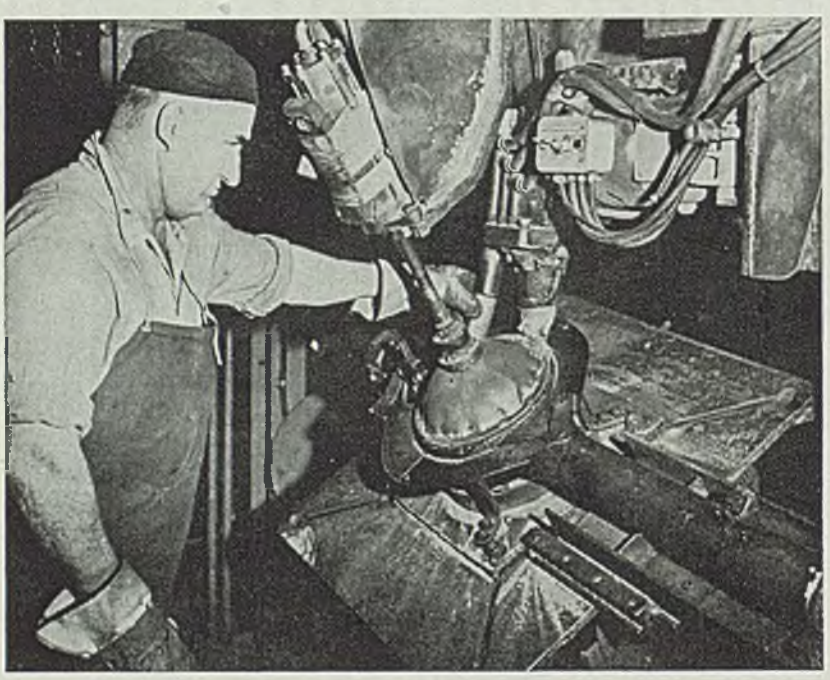
A typical case is that of a Ford supplier in the Buffalo district. A week ago this company, on the eve of the steel strike, received a carload of steel from the Rouge. Practically at the moment the steel arrived, the plant's working force walked off the job, the strange part being that the local union and management had signed an agreement over wages and working conditions several weeks previous. Nevertheless, as the union local president explained, "Orders from Pittsburgh" required them to walk out. This is just another instance of the monopolistic power of the CIO, under which local agreements are superseded by orders from Murray's lieutenants.

A break in the Ford wage negotiations seemed to be in sight last week, even though the company maintained it was standing pat on its offer of 17½ cents an hour, effective when production reached a normal level. Secret meetings between company and union representatives appeared to tip off an agreement, but it is obvious the pressure for reaching an accord dwindled appreciably following the start of the steel strike. This may be what convinces Phil Murray of the "dastardly plot" which big business is cooking up to bust unions; at least he can make a plausible story out of it. Actually he probably knows himself this is so much applesauce, since all progressive managements have accepted unions for years and plan to continue in this position. Mr. Murray, and a lot of other union leaders, however, realize full well the public's appetite for applesauce.

Chrysler divisions are skidding to a stop, accompanied by layoffs of more than 7000 at Chrysler, Dodge and DeSoto plants, attributable to exhaustion of glass stocks. Fortunately the settlement of the glass strike last week may make this interruption short-lived, for although it may take 4-6 weeks to get fresh stocks of glass moving this way, there was still a considerable amount of material in inventory which now can be released, plus a further amount in process, awaiting only lamination and finishing. It is understood the glass companies kept the heat on most of their furnaces throughout the 90-day strike, which must have run up a considerable fuel bill.

Despite the fact many Chrysler dealers

POSTWAR BUS: First of two busses of strictly postwar design built by the ACF-Brill Motors Co. for the Vermont Transit Co., Burlington, Vt. An order for eight ACF-Brill busses was placed by the company before Pearl Harbor, remained on the company's books during the war, and was first in line when production was resumed



AUTOMATIC WELDER: This automatic welding process has become standard fabrication technique in many automobile parts production plants. A "Unionmelt" machine is shown welding the differential housing to the axle assembly of a four-wheel drive truck

have received cars, they are not showing them publicly, and Plymouth, Dodge, DeSoto and Chrysler find themselves in the strange position of having OPA-approved prices but nothing to sell. Interesting feature of the announced prices is the extent of increases allowed on the score of "engineering improvements"—$70-$121 for Plymouth, $59-$68 for Dodge, $59-$66 for DeSoto and $70-$121 for Chrysler. Base price increases over the 1942 figure are confined to the 1-3.5 per cent range. The inference is that some significant changes can be expected in the Chrysler lines since the allowances for improvements are well above those granted by the OPA to other producers whose prices have been announced. What the improvements may be is still open to conjecture. Higher horsepower engines may be one explanation, various new safety features (wheels and brakes) may be another.

Estimates now indicate the striking General Motors workers already have lost an average of $400 apiece in wages, which just about matches the average individual savings announced by the UAW before the start of the strike. The UAW attempt to cudgel GM into accepting its offer of settlement on the basis of 19½ cents an hour by putting a one-week deadline on the offer drew a blank from the corporation as was to be expected.

The corporation meanwhile has been holding a series of meetings throughout the nation, inviting business men, merchants and other citizens to hear a concise recitation of the facts and issues involved in the strike. Two of these meetings have been held here in the past ten days, under direction of the GM public relations staff. Summing up a review of the issues in the case, GM warns, "America is at the crossroads. The issues involved are far broader than those concerning GM alone. These issues might well be the signal for the beginning of the end of the management of private business by its owners and the passing of such responsibility to a political bureaucracy. . . . . it would begin with the larger units of industry and eventually pass down to embrace all in a regimented system."

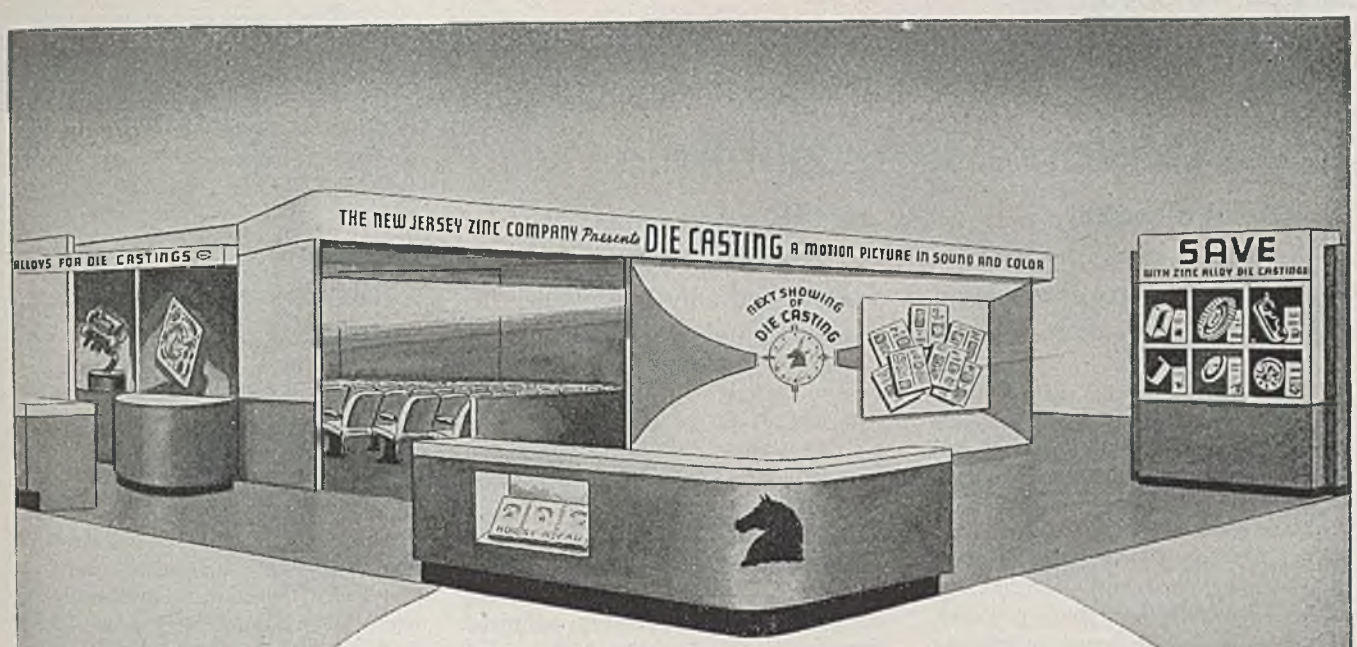
Many seasoned observers in this bailiwick are inclined to question the dexterity with which GM has handled this costly strike. They feel the corporation appears to have been constantly on the defensive, continually groping for individuals to plead its case with the public. The latest is Dr. Alfred P. Haake, who has been doing a somewhat better job than his predecessors. Perhaps this "galloping off in all directions" is necessary, considering that GM is being made the guinea pig by the UAW in its current battles, but the seeming lack of cohesion and failure to establish a clear path to a logical conclusion on the part of GM has brought forth the prediction from the "boys in the back room" that, once the strike is settled, there will be some heads rolling in the basket on the fifteenth floor of General Motors building.

Quite a fancy party was slung by the Kaiser-Frazer Corp. a week ago Sunday at the Waldorf in New York on the occasion of the first showing of its two new automobiles — both hand-built jobs. Visiting press representatives were met at the train by porters and public relations men who grabbed their coats and luggage, pressed bottles of scotch in their respective arms and herded them to waiting limousines. Clockers reported about 50,000 thronged into the hotel to see the cars. Order-takers reported a brisk business, but they could make no promises on deliveries. These enthusiastic buyers would have had their spirits considerably dampened if they could take a peek inside the Willow Run plant where the cars are to be built. The vast structure is virtually empty, with a few hundred men busy digging pits for future machinery, installing a couple of paint baking ovens and inspecting some conveyor chain.

At Philadelphia, Kaiser-Frazer has filed an amendment to the registration statement and prospectus originally filed Jan. 4 covering proposed public offering of 1,800,000 new shares of stock. The amendment notes that the Henry J. Kaiser interests intend to purchase from underwriters 45,000 shares of the new offering, bringing their total to 370,000 shares, while J. W. Frazer will take on 5000 shares of the new issue. It is also revealed K-F has concluded franchises with 1352 dealers for the Kaiser car, is preparing franchises for 749 more and negotiating with 1916 prospective dealers in contemplation of a total organization numbering 4000. Finally, the amendment points out K-F has obtained option from the RFC which, if exercised, will extend the term of its lease at Willow Run to Dec. 31, 1955, at annual rental of $1,200,000 after 1947. Rental fee this year is $500,000.

Socialistic Trend Emphasized

Timken Roller Bearing Co. has called public attention to the CIO's firm refusal to consider wage increases on a percentage basis and insistence on a straight cents-per-hour across-the-board increase for all wage classifications as just another proof of the socialistic union policy which refuses to recognize initiative and individual ability. Obviously a percentage increase would mean much more to the man earning $3 an hour than to the man making only $1 an hour, but in its leveling off to the plane of the least efficient the CIO insists on penalizing the higher paid worker and favoring the laggards and the least efficient.



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Steel Strike Affects 100 Plants and 25,000 Workers in California

National walkout may affect bidding on government-owned Geneva works in Utah. Surplus Property Administration reported to have received no firm offers and only one inquiry for further information. Machinists' strike delaying reconversion

SAN FRANCISCO

FORTY-NINE northern California steel companies employing approximately 10,000 workers are affected by the nation-wide steel strike. Fifty other companies in southern California, employing about 15,000, likewise are affected, bringing the state's total to 25,000.

The Fontana plant of Henry J. Kaiser, who met the union's terms by granting a wage increase of 18½ cents an hour, is not affected.

Several smaller companies also have reached agreements with the union and are continuing to operate.

Largest of the struck mills is that of Columbia Steel Co. at Pittsburg, employing 2500 men. Picketing began at the Columbia mill 38 hours before the strike deadline. Second largest plant to close on Pacific Coast is Bethlehem Pacific Steel Corp. with about 1000 employees. Other important operations affected are American Can Co., California Wire Cloth Co., Metal & Thermit Corp. and E. H. Edwards Co.

Wage agreements signed by the Pacific States Steel Corp. and Judson Steel Corp. grant workers increases of 25 cents an hour. Jacuzzi Pump Co. has granted an increase of 20 cents and has not been struck.

Interest in Geneva Wanes

Aside from the strike effects on the companies immediately concerned, steel and industrial circles here are speculating on what effect the national walkout will have on bidding for the Geneva steel works in Utah. There is a considerable opinion that steelmakers who may have been interested in acquiring the Geneva operation several months ago, might now prefer to sit on the sidelines for awhile or withdraw as bidders if higher wage cost prospects prove a threat to profitable operation of Geneva.

According to information from Washington, the Surplus Property Administration, which is asking for bids on the plant, as yet has received no firm offers, and in fact has only one inquiry for further information. Although the inquirer was not disclosed, it is believed to be United States Steel Corp.

Meanwhile, San Francisco industries are hopeful that there will be an end soon to the machinists' strike, a walkout that now is in its fourth month and which has closed 205 plants in the San Francisco area. Some 30,000 to 35,000 workers are affected.

This stubborn strike has delayed reconversion in this region more seriously than any other single factor. In addition, it has jeopardized prospects for industrial growth that San Francisco had counted on heavily to get under way in 1946. Although no firm has as yet dropped plans to expand here, several plants have had to hold up their projects, and several have threatened to go to other areas, particularly to Los Angeles and Seattle.

The strike also has affected all ship repair yards, which has caused a steady diversion of vessels to other yards along the Coast.

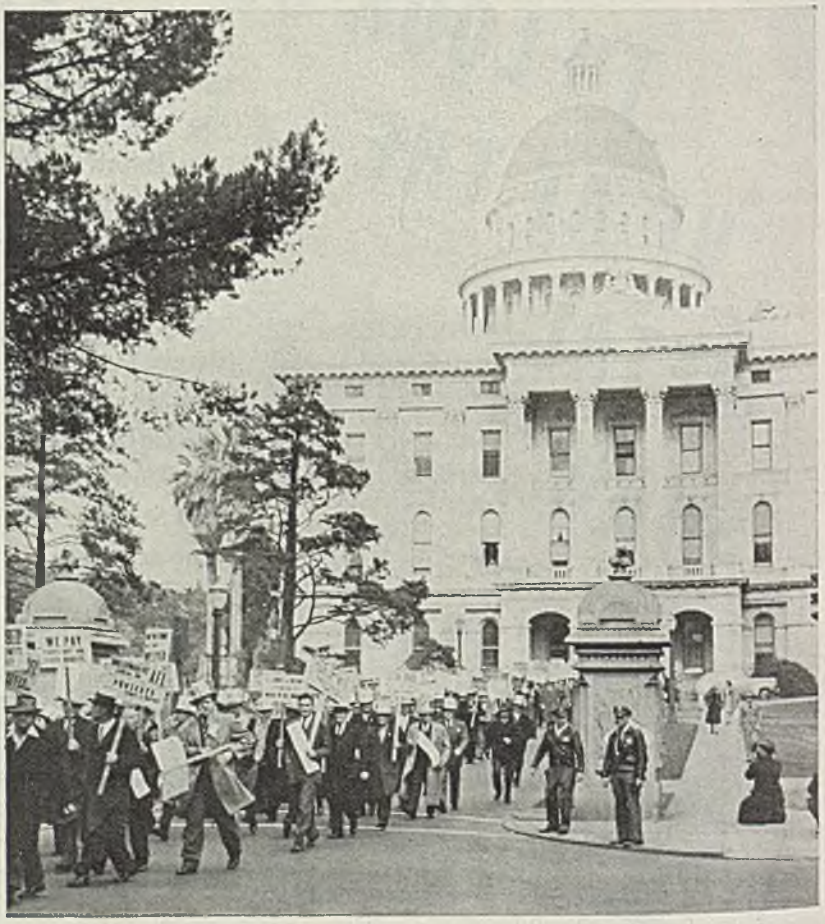
Los Angeles Employment Turns Upward in December

Industrial employment in the Los Angeles area, which dropped 30 per cent after V-J Day, showed an upward trend during December, it was disclosed recently in that city.

The research department of the Security-First National Bank made public the following summary of business conditions, prefacing the announcement by saying that there are about 80 per cent more factory jobs than before Pearl Harbor.

While reconversion has been delayed, the area has been relatively free of strikes in comparison to other industrial areas.

Jobs in Los Angeles County totaled



PROTEST DELAYS: Several hundred strike-idled San Francisco Bay area American Federation of Labor metal trades unionists went to the California capitol at Sacramento to protest delays in their appeals for unemployment insurance. After Gov. Earl Warren promised that their appeals would be expedited they marched away. NEA photo

233,000 in December, this figure being 10,000 more than in November. Factories within the county had 97,000 jobs in other than actual plant operations.

Despite shortages which became apparent after the war ended, building rose to an all-time high in southern California during 1945. Further substantial increases are certain to follow the release of more materials.

Pacific Fruit Express Plans To Order 2000 New Cars

Pacific Fruit Express, jointly owned by Southern Pacific and Union Pacific railroads, has announced intention to order 2000 new railroad refrigerator cars. It is hoped the new cars will be delivered in time to handle next fall and winter crops. Refrigerator car shortages have been and still are a serious bottleneck to movement of California's fresh fruits and vegetables.

Last year Pacific Fruit Express received delivery of 1000 new cars, costing $5,296,000, and on recent report had 36,528 serviceable cars, compared with 36,201 four years ago.

Seattle Reports Business Activity Near Standstill

SEATTLE

Labor difficulties, both local and in other sections of the country, have seriously retarded normal operations in this area. Shipments of steel and steel products have practically ceased while local industry gropes in the dark until labor adjustments are made. In the existing uncertainty industry cannot plan for the future, and business is nearly at a standstill. This situation is aggravated by a six-weeks long printers' strike, and daily newspapers have suspended publication. Machinists are on the verge of striking; the rolling mills and allied plants are prepared for a prolonged period of idleness, and the city's transportation is in chaos due to the strike of bus operators.

Idaho Mine Production Figures Less Than 1944

Lead production in Idaho in 1945 was the smallest since 1899, according to preliminary figures released by the Salt Lake City office, Bureau of Mines, Department of the Interior. Idaho ores and gravels in 1945 yielded gold, silver, copper, lead and zinc valued at $36,370,800, a 15 per cent loss from 1944. The output of each metal was less than that in 1944; gold declined 16 per cent; silver, 21 per cent; copper, 1 per cent; lead, 19 per cent; and zinc, 15 per cent.

California Gains 4683 New Firms in 1945; Many Locate in Los Angeles

Southern California boosters see area developing into greatest manufacturing district west of Chicago. Los Angeles County's new industrial investments in land, buildings and equipment total $84 million in year. Eastern firms establishing branches

LOS ANGELES

A MAJORITY of all incorporations in California during 1945 were of businesses which located in the Los Angeles area, according to figures released by Frank M. Jordan, secretary of state.

In the state as a whole, 4683 corporations with aggregate capital of $1,113,969,220 were granted permission to operate in the state last year. The number is the highest since 1931 and 1856 more than in the preceding year. Southern California became the home of 68.1 per cent of the new corporations for 1945. Among out-of-state corporations, 85 per cent selected the Los Angeles area as headquarters.

Last December registered the highest number of monthly establishments of businesses, with a total filing of 668 in the state. Eight other months have shown new filings in excess of 500.

The trend is continuing into 1946, with due allowances for slow-ups attributable to strikes and other reconversion blockades. Two eastern makers of electrical appliances, for instance, have plans well along for establishments in Los Angeles, but are delaying moves until the strike situation is clarified.

Los Angeles County industrial growth in 1945 totaled investments of $83,647,000 in land, buildings and equipment. In all, 228 new factories were under construction or completed by the end of the year and 334 expansions had been made.

Local industrialists and civic leaders declare the figures on Los Angeles' industrial growth indicate it rapidly is developing into the greatest manufacturing district west of Chicago.

379 New Plants Established In San Francisco Area

SAN FRANCISCO

The San Francisco Chamber of Commerce has completed its 1945 tabulation of industrial growth and has reported that 379 new plants were established in this area last year and expansion programs were carried out by 321 firms. The total outlays involved in this work were $188,580,269.

Meanwhile, the number of incorporations of new business in California has continued to increase steadily since the war ended. In December there were 668 filings, or 142 more than the previous monthly record established in March, 1924.

$140 Million To Be Spent For U. S. Projects in West

Construction work on thirty projects in seventeen western states is foreshadowed in the huge program in which $140 million will be spent throughout the West by the Department of the Interior, the industrial department, Los Angeles Chamber of Commerce reported recently.

The program includes $35 million for the Central Valley project in California and $6,615,400 for the Coachella Canal which will bring water to millions of acres in the Thermal-Mecca region below Palm Springs.

Slated to start this year, the plan will provide thousands of jobs on irrigation, power production and flood control projects in the Central Valley as well as in the Columbia river basin in Washington and the Missouri valley basin of the near northwest.

Maritime Commission Offers Steel Refrigerator Barges

First public offering of steel refrigeration barges, knocked down and crated, ready for shipping, was announced recently by the United States Maritime Commission. The barges, declared surplus by the Army Transportation Corps, were built at a cost of $146,500 each and will be sold at fixed prices commensurate with present day market levels.

These steel barges are standard type for harbor use. They are non-propelled, with a length of 112 ft, beam of 29 ft, 8-ft depth, and 7-ft draft at 587 long tons. Sixty of the one hundred barges, declared surplus, are complete, have 9 portable completely self-contained refrigeration boxes of the walk-in type with a capacity of 11,000 cu ft. Each of the 60 barges has one spare refrigeration unit. The remaining 40 are incomplete.

The barges are located at Yermo, Calif., and are offered for sale on an "as is, fob location," basis.

National Carbon Expands; Buys Battery Plant

Facilities were operated by company during war for Signal Corps. Bennington, Vt., plant being enlarged

NATIONAL Carbon Co. Inc., a unit of Union Carbide & Carbon Corp., New York, has announced expansion plans calling for the purchase of a government-owned plant and the construction of an addition to one of its branches.

The company has completed negotiations with Reconstruction Finance Corp. to purchase the Army Signal Corps battery manufacturing plant at Charlotte, N. C., a plant which National Carbon operated for the government during the war. Although the purchase price has not been disclosed, it was reported that engineers appraising the plant for RFC set its worth at substantially in excess of $350,000.

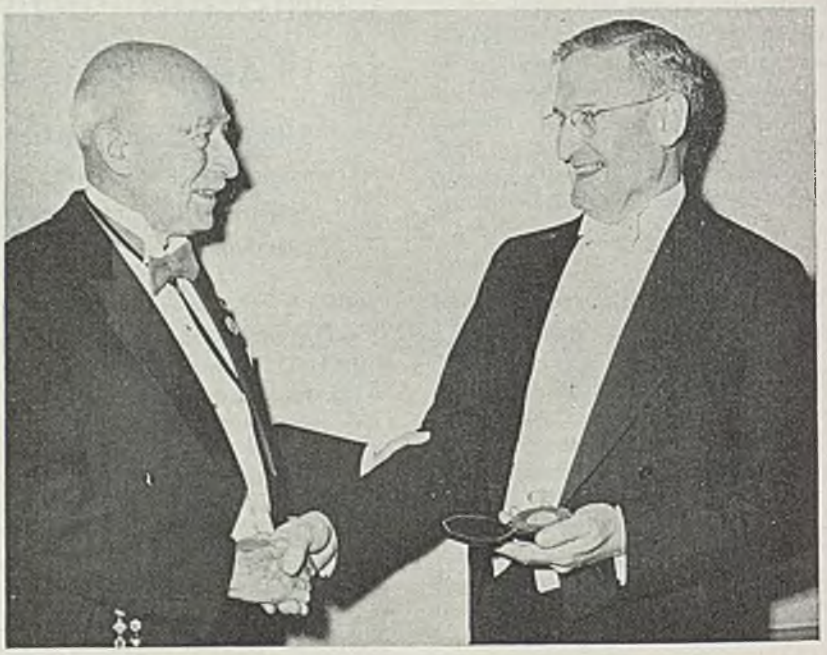
Construction has begun on a three-story addition to the laboratory of the company's plant at Bennington, Vt., which when completed will provide 16,000 sq ft of floor space. Despite delays caused by the weather, the building is expected to be ready for occupancy June 1. This plant will be headquarters for the production of the company's line of plastic products, recently introduced in the form of shower curtains and draperies.

The Charlotte facilities will be used for the manufacture of small batteries, similar to those made during the war to power "walkie-talkies" and other military communications equipment, and are to be used for small radio sets, hearing aids and like applications.

Rockwell Buys Arcade Co., Foundry Equipment Maker

Acquisition of Arcade Mfg. Co., Freeport, Ill., by Rockwell Mfg. Co., Pittsburgh, has been announced by Col. Willard F. Rockwell, president and chairman of the latter organization.

Arcade, which was incorporated in 1885, started as a manufacturer of feed grinders, plows, other agricultural implements and coffee mills, and in time extended its line to more than 300 items. Its manufacturing emphasis has changed to foundry equipment, hardware for the refrigeration industry and miscellaneous cast iron items.



AWARD WINNER: Dr. Francis C. Frary, right, director of research, Aluminum Co. of America, is shown receiving the Perkin Medal for achievement in industrial research from Dr. Marston T. Bogert, left, emeritus professor of chemistry, Columbia University

BRIEFS . . .

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

B-W Superchargers Inc., Chicago, subsidiary of Borg-Warner Corp., that city, will move its manufacturing operations to Cleveland where it will occupy facilities of Pesco Products Co., another Borg-Warner subsidiary.

—o—

Conlon Corp., Chicago, has purchased control of Moore Corp., Joliet, Ill., and will double the latter company's production of stoves, heaters and furnaces.

—o—

Philadelphia Gear Works Inc., Philadelphia, has appointed Atwood Machinery Co., Los Angeles, distributors for southern California, and has named Leroy L. Handy, Detroit, as representative for that area.

—o—

Walter P. Jacob Industries Inc., New York, has purchased the holdings of Hartford Electric Co. in Hartford Steel Corp., Hartford, Conn., and will expand the latter company's operations.

—o—

Tonawanda Iron Corp., North Tonawanda, N. Y., has announced that Louis H. Miller, New York, and Charles A. Reed, Boston, formerly with Rogers Brown-Lavino Co., Philadelphia, will represent the iron company as individuals in their respective territories. The Boston and New York offices of the Rogers Brown-Lavino Co. have been discontinued.

—o—

Thomas Machine Mfg. Co., Pittsburgh, Contract Division, has published a new five-section catalog illustrating numerous types of special machinery and contract machine work.

—o—

A. B. Murray Co. Inc., Elizabeth, N. J., steel and tube warehouse, has formed an affiliated organization, Murray Tube Works, to engage in custom fabrication of tubular steel. The new concern is located at Green Lane, Elizabeth, N. J.

—o—

Dravo Corp., Pittsburgh, has organized a sales department known as the Gear and Transmission Section, Machinery Division, with offices at Dravo Bldg., 300 Penn Ave., Pittsburgh 22.

—o—

Detroit Tool & Die Co., Detroit, has announced completion of its new plant at 4580 Oakman Blvd., Detroit 4.

—o—

General Blower Co., Chicago, has opened a branch office at Bessemer Bldg., Pittsburgh 22.

Barium Steel Would Add to Its Properties

Canton, O., firm would control ten companies after acquisition of four operating units of Republic Industries Inc.

BARIUM Steel Corp., Canton, O., recently announced plans for acquisition of control of Republic Industries Inc., which operates four manufacturing companies with plants in Cleveland, Detroit, Pottstown, Pa., and Toronto, Canada. Stockholders of Barium have been called to a special meeting on Jan. 28 to vote on authorization of 1,500,000 shares of additional capital stock of which 650,000 shares will be used to procure the Republic Industries properties.

The Republic Industries Inc. companies to be taken over by Barium Steel are engaged in the manufacture of stampings, chiefly for the automobile industry, airplane engines, marine engines, permanent adjustable jacks and aircraft and hydraulic equipment.

Republic Industries Inc. is a Delaware corporation, with its principal office at 25 Broad St., New York. It was organized in 1944 as the Continental Engineering & Management Corp. and in April of 1945 its name was changed to Republic Industries Inc. Its operating units are:

Jacobs Aircraft Engine Division, Pottstown, Pa., organized in 1929, and while originally a manufacturer of engines for automobile racing cars it steadily increased its output of airplane engines during recent years. The company has developed a new line of hydraulic equipment to be used by the builders of farm and material-handling equipment and will extend this further into the manufacture of hydraulic machinery for the machine tool industry.

Kermath Mfg. Co., Detroit, a subsidiary, has been making marine engines for 35 years. While primarily in the pleasure craft trade, it is expanding into the industrial and stationary fields.

The Geometric Stamping Co., Cleveland, also a subsidiary, was organized thirty years ago, and fabricates a line of specialty stampings, principally for the automotive trade.

Porcelain Steels Division, Cleveland, originally was a division of the Ferro Enamel Corp. It formerly specialized in the manufacture of hot water tanks but now produces a permanent adjustable house jack and other metal products.

Perma-Jack Corp., Cleveland, a sales company which markets exclusively the products of the Cleveland division, is a wholly-owned subsidiary. Also affiliated with Republic Industries Inc. is the Industrial Hydraulic Corp., Painesville, O., designer and distributor of a line of industrial hydraulic equipment manufactured by the Jacobs Aircraft Engine Co.

Acquisition of control of Republic Industries will be the fourth addition to the Barium Steel Corp.'s properties since June, 1944. It gives Barium Steel ten companies with two plants in Cleveland and plants in Canton, O., Duluth, Minn., Detroit, Erie, Pa., Syracuse, N. Y., Pottstown, Pa., and Toronto, Canada.

FAMILY AFFAIR: A father and his six sons handle the executive matters of W. C. Dillon & Co. Inc., Chicago, producer of precision instruments. Standing, left to right, are: R. E. Dillon, sales and advertising manager; R. R. Dillon, chief engineer; G. P. Dillon, research department; W. C. Dillon Jr., construction supervisor. Seated, left to right, are: W. L. Dillon, electrical engineer; W. C. Dillon Sr., president; and E. I. Dillon, vice president

Warner & Swasey To Build Earth-Moving Machinery

Warner & Swasey Co., Cleveland machine tool builder, is entering the road machinery field with the manufacture and sale of a new grading machine trade-named "Gradall," Charles J. Stilwell, president, has announced.

The machine, which is of a design which permits earth-moving in places not ordinarily accessible to previous types of excavating equipment, was invented by Ray Ferwerda, a Cleveland contractor, and Warner & Swasey is licensed to build the machine under his patents. Hydraulically operated, the machine has an expandable 24-foot boom of arc welded construction.

"Five of these machines previously built have for some months been tested out on a variety of work in the Cleveland area," Mr. Stilwell said. "Field results have convinced us that this machine will be an excellent item to supplement our regular machine tool business. The machine will, however, not be sold through our regular sales force but will be handled by distributors in the road machinery field. Production in our plant is just now getting under way, and the machine is not expected to be ready for market until mid-1946."

$100 Million Expansion Planned by Harvester Co.

A $100 million expansion program for International Harvester Co., Chicago, was announced by Fowler McCormick, president, in his annual message to employees. Part of this program has already been completed with the purchase for $13,750,000 of the government-owned Buick plant at Melrose Park, Ill., and the acquisition of the former Republic Aviation Corp. plant near Evansville, Ind., for $5,648,000. Another phase of the program is the recently-announced factory in construction for the production of small agricultural tractors at Wood River, Ill.

MEN of industry

H. M. HECKATHORN

OSCAR R. OLSON

G. W. BIRDSALL

Harry M. Heckathorn has been appointed executive vice president, Mullins Mfg. Corp., Warren, O., and **Frank M. Beauregard** as operating manager of the company's plants in Warren and Salem, O. Mr. Beauregard formerly was works manager for Willys-Overland Co., Toledo, and Mr. Heckathorn since 1938 had been operating vice president for the Mullins company.

—o—

Oscar R. Olson has organized the Olson Engineering Co., Fulton Bldg., Pittsburgh, to serve as furnace engineers and contractors. Mr. Olson formerly was president, Pennsylvania Industrial Engineers, which he founded in 1928, and he also headed Amsler-Morton Co., at the time the two companies became divisions of Union Industries Inc., in 1944.

—o—

G. W. Birdsall has been appointed manager, editorial department, Reynolds Metals Co., Louisville, Ky. Mr. Birdsall, previously associate editor, STEEL, is well known in industry for his technical articles pertaining to the metalworking industry. Prior to joining STEEL, he was associated with *Industry and Welding*, the Electrical League of Cleveland and the Ideal Electric & Mfg. Co., Mansfield, O.

—o—

J. Harvey Bryan Jr. has become associated with his father in the J. Harvey Bryan Co., 50 Church St., New York, manufacturers' representative. Mr. Bryan Jr. was graduated from Lehigh University in 1941 and recently was released from the Army.

—o—

Amos Bowman, vice president, Luria Bros. & Co. Inc., Philadelphia, has been appointed manager of the company's Pittsburgh office, succeeding the late **Joseph E. Jacobson. Mervin Luria** has been released from the armed service and has become associated with Luria Bros. & Co. Inc., and will be located at the company's Detroit office.

—o—

A. C. Castle, vice chairman, A. M. Castle & Co., Chicago, resigned from active duty effective Jan. 2. He will remain as a director of the company.

—o—

William J. Cornelius has been appointed manager of the specialties department, A. B. Murray Co. Inc., Elizabeth, N. J. Mr. Cornelius formerly was chief, Carbon Tube and Aircraft Tube Sections, Steel Division, WPB, Washington.

—o—

John S. Chafee, for nearly 3 years with the WPB, Washington, and serving during most of that time as director, Tools Division, is joining Saco-Lowell Shops, Boston, as vice president.

—o—

N. D. Devlin is chairman; **C. R. Vincent Jr.**, president and general manager; **P. T. Wharton**, vice president, and **Haldeman Finnie**, secretary-treasurer are the officers of Stainless Products Inc., Elizabeth, N. J., a wholly-owned subsidiary of Rotary Electric Steel Co., Detroit.

—o—

Hugh Littell, formerly manager of the New York branch office, James Flett Organization, Chicago, has been promoted to supervisor, Agency Contract Sales Division. **Ira Miller**, who was Mr. Littell's assistant, becomes manager of the New York branch office.

—o—

Sterling T. Boyd has been appointed plant metallurgist, Colonial Steel Division, Monaca, Pa., Vanadium-Alloys Steel Co. Mr. Boyd previously was chief inspector.

—o—

J. R. Strohm, who served during the war as chief metallurgist, Forge Division, Dodge Chicago plant, has accepted the position of Chicago district manager, Copperweld Steel Co., Glassport, Pa.

—o—

Albert L. Hartley is vice president, Federated Fabricators Inc., Cincinnati, rather than Federal Fabricators Inc., as incorrectly reported in the Jan. 21 issue of STEEL, p. 72.

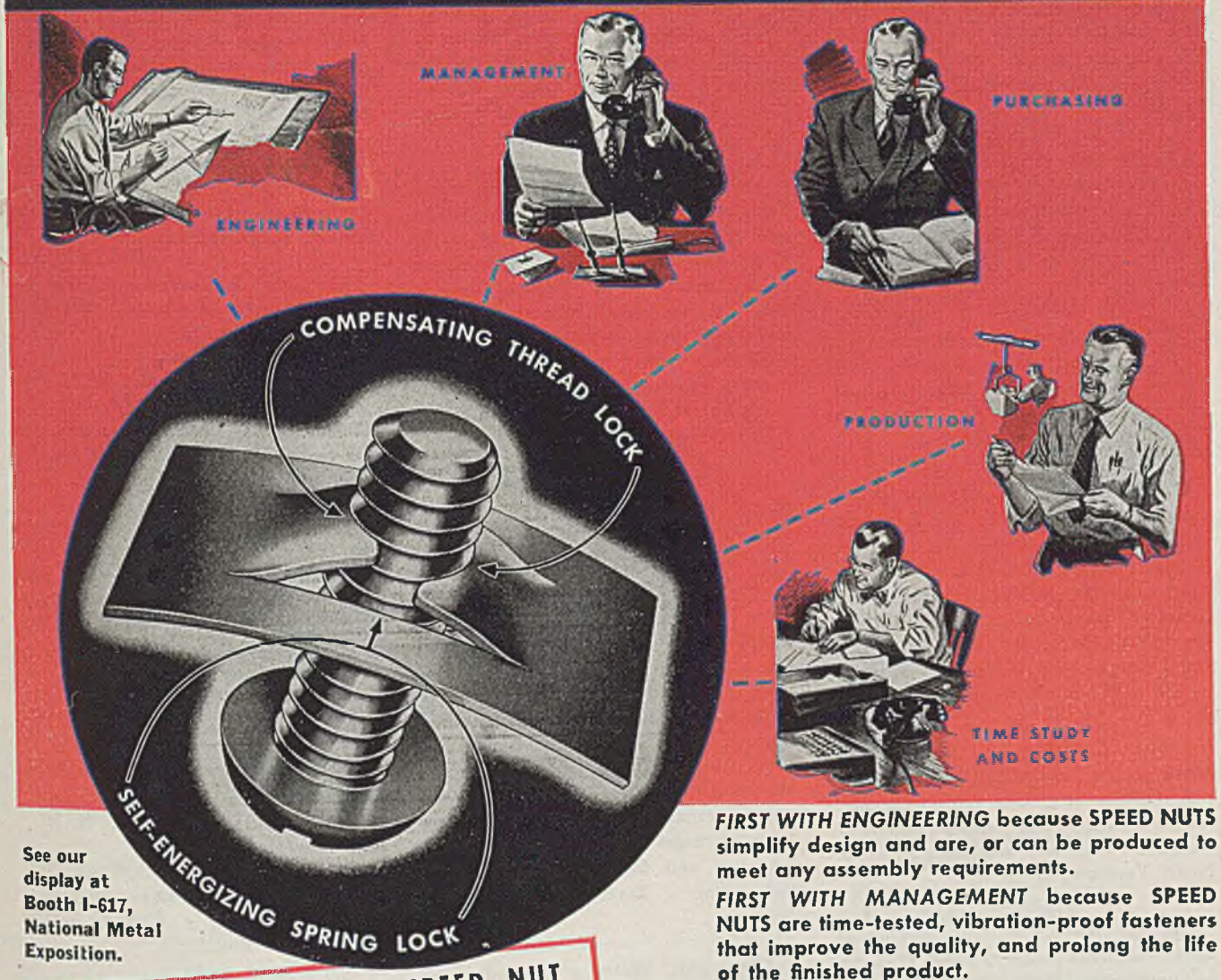
—o—

Maj. C. W. Henkle has resumed his position as vice president, Mercury Mfg. Co., Chicago, following 3½ years with the Army Air Forces.

—o—

Paul F. Pardonner is being transferred from the Philadelphia to the Detroit office, American Rolling Mill Co., effective Feb. 1. He will be succeeded as a member of the Philadelphia sales staff by **James G. McKillen**, until recently a commissioned officer in the Navy, and prior to that with the Buffalo office of the company. **W. O. Robertson**, manager of railroad sales, Philadelphia area, Armco Drainage & Metal Products Inc., is being transferred to Baltimore with similar responsibilities. **C. H. Anderson**, superintendent in Philadelphia, Construction Division, is being transferred to Cleveland as manager of railroad sales, Central Division. **O. W. Wells** is soon to become

Why Speed Nuts are *First* with all Five



See our display at Booth I-617, National Metal Exposition.

NOTHING LOCKS LIKE A SPEED NUT

TWO distinct forces are exerted on the screw, as a SPEED NUT is tightened.
First, a compensating thread lock, as the two arched prongs move inward to lock against the root of the screw thread. These free-acting prongs compensate for screw thread tolerance variations.
Second, a self-energizing spring lock, created by the compression of the arch in both the prongs and base. The combined forces of the thread lock and spring lock definitely prevent vibration loosening.

FIRST WITH ENGINEERING because SPEED NUTS simplify design and are, or can be produced to meet any assembly requirements.

FIRST WITH MANAGEMENT because SPEED NUTS are time-tested, vibration-proof fasteners that improve the quality, and prolong the life of the finished product.

FIRST WITH PURCHASING because SPEED NUTS lower inventory costs, reduce stocking problems, and are DELIVERED on time. Production and service facilities are unlimited.

FIRST WITH PRODUCTION because SPEED NUTS eliminate extra handling of parts, are applied faster and easier, and compensate for a wider range of tolerances.

FIRST WITH TIME STUDY AND COST because SPEED NUTS slash total net assembly costs to a fraction of other assembly methods.

Investigation will show that SPEED NUTS should be YOUR first choice, too. Write today.

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In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In France: Aerocessoires Simmonds, S. A., Paris
In England: Simmonds Aerocessories, Ltd., London
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

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*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS...OVER 3000 SHAPES AND SIZ

affiliated with the Philadelphia office, Armco Drainage & Metal Products Inc.

—o—

James S. Duncan, chairman of the board, Massey-Harris Co., Racine, Wis., and president, Massey-Harris Co. Ltd., Toronto, Ont., Canada, has been elected a director, International Nickel Co. of Canada Ltd.

—o—

Thomas Toby has been named eastern manager of sales with offices in Philadelphia for the Pittsburgh Screw & Bolt Corp., Pittsburgh. **Robert M. Smith** becomes district sales manager in New York.

—o—

M. R. Underwood, formerly with Aviation Corp., has become associated with Pioneer Engineering & Mfg. Co., and Pioneer Pump & Mfg. Co., Detroit, as their director of purchases.

—o—

O. P. Adams becomes director of development, National Tube Co., Pittsburgh, formerly serving as assistant general superintendent of the company's National works, McKeesport, Pa. **T. H. Kennedy** has been appointed assistant general superintendent, National works, and **J. Jay Dunn** has retired as assistant to the vice president, operations.

—o—

George E. Miller has been named assistant sales manager, Machine Division, Osborn Mfg. Co., Cleveland. Mr. Miller formerly was vice president in charge of sales and engineering, Smith Power Transmission Co.

—o—

Cal R. Wood, assistant purchasing agent since 1937 succeeds **Ralph D. Lane** as purchasing agent, Aetna Standard Engineering Co., Youngstown.

—o—

J. B. Kintner has resigned as vice president, Union Steel Castings Division, Blaw-Knox Co., Pittsburgh, to establish the J. B. Kintner Co., Union Trust Bldg., Pittsburgh, operating as a manufacturers' agency.

—o—

C. B. Callomon, formerly chief metallurgist, Western Gear Works, has become associated with Metal Control Laboratories, Los Angeles, as general manager and chief metallurgist.

—o—

Arthur D. Beers, formerly assistant superintendent, succeeds **J. C. Wilkins** who is retiring as superintendent of the Gary, Ind., steelworks, Carnegie-Illinois Steel Corp. **David L. Simpson**, formerly assistant chief metallurgist of the plant, has been made superintendent of two merchant mills succeeding **William Lange**, resigned. **Lester R. Pearson** succeeds **Robert S. McCleery**, retired, as roll shop superintendent.

—o—

A. P. Craig is retiring as manager, X-Ray Division, Baltimore, Westinghouse Electric Corp., to become assistant to the president, Canadian Westinghouse Co. Ltd., Hamilton, Ont.

—o—

Foster M. Gruber has been named administrative assistant to the president, Ellinwood Industries, Los Angeles. **Orrin Broberg** has been appointed chief engineer, Marine Equipment Division; **Colin Chambers**, sales manager, furnace brazing and heat treating; **D. W. Morgeson**, superintendent, Farm Equipment Division; **Palmer Wentworth**, personnel manager; and **John H. Williams**, project engineer, Farm Equipment Division.

—o—

George W. Veale, a vice president, Eaton Mfg. Co., Cleveland, has been appointed general manager of its Axle Division. Mr. Veale has been associated with the company since 1920 serving as production manager of its axle plant and later as general manager, Bumper Division.

—o—

G. A. Huggins, formerly chief of tooling for all Douglas Aircraft Co. plants and later plant manager of the company's Long Beach, Calif., factory, succeeds **H. E. Guerin** as manager of the Santa Monica, Calif., plant.

—o—

Bruce A. Irwin has been appointed sales manager, Hammel-Dahl Co., Providence, R. I., manufacturer of automatic control equipment.

—o—

Dr. James R. Downing has been appointed director of research, Cook Electric Co., Chicago.

—o—

Ray Morrissey, associated for 29 years with Cincinnati Milling Machine Co., Cincinnati, has become connected with the Cross Co., Detroit, machine tool distributors, as vice president, sales.

—o—

Brooks Oil Co., Cleveland, announces the following changes in its personnel: **W. Morrison** has been appointed sales manager; **Thomas M. Stonerod**, Pittsburgh district manager; **Joseph A. Rigby**, chief engineer.

—o—

Gervase E. Magrum, research manager, Houde Engineering Division, Buffalo, Houdaille-Hershey Corp., has resigned to become vice president in charge of engineering and manufacturing, Mundet Cork Corp., Hillside, N. J.

—o—

Robert E. Dillon, president and general manager, Lake Erie Engineering Corp., has been elected a director, Sterling Engine Co., Buffalo.

—o—

David B. Smith, director of the Research Division since 1941, Philco Corp., Philadelphia, has been appointed vice president in charge of engineering.

—o—

J. W. Brauns has been appointed manager, Industrial Haulage Division, General Electric Co., Schenectady, N. Y. He succeeds **F. H. Craton** who is now assistant manager of the Transportation Divisions.

—o—

H. B. Axtell and **V. A. Chern**, with offices in New York, will represent the Progressive Welder Co., Detroit, in the eastern district.

—o—

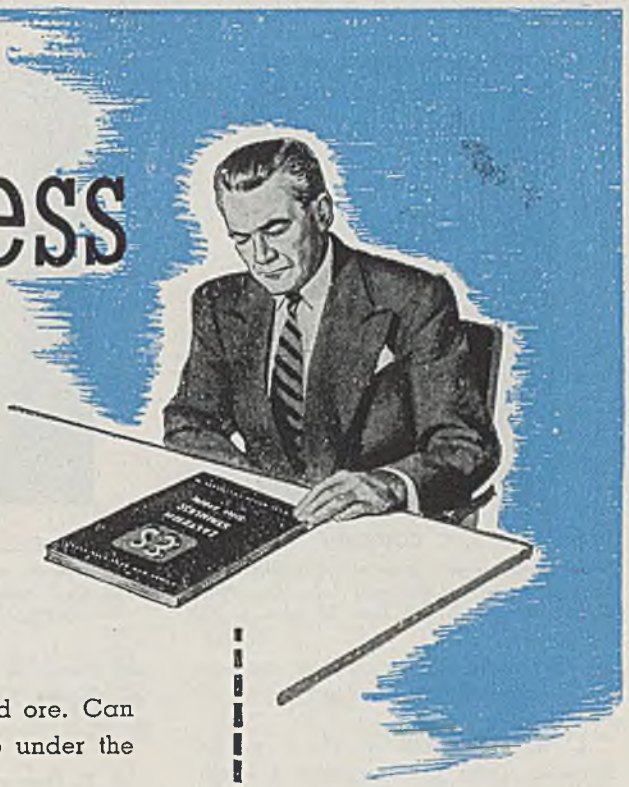
L. M. Weaver has been named sales manager in charge of Celfor Drill & Cutting Tool Division, Clark Equipment Co., Buchanan, Mich.

—o—

J. R. Ferguson has been named director of automotive engineering, Packard Motor Car Co., Detroit. During the war,

GEORGE W. VEALE

which Stainless *shall I use?*



MINE CARS?

Our mine cars handle a moist abrasive acid ore. Can we get a Stainless Steel that will stand up under the abrasion, and also resist the acid corrosion?

HEAT TREATING EQUIPMENT?

Our heat treating furnaces operate up to 1,500° F. Can we replace the hoods with Stainless? If so, which grade do you suggest?

CHEMICALS?

We are thinking of using Stainless Steel sheets for the lining of our dye vats. What grade and finish of Stainless Steel would you recommend?

MARINE HARDWARE?

Please send us your recommendation for the best grade of Stainless Steel for use in marine hardware, including rudders and fins.

Such questions on Stainless Steel selection are typical of questions which Eastern Stainless representatives answer every day. Eastern Stainless offers *all* the stainless grades you need for specialized applications of stainless steel sheet and plate. Consult Eastern on your selection problem.

Many of the answers are in the 96-page "Eastern Stainless Steel Sheet" handbook which, because of the great demand for copies, is now in its second printing. Write for your copy on your company letterhead.

JMLCO. E-81

ask Eastern for the answer when Stainless is the question

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STEEL CORPORATION
BALTIMORE 3, MARYLAND • Distributors' stock available in most areas
CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA

B. C. COLCORD

Newly appointed general superintendent, Lorain, O., works, National Tube Co., Pittsburgh, noted in STEEL, Jan. 21 issue, p. 74.

F. T. H. YOUNGMAN

Who recently was elected president, Jessop Steel Co., Washington, Pa., and noted in STEEL, Jan. 7 issue, p. 426.

RUSSELL HUNT

Who is retiring as vice president in charge of sales, Sloss-Sheffield Steel & Iron Co., Birmingham, noted in STEEL, Jan. 21 issue, p. 74.

Mr. Ferguson was production engineer of the company's Aircraft Division.

—o—

A. K. Steigerwalt has been named manager, Parts & Accessories Division at Willow Run, Mich., for the Kaiser-Frazer Corp. and Graham-Paige Motors Corp.

—o—

Richard L. Kopp, with the Sales Division, Sawhill Mfg. Co., Sharon, Pa., since 1943, has been named assistant manager of that division.

—o—

E. W. Bauman has been appointed executive secretary, Toncan Culvert Manufacturers Association, Cleveland.

—o—

L. L. Lessig, after more than 3 years as a lieutenant colonel with the Army Engineers, has returned to Bethlehem Steel Co., Bethlehem, Pa., as contracting engineer in Philadelphia. During his tour of service, Mr. Lessig served in India and Burma as well as executive officer and deputy district engineer, U. S. Engineer District, Philadelphia.

—o—

R. B. Heppenstall, president, Heppenstall Co., Pittsburgh, has been elected president, Forging Manufacturers Association Inc., New York. Other officers elected at the organization's recent annual meeting are: **George L. Street Jr.**, president, J. R. Johnson & Co., Richmond, Va., first vice president; **Alex Lumsden**, vice president, Ajax Steel & Forge Co., Detroit, second vice president; and **W. J. Parker**, New York, secretary-treasurer.

—o—

Carl E. Newton has resigned as president, Chesapeake & Ohio Railway Co., Cleveland, to return to the practice of law with the firm of Donovan, Leisure, Newton & Lumbard, New York.

—o—

Irving F. Wagner, manager, Kellogg plant, Rochester, N. Y., American Brake Shoe Co., has been made a vice president of the Kellogg Division.

—o—

Perfex Corp., Milwaukee, has announced appointment of **L. B. Miller** and **Allen Butler** as vice presidents, Controls Division, and **I. G. Bohrman**, vice president in charge of the Radiator Division.

—o—

New officers elected by the Electric Industrial Truck Association at its recent meeting in New York are: President, **Gordon J. Berry**, vice president, Electric Products Co., Cleveland; vice president, **F. J. Shepard Jr.**, treasurer, Lewis-Shepard Sales Co., Boston.

—o—

E. H. Hoerres has been named resident manager of sales at Milwaukee, Jones & Laughlin Steel Corp., Pittsburgh. He succeeds **Milton G. Englert** who has been transferred to the steel company's district sales office in New York.

OBITUARIES...

Merle N. Smith, 68, who retired in 1943 as general manager of the sales department's order division, Carnegie-Illinois Steel Corp., Pittsburgh, after serving that company and its predecessors for 48 years, died Jan. 18 at his home in Ben Avon, Pa.

—o—

Joseph P. Eastman, 69, founder of the Eastman Mfg. Co., Manitowoc, Wis., died recently in that city.

—o—

Roy E. Law, for the past several years salesman for the Lakeside Bridge & Steel Co., Milwaukee, died Jan. 18.

—o—

Wheeler N. Voorhees, 76, who served for 32 years as construction engineer at the New York office, General Electric Co., died recently in Brooklyn, N. Y. Mr. Voorhees retired in 1932.

—o—

Charles H. Sanderson, 94, one of the founders of the Enos & Sanderson Co., Buffalo, iron and steel foundry, died recently in Deland, Fla.

—o—

Joseph L. Thistlethwaite, 74, cofounder and treasurer, Ontario Drill Co., East Rochester, N. Y., farm implement manufacturers, died Jan. 16.

—o—

Charles P. Rice, 77, president and treasurer, York Corrugating Co., York, Pa., died recently in that city.

—o—

Walter D. Heist, who resigned last fall as purchasing agent, Alan Wood Steel Co., Conshohocken, Pa., died at his home in Green Valley, Pa., Jan. 15.

—o—

Louis C. Ducro, 81, retired head of the Ducro Engine Co., Buffalo, died recently in that city.

—o—

William Hill, 86, for many years president of the Hill Mfg. Co., Buffalo, died recently at his home in that city.

—o—

S. M. Heller, 73, until his retirement 2 years ago, secretary-treasurer of the Oilgear Co., Milwaukee, died Jan. 18 in Pasadena, Calif.

—o—

H. V. Putman, 46, vice president, Westinghouse Electric Corp., died Jan. 16 in Cleveland. Mr. Putman supervised development and manufacture of electric torpedoes used by the Navy during the recent war.

Dominion's War Output Totaled $10.5 Billion

Department of Munitions and Supply reports on production accomplishments on eve of dissolution

CANADIAN war production figures have been released as the last step before the dissolution of its Department of Munitions and Supply. During the war this department contracted for all munitions and materiel, and in the all-time peak of production in the last quarter of 1943, the department has announced that production was more than $150 million a month.

In the first quarter of 1946, reductions in the size of the armament program have resulted in cutbacks in production to only $10 million monthly with some development and re-designing work being continued, but the bulk of the expenditures are being used to provide rations for Canada's forces at home and abroad.

Since the outbreak of hostilities, the department has made commitments totaling about $10.5 billion, of which about $1578 million represents the total of war contracts awarded in 1945. This 1945 total shows a drop of 46 per cent from the 1944 figure, while the average quarterly production of last year was about 53 per cent below the 1943 last quarter average.

Production Greatly Accelerated

The war years witnessed a greatly accelerated production and consumption of steel in Canada. In 1939 a total of 1,230,120 tons was produced; in 1944 this had risen to 2,821,097. The 1945 estimate of production was 2,860,000 tons. Consumption figures took a similar upswing with 1,563,391 tons being used in 1939; in 1942, peak consumption year for steel, 4,297,974 tons were used. By 1944, this consumption had fallen off to 3,442,805 tons, and the 1945 estimate for consumption was 3,599,000 tons. Imports accounted for the difference between the production and consumption figures.

During the war period and to the end of 1945, Canadian shipyards produced 349 cargo ships in the 10,000-ton class, 43 cargo ships of smaller tonnage, 2 destroyers, 541 other naval craft, 1662 cargo lighters, 1331 barges and 3783 non-powered smaller craft.

Automotive plants turned out almost 800,000 units of mechanical transport and ran up a total of 50,000 armored vehicles. The output of military aircraft was greater than 16,000 planes. Also produced were more than 1,600,000 machine guns, rifles and other small arms, over 50,000 complete artillery units, and about $591 million worth of radar, signal apparatus, electrical devices and instruments. Of heavy ammunition, 100 million filled rounds and more than 4.6 billion rounds of small arms ammunition were produced.

Steel Co. of Canada Awards Order for 61 Coke Ovens

Steel Co. of Canada Ltd., Hamilton, Ont., has awarded a contract to the Wilputte Coke Oven Corp., New York, for the installation of 61 new Wilputte underjet high-low burner coke ovens. In addition, modernization work on the by-product and benzol plants is to be undertaken. The construction program will result in the ultimate replacement with new Wilputte ovens of the two 40-oven Wilputte batteries which were built in 1918.

Canada Building New Units To Increase Power Output

Construction is progressing on the new Canadian power expansion program which is scheduled to develop 50,000 horsepower and cost $7 million for the first installation. This first project will be followed by four similar ones which are designed to increase power capacity for eastern Ontario. The facilities will be owned by the provincial government.

Caribbean Scrap Offering Extended to Jan. 31

Time limit for submitting bids on 18,270 gross tons of scrap iron and steel stockpiled by the United States Commercial Co., a Reconstruction Finance Corp. subsidiary, in Caribbean countries, has been extended to Jan. 31, the RFC announced recently. This scrap is located in Guatemala, Honduras, Costa Rica, Nicaragua, Jamaica, and Venezuela. It was recently offered "as is, where is" on a sealed bid basis. All bids should be sent to Ira J. Schuster, U. S. Commercial Co., Room 1434, Temporary "T" Bldg., Washington.

Coal Exports to Europe Fall 2 Million Tons Short

Exports of coal from this country to Europe in December totaled about 1,182,000 tons, according to the Office of War Mobilization and Reconversion. Allocations for January have been set at about 1,500,000 tons. Out of about 8 million tons of coal which this country had expected to export by Jan. 1, only 5,602,200 tons were actually shipped, leaving a deficit of more than 2 million tons. It is expected that this deficit will be made up before the end of the coal year, March 31.

HELICOPTER AIDS PIPELINE CREWS: Army petroleum distribution experts used helicopters in building pipelines through impassable swamps during secret war-time tests. Photo shows how the helicopter delivered 20-foot sections of pipe to construction crews in Louisiana swampland. The craft also carried other equipment to the crews. NEA photo

Interesting Exhibits Planned by Many Companies at Metal Show

Cleveland Exposition Feb. 4-8 will show new and improved models of metalworking equipment for first time. Many machines and processes, involving heat treating, welding, surface treatment, inspection, machining, etc., will be in operation

SEVERAL hundred companies are planning exhibits at the National Metal Congress and Exposition beginning Feb. 4, many of which will include machines and processes in actual operation. In addition, many will show new and improved postwar models for the first time.

E. I. du Pont de Nemours & Co. will have in operation an installation of its recently-announced sodium hydride process for descaling metals. It will handle forgings and castings up to 2 lb and sheets, bars and rods up to 10 in.

Cyril Bath & Co. has developed a new line of equipment for forming metal under tension or compression. Interesting examples of parts will be shown, along with a machine in operation.

The Carborundum Co. will show several new types of grinding wheels; its refractory division will operate a typical furnace using super refractories; and the Globar division will show non-metallic electric heating elements for furnaces.

A feature of the American Brass Co.'s display will be a bronze welding demonstration using both electric and oxyacetylene methods. One new rod for gas welding is made of deoxidized copper.

The Drop Forging Association will operate a miniature drop forging hammer to make tokens for visitors. Precision Scientific Co. will exhibit metallurgical specimen mounting equipment, such as presses and polishers.

A spray-type washing machine will be shown by the Alvey-Furguson Co. . . . castings, electrodes, welder parts and safety tools by Ampco Metal Inc. . . . quenching equipment for heat treatment of metals by Bell & Gossett Co. . . . two industrial induction heaters by Budd Wheel Co. . . . a bending press in operation by Cleveland Crane & Engineering Co.

Brush Development Co. will show a new hypersonic flaw detector . . .Carboloy Co. cemented carbide tools in use . . . Detroit Surfacing Machine Co. a reciprocating electric sander . . . Denison Engineering Co. 4, 6 and 8-ton hydraulic presses . . . Gray-Mills Co. gear and centrifugal pumps . . . Ohio Crankshaft Co. a 50-kw induction unit heating bars for forging. . . Ohio Steel Foundry Co. heat and corrosion resistant castings.

Lindberg Engineering Co. will operate heat treating and brazing furnaces . . . Republic Drill & Tool Co. drill presses using Jet drills . . . Ohio Seamless Tube Co. miniature tube piercing mill . . . Olson Testing Machine Co. 20,000 lb electro-mechanical testing machine . . . North American Mfg. Co. interchangeable gas and oil burner systems. . . Motch & Merryweather Machinery Co. cold sawing machines . . . Wendt-Sonis Co. carbide-tipped cutting tools . . . Selas Corp. combustion equipment.

Rustless Iron & Steel Corp. will show in operation its electropolishing process for stainless steel . . . Joseph T. Ryerson & Son Inc. a machining operation demonstrating clean cut plates . . . Webster Products Co. a bench model honing machine . . . Upton Electric Furnace Division a salt bath furnace with sealed-in electrodes . . . Standard Oil Co. of Ohio a surface grinding machine demonstrating grinding oil . . . Steel Parts Mfg. Co. an all-steel conveyor . . . Nelson Speciality Welding Equipment Corp. stud welders.

Testing Machines Included

Other exhibits include testing machines by W. C. Dillon & Co. Inc. . . . a metal disintegrator by Clinton Machine & Foundry Co. . . . testing equipment by Harry W. Dietert Co. . . . copper alloys by Bridgeport Brass Co. . . . abrasive products by Norton Co. . . . rare metals by Metal Hydrides Inc. . . . applications for castings by Malleable Founders' Society . . . a conveyor-type washing machine by N. Ransohoff Inc. . . . new applications of copper and copper alloys in industry by Revere Copper & Brass Inc.

New Jersey Zinc Co. will show as-cast and finished zinc alloy die castings . . . Torrington Mfg. Co. a new spring grinder . . . Tide Water Associated Oil Co. industrial lubricants. . . . Vanadium-Alloys Steel Co. various grades and forms of tool steels . . . Sperry Products Inc. a supersonic reflectoscope . . . Texas Co. petroleum products . . . Sutton Engineering Co. a 7-roll guidless tube and bar straightening machine . . . John A. Roebling's Sons Co. wire and wire product and strip . . . Sentry Co. a high-speed hardening machine . . . Parker-Kalon Corp. a new size-marked gear grip socket head cap screw. . . A. F. Holden Co. heat treating and brazing unit with 2 gas-fired and one electric furnace enclosed in one shell.

Recent Patents

Blast Furnace Charging Bell: G. Wehr, Steubenville, O., No. 2,388,941, Nov. 13, 1945.

In a blast furnace, a charging chamber having a small bell in the top for charging the chamber and a large bell in the bottom for discharging stock into the furnace, a vent for the chamber communicating with the atmosphere to maintain at all times the atmospheric pressure between the bells when both are in their closed position. A valve moves coordinately with the movement of the discharge bell to close the vent when the bell is in an open position and to open the vent when the bell is in closed position.

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Strand Engaging Drum: D. D. Symmes, West Haven, Conn., assignor to American Steel & Wire Co., No. 2,389,878, Nov. 27, 1945.

A capstan drum for shaped, flexible strand is characterized by having multiple, circumferential grooves in its periphery with a portion of these grooves at its high-tension end shaped to fit the strand. The drum supports the strand against deformation due to its pressure against the sides of these grooves and a portion of these grooves at its low-tension end. The result is that the strand wedges therein to obtain enhanced frictional engagement with these sides.

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Method of Producing High-Tensile Strength Deep-Drawing Steel: J. W. Kinnear, Jr., Pittsburgh, No. 2,389,516, Nov. 20, 1945.

A method of casting steel, characterized by casting effervescing steel into an ingot mold, allowing the steel to effervesce until a solidified skin forms, casting steel of a different chemical composition into the ingot mold while the central portion of the effervescing steel is molten to displace the central portion by the second named steel and allowing the latter to solidify and integrally join with the skin, the second named steel being a higher tensile strength than the effervescing steel by containing a suitable amount of a strengthening element.

Metal Show Scheduled for Atlantic City in November

The 1946 annual meeting of the American Welding Society will be held in Atlantic City in connection with the National Metal Congress and Exposition during the week of Nov. 4.

Checking surface finish

Instrument measures surface wear proportional to percentage of interrupted area lying in same plane

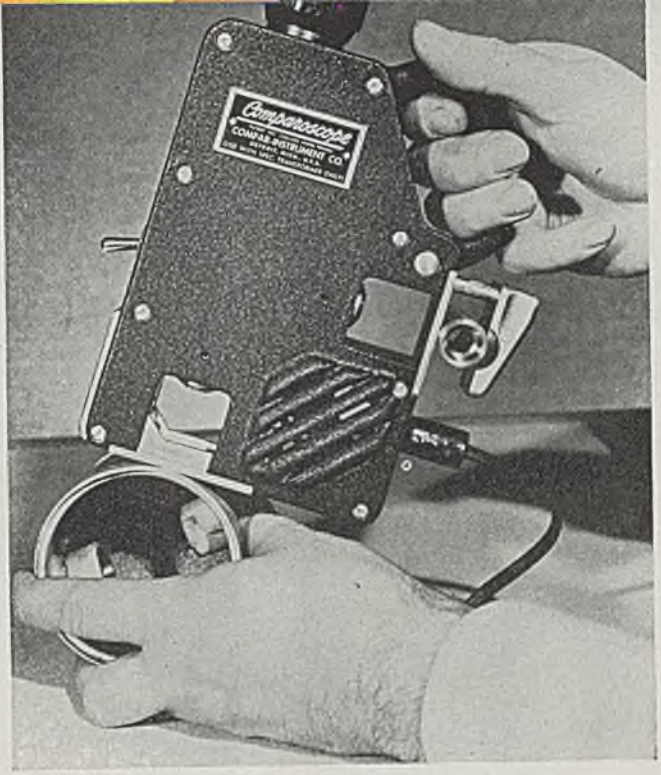

Fig. 1

DESIGNATION and measurement of surface finish is of increasing importance to industry in order to meet demands for finer tolerances and greater resistance to wear. A new instrument for checking and controlling surface finish, the Comparoscope, made by Compar Instrument Co., Detroit, checks surfaces by a simple optical method which instantly provides desired information. It measures surface wear proportional to percentage of interrupted area lying in same plane (instead of only the number of interruptions per unit area or depth of interruptions).

Basic principle of unit is based on the fact that a light beam thrown at a given angle upon a perfect surface, such as a mirror, will be reflected from this surface at the same angle. If an observer were standing in a normal position to such a perfect surface, no light would reach his eye and the surface, therefore, would appear to be black. If a surface has numerous interruptions, such as those caused by various finishing methods, these interruptions will form minute prismatic surfaces, throwing light back into the observer's eye. Therefore, the more numerous and wider these surface interruptions are, the brighter such surface will appear to the eye of the observer inspecting through the instrument.

This instrument is principally a dual microscope in which an accepted standard or master of any shape is clamped onto the master-stage of the instrument. This master may have been determined as having the desirable finish by any method deemed suitable, or even by actual wear tests. The instrument may be placed on the surface to be examined, as shown in Fig. 1, and its built-in illumination turned on. In the eye-piece appear, side by side, the image of the master and that of the test piece. As the same source of illumination, a condensed filament 6-v lamp, is used at an equal distance from both specimens, illumination of both images is identical. This provides a standard condition for both pieces. Photographs taken with the instrument show clearly the indisputable difference between two surfaces as low as 1 RMS.

The instrument possesses discernment of a kind that

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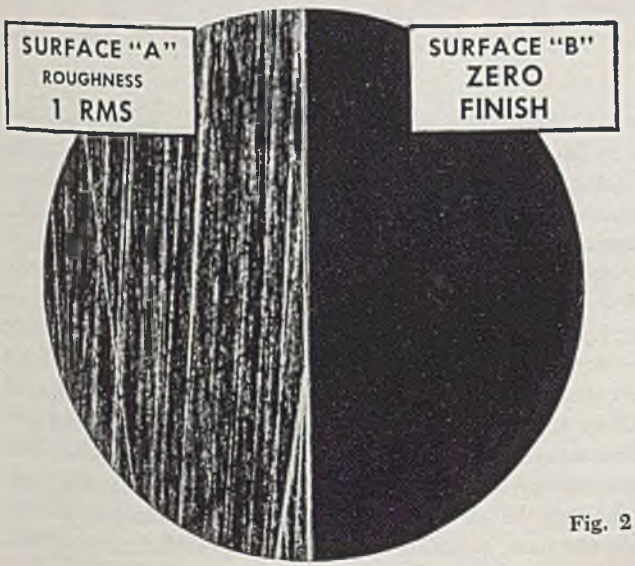


Fig. 2

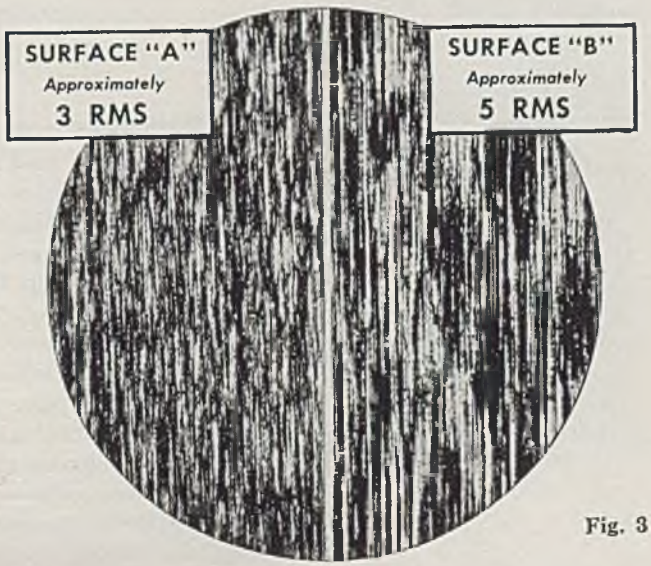
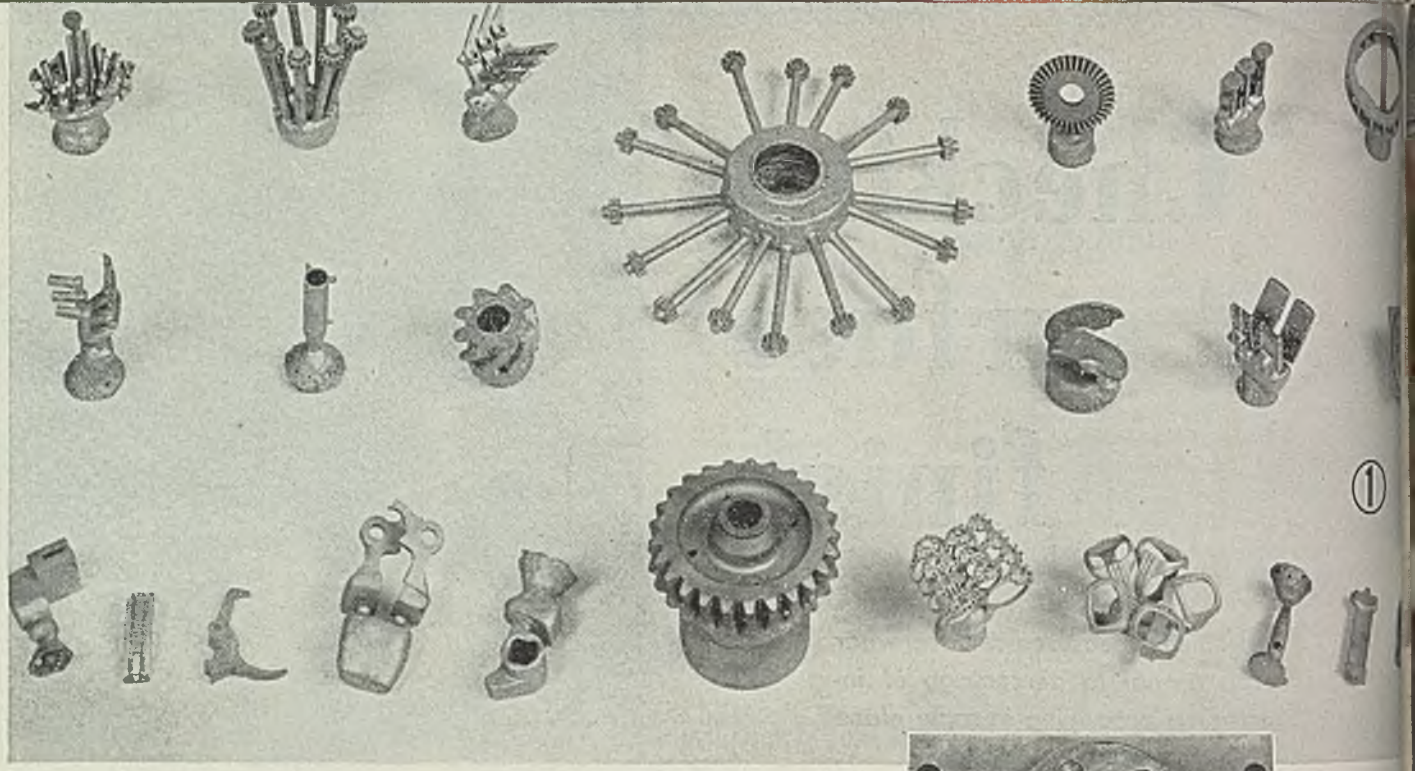
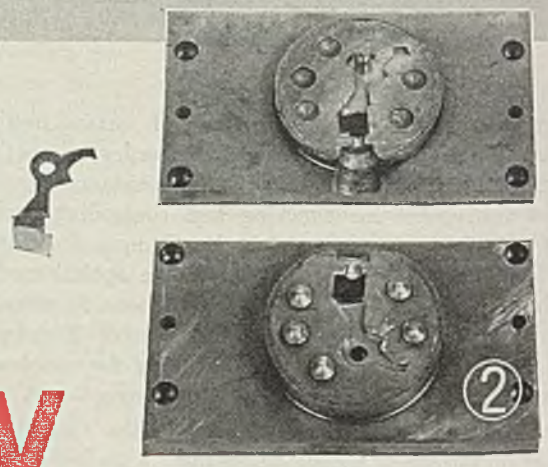


Fig. 3



More than a million precision-made parts were produced in 6 months by Kerr Dental Mfg. Co. on machines representing a new approach to the "lost wax" technique



PRECISION CASTING PRACTICE

PRECISION casting by the "lost wax" process, originally used for casting works of art, and later for gold inlays in dentistry, today is finding increasing use in industry as a fast, simple and low-cost method of producing a variety of accurate and dense castings. Complicated parts requiring several different machining operations, or parts that for some reason cannot be machined, are equally suited to the process. Intricate parts which usually require the services of a skilled craftsman often are duplicated easily by the lost wax technique. A few of the many types of castings that can be produced by this method are shown in Fig. 1.

More than a million castings for Army equipment were produced in 6 months at Kerr Dental Mfg. Co., Detroit, according to Harry B. Lange of that company. Special equipment designed and built by Kerr, incorporating unique features which speed production and afford a superior finished product, was used on the production line. For example, company's centrifugal casting machine utilizes as a casting crucible, the same crucible that is employed for melting the metal. This permits the metal to pass directly from the melting crucible into the flask, avoiding the dangers of oxidation or chilling

Fig. 1—A few of the many types of castings that can be produced by the lost wax process

Fig. 2—Master model of casting, mold for forming wax pattern and the wax pattern itself

Fig. 3—Battery of six wax injection units, hydraulically powered and completely automatic in operation

Fig. 4—Wax patterns mounted on sprue base ready for investing, and flask lined with asbestos to cushion lateral movement of investment

that are present when molten metal is poured through the air from ordinary casting crucibles.

Molds: Typical mold for forming a wax pattern is shown at center in Fig. 2. Master model is at left, wax pattern at right. Molds may be machined from either hard steel or brass, or they can be of soft metal hobbed directly from the master part. For extensive production, the machined mold usually is employed. The hobbed mold generally is preferred for short limited runs of an individual casting and for test casting. The hobbed mold will distort under continuous use, limiting the amount of pressure that can be applied on the wax for injection into the mold. It is most useful for determining amount of shrinkage that may be encountered in casting, together with its cumulative effect on the finished part, before making the machined mold. Its cost is considerably less than that of a steel or brass mold, making feasible test runs with large, bulky or irregularly shaped castings to determine how closely tolerances of the finished casting can be held.

Lubrication: Lubrication of the mold, so that formed wax pattern can be removed without damage to its surfaces, is the next step in precision casting. Formulation of the

Fig. 5 — Vacuuming and investing the flask. Six wax patterns are being invested in a flask 2½ in. in diameter and 2½ in. high. Eight to 10 girls can invest from 1500 to 2000 flasks per day

lubricant is important, as it affects the fineness of surface of the wax pattern, as well as freeing the pattern from the mold. Wax adhering to a mold should be dissolved and washed off with acetone, never scraped, as the surface of the mold may be damaged. Too much lubricant, or a lubricant that is viscous and gummy, also may result in a poor surface on wax pattern and eventually on casting.

High temperatures and pressures complicate the problem of proper lubrication. Lubricants which may cause the mold to rust or corrode should be avoided. Detailed research on lubricants by Kerr has resulted in an unusual lubricant called Microfilm. It is said to contain a special wetting agent that makes it easy to apply and affords clean separation under all conditions. Several wax patterns can be produced from one application.

Wax and Wax Characteristics: A wax for precision casting patterns must burn out cleanly from the investment mold, without leaving a residue or ash, and it should have a low thermal expansion. Thermal expansion is important for two reasons: First, because the strain placed upon the investment compound by the wax in the initial stage of burnout is directly related to it, and second, because the thermal expansion of wax is related to shrinkage, thus making a high thermal expansion indicative of a high degree of shrinkage.

One wax obviously cannot meet all conditions encountered in precision casting. For this reason, most waxes for precision casting are a combination of waxes formulated so as to have specific physical characteristics. A high room temperature and consequently high mold temperature, for example, require a rapid-chilling wax. Under reverse conditions, the same wax might be too brittle. Bulk of the wax pattern also is important, as the greater the bulk, the longer the time required for cooling. To meet these and

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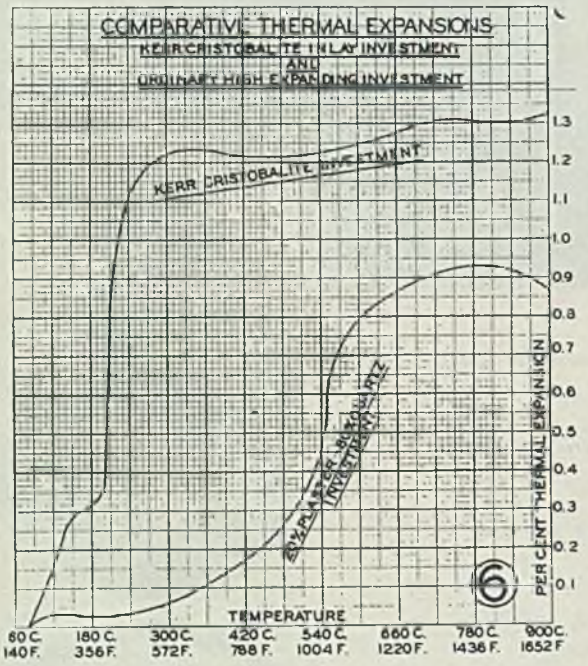

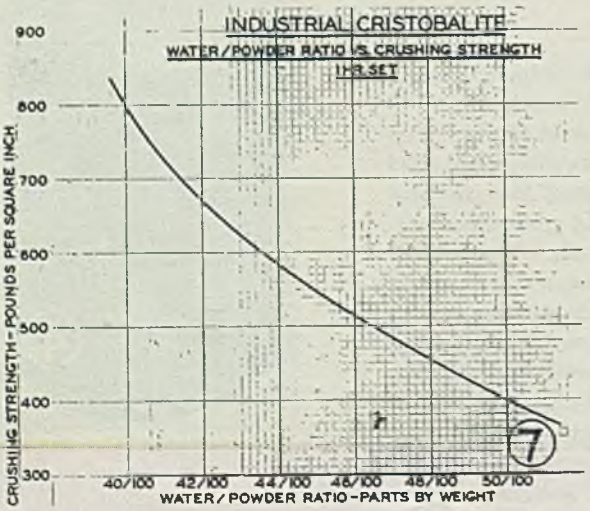

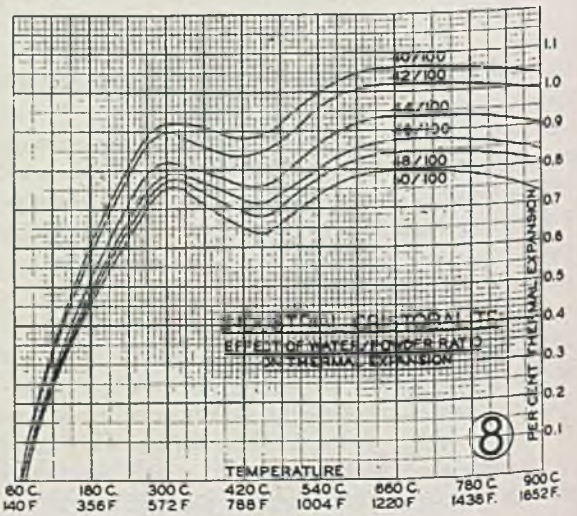

By E. I. LARSEN
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making ELECTRICAL contacts

With Metal Powders

A discussion of factors bearing on adoption of powder metallurgy for fabrication of special property contacts—including selection of type, density, physical properties, thermal conductivity, resistance to erosion and corrosion, and joining medium to be used

ALTHOUGH powder metallurgy has been described as being "as old as the pyramids," it has been only in the last 10 or 15 years that widespread use has been made of this method of fabricating various articles.

One of the first items fabricated by powder metallurgical methods on a commercial scale was electrical contacts, made from metal powders as early as 1920. Powder metallurgy has been used because compositions of most of these materials are such that they could not be made by conventional methods of melting, casting, rolling, drawing, etc.

In general, electrical contacts fabricated from metal powders fall into two classes, both from point of view of method of fabrication and components that make up chemical composition. One class is composed of silver or copper and a refractory metal such as tungsten, molybdenum, or compounds thereof such as carbides. Second class contains a predominant amount of silver and a semi-refractory material such as cadmium oxide, nickel, cobalt, or graphite.

Electrical contacts of the first class have been developed primarily as facing materials for heavy-duty circuit-interrupting devices. This class of material unites the high melting point, high boiling point, great resistance to electrical erosion, and the refractory characteristics of molybdenum, tungsten, or their carbides with the high thermal and electrical conductivities and low contact resistance properties of silver or copper.

The second class of material is used for lighter duty or specialized applications such as heavy-duty, direct-current aircraft relays.

Electrical contacts fabricated from metal powders are made in a wide variety of composition, shapes, and sizes. In general, sizes of electrical contacts fabricated from powders vary from contacts weighing approximately 0.001-oz up to those weighing 3 to 4 lb, the contacting face being as small as 0.001-sq in. up to approximately 6 sq in. in area. The shapes consist of: Round or rectangular buttons, some of which have radii or bevels on contacting faces; rings, cups, rectangular bars, the contact face of which may have a radius across the width and/or at one end; and form-pressed pieces of a wide variety such as angles, both acute and obtuse, irregular shapes comprising a radius blended into a flat, which in turn may have steps.

Size or shape of the contact is dictated principally by the mechanical design of the manufacturer, who in turn may have problems to be met such as: Size, weight, or space limitations; electrical conditions such as blowout coils, arc chutes, baffles, gas passages.

Selection of the grade of contact materials depends upon the application. For example, if the contact is to be used as an arcing tip, absolute resistance to welding or sticking is required. If the material is to be used as a current-carrying contact, and is not required to make or break the circuit, factors such as current-carrying capacity and low contact resistance are indicated. In the majority of cases, however, the contact must combined both of these qualities; that is, the material must be able not only to carry the necessary electrical load but also to interrupt or break the circuit when desired. Only by means of powder metallurgy is it possible, at least at the present time, to produce contacts that combine high electrical load-carrying properties with ability to interrupt the electrical circuit when short-circuit conditions arise.

Manufacture: In nearly all applications the contact is brazed or welded to a copper or copper-alloy backing member.

This operation is important and must be performed with care. Since most metal-powder contacts are somewhat difficult to braze, tinning prior to assembly is recommended. Contact manufacturers prefer to supply parts already tinned. If the contact is thin, overheating must be avoided to prevent the formation of an alloy with the solder and subsequent diffusion of the alloy thus formed into the contact, changing its chemical composition and, as a result, altering its contact characteristics. Any such alteration of the contact is inevitably detrimental to its operating characteristics. Overheating will result also in the oxidation of the refractory constituents.

Excess solder must be removed from areas near the contact face, otherwise arcing during operation may cause local fusion. Presence of silver solder on the operating face must be avoided, of course, since this would radically change the characteristics of the contact material. Thus,

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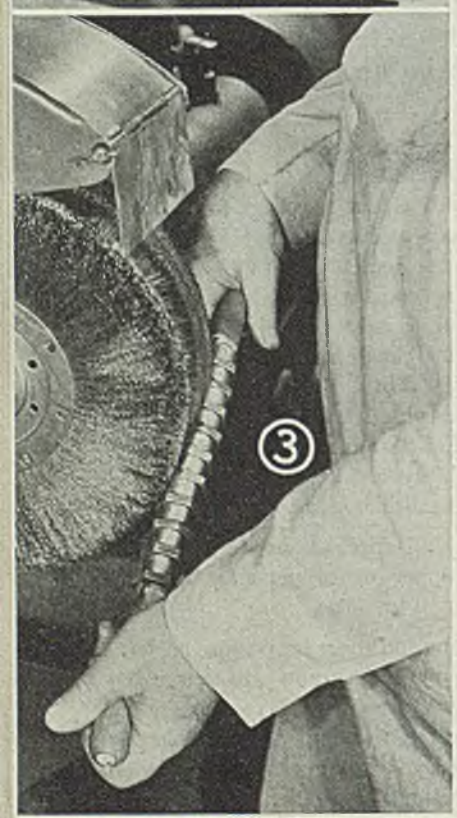

By G. O. ROWLAND
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Power Brushing Fixtures

Special methods used to hold parts at proper angle with sufficient pressure assure satisfactory results in brushing operations

MANY factors must be taken into consideration to obtain maximum benefits from power brushing. None affect production more than methods used to hold parts to brushing tool for right length of time, at correct angle and with proper contact pressure.

It also is important to choose brushes adaptable to a specific purpose. Best results on one metal may be obtained from a wire brush. Another application may require tampico; another may require hair. Proper brush size also is essential, as is running it at its most effective speed.

A typical simple brushing operation is cleaning the inside diameter of a steel thrust plate or ferrule. This is accomplished by attaching a small fine-wire tube brush to a standard drill press, as shown in Fig. 6. This simple holding fixture enables the operator to do a uniformly good job with little effort at a high speed.

Another simple fixture used in removing burr edges from aluminum tubes can be made by mounting an end-type brush of fine wire horizontally in a chuck fitted to an ordinary bench motor, as in Fig. 7. Tube is placed on V-blocks providing accurate alignment. Brush is "bridled" to prevent it from spreading under high speed. By this method, ends of the 0.005-in. wire will contact both outside and inside diameter of tubing.

Forceps holding fixture shown in Fig. 1 may be altered for various requirements by changing forcep points to fit the shape and size of the part being brushed. Three holding heads for various requirements are shown in Fig. 5. Flexibility of this holding device is limited only by resourcefulness of operator, as end attachments can be altered to hold parts stationary or allow them to spin against the brush. In Fig. 1, the operator is brushing a tiny spline part which is allowed to spin. Speed is con-

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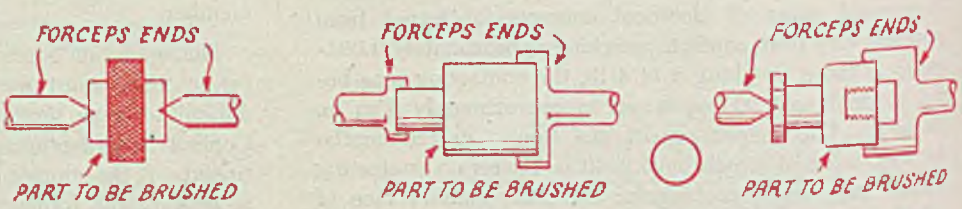

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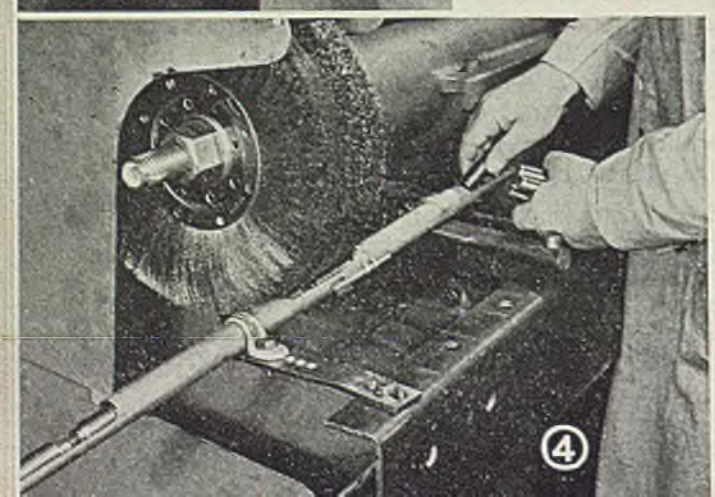

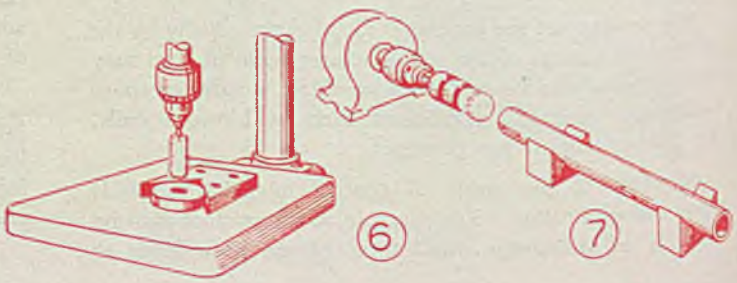

6 7

STANDARDIZATION of color

. . . FINISHES FOR MACHINERY AND EQUIPMENT

Use of four standard grays affords more pleasing appearance, better visibility, and elimination of difficulty in matching colors when replacing parts or repainting equipment. Conclusions follow analysis of possibilities for standardization by Westinghouse and General Electric stylists

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MANUFACTURERS of machinery and other industrial equipment often develop and use new paints of unusual shades in an attempt to satisfy various desires. No guiding rules have been recognized in industry, except possibly the use of "machine tool gray," standardized by the National Machine Tool Builders Association. As a result, hundreds of grays alone are in use, many of which can be considered "bad matches" with each other.

Industry, however, is becoming conscious of the need for better appearances. There is increased demand for two-tone combinations that require proper contrast. Lack of economy, therefore, is noted in the all too frequent need for refinishing assembled equipment to obtain uniformity in appearance. The matching of finishes in part replacement or maintenance painting is a difficult problem. Also, industry is becoming conscious of the psychological effects of color in industry and its importance in respect to health, safety, and performance. These reasons also account for present interest in color.

Grays have long been the usual finish for industrial products. Perhaps the selection of gray was first made on the basis of its impartial sobriety, considered fitting to the old idea of work. In any event, industry today is parent to thousands of different grays, the variations consisting of minor differences of value or hue in many cases, but still different.

(The terms *hue*, *value*, and *chroma* refer to terms that appeared in the American War Standard Specification

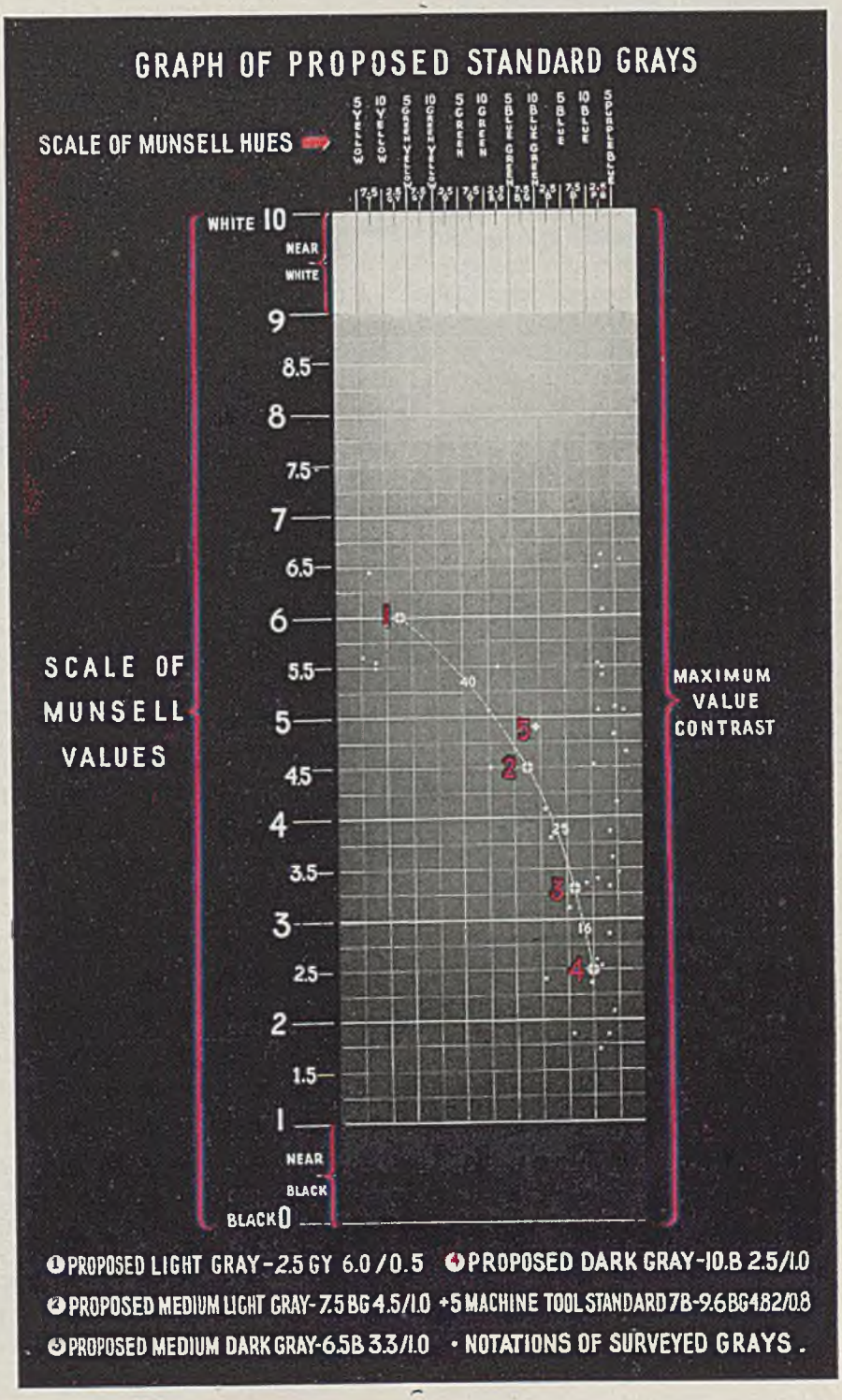


Fig. 1—Graph of proposed standard grays. Data and illustrations courtesy of "Industrial Standardization" and Munsell Co.

and Description of Color, Z-44-1942[1]. The three-dimensional Munsell system is comprehensive and well adapted as a working standard for industrial use. It possesses the advantages of decimal notation suitable to the use of instruments. The spectrophotometer is the only instrument know to date which is capable of reading color in terms of scientific constants uncompromised by weakness of the eye or lighting. Refer to Fig. 2 and definitions of Munsell terms at end of article).

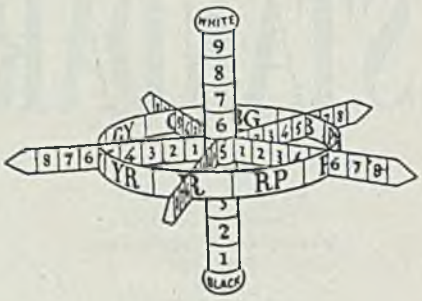


Fig. 2—Diagram showing hue, value, and chroma in their relation to one another. The circular band represents hues in their proper sequence. Upright center axis is the scale of value. Paths pointing outward from the center show steps of chroma increasing in strength as indicated by numerals

Together with the decision to attempt order in this field of grays came recognition of the need to define the field. The term *gray* has been much too loosely used, applying to anything between black and white with little color. It may be defined as purely neutral combinations of black and white, devoid of any color. But for industrial use this definition is found to be very inadequate; it leaves out the vast majority of border-line grays that are neither neutral nor definite in hue. Actually, there are as many such families of so-called gray as there are hues in the spectrum. A survey by one company showed that only 3 per cent of the paints called gray were within the above definition.

There are other disadvantages to adopting the definition of grays as purely neutrals, although it first seemed that the problem would be greatly simplified if this could be done.

In carrying out the investigations, five spaced neutral grays, from dark to light, N2., N3., N4.5, N6., N7.5 were selected, and these Munsell notations specified for matching by five paint suppliers; the best results showed an average per cent of visible error of 77. This is largely due to the technical difficulties in formulating pure neutrals. The so-called pure black and white pigments when mixed produce grays having the appearance of intermediate hues of slight degree. They cannot be considered neutral. The tendency is toward a bluish or purplish cast. To correct this, small amounts of color pigments must be added. Furthermore, the average person finds little satisfaction in the drab, colorless neutrals. As stated, a strong tendency toward the use of more definite color industrially is to be expected, and even in the field of grays this tendency can be turned to advantage in popular preference.

For these reasons it was deemed advisable to discard the definition of grays as neutrals and seek a broader one adapted to practice and manufacturing limitations. Extensive surveys within the two companies showed that approximately 84 per cent of their "grays" had a chroma, or color content, of 1.5 or less under the Munsell System of notation. (See Fig. 2) Each company therefore has adopted the tentative working definition of grays as applying to "neutral shades" or "hues" not exceeding 1.5 in chroma. Thus a distinct line is drawn between our present field of endeavor and *black, white,* or *color*. The industrial use of color is in no way retarded; instead, such a standard for grays will make its foundation secure.

Analysis: With grays defined, the next step was to determine the optimum number of grays needed for general-purpose industrial requirements. At this point the field narrowed to consideration of external finishes only. Apart from the wish to minimize the number of reasons of economy, it is obvious that the more shades admitted, the closer will be the approach to "bad matches." The fewer grays there are on standard stock products, the more practical it will be to plan definite and acceptable contrasts. For, in the last analysis, there is little likelihood of controlling the number or source of stock products that might come together under one roof.

In an analysis of past usage, both companies noticed that approximately four shades or "values" of gray between, but not including, black and white would meet general-purpose requirements. The lighter grays were found to be preferred on smaller equipment, and progressively darker shades for larger and heavier apparatus.

Next, it was found that the color content, or hue of a gray may vary all the way from yellow to purple-blue. Cool blue and purple-blue predominate, particularly in the darker shades. But the results of the general tendency toward brighter colors was evident even here. In the past few years a swing toward warmer, or yellow grays, has gained so much ground that it cannot be ignored. This is more true of the lighter finishes commonly used on indoor equipment. Use of the darker finishes persists on outdoor equipment where blue-black pigments offer high durability.

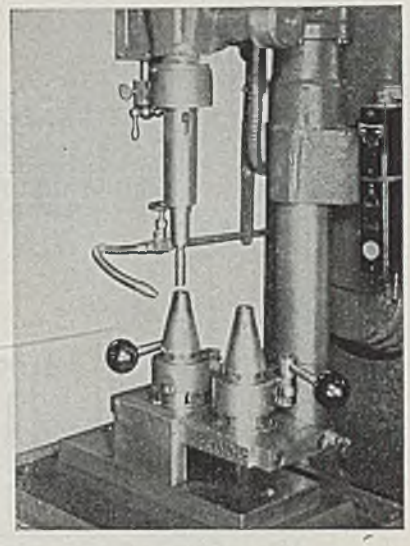
Therefore, the existence of two basic hue families, yellow and purple-blue had to be recognized. These hues are in maximum color contrast, and it is well known, yield green when mixed. However, the same values or shades of these two families are very bad companions. A light yellow gray and a light purple-blue form an inharmonious combination. The same is true of the dark yellow gray and the dark purple-blue and, to a lesser extent, of any other two intermediates of the same value. This is the common occurrence that so disturbs not only appearance designers but anyone else, when apparatus from many different sources, with no standardization of color, is viewed in the final installation.

Fortunately, the difficulty vanishes when value contrast is added to hue contrast. In other words, when combining a yellow-gray and a purple-blue-gray, a light value of one and a dark value of the other should always be used. An intermediate hue such as a green-gray has sufficient of both yellow and blue to harmonize with either in a variety of shades. Such combinations are not only satisfactory, but pleasing.

The chart, Fig. 1, graphically shows how the four grays were finally selected. The vertical scale at the side is in terms of the Munsell value, from light to dark reading down. The horizontal scale across the top reads in terms of Munsell hue, from yellow at the left to blue at the right.

(*Please turn to Page* 184)

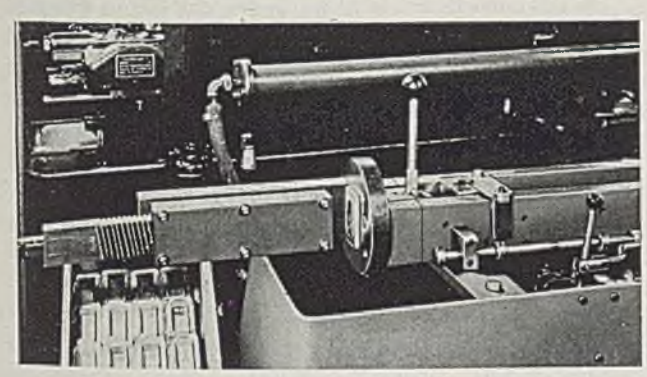
Tapping Time Reduced by SHUTTLE TYPE FIXTURE



Shuttle fixture is so constructed that when one piece is being tapped the operator has both hands free to load and unload the other station. In this manner it was possible to get a production of 450 pieces per hour on one job from equipment designed and built by the Cleveland Tapping Machine Co., Cleveland.

The operator merely placed the nose piece in the fixture, tightened a lever which automatically aligned the work piece in position and, as the spindle raised to its uppermost position, the operator slid the shuttle with work piece into tapping position. Sensitive automatic control of the machine (vertical travel of the spindle being held to within 0.005-in. limit), permitted the operator to devote his attention to the free station. In case misalignment occurred, the sensitive clutch would slip, thereby preventing damage to work piece or machine.

A 2-station shuttle fixture used in conjunction with a standard lead screw type machine practically eliminated the loading and unloading time when tapping the nose of an M-83 flare 5/8-in.-18 to a critical depth of 0.400-in.



BROACHING INTERNALLY: Broach is pulled through a 2½ x 1-in. rectangular hole, ½-in. long in a bronze shoe. Special fixture for guiding broach on back end maintains dimensional tolerances between inside of hole and outside of bronze casting. This makes it possible to do a production job formerly handled on a gear shaper. In one operation, this broaching machine, built by Zagar Tool Inc., 23880 Lakeland boulevard, Cleveland, produced an average of 50 pieces per hour with an unskilled operator

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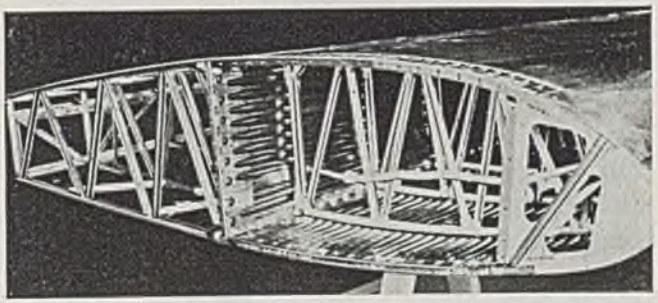
TOUGH: Retention of toughness and high fatigue strength at subnormal temperatures is a major requirement for materials used for lightweight structures. Thin sections of both 17-7 and 18-8 stainless steel, material comprising the primary structural members of this airplane wing, can take a 180° bend at all temperatures down to minus 300° F without failure, whereas thicker sections exhibit high impact values under the same low temperatures without brittleness. According to Russell Franks, chief metallurgist, Union Carbide & Carbon Research Laboratories Inc., New York, pending construction will emphasize light-weight high-strength materials



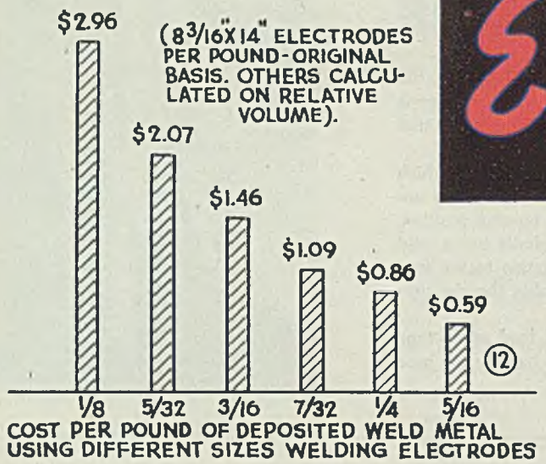
Gusset Tool

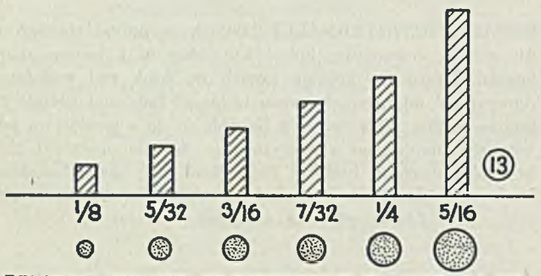
New implement used to install nose rib attaching gussets on huge seaplanes at Glenn L. Martin Co., Baltimore, this tool is composed of an L-shaped bar with an adjustable locating arm attached at the end of the longer side of bar and a vertical clamp and brace at the shorter end. When in use, clamp is fastened to spar stiffener after tool has been placed underneath spar, brace is adjusted to steady tool, and locating arm is tightened flat against the opposite side of the spar. Riveter then can attach gusset accurately merely by holding it flat against edge of locating arm

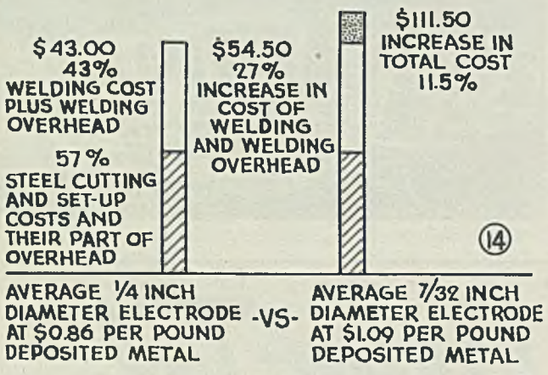
Economics of Arc Welding

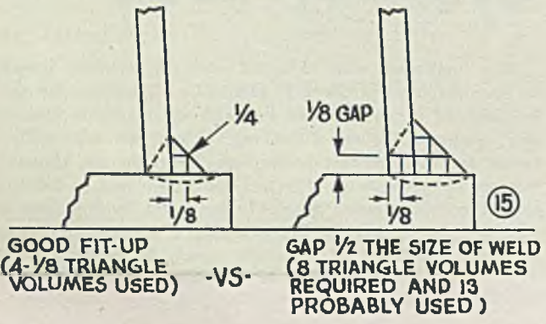
Four additional factors are analyzed for their effect on total cost of welded product in concluding installment of article

By WALTER J. BROOKING
Director of Testing & Research
R. G. LeTourneau Inc.
Peoria, Ill.









FACTORS studied in the preceding article for their relationship with the total cost of a welded structure were: Design of structures to minimize the use of weld metal; planned use of material to reduce amount of scrap; use of setting up fixtures to standardize structures; and use of positioning fixtures to deposit welds in most favorable positions.

In this second article of the series, the factors discussed are electrode size, fitup of joints, correct weld size, and operator accomplishment. Also, after each of the factors has been treated separately for its specific effect on the total cost of a welded unit, a summary is made of the accumulated influence of all of the factors on the total cost.

(5) **Using the Most Economical Size of Electrode:** Amount of weld metal deposited by a given size of electrode depends more upon the volume of metal in the electrode than upon any other factor.

Stop watch studies of the burning off of welding electrodes of different sizes ranging from 1/8 to 5/16-in. in diameter (all of the same length), indicate that with the machine setting correct for the burning of that electrode on an average job, the same length of time is required for each size.

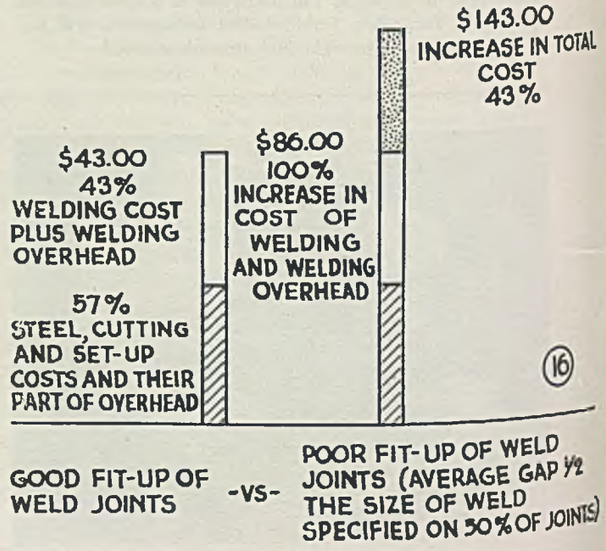
Although this time does vary somewhat, it usually requires about 90 sec with a normal machine setting for a 14 in. electrode to be burned down to a stub of about 1½ in. Assuming this to be the correct length of time for burning an electrode and that length of time for burning electrodes of different diameters is the same, the amount of deposited weld metal for a given size of electrode then depends upon the volume of the wire. Fig. 13 shows the relative volume of metal of different diameter electrodes.

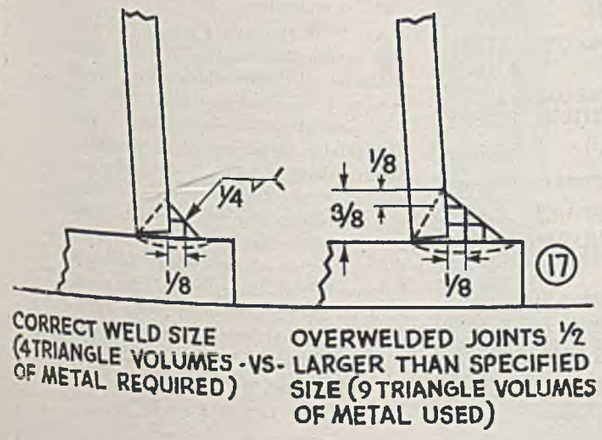
Length of time required to deposit a pound of weld metal with each given size of electrode has a definite relationship to the amount of wire deposited per electrode. This relationship, assuming 90 sec burn-off and 15 sec for changing electrodes, forms the basis for the difference in cost per pound of deposited weld metal using different sizes of electrodes (assuming a constant cost per hour for labor).

If 14 in. electrodes are being used, and if the number of electrodes per pound is in direct ratio to the cross sectional area of the different sized electrodes, the cost of depositing a pound of weld metal—using various sizes of electrodes at $1.10 per hr for labor, plus 150 per cent overhead and 66 2/3 per cent deposit efficiency of the electrode—is as shown in Fig. 12.

Often, electrodes of too small a size are used. Even in cases where positioning fixtures permit the use of welding electrodes of any size suitable for a given weld, smaller electrodes are used than are necessarily in keeping with good welding practice.

Assuming, in the case of the machine base discussed herein, that an average ¼-in. diameter electrode would be the best size, the difference between it and an average 7/32-in. electrode is a significant figure in cost as shown in Fig. 14. This relatively insignificant difference of 1/32-in. in size in the average diameter of electrode used represents a total difference of 27 per cent in welding cost, or 11½ per cent in the total cost of the unit. A cost increase of 11½ per cent means $11.50 per unit in this case. This is a sizable margin arising from a relatively insignificant appearing factor.

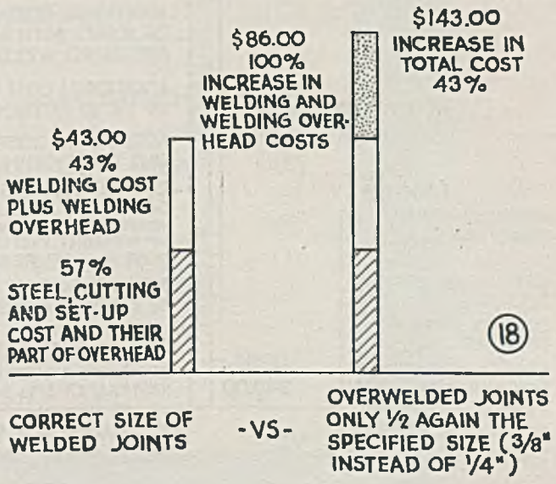


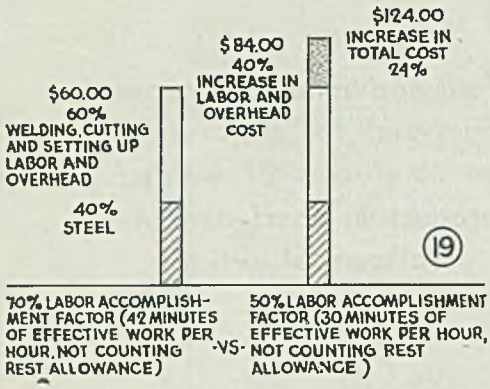


6. Good Fitup of Welded Joints Compared to Poor Fitup of Welded Joints: One of the most important of all factors in ordinary welding practice is the degree of perfection of fitting together component members of the joints in the structure prior to welding.

The economic basis for this argument lies in the fact that deposited weld metal is an expensive commodity and that what appears to be a relatively small gap in a welded joint, when analyzed from its volume compared to the volume of a finished weld, is often surprisingly large. These gaps must be filled with weld metal according to good welding practice; and normally a welding operator will overweld a gapping point to be sure that it will not fail, rather than produce a weld including the filled up gap, equivalent to the correct size of joint which had no unusual gap.

Fig. 15 shows the volume of a weld such as might be found in this machine base compared to the volume of the same weld made with a gap in the joint equivalent to one-half the weld's size followed by the normal opera-





tor practice of applying an additional amount of weld metal to be sure that the weld is properly safe.

Approaching the economics of this problem from the volume of weld metal alone, comparison shows that a filled gap one-half the size of the weld, plus the additional amount placed by a conservative operator for safety, represents more than three times the amount of weld metal used in the joint when it has a normal amount of gap.

This assumption leads to a vast understatement of the cost of a poor fitting joint because in the filling process a much smaller welding electrode is required and a much longer time is required for cleaning after each successive welding pass and for cooling of the joint between passes than for a normal fitting joint. This greatly increases the time of deposition over what would normally be used with the regular size electrode for a normal joint.

Therefore, the assumption in the case of this machine base, that the fitup at the corners and around the edges averages normally good for 50 per cent of its length and has an average gap of 1/8-in. (assuming 1/4-in. sidewalls and a gap half the thickness of the size weld required in this particular case), increases by 100 per cent the total volume of welds required for the job. This represents a 43 per cent total increase in the cost of the unit shown graphically in Fig. 16.

In addition to the volumetric and related cost considerations, the structural strength and metallurgical quality of joints with gaps in them is inferior to joints with normally good fit-up. Therefore, in a study of the economics of poor fitting joints, an undeterminable amount of failure which is costly from the standpoint of good will as well as replacements must be considered. No attempt to evaluate that will be made in this discussion, but the very conservative figure established above may be checked by a stop watch time study of the process of filling up gaps and will usually be found to be conservative.

7. Correct Size of Weld Compared to Overwelded Joints: Another one of the most important economic factors in welded production is the control of the size of the welded joints so that the amount of weld metal is held down to the proper size rather than applied in excessive amounts. If a fillet type weld is increased in size (and therefore in strength) to double its original leg measurement and strength, there is not just twice as much weld metal deposited, but four times as much. This relationship is shown in Fig. 17.

Overwelding is a very common practice and is very easily done, especially on structures which involve a large percentage of fillet type joints.

In the case of the machine base under discussion, the fact that it is of a box shape wherein the thickness of the sidewalls is not evident and the fact that the capscrew or bolt blocks which are welded to the top are relatively thick, normal tendency would be for overwelding. It is assumed in this particular case that a ¼-in. weld size would be satisfactory for all of the welds in the structure, since all are box shaped or are blocks fastened all around to a ¼-in. thick wall section by welding.

For a comparison let it be assumed that the ¼-in. weld used in normal good practice is increased only 50 per cent (from ¼-in. to ⅜-in.) The result in welding cost, demonstrated in Fig. 18, shows graphically that increase of the dimensions of the weld by one-half more than *doubled the amount of weld metal* deposited. Conservatively figured, the cost of welding is doubled. This represents a 100 per cent increase in the welding cost, or a 43 per cent increase in the completed unit attributable to this factor alone—the cost of overwelding.

This is another factor where the theoretical value based on the volume of the weld can easily be checked with a stop watch and satisfactorily demonstrated. It is one of the most important economic factors in arc welding and is fundamentally the result of the fact that weld metal is expensive.

8. Good Operator Factor (Workmanship Accomplishment) in Welding Manufacture: A factor which exerts one of the most far reaching effects upon the total cost of an arc welded unit is that of operator factor on all of the direct labor operations. This is especially true of the arc welding operation itself since the operation requires constant attention while the arc is burning and since the percentage of time which the arc is burning fundamentally controls the economy of the deposition of weld metal. If the arc is not burning, no weld metal is being deposited, no matter what the other conditions may be.

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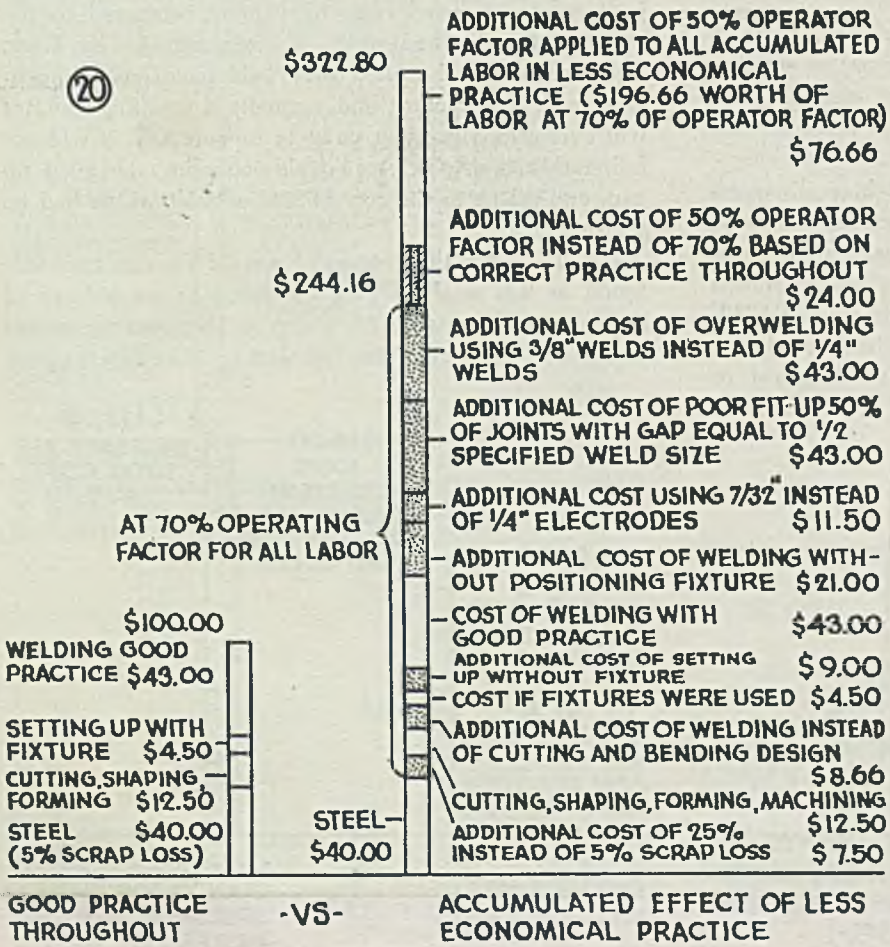

Preview of the 27th NATIONAL METAL CONGRESS and Exposition

Cleveland, February 4-8, 1946

On the following pages, STEEL presents a preview of the 27th National Metal Congress and Exposition sponsored by the American Society for Metals. The exposition and the technical sessions of ASM and the American Industrial Radium and X-Ray Society are expected to attract some 30,000 visitors to Cleveland to see and hear about the many new and improved products and production techniques for peacetime applications.

CONTENTS OF THIS SECTION

C. H. HERTY, JR.
President ASM

A. L. BOEGEHOLD
Vice President, ASM

H. K. WORK
Treasurer, ASM

W. H. EISENMAN
Secretary, ASM

PROGRAM

Well-rounded program of technical sessions, round table discussions and educational lectures offers helpful information on wide variety of subjects.

Monday, Feb. 4, 1946

(Exposition opens at 12 noon, closes at 10:30 p.m.)

Morning Technical Sessions

Session No. 1—Hotel Statler—9:30 a.m.

"Drawability of Aluminum Alloys at Elevated Temperatures, Part I—Deep Drawing Cylindrical Cups," by D. M. Finch, research engineer; S. P. Wilson, engineer; and Dr. J. E. Dorn, University of California, Berkeley, Calif.

"Deep Drawing Aluminum Alloys at Elevated Temperatures, Part II—Deep Drawing Boxes", by D. M. Finch, research engineer; S. P. Wilson, engineer; and Dr. J. E. Dorn, University of California, Berkeley, Calif.

"New Aluminum Alloys Containing Small Amounts of Beryllium," by Dr. R. H. Harrington, General Electric Co., Schenectady, N. Y.

Session No. 2—Hotel Statler—9.30 a.m.

"The Partition of Molybdenum in Hypo-Eutectoid Iron-Carbon-Molybdenum Alloys," by Fred E. Bowman, Climax Molybdenum Co., Detroit.

"The Effect of Variations in Composition and Heat Treatment on Some Properties of 4 to 6 Per Cent Chromium Steel Containing Molybdenum and Titanium," by Geo. F. Comstock, chief metallurgist, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

"Iron-Manganese Alloys—the Properties of Cold-Worked and Heat Treated Alloys Containing 1 to 7 Per Cent Manganese," by Dr. R. S. Dean, J. R. Long, senior metallurgist; T. R. Graham, senior metallurgist; and R. G. Feustel, assistant metallurgist, Bureau of Mines, Washington.

Session No. 3—Hotel Statler—9:30 a.m.

"The Application of Ms Points to Case Depth Measurement," by Dr. E. S. Rowland and S. R. Lyle, Timken Roller Bearing Co., Canton, O.

"A Mechanism of the Surface Decarburization of Steels," by W. A. Pennington, chief chemist and metallurgist, Carrier Corp., Syracuse, N. Y.

"Graphite in Cold Rolled Subcritically Annealed Hypo-Eutectoid Steels," by M. A. Hughes and J. C. Cutton, Carnegie-Illinois Steel Corp., Youngstown.

ROUND TABLE DISCUSSION

Music Hall, Public Auditorium—8:30 p.m.

Discussion on hardening of steel, including theories on decomposition of austenite.

Tuesday, Feb. 5, 1946

(Exposition opens at 12 noon, closes at 10:30 p.m.)

Morning Technical Sessions

Session No. 1—Hotel Statler—9:30 a.m.

"High Forging Temperatures Revealed by Facets in Fracture Tests," by J. Robert Strohm, Chicago district manager, Copperweld Steel Co., Chicago; and W. E. Jominy, chief metallurgist, Chrysler Corp., Detroit.

"Critical Points of SAE 4340 Steel as Determined by the Dilatometric Method," by D. Niconoff, Republic Steel Corp., Canton, O.

"Gas Evolution from Cast Steel at Room Temperature," by H. H. Johnson, metallurgist; L. H. Arner, chief chemist; and Dr. H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.

Session No. 2—Hotel Statler—9:30 a.m.

"The Effects of Combined Stresses and Low Temperatures on the Mechanical Properties of Some Nonferrous Metals," by Dr. D. J. McAdam, Jr., metallurgist; G. W. Geil, assistant metallurgist; and Dr. R. W. Mebs, National Bureau of Standards, Washington.

"Temper Brittleness," by Capt. John H. Hollomon, Watertown Arsenal, Watertown, Mass.

"Fracture of Metals Under Combined Stresses," by Dr. D. J. McAdam, Jr., National Bureau of Standards, Washington.

Session No. 3—Hotel Statler—9:30 a.m.

"Soft Soldering," by M. E. Fine and Prof. R. L. Dowdell, University of Minnesota, Minneapolis.

"The Cold Working and Heat Treatment of a 10-Karat Gold Alloy," by Vernon H. Patterson, chief metallurgist, and B. N. Iannone, Bausch & Lomb Optical Co., Rochester, N. Y.

"Tellurium in the Iron Foundry," by James O. Vadeboncoeur, research metal-

lurgist, General Motors Corp., Pontiac, Mich.

Afternoon Technical Sessions

Session No. 1—Public Auditorium—2 p.m.

"Investigation of a Type of Failure of 18-8 Stabilized Stainless Steel," by W. C. Kahn, general supervisor, New York Testing Laboratories, New York; H. Oster, assistant director, and R. Wachtell, metallurgist, Republic Aviation Corp., Farmingdale, Long Island, N. Y.

"The Influence of Carbon Content Upon the Transformation in 3 Per Cent Chromium Steel," by Dr. Taylor Lyman, editor of Metals Handbook, ASM-Cleveland; and Dr. A. R. Troiano, University of Notre Dame, Notre Dame, Ind.

"Effect of Nickel on Physical Properties and Thermal Characteristics of Some Cast Chromium-Molybdenum Steels," by N. A. Ziegler, research metallurgist, and W. L. Meinhart, assistant research metallurgist, Crane Co., Chicago.

Session No. 2—Public Auditorium—2 p.m.

"Factors Affecting the Hardenability of Boron-Treated Steels," by R. A. Grange and T. M. Garvey, U. S. Steel Corp. Research Laboratories, Kearney, N. J.

"Quenching of Steel Balls and Rings," by Victor Paschkis, research associate, Columbia University, New York.

"Mass Temperature Effects on Quenching 36 Per Cent Cobalt Magnet Steel," by Benjamin Falk, Simonds Saw & Steel Co., Lockport, N. Y.

ROUND TABLE DISCUSSION

Music Hall, Public Auditorium—8:30 p. m.

Discussion on "super" alloys for use in high-temperature applications, such as in gas turbines.

Wednesday, Feb. 6, 1946

(Exposition opens 12 noon, closes at 10:30 p.m.)

CAMPBELL MEMORIAL LECTURE

Hotel Statler—10 a.m.

Edward de Mille Campbell Memorial Lecture, by Dr. M. Gensamer, Pennsylvania State College, State College, Pa.

AFTERNOON TECHNICAL SESSION

Session No. 1—Public Auditorium—2 p.m.

"Anti-Reflection Films for Metallographic Objectives," by James R. Benford, Bausch & Lomb Optical Co., Rochester, N. Y.

"Detection, Causes and Prevention of Injury in Ground Surfaces," by L. P. Tarasov, Norton Co., Worcester, Mass.

"The Practical Application of Statistical Methods in a Quality Control Program," by W. T. Rogers, chief statistician, National Tube Co., Lorain, O.

Session No. 2—Public Auditorium—2 p.m.

"Stress Comparisons by Correlation With High Frequency Magnetic and Eddy Current Losses," by P. E. Cavanagh, chief metallurgist, Allen B. duMont Laboratories, Passaic, N. J.

"Metallurgical Characteristics of Induction-Hardened Steel," by James W. Poynter, metallurgist, Army Air Forces, Wright Field, Dayton, O.

"Induction Hardening and Austenitizing Characteristics of Several Medium Carbon Steels," by D. L. Martin, research metallurgist, General Electric Co., Schenectady, N. Y.; and Prof. W. G. Van Note, North Carolina State College, Raleigh, N. C.

ROUND TABLE DISCUSSION

Music Hall, Public Auditorium—8:30 p.m.

Discussion on "Nucleonics" or atomic energy and its implications.

Thursday, Feb. 7, 1946

(Exposition opens 10 a.m., closes 6 p.m.)

MORNING EDUCATIONAL LECTURES

Hotel Statler—9 a.m.

Magnesium (Lecture No. 1)

"Origin of Metal and Basic Properties," by Prof. L. M. Pidgeon, University of Toronto, Toronto, Canada.

Induction Heating (Lecture No. 1)

"Principles and Theory of Induction Heating (Including Dielectric Induction Heating)," by Dr. H. B. Osborn, Jr., Ohio Crankshaft Co., Cleveland.

Surface Stressing (Lecture No. 1)

"The Problem Defined," by Prof H. F. Moore, University of Illinois, Urbana, Ill.

Corrosion (Lecture No. 1)

"Basic Principles of Metallic Corrosion," by Dr. Carl B. Borgmann, University of Colorado, Boulder, Colo.

Hotel Statler—10:30 a.m.

Magnesium (Lecture No. 2)

"Magnesium Structural Design," by J. C. Mathes, development engineer, Dow Chemical Co., Midland, Mich.

Induction Heating (Lecture No. 2)

"Induction Heating Circuits and Frequency Generation," by Dr. P. H. Brace, Westinghouse Electric Corp., East Pittsburgh, Pa.

Surface Stressing (Lecture No. 2)

"Measurement of Stresses at Surface," by Dr. W. M. Murray, Society for Experimental Stress Analysis, Cambridge, Mass.

Corrosion (Lecture No. 2)

"Effect of Composition and Environment on Corrosion of Iron and Steel," by C. P. Larrabee, Carnegie-Illinois Steel Corp., Vandergrift, Pa.

AFTERNOON EDUCATIONAL LECTURES

Public Auditorium—4:30 p.m.

Magnesium (Lecture No. 3)

"Castings," by Dr. N. E. Woldman, Bendix Aviation Corp., Teterboro, N. J.

Induction Heating (Lecture No. 3)

"Practical Application of the Motor-Generator Type of Induction Heating (Frequency up to 10,000 Cycles)," by W. G. Johnson, Caterpillar Tractor Co., Peoria, Ill.

Surface Stressing (Lecture No. 3)

"Methods of Applying and Tests Used Including Carburizing and Nitriding," by J. O. Almen, head of mechanical department, Research Laboratories, General Motors Corp., Detroit.

Corrosion (Lecture No. 3)

"Corrosion Resistance of Stainless Steels and High Nickel Alloys," by W. O. Binder, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y.

Friday, Feb. 8, 1946

(Exposition opens 10 a.m., closes 6 p.m.)

ANNUAL DINNER

Grand Ballroom, Hotel Statler

Speaker: Dr. Gerald Wendt, editor, Science Illustrated.

Awards: Henry Marion Howe Medal for the paper of the highest merit published in Transactions during 1944; Albert Sauveur Achievement Award, the ASM Medal for the Advancement of Research, and ASM Gold Medal.

MORNING EDUCATIONAL LECTURES

Hotel Statler—9 a.m.

Magnesium (Lecture No. 4)

"A Survey of Wrought Magnesium Alloy Fabrication," by J. V. Winkler, Dow Chemical Co., Los Angeles.

Induction Heating (Lecture No. 4)

"Practical Applications of High Frequency Induction Heating (100,000 Cycles and Up)," by J. W. Cable, Induction Heating Corp., New York.

Surface Stressing (Lecture No. 4)

"Stressing Axles and Other Railroad Equipment by Cold Rolling," by O. J. Horger, chief engineer railway division, Timken Roller Bearing Co., Canton, O.

Corrosion (Lecture No. 4)

"Corrosion of Light Metals (Aluminum and Magnesium)," by Dr. E. H. Dix, Jr.,

(*Please turn to Page* 137)

ASM TECHNICAL PAPERS

Thirty technical papers scheduled for presentation at Cleveland February 4-8 are digested here so that each visitor may attend sessions of greatest interest to him. Accompanying program shows day and time of presentation.

New Aluminum Alloys

By R. H. Harrington, Research Metallurgist,
General Electric Co., Schenectady, N Y.

These new heat treatable compositions are of two types: (a) aluminum-copper-beryllium with the copper and beryllium in the critical ratio of 7 to 1 and (b) aluminum-copper-beryllium-cobalt with the cobalt and beryllium in the critical ratio of 6.5 to 1. These alloys developed superior strength properties as castings made by gravity-sand, centrifugal, and lost-wax methods combined with high thermal stability and unusual oxidation-corrosion resistance. They also developed useful wrought properties so that it is possible for one representative composition to meet requirements in both fields.

Iron-Manganese Alloys

By R. S. Dean, Assistant Director, Bureau of Mines, Washington
J. R. Long, T. R. Graham, Senior Metallurgists
R. G. Feustel, Assistant Metallurgist,
Bureau of Mines, Salt Lake City, Utah

Iron-manganese alloys containing up to 7 per cent manganese have been shown to be amendable to cold working. They have been cold-rolled to 80 per cent reduction in thickness and the properties resulting from this cold deformation determined on 1/16-in. sheet. The 1 and 2 per cent alloys could be readily rolled with relatively heavy reductions, while the 6 to 7 per cent alloys, because of their greater strength and hardness, were reduced by much lighter reductions per pass. Tensile properties were determined in various stages of cold reduction and heat treatment after the cold work.

The properties in the normalized and tempered state indicate a regular increase in tensile strength of about 11,000 psi for each 1 per cent manganese with an initial decrease of 5 per cent in elongation tapering down to about 1 per cent for each per cent of manganese at the higher manganese contents while the hardness varies from Rockwell B-55 to C-23. The 7 per cent manganese alloy has a tensile strength of 114,900, a yield strength of 70,000, and a proportional limit of 56,000 psi, with an elongation of 16 per cent in 2 in. and a hardness of Rockwell C-23.

In the cold-worked condition the tensile strength is doubled by 80 per cent reduction of the low-manganese alloys. The 7 per cent alloy shows a tensile of 192,500 psi in this state. The elongation is greatly affected by the initial reductions but decreases more slowly with additional working and is changed but little over the range of 40 to 80 per cent reduction. Manganese increases the elongation of heavily cold-worked material by a few per cent for initial manganese additions after which the elongation remains constant. That is, the 3 to 7 per cent alloys have the same elongation at each cold working level.

Annealing and normalizing treatments at temperatures up to 1100 or 1200° F produce the usual softening of cold-worked material with greatest effects in this temperature range. In alloys from 3 to 7 per cent manganese higher temperatures will produce a hardening effect, due to the formation of a martensitic constituent resulting from the decomposition of the iron-manganese gamma solid solution. The properties of the alloys so treated will vary with the manganese content and the heat treating temperature.

A tempering treatment of 1150° F superimposed on previously normalized material tends to produce substantially constant properties independent of the normalizing temperature and approximating those obtained by normalizing from 1100° F. Apparently the 1150° F tempering temperature is capable of producing the softest condition in all of the alloys by modification of the martensitic constituent formed by the other treatments and by the production of a maximum amount of the ferrite solution.

Effect of Variations in Composition and Heat Treatment of Chromium Steel

By G. F. Comstock, Chief Metallurgist
Titanium Alloy Mfg Co., Niagara Falls, N. Y.

With titanium-carbon ratios between 3.5 and 5.5 in the 5 per cent chromium - molybdenum - titanium steel better notch toughness and high temperature rupture strength are obtained than with higher titanium, together with satisfactory ductility and restriction of air hardening.

Silicon around 1 per cent in these steels of 3.5 and 5.5 titanium-carbon ratio gives superior resistance to oxidation, and need not impair the notch toughness, higher temperature rupture strength, or other properties if the manganese content is about 0.75 to 1 per cent and the steel is merely tempered at about 1350° F without annealing or normalizing, after hot working at a reasonably low temperature so as to avoid a coarse grain size.

In these steels with silicon above 0.75 per cent, the transition temperature from low to high notch sensitivity is between room temperature and zero with titanium-carbon ratios below 5.5, and above room temperature with higher titanium-carbon ratios.

Higher than normal phosphorus, molybdenum, and aluminum in these titanium steels promote notch sensitivity, but about 0.08 per cent phosphorus might be tolerated with manganese up to 0.80 per cent and low silicon, or with a low titanium-carbon ratio. Nitrogen tends to reduce the effective titanium-carbon ratio.

The 5 per cent chromium-molybdenum-titanium steel may be welded without hardening to above 200 brinell if the welds are tempered at 1350° F. The notch sensitivity of welds tends to be high, but flash welds with fairly good impact values can be made if the silicon content is below 0.60 per cent or the manganese above 0.70 per cent, the steel is normalized before welding and tempered at 1350° F afterward, and the welding current is not applied too long, or not over 6 seconds for ¾-in bars.

Oxidation resistance is improved slightly by titanium, not by high manganese, and greatly by more than 1.2 per cent silicon. The pitting type of scaling that occurs with moderate rates of oxidation was not found on titanium steels.

The tensile, hardness, and impact properties of the 5 per cent chromium - molybdenum - titanium steels merely tempered at 1350° F after hot working are satisfactory, so that annealing or normalizing is not required for them.

Partition of Molybdenum in Hypoeutectoid Iron-Carbon-Molybdenum Alloys

By Fred E. Bowman, Research Laboratory
Climax Molybdenum Co., Detroit

The investigation of the partition of molybdenum in iron-carbon-molybdenum alloys has established the following facts:

(a) Molybdenum segregates in the carbide during the isothermal transformation of austenite at the higher subcritical temperatures.

(b) In alloys containing more than 0.50 per cent molybdenum and isothermally transformed at 1200 and 1300 degrees Fahr. the cementite is replaced by an iron-molybdenum carbide, $(Fe,Mo)_{23}C_6$, having a larger and more complex unit cell.

(c) Molybdenum retards the rate of formation of proeutectoid, although the molybdenum content of the ferrite remains unchanged from that of the austenite.

(d) Molybdenum moves from the ferrite to the carbide during the tempering of martensite.

(e) The rate of graphitization of the carbides during the tempering of martensite is retarded by molybdenum.

(f) The molybdenum concentration in the orthorhombic carbide (Fe_3C) can be increased by tempering martensite to a value greater than that which results in the presence of the face-centered cubic carbide, $(Fe,Mo)_{23}C_6$, after the isothermal transformation of austenite.

Case Depth Measurement

By E. S. Rowland and S. R. Lyle
Metallurgical Department, Timken Roller Bearing Co., Canton, O.

A method is described for the measurement of case depth based upon the change in martensite point temperature with variation in carbon content. This method is applied to nine commercial carburizing steels.

Additional data are given on the martensite points of two series of steels of various carbon contents. Necessary test conditions are given for the determination of carbon depletion in S.A.E. 52,100 by this method. Comparisons are made between the experimental Ms points derived from this investigation and those arrived at through calculations by means of the published formulae.

Surface Decarburization of Steel

By W. A. Pennington, Chief Chemist and Metallurgist,
Carrier Corp., Syracuse, N. Y.

A study has been made of the decarburization of an ordinary carbon steel of eutectoid composition at temperatures from 1275 to 1700° F at intervals of temperature which were in general 50° F. A mixture of hydrogen and water vapor containing approximately 20 per cent (by volume) of water vapor was used as a medium to effect the decarburization. Water vapor has been regarded as a reactant and not as a catalyst.

The mechanism of decarburization as presented explains the chemical reactions which take place at the surface, thus forcing the diffusion, the formation of ferrite bands in some cases but not in others, the formation of a hypereutectoid steel rather than a ferrite case on cast iron where it is decarburized above the A_3 point for pure iron, why copper-plated steel does not decarburize, and the anomalous variation in rates with a change in temperature.

Graphite in Cold-Rolled Subcritically Annealed Steels

By M. A. Hughes & J. G. Cutton
Carnegie-Illinois Steel Corp., Youngstown, O.

A study was made to determine the effect of temperature, residual alloy, variations in per cent cold reduction, mode of deoxidation, full annealing prior to cold reduction, and carbon content, on the susceptibility of hypoeutectoid steels to graphitization when cold-rolled and annealed at subcritical temperatures.

Chromium was found to stabilize the carbides, while copper appeared to have no effect upon the stability of the carbides. When cold-rolled strip samples were subjected to two cold reductions totaling 50 per cent reduction, and two subcritical anneals totaling 144 hours at 1200° F, it was observed that first reduction of 10, 20 and 30 per cent produced more graphite than 0, 40 and 50 per cent first reductions.

Drawability of Aluminum Alloys

(Part I—Deep Drawing Cylindrical Cups)

By D. M. Finch, Research Engineer, S. Wilson, Engineer, and J. E. Dorn, Project Supervisor and Associate Professor, University of California, Berkeley, Calif.

Deep drawing properties of the aluminum alloys which were investigated improved substantially with increase in temperature. Maximum deep drawing temperature for the annealed alloys was found to be limited to 700° F due to lubricant failures above this temperature.

A 4 per cent clearance was found to yield higher cups than an 83 per cent clearance die for alloys tested at 450° F.

Optimum punch radius depended upon the alloy and temperature of drawing. In general, higher temperatures permitted the production of cups with sharper bottom radii. In general, the drawability of aluminum alloys increased with an increase in die radius. One of the major factors in the deep drawing of aluminum alloys at elevated temperatures was lubrication. The best lubricant found thus far was a 600W steam cylinder oil modified with 1¼ lb of graphite per gallon of oil.

Deep Drawing Aluminum Alloys

(Part II—Deep Drawing Boxes)

By D. M. Finch, Research Engineer, S. Wilson, Engineer, and J. E. Dorn, Project Supervisor and Associate Professor, University of California, Berkeley, Calif.

Results obtained for a limited number of alloys and two temperatures, 70 and 450° F illustrate the decided advantage of deep drawing box-type parts of aluminum alloys at elevated temperature.

Improvement in drawability at 450° F as compared to 70° F was the greatest for the high-strength aluminum alloys. The results warrant consideration of deep drawing aluminum alloys in the hardened temper at elevated temperature and subsequently heat treating and aging.

Improvement in drawability at elevated temperatures also indicated that the application of this technique to the drawing of parts from standard alloys will result in a reduction in the number of press and anneal operations required by reducing the number of re-draws.

Critical Points Determined by Dilatometric Method

By D. Niconoff, Metallurgical Laboratory Republic Steel Corp., Canton, O.

As determined by the dilatometric method, the position of the critical points observed on heating S.A.E. 4340 steel depends upon the prior structure of the steel as well as upon the heating rate employed.

The soaking temperature and time also appear to be factors in determining the position of the critical points.

By plotting the critical temperatures as obtained under conditions of uniform soaking upon the semilogarithmic time-temperature co-ordinates, two zones were obtained in which the transformation of austenite takes place. These results appear to be in good agreement with the transformation diagram for continuous cooling of S.A.E. 4340 steel developed by Grange and Kiefer.

Gas Evolution from Cast Steel

By H. H. Johnson, Metallurgist, Sharon Works
L. H. Arner, Chemist, Sharon Works
H. A. Schwartz, Manager of Research, Cleveland
National Malleable Castings Co.

Composition and rate of evolution of gas, evolving from freshly cast steel at or near room temperature, have been studied. The gases consist mainly of CO, N_2 and H_2. Electric intermediate manganese steels differ little among themselves in the total of the two former gases evolved per unit weight of steel but vary greatly in the amount of hydrogen.

The amount of gas evolved and the rate of evolution increases with temperature. Neither varies significantly with the ratio of surface to volume of the specimen. The rate of evolution varies with the partial pressure of the evolved gases in the ambient atmosphere, but the amount varies but little.

High-Forging Temperatures Revealed by Facets

By J. R. Strohm, Metallurgist, W. E. Jominy, Chief Metallurgist Dodge Chicago Plant, Division of Chrysler Corp., Chicago

Appearance of large grains or facets in the fracture of alloy steel forgings is an indication of questionable quality and of high temperature forging. Temperatures below which facets are not formed were accurately determined by means of thermocouples inserted in test pieces and by fracture testing production forgings.

Effects of Combined Stresses and Low Temperatures

By D. J. McAdam, Jr., Chief, Section of Thermal Metallurgy
G. W. Geil, Metallurgist, R. W. Mebs, Metallurgist
National Bureau of Standards, Washington

By means of tension tests of notched specimens an investigation has been made of the mechanical properties of K-monel metal, nickel, plain and leaded phosphor bronzes, commercial aluminum and high purity aluminum. Diagrams are presented to show the influence of notches and of the stress system on resistance to plastic deformation, resistance to fracture, and ductility between room temperature and 188° C.

The difference between the initial technical cohesive strength of a metal and its resistance to plastic deformation is much less than has been generally supposed. After even moderate plastic deformation, the resistance to plastic deformation is only slightly less than the technical cohesive strength.

Temper Brittleness

By J. H. Hollomon, Captain, Ordnance Department, U. S. Army, Watertown Arsenal, Watertown, Mass.

Manganese, chromium, and nickel, all definitely appear to increase the susceptibility, for without any of these elements (manganese less than about 0.60 per cent) steel is apparently not susceptible to temper brittleness. Molyb-

denum may be used to ameliorate the embrittlement in moderately susceptible steels. In fact, with low-manganese nickel-chromium steels 0.25 per cent molybdenum will prevent embrittlement even upon furnace cooling after tempering from above 600° C. Some data indicate that tungsten and possibly titanium and columbium affect the transformation in a manner similar to that of molybdenum. It appears that the apparent effect of phosphorus in increasing the apparent temper brittleness is caused by an increase in the temperature of brittle failure of nonembrittled steels of high-phosphorus content which in some cases brings the divergence in the impact curves between embrittled and nonembrittled specimens closer to room temperature. Effects of elements such as vanadium, nitrogen, and oxygen are not definitely known.

Tellurium Corewashes

By J. O. Vadeboncoeur, Research Metallurgist, General Motors Corp., Pontiac, Mich.

These corewashes have solved troublesome gray iron foundry problems. They have been particularly successful in the prevention of shrinks, but care in application must be emphasized since porosity and migrated chills are often the result of careless supervision in their preparation and use.

Several mixtures used on mass production are described, and the possible mechanism of the action of tellurium in corewashes is discussed.

Cold Working of Gold Alloy

By V. H. Patterson and B. N. Iannone, Metallurgical Department, Bausch & Lomb Optical Co., Rochester, N. Y.

This paper describes the effect of cold working and heat treatment on some of the properties of a 10-karat gold alloy. Solution heat treating at 1250° F for a period of 20 min developed maximum mechanical properties after aging. Corrosion resistance of 10-karat gold is affected more by a combination of cold working and heat treatment than by cold working alone.

Aging 10-karat gold at temperatures of 700° F or above caused a marked increase in resistance to attack by concentrated nitric acid. Aging 10-karat gold, cold-reduced over 40 per cent, at temperatures of 700° F or higher lowered the resistance to attack by artificial perspiration. As the cold reduction is decreased, higher aging temperatures can be used without materially impairing the corrosion resistance in artificial perspiration.

Fracture of Metals Under Stresses

By D. J. McAdam, Jr., Chief, Section Thermal Metallurgy, National Bureau of Standards, Washington

In this paper attention is confined to the influence of combined stresses. From 2 dimensional diagrams based on experiments of several investigators, dimensional diagrams have been derived to represent the technical cohesive strength of brittle and ductile metals. A single diagram may be used to represent resistance to cleavage and resistance to shearing fracture. Resistance to fracture, either by cleavage or by shear, probably is determined by a critical value of a shearing stress, which varies with the volume stress.

Ideal locus of fractures of a ductile metal has either circular or scalloped hexagonal cross sections. If the surfaces have circular cross section, resistance to fracture and resistance to flow are similar functions of the same variables, namely, plastic deformation, temperature, strain rate, and the stress combination.

Factors Affecting Boron-Treated Steels

By R. A. Grange
United States Steel Corp. of Delaware, Kearny, N. J.
T. M. Garvey, Carnegie-Illinois Steel Corp., Duquesne, Pa.

Hardenability of four series of plain carbon steels containing 0.40, 0.52, 0.63 and 0.75 per cent carbon respectively, each series prepared by adding graded amounts of boron to adjacent ingots, is compared.

In all these steels hardenability is increased by boron, though it is also raised somewhat by addition of grainal without boron. The increase due to boron is greater the lower the carbon, at least to 0.4 per cent; and it appears to approach zero in hypereutectoid carbon steels. Increase in hardenability produced by boron is greatest when the austenitizing temperature is 1550 to 1600° F, as ordinarily used in practice; it become gradually less for higher austenitizing temperatures and may approach zero when the latter is about 2000° F.

In a given steel the increase in hardenability is roughly parallel to, but does not correlate well with, the percentage of boron as determined by chemical analysis of the steel; it appears, however, that, as others have reported, as little as 0.001 per cent boron may suffice to develop the maximum increase producible by boron. Nor do the chemical analyses for boron, whether "soluble" or "insoluble", correlate well with the amount of boron nominally added to the liquid steel in the mold.

In a given steel the increase of hardenability correlates fairly well with the amount of a "boron constituent" which is microscopically visible as a row of fine dots at the austenite grain boundaries when the steel is carefully heat treated in a special way; despite many efforts to reveal it, this precipitate was not observed if the boron content by analysis was less than 0.0004 per cent.

When a boron-treated steel is heated at a high temperature for a long time, the increase of hardenability due to boron gradually diminishes and finally disappears; nor is it restored by any subsequent heat treatment of such a "homogenized" steel. Moreover, under this treatment the characteristic "boron constituent" likewise gradually disappears, although boron content as measured by analysis remains unchanged. It is possible therefore that some part (or all) of the efficacy of boron in enhancing hardenability may be lost when the steel is heated for rolling or forging.

Addition of boron as grainal to the 0.40 and 0.52 per cent carbon series lowered the temperature at which austenite grains coarsened in a given time. With increasing boron content the grain growth behavior became more and more like that of steel which is not aluminum-killed, but this grain coarsening is only a minor factor in relation to the extra hardenability developed in presence of a minute percentage of boron.

At present it seems as if the best index, other than actual measurement of hardenability, is the amount of precipitated "boron constituent" as revealed by the special metallographic test. The precise nature of this constituent is still an open question; it appears to be some sort of iron boride, probably containing carbon, and possibly other alloying elements.

Failure of Stabilized Stainless Steel

By W. Kahn, Director, H. Oster, Assistant Director, and R. Wachtell, Metallurgist, Inspection Control Laboratory, Republic Aviation Corp., Farmingdale, Long Island, N. Y.

This paper deals with a type of high temperature failure found in 18-8 stabilized stainless steel, much of which has been used in modern aircraft exhaust systems. With perhaps greater emphasis than is generally found in the literature, a type of failure is traced which appears to be due to a carburization of the stainless steel by exhaust gases under certain conditions. It has been shown that if more carbon is introduced than can be absorbed by the stabilizing element, actual carburization takes places, and deterioration of the stainless steel occurs as though no stabilizing element was present. It is hoped that this investigation will prove itself of value in casting some light in a region hitherto obscure.

Soft Soldering

By M. E. Fine, Instructor
R. L. Dowdell, Professor of Metallurgy
Institute of Technology, University of Minnesota, Minneapolis

Addition of $SnCl_2$ to fluxes caused increased spreading because tin from the flux plates out on the steel ahead of the spreading solder.

Some actual soldering with a mixture of 15g $ZnCl_2$, 5g $PbCl_2$, 25 cu cm petroleum and 2 cu cm H_2O proved it to be an excellent flux. No trouble was experienced in removing the flux residues.

Authorities are divided as to the actual purpose of solder fluxes. Previous opinion can be divided into two groups. Some believe the only purpose of a flux is to assure clean surfaces and others believe certain fluxes perform an additional function. This investigation shows that great many solder fluxes are able to dissolve the oxide dross films which form on molten solder. Some fluxes can dissolve a thin oxide coating on the base metal. Chloride fluxes are the most efficient from this standpoint. This cleansing aids wetting by assuring metal-to-metal contact.

Fluxes containing $ZnCl_2$ or NH_4Cl will dissolve molten tin or lead. When a chloride flux is bubbling, indicating that there is water present, it is more active both in cleaning and causing spreading than when present as a molten salt. The presence of this free acid accounts for the superior cleaning properties of chloride fluxes.

A reasonable explanation of the action of solder fluxes is that they clean the solder and base metal surfaces, protect these surfaces from further oxidation, and change the character of the surfaces so that the solder will spread more readily on the metal surface. Some fluxes perform all of these functions, some two, and some only one.

With 50 tin-50 lead solder the joint strength decreased as the temperature increased. The strongest joints were those made at the lowest possible temperature, 210° C, which is below the liquidus temperature of this solder.

In practically all properties measured except joint strengths the tin-lead solders were superior. Ordinary 50 tin-50 lead solder has a lower soldering temperature, wets better, drosses and oxidizes less, and flows better than any substitute low tin or tinless solder. It, however, showed a decrease in strength upon aging at room temperature.

Perhaps the best tinless solder for steel and tinplate, when both cost and performance are considered, is the alloy of 87.5 lead, 12 antimony, 0.5 arsenic. It cannot be used with copper or brass because of the formation of an objectionable compound. A copper soldering tool cannot be used unless it is previously tinned with tinlead solder or coated with nickel or iron.

Influence of Carbon Content on Chromium Steel

By T. Lyman, Secretary, Metals Handbook Committee, American Society for Metals, Cleveland.
A. R. Troiano, Assistant Professor of Metallurgy, University of Notre Dame, Notre Dame, Ind.

Transformation in seven 3 per cent chromium steels with carbon contents of 0.08 to 1.28 per cent have been studied as functions of time and temperature, using microscope, dilatometer and X-ray diffraction. With increasing carbon content, cementite precipitation occurs first at about 450° C following previous transformation to ferrite or intermediate-reaction product.

Increasing carbon lowers the martensite range more than it lowers the intermediate range. The temperature below which the intermediate reaction goes to completion is relatively insensitive to carbon content. Austenite can be retained at room temperature after partial transformation of steels of lowest carbon content in the intermediate range. The gamma phase can be retained in an alloy of iron plus 3 per cent chromium after similar treatments.

The structures of the carbides in these steels have been studied as functions of time, temperature and carbon content. Each of the seven steels can contain both $(Fe,Cr)_3C$ and $(Cr,Fe)_7C_3$ after certain isothermal treatments although only the 0.69 per cent carbon steel contains both carbide phases following treatments designed to produce equilibrium at high subcritical temperatures. The previous structure has a marked influence upon the rate of formation of $(Cr,Fe)_7C_3$ from alpha plus $(Fe,Cr)_3C$.

Hardnesses of some of the steels after partial and complete isothermal transformation of austenite have been considered.

Quenching of Steel Balls and Rings

By V. Paschkis, Research Associate, Columbia University, New York

Temperature - time - space relationships obtained in quenching steel spheres and cylindrical rings were investigated on the "Heat and Mass Flow Analyzer" at Columbia University. For spheres general curves are presented, in which the delaying effect of heat of transformation in the range from 250 to 150° C has been included.

In addition a large number of investigations have been

carried out in which the change of thermal properties (conductivity and specific heat) with temperature has been considered.

For steel rings charts have been developed which show the complete temperature-time-space relationships in rings of any size and material of constant thermal properties.

Quenching 36 Per Cent Cobalt Steel

By B. Falk, Metallurgical Department
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The purpose of this investigation is to study the effect of mass on the magnetic values of 36 per cent cobalt permanent magnet steel; to correlate this with the quenching rate; and then to arrive at a method whereby equivalent quenching rates and, consequently, equivalent magnetic values could be obtained, regardless of mass. An empirical relationship between mass and quenching temperature is established by the experimental method. A mathematical development of this formula is presented, which demonstrates that the empirical relationship is well founded on the concepts of the mass effect evolved by previous investigators.

Critical cooling rate may be attained on masses of various dimensions by varying the quenching temperature, and holding all other factors constant. It follows, therefore, that the recommended quenching temperature for this steel should be the range of temperatures from which this steel may be treated to yield maximum magnetic results.

Statistical Methods in Quality Control

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This paper presents examples of the application of statistical methods in a quality control program. Three general methods of handling routine data are discussed: frequency distributions, control charts, and correlation, with a number of examples demonstrating each application.

Advantages of the control chart method of presenting data are compared to those of the frequency distribution in both routine and experimental problems, and the inadequacy of the frequency distribution is pointed out. Problems in simple and multiple correlation, taken from actual experience, are presented, with a final example showing the results of a co-ordination of correlation and control charts.

An effort has been made to keep all discussion practical, although it is presupposed that the reader has an elementary knowledge of statistics.

Effect of Nickel on Cast Alloy Steels

By N. A. Ziegler, Research Metallurgist and
W. L. Meinhart, Assistant Research Metallurgist,
Crane Co., Chicago

Experimental evidence of the effect of nickel (up to 2 per cent) on thermal characteristics and physical properties of steels containing 2.5 chromium, 0.5 molybdenum—up to 9 chromium, 1.5 molybdenum and 0.05 to 0.3 per cent carbon is presented. Nickel strengthens all of these steels, without undue reduction of ductility and impact resistance. Effect of nickel is more pronounced in 2.5 and 5 per cent chromium steels than in those containing 7 and 9 per cent chromium. Likewise, the effect of nickel is more pronounced in these steels if the carbon content is held under 0.15 per cent than when it is increased to 0.2 per cent or higher.

Nickel increases thermal sluggishness of these steels, but to a lesser degree than carbon in amounts necessary to develop similar strength.

The addition of about 1.0 per cent nickel to low carbon (0.10 per cent) steels of the above type produces physical properties similar to those of higher carbon (0.20 per cent) steels. However, the hardness developed by welding in low carbon nickel-bearing steels is less than that obtained in higher carbon nickel-free steels of the same desired strength.

Films for Metallographic Objectives

By J. R. Benford, Scientific Bureau
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Experimental studies on improvement in performance of metallographic microscopes due to antireflection films on the objective lens surfaces show the improvement to be dependent on the objective design and on the type of specimen viewed. The improvements accomplished by the filming consist of a gain in image contrast and a shortening of the photographic exposure. Photomicrographs are submitted showing comparative performance between filmed and infilmed objectives. These results are supplemented by observations made with a visual comparator device which enables the observer to view two metallographic microscope images simultaneously. Photoelectric measurements of percentage flares in the images are correlated with the photographic and visual results.

The application of antireflection films to metallographic objectives produces a gain in image contrast. The amount of this gain depends not only on the objective design but also on the type of specimen being observed. A definite and useful gain in contrast is obtained on specimens having a long tone range, low reflecting power, and low contrasts. Little gain in contrast is obtained on contrasty specimens of high reflecting power having few shades of gray. The basic cause of flare variations in different lens designs appears traceable principally to the relative spreading of the flares in the image plane rather than to differences in the number of air-glass surfaces in the lens system. If we accept the philosophy that all objectives should give good crisp imagery on the "tough" as well as the "easy" specimens, filming the objectives appears advisable.

Prevention of Injury in Ground Surfaces

By L. P. Tarasov
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This paper brings together and reviews widely scattered information, published or otherwise, on injury in ground surfaces and it should make it easier for a metallurgist to decide how to attack to best advantage problems involving possible or actual injury in a ground surface.

Methods of detecting cracks, stresses and burn in

ground surfaces are discussed first. This is followed by a description of cracks and crack patterns that have been observed in practice.

With this as a background, the metallurgical factors are considered that have been repeatedly shown to cause hardened steels to be susceptible during grinding to trouble from cracking or from unduly high stressing.

Numerous grinding factors are next taken up, and specific examples are presented regarding the influence of some of the more important ones upon possible injury to the ground surface. Finally, methods are discussed by which undesirable stresses may be eliminated from ground surfaces after grinding.

Stress Comparisons

By P. E. Cavanagh, Consulting Metallurgist
Allen B. DuMont Laboratories, Inc., Passaic, N. J.

Preliminary experiments described establish the fact that total core losses can be used to correlate with stresses in metals. The practical application of stress comparisons to production pieces is quite a different problem. Core losses are affected by a large number of variables such as analysis, heat treating history, grain size, etc. Major differences in core losses are sometimes caused by variations in physical properties which have no significant effect on service life. In order to apply such a correlation to production problems, all extraneous variables must be eliminated. This fact limits the application of the cyclograph in this field to the following instances:

1. Where parts are tested in the cyclograph, then stressed and tested to find the change in core losses. This procedure can be extended to testing samples during stressing.
2. Where it is definitely known that nothing varies from piece to piece except stresses.
3. Where it is possible to use the cyclograph at one frequency to first separate samples into groups in which the pieces are sufficiently similar in extraneous variables to allow subsequent successful correlation with stresses at another frequency.

Quenching stresses cause cracks. The cyclograph does not indicate the presence of a crack except in certain special instances where a crack may completely break the magnetic and electrical circuit in a closed ring.

A high-frequency oscillator which will compare total core losses in metal specimens seems admirably suited to rapid nondestructive stress comparisons. The method is only applicable in certain specific types of investigations and has definite limitations.

If used intelligently, core loss correlations can give useful information about stress conditions in ferrous and nonferrous metals. The possibility of predicting fatigue failure seems excellent in some instances.

Characteristics of Induction-Hardened Steel

By J. W. Poynter, Metallurgist, Materials Laboratory
Air Technical Service Command, Dayton, O.

Specimens of S.A.E. 4340 steel, heat treated by induced high frequency (355,000 - cycle) electric currents and quenched, have the same metallurgical characteristics as furnace-heated and quenched specimens. Depth of hardening is increased by increasing heating times (lower power input) to produce the same surface temperature or by heating to higher surface temperatures with the same power input. Transition between the hardened zone and the unaffected metal is cone shaped. Hardness of this transition zone is naturally less than that of the hardened zone and in some cases may be less than that of the unaffected metal.

Samples containing small carbide particles respond more readily to heat treatment than those in which the carbide particles are larger.

No evidence is found to indicate that induction heating results in more rapid solution and transformation rates and in the absence of grain coarsening at higher temperatures. It is believed that the effect of frequency on depth of hardening has been overemphasized since the rate of heat flow also has a definite effect on the depth of hardening.

Induction Hardening of Medium Carbon Steels

By D. L. Martin, Research Metallurgist
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and W. G. Van Note, Professor of Metallurgy
North Carolina State College, Raleigh, N. C.

The present paper is an account of a series of experiments designed to help establish a better understanding of the metallurgical factors which are of importance in induction hardening of steel.

The hardenability and austenitizing characteristics of the following medium carbon steels were studied: S.A.E 1050, 1350, 2350, 4160, and NE 9255, and the results discussed in their relation to the induction hardening characteristics.

Hardenability was found to be of secondary importance in surface induction hardening of steel, although a minimum hardenability is required to prevent the formation of soft spots in the hardened case. Generally the manganese, silicon, and residual elements found in commercial plain carbon steels impart sufficient hardenability for most surface hardening applications; however, occasions may arise where deeper hardening alloy steels may be required.

Effect of alloying elements on the induction hardening characteristics is related to their effect on the microstructure, critical temperatures, and hardenability. The ideal steel for induction hardening is one with low critical temperatures, little or no free ferrite, and medium to deep hardenability.

The slightly higher hardness of induction-hardened over furnace-hardened samples which has been frequently observed appears to be due to (a) compressive stresses in the martensitic zone of the surface-hardened samples, and (b) a finer martensitic structure with less retained austenite which is usually obtained by induction methods due to lack of homogenization during heating.

Results on the five steels showed that cracking occurred only when the samples were hardened to a great depth, and that the four alloy steels were more susceptible to cracking than the S.A.E. 1050 steel.

Metallurgists To Receive Awards At A.S.M. Annual Banquet

FOUR important awards for metal industry achievements will be made by the American Society for Metals during the 27th National Metal Congress and Exposition in Cleveland, Feb. 4-8. Presentation will be made at the annual banquet of the society, Hotel Statler, Thursday evening, Feb. 7.

Gerard Swope, General Electric Co., New York, will receive the A. S. M. Medal for the Advancement of Research as recognition of his pre-eminent share in many of the important developments in metallurgy in recent years. During his presidency of General Electric from 1922 to 1939 and again during the war emergency from 1942 to 1944, Mr. Swope demonstrated his faith in the future by his unfailing support of a program of research.

The Gold Medal of the A. S. M. recognizing outstanding metallurgical knowledge and a mature ability in the diagnosis and solution of diversified metallurgical problems will be presented to E. C. Smith, chief metallurgist, Republic Steel Corp., Cleveland. He early recognized that a producer of quality steels should be able to deliver to each buyer a metal especially adapted to meet the requirements, not only of the part to be manufactured but also of the machining, fabricating and heat treating practices existing in that specific plant. To put this policy into effect he recruited, trained and directed a group of men known as contact metallurgists. Because of his intimate contact with all phases of steelmaking he exercised an important influence on the development and interpretation of effect of grain size.

The 1945 Sauveur Achievement Award to R. S. Archer, Metallurgical Assistant to the Vice President, Climax Molybdenum Co., New York, is made for proven achievements in the metal industry. Mr. Archer's achievements are particularly evident at present in the greatly expanded aircraft industry. His greatest contributions are in the art of fabricating, compounding, and heat treating of aluminum alloys. Evaluation of his achievements may also be seen in the long list of patents which bear his name. Three alloys described in these patents may be said to be the base upon which present-day aluminum forging industry has been built.

The 1945 Howe Medal to the authors of the paper judged of highest merit, presented before the A. S. M. and published during the past year in the *Transactions* of the Society will be presented to D. P. Antia, S. G. Fletcher and M. Cohen for the paper entitled "Structural Changes During the Tempering of High-Carbon Steel", Dr. Cohen is associate professor physical metallurgy, M. I. T., and at the present time Dr. Antia is with Indian Aluminum Co., Calcutta, India, and S. G. Fletcher is chief research metallurgist for Latrobe Electric Steel Co., Latrobe, Pa.

A.S.M. Program

(*Concuded from Page* 129)

Aluminum Co. of America, New Kensington, Pa.

Hotel Statler—10:30 a.m.

Magnesium (Lecture No. 5)

"Corrosion," by W. B. Loose, Dow Chemical Co., Midland, Mich.

Induction Heating (Lecture No. 5)

"Comparison of Induction Heating to Other Methods of Heat Treating," by T. E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa.

Surface Stressing (Lecture No. 5)

"Progressive Stress Damage," by Peter R. Kosting, Watertown Arsenal, Watertown, Mass.

Corrosion (Lecture No. 5)

"Corrosion of Copper and Brass," by H. L. Burghoff, research metallurgist, Chase Brass & Copper Co., Waterbury, Conn.

Radium and X-Ray Program

Speakers scheduled to appear on three-day program sponsored by American Industrial Radium & X-Ray Society provide much new data on inspection and testing.

Wednesday

February 6, 1946

10:00 A. M.

Short business meeting.

10:30 A. M.

Lester lecture on "Advances in Steel Weldments in the Past Few Years" by O. R. Carpenter, Babcock & Wilcox Co., Barberton, O.

2:00 P. M.

"Fluoroscopy" by Doctors Clark and Cassen, California Institute of Technology, Pasadena, Calif.

"Spot Weld Radiography" by G. W. Scott Jr., Assistant Chief Physicist, Armstrong Cork Co., Lancaster, Pa.

"Radium's Position in Industrial Radiography of the Future" by Lt. D. H. Wise, USNR, Office of Inspector of Naval Material, San Francisco.

Thursday

February 7, 1946

10:00 A. M.

"The Radiography of Captured Enemy Equipment by the U. S. Navy" by Lt. D. T. O'Connor, Radiographic Officer, Ordnance Investigation Laboratory, Indian Head, Md.

"Device and Method of Quantitative Analysis by X-Ray Diffraction" by S. A. Brosky, Pittsburgh Testing Laboratory, Pittsburgh.

"The Influence of Inherent Filtration of the X-Ray Tube in Industrial Radiography and Fluoroscopy" by E. D. Trout, General Electric X-Ray Corp., Chicago.

2:00 P. M.

"X-Ray in the Inspection of Ammunition" by Capt. R. E. Thorpe, Army Inspector of Ordnance, Iowa Ordnance Plant, Burlington, Iowa.

"Gamma Radiography of Rail Welds in Moffet Tunnel" by R. McBrian, Denver & Rio Grande Railroad Co., Denver.

Friday

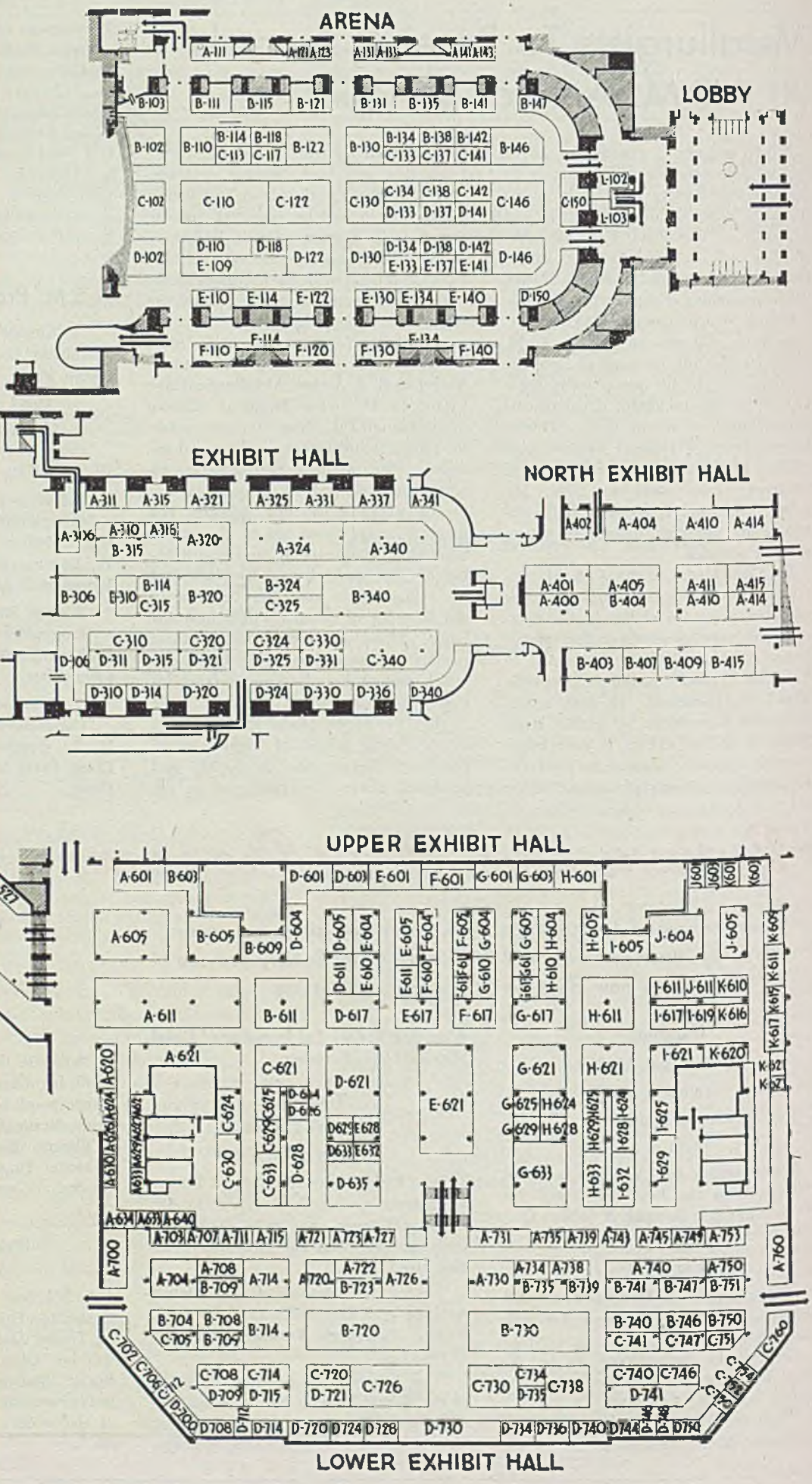
February 8, 1946

10:00 A. M.

A full day symposium sponsored by Committee E-7 of the American Society for Testing Materials, the theme of which will be "Ultra High-Voltage and High-Speed Radiography," comprising subjects of current interest discussed by some of the world's most outstanding speakers.

XPOSITION

floor plan



A

Ace Abrasive Laboratories, New York ..... G 605
Agaloy Tubing Co., Springfield, O. ..... A 749
Aimes Engineering Co., Cleveland ..... D 744
Air Hydraulics, Jackson, Mich ..... K 631
Air Reduction Sales Co., New York ..... D 621
Akron Bronze & Aluminum Co., Akron, O. ..... F 110
Allegheny Ludlum Steel Corp., Brackenridge, Pa. ..... B 410
Allen Mfg. Co., Hartford, Conn. ..... B 142
Allis-Chalmers Mfg. Co., Milwaukee ..... C 603
Allison Co., Bridgeport, Conn. ..... D 315
Alloy Casting Co., Champaign, Ill. ..... C 113
Alox Corp., Niagara Falls, N. Y. ..... P 521
Aluminum Co. of America, Pittsburgh ..... C 122
Aluminum Industries, Inc., Cincinnati ..... A 334
Alvey-Ferguson Co., Cincinnati ..... G 608
American Brake Shoe Co., Elyria, O. ..... B 122
American Brass Co., Waterbury, Conn. ..... D 320
American Chain & Cable Co., Inc., Bridgeport, Conn. ..... D 311 & 314
American Chain Ladder Co., New York ..... C 736
American Cyanamid & Chemical Corp., New York ..... P 523
American Cystoscope Makers, Inc., New York ..... H 610
American Foundrymen's Assoc., Chicago ..... E 109
American Gas Association, New York ..... F 617
American Gas Furnace Co., Elizabeth, N. J. C-110
American Machine & Gage Co., Chicago ..... H 633
American Machinist, New York ..... H 604
American Machine & Metals, Inc., East Moline, Ill. ..... E 604
American Measuring Instruments Corp., New York ..... F 130
American Photocopy Equipment Co., Chicago ..... A 321
American Welding & Mfg. Co., Warren, O. ..... A 739
Ampco Metal, Inc., Milwaukee, Wis. ..... D 611
Anderson Brothers Mfg. Co., Rockford, Ill. ..... D 310
Anderson Oil Co., F. E., Portland, Conn. ..... H 621
Annis Co., R. B., Indianapolis ..... I 627
Ansco Div. — General Aniline & Film Corp., Binghamton, N. Y. ..... E 137
Aro Equipment Corp., Bryan, O. ..... C 633
Adkins & Co., E. C., Indianapolis ..... A 760
Atlas Metal Stamping Co., Philadelphia ..... B 741
Austenal Laboratories, Inc., New York ..... G 604
Automatic Temperature Control Co., Inc., Philadelphia ..... B 310
Automatic Transportation Co., Chicago ..... A 405
Automotive & Aviation Industries, Philadelphia ..... A 131
Avery Engineering Co., Cleveland ..... C 630

B

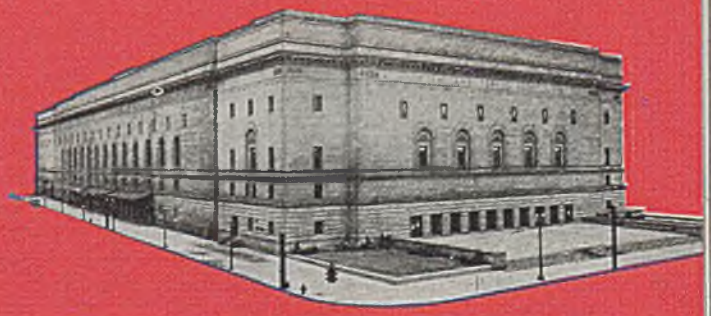
Baker-Raulang Co., Cleveland ..... D 604
Barco Machine Products Co., Cleveland C709
Barrett-Cravens Co., Chicago ..... C 624
Bath Co., Cyril, Cleveland ..... B 736
Bausch & Lomb Optical Co., Rochester, N. Y. ..... B 141
Bell & Gossett Co., Morton Grove, Ill. ..... G 617
Bellis Heat Treating Co., Branford, Conn. ..... A 306
Bergen Precision Castings Co., Pleasantville, N. Y. ..... B 118
Beryllium Corp. of Pa., Reading, Pa. ..... B 709
Black Drill Co., Cleveland ..... E 114
Black Mfg. Co., Baltimore, Md. ..... C 754
Braeburn Alloy Steel Corp., Braeburn, Pa. ..... D 728
Bramson Publishing Co., Detroit ..... B 725
Brickseal Refractory Co., Hoboken, N. J. ..... D 750
Bridgeport Brass Co., Bridgeport, Conn. ..... A 315
Briggs Mfg. Co., Cleveland ..... I 621
Brown Corp., W. R., Chicago ..... C 736
Bruning Co., Inc., Charles, Chicago ..... C 741
Brush Beryllium Co., Cleveland ..... H 614
Brush Development Co., Cleveland ..... E 617

EXHIBITORS

...At the National Metal Exposition

Public Hall, East Sixth and Lakeside Avenue, Cleveland

(Exposition opens at noon and closes at 10:30 p.m. on Monday, Tuesday and Wednesday, February 4, 5 and 6; on Thursday and Friday, February 7 and 8, exposition opens at 10 a.m. and closes at 6 p.m. Booths may be located by referring to the floor plan on the opposite page.)



Industrial Press, New York ..... E 133
Industrial Publishing Co., Cleveland ..... P 510
Industrial Steels, Inc., Cambridge, Mass. ..... D 130
Industrial Tape Corp., New Brunswick, N. J. ..... B 746
Industry & Welding, Cleveland ..... P 510
Infra-Red Engineers & Designers, Cleveland ..... A 123
Instrument Specialties Co., Little Falls, N. Y. ..... D 335
Intercontinental Engineers, Inc., Chicago ..... C 332
International Nickel Co., New York ..... B 102
Iron Age, New York ..... C 150

J

Jack & Heintz, Inc., Cleveland ..... B 320
Janney Cylinder Co., Philadelphia ..... H 605
Jones Co., C. Walker, Philadelphia ..... I 624

K

Kelley Co., J. W., Cleveland ..... C 137
Kennametal Inc., Latrobe, Pa. ..... B 130
Kerr Dental Mfg. Co., Detroit ..... I 629
Kett Tool Co., Cincinnati ..... D 737
King, Andrew, Narberth, Pa. ..... D 118
Kinzie Stampers Div., Chicago ..... H 633
Kolene Corp., Detroit ..... C 114
Krouse Testing Machine Co., Columbus, O. ..... A 734
Kux Machine Co., Chicago ..... A 311

L

Lakeside Steel Improvement Co., Cleveland ..... E 122
Lectroetch Co., E. Cleveland ..... L 102
Lempco Products, Inc., Bedford, O. ..... C 620
Lepel High Frequency Laboratories, Inc., New York ..... K 615
Lester-Phoenix, Inc., Cleveland ..... A 330
Lewis-Shephard Products, Inc., Watertown, Mass. ..... D 617
Lieser, George H., Berea, O. ..... A 704
Light Metal Age, Chicago ..... D 712
Lincoln Engineering Co., St. Louis ..... A 740
Lindberg Engineering Co., Chicago ..... D 146
Linde Air Products Co., New York ..... G 621
Lion Mechanical Works, Long Island, N. Y. ..... I 625
Lithaloys Corp., New York ..... A 714
Lithium Co., Newark, N. J. ..... E 117
Lord Mfg. Co., Erie, Pa. ..... C 760
Lukens Steel Co., Coatesville, Pa. ..... B 110
Lukenweld, Inc., Coatesville, Pa. ..... B 110

M

MACHINE DESIGN, Cleveland ..... P 504
Machine Tool Blue Book, Chicago ..... J 601
Machinery, New York ..... E 133
Magnaflux Corp. ..... D 113
Magnetic Analysis Corp., Long Island, N. Y. ..... B 121
Malleable Founders' Society, Cleveland ..... H 607
Mallory & Co., Inc., P. R., Indianapolis ..... F 601
Manhattan Rubber Mfg. — Div. of Raybestos-Manhattan, Inc., Passaic, N. J. ..... A 605
Manufacturers Screw Products, Chicago ..... D 741
Martindale Electric Co., Cleveland ..... A 715
Materials & Methods, New York ..... B 600
McGraw-Hill Publ. Co., Inc., New York ..... H 601
Melville Shoe Corp., New York ..... K 621
Metal Finishing, New York ..... K 637
Metal Finishing Service, Chicago ..... C 747
Metal Hydrides, Inc., Beverly, Mass. ..... C 629
Metal Industries Catalog, New York ..... B 600
Metallizing Co. of America, Chicago ..... I 619
Metals & Alloys, New York ..... B 600
Michiana Products Corp., Michigan City, Ind. ..... B 131
Midvale Co., Nicetown-Philadelphia E-611
Milne & Co., A., New York ..... D 710
Mine Safety Appliance Co., Pittsburgh ..... B 111
Modern Machine Shop, Cincinnati ..... I 632
Modern Metals, Chicago ..... F 120
Molybdenum Corp. of America, Pittsburgh ..... C 133
Monarch Steel Co., Indianapolis ..... P 526
Monroe Tool & Mfg. Co., Monroe, Mich. ..... A 331
Morse Twist Drill & Machine Co., New Bedford, Mass. ..... D 736
Motch & Merryweather Machinery Corp., Cleveland ..... E 621
Moto-True Co., Cleveland ..... K 620
Motor Products Co., N. Chicago ..... D 714
Mueller Co., Niles, Mich. ..... K 623

N

National Bronze & Aluminum Foundry Co., Cleveland ..... B 751
National Carbon Co., Inc., New York ..... G 621
National Diamond Hone & Wheel Co., New York ..... C 712
National Engineering Co., Chicago ..... B 115
National Industrial Pub. Co., Pittsburgh ..... D 745
National Lead Co., Cleveland ..... G 609
Nelson Specialty Welding Equipment Corp., Chicago ..... P 502
NEW EQUIPMENT DIGEST, Cleveland ..... P 504
New-Field Co., Los Angeles ..... D 737
New Jersey Zinc Co., New York ..... B 730
Nichols-Morris Corp., New York ..... C 634
North American Mfg. Co., Cleveland ..... C 320
North American Philips Co., Inc., New York ..... A 415
Norton Co., Worcester, Mass. ..... D 603

O

Office Devices Co., Chicago ..... H 633
Oakite Products, Inc., New York ..... E 134
Oficina Mechanica Moderna ..... I 632
Ohio Carbon Co., Cleveland ..... A 634
Ohio Crankshaft Co., Cleveland ..... A 324
Ohio Overall Cleaning Co., Cleveland ..... H 601
Ohio Seamless Tube Co., Shelby, O. ..... K 610
Ohio Steel Foundry Co., Springfield, O. ..... D 134
Olsen Testing Machine Co., Tinius, Philadelphia ..... C 625
Osborn Mfg. Co., Cleveland ..... B 331
Owens-Corning Fiberglas Corp., Toledo, O. ..... A 730

P

Page Steel & Wire Division, Monessen, Pa. ..... D 314
Parker Appliance Co., Cleveland ..... E 601
Parker-Kalon Corp., New York ..... A 703
Peerless Gear & Machine Co., Cleveland ..... D 708
Penton Publishing Co., Cleveland ..... P 504
Peters-Dalton, Inc., Detroit ..... B 611
Phillips Mfg. Co., Chicago ..... A 723
Physicists Research Co., Ann Arbor, Mich. ..... H 625
Pines Engineering Co., Aurora, Ill. ..... A 700
Pioneer Alloy Products Co., Inc., Cleveland ..... K 639
Pond Engineering Co., Springfield, Mass. ..... A 625
Porter-Cable Machine Co., Syracuse, N. Y. ..... L 103
Powermatic Ventilator Co., Cleveland ..... E 610
Precise Products Co., Racine, Wis. ..... A 309
Precision Scientific Co., Chicago ..... I 605
Production Devices, Inc., Whitehall, N. Y. ..... A 638
Production Engineering & Management, Detroit ..... B 725

...SEE REVERE AT THE METAL SHOW CLEVELAND, FEBRUARY 4-8

AT the FIRST RECONVERSION SHOW be sure to see the Revere Exhibit. You will find it in Space B-306, the same location in which you found us in the two previous Metal Shows.

Now we are able to point out, openly, definitely and in much more detail than ever before, the amazing advances in metallurgy born of war. In addition we shall re-emphasize the virtues of the more familiar Revere mill products.

Look for exhibits of Revere magnesium and aluminum, of the new specially-prepared switch copper, the new Free-Cutting Copper, the Certified Oxygen-Free High Conductivity Copper, the amazing special finishes available for Radar, and other products of copper, brass and bronze offering great peace-time potentialities.

Revere Technical Advisors and representatives will be available to assist you.

Revere Exhibit at the 1944 Metal Show

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DUAL SYSTEM FOR

CLEANING BLAST FURNACE GAS

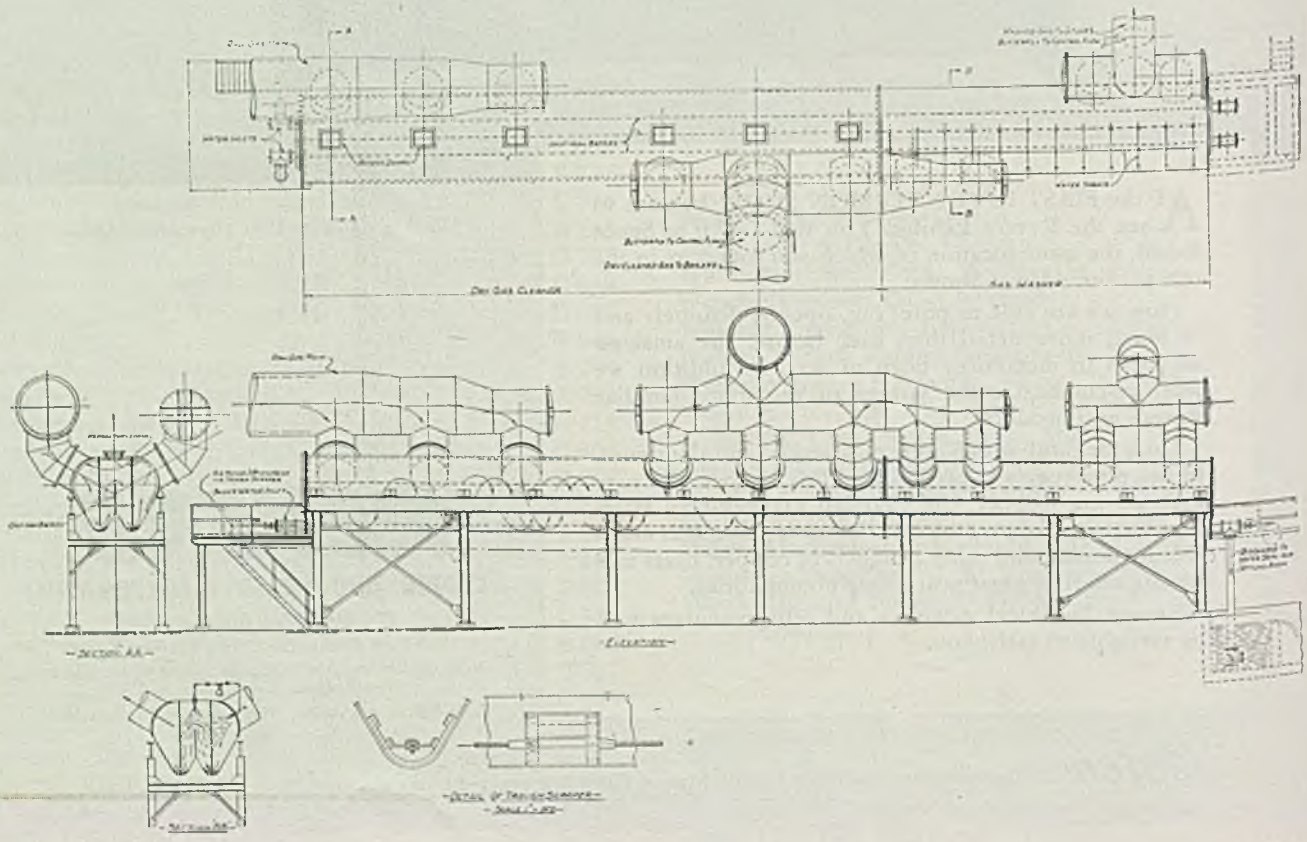
Details of Dovel type combination dry gas cleaner and washer

GAS CLEANING is an important step in blast furnace operation. Operators who have fully appreciated the great economical advantages derived from the proper handling of blast furnace gases point out that cleaning of the gases is more important now than in the past because of higher prices of coke.

Equipment for dry cleaning gas designed by J. P. Dovel, Birmingham, Ala., was first installed about 1910. It was built to reduce the amount of dust carried by the gases down to 0.3-grain per cu ft without any appreciable loss of sensible heat. This degree of cleanliness is sufficient for boilers and hot blast stoves equipped with large checkers, but for small checker stoves, gas engines, by-product coke ovens, or for gas mixing purpose, a higher degree of cleanliness is required.

Consequently, the cleaner was redesigned to fit in with the general plan layout of a present-day blast furnace plant. In the accompanying illustration it will be seen that the gages are first dry cleaned, then recleaned in a combination dry and wet process for uses other than the boilers. The cleaner represents two methods built into one structure, using the same system of conveying the entrained dust out of the cleaner. This conveying system consists of a stream of water circulating through the entire structure, thereby presenting a clean wet surface which entrains the dust thrown

Elevation and plan view of gas cleaner for preparing blast furnace gas for boilers and gas washer for recleaning it in a combination dry and wet washer for burning in the hot blast stoves equipped with large checker brick



Die and Punch life INCREASED 75 TIMES *in drawing Beryllium Copper!*

IN THE FORMING of tough beryllium copper parts, steel dies and punches wore rapidly . . . required frequent downtime for reconditioning. To remedy this, Carboloy Cemented Carbide replaced tool steel at two critical points especially subject to rapid abrasive action: the draw ring and extruding punch.

The result: Die and punch life stepped up 75 times . . . elimination of two costly copper plating operations formerly needed to insure adequate lubrication . . . quality of finish vastly improved.

Whether you work with beryllium copper, or any other metal, Carboloy Sheet Metal Dies will increase production, improve quality, decrease costs, keep presses in more continuous operation, and reduce —often eliminate—subsequent buffing or polishing.

Carboloy Die Specialists can show you how to get these outstanding benefits on your sheet metal operations also.

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down by centrifugal force as the gases pass around a baffle at short radius.

In the dry cleaner portion, the gases after being spread out in a thin sheet, are treated twice by this method.

In the wet portion the gases have finally had the benefit of four treatments by centrifugal action and have passed through two sprays. One of the difficulties of cleaning gas by the wet method has been the tendency of the cleaner to become clogged with accumulated dust and thus necessitate a shutdown of the furnace for a cleanout. Another difficulty has been to saturate large quantities of dust and get it out of the cleaner.

No large amount of water is required for the sprays as there is little dirt to be wetted. A small amount of dust going to this section of the cleaner is fine, extremely light and it is mostly trapped on the wet surface rather than by saturation. All difficulty due to the clogging or building up in the cleaner, is completely eliminated by a cleaning device which keeps the cleaner in operating condition at all times. This device prevents the formation of sludge at the only point in the cleaner where the dust has a tendency to start building, namely, around the edges of the flowing conveyor water. This point of trouble is kept clean at all times and requires only a tiny air motor for its operation and about 10 minutes of the stoveman's time each day.

Another important feature of this cleaner is a simple adjustable means for directing the proper amount of gas to the hot blast stoves and the remainder to the boilers. Too much gas going to the hot blast stoves is almost as bad as too little.

Effective results in present-day blast furnace practice cannot be expected unless the hot blast system gives maximum efficiency at all times. Improved results will come from salvaging every possible heat unit and applying it at high temperatures.

Preventing Graphitization

. . . . . in power plant steam pipes

USE of low aluminum or silicon-killed carbon-molybdenum steels with initial graphite content of not more than 0.01 per cent, or chromium-molybdenum steels containing 0.50-1.00 per cent chromium and 0.50 molybdenum, for the manufacture of pipes for power plant steam lines was discussed recently by Dr. S. L. Hoyt, technical adviser, Battelle Memorial Institute, Columbus, O., as a possible means of preventing graphitization in such lines.

This possible solution to one of the most perplexing technical problems of the power industry was proposed by Dr. Hoyt in a summary report covering the findings of various research investigations, presented before American Society of Mechanical Engineers. Dr. Hoyt also suggested the practice of stress-relieving pipe joints after welding and the replacement of severely graphitized pipe in service.

"Though joints exhibiting some graphitization in service can generally be 'healed' by normalizing at 1650-1700° F", he said, "they should be checked periodically. When a joint is severely graphitized, the only safe procedure is to cut it out and reweld, or replace it with a spool of new pipe. In fact, where severe graphitization is encountered in a large number of joints throughout the installation, it is safest to replace all the pipe with a type resistant to graphitization."

Some possible causes of graphitization of high-pressure steam lines were named in the report. The deoxidation practice used in making steels which are presumably of the graphitizable type was stated as having a pronounced effect on graphitization. In particular, the use of from 1½ to 2 lb aluminum per ton of steel is sufficient to promote it in both carbon and carbon-molybdenum types of steel. Steels deoxidized with not over ½-lb aluminum per ton and straight silicon-killed steels were found to be relatively immune to graphitization.

Cause of Graphitization

There are indications, Dr. Hoyt stated, that the amount of free carbon in steels may affect, or at least indicate, the tendency to graphitize. Tests have shown that the nongraphitizing steels contained not over 0.01 per cent free carbon and the graphitizing steels about 0.04 per cent. Manganese and silicon, are both known to affect graphitization, but, to date, no specific effects of these elements have been uncovered. Molybdenum and particularly chromium have a stabilizing effect and tend to keep the steel from graphitizing.

While random graphitization can occur in steel pipe without causing undue alarm, the heat effects of welding establish a highly critical zone, he pointed out. This is the major, though not the sole, cause of segregated graphite in steam lines. Stress relieving carried out at temperatures high enough to eradicate the structure of the heat-affected zone have an important effect on the elimination of segregated graphite, but this treatment should be regarded as a "corrective measure" for use with a known or suspected graphitizable steel and not as a substitute for a stable steel.

The report presented by Dr. Hoyt was written jointly by himself, R. D. Williams, and A. M. Hall, all of the Battelle staff. It summarized the findings to date on graphitization investigations conducted both at Battelle and elsewhere.

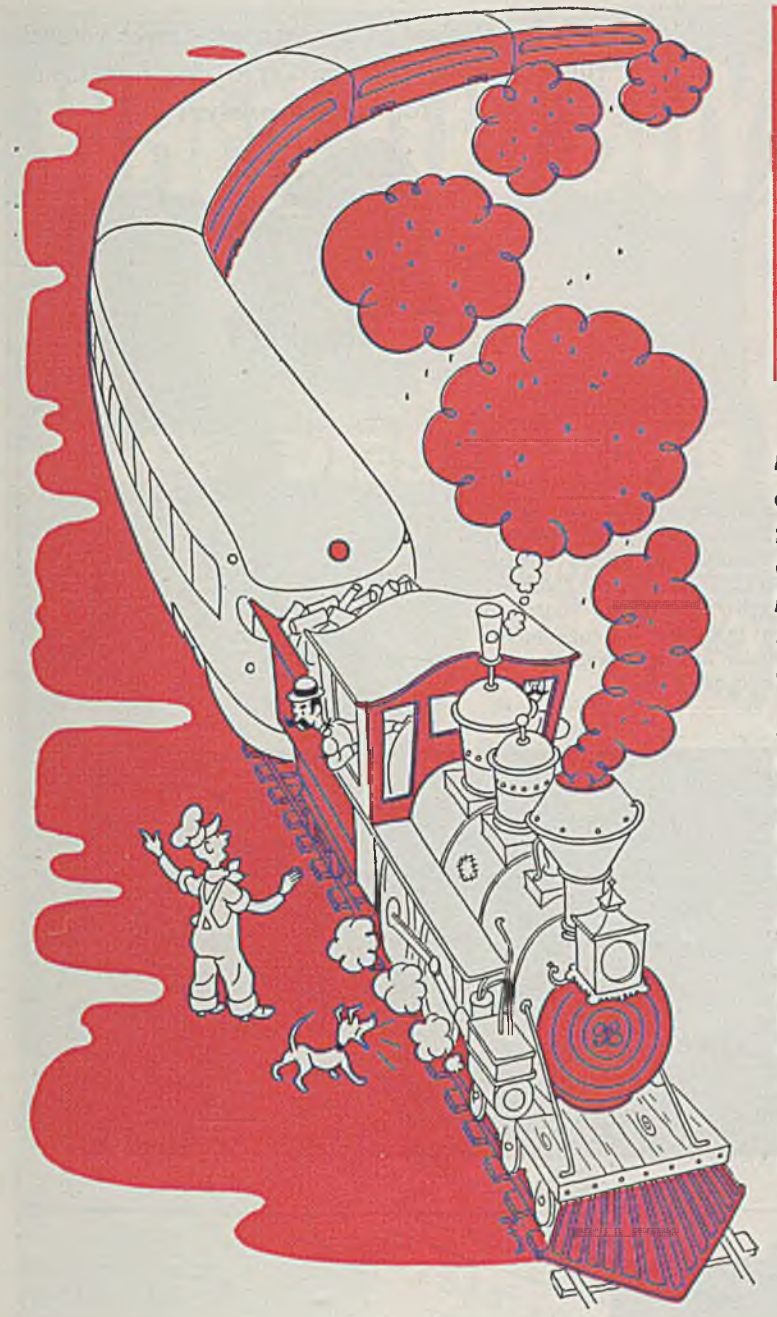
Power companies and metallurgists of the country have been acutely interested in the graphitization of steam lines since the failure of a welded joint in a high-pressure steam line in New Jersey, January, 1943. Investigations on the causes of the failure were immediately begun by various interested groups in industrial laboratories, universities, and research institutes. The research at Battelle Memorial Institute was conducted under the auspicies of the Edison Electric Institute and the Association of Edison Illuminating Companies.

Grain Size Study Reported

Publication of the study "Grain Sizes Produced by Recrystallization and Coalescence in Cold-Rolled Cartridge Brass," by Harold L. Walker, has been announced by the University of Illinois, Urbana, Ill. It is Bulletin No. 359 of the university's Engineering Experiment Station.

The new bulletin describes an experiment designed to distinguish between the grain sizes produced by true recrystallization and those produced by coalescence.

Bulletin also presents data which contribute to a better understanding of processes of recrystallization.



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Nor would you put carbide cutting tools on a lathe that cannot transmit the power to use them at their maximum efficiency. Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Jones & Lamson Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of carbide tools. They have the rigidity, they can transmit the power, they are easy to operate.

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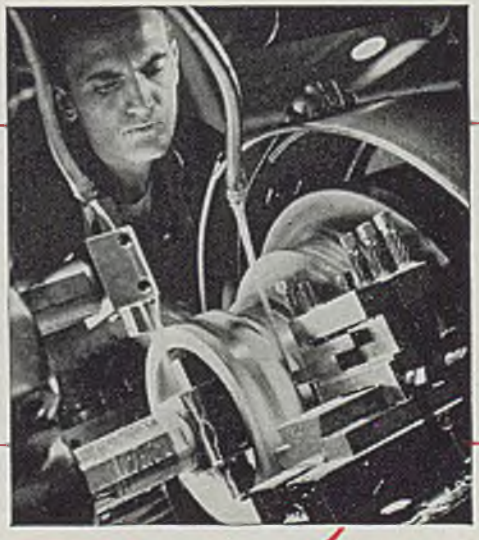
What HORSEPOWER Are You Using?

Combined cuts like these, require as much as 300 per cent more horsepower with carbide tools than with high speed steel tools, but carbide halves the cutting time.



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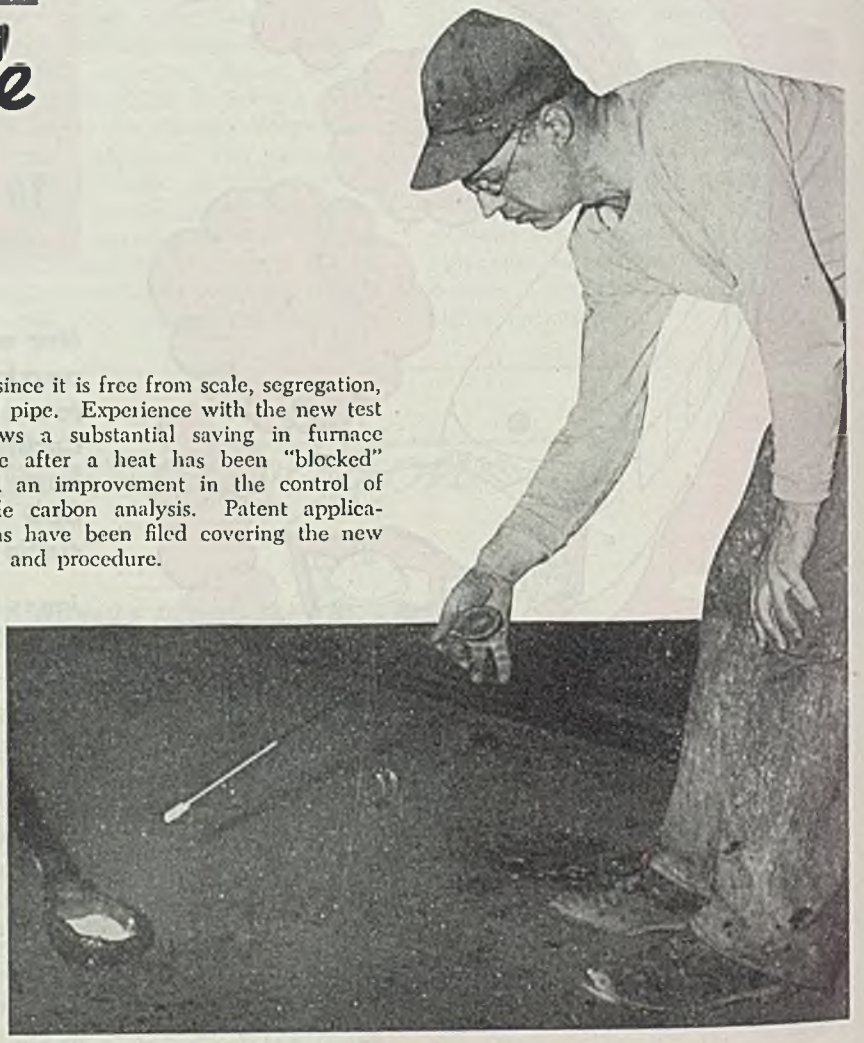
NOVEL Test Sample

Speeds Tap Carbon Analysis

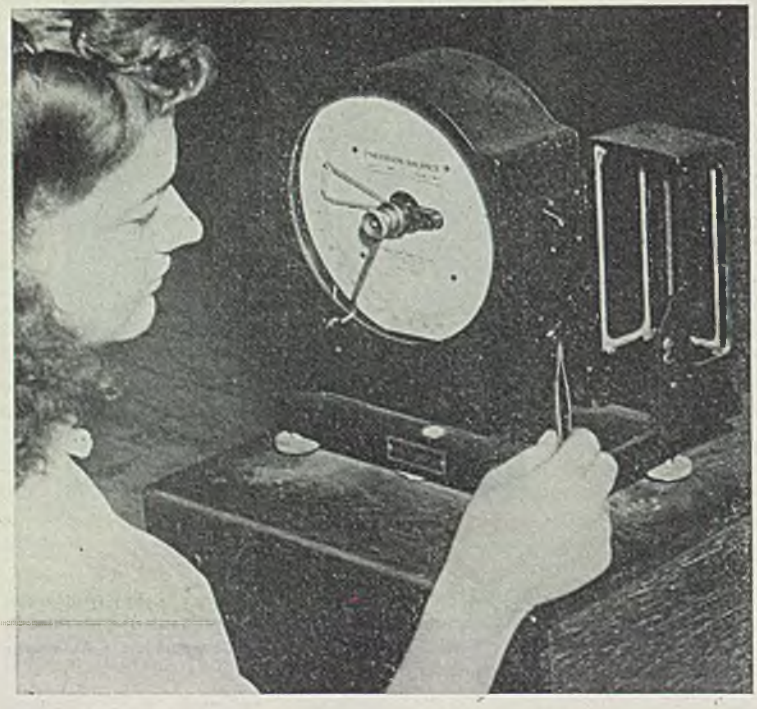
White hot steel in a glass tube saves valuable furnace time in preparing a slag-free sample for carbon analysis



TAP carbon analysis has been speeded up considerably at National Tube Co.'s National Works by a novel sampling procedure now in standard use at several United States Steel Corp. subsidiary plants. The procedure consists of taking a test spoonful of slag-free metal from the bath, killing the steel with aluminum wire and drawing up a column of approximately 6 in. of clean steel at 3000°F into a 6 mm pyrex glass tube by means of a 1 oz rubber bulb.

Caution must be exercised to assure that no slag covers the surface from which the sample is drawn and that no time is lost between withdrawing the spoon from the bath and taking the glass tube sample. The sample is quenched in water, the glass broken from the steel and a test piece ¾-in. long sheared from the center of the rod by wire clippers. This test piece is weighed directly and fused under standard conditions in a high-temperature combustion furnace for carbon determination. The entire process requires approximately 12 min.

The test piece is ideal for carbon analysis since it is free from scale, segregation, and pipe. Experience with the new test shows a substantial saving in furnace time after a heat has been "blocked" and an improvement in the control of ladle carbon analysis. Patent applications have been filed covering the new test and procedure.



MEASURES DIAMETER BY WEIGHT: By weighing a unit-length sample on a torsion balance accurate to 2/10-milligram, and calculating this with its density, wire diameter can be computed. This method is used for wires too small for precision micrometers at North American Philips Co. Inc., Dobbs Ferry, N. Y.

Precision Casting Practice

(*Continued from Page* 118)

other problems encountered in casting, waxes vary from the soft, slow-chilling type to the hard, rapid-chilling variety. Generally, soft, slow-cooling waxes are of little use in precision casting, as they are inefficient and have an inherent danger of pattern distortion. A precision pattern wax formulated for medium chilling, and a modifying wax for fast chilling, are blended by Kerr to obtain practically any physical characteristics desired. This combination appears suitable for a wide range of operating and pattern characteristics, and is especially useful when wax is to be injected at high speed for a rapid rate of pattern production in large-volume production.

Wax Injection: Wax injection units designed and built especially for producing Army equipment parts are shown in Fig. 3. Purpose of these units is to completely fill the mold, thus minimizing wax shrinkage. Mold also must be filled quickly, regardless of size, or "cold-shots" will appear on the surface of the pattern. Lowest possible temperature, and highest possible pressure will provide minimum shrinkage. Experience indicates that as wax pressure is increased, temperature of the wax can be reduced. Lower tax temperatures reduce heat radiation into the mold and shorten time necessary for solidification of pattern, an advantageous condition for production operations.

Wax injection units shown in Fig. 3 are hydraulically powered and completely automatic in operation. Mold is closed, cores put into place, and wax is injected by the operator simply by moving control lever to the left. A chilling time of 5 sec is allowed for the wax, lever is moved to the right, sequence reversed, and pattern removed from the mold. Each of the six units mounted on table is capable of producing wax patterns at the rate of 3 per min. Temperature and pressure of the wax is accurately controlled by the use of instruments.

Gating and Mounting: The gate — the channel in a mold through which the molten metal will flow into the cavity which remains in the investment after the wax pattern has been eliminated — is very important in precision casting. Its position should be carefully determined by the factors which affect the proper solidification of metal. Metal should solidify first in the mold, preferably at the extreme end of the casting. Solidification then should proceed back through the casting, through the gate, and into the riser, in that order. This sequence allows fluid metal to flow into the casting and replace the metal lost by shrinkage.

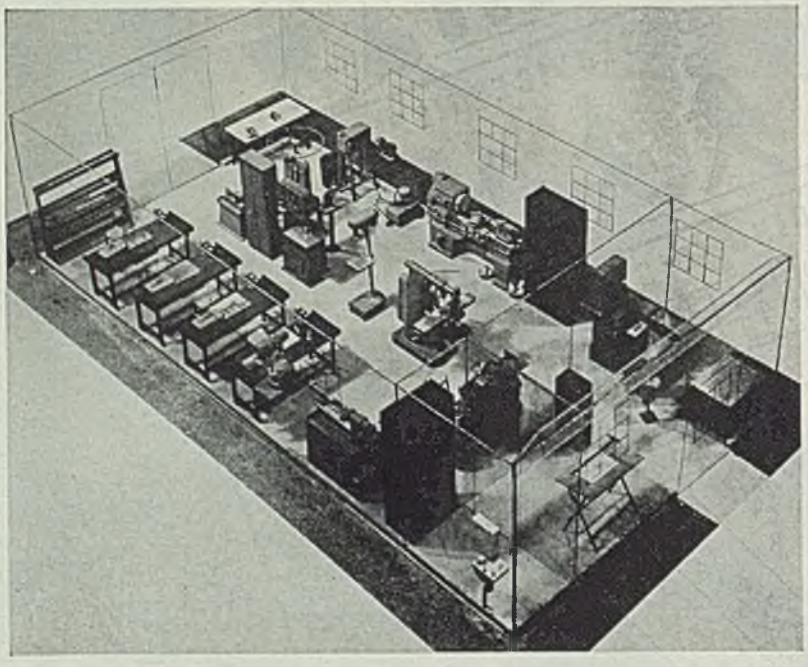
The gate should "feed" the bulkiest section of the pattern, because the greater bulk will be the slowest to chill. Fluid metal from this section also will pass into gate. Individual sprues—the holes through which the metal is poured into the gate and thence into the mold—should serve heavy sections separated by thinner sections, when there are two or more heavy sections.

For slower cooling in the gate and to provide a continuous feed, the gate should, theoretically, be larger than the casting. It has been Kerr's experience, however, that where there is a short sprue, a bulky riser has a pronounced effect upon metal solidification. Heat radiation from the riser apparently is sufficient in the case of a short sprue to keep this passage open, even though it is considerably smaller than the attached part. It is necessary, nevertheless, for the riser to be of greater bulk than the bulkiest section of the casting. Careful consideration should be given to both the size and shape of the crucible former, as the size of the riser is limited by the dimensions of the cone on the crucible former plate used for mounting the wax patterns.

Investing the Wax Patterns: Wax patterns are shown mounted on a sprue base and ready for investing above in Fig. 4. To contain the investing compound, a metal tube or flask is used. Asbestos 1/16-in. thick usually is used to line the flask, with the exception of a short space at each end, as shown below in Fig. 4. Length of flask will cause variations in this space, but the space is not critical. For a 3-in. flask, for example, the asbestos should be ¼-in. short at each end. Distance should be increased proportionally for longer flasks. Metal is left exposed, and flask inserted in water and wet asbestos pressed to flask.

Asbestos cushions lateral movement of investment in flask, and bare metal at each end of flask will confine expansion to within dimension limits of flask, preventing cracking as a result of free expansion. This is essential when using an investment compound of high thermal expansion, such as Cristobalite, which causes the mold to become larger upon the application of heat to burn out the wax. Accuracy of casting is influenced by asbestos lining — tests made with and without asbestos show differences as great as 3/1000-in. in lateral dimensions. Use of asbestos also permits easy removal of investment from flask, usually with a plunger-type knockout press. The press modifies the danger of damaging castings or flask.

Thoroughly mixed investment then is poured into the container, as shown in Fig. 5. High vacuum is used to eliminate entrapped air. After pouring, the flask is again exposed to vacuum (extreme



PACKAGED MACHINE SHOP: One of first uses of scale models to show features of new products is this model of a four-man tool and die shop exhibited by DoALL Co., Minneapolis, at the 27th National Metal Congress and Exposition in Cleveland. It is one of the company's eight packaged shops, expected to be of especial interest to returning servicemen and others setting up small enterprizes

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right of illustration) to eliminate any air that entered during the pouring. Under a high vacuum, the investment should "boil". Investment then is allowed to "set" for at least 1 hr before going to the burnout furnace.

Investment Compounds: Early investment compounds consisted of a mixture of quartz and plaster. These materials, however, usually had a low thermal expansion, and in dentistry, could not fully compensate for the shrinkage of the wax pattern and the cast gold. In 1932, Cristobalite compound was made available for general use by Kerr. Its name was derived from the use of a new ingredient for investment compounds, cristobalite (silica, SiO_2, in white octahedra), which has many unusual physical properties as compared to quartz. Cristobalite has a high thermal expansion, and this fully compensates for the gold shrinkage encountered in the casting of a dental inlay. Fig. 6 gives the comparative thermal expansion curves of a quartz investment and Cristobalite.

Manufacturing jewelers next became interested in the use of the cristobalite and plaster investment as a means of obtaining accurate reproduction of detail and smoothness of casting in duplicating ring models. The method is almost universally used in this industry today, and the compound has been found a satisfactory investing material. It is readily mixed at several different consistencies to meet specific physical properties. Its range starts at 40 cc or grams of water to 100 grams Cristobalite, and can be used up to and including 50 cc or grams of water to 100 grams of powder. Consistency of the compound, of course, becomes thinner as the quantity of water is increased. A slightly longer setting time is required when using the thinner consistencies, and strength of the mold will be reduced in proportion to the increase in the amount of water, as shown by the chart for water/powder ratio vs. crushing strength, Fig. 7.

Differences in the consistency of the mix also will affect the amount of thermal expansion obtained from the Cristobalite, as shown in Fig. 8.

Consistency of the mix usually is determined by the weight of the compound. A thinner mix is most desirable for small delicate parts. Air also is removed most easily from the thinner mixes. Heavier consistencies are desirable for heavy castings because of the amount of force that must be applied against the investment in casting the greater bulk of metal. Accuracy in casting demands that the compound and water be weighed for every mix. Cristobalite may be mixed by proportion of any convenient unit of weight. Previously, the water-Cristobalite proportions were given in

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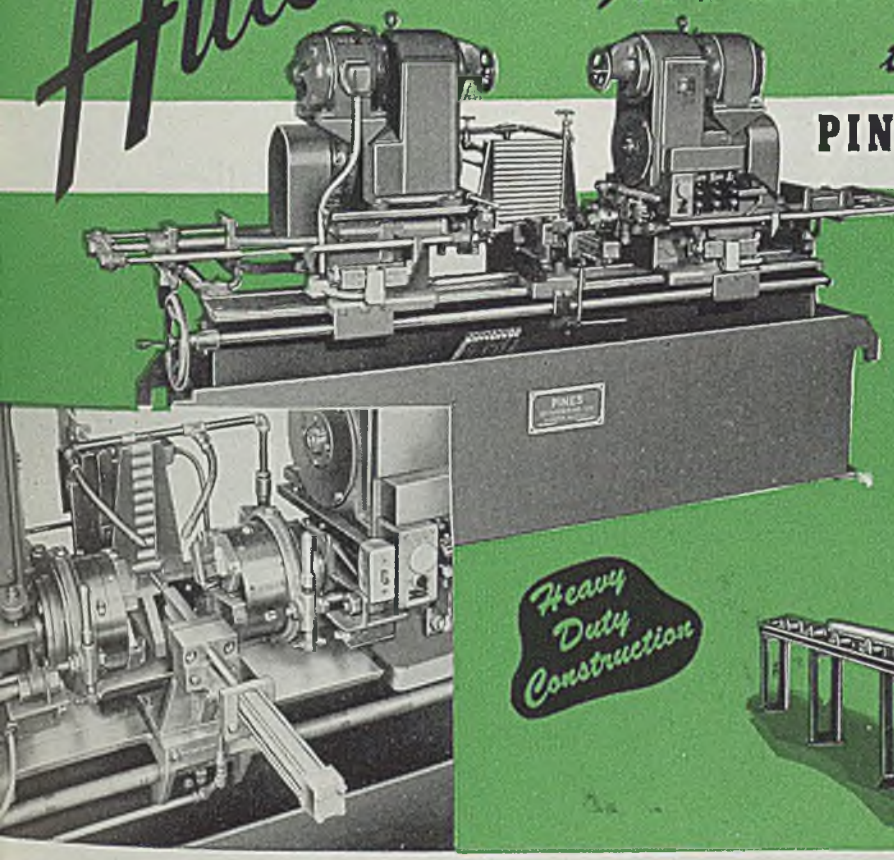
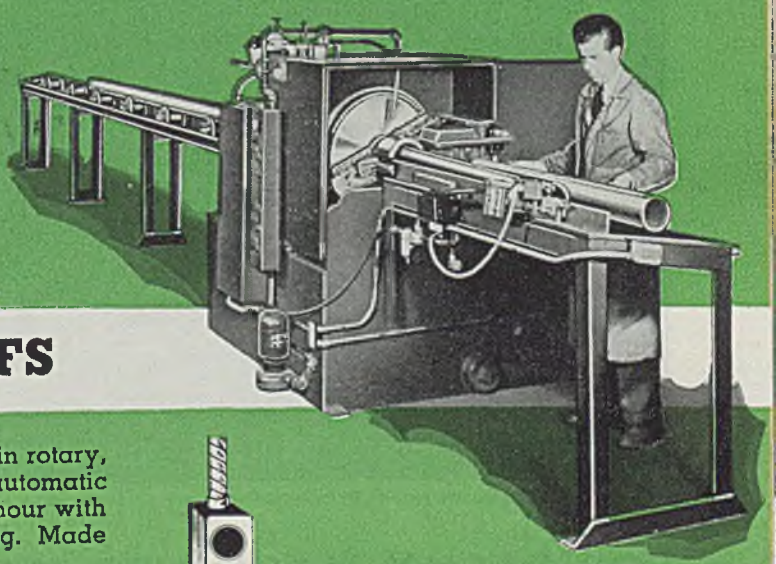


PINES *Automatic* PROFILERS

For processing tubes from the smallest sizes up to 6" O.D. and 100 feet long. Operations include threading, burring, chamfering, facing, flaring, boring, centering, turning, drilling and reaming, one or both ends simultaneously. Pines Automatic Profilers are made in 3 sizes, single and double spindle types. A typical production figure is 1500 ¾" burred tubes per hour or 700 ¾" pipe nipples threaded per hour.

Heavy Duty Construction



PINES *Automatic* CUT-OFFS

For cutting off tubes of any size or kind up to 5" O.D. Made in rotary, friction and disc types, all of which are available with full automatic operation. A typical production figure is 1500 2" tubes per hour with friction cutting and 150 5" tubes per hour with rotary cutting. Made in 3 different sizes.

Push button control on all PINES machines

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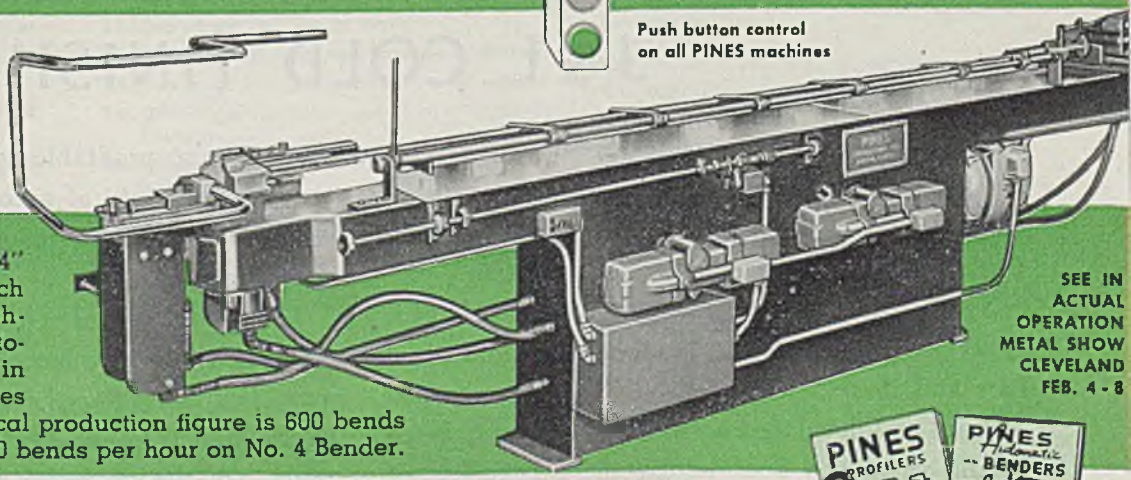

For bending tubes or pipe up to 4" O.D. Many exclusive features such as the patented Booster Attachment, Angle-of-Bend Selector, automatic Mandrel Extractor. Made in 6 standard sizes and special types for specific applications. A typical production figure is 600 bends per hour on No. ¾ Bender and 60 bends per hour on No. 4 Bender.

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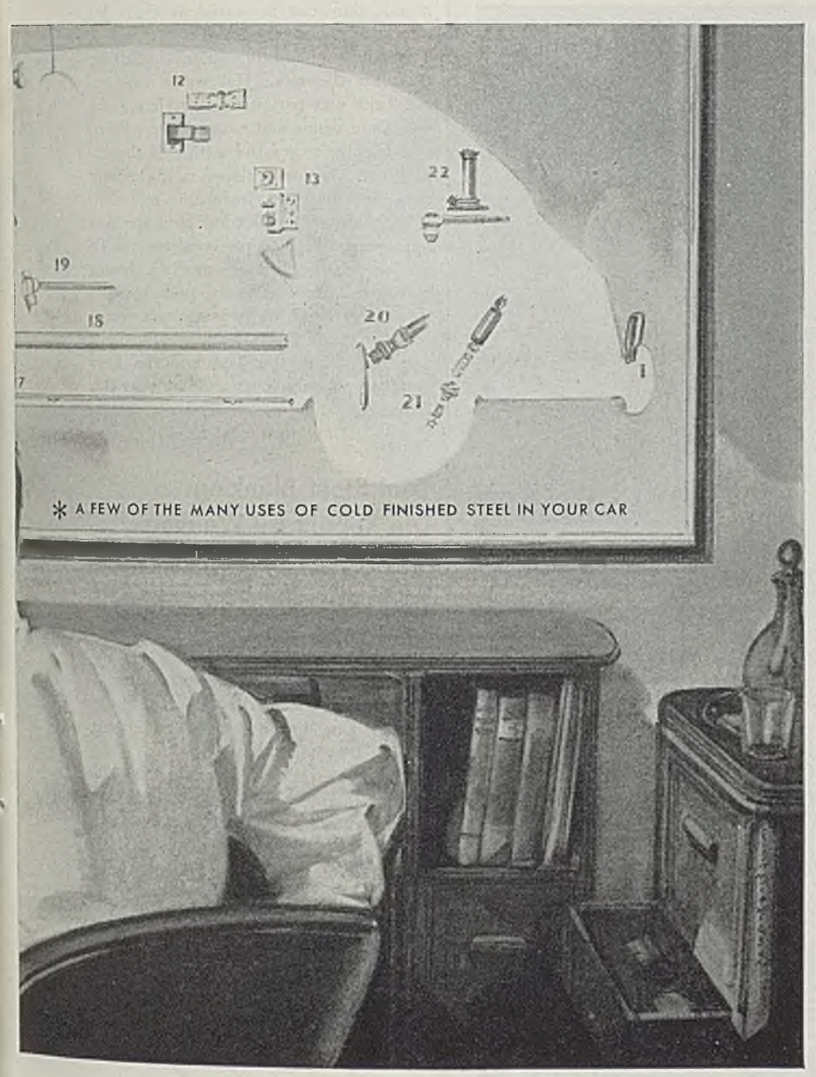
Some parts are pressed. Others are forged. A great many stem from cold finished steel bars and shapes. Cold finishing of steel was discovered and developed at J&L. To this experience of the years has been added the quickening of research and production that the war demanded. Out of this now come new techniques and methods that promise profitable application in the peacetime manufacture of automobiles—of all manner of machines and equipment where strong, durable parts are needed.

The production of cold finished steel at J&L is integrated from raw materials to the hard, shining bars, the rounds, flats, hexagons and special shapes. Every step is controlled for quality. It is steel made to do the job, be it a gear in the water pump, the hard-working drive shaft or the special shapes that form the door hinges.



** A few of the many uses of Cold Finished Steel in your car:*

1. *Bumper guards—made from special shapes or ground bars.*
2. *Water-pump gear assembly.*
3. *Spark-plug parts.*
4. *Cold drawn tubing for racker-arm shafts.*
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STEEL FOR MACHINES

Discouragement to autos was considered duty of many American municipalities when "horseless carriage" first appeared on streets, terrifying pedestrians. Ordinances put anti-speed humps in paving, forbade sale of gasoline, required drivers to send flagman ahead, compelled operators of steam propelled autos to become licensed engineers. Can you recall other similar restrictions?

1,500 makes of cars and trucks have been on market. How many do you remember?

Spark plugs in 1902 on Cadillac car were advertised as big feature because they could be taken off for cleaning "with the greatest of facility." Even then, as now, J&L cold finished steel was popular for spark plug shells.

Machines that make machines are called machine tools. They use cold finished steels in huge quantities to make other machinery and equipment and are themselves made of cold finished steel.

Organized in 1904, the SAE (Society of Automotive Engineers) brought about standardization of specifications that aided rapid development of motor cars.

Partial fabrication of parts is offered by special cold finished shapes in which J&L specializes, resulting not only in material and cost saving but in better physicals.

Before steel, machinery was laboriously, often clumsily, handmade of iron or even wood. The marvels of the present machine-tool age became possible when steel in abundance was made available in America about half a century ago.

Design engineers like new steels that are lighter, stronger, more workable and give them opportunities to re-design machines and equipment for greater usefulness at lower cost with less weight.

Gold medal for Jalcase Steel was awarded J&L at the Philadelphia Sesqui-Centennial Exposition. This grade was later adopted by SAE.

Bequests of iron nails, along with jewels, are found in wills of wealthy American Colonists because England forbade the Colonies to manufacture articles of iron.

Measuring to 5/10,000 of an inch with delicately balanced, jeweled gauges, so sensitive a watchmaker is employed to keep them accurate, has long been the practice at J&L in production of cold finished steel.

J&L Steel Data Chart, 29 x 45 inches, shows many tables (SAE, AISI, NE, and others) of tolerances, weights, hardness, machinability ratings, heat treatments, carburizing practice and spindle speeds for cold finished steel bars. For a copy write to Publicity Manager, Jones & Laughlin Steel Corporation, Pittsburgh, 30, Pa.

grams; they can be mixed as easily by ounces or pounds if desired.

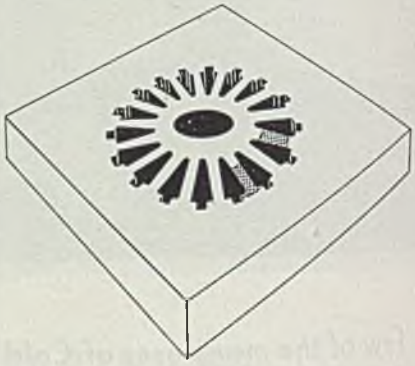
Room temperature water should be used for the mix. Hot water will expand the wax pattern and accelerate the set. Cold water will contract the pattern and slightly retard the setting of the investment. Water is placed in the mixing bowl first, and the Cristobalite added to it and thoroughly blended until the mix has a smooth, uniform consistency. To produce a more thorough mix in a shorter time, mechanical mixers should supplant mixing by hand. It is sometimes necessary to vibrate the investment to make it run freely into the flask and the Kerr company manufactures a vibrator for this purpose.

(*Continued next week*)

Tool Steel Blanking Die Rebuilt by Welding

Blanking die in a machine and stamping company plant broke in the press during a punching operation. As a new die would have taken 3 weeks to make at a cost of approximately $200, the plant foreman decided to try to repair the break by arc welding. Tool steel die shown in accompanying illustration was first piece to be rebuilt.

After taking die apart, breaks were V'd out and the die placed in an oven having a temperature of 300° F. At the same



time, a cast iron blank was placed in the oven. After they were thoroughly heated, both were removed. The die was placed on the block so that it would not cool too rapidly. Breaks then were welded with a ⅛-in. tool steel electrode with the welder set at 100 amp. Only a small bead was welded at each pass. Welds were peened thoroughly as work progressed until the break was filled. After being draw dipped in oil to harden, die was again placed in the oven. Grinding and replacement in the press followed.

Entire cost of reclaiming the die was only $10, according to Pete Marose, Des Moines, Iowa, who described the job in a letter submitted to the Hobart Arc Welding News, published by Hobart Bros. Co., Troy, O. Very little delay in production occurred.

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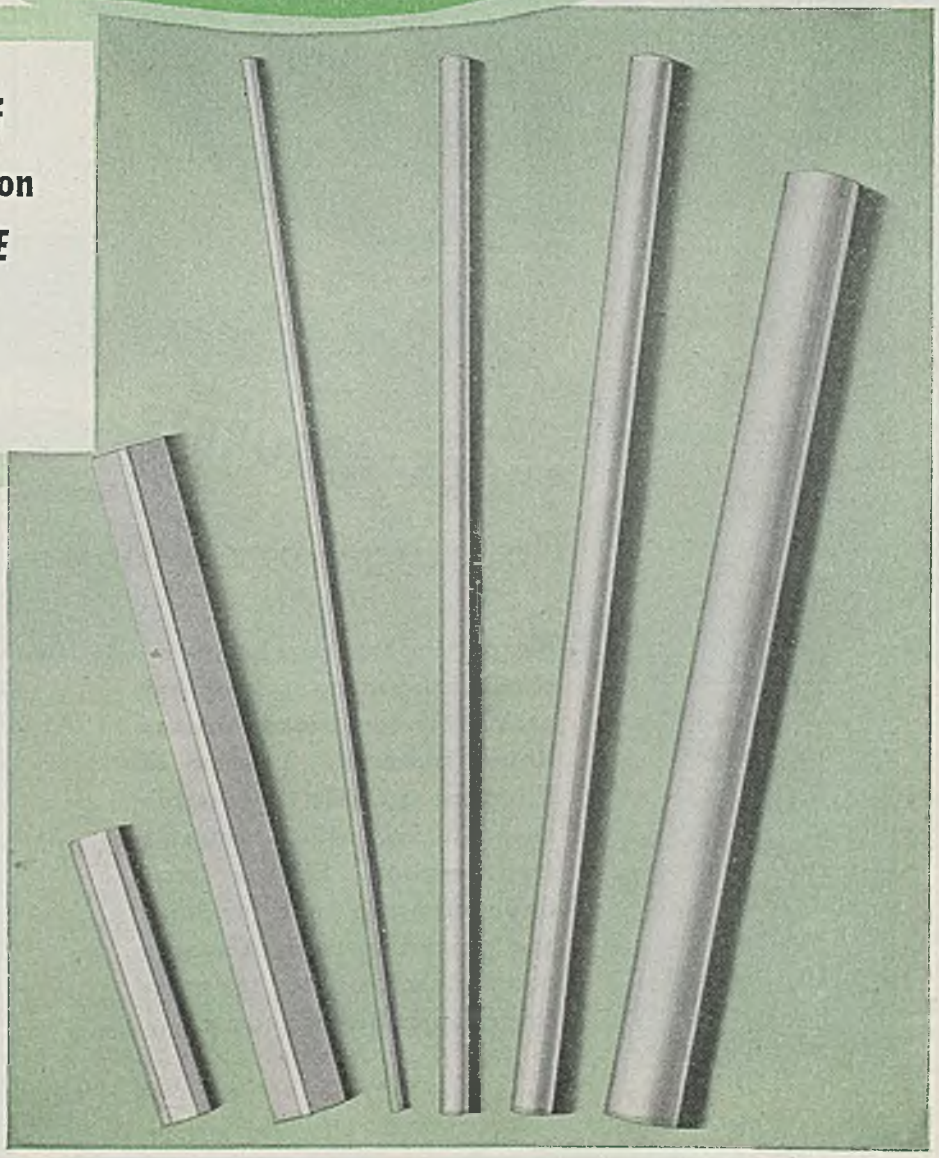

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Checking Surface Finish

(*Concluded from Page* 115)

properly places emphasis and proves the importance of the direction of finish in relation to the direction of the intended motion of "wear" parts. By placing the instrument in the direction of the intended motion of such parts, the image will be a direct indication of the reaction of such a surface to its mating member. It clearly shows the disadvantage of finishing reciprocating parts, such as pistons, in the same direction as rotating parts, such as driving shafts. Some finishing methods, such as the well-known "Superfinish," when examined with the Comparoscope, show the same surface value regardless of the direction in which the instrument is placed upon the surface. This indicates a uni-directional finish which will wear equally regardless of direction of motion.

Effectiveness of this method of evaluating surface finishes is shown in Figs. 2 and 3. In Fig. 2, a view through the eyepiece of the instrument, the dual image reveals that surface A has a roughness of 1 RMS, while surface B has a zero finish. Thus the difference between the two surfaces is only 1 RMS, but it is easily noted by the observer. In Fig. 3, the dual image shows surface A as 3 RMS and surface B as 5 RMS. Here again the difference is very obvious.

Placed on its stand the instrument with its adjustable stage can be used as an oblique - illumination type shop microscope for study of all types of parts and specimens.

Instrument is versatile. In grinding work it reveals action of wheels on particular metals being ground. Grain of grinding wheels and clearance between individual abrasive particles which form the chip clearance, important in obtaining a good finish, may be determined. Voids between individual particles that are filled with bonding material, causing the wheels to load and give inferior performance, are revealed.

It can be used to compare two seemingly similar types of fabrics or textiles to determine the superiority, from a wear standpoint, of one over the other. Granular material, as well as paint and pigments in powder form, may be examined and compared with the same ease.

—o—

Many castings and parts for machine tools are of a size or shape not readily handled on skids or in skid boxes, or reached by other equipment such as overhead traveling cranes. Accordingly, one machine tool builder has adapted his platform trucks to these loads by means of a detachable boom built from steel angles and rods by Elwell-Parker Electric Co., 4000 St. Clair avenue, Cleveland.

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Electrolytic Zinc-Coated Sheets and Strip, Plain or Bonderized

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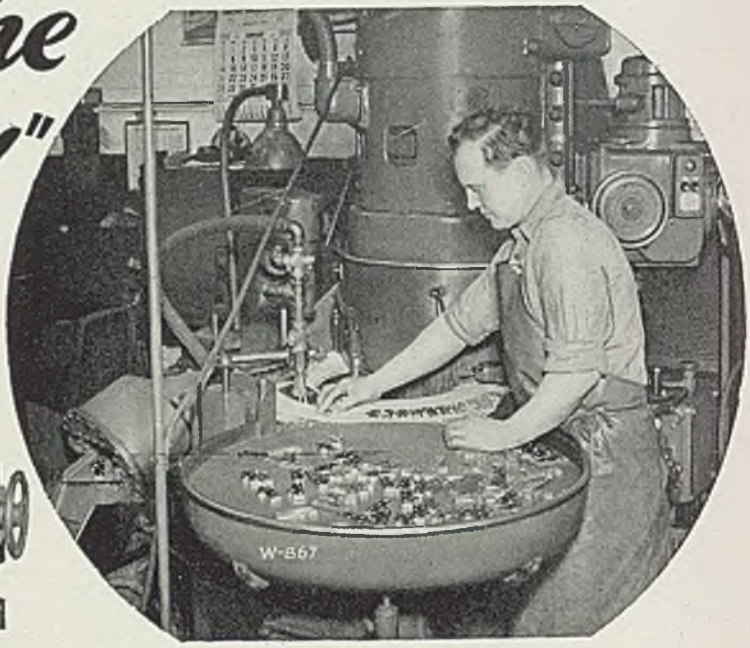

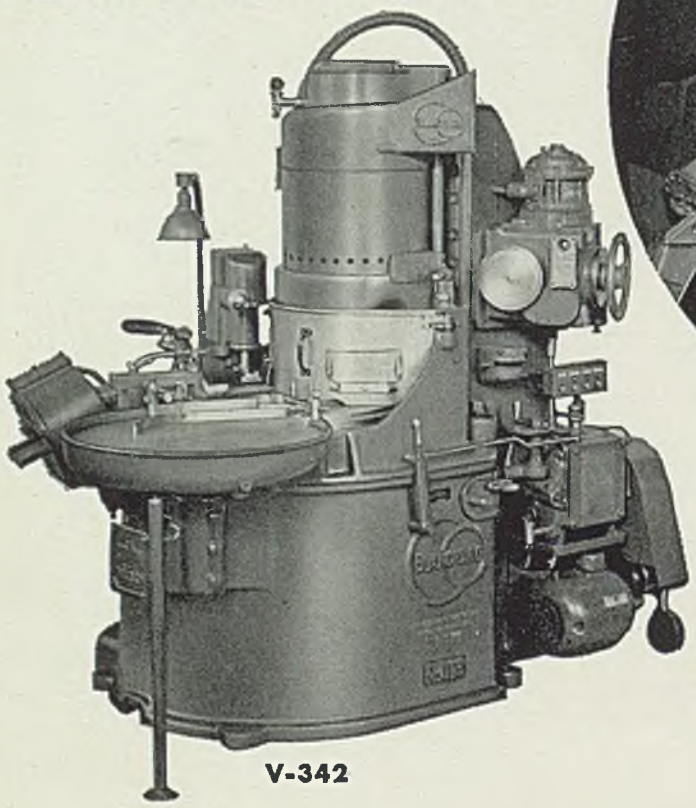

V-342

These 3" x 1⅝" x ⅜" Cold Rolled Steel Punchings are ground on a No. 16-A Blanchard Automatic Grinder to very close limits and with high production.

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The No. 16-A Blanchard Automatic Grinder is ideal for quantity production of small parts. It grinds continuously with a wheel that is set and automatically maintained at a fixed height. The operator has only to load the work on the magnetic chuck or fixture. Unloading is automatic, and if desired, attachments can be supplied for demagnetizing and washing the work as it leaves the grinder.

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Making Electrical Contacts

(*Continued from Page* 119)

manufacture of electrical contacts is immensely more complicated than that of most products made from metal powders for which physical properties and cost are the prime requisites. Prerequisites of contact materials might be listed as follows: (1) High density; that is, a density equal to or approaching the theoretical; (2) good physical properties; (3) high electrical and thermal conductivity; (4) low contact resistance; (5) resistance to welding or sticking; (6) resistance to electrical erosion; (7) resistance to corrosion from various atmospheres; and, (8) ability to be brazed to other materials.

Necessity for combining all of these qualities in an electrical contact requires extremely careful control throughout the manufacture of the contact, from the selection of raw materials through the attaching of the finished contact to its supporting member in the electrical device in which it is to be used. For example, powders used in the manufacture of electrical contacts must meet rigid specifications as to purity and particle size.

Particle size is measured in microns rather than screen-mesh size. It is extremely important that powder particles not only fall within a certain range of micron diameters, but that the average particle size in microns and the percentage of particles falling within various groups be constant from lot to lot of powder. If these conditions are not maintained from one lot of powder to another, final characteristics of contact materials are radically affected. Contact resistance in one case may be higher, final composition may be off, percentage of theoretical density may be low, or the resistance to shock may be low, to mention a few of the variations that could be expected.

Considerations in Adopting Powder Metallurgy: The same general rules that apply to other parts fabricated from metal powders hold true for electrical contacts. In an article by Colin Carmichael, associate editor, *Machine Design* Nov. 1943, "Designing Powder Metal Machine Parts," the following general rules were listed as being helpful in determining whether powder metallurgy could be considered as a possibility for a particular part:

(1) Re-entrant angles in the direction of pressing cannot be molded.

(2) Holes at right angles to the central axis of pressing cannot be molded.

(3) Threads cannot be molded.

(4) Parts that are more than 3 or 4 in. in length are prone to weakness of structure in the center, because the pressing is

done from the top and bottom only.

(5) Parts that require dies of weak construction, such as feather edges, small pins, narrow and deep splines, should be avoided. Powder-metal parts are molded at pressures of 20,000 to 80,000 psi or even higher, and failures in the dies will occur under these pressures.

(6) Bevels and radii should be allowed at all edges and angles, in order to prevent flash marks.

(7) It must be possible to construct dies so that, on filling, all powder is placed in the final position, inasmuch as the powdered metal will not flow laterally in the die.

(8) Large and sudden changes in cross-sectional area should be avoided.

In thinking of parts being fabricated by powder metallurgy, one visualizes thousands of pieces being pressed at high speeds on automatic presses and sintered in continuous or large batch-type furnaces.

Must Fabricate Small Quantities

In contrast to this, manufacturers of electrical contacts by powder metallurgy methods think more often in terms of tens and hundreds of pieces. For example, a huge circuit-breaker installation, which cost hundreds of thousands of dollars, may require only a few dozen metal-powder electrical contacts. Thus the contact manufacturer, of necessity, must be able to fabricate relatively small quantities of parts to meet the customer's specific demands.

Very often the customer submits drawings of contacts, the design of which has been predicated on his device as a whole and often these designs make work extremely difficult for the contact manufacturer. If a radius could be added here, a small flat there, an angle changed slightly, the thickness to width or length ratio changed somewhat, the contact manufacturer's problems would be immeasurably lessened. Unfortunately, there are no hard and fast rules other than those just mentioned that can be laid down regarding electrical contacts that can or cannot be made with ease by powder metallurgy.

If the electrical manufacturer would consult with the contact fabricator when his designs are in the initial stages, much could be accomplished towards form-pressing pieces to finished size and shape, reducing inventory of powder-pressing dies required, utilizing dies for a variety of different applications and speeding up delivery dates.

Due to the extremely abrasive nature of the refractory materials used in electrical contacts, die life is very short as compared with most other powder metallurgy products. This necessitates use of special steels and often sintered carbide

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inserts for punches and dies. Therefore, in order to utilize the simplest type of punch and die design, it is often desirable not to attempt to press an electrical contact to the finished shape but rather approximate this shape and finish the part by machining.

Certain electrical contacts fabricated from metal powders have a limited degree of ductility. This allows for carefully controlled forming operations such as swaging, drawing, and bending. Advantage can be taken of this to produce electrical contacts that would be extremely difficult or impossible to fabricate by form pressing. Here, again, the electrical manufacturer and the contact fabricator should work in close collaboration during the initial design stages, to take advantage of these possibilities.

Recent experiments have indicated that some metal-powder compositions can be fabricated into wire and headed.

Because of the complexity in the manufacture of electrical contacts by powder metallurgy, no attempt has been made to describe in detail the exact procedures, but rather to indicate the importance of two factors:

1. The absolute necessity of rigid control of raw materials and fabricating processes.

2. The necessity of close collaboration between contact users and contact fabricators so that correct contact combinations and the most suitable method of fabricating may be determined before the contact user's final designs have been frozen.

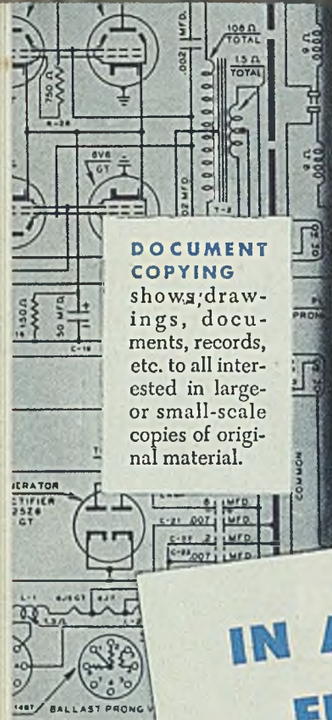
Magnetic Particle Testing Discussed in Symposium

Symposium on Magnetic Particle Testing, paper, 122 pages, 6 x 9 inches; published by American Society for Testing Materials, 260 South Broad St., Philadelphia 2, for $1.25.

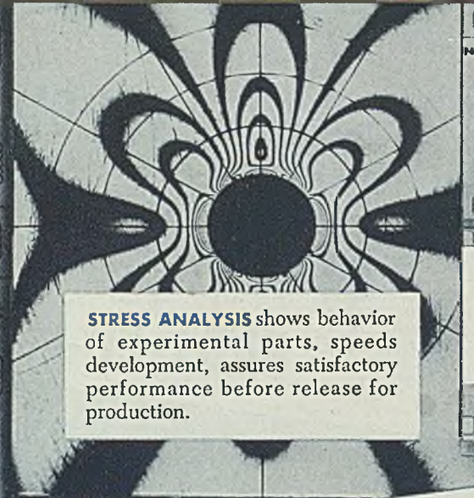
Containing eight technical papers, with considerable discussion, as presented at a meeting of the Philadelphia District, American Society for Testing Materials, this publication covers application of this test in a number of industries. Each participant in the symposium is an authority in this field and in close touch with its applications.

Contents include a paper on advantages and disadvantages of the test, comments on the test as used by railroads, discussion of tests on aircraft parts, specifications and procedure, use of the method on castings, forgings and miscellaneous applications.

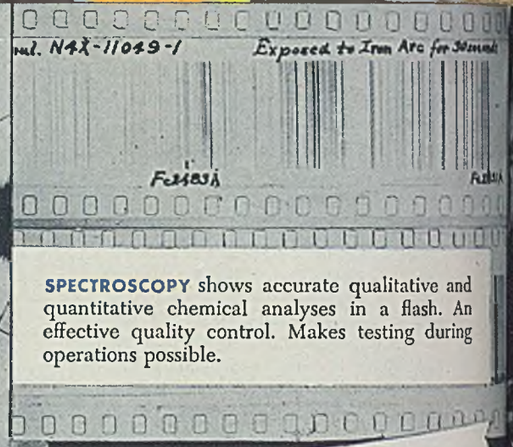
Two A. S. T. M. methods of magnetic particle testing and inspection of commercial steel castings and heavy steel forgings are included.



DOCUMENT COPYING shows drawings, documents, records, etc. to all interested in large- or small-scale copies of original material.



STRESS ANALYSIS shows behavior of experimental parts, speeds development, assures satisfactory performance before release for production.



SPECTROSCOPY shows accurate qualitative and quantitative chemical analyses in a flash. An effective quality control. Makes testing during operations possible.

IN A CHANGING WORLD FUNCTIONAL PHOTOGRAPHY SHOWS THE WAY...

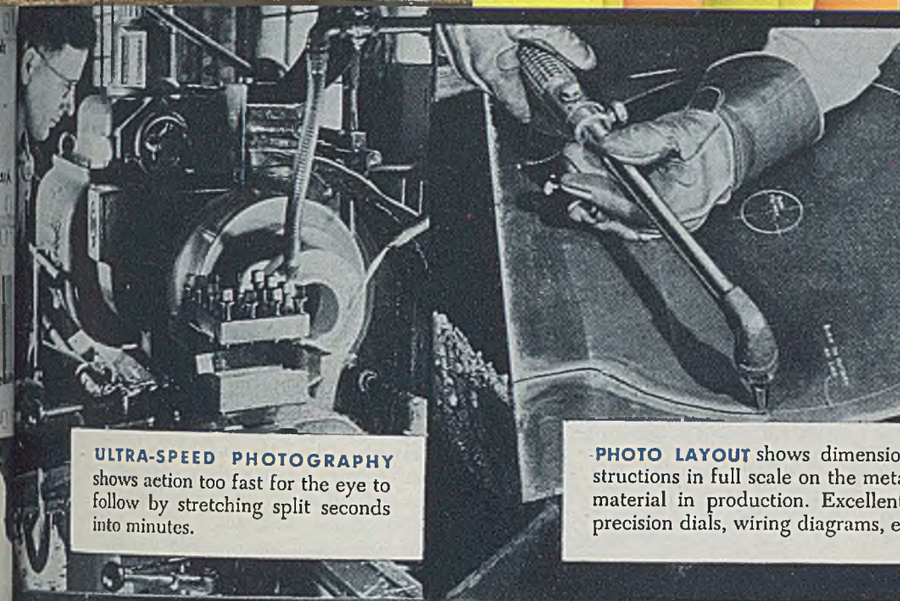
ESSENTIALLY PRACTICAL, Functional Photography more than pays its way. Reflecting the expanding needs of modern business and industry, it harnesses for those needs photography's unique powers to show . . . to record and reproduce information, much of which is beyond the ability of human vision.

In research and development, in production, in administration, Functional Photography is proving itself a dependable medium with many and varied uses . . . showing new ways to faster processes, sounder technics, lower costs, and more efficient administration in today's highly competitive world.

Highlighted here are a dozen examples of Functional Photography which provide a brief introduction to the wide variety of photography's uses in business and industry. Investigate their possibilities in your operations.

Eastman Kodak Company, Rochester 4, N. Y.

You will be welcome at the Kodak Exhibit. If you are planning to attend the 27th Metal Congress Exposition in Cleveland, be sure to see the Kodak Functional Photography exhibit, booths B409 and B415. It will help you determine photography's usefulness in your business. If you are not attending, write for new twenty-page "Functional Photography" booklet.



ULTRA-SPEED PHOTOGRAPHY shows action too fast for the eye to follow by stretching split seconds into minutes.

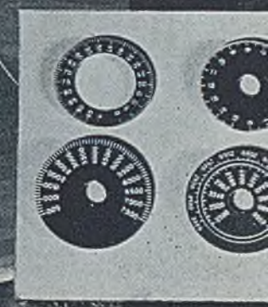
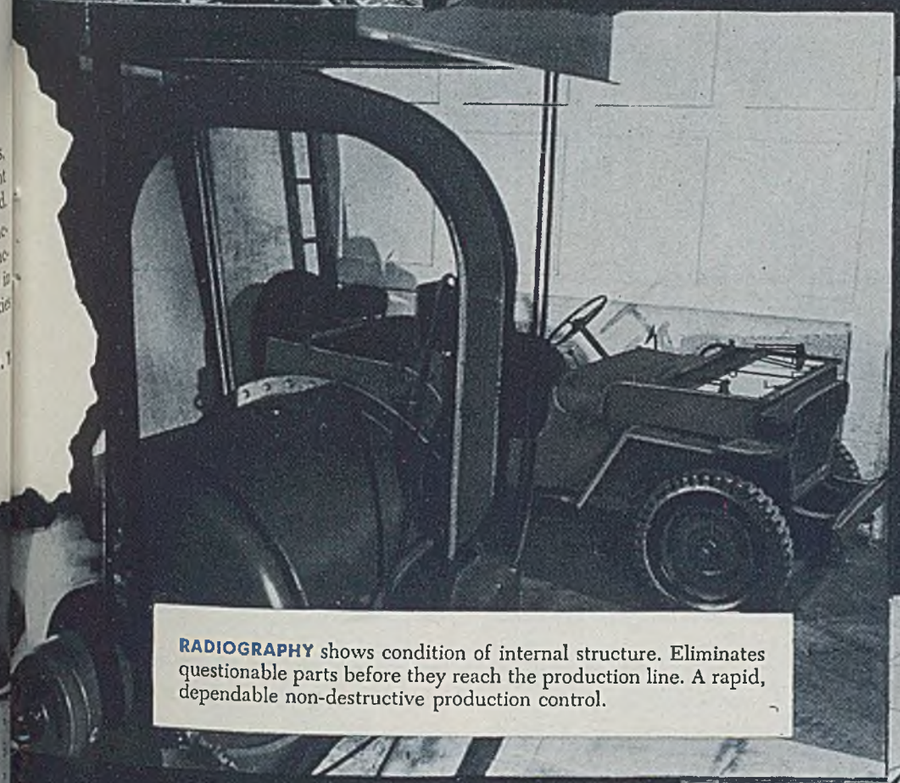


PHOTO LAYOUT shows dimensions and working instructions in full scale on the metals, plastics, or other material in production. Excellent for templates and precision dials, wiring diagrams, etc.

X-RAY DIFFRACTION shows effect of processes and operations on the crystal structure of materials.



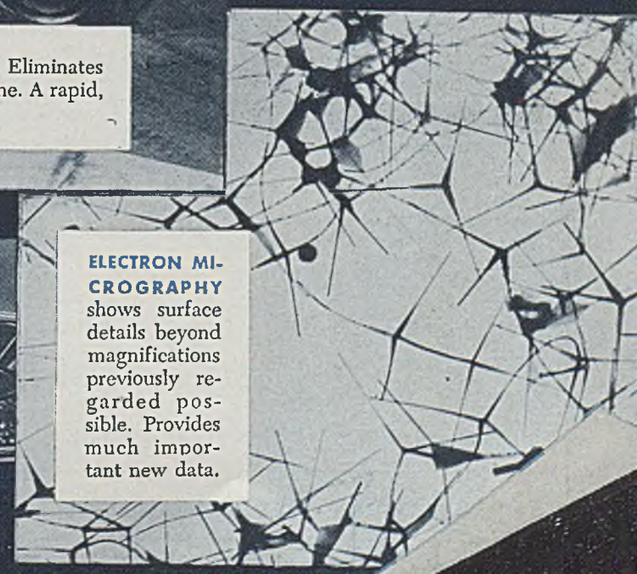
RADIOGRAPHY shows condition of internal structure. Eliminates questionable parts before they reach the production line. A rapid, dependable non-destructive production control.

INSTRUMENT RECORDING shows electrical or mechanical phenomena too rapid for the eye to follow. Provides a record for reference.

PHOTOMICROGRAPHY shows changes in grain structure caused in material by metal-working, heat-treating, etc. at magnifications up to 5,000 diameters.

PHOTO-VISUALS show workers how to perform production operations graphically, quickly, and inexpensively.

RECORDAK puts hundreds of big bulky drawings or other records on a single small roll of microfilm, saves 98% in space, 99% in weight. Safeguards valuable records.



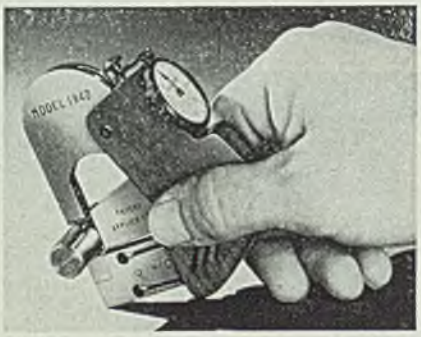
ELECTRON MICROGRAPHY shows surface details beyond magnifications previously regarded possible. Provides much important new data.

Kodak

INDUSTRIAL EQUIPMENT

Snap Gage

A snap gage offered by Federal Products Corp., Providence, R. I., visualizes the actual dimension of the workpiece. It has all the simplicity, compactness and utility of the snap gage with the addition of defining positively that there is a variation in the specified dimension and also



in addition it tells how much the dimension varies.

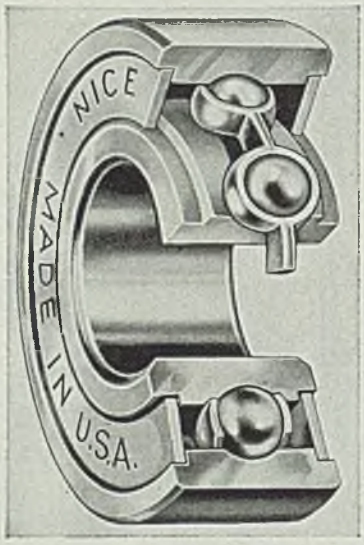
Designated as Model 1340, it magnifies impersonally and mechanically all dimensional variations. It fits the hand comfortably and is handled in an entirely natural manner. It is a single-purpose type of gage, dial of which is graduated in 0.0001-in., has a range of 0.008-in. and can be made to suit any dimension between 1/8 and 1½ in. It weighs approximately 7 oz.

Weight of the gage rests on the rigid upper anvil, therefore, it cannot influence the indicator reading. The lower anvil is a flexible, solid piece of metal which transfers the variation in the dimension from the workpiece to the dial indicator. Both anvils are tungsten carbide tipped for long wear. It has an insulating finger grip.

Steel 1/28/46; *Item No.* 9862

Radial Bearings

Nice Ball Bearing Co., 30th and Hunting Park avenue, Philadelphia 40, has developed a new inch size line of precision radial bearings. Especially designed for adaptation to a majority of precision



bearing applications, these close tolerance, "ground all over" units are recommended for medium loads and for maximum speeds ranging from 3000 to 5000 rpm. Where smaller sizes are involved and in instances of intermittent service, higher speeds may be considered.

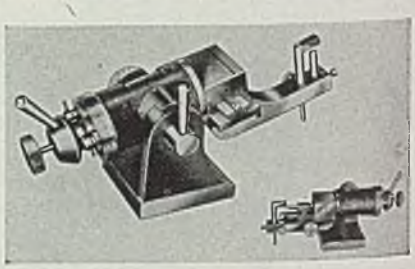
All bearings in this 1600 series incorporate one-piece inner and outer races turned from high quality stock. After careful heat treatment resulting in a uniform and exact degree of hardness for minimum wear and maximum service, all surfaces are accurately ground to close tolerances, with care devoted to attaining maximum contour accuracy and high micro finish in the ball grooves. A ball retainer, or separator is incorporated in all 1600 series annulars, which construction reduces ball friction, increases range of allowable speeds. All retainers are of two-piece type designed for a minimum of ball contact friction and balls employed are of close tolerance, highly polished, chrome alloy steel.

These bearings are available double shielded, with one shield, or without shields, and with exception of double shielded units, which are grease packed as standard, can be furnished with or without grease packing, as desired.

Steel 1/28/46; *Item No.* 9050

Radius Dresser

Radius dresser, known as Model 150, makes practical dressing tangent to a radius and the radius tool with one set-



up has been introduced by U. S. Tool & Mfg. Co., 6906 Kingsley avenue, Dearborn, Mich. With this one instrument operator can dress (1) a radius, (2) an angle, (3) a compound-complex angle and (4) an angle tangent to a

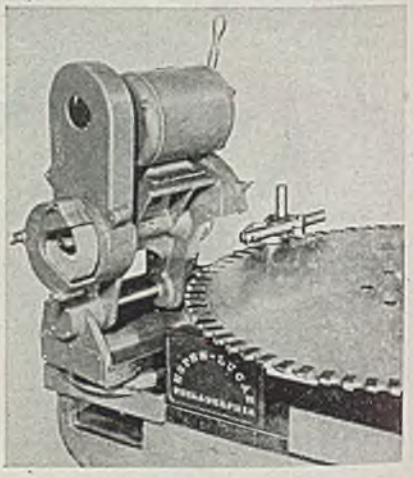
(All claims are those of the manufacturer of the equipment being described.)

radius, in one operation. When these four operations are performed, primary diamond holder position is used, but provision also has been made in this model for forming extremely small or large radii in the section of wheel where radius has up to 180° of arc. For this work, an accessory equipment is used which consists of a special diamond holder mounted in the secondary position.

Steel 1/28/46; *Item No.* 9958

Saw Blade Grinder

A circular saw blade grinder of heavy, rigid construction for sharpening inserted-tooth metal-cutting saws has been announced by Espen-Lucas Machine Works, Front and Girard avenues, Philadelphia 24. The unit is designed to grind teeth accurately and uniformly to within 0.001-



in. and to maintain proper tooth contour. These features are said to insure greater saw cutting speeds and lengthen intervals between sharpenings. Though grinder, model No. 27, handles blades from 18-in. to 48 in., its capacity can be increased to take 60 in. blades. Motor required for the grinder is of ¾-hp, 1800 rpm (approx.).

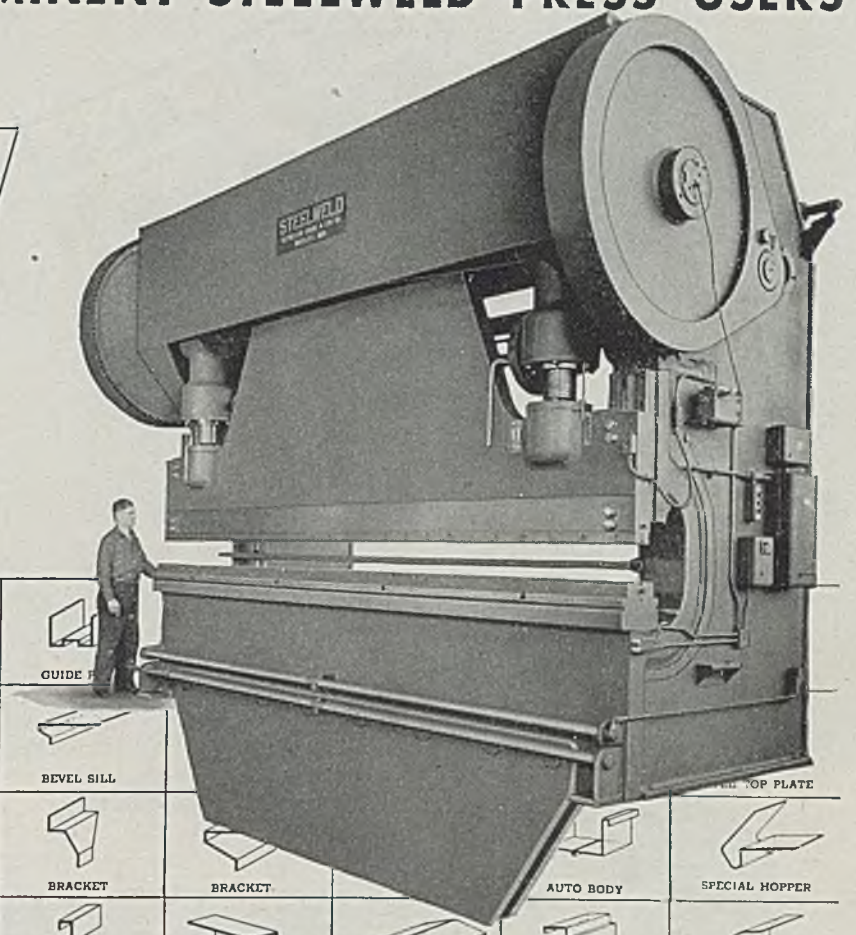
Steel 1/28/46; *Item No.* 9934

Inspection Lamp

Designated as Eder-Lite, a new miniature inspection lamp offered by Harmon and Co., 6 North Michigan avenue, Chicago 2, now makes it possible for inspectors, engineers, mechanics, and others whose work requires inspection of hard-to-get-at places, to light up and visually inspect cylinders, gear housings, tubes, rifle barrels, pipes and other equipment that has openings as small as 5/16-in. and recessing interiors.

Small light reflecting and glareless metal protected tungsten bulbs attached to flexible or rigid exension make clear vision possible by literally steering them

WORDS FROM PROMINENT STEELWELD PRESS USERS



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STEELWELD

BENDING PRESSES

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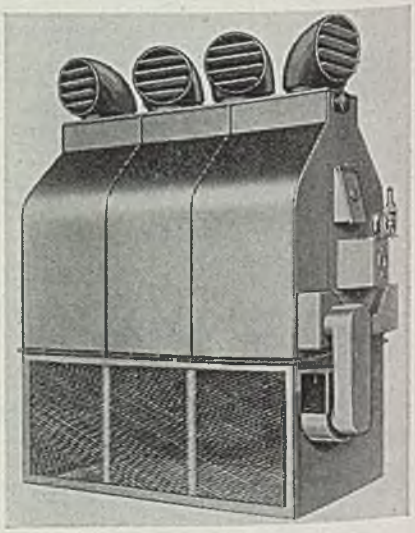
down the proper channels so that a maximum amount of light is focused on the proper place. This device is manufactured to protect the user against shock by supplying the power through a rubber insulated wire cable to a transformer enclosed in a bakelite handle. Also, in fields where there is danger of explosion or fire, it can be had in a special model to provide complete safety in this type of work.

The standard set consists of a built-in pushbutton type transformer lamp handle constructed for alternating current, a 10 ft plug-in cord, two rigid and two flexible extensions of varying length that can be used in combination or separately, and four screw-in miniature tungsten bulbs of varying sizes. Additional extensions with lengths up to 32 in. in flexible, semirigid, rigid and rigid angle construction, and special lamps, cord lengths and mounting or hand brackets are available.

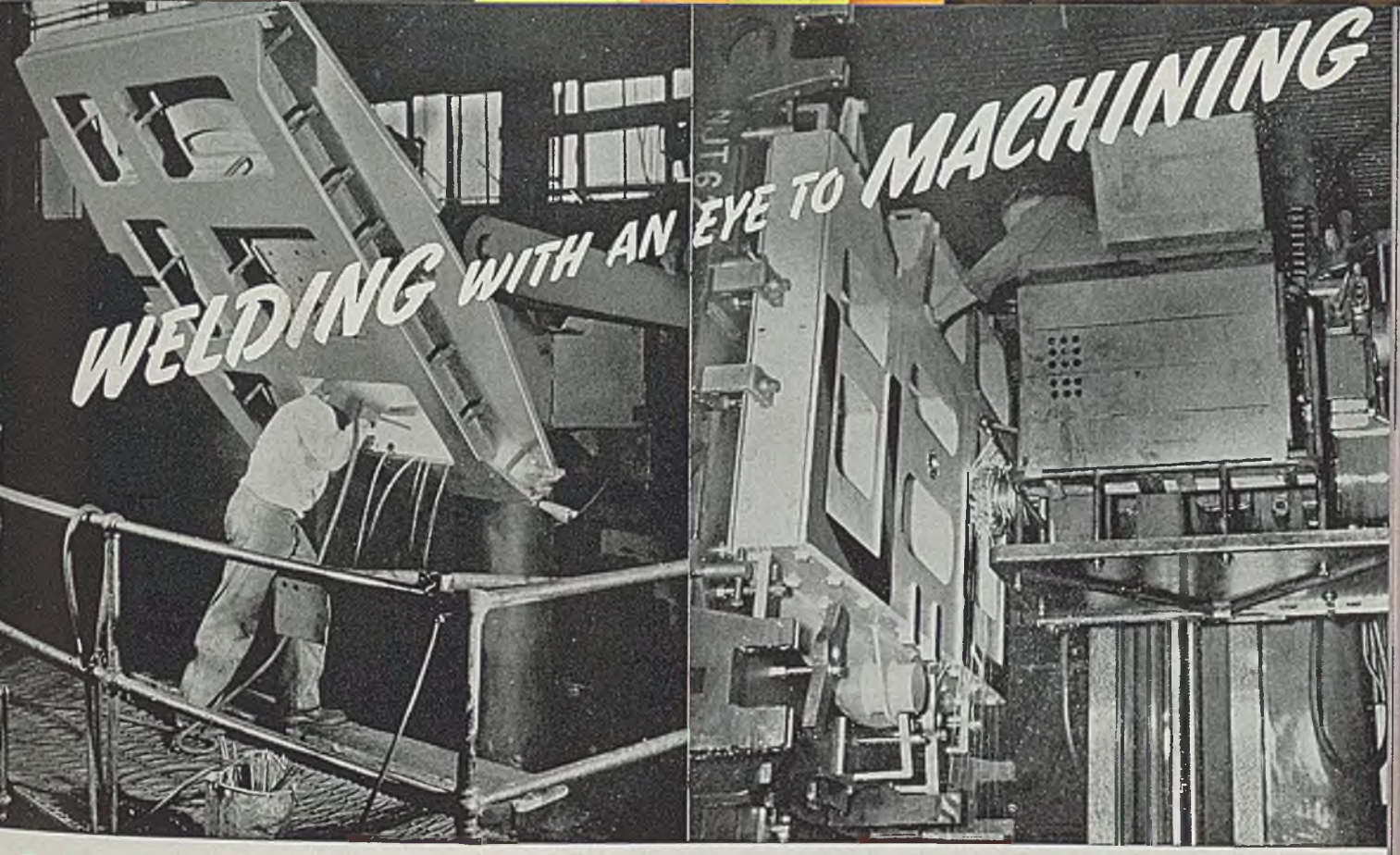
Steel 1/28/46;*Item No.* 9049

Direct-Fired Heaters

Heaters in capacities of 75,000 to 2,000,000 Btu output per hour are available from Herbert H. Davis Co., Cicero, Ill. Units, for all types of fuel, oil, gas,



or coal, are made entirely of steel and are completely self-contained. They have fully automatic control systems and are adaptable to variety of installations, either for air distribution direct through rotatable diffusers or through ducts. Unit is shipped in two sections, making possible unloading and placing without heavy crane facilities and entry through smaller building openings. Filters are applied without special transformations requiring additional floor space. Lower resistance through heater provides quieter fan operation and lower motor horsepower. Tubes may be cleaned while



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at Lower Final Cost

Position welding sped the above base to the machining stage because position welding is down-hand welding—faster because push button control brings the weldment to any desired angle—lessens handling and propping.

Revolving horizontal and vertical tables—standard and right-angle heads on the horizontal boring mill above makes possible innumerable combinations of milling, facing, turning, and boring, and multi-surface machining without change of setup. These extensive facilities at the Danly plant plus the "know how" are speeding reconversion with mass production of large units.

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Three factors vital in cutting costs of manufacture of large structures are grouped here:

1 ***Known quality of welding.*** Flaw-free welding to close tolerances makes for effective reductions in the cost of machining. Rough cuts are fewer or may be eliminated entirely.

2 ***The job should be of volume quantity.*** Repetition makes for greater efficiency, and tooling costs lower as they are spread over volume production.

3 ***Facilities must be adequate to handle the job.*** In Danly's modern plant are the welding facilities, machine tools, normalizing furnaces, shot blast equipment, handling equipment, X-ray, Magnaflux, and complete inspection facilities for producing and delivering your job to any desired specifications at lower *final cost.*

Avail yourself of Danly's efficient production program and fast delivery service. Call, write or send in your blueprints.

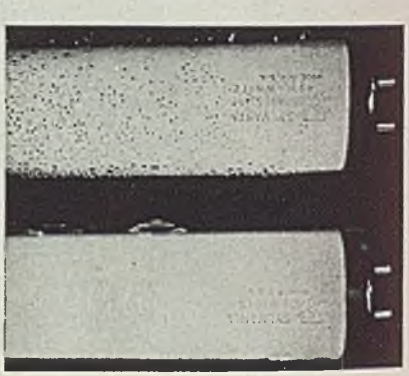
DANLYWELD

standing on floor. Self-contained automatic thermostatically controlled humidification is provided.

Steel 1/28/46; *Item No.* 9964

Fluorescent Lamp

A new instant-start 40 w, T-12 fluorescent lamp designed to operate with instant starting type of ballast and specially treated to eliminate operating faults frequently encountered in conditions of high humidity is announced by Sylvania Electric Products Inc., Salem,



Mass. Lamps are designed to operate in two-lamp compensated ballast circuit providing 450 v operation without affecting light output, life or other features of standard 40 w fluorescent lamps. Humidity, frequently the cause of bad starting in instant-start types, will not affect operation of the units which are supplied with special invisible hydrophobic coatings which cannot be rubbed or scratched off and effectively prevent the formation of a film of moisture. Photo shows untreated lamp (at top) after receiving fine spray of water which has produced continuous film of water in contrast with the treated lamp below on which moisture has collected in tiny droplets, each separated from the other by a completely dry area. They are not interchangeable with standard 40 w fluorescents but have the same ratings.

Steel 1/28/46; *Item No.* 9865

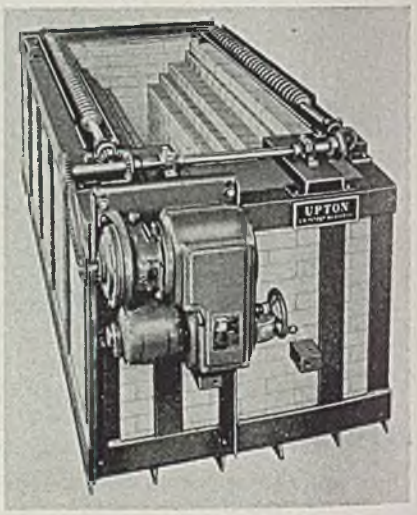
Salt Bath Furnace

A new, high production speed salt bath furnace designed for production quenching and specially suited for austempering high carbon and other steels is added to its line of electric salt bath furnaces by Upton Electric Furnace Division, 7450 Melville avenue, Detroit. The quench furnace illustrated is designed for a capacity of 1000 lb of work per hour at 700° F. The rapidity of quenching which permits this high speed operation is due to two factors: Step-back design and method of adding balancing heat.

Step-back construction gives sufficient

surface area to radiate and thus dissipate heat at a rate in excess of that brought into the furnace by heated work that is to be quenched. Electrodes at the bottom of furnace supply exactly the right amount of heat to balance and thereby keep temperature of salt in the furnace uniform throughout.

A variation in speed with which work progresses through the furnace is also available by adjustment of variable speed



transmission which drives the two worms that carry the work through the bath. When used with Upton pre-heat and high heat furnaces of similar design, this design permits full automatic heat treating. In addition to full automatic operation, including temperature control and timing, salt that coats work provides protection against oxidation during the short interval the work is being transferred from high heat to quench.

Steel 1/28/46; *Item No.* 9812

Plug Gage

Schrillo Aero Tool Engineering Co., 8715 Melrose avenue, Los Angeles 46, offers the Dubl Duty cylindrical plug gage. The gage has a light aluminum

alloy collet type handle which firmly positions a set of wire type cylindrical plug gages. This type of handle enables the user to reverse the gage member after it has worn under the allowable limit and take full advantage of the unused gaging surface that was formerly in the handle.

Members are made of high grade tool steel, hardened, ground, plated and lapped, furnished out of stock in a size range

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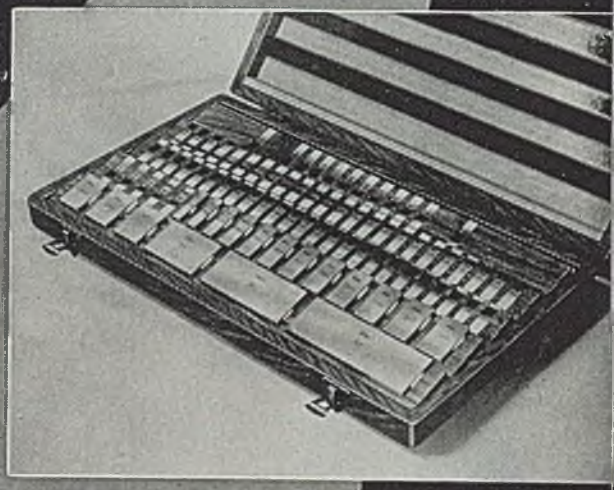
WEBBER Standard Gage Blocks... Heavy Duty Gage Blocks

● In Webber Standard Gage Block Sets you get a wide working range with gage blocks made within 4 millionths of an inch accuracy. Webber Sets permit 250,000 measurements as compared to the average 125,000. This is made possible by the .10005 inch block included in all 84 and 43 block sets. Another advantage is the two wear blocks also included in these sets for use where blocks come into contact with the work. Dimensional accuracy—Stability—Surface Finish—Wearing Quality are inherent features of all Webber Gage Blocks.

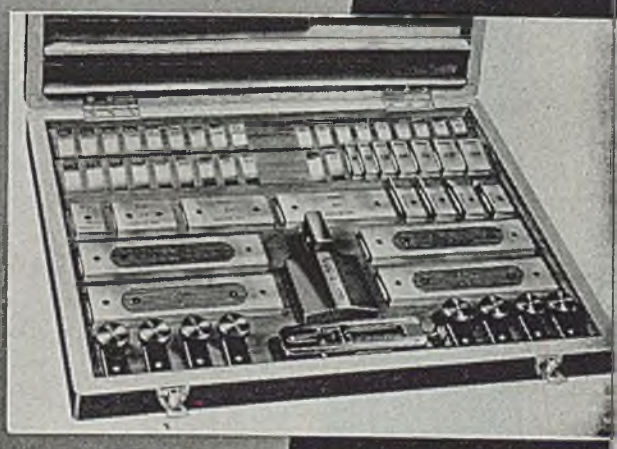
Webber Heavy Duty gage blocks are practical, accurate measuring tools which may be quickly assembled into a precision Height Gage—an inside or outside Caliper or Divider. These extra large gage blocks with generous wearing surfaces all with accuracies within millionths of an inch bring the tool maker new precision in layout and inspection work. Note all 6 inch heavy duty blocks have walnut insulation strips to keep heat of hands from the gage itself.

For a complete dependable gage block service use Webber Standard and Heavy Duty Gage Blocks.

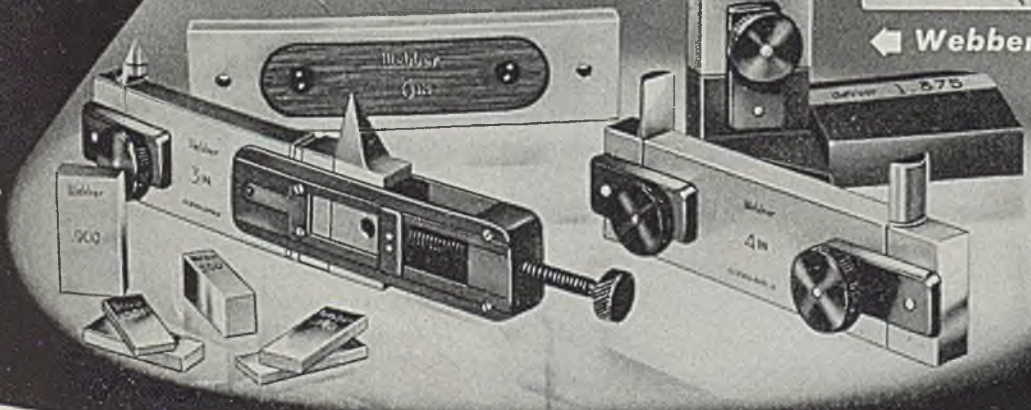
Set No. 84A . . $350.00 Set No. 43A . . $185.00
Set No. 84B . . $235.00 Set No. 43B . $150.00
Set No. 38A (Thin Blocks) . . . $195.00
Set No. 38B (Thin Blocks) . . . $155.00
Set No. 14A (Angle Blocks) . $450.00
Set No. H. D. 24 . . . $385.00
Set No. H. D. 36 . . . $450.00



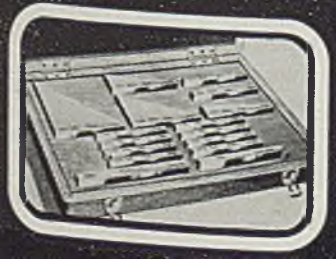
Webber Standard Gage Blocks



Webber Heavy Duty Gage Blocks



Full Descriptive Bulletins on both Standard and Heavy Duty Sets Available



Webber GAGE COMPANY

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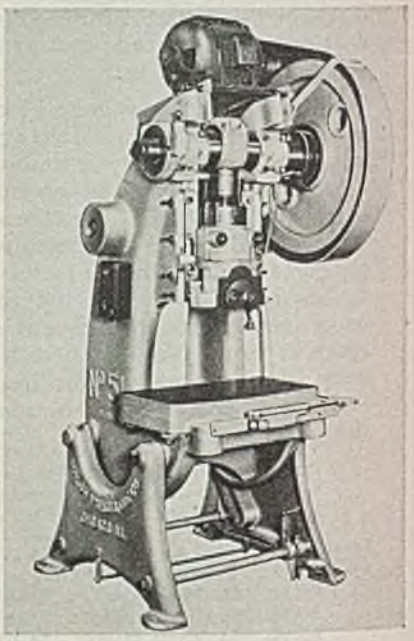
of 1/8 to 1 in. in increments of 1/8-in. It is made to a commercial Y tolerance. Limits are established at plus and minus 0.0005-in. from the basic figure.

Steel 1/28/46; *Item No.* 9922

Punch Presses

Walsh Press & Die Division of American Machine & Gage Co., 4743 West Kinzie street, Chicago, announces a complete new line of punch presses, ranging in size from 6 to 80 tons capacity. All sizes feature carefully ground forged steel



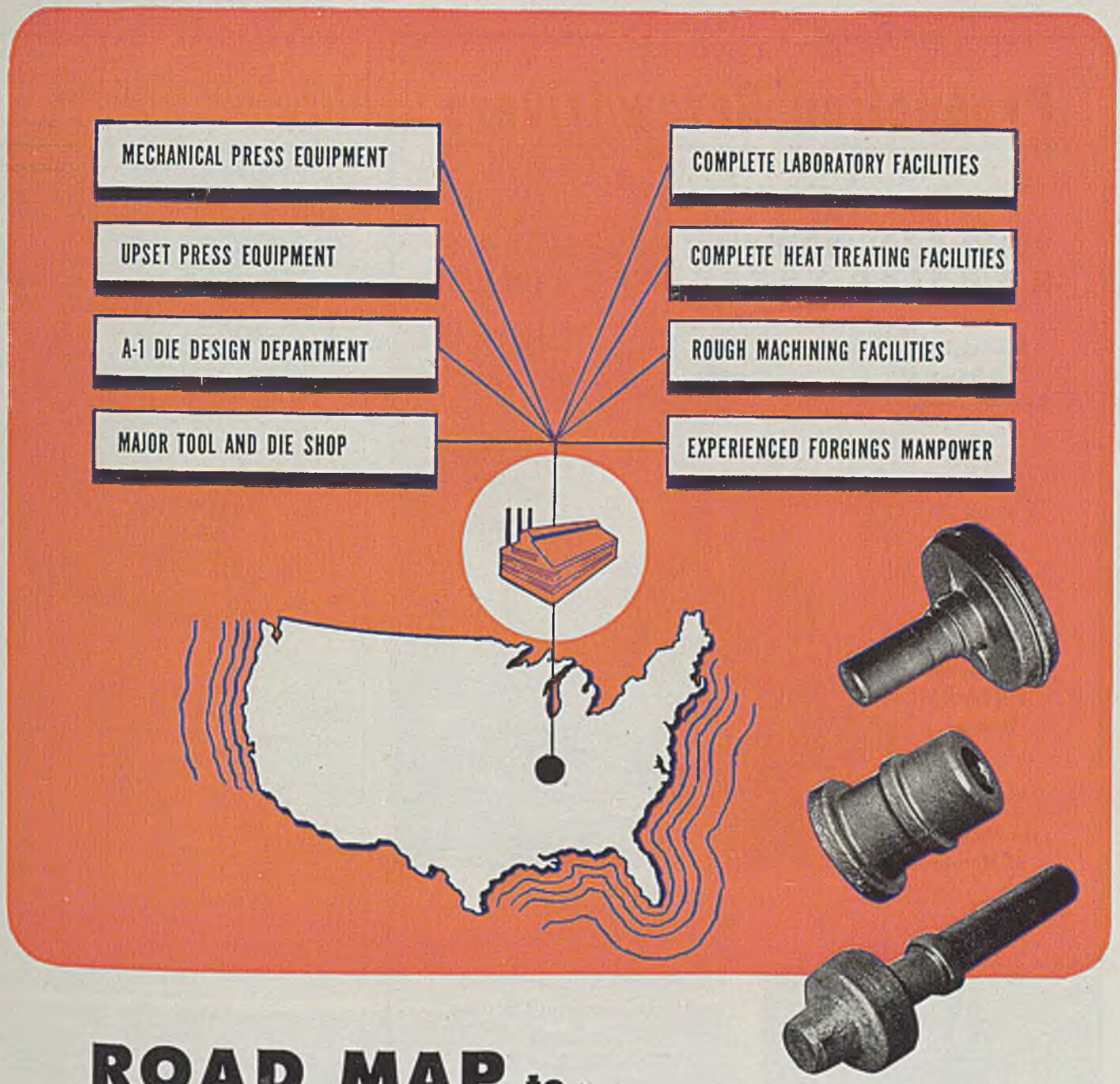
crankshafts; hand-scraped bearings; solid web wheels and gears; ready inclinability; an adjustable die head; smooth, high speed operation; and a simple yet highly efficient two-button safety device for protection of operators.

Steel 1/28/46; *Item No.* 9978

Motorized Truck

A motorized load-carrying truck specially designed and built to carry heavy motors and generators is now available for other materials handling work. Built by Walter C. Stuebing, Jr. of Lift Trucks Inc., 2425 Spring Grove avenue, Cincinnati 14, the truck has a stationary bed.

Safety rated capacity is 4000 lb. Finger-tip control permits easy maneuvering of the heaviest load forward or back to destination. This is an exclusive feature which provides easy starting and stopping. Control consists of two buttons on handle, one for forward motion and one for reverse, operating in conjunction with an Allen-Bradley controller unit. Unit also has dynamic brake control. Forward or reverse speed is 312



ROAD MAP to

Better Service in Better Forgings

IF you want quantities of steel forgings produced with efficiency and dispatch these days, look for a source that (a) *has everything it takes* (b) *under one roof* (c) *in a good working location.*

These qualifications point to Tube Turns. This widely known Louisville organization handles every operation pertaining to the production of better forgings in its own plant, which houses mechanical and upset press equipment up to 9-inch capacity, an unexcelled die design department, a major tool and die shop, complete laboratory facilities, complete heat treating facilities, rough machining facilities, and experienced man power.

When you deal with Tube Turns you deal with an organization which has the complete job under control and is directly responsible for all of it.

Please feel free to call upon Tube Turns engineer for any kind of consultation about forged steel which may be helpful to you in improving present products or designing the new. TUBE TURNS (Inc.), Louisville 1, Kentucky.

TUBE TURNS tt *Forgings for Industry*

fpm when empty, and 220 fpm loaded. Power is generated by heavy duty batteries which operate for 10 to 20 hr under maximum load without recharging.

Drive is by 12 v enclosed continuous rating series motor with 14.5 to 1 reduction, giving high starting torque without excessive heating. Rear drive transmission is through sets of spiral bevel and spur gears. All gears are alloy steel, heat treated, with ball bearings, and

operate in oil bath. Batteries can be charged on regular equipment or rectifier furnished for overnight charging at low cost. All-steel frame has parts standardized and interchangeable, is heavily reinforced with ample factor of safety. Important wearing points are hardened. Truck rides on cast steel wheels with sealed ball bearings and alloy steel axles. Front wheel load is taken on Timken thrust bearing in steering column.

Steel 1/28/46; *Item No.* 9910

Dust Sampler

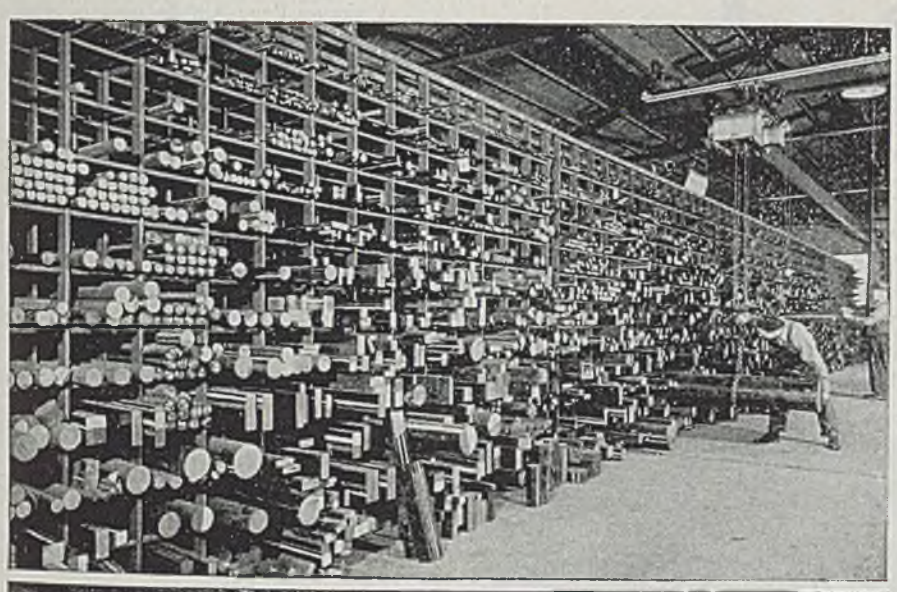
All-glass sampling units for use with the M. S. A. midget impinger have been developed by Mine Safety Appliances Co., Pittsburgh.

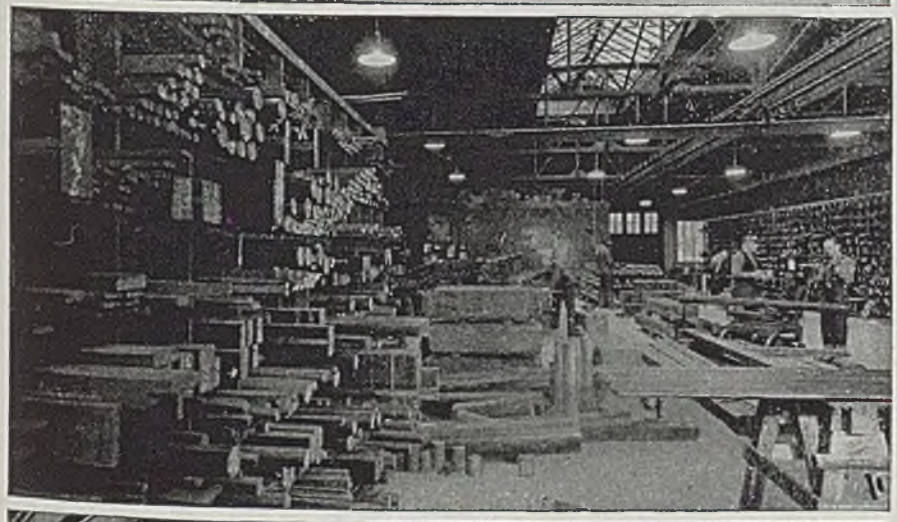
The all-glass sampling units consist of a flask and nozzle with a standard taper ground-glass stopper. A fritted glass bubbler is also available. This equipment is for sampling wide variety of dusts, gases, and vapors. All-glass construction of the new impinger units permits thorough cleaning and prevents contamination or discoloration of the sample undergoing test. Air outlet in these units is placed at a maximum height, and possibility of drawing over any of the collecting fluids is practically eliminated.

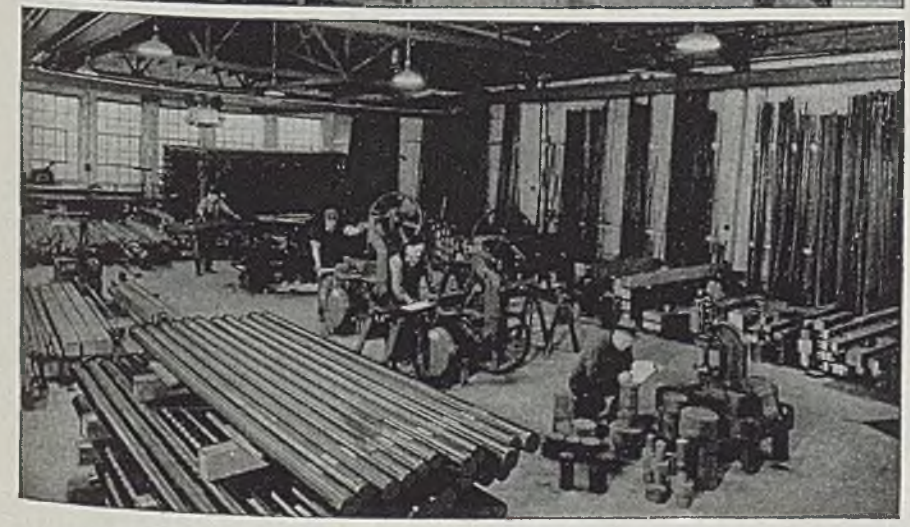
The impinger nozzle orifice is fixed at the correct height and no readjustment is necessary. Each nozzle has been checked to insure a flow within 4 per cent of 1/10 cu ft per minute at 12 in. water vacuum.

Steel 1/28/46; *Item No.* 9944

"Steel to Endure Must be Pure"







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YOU are invited to visit our modern Chicago Warehouse and check your Tool Steel requirements with us.

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PURE-ORE "CHIZ-ALLOY" Steel
PURE-ORE "AIR-CHROM"
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Hot Work Steel
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PURE-ORE Carbon Tool Steels
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Power Brushing Fixtures

(*Concluded from Page* 120)

trolled by varying pressure on forceps.

A simple dowl can be used to finish the exterior surface of a steel packing nut (Fig. 2). Here operator holds part against brushing wheel at angle causing nut to revolve as it is brushed. When operation is complete, the operator drops end down and finished nut falls into a tote box between his knees.

Another method of brushing packing nuts is to affix two wooden handles to a dowl that fits easily into the inside diameter of the nut, as shown in Fig. 3. Length of dowl may be sufficient to accommodate as many as 12 nuts. Shaft is made fast in one handle and the other handle is provided with a larger diameter hole so that the operator can control the rotation of the packing nuts by hand pressure on the handle against freely rotating parts. When operation is complete, operator slips off the free handle and permits the entire row of nuts to fall into a bin.

Burring External Threads

For fast power brushing of studs and other externally threaded parts which have no heads or other outer surface irregularities, the fixture illustrated in Fig. 4 offers an unusual but efficient method. Job is burring of external threads on a production basis, but principles of fixture design and construction, although simple, are exacting and provide accurate control and uniform results.

In Fig. 4, piping is attached slightly out of level, with feed end higher in amount of difference between round and flat brackets. This provides proper angle of brushing wheel contact with threads. To control timing and insure even brushing on all threads, a small side brush is fastened to pipe and its wire ends extend through a hole opposite brushing wheel. When threaded part reaches opening provided for brush contact, this small brush engages threads and controls speed through the piping according to the number of revolutions required to run the thread from one end to the other. The fixture is adjustable to provide for wear.

If parts to be brushed are made of a soft material, the piping which has been cut away to allow for feeding and brush contact could be of plastic material to protect against possible damage of threads while rotating through tube.

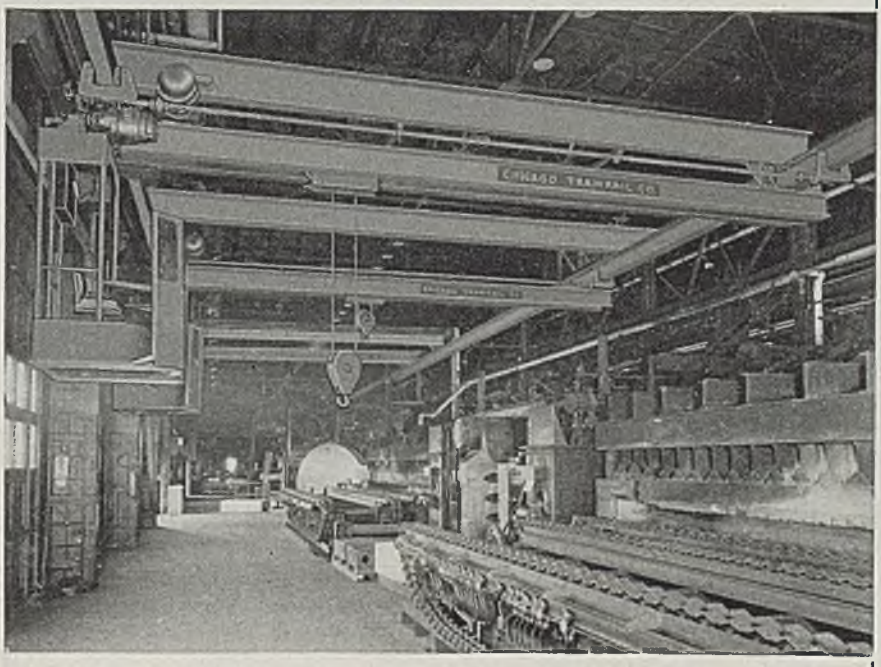
—o—

A book and folder released by Diebold, Inc., Canton 2, O., presents a motion study in lines of light. The book contains practical office motion study photo-diagrams and carries on to display the Cardineer rotary file. The folder is entitled "Rays of Light" and the book, "Across the Land".

On the right track .... FOR BIG SAVINGS

An Outstanding Example of Efficient Straight Line Forging with 6 Alternate Operating

OVERHEAD CRANES



★ You are *on the right track* and headed for big savings when you install Chicago Tramrail overhead bridge crane equipment for overall and intermediate production line operations.

For instance, the six cranes shown above operate on a single runway 280 feet long to handle a number of important operations during the forging (upsetting) of aircraft engine cylinder barrels.

Considered the outstanding installation of its type in the country, two cranes operate alternately, furnishing heavy (750 lb.) mill length (12 ft.) billets to each forging unit. The crane (with operator in cab and two helpers on the floor) 1, raises the billet off the conveyor—2, places the billet in the "V" groove of the flight conveyor—3, backs it out of the furnace mouth—4, guides it into the de-scaling cabinet—5, backs it out again—6, elevates and carries the billet to the top pass of the forging machine—7, lowers it to each of three subsequent passes. The finished forging is then discharged, the crane backs the remainder of the billet out of the machine and delivers it to the tail end of the conveyor onto the "V" groove with the end protruding to repeat the operation over and over.

Observe that the cranes operate on approximately 60 feet of runway and by performing a complete cycle in two minutes achieve an output of SIXTY FORGINGS PER HOUR from each machine!

WRITE—describe your handling operation, and we will submit specific recommendations. No cost. No obligation.

"On the Right Track"

CHICAGO TRAMRAIL COMPANY

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OVERHEAD CRANES • JIB CRANES • MONORAIL CRANES • HOISTS

Standardization of Color

(*Continued from Page* 122)

The hue and value units were proportioned to agree with the least perceptible difference that the eye can detect; so that a true circle drawn about a notation point can describe a permissible tolerance, horizontally in hue, vertically in value. The dot indicates notation in hue and value, the circle describes tolerances further discussed below.

Upon this graph the positions of the two extreme grays are indicated by the points marked 1 and 4. After many trials judged by many experts, all directed toward the selection of two intermediates that would form a progression pleasing to the eye in contrast and harmony, the grays indicated at points 2 and 3 were selected. When placed upon this graph, it became evident that their selection was no arbitrary choice. A curve drawn through the four points indicates a logical progression. The disposition of the points so closely agrees with a preferred-number progression (See American Standard Preferred Numbers, Z17.1-1936), that they can scarcely be shifted to any advantage. Other dots upon this graph indicate the notations of 40 sample grays used in the greatest bulk by one of the two companies. Here again it is worthy of note that the selected four are so located as to favor the majority, and yet their coverage of extremes is evident from the manner in which the curve cuts across the field.

Thus four grays were selected. The lightest of these has a warmth; enough yellow in it to be properly called a "french" gray. It is very close to an average of the majority of light grays now used on indoor apparatus, such as switchgear, and is already almost a standard by common consent for such uses. The darkest gray is cool, of the typical purple-blue type, and dark enough to meet all requirements of formulation for extreme durability. This also is a common consent standard for heavy outdoor apparatus such as transformers. The next to lightest gray has more yellow than blue; may be termed a blue-green gray. This gray was found to be close to the new Machine Tool standard gray. The last, or darker, intermediate gray is cool, approaching the blue family. It alone of the four is at all new to industry, being a little lighter and more blue than the old Machine Tool gray, but its selection was the result of the effort to develop systematic spacing of all, in both hue and value.

Common adoption of four such grays would result in good color harmony when all or more than one occur together either on separate products or as two-tone treatments of a single product. It would

also establish a group of grays including and consequently harmonizing with the hues proposed for the major areas in industrial plants by the exponents of "color engineering."

Numerous samples of the grays that were selected were made and subjected to Spectrophotometer analysis. The results were averaged and yielded the Munsell-Spectrophotometer notations given under "Conclusions" in subsequent paragraphs.

How Tolerances Were Determined: Since a finish of this kind must have some flexibility to be workable, tolerances had to be established. It is easier to "pin the tail on a donkey" than to formulate a paint that conforms exactly to a specified notation. The process of trial and error is still used. Consequently, a reasonable amount of error should be permissible; but its degree should be limited. Studies on this phase of the subject showed that there are certain small differences that, while sufficient to be detected when samples are placed directly together, are not noticeable to the average person as soon as such samples are separated. Such differences, based on visual thresholds, would seem to be reasonable basis for determining tolerances. They may be reduced to the approximate values also given under "Conclusions."

While these may appear small, it must be recalled that errors seldom exist in one dimension alone, but are usually compounded. The effect upon the eye is cumulative and the maximum tolerated error in all three dimensions will be much more noticeable than in one.

There is much work yet to be done by industry in this matter of determining tolerances. Even if tentative tolerances are acceptable from the standpoint of visual matching it is still quite uncertain as to whether they could be held in practice. The differences resulting from formulation in different materials and vehicles, for different methods of application, and subjected to differing methods of analysis may very well add up to much greater totals, and that excludes the effects of aging of material upon the samples matched, as well as on the product finished. It is also possible that greater tolerances may be acceptable and necessary on the darker grays than are allowed on the lighter ones.

The degree of gloss of the finish is also a factor that may affect the appearance or match. However, the situation with regard to instruments for measurement of this characteristic of a surface is now so unsettled that it was decided unwise to attempt definition or standardization of the terms *flat*, *semigloss*, and *gloss*. This situation is one seriously deserving attention, but, until settled,

tolerances must be sufficient to cover variations due to gloss differences.

Conclusions: The following summarizes gray specifications that are being considered by the designers of the two companies for their respective products. **Scope**—To apply to the use of grays in finishing external parts of industrial products, machines, and apparatus where grays are normally used.

Definition—The term *gray* should apply to all neutral shades or hues not exceeding a Munsell chroma of 1.5; the term *color* should apply to anything of a higher chroma.

Recommended grays are indentified by four Munsell notations:

Light gray	2.5GY6.0/5
Medium light gray	7.5BG4.5/1.0
Medium dark gray	6.5B3.3/1.0
Dark gray	10B2.5/1.0

(The new National Machine Tool Gray Standard, 7B which has been measured as 9.6BG4.82/0.8 is close enough to medium light gray, as above, so that its use would be a reasonable alternate).

Tolerances—Matching of standard grays, as above, should be limited as closely as practical to the following:

Hue, plus or minus 1.0
Value, plus or minus 0.5
Chroma, plus or minus 0.5

Method—The determination, and analysis and identification of such recommended grays should be according to the Munsell-Spectrophotometer system as specified in American War Standard Specification Z44-1942.

Use of these grays appears to be logical. The lightest gray was accepted as part of the recommendation on switchgear made to the Navy. As rapidly as laboratory work on formulation of the materials can be accomplished, they will be applied and tested under all conditions.

[1] **Hue:** The distinctive primary characteristic of any chromatic color. In terms of hue, we describe a color as red, yellow, green, blue or purple.

Value: The lightness or darkness of any color. In terms of value, we describe all colors as dark, middle, or light.

Chroma: The strength or weakness of a chromatic color. In terms of chroma, color is described as weak, moderate or strong.

Jack and Heintz Plans

Jack & Heintz Inc., Cleveland, which produced aircraft accessories during the war, si entering the peacetime market with a wide variety of new products. These include electronic gaging devices, ball bearings, refrigerator compressors and a gasoline engine. An automotive engine of the "pancake" type on display at the National Aircraft Show in Cleveland was assembled from die castings, said to be largest ever made. Clutch and transmission are an integral part of the unit.

Economics of Arc Welding

(*Continued from Page* 126)

The same is true of cutting, bending, forming, machining, setting up and other direct labor operations, and the total effectiveness of the workman's use of his time on productive work greatly influences total cost of finished unit.

Fig. 19 shows the relative importance of a good operator factor compared to one which is less desirable.

This 70 per cent may seem a little bit low, but assuming eight 3/16 x 14 in. electrodes per lb and 24 lb burned per day, at 90 sec burn off, and 15 sec electrode change for each electrode, it results in a total of 42 min of actual arc time and electrode changes per hour for 8 hours, or a total of 336 min of work.

Because of the confining and attention demanding nature of depositing weld metal with the arc, it is not uncommon to consider a 20 per cent fatigue or rest allowance factor (12 min out of 60). When computed on a basis of 336 min in an 8 hr day, this results in 83 min of rest allowance which should be added to the 336 min of work.

This amounts to a total of almost exactly 7 hr, leaving only 60 min remaining in the day for handling time, job starting and stopping, cleaning up, changing jobs, getting electrodes, etc.

A 50 per cent operator factor which produces only 30 min instead of 42 min of work per hour, (not including rest allowance) represents a 40 per cent increase in the labor cost over the 70 per cent operating factor on all direct labor.

"Clean Surface" Article

In the article "Is a 'Clean' Surface Necessary?" (STEEL, Dec. 31, p. 82.) by Dr. Ernest H. Lyons Jr., Meaker Co., Chicago, a number of footnotes were omitted which would have further clarified some of the data presented. Observations on finished surfaces were those of B. F. Lewis in the *Monthly Review* of the American Electroplaters' Society. References to electrodeposits on lead should have been credited to R. Scott Modjeska of Scientific Control Laboratories, Chicago. Comments on peeling of certain nickel deposits were those of A. W. Hothersall in the Proceedings of the American Electroplaters' Society. Dr. Lyons' original paper is included in Volume 88 of the Transactions of the Electrochemical Society, Columbia University, New York 27.

In the case of the machine base, 40 per cent increase in labor costs causes a 24 per cent increase in the total cost of the production of the unit.

This represents $2400 on a hundred machine bases as a margin for improvement between 50 and 70 per cent operating factor. Since the overall operator efficiency of a shop is one of the best indications of the degree of efficiency in the organization and the association of the workmen with the job, it is an extremely important factor. Some question might be raised about charging 150 per cent overhead to a job with a poor operator factor. The fact remains that if a poor operator factor is habitually the case in a shop, there are more workmen to do a given amount of work which in turn requires more equipment, more payroll taxes, more factory space, more supervision, and a general increase of the costs which contributes to overhead expense so that the relationship of the 50 to the 70 per cent from the standpoint of overhead in all probability is about the same. Actually, overhead expenses may possibly be greater for the 50 per cent operator factor.

Cumulative Effect of Factors on Weld Cost: In the foregoing eight examples of the specific effect of a given factor on the cost of a welded unit, only one factor at a time has been considered. This has been done to make the relative value of each factor specific and pointed.

It is important to show the cumulative effect on the total cost of all of the factors, all of which were relatively conservative in themselves, and compare them to the original cost based on normally attainable good practice. Fig. 20 shows the cumulative effect of all of the various factors in their proper relationship, based upon the assumption made with each factor in the section where it was described.

It should be borne in mind that each of these factors are added in Fig. 20 without any special interrelation of the effects of one upon the other. For example, the cost of the effect of overwelding is based on the assumption that ¼-in. electrodes were used in good practice and will also be used in the overwelding. If a smaller electrode should be used, say a 7/32-in., which makes a difference of 11½ per cent in the total cost of the unit, cost of overwelding would be 27 per cent greater than it actually was assumed to be. The same might be said of the consideration of the cost of welding up bad fits.

Even with this conservative approach, it is of considerable interest to observe that while assuming the almost ideal 70 per cent operator factor, the total cost of the unit with the accumulated cost effect of the less desirable practice (conservative though it may have been)

amounts to $244.16. This is an increase of over 144 per cent. It represents the difference between a cost of $10,000.00 compared to $24,416.00 for the same 100 machine bases.

Should a 50 per cent operator factor be assumed instead of a 70 per cent operator factor, the cost immediately goes to $822.80, an increase of 222.8 per cent above the cost of the normally attainable good practice, rated at 100 per cent. Even if proper discount is made for the inclusion of elements which slightly expand overhead in some of these costs, the accumulated cost of making these bases with the less desirable practice exceeds 500 per cent the cost with normally attainable good practice in arc welding manufacture.

These differences when accumulated may look to be very large. In actual practice, careful study with stop watch and other accurate measuring devices indicate that they are of such great importance that they represent the largest common margin for economic improvement in arc welding.

It is for these reasons that there are greater opportunities for economic advantages to be obtained by careful study, organization, and control of the arc welding process than may commonly be realized.

New applications of arc welding in manufacturing seldom begin at the highest degree of obtainable good practice, yet often provide a very desirable margin of profit even at the start. The margin of additional profit or economic advantage obtainable by improving the various phases of the operation to the best practice attainable for that job adds much to the competitive position of the manufacturer.

Bureau of Standards Lists Standard Steel Samples

National Bureau of Standards, Washington 25, D. C., has added four new standard analyzed steels to its list of standard samples. These are sample Nos. 139, 152, 155 and 156.

Sample No. 139 is an NE 8637 steel, with approximate weight of 150 grams; price is $3. Sample No. 152 is a B. O. H. tin-bearing steel (with content of approximately 0.04 Sn). Its price is $2. Sample No. 155 is a chromium-tungsten steel (approximately 0.5 chromium and 0.5 tungsten); its price is $3. The fourth sample, No. 156, is an NE 9450 steel priced at $3. Approximate weight of all samples is 150 grams.

Orders should give both number and name of the sample wanted. No samples of smaller size than those listed are distributed by the Bureau. Remittance should accompany the order.

the BUSINESS TREND

TEMPO of industrial production was slowed sharply in the week ended Jan. 26 by the strike in the steel industry. Further paralyzing action from that strike will be noted in the days immediately ahead as manufacturing plants close from exhaustion of steel supplies.

Even before the steel strike officially started, the index of industrial production as compiled by STEEL for the week ended Jan. 19 declined as steelworks made preparations for the strike. STEEL's index for that week registered 115 per cent (preliminary), compared with 123 of the previous week.

AUTOS—One of the many effects of a prolonged steel strike will be the halting of production in the automobile industry, which because of strikes has been unable to attain projected goals of output. From a year-end dip in production, auto assemblies in the first three weeks of 1946 were on the upgrade, with output in the week ended Jan. 19 at 28,465 units, a 22 per cent rise over the previous week.

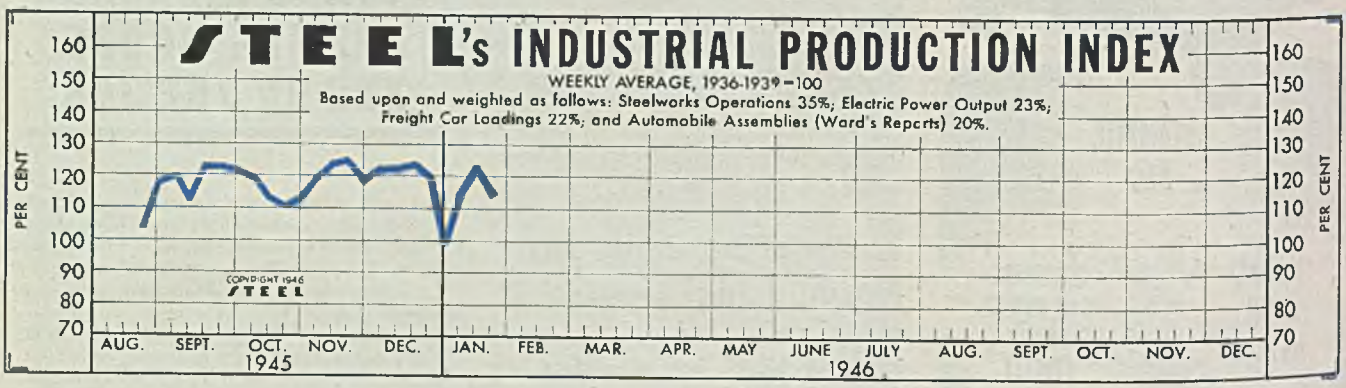
MACHINE TOOLS—Reported shipments of machine tools in December dropped to $21,646,815, lowest monthly figure for 1945, but new orders that month rose to $31,610,252, highest since last June. Cancellations of orders in December dropped to $1,748,315, lowest for any month last year. Unfilled orders rose in December to $178,972,145. Total reported shipments in 1945 were $390,098,798, and estimated total industry shipments were $407,315,000. Of the reported December shipments of $21,646,815, foreign shipments accounted for $4,402,499, or 20.3 per cent. Of the $31,610,252 worth of new orders placed in December, $13,397,656, or 42.4 per cent, were for foreign business.

COAL—Bituminous coal production in the first two weeks of 1946 was 11.1 per cent behind that for the corresponding period last year. Cumulative output totaled 20,115,000 tons, compared with 22,625,000 tons in the like period of 1945.

CONSTRUCTION—Building permit valuations in 215 cities rose in December to the highest level since October, 1929. Dollar valuations of permits issued last month in those cities totaled $188,092,192, more than four and one-half times that of December, 1944, and 15.1 per cent over November, 1945. Estimated value of permits for 1945 totaled $1,242,104,586, highest since 1941.

FOUNDRY EQUIPMENT—Index of total orders placed for foundry equipment rose in December to the highest mark since September. The December orders were exceeded in 1945 only by those of March and September.

STEEL FORGINGS—Shipments of steel forgings rose in October to 127,623 tons, a 17 per cent increase over September. Unfilled orders at the end of October amounted to 643,340 tons, 3 per cent over those on September 30.



The Index (see chart above): Latest Week (preliminary) 115 Previous Week 123 Month Ago 119

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	70	82	80.5	93.5
Electric Power Distributed (million kilowatt hours)	4,150	4,163	4,239	4,588
Bituminous Coal Production (daily av.—1000 tons)	1,913	1,709	2,061	2,025
Petroleum Production (daily av.—1000 bbls.)	4,606	4,578	4,480	4,734
Construction Volume (ENR—Unit $1,000,000)	$45.4	$88.0	$63.8	$27.7
Automobile and Truck Output (Ward's—number units)	28,465	23,340	17,580	20,720

*Dates on request.

TRADE

Freight Carloadings (unit—1000 cars)	700†	773	688	770
Business Failures (Dun & Bradstreet, number)	20	10	8	16
Money in Circulation (in millions of dollars)‡	$28,119	$28,297	$28,557	$25,209
Department Store Sales (Change from like wk. a yr. ago)‡	+13%	—7%	+15%	+14%

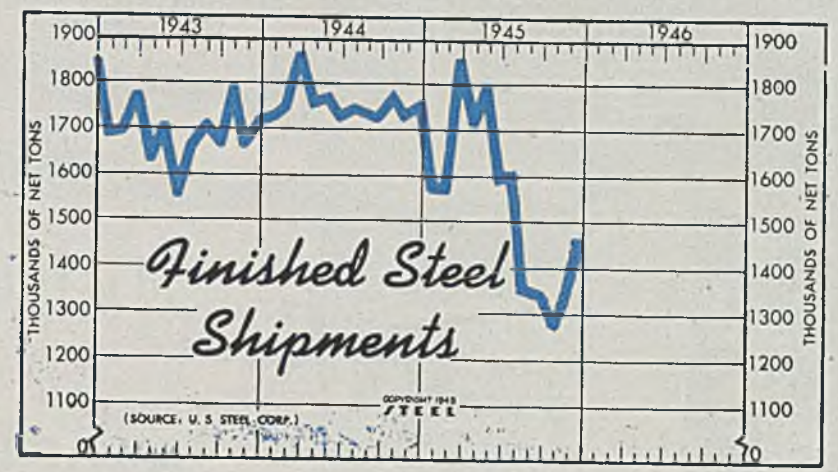
†Preliminary. ‡Federal Reserve Board.

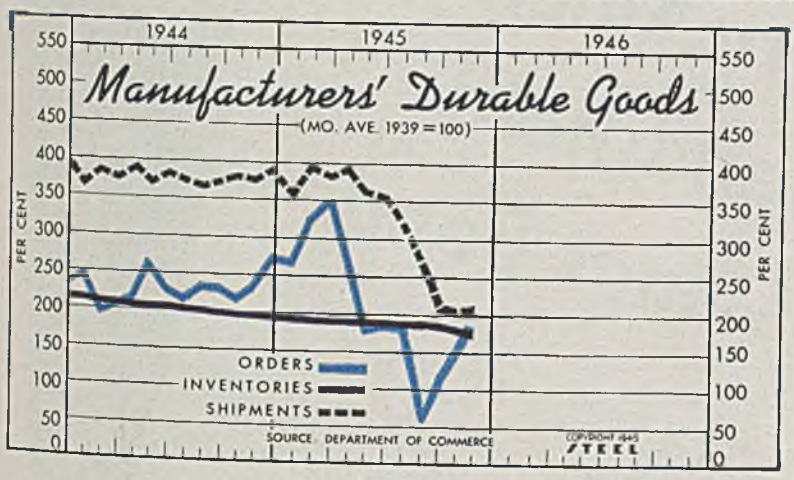
U. S. Steel Corp.'s Finished Steel Shipments

(Net Tons)

	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,685,993	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	1,608,994	1,754,525	1,660,762	1,765,749
Aug.	1,332,180	1,743,485	1,704,289	1,788,650
Sept.	1,321,576	1,733,602	1,664,577	1,703,570
Oct.	1,290,358	1,774,969	1,794,968	1,787,501
Nov.	1,346,407	1,743,753	1,660,594	1,665,545
Dec.	1,459,803	1,767,600	1,719,624	1,849,635
Total	18,484,277	21,150,788	20,244,830	21,064,157
Adjustment		*98,609	*97,214	*449,020
Total	18,484,277	21,052,179	20,147,616	20,615,137

*Decrease.





Index of Manufacturers' Durable Goods

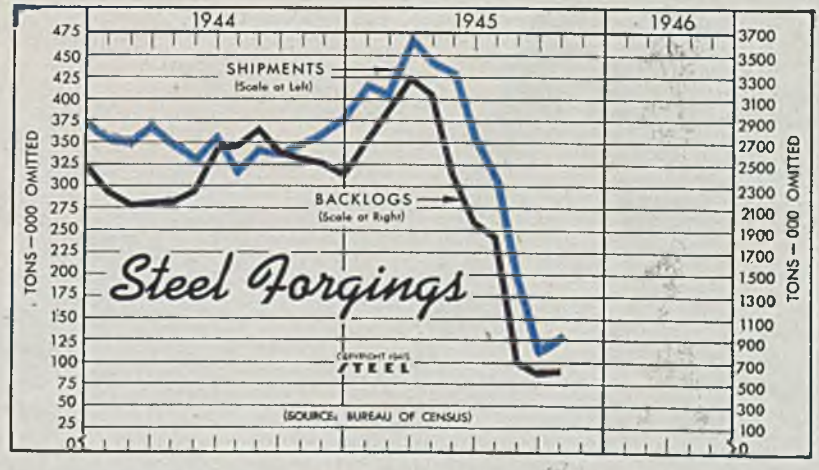
(Mo. Ave. 1939 = 100)

	Orders		Shipments		Inventories	
	1945	1944	1945	1944	1945	1944
January	267	248	354	364	190	212
February	326	195	394	384	189	209
March	351	202	382	377	189	207
April	267	215	389	389	189	205
May	177	265	361	371	189	204
June	182	227	356	383	189	204
July	180	213	320	373	187	202
August	54	231	262	366	185	201
September	121	230	216	372	185	199
October	165	214	206	380	183	197
November	179	232	208	374	176	195
December		276		390		192
Average		229		377		202

Steel Forgings

Tons—000 omitted

	Shipments		Backlog		Consumption of steel	
	1945	1944	1945	1944	1945	1944
Jan.	417	355	2,723	2,256	556	521
Feb.	406	350	3,018	2,132	544	509
Mar.	469	370	3,304	2,142	632	521
Apr.	442	347	3,147	2,166	576	494
May	430	330	2,428	2,252	567	453
June	357	359	1,947	2,637	467	457
July	306	315	1,855	2,670	393	441
Aug.	195	341	696	2,821	257	483
Sept.	110	336	623	2,602	152	463
Oct.	128	348	643	2,564	173	488
Nov.		360		2,510		488
Dec.		377		2,408		506



FINANCE

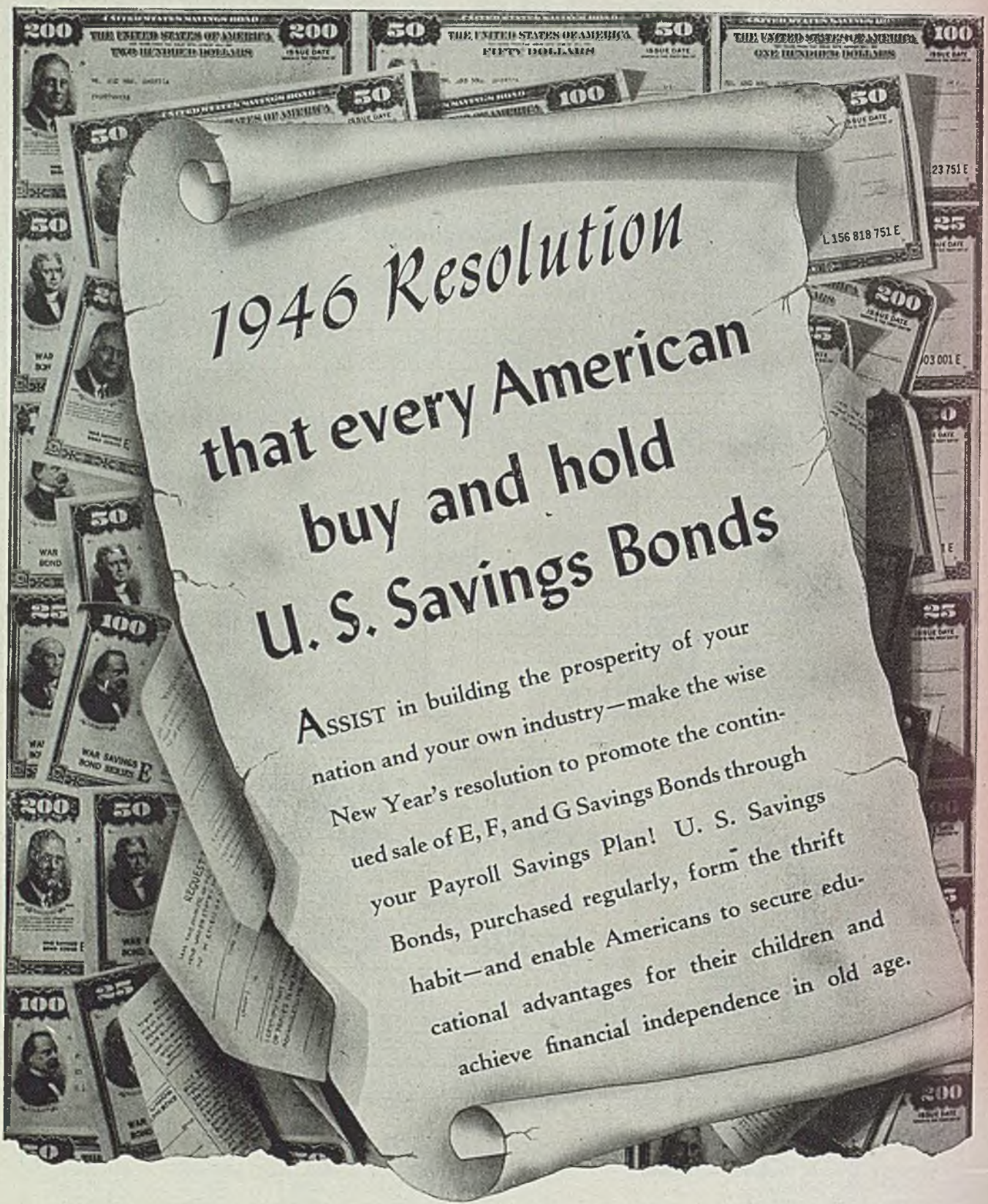
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,762	$13,171	$13,757	$11,371
Federal Gross Debt (billions)	$278.0	$278.6	$278.3	$233.1
Bond Volume, NYSE (millions)	$51.7	$50.6	$30.7	$68.7
Stocks Sales, NYSE (thousands)	14,668	12,290	6,667	9,124
Loans and Investments (billions)†	$67.8	$67.9	$68.0	$59.6
United States Gov't. Obligations Held (millions)†	$49,133	$48,674	$48,817	$44,138

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$57.55
All Commodities†	106.7	106.8	106.7	104.7
Industrial Raw Materials†	119.0	119.7	119.7	115.6
Manufactured Products†	102.8	102.6	102.6	101.4

†Bureau of Labor Statistics Index, 1926 = 100.



The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

Cut slag-handling costs – use

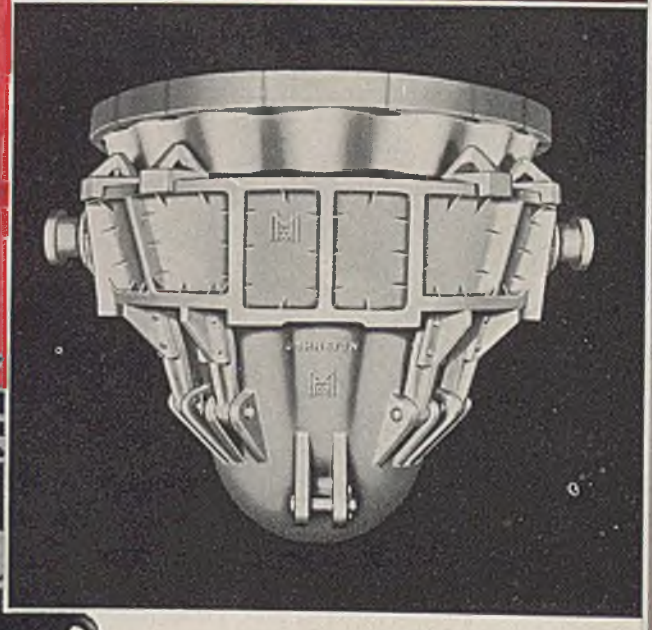
Johnston cinder pots

BLAST FURNACE AND OPEN HEARTH TYPE

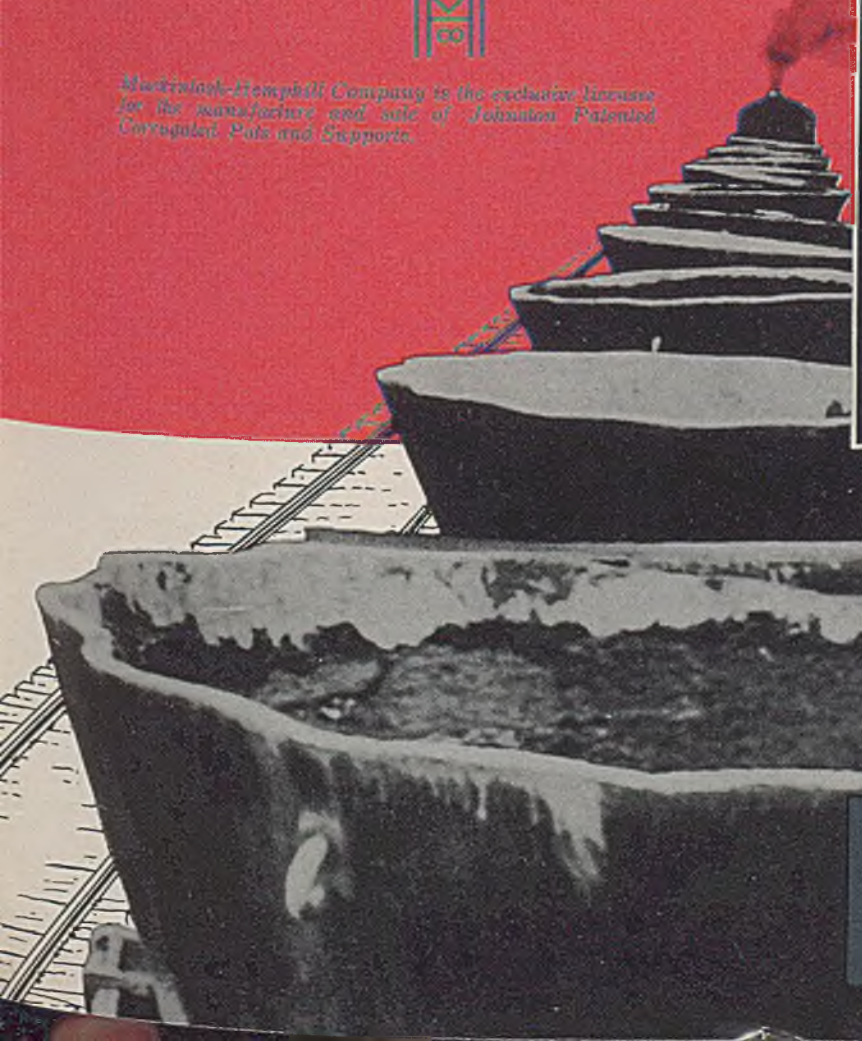
We don't sell "just castings"—we have no stock pots—Each Johnston Corrugated Cinder Pot is individually engineered to a specific plant condition . . . and we keep complete records of the chemical, metallurgical and physical properties of every one of them—actual plant performance where it's available.

We don't know *all* the answers but we do manage to lick a lot of problems. Our expanding rim (cast integral) for instance is generally acknowledged to be the most important cinder pot development since the advent of the Johnston Pot Support. This and other improvements has resulted in a 100% adoption of the Johnston Pot by an impressive number of leading plants . . . so we feel pretty certain that we can cut your slag-handling costs.

1803

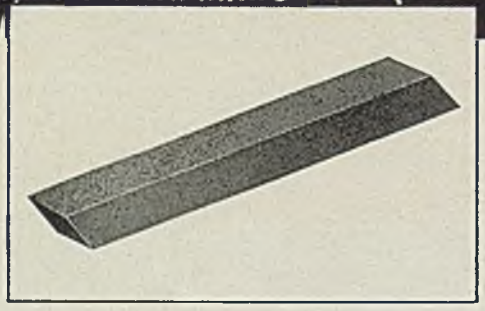


Mackintosh-Hemphill Company is the exclusive licensee for the manufacture and sale of Johnston Patented Corrugated Pots and Supports.



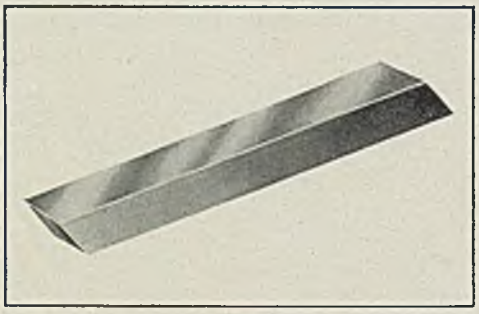
MACKINTOSH-HEMPHILL CO.

PITTSBURGH AND MIDLAND, PA.



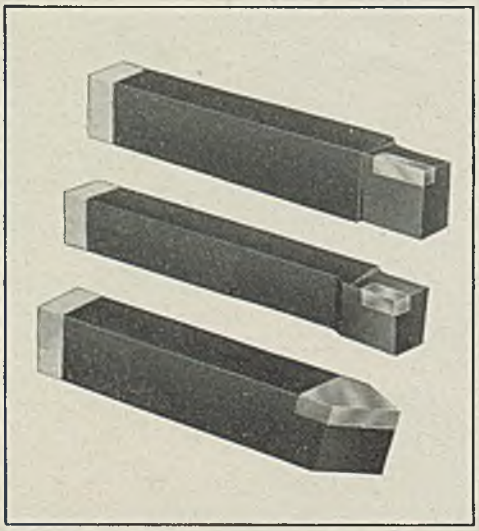
HIGH SPEED STEEL

Wide adaptability through choice of many analyses. Foremost in shock resistance. Usable at lower power and on slower machines. Lower cost. Available in standard shapes and sizes, sand blasted or ground.



"T and V"

Exceeds high speed steels in hardness, wear resistance and in permissible speeds. Exceeds carbide in shock resistance. A cast-to-shape alloy of cobalt, chromium, tungsten, and boron, ground to close tolerances.



MALTA CARBIDE

Highest in wear resistance and allowable speeds. MF for hard irons and non-ferrous, non-metallic materials—SF for all types of steel—CR for coarse-roughing, interrupted cuts on soft steels, cast irons, etc. Ten grades. Complete tools or tips furnished.

A *nearly* right tool is a time and money loser; an *exactly* right tool for the work you have in hand will increase production, lessen "down time." If you will describe the application, experienced Jessop engineers will recommend the *exactly right* tool for the job. Write in full.

JESSOP STEEL COMPANY

HEAD OFFICE AND WORKS **WASHINGTON, Penna.**

MARKET SUMMARY

Steel Users Face Shutdown As Inventories Dwindle

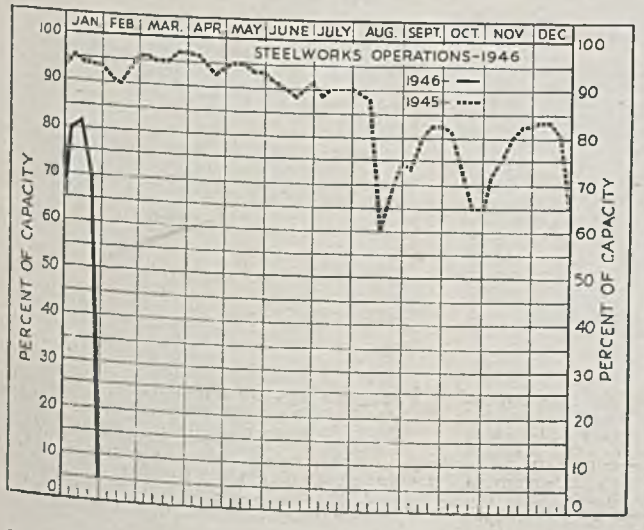
Some conserve stocks for quick resumption . . .
Scrap continues to be shipped and stored . . .
Warehouses limit sales

WHILE steelmaking is at probably the lowest percentage rate in the history of the industry as a result of the steel strike, consumption is tapering much more moderately as most steel fabricators have not yet been confronted by labor stoppages of their own and have been able to carry on temporarily from stocks on hand.

However, until the end of the strike consumption is expected to decline at an accelerated pace as consumer inventories at the beginning of the strike did not average more than 30 days supply at most. Consideration of the fact that it will take some time for mills to resume full production after the strike's end is causing consumers to conserve stocks and plan suspension of operations before their steel is gone.

In fact, some fabricators, assuming post-strike shipments will be slow and having small stocks, suspended fairly promptly, to prepare for a quick start after the strike. But most shops in a position to operate have done so and in absence of mill shipments many have turned to steel distributors for such help as can be afforded. In some cases demands on warehouses have been almost fantastic. Distributors in general have responded conservatively to make sure available supplies were being equitably divided among customers and to comply with the request of the Civilian Production Administration for voluntary co-operation in seeing that only spot needs are given consideration and in particular that effort be made to have steel available for emergency maintenance and repair.

Meanwhile, to provide steel for emergencies which cannot be met under such a voluntary rationing, CPA is following a policy of issuing AAA ratings where necessary, having previously suspended all priorities granted before the strike.



DISTRICT STEEL RATES

(Percentage of Ingot Capacity Engaged in Leading Districts)

	Week Ended Jan. 26	Change	Same Week 1945	Same Week 1944
Pittsburgh	2.5	—54	86	97
Chicago	4.5	—59.5	97.5	102.5
Eastern Pa.	4	—74	94	96
Youngstown	0	—65	85	94
Wheeling	59	—34	92.5	94
Cleveland	0	—83	86.5	96
Buffalo	0	—25.5	81.5	83.5
Birmingham	0	—95	90	95
New England	10	—70	92	95
Cincinnati	44	—37	92	89
St. Louis	14	—49	75	83
Detroit	31	—57	90	88
Estimated national rate	5	—65	93.5	99

*Based on steelmaking capacities as of these dates.

While inquiry to mills has dropped sharply following the walkout, there has been more demand than many trade interests expected. In addition to interest as to the status of tonnage due or possibly en route there has been continued evidence of consumer desire to get on mill books even though no definite promise can be given. Some leading mills have asked buyers to take back their orders and reinstate them later when conditions are settled. Others simply file these orders.

Steelworks operations last week are estimated at 5 per cent of capacity, probably lowest in history. At Buffalo, Cleveland, Youngstown and Birmingham all production was stopped. At Pittsburgh the rate was 2½ per cent, Chicago 4½ per cent, eastern Pennsylvania 4, Detroit 31, Cincinnati 44, Wheeling 59, St. Louis 14, New England 10.

Indications are action on steel price advances is unlikely pending clarification of the wage situation. Talk of an increase has ranged all the way from $2.50 to $7 per ton. Recently $4 per ton increase seemed to be the figure generally expected to be applied. However, with production at a standstill, steelmakers declining to accept President Truman's compromise wage suggestion, it was said last week price action would be delayed, the government holding this as a trump card to apply in wage negotiations at the opportune moment.

Pig iron production is at a low ebb, most blast furnaces being banked and the few still operating being unable to meet more than a small part of demand. Under regulations in force for some time foundries have been limited in their inventories and face the present situation with not more than a 30-day supply, usually much less. Some foundries are down, while others are producing from stock but face closing in a short time if iron production is not resumed soon. As resumption of production by blast furnaces is a slow process full flow of iron will require some time after the strike is over and a severe shortage is expected to continue for some time at best.

Meanwhile, railroad car buying is proceeding at a good rate and a number of orders have been placed recently, including 36,750 units for the French government, divided among six builders. The Pennsylvania has distributed orders to three builders for 214 streamlined passenger cars.

COMPOSITE MARKET AVERAGES

	Jan. 26	Jan. 19	Jan. 12	One Month Ago Dec. 1945	Three Months Ago Oct. 1945	One Year Ago Jan. 1945	Five Years Ago Jan. 1941
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$57.35	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.80	24.80	24.80	24.80	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	18.95	21.00

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material	Jan. 26, 1946	Dec., 1945	Oct., 1945	Jan., 1945
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron	Jan. 26, 1946	Dec., 1945	Oct., 1945	Jan., 1945
Bessemer, del. Pittsburgh	$26.94	$26.94	$26.19	$25.19
Basic, Valley	25.25	25.25	24.50	23.50
Basic, eastern del. Philadelphia	27.09	27.09	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	26.44	26.44	25.69	24.69
No. 2 foundry, Chicago	25.75	25.75	25.00	24.00
Southern No. 2, Birmingham	22.13	22.13	21.38	20.38
Southern No. 2 del. Cincinnati	26.05	26.05	25.30	24.30
No. 2 fdry., del. Philadelphia	27.59	27.59	26.84	25.84
Malleable, Valley	25.75	25.75	25.00	24.00
Malleable, Chicago	25.75	25.75	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.94	25.94	25.19	24.19
Ferromanganese, del. Pittsburgh	140.00	140.00	140.33	140.33

Scrap				
Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	18.45	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.75	13.75	13.35

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bll) $38; Pac. Ports, (bll) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co. $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42, Detroit, del. $44; Duluth, billets, $44; forg. bll. f.o.b. Pac. ports, $54.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co. $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅝ in. inclusive, per 100 lbs., $2.15 Do., over ⅝—41-in., incl., $2.30; Galveston, base, $2.25 and $2.40 respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.05 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Youngstown, Chicago Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.55c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit del., 2.80c. (Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20 gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	....
58	7.75c	8.50c	....
52	8.55c	9.30c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c.

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed, .450c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Plates

Roofing Ternes: Pittsburgh base per package 112 sheets: 20 x 28 in., coating I.C. 8-lb. 12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c; Gulf ports, 2.45c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.45c, Bethlehem, Pa., on the general range and 2.55c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.40c; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham to manufacturers in carloads. Bright, basic, bessemer wire ..... °$2.75
Spring wire ..... °†$3.35

Wire Products to the Trade: Standard and cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, $2.90; Pac. ports, $3.40; galvanized, $2.55 and $3.05, resp.

Annealed Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.20

Galvanized Merchant quality wire, 100-lb., Pittsburgh, Chicago, Cleveland, Birmingham ..... ††$3.55

Woven fence, 15½ gage and heavier, per base column 67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 72; twisted barbless wire, column 72.

°Add $0.10 for Worcester, $0.05 for Duluth; add $0.50 for bright, annealed, aglvanized and $0.70 for other finishes for Pacific ports.

† Same bases as for bright basic except Birmingham.

†† Add 10 cents for Worcester; 50 cents for annealed, bright basic and 70 cents for all other finishes for Pacific ports.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b.f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	....	$ 9.01	....	....
1¼"	13	....	10.67	....	....
1½"	13	$10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

°Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

°Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	....	67.00c
1.5	4	1	8.5	54.00c
....	4	2	3	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
°316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
†347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
°°410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	26.50	32.50	24.00	32.00
443	22.50	26.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

°With 2-3% moly. §With titanium. †With columbium. °°Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Rivets, Washers

Birmingham

F.o.b. Pittsburgh, Cleveland, Chicago

Structural 3.75c

⅛-inch and under ..... 65-5 off

Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..$2.75-3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65¼ off
Do., ⅜ and ⅝ x 6-in. and shorter	63¼ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the some designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from **Extra** mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prces, wasters 75%, wastewasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terns plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	°7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.08
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

°Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.

†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	26.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls., to jobbers	8.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$20.00

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[15]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[23]	4.152[23]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Contesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[15]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.043[1]	4.093[1]	4.093[1]	5.693[1]	3.793[1]	4.143[1]	4.143[1]	5.615[12]	5.443[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	3.943[1]	3.993[1]	3.993[1]	5.593[1]	3.693[1]	4.043[1]	4.043[1]	5.515[12]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[12]	4.46[24]	4.461[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[11]	5.172[13]	4.347[24]	4.131[21]	4.931	6.131[23]	6.281[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[6]	4.313[3]	5.313[26]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[1]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.633[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 1999 pounds; 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.95
Mesabi nonbessemer	4.55
High phosphorus	4.55
Mesabi bessemer	4.70
Old range nonbessemer	4.80

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 243, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace: Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
	Chemical Composition Limits, Per Cent									
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c. per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximum fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, and Oct. 22, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.75	$26.25	$27.75	$27.25
Newark, N. J., del.	28.28	27.78	29.28	28.78
Brooklyn, N. Y., del.	29.25	.....	.....	29.75
Birdsboro, Pa., base	26.75	26.25	27.75	27.25
Birmingham, base	22.13	20.75	26.75	.....
Baltimore, del.	27.36	.....	.....	.....
Boston, del.	26.89	.....	.....	.....
Chicago, del.	25.97	.....	.....	.....
Cincinnati, del.	25.81	24.48	.....	.....
Cleveland, del.	25.87	24.99	.....	.....
Newark, N. J.	27.90	.....	.....	.....
Philadelphia, del.	27.21	26.71	.....	.....
St. Louis, del.	25.87	24.99	.....	.....
Buffalo, base	25.75	24.75	26.75	26.25
Boston, del.	27.25	26.75	28.25	27.75
Rochester, del.	27.28	.....	28.28	27.78
Syracuse, del.	27.83	.....	28.83	28.33
Chicago, base	25.75	25.25	26.25	25.75
Milwaukee, del.	26.85	26.35	27.35	26.85
Muskegon, Mich., del.	28.94	.....	.....	28.94
Cleveland, base	25.75	25.25	26.25	25.75
Akron, Canton, del.	27.14	26.64	27.64	27.14
Detroit, base	25.75	25.25	26.25	25.75
Saginaw, Mich., del.	28.06	27.56	28.56	28.06
Duluth, base	26.25	25.75	26.75	26.25
St. Paul, del.	28.38	27.88	28.88	28.38
Erie, Pa., base	25.75	25.25	26.75	26.25
Everett, Mass., base	26.75	26.25	27.75	27.25
Boston, del.	27.25	26.75	28.25	27.75
Granite City, Ill., base	25.75	25.25	26.25	25.75
St. Louis, del.	26.25	25.75	.....	26.25
Hamilton, O., base	25.75	25.25	.....	25.75
Cincinnati, del.	26.19	26.36	.....	26.86
Neville Island, Pa., base	25.75	25.25	26.25	25.75
†Pittsburgh, del. No. & So. sides	26.44	25.94	26.94	26.44
Provo, Utah, base	23.75	23.25	.....	.....
Sharpsville, Pa., base	25.75	25.25	26.25	25.75
Sparrows Point, base	26.75	26.25	.....	.....
Baltimore, del.	27.74	.....	.....	.....
Steelton, Pa., base	.....	26.25	.....	27.25
Swedeland, Pa., base	26.75	26.25	27.75	27.25
Philadelphia, del.	27.59	27.09	.....	28.09
Toledo, O., base	25.75	25.25	26.25	25.75
Youngstown, O., base	25.75	25.25	26.25	25.75
Mansfield, O., del.	27.69	27.19	28.19	27.69

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. § For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	....$31.25		
6.51-7.00	$32.25	9.01- 9.50	37.25
7.01-7.50	33.25	9.51-10.00	38.25
7.51-8.00	34.25	10.01-10.50	39.25
8.01-8.50	35.25	10.51-11.00	40.25
8.51-9.00	36.25	11.01-11.50	41.25

F.o.b. Jackson county, O., per gross ton. Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $25.25
Valley base 25.25

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $31.25 base; $32.49, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $28.25.

Switching Charges: Basing Point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	50.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads, CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135 f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is producer; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is producer; $140 f.o.b. cars, Pittsburgh, where Carnegie-Illinois Steel Corp. is producer; add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l. 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l. max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed: 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed. 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%. car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.623, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 8 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide, approx. 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c, and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all f.o.b. Bridgeville, Pa., usual freight allowance.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c; 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96% min. manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 30c, 2000 lb. to c.l., 32c, central, 30.25c, and 33c; western 30.55c and 35.05c.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: Spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6.8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon. 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.56
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.31
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach. Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Heavy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn.	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.50
Shoveling Turnings	12.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	7.00
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.00
Tin Can Bundles	14.50
No. 2 Steel Wheels	15.50
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.50
Uncut Frogs, Switches	15.50
Scrap Rails	15.50
Locomotive Tires	15.50

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12,12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more. 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.45c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.00c to 8.25c, Grade 4 (85-90%) 7.75c; any other ingot containing over 1% iron, except PM 754 and hardeners, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Price for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1¼c 1000-2239, 2¼c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $108-$110 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.): $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	8.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 196

While inquiry for sheets and strip almost ceased with beginning of the steel shutdown it continued at a rate higher than had been expected, consumers seeking position on mill books regardless of lack of promises as to delivery. Sheet inventory at consumer plants is probably lowest of any major steel product, with few having 45 days supply, most having less than 30 days requirements. Some consumers have shut down at once, saving stocks for use in the interval between end of the strike and resumption of mill shipments. Others continue consumption in the hope the strike will not be prolonged. Some sellers refuse to book further tonnage under existing circumstances.

New York—Of all the major products, sheets are in lightest supply at consumer plants in this district. Few have anything like 45 days supply, the maximum under government regulations. The great majority, in fact, have less than 30 days supply, and those that are not already down for one reason or another, particularly because of the electrical strike, are likely to begin tapering production shortly.

Inquiry, meanwhile, has declined sharply, with much of the interest during the first few days of the strike directed to inquiry as to status of shipments scheduled to be received at that time, as to whether they were enroute. However, new demand did not dry up entirely, but rather came out in a volume that was surprising to sellers under the circumstances. Various consumers wanted to get on mill books regardless of inability of mills to make anything like definite promises. The policy of some leading sellers at least was to refuse to accept new tonnage for the present.

St. Louis — Sheet and strip production here continued at a slowed pace the first days of the strike with the largest mill closed but two smaller ones continuing operations. CIO unionists in the two latter disclaimed interest in the strike until they are picketed. Mills are sold through the year although delivery of some rail steel can be made in second quarter.

Boston—Light flat-rolled inventories with few exceptions are smallest among steel products, hardly one month at current operations with some fabricators. An exception is the carbuilding shop at Worcester, Mass., with substantial sheet stocks, in both light and heavy gages. This shop is down at the moment. Shortages in No. 12 hot-rolled will soon curtail fabrication of 275-gallon tanks, which have sustained heavy demand for that gage. Output of narrow cold strip has not ceased entirely, with two district shops producing with inventories of hot strip better than 45 days in one instance, although unbalanced as to sizes and grades. The one large sheet producer still operating is so heavily booked on all grades that no material relief is in sight from that source. This mill schedules on a monthly basis and the January carryover in electrical sheets is so heavy little new tonnage will be rolled this month. February finishing schedules have been closed. Although on a reduced scale, some orders still trickle in for place on schedules when rolling is resumed. Surplus sales include 417 tons in poor condition to the Builders Specialty Co., Providence, R. I.

Cleveland—Sheets and strip steel consumers last week continued to seek positions on production and shipping schedules but the volume of inquiry was smaller than expected. Orders are being acknowledged but not processed. Some mills will make a complete revision of schedules when the strike is ended, placing orders to cover essential needs in preferred positions. Other mills will move forward their entire schedules. Shipments were four to ten weeks behind schedule at the time of the general shutdown and will lose an additional two weeks for preparation of facilities for resumption of operations plus whatever time the strike continues. At the start of the strike, few consumers had more than a month's supply of sheets and strip, reflecting the various quota and allocation systems which had been in effect, and some consumers had only a week's or ten days' supply.

Pittsburgh — Strike has forced complete shutdown of all sheet production facilities in this district with the one exception at the Butler, Pa., plant of American Rolling Mill Co. In the nearby Wheeling district the Weirton Steel Co.'s units are the only ones operating. Leading producers here are not processing including orders because only department heads are permitted to enter company buildings in most instances. Prolonged steel strike is expected to force many metalworking companies not affected by the strike to shut down within two to three weeks as inventories will not last longer than this.

Philadelphia — While two large producers of sheets in another territory continue in operation they cannot keep pace with current commitments and so can offer no relief to consumers cut off from supply by the strike. A number of buyers, however, are still trying to get on mill books on the basis of shipments at mill convenience.

Steel Bars . . .

Bar Prices, Page 196

Bar consumers are not seeking to palce further tonnage on mill books, sensing the impossibility of obtaining shipment, although there is some inquiry for material for delivery at mill convenience and much interest is manifested in obtaining information as to shipments made just prior to closing of mills. At the beginning of the strike carbon bars were sold practically through third quarter, small sizes going over into fourth quarter. Cold-drawn bars were easier, some tonnage being available for second quarter. These deliveries now are deferred to the extent of the strike duration.

New York—Although demand for hot carbon bars has dropped sharply, following the suspension of steelmaking operations, there is still more than many sellers thought likely would be the case. There is not only inquiry with respect to the status of steel scheduled for delivery at this time, but inquiries for new tonnage for delivery at mills' convenience. Most sellers, however, have discouraged such demand, preferring to wait until there are more definite signs as to when the steel dispute will be adjusted.

At the time the steel strike went into effect little hot carbon bar tonnage was available for third quarter, and in the smaller sizes not much before the end of third quarter and the early part of fourth quarter. In fact, some producers were booked up for the entire year on the very small sizes.

Cold-drawn bars were less tight, with certain producers able to quote early second quarter delivery on larger rounds, although unable to do much before the end of that quarter on the smaller sizes. Some cold drawers had nothing left for second quarter on the small and medium sizes. Hot carbon alloy bars were available in March. These schedules are all naturally being set back as a result of the steel strike.

Cleveland — Orders for bars continue to arrive at sales offices in a surprisingly large volume. These are being held pending termination of the strike, no attempt being made to process them. Some bar mills were forced to close down as much as ten days before the general walkout, causing shipments to fall far behind schedule. When the strike was called, shipments were generally about eight weeks delayed. No decision has been reached as to what arrangements will be made by mills to supply customers' needs on an equitable basis when production is resumed. At that time, it is believed, the situation will be similar to that immediately following V-J Day when the pipelines to consumer goods manufacturing plants were practically empty. The process of filling these pipelines, accompanied by heavy pressure for prompt deliveries, will be repeated and may require the establishment of a stricter allocation system.

Boston—More steel than might be expected, including bars, was delivered in New England during January, before the strike. Some mills shipped on the day of the strike, having strained to get as much tonnage cleared during the first half of the month. As a result inventories are fair with bar consumers, most of which, including forgers, are operating. Substantial lots of carbon bars in small sizes came in earlier this month and alloy stocks are substantial in view of the relatively good deliveries on that grade during the extended period on carbon, including hot and cold-rolled. This unexpected increase in deliveries was made possible in some cases by suspensions in automotive tonnage, mainly General Motors and suppliers.

Philadelphia — With steel bar production almost flat consumers are limiting buying efforts mainly to getting on mill books for tonnage to be shipped later, at some indefinite time. District commercial railroad equipment shops, with one important exception are believed to be in operation as are some forging and marine hardware shops, with a number of miscellaneous bar consumers.

Steel Plates . . .

Plate Prices, Page 197

With plate production practically at a standstill inquiry continues and consumers are seeking a place on mill books for indefinite delivery after the strike. Many plate fabricators are closed down and others are operating on material in stock. Placing of 36,750 freight cars for France will call for a considerable plate

tonnage, although the cars are smaller than domestic units.

Philadelphia — Plate producers assert there still is a fair sprinkling of inquiry, notwithstanding the fact that many plate fabricating shops are down and that producers will be unable to offer definite deliveries until they resume operations. Railroad equipment shops are among the more active plate fabricators at present, drawing on stocks. However, Baldwin Locomotive Works, a notable exception, is down completely as a result of a walkout. When the steel strike was called producers were quoting late second quarter and early third quarter delivery.

New York — With plate production along the east coast at a standstill, inquiry is off appreciably. Nevertheless there is a fair amount of demand, with indications of a sharp spurt once there are signs of a settlement in the labor controversy. Substantial tonnage of plates is in prospect for the 36,750 freight cars recently placed in this country by the French Supply Council, with orders distributed among six builders.

Boston—Most plate fabricating shops are in production with inventories generally under 45 days, reserves being smallest in lighter gages. Orders have not stopped entirely and while considerable rescheduling is in prospect tonnage is offered for rolling mill space when available, which for some gages and widths will be several months after production starts. Definite specifications are impossible so far ahead but a considerable number of consumers want tonnage on books. In one case employes have voted to co-operate with the shop to lengthen the period of work with present inventories by reducing the rate of production schedules. Tank builders are notably out of balance as regards plates and heads. Some have more plates than heads and will automatically slow down when stocks of the latter are low, regardless of plate stocks. Shipyard stocks are sufficient for some time at current rates of activity and if shortages develop there still are considerable lots of terminated contract surplus which in any event will become more in demand. Large tank work includes two elevated structures for water systems for two Cape Cod towns, involving several hundred tons.

Wire . . .

Wire Prices, Page 197

Boston — Production of drawn wire has been reduced to a trickle at Worcester and other districts, with rod inventories hardly more than 30 days, including material in process. Shipments were heavy during the first half of January and consumer stocks are somewhat larger than before although production of finished grades will be affected within a month. Manufacturers of tires have limited stocks of bead wire and with little new tonnage in sight output will be threatened within a few weeks. At end of strike many consumers will be without steel and unless the rod situation is materially improved replenishment will be slow. Three mills in Central Massachusetts are producing. One plant at Worcester is included, union holding to a no-strike clause in the contract after an earlier walkout. A plant of the same company in the Boston district was struck and is down.

Structural Shapes . . .

Structural Shape Prices, Page 197

Boston — Not until semifinished is allocated to rolling mills in greater volume will supply of structural shapes approach demand and there are indications more steel will be forthcoming soon, when mills get rolling. Backlogs, however, are topheavy with small sizes and another contributing factor is specification of more sizes which were banned during the war. Demand in tons is not outstanding, but limited stocks make structurals among the tightest of steel products. Lag in public works to the blueprint and bid stage is fortunate. Estimates for some programs have practically doubled earlier costs and appropriations. Electric Boat Co., Groton, Conn., a newcomer in the structural fabricating industry, has bought miscellaneous machines, 172 units, at $267,915.63, surplus through the Boston agency of RFC.

Denver — Bids close Feb. 11 with the Bureau of Reclamation for erection of 4250 tons of structural steel for 60 to 110-foot towers, transmission line, 56 miles, from Oroville, Calif., to Sacramento. Conductors for this line will be either steel-reinforced aluminum or expanded type copper. Gates and penstock deck for Ft. Peck power plant take 4250 tons of miscellaneous steel, including structurals, much of which will be embedded; bids Feb. 11, U. S. engineer, Ft. Peck.

Cleveland — Activity in the structural

market has not come to as abrupt halt as in the case in other finishing departments of the strike-bound steel mills. Bids are still being figured. Estimating and detailing work is being carried on as usual by companies whose departments for this type of work are not at the mills. Much of the work in fabricating shops at the time of the shutdown was scheduled for delivery through second quarter, indicating that spring construction will be limited.

Independent fabricators have sufficient stocks to finish most of the jobs now in process and will be able to continue at a reduced rate for an additional 30 days. They will have to make a careful check of inventories, however, to determine whether they have all the material required to finish each job. Reserve stocks of steel have declined steadily in recent weeks due to curtailment of mill deliveries. Some fabricators report they have not received all the material purchased as early as July with delivery originally promised by the mill for fourth quarter, although part of this tonnage had been extended as far forward as second quarter prior to the strike.

Pittsburgh — Many construction projects are held up by complete shutdown of some fabricating shops in this area. Completion of plans on new work are also at a standstill for same reason. Plants closed here include among others: American Bridge Co., Fort Pitt Bridge Works and Pittsburgh-Des Moines Steel Co. Present steel strike will accentuate the shortage of building materials and should materially delay new construction. Volume of this type work should reach record proportions once wage and price levels are established.

Rails, Cars . . .

Track Material Prices, Page 197

New York—The French Supply Council is reliably understood to have awarded 36,750 freight cars to six car builders in this country. American Car & Foundry Co., New York, is said to have received 8750 box cars and 4000 gondolas; Pullman-Standard Car Mfg. Co., Chicago, 10,000 box cars; Pressed Steel Car Co., Pittsburgh, 4500 box cars; General American Transportation Co., Chicago, 3500 box cars; Greenville Steel Car Co., Greenville, Pa., 3000 gondolas; and Magor Car Corp., New York, 3000 gondolas. The cars in general range from 20 to 30 tons capacity.

Domestic freight car buying so far this month has been spotty and general indications are that there will be little new buying until the labor situation becomes untangled, especially in the steel industry.

Orders for domestic freight cars in 1945 involved 45,432 units, compared with 53,221 in 1944, 41,355 in 1943 and 26,028 in 1942. Bookings in the final month of last year totaled 4116 cars; further comparisons follow:

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March ...	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	670	1,150	50	0
July	3,500	795	4,190	1,025
Aug.	7,240	3,900	8,747	0
Sept.	12,840	400	6,820	1,863
Oct.	1,320	2,425	5,258	0
Nov.	1,650	1,065	870	0
Dec.	4,116	16,245	2,919	135
Total	45,432	53,221	41,355	26,028

Latest estimates as to the steel required for the 36,750 freight cars just placed by the French Supply Council are approximately 300,000 tons, this including the wheels and axles as well as the rolled steel products. The steel strike will delay schedules on this program, but probably a greater factor for delay will be shortage of lumber, that is unless the steel strike is prolonged.

Pig Iron . . .

Pig Iron Prices, Page 199

Virtual cessation of pig iron shipments from furnaces throws melters back on their own stocks in large measure. Continuance of the steel strike foreshadows closing of foundries when present inventories are worked off, which will be in less than 30 days in most cases, stocks having been held to that limit by government regulation. Resumption of shipments will meet heavy demand, all melters, who probably will be entirely out of iron, seeking supply to resume operations.

New York — Several foundries in this district are already down as a result of the steel strike, with indications that still others now in operation will be

forced to suspend before the end of the month unless the strike ends before then. Recent stoppages are in addition to strikes at several gray iron foundries in Brooklyn, where CIO labor walked out early in the month because wage demands were not met. Some foundries, however, have 30 days supply, the inventory limit set by Washington, and consequently may be able to continue on into next month regardless of whether the steel strike continues, unless they are forced to suspend because of shortage of coke. Supplies at some plants are said to be low.

Boston — Inventories of New England pig iron consumers, foundry and malleable grades, vary, with most stocks under 30 days, to meet stoppage of deliveries. Basic melt has all but ceased. A few larger melters, including some textile mill equipment shops, are holding more than 30 days supply and were prohibited from taking shipments before the stoppage developed. Melting by some consumers has halted, while others continue. In the foundry industry interruption of operations is mixed and confused. Most of those now melting will be affected by the shortage of iron in less than a month. That the pinch in iron will continue for some time after a settlement of current difficulties is indicated by lack of inventories at blast furnaces and the likelihood present reserves held by consumers will be worked off before that point is reached, meaning most users will be pressing for shipments at the same time, in the effort to resume production.

St. Louis — Pressure on pig iron remains strong. Orders suspended by struck steel mills are being diverted to other users, so present low inventories show no signs of improving during the shutdown.

Cincinnati — Full effect of the steelworkers' strike on foundries in this district was not immediately discernible. Perhaps the feature of the situation is the absence of drastic cutbacks in demand for castings and although there may be later holdups all available output, it is believed, will be taken even if it goes into inventory. The melt is down because of foundry strikes, and pig iron stocks are meager.

Cleveland — With the exception of foundries which are closed due to labor difficulties within their own plants, the castings industry here is maintaining operations at about the same rate as before the general steel strike. Although government regulations forbid holding more than 30-day supply of pig iron, many foundries are expected to maintain production at least through February. Other foundries, which have a smaller supply, plan to operate at a steady pace in the hope that blast furnaces will resume by the time their pig iron is depleted. Production of castings for General Motors has practically ceased in this district, pending settlement of the strike in its plants.

Pittsburgh — Many foundries here are under USA-CIO contracts and thus shut down, while those having contracts with AFL union are estimated to have sufficient iron and coke to maintain present operations for three to four weeks. CPA regulations restricting pig iron inventories to 30 days have prevented accumulation of stocks to the normal level of 45 to 60 days. The few independent coke interests still operating report considerable number of hold-up orders from foundries, while those foundries still in operation are seeking new sources of supply in cases where regular supplier is shut down.

Chicago — The steel strike is seriously reducing the quantity of pig iron that can be moved to foundries. Last week, only nine of the district's 41 blast furnaces were operating, comparing with 28 the week before and 35 two weeks ago. Of the four plants operating these units, three provide all or a part of their output to the merchant trade. Two are not struck and can ship, the third cannot ship. Some foundries are closed by strike and serves to hold down demand for iron, but shops still running are aggressively searching for iron. Few foundries have more than two weeks' inventory, many less than this. Thus, unless normal supply of iron is resumed soon, many foundries face enforced closing.

Philadelphia — Except for one eastern Pennsylvania stack with employes not under CIO contract, all district furnaces are down. This stack has gone off basic and is producing iron to aid foundries, most of which still are operating. One producer now down was able to ship four-fifths of its January commitments before the strike. Severe shortage of pig iron is expected for some time after the strike. One producer in this district

plans to take off one of its two furnaces in the spring for relining.

Scrap . . .

Scrap Prices, Page 200

Scrap continues to move with little interruption, steelmakers taking all shipments on old orders as backlog for use when production is resumed. No new buying is being done at present. Material arriving at strike-bound mills is left on tracks or stored at nearby accumulation centers. Supply is only moderate and closing of many manufacturing plants, expected to come as steel supply is used up, will tend to reduce volume of industrial scrap.

Pittsburgh — Every effort is being made to keep scrap flowing to yards adjacent to consuming points. Leading producer is stocking material at Curry Hollow on the Union Railroad near Irvin, Pa., and Pittsburgh Steel Co. at a railroad yard near Glassport, Pa. Other steel producers, with one exception, are accepting shipments on schedule. Dealers and consumers are closely watching possible adjustment in prices. Consensus is for no weakness to develop in near future for supply has been steadily dwindling in recent weeks with strikes tying up operations among General Motors Corp.'s and electrical equipment plants, while the steel strike has forced a shutdown of many metalworking plants and if the strike should last hundreds of other plants will be forced to close within three to six weeks. There is considerable conjecture over possible higher scrap price levels when the steel strike is over, should the steel companies obtain a price increase and the fact that wage levels in dealers' operations also probably will be increased somewhat.

Cleveland — In spite of the strike-bound position of all steelmakers in this district practically no suspension has been made in scrap delivery, except in the case of some small foundries. Mills are accepting delivery, allowing cars to stand on tracks and paying demurrage. This is because of great need for material for use after work is resumed and fear of a shortage in supply if present tonnage is refused. No new buying is being done but all existing orders are being filled as fast as scrap becomes available. A mill in the Wheeling district, not affected by the strike, is taking all material offered and is unloading it as received. Prices are at ceilings with springboards paid for material coming from a distance. Supply continues light and brokers have difficulty finding sufficient to maintain shipments on old orders.

Boston — While there are suspensions on heavy melting steel, some tonnage in that grade continues to move, although the movement to steel mills is nearly halted. Demand for foundry grades holds well, with cast still scarce. Several larger consumers are out of the market for cast, being above the 60-day limit.

Chicago — Despite the fact that only one steel mill in this district is not closed by strike, no hold orders on shipment of scrap have been reported. Material cannot be moved into closed plants, of course, but is being diverted to nearby convenient storage points to be held in cars for quick movement when the strike ends. It is understood that scrap can be so handled at a cost of $1.50 per car per day. Numerous foundries in this area also are down by the strike, thus those shops still operating may find it easier to have their requirements met. In general, new buying has dropped some, and prices hold at full ceiling. For most scrap yards, the strike will serve as a breathing spell and some accumulations may result.

Buffalo — Although scrap receipts have been slashed to a minimum by strike-bound industries, dealers report operations maintained, chiefly by processing of yard stocks. One leading mill consumer is still accepting shipments, leaving cars in its yards. The mill explains that it is willing to accept the demurrage charge on cars to build reserve stocks. The leading mill consumer is faced by the equivalent of an embargo on shipments as the only railroad serving the plant has temporarily suspended operations on lines into the mill.

St. Louis — Scrap deliveries have been halted under a union prohibition against its entering plants during the steel strike. Mill reserves range from two to four weeks. Shipments are off, due to bad weather and dealers hold little hope of being able to build yard stocks substantially during the strike. All prices remain at ceilings.

Cincinnati — Available scrap is going to mills and foundries, not strike-bound,

in volume so far only moderately greater than recent levels. Supplies, which have been tight, will quickly catch up with this demand on diversion of available tonnage, it was predicted. Hence, brokers and dealers are moving cautiously and general activity in the district is off.

Warehouse . . .

Warehouse Prices, Page 198

New York — Jobbers are being swamped with inquiry, with some requests fairly fantastic. Requests are appearing for 20,000 tons of sheets per month for the duration of the strike, with other large tonnages involving wide variations of specification and size.

Pittsburgh — Metalworking companies cannot expect much relief from steel warehouse sources here should the nationwide steel strike continue longer than their inventories hold out. Only three of eleven steel distributors in this area are not closed down due to the strike. Those warehouses operating expect to be out of steel within a few weeks. It is questionable as to what extent CPA's policy of a voluntary rationing system for emergency repairs and maintenance for transportation, hospitals, public utilities, etc., will be adhered to. Undoubtedly present inventories will be rationed to regular customers, but some observers believe maintenance and repair stock will be shipped even though inventories fall below present levels. Warehouse interests report a record volume of new inquiries as a result of the strike and this situation is accentuated by fact such a large proportion of steel distributors are also shut down.

Cleveland — Warehouses are adhering closely to the policy formulated by the Civilian Production Administration for voluntary rationing of steel. Under this plan, warehouses are restricting delivery to immediate needs of customers, thereby conserving stocks for emergency maintenance and repair uses, such as requirements of hospitals, public utilities and transportation facilities. In many instances, this represents no departures from recent practice under which warehouses have restricted sales in the interest of equitable distribution.

Boston—Inventories in some instances are the heaviest in weeks, due to large receipts before the stoppage. Distributors are rationing tonnage against heavy inquiry and in some cases are filling only 10 per cent of any order per size. Most could sell out in sheets, strip, shapes and other products. Brisk demand also prevails for some sizes of plates. Inquiry is also broadening in a large number of products.

Iron Ore . . .

Iron Ore Prices, Page 198

Consumption of Lake Superior iron ore in December totaled 6,099,134 gross tons, compared with 5,611,227 tons in November and with 7,090,174 tons in December, 1944, according to figures of the Lake Superior Iron Ore Association, Cleveland. For the entire year 1945 consumption was 75,575,878 tons, against 87,247,000 tons in 12 months of 1944.

Stocks of Lake Superior ore at furnaces and on Lake Erie docks Jan. 1 were 39,058,650 tons, compared with 44,706,399 tons a month earlier and 37,823,876 tons as of Jan. 1, 1945. Of the total at the beginning of this year 34,659,764 tons were at furnaces and 4,398,886 tons on docks.

Furnaces in blast Jan. 1 totaled 152 in the United States and six in Canada. As of Dec. 1, 1945, furnaces in blast in the United States numbered 148 and as of Jan. 1, 1945, they numbered 164, with six active in Canada in both instances.

Canada . . .

Toronto, Ont. — While the steel strike in the United States so far has had no direct effect on industrial activities in Canada a number of manufacturers in this country will be forced to curtail operations if the strike continues for any long period. Canadian industry depends on the United States for certain types of steel not produced here, but most of these have inventories sufficient to carry them for a few weeks. At the moment there are no indications that the strike will be reflected in labor problems on this side of the border, although some union leaders are said to be considering requests for higher wages.

The shutting down of steel mills across the border, however, is creating some uneasiness among steel consumers and as a result a fresh flood of inquiries and new orders appeared during the past week. Intimations from Ottawa to the effect that ceiling prices on some com-

modities may be lifted or abandoned has given hope to Canadian steel producers that higher prices for various steel materials may be permitted soon.

Further improvement is reported in demand for steel plate as the result of new orders for ships placed with Canadian shipbuilders by the French government totaling about $25,000,000. No shortage of plate is reported, however, and Ontario producers are offering delivery in two to three months. Car and locomotive builders continue heavy buyers, and there is a steady flow of small orders from other consumers.

Backlogs on carbon bars will absorb all available capacity for first quarter, and some producers report heavy orders extending into second quarter. With the closing out of bar supplies from the States consumers that formerly depended on supplies from that quarter now are endeavoring to make purchases from Canadian producers. Demand for alloy bars also has shown some improvement in the past few days, but deliveries against new orders are said to be available in April.

Merchant pig iron sales continue steady, with awards for the week around 10,000 tons.

Serious shortage continues in scrap iron and steel and dealers report no improvement in receipts to relieve the situation. For some time past steel mills have been drawing heavily on reserves to meet daily requirements, with the result that inventories have been reduced to the lowest level in many years. Fresh offerings of scrap are not appearing in large volume and some larger consumers have been buying up ships produced in wartime, to be converted into scrap. Imports of scrap from the United States also are far below normal with no indication of early improvement.

OPA Revises Iron and Steel Scrap Price Provisions

Changes in ceiling price provisions for iron and steel scrap, necessitated by the reduced allocation and distribution activities of Civilian Production Administration, were announced last week by the Office of Price Administration. The War Production Board extensively allocated scrap during the war but on Nov. 3 allocations were discontinued.

Scrap Disposal Policy To Restrict U. S. Shipments

(*Concluded from Page 93*)

ders. It also includes provisions for the return of lead and tin-bearing scrap from abroad as recommended by the advisory committee. This policy applies only after clearance from the Civilian Production Administration, which clearance is needed to avoid cross-hauling of the same or similar types of raw materials that have been allocated to foreign countries.

Aluminum scrap will generally be disposed of locally overseas, as recommended by the advisory committee, except that aluminum landing mat, which has a high content of the metal, will be returned to this country. In Japan aluminum scrap will be stockpiled pending further study, and in United States-occupied Germany it will be held with the view of possible use of facilities there to reduce it to ingot form for later return to this country.

Copper and brass scrap will be returned from all overseas commands except France, Belgium, England and the Netherlands. In those countries, copper and brass scrap will be disposed of locally to assist in civilian rehabilitation.

Speaking on the matter at the Scrap Institute convention, General Hauseman said that every one of the Overseas Scrap Committee's recommendations was carefully analyzed for it was realized that in addition to the fact that our domestic economy would be affected by the disposal problem involved, that also the matter of foreign policy was involved.

On the basis of the announcement of the War Department it was felt that the volume of scrap to be returned to this country will be relatively small. Other Army scrap and salvage, however, will continue to total substantial tonnages. According to General Hauseman, prospects of obtaining scrap from the Army reflect an immediate counter-balancing situation. There will be an increase from some of its sources and a decrease from others. The increase will result from the demilitarizing of artillery, non-flyable aircraft and the like. Termination inventory still offers substantial scrap tonnage. The decrease in Army scrap flow will be noted from government manufacturing operations. Army housekeeping will also provide a smaller supply as the demobilization program advances.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1400 tons, office building, New Haven, Conn., for New York, New Haven & Hartford, to Harris Structural Steel Co., New York.

1350 tons, mill building, Union Bag & Paper Co., Savannah, Ga., to American Bridge Co., Pittsburgh, through Morton C. Tuttle Co., Boston, general contractor.

800 tons, building for Doubleday, Doran & Co., Garden City, N. Y., to Harris Structural Steel Co., New York.

800 tons, building, Detroit, for Pfeiffer Brewing Co., to Whitehead & Kales Co., Detroit.

710 tons, highway bridge, Oakville, Iowa, for State Highway Commission, to Bethlehem Steel Co., Bethlehem, Pa.; bids Jan. 8.

640 tons, bridge, Wapello, Iowa, for State Highway Commission, to Clinton Bridge Works, Clinton, Iowa, for fabrication by Allied Structural Steel Co.'s; bids Jan. 8.

628 tons, bridge No. 1 GVG 153496-ADS, Waneta, B.C., for Great Northern railroad, to Canadian Bridge Co. Ltd., Walkerville, Ont.; bids Sept. 6.

457 tons, vapor recovery units, Whiting, Ind., for Standard Oil Co. of Indiana, to American Bridge Co., Pittsburgh.

400 tons, building for International Minerals

Corp., San Jose, Calif., to Moore Dry Dock Co., San Francisco, through Stone & Webster Engineering Corp., Boston.

400 tons, for Norton Pipe Co., Littleton, N. H., to American Bridge Co., Pittsburgh.

308 tons, alterations to Conway building, Chicago, to American Bridge Co., Pittsburgh; bids Dec. 26.

251 tons, industrial building, Gary, Ind., for Anco Building Corp., to American Bridge Co., Pittsburgh.

220 tons, bridge WERI-20-B, Morton county, N. D., for State Highway Commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; Rue Bros., contractor; bids Jan. 9.

205 tons, Western Electric Co., Kearny, N. J., to American Bridge Co., Pittsburgh, through United Engineers & Constructors, Philadelphia.

200 tons, beam spans, bridge No. 429, Clifton, Mo., for Wabash railroad, to Bethlehem Steel Co., Bethlehem, Pa.

STRUCTURAL STEEL PENDING

9500 tons, bearing piles for building for John Hancock Insurance Co., Boston.

2600 tons, building for Libby Owens Co., Toledo, O., Stone & Webster Engineering Corp., Boston, contractor.

2300 tons, bridge A-313, Canyon Diablo, Ariz., for Atchison, Topeka & Santa Fe railroad; bids Feb. 12.

1700 tons, brewery for Anheuser-Busch Co., near Newark, N. J., George A. Fuller Co., New York, contractor.

1545 tons tainter gate movable parts, including forgings, 250 tons trash racks.

1500 tons, powerhouse for Standard Oil Co. of Indiana, Whiting, Ind., Stone & Webster Engineering Corp., Boston, contractor.

1000 tons, estimated, for reserve fleet berthing facilities at New London, Conn.

846 tons, gates for Keswick dam, Redding, Calif., for Bureau of Reclamation.

730 tons, sheet piling for seawall at Hampton Beach, N. H.; bids in.

400 tons, embedded structural steel for tainter gates, Ft. Peck power house; bids Feb. 11, U. S. engineer, Ft. Peck, Mont.; also 312 tons miscellaneous metals including castings, 165 tons embedded semi-corrosion resisting steel,

350 tons, building for Peoples Savings Bank, Providence, R. I., George A. Fuller Co., New York, contractor.

236 tons, three bridges for Pennsylvania state highway commission.

235 tons, warehouse, Miami, Fla., for Louis Kasoff.

REINFORCING BARS . . .

REINFORCED BARS PLACED

675 tons, assembly plant for General Motors Corp. at Framingham, Mass., to Bethlehem Steel Co., Bethlehem, Pa.

650 tons, foundry building for Manning, Maxwell & Moore at Watertown, Mass., to Truscon Steel Co., Youngstown, through Stone & Webster Engineering Corp., Boston.

540 tons, paving, Dubuque and Jackson counties, Iowa, for State Highway Commission, to Ceco Steel Products Corp., Omaha, Neb.; Western Contracting Corp., Sioux City, Iowa, contractor; bids Oct. 30.

350 tons, bridge, Stafford, N. H., to Truscon Steel Co., Boston; Charles W. Riva Inc., Boston, general contractor.

300 tons, Procter & Gamble, St. Bernard, O., to Joseph T. Ryerson & Son, Inc., Chicago.

216 tons, paving, Sioux county, Iowa, for State Highway Commission, to Des Moines Steel Co., Des Moines; Booth & Olson, Sioux City, Iowa, contractor; bids Oct. 30.

209 tons, bins, Superior, Wis., for Great Northern railroad, to Carnegie-Illinois Steel Corp., Chicago; James Stewart Corp., Chicago, contractor.

150 tons, addition to Sattler's Department Store, Buffalo, N. Y., to Bethlehem Steel Co., Bethlehem, Pa., through Siegfried Construction Co., Buffalo.

121 tons, bridges, Louisa county, Iowa, for State Highway Commission, to Waterloo Steel & Equipment Co., Waterloo, Iowa; A. Olson Construction Co., Waterloo, Iowa, contractor; bids Jan. 8.

110 tons, power station, Kalamazoo, Mich., for Allied Paper Mills, to Joseph T. Ryerson & Son Inc., Chicago; Sargent & Lundy, Chicago, engineers; bids Dec. 27.

REINFORCED BARS PENDING

1500 tons, deck over penstock area, Ft. Peck, Mont.; bids Feb. 11, U. S. engineer, Ft. Peck.

900 tons, Curtis Publishing Co., Philadelphia.

558 tons, flood walls, levees and appurtenances, central industrial district (Missouri) Kansas City; bids Feb. 14 U. S. engineer, Kansas City.

500 tons, spillway and embankment, Canton dam, North Canadian river, Oklahoma; bids Feb. 7, U. S. engineer, Tulsa.

395 tons, flood control, unit No. 1, Newport, Ky.

360 tons, power house, Alma, Wis., for Dairyland Power Co-operative; Lacrosse Contracting Co., Chicago, contractor; bids Jan. 18.

267 tons, for New Jersey state highway commission; bids Feb. 18; also requires 875 tons of shapes.

150 tons, fabricating shop, Milwaukee, for Chicago, Milwaukee, St. Paul & Pacific railroad.

150 tons, state agriculture building, St. Paul; Lovering Construction Co., St. Paul, contractor; bids Jan. 11.

PIPE . . .

CAST IRON PIPE PLACED

2836 tons, 6, 8 and 10-inch, Dennis, Mass., to Warren Pipe Co., Everett, Mass.

2700 tons, 6, 8 and 10-inch, Yarmouth, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

295 tons, 6 and 8-inch, Newton, Mass., to Warren Pipe Co., Everett, Mass.

STEEL PIPE PENDING

425 tons, 6 to 14-inch for Framingham, Mass.; bids in.

RAILS, CARS . . .

RAILROAD CARS PLACED

French Supply Council, for French government, 36,750 freight cars, 20 to 30-ton capacity; American Car & Foundry Co., New York, 8750 box and 4000 gondolas; Pullman-Standard Car Mfg. Co., Chicago, 10,000 box; Pressed Steel Car Co., Pittsburgh, 4500 box; General American Transportation Co., Chicago, 3500 box; Greenville Steel Car Co., Greenville, Pa., 3000 gondolas; Magor Car Corp., New York, 3000 gondolas.

Pennsylvania Railroad, 214 passenger cars, 57 to American Car & Foundry Co., New York. 70 to Edward G. Budd Mfg. Co., Philadelphia and 87 to Pullman-Standard Car Mfg. Co., Chicago.

Detroit & Toledo Shore Line, 25 covered hopper cars to Harlan & Hollingsworth Corp., Wilmington, Del.

RAILROAD CARS PENDING

Seaboard Air Line, 200 seventy-ton phosphate cars; bids asked.

LOCOMOTIVES PLACED

Erie, seven diesel passenger locomotives to Electro-Motive Division General Motors Corp., La Grange, Ill.

CONSTRUCTION AND ENTERPRISE

OHIO

BELLEVUE, O.—Nickel Plate railroad will build a three-story 46 x 83-foot powerhouse with two 300-horsepower boilers, air compressors, coal and ash-handling facilities. Offices are in Terminal Bldg., Cleveland.

CHAGRIN FALLS, O.—Fram Heating Co., 46 North Main St., is building a new plant on Bainbridge Rd., including 100 x 100-foot warehouse and shop and 22 x 30-foot manufacturing building. Foundations are being set for an 18,000-gallon steel storage tank.

CLEVELAND—Forest City Brewery, J. A. Bohannon, president, 9400 Quincy Ave., plans a one or two-story addition containing 100,000 square feet floor space and new equipment at 6922 Union Ave.

CLEVELAND —East Ohio Gas Co., 1405 East Sixth St., plans a natural gas pipeline when federal permission is obtained. Will connect with Hope Gas Co. lines at Ohio river and supply Youngstown and adjacent cities and pass between Cleveland and Akron. Capacity is 115 million cubic feet daily. J. French Robinson is president of East Ohio Gas Co.

CLEVELAND—D. Loveman & Son Inc., 524 Keith Bldg., has been incorporated with $500 capital and 250 shares no par value to deal in steel, iron and other metals by David Loveman. Company plans warehouse and is negotiating for building containing 70 x 280 feet floor space, where equipment will be installed.

CLEVELAND—High Voltage Equipment Co., Lester Hart, president, 2891 East 79th St., will build a plant on East 116th St. containing 12,000 square feet floor space, including monorail, loading docks and railroad siding.

CLEVELAND—Parker Rustproof Inc., 2617 East 76th St., has let contract to L. M. Gunderson, 13124 Shaker Sq., Shaker Hgts., O., for a one and two-story 90 x 130-foot plant addition, to cost about $50,000.

CLEVELAND—Sabin Machine Co., 6536 Carnegie Ave., plans a machine shop addition. Christian, Schwartzenburg & Gaede, 1836 Euclid Ave., are consulting engineers.

DAYTON, O.—WBW Tool Co., 215 South Clinton St., has bought a site of about an acre and will build new plant.

ELYRIA, O.—General Industries Co., Olive St., will increase manufacturing facilities by erection of a one-story addition 24 x 135 feet. R. Graham is manager.

SALEM, O.—Schnell Tool & Die Co., 638 West State St. has been incorporated by E. M. Falk, same address.

SALEM, O.—Silver Mfg. Co., Francis M. Wick, manager, Mill St. and South Ellsworth Ave., will build an addition 36 x 68 feet and install new equipment for manufacture of shredders and feed cutters.

SANDUSKY, O.—Klotz Machine Co. plans a manufacturing plant building to cost about $40,000.

YOUNGTOWN—Holub Iron & Steel Co., J. Holub, president, 1990 Poland Ave., has plans for a one-story 36 x 75 and 54 x 78-foot building.

NEW YORK

BROOKLYN, N. Y.—Majestic Metal Spinning & Stamping Co. Inc., 61 Navy St., has plans by Maurice Courtland & Son, 2 West 89th St., New York, for a two-story factory and office bldg., on Nevins St., to cost $140,000.

NORTH TONAWANDA, N. Y.—Rudolph Wurlitzer Co., has let contract to C. E. Knowles Co., North Tonawanda, for three plant buildings costing about $1 million. W. E. Kapp, 730 Buhl Bldg., Detroit, is architect.

PENNSYLVANIA

GREENVILLE, PA.—Morris Coupling & Clamp Co., Empire Bldg., Pittsburgh, has plans by Clepper & Clepper, 72 Vine St., Sharon, Pa., for a two-story plant 50 x 150-feet, to cost about $40,000.

PHILADELPHIA—William Gretz Brewing Co., 1536 Germantown Ave., has let contract to C. A. Kessler, Hardt Bldg., for a bottling plant costing about $100,000. A. H. Moore, 1649 North Broad St., is architect.

MICHIGAN

DETROIT—Budd Wheel Co., 12141 Charlevoix Ave., has let contract to Fullerton Construction Co., 11733 Russell St., for a powerhouse, to cost about $125,000.

FENTON, MICH.—Genesee Molding Co., 305 North Leroy St., has been incorporated with $100,000 capital to manufacture metal and plastic products, by Otto Rasch, Three Mile Dr., Detroit.

GRAND RAPIDS, MICH.—Expert Industries Inc., 203 Front Ave. N. W., has been incorporated with $300,000 capital to manufacture tools, dies and stampings, by Raymond J. Scheffler, 859 Ballard St. SE.

GRAND RAPIDS, MICH.—Grand Rapids Metalcraft Corp., 22 Commerce St. SW. has plans by Robinson, Campau & Crowe, 760 Michigan Tower Bldg., for a plant addition to cost about $100,000.

PORT HURON, MICH.—American Wire Division of Auto-Lite Co., Port Huron, has let contract to Steinle-Wolf Co., Fremont, O., for a plant addition to cost about $100,000.

ILLINOIS

ARGO, ILL.—Corn Products Refining Co., 333 North Michigan Ave., Chicago, has plans by Schmidt, Garden & Erickson, 104 South Michigan Ave., Chicago, for a research laboratory estimated to cost about $2,500,000.

CHICAGO—Welland Tool & Die Co., 910 West Jackson Blvd., plans a machine shop addition costing about $40,000. Sivert Klefstad, 3600 West Fullerton Ave., is engineer.

CHICAGO—Spiral Mfg. Corp., 5022 Kedzie Ave., plans construction of a one-story 95 x 120-foot factory building costing about $40,000. Klefstad Engineering Co., 3600 West Fullerton Ave., is engineer.

CHICAGO—Cummins Perforator Co., 4740 North Ravenswood Ave., has let contract to J. B. Regnell Co., 1005 West Belmont ave., for a one and two-story plant and office, to cost about $50,000. Fox & Fox, 549 West Randolph St., are architects.

CICERO, ILL.—American Gear & Mfg. Co., 6633 West 65th St., Chicago, has let contract to Clearing Industrial District Inc., 6455 South Central Ave., Chicago, for a one-story 75 x 100-foot machine shop addition for its Lindahl Foundry Division, 5900 West Ogden Ave., Cicero, to cost about $45,000.

KANKAKEE, ILL.—Armstrong Cork Co., Lancaster, Pa., has let contract to J. L. Simmons Co. Inc., 26 North Water St., Decatur, Ill., for a manufacturing plant estimated to cost $500,000. H. Boettcher, care owner, is associate architect.

WAUKEGAN, ILL.—Johnson Motors has plans by Eschweiler & Eschweiler, 720 Mason St., Milwaukee, for a two-story plant addition and remodeling, to cost about $150,000.

ALABAMA

BIRMINGHAM—Lone Star Cement Co. plans plant addition, including 14 additional cement storage silos and enlargement of packaging building.

KENTUCKY

LOUISVILLE, KY.—Park & Tilford Distillers of Kentucky, Taylor and 34th Sts., has let contract to Whittenberg Construction Co., 2214 South Floyd St., for a boiler plant, to cost over $40,000. United Engineers & Con-

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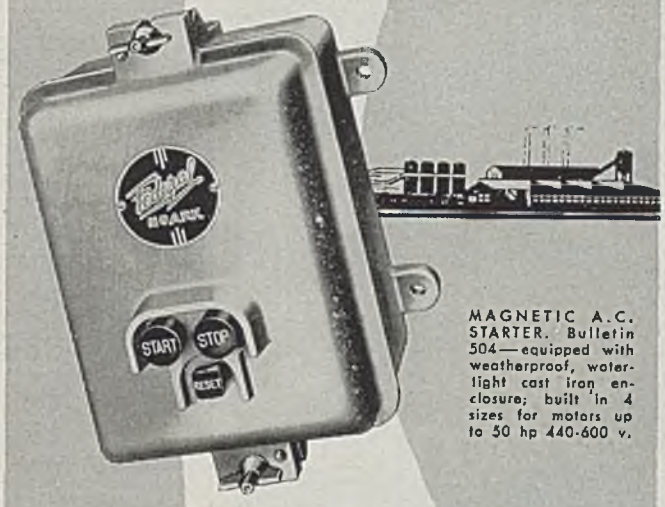

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structors Inc., 1401 Arch St., Philadelphia, are engineers.

MISSISSIPPI

CLARKSDALE, MISS.—Dismuke Tire & Rubber Co., recently incorporated by W. O. Dismuke and associates, with $200,000 capital, plans plant for manufacture of tires and tubes.

NATCHEZ, MISS.—California Co., New Orleans, has let contract to Hudson Engineering Co., Houston, Tex., for a gas recycling plant estimated to cost $15 million.

TENNESSEE

KNOXVILLE, TENN.—Martin Machinery Co. plans construction of a factory building to cost about $100,000.

LOUISIANA

BELLE CHASSE, LA.—Niagara Sprayer & Chemical Co., Middleport, N. Y., has let contract to W. Horace Williams Co., Southern Bldg., New Orleans, for sulphur grinding plant. V. J. Bedell Co., 504 Pan American Bldg., New Orleans, is consulting engineer.

WEST VIRGINIA

PARKERSBURG, W. VA.—American Cyanamid Co., 30 Rockefeller Plaza, New York, has let contract to Turner Construction Co., 420 Lexington Ave., New York, for a plant for Calco Division at Willow Island, costing about $3 million.

MISSOURI

ST. LOUIS—Missouri Jewelite Sign Co. Inc. has let contract to Jones-Kissner Construction Co., 722 Chestnut St., for a one and two-story 100 x 100-foot factory building to cost about $75,000. A. L. Struebig, 3606 Gravois Ave., is architect.

ST. LOUIS—Chase Bag Co., F. H. Ludington, president, New York, and 928 Spruce St., St. Louis, plans one-story plant containing 115,000 square feet floor space at cost of about $400,000.

OKLAHOMA

BLACKWELL, OKLA.—Acme Foundry & Machine Co., Coffeyville, Kans., will rebuild its foundry and machine shop here at cost of about $50,000.

WISCONSIN

MILWAUKEE—Stolper Steel Products Corp., 3258 West Fond du Lac Ave., D. D. Wensink, president, has bought 12 acres on Milwaukee river as part of a long-range expansion program and plans to build there later.

MILWAUKEE—Blatz Brewing Co., 226 East Highland Ave., has building permit for an addition costing $70,000 and for additions to present plant costing $55,000.

MILWAUKEE—Rex-O-Graph Inc., 3727 North Palmer St., has let contract to Gebhard-Berghammer Inc., 5420 West State St., for a one-story 80 x 160-foot plant and office building.

MINNESOTA

MINNEAPOLIS—Brown Steel Co., W. V. Brown, president, 2901 SE Fourth St., has let contract to Graus-Anderson Inc., 501 South Eighth St., for a one-story 138 x 164-foot plant addition costing about $45,000. Lang & Raugland, 502 Wesley Temple Bldg., are architects.

TEXAS

HOUSTON, TEX.—Diamond Alkali Co., Oliver Bldg., Pittsburgh, plans construction of a chemical plant costing about $6 million.

LONGVIEW, TEX.—R. G. LeTourneau Co., Peoria, Ill., plans a manufacturing plant here to cost about $750,000.

LUFKIN, TEX.—Texas Power & Light Co., Interurban Bldg., Dallas, Tex., has plans under way for an electric power substation to cost about $750,000.

CALIFORNIA

BERKELEY, CALIF.—Berkeley Tool & Die Co., 1741 Fifth St., has let contract to Christensen & Lyons Construction Co., 3454 Harlan St., Oakland, Calif., for a plant addition estimated to cost about $40,000.

BERKELEY, CALIF.— Dobeckmun Co., 1330 62nd St., Emeryville, Calif., plans a one-story manufacturing plant and a two-story office building, to cost about $250,000.

EMERYVILLE, CALIF.—Abbett Electric Co., 472 Tehama St., San Francisco, has let contract to Christensen & Lyons, 3454 Harlan St., Oakland, Calif., for a one-story manufacturing building to cost about $50,000. Ellison & King, 500 Sansome St., San Francisco, are engineers.

LOS ANGELES—United Metal Products Co., care architects, has permit for a plant building 46 x 134 feet, costing $18,000. Spencer & Langdon, 1924 Hillburst Ave., Los Angeles, are architects.

LOS ANGELES—Earle M. Jorgensen Co., 10510 South Alameda St., has building permit for a billet storage building containing 22,890 square feet floor space, to cost about $51,000.

LOS ANGELES—Sapolita Bros., 1935 South Boyle Ave., is building a machine shop at 5981 Maywood Ave., Huntington Park, 70 x 120 feet, to cost $20,000.

LOS ANGELES—Perfection Machine & Tool Co., 1577 East 23rd St., has permit for craneway, to cost about $10,000.

ONTARIO, CALIF.—Fletcher Aviation Corp., engineering department, 190 West Colorado Ave., is completing plans for factory building adjacent to municipal airport, and will take bids for erection of newly purchased government-owned plant to be delivered to site. Will be 200 x 200 feet and possibly 200 x 400 feet.

VERNON, CALIF.—Earlie F. Haliburton Metal Products Co., 4724 South Boyle Ave., has building permit for additions and alterations costing $51,800.

VERNON, CALIF.—Electric Tool & Supply Co., 5316 Santa Fe Ave., will let contracts soon for a one-story 123 x 141-foot manufacturing plant at Santa Fe Ave. and 30th St., to cost about $45,000. Dixon & Kline, 1151 South Broadway, Los Angeles, are architects.

WILMINGTON, CALIF.—Drake Craft Boat Building Co., T. R. Drake, 162 Glendora Ave., Long Beach, Calif., manager, will build a plant in Los Angeles harbor for manufacture of boats, at cost of about $100,000.

OREGON

PORTLAND, OREG.—Shell Oil Co., Terminal Sales Bldg., has let contract to Bechtel Bros. & McCone, 155 Sansome St., San Francisco, for an asphalt refinery at Willbridge terminal, to cost about $200,000.

PORTLAND, OREG.—Mercer Steel Co. Inc., 838 NW 13th St., will build a plant 100 x 200 feet with special high ceiling for traveling cranes, to cost about $70,000. Reimers & Jolivette, Railway Exchange Bldg., Portland, have the contract. Lamond F. Henshaw, 4006 NE Davis St., is architect.

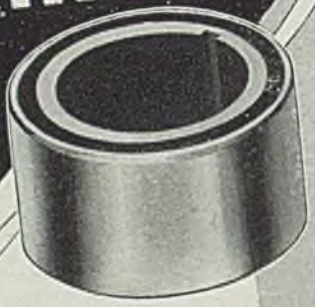
WASHINGTON

SEATTLE—Freuhauf Trailer & Equipment Co. plans erection of a $300,000 plant, for which city has vacated a street area. Project will not develop for several months.

TACOMA, WASH.—Northwest Welding & Supply Co. has been incorporated with $50,000 capital by T. M. Scoggin and associates, 2547 South K St.

VANCOUVER, WASH.—Columbia Levulose Sugar & Refining Co., subsidiary of Columbia Engineering & Supply Co., plans to establish a plant at Camas, Wash., to process levulose sugar from artichokes.

Torflex FLEXIBLE BEARINGS IN GEARS!



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TORFLEX Bearings are used in gears (see illustration below) to cushion shocks, prevent tooth breakage, reduce chatter, vibration and noise and by allowing torsional wind-up, they reduce starting loads.

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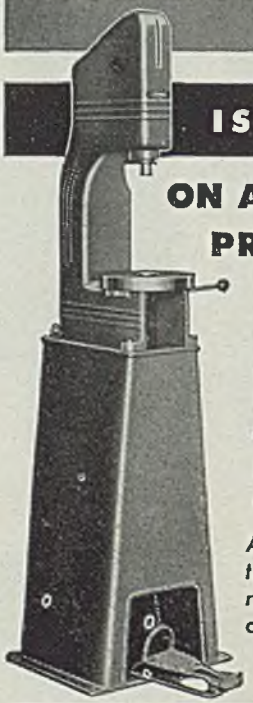

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ONE BUILDING 71' 10½" C/C runway, 640' long, 30' to top runway, with monitor and has one 10-ton and one 15-ton crane. This building separated longitudinally by

ONE YARD CRANE RUNWAY 57' 6" C/C, 747' long, 30' to top rail, covered a distance of 127' at one end, balance open, has two 5-ton cranes; and on other side is

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ONE BUILDING 63' C/C runway, 22' 6" to top rail, 280' long, with 10-ton Champion crane.

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1 LeBlond ENGINE LATHE 21" x 8'. Double-backed geared, quick change, tool holder, special face plate, no chuck, tools or steady rest. Equipped with Lima individual drive. Complete with motor and starter.

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Lot—Twenty-one (21) high-cycle GRINDERS, 19 either new, factory rebuilt or used, remaining two gearhead missing only. Complete with motor and 32 KW generator for 180 cycle current to supply required current.

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WANTED: DISTRICT SALES MANAGER WAter treating and process equipment for liquids. Must be familiar with these lines and have held similar positions. Location New York City. Write stating experience, education, age, companies worked for, references, positions held, salary expected, etc. Enclose picture. Address Box 351, STEEL, Penton Bldg., Cleveland 13, O.

CUTTING TOOL SALES ENGINEER For Detroit area, capable of engineering cutting tool problems and promotion of sales; knowledge of grinding of special cutting tools helpful. Plant located in Detroit; distributors of standard cutting tools, also fitting into the field of specials. Address Box 397, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: SALES MANAGER EXPERIENCED ing process equipment for liquids and water treating equipment. Location middle west. Write giving age, education, experience, positions held, companies employed by, references, salary expected. Enclose picture. Address Box 377, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

WANTED
CHIEF STRUCTURAL ENGINEER
Southern Location

Unusual opportunity to head engineering department leading structural steel fabricator. Thoroughly competent all phases steel design, particular emphasis welded construction and development new ideas. All replies confidential. Only those properly qualified need apply.

Address Box 388,
STEEL, Penton Bldg., Cleveland 13, O.

Accounts Wanted

Manufacturer's Representative

State of Ohio or Northern section. Cleveland Office. Forgings, castings, screw machine parts, plastics, etc. Must be hi-grade account.

Address Box 338
STEEL, Penton Bldg., Cleveland 13, O.

Manufacturers' Representative

With extensive background among electronics, plastic and metal working industrial plants in the metropolitan New York City area, invites inquiries from manufacturers who are interested in obtaining aggressive and effective representative for their products in this area.

Address Box 391
STEEL, Penton Bldg., Cleveland 13, O.

STEEL WANTED
Manufacturers' Representative — recently discharged from Army Ordnance—former metallurgist, sales engineer, tool and production specialist wants to represent top producers of tool, hot-rolled and cold finished steels, both alloy and carbon, bars or tubing—personal activities will be centered within 150-mile radius of Chicago, but will ultimately have men in each large industrial area in the Midwest. Address Box 386, STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURERS' REPRESENTATIVE WITH long experience in sales and service, now contacting sheet metal fabricators and affiliated industries, can handle additional accounts—preferably copper and stainless tubing and sheets. Commission basis. Territory—Pennsylvania, New Jersey and Delaware. Address Box 381, STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURERS' REPRESENTATIVE Covering the southern half of the state of Ohio wants representation on a line of Die Castings and Plastics both compression and injection. Am well established handling high grade accounts only. Address Box 387, STEEL, Penton Bldg., Cleveland 13, O.

STEEL CASTING SALES ENGINEER EXPERIenced, located Pittsburgh, desires to represent carbon steel foundry and machine company. Straight commission exclusive territory. Address Box 390, STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURERS' REPRESENTATIVE with established Buffalo office covering Western New York. Would appreciate additional lines, Production Parts. Must be high grade. Address Box 394, STEEL, Penton Bldg., Cleveland 13, O.

Employment Service

SALARIED POSITIONS $2,500-$25,000. Reconversion is creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated through a procedure individualized to each client's requirements. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details. R. W. BIXBY, INC., 110 Delward Bldg., Buffalo 2, N. Y.

Opportunities

NEW PRODUCTS WANTED

Our client, an established manufacturer, wants new products or new ideas that might be developed into new products.

Experienced in steel casting, welding and machining in any combination—large sizes, great precision.

Selling industrial and manufacturing markets.

Please write Dept. 16. Communications in confidence. We are fully compensated by our client.

Charles H. Welling & Co., Inc.
52 Vanderbilt Ave., New York 17, N. Y.

New Products — New Processes

We are reorganizing sales in United States and open for

PROPOSITIONS for WAREHOUSE DISTRIBUTING of WORLD FAMOUS SWEDISH TOOL AND DIE STEELS

Limited tonnage available March/April shipments:

High-carbon high chrome steel, also our standard brands non-shrinkable, oil-air-hardening die and tool steels. Our high speed steels and our highest grade crucible and electric furnace tool steels straight carbon and alloys at your own specifications. Drawn wire and centerless ground polished drill rods, billets and forgings, etc.

Correspondence invited:

E. O. EK
Room 611, 224 S. Michigan Ave., Chicago

Positions Wanted

EXECUTIVE ENGINEER. M.S. METALLURGY, age 33. Eleven years background in the welding, gas cutting and heat treating industries as welding supervisor, engineer in charge of research and development and chief metallurgist. Desires responsible connection with medium-sized progressive concern, preferably in Midwest. Presently employed. Address Box 380, STEEL, Penton Bldg., Cleveland 13, O.

SALES MANAGER—STEEL CASTINGS. AGgressive, thoroughly experienced in all phases of steel foundry operations, have exceptional sales record and can guarantee results. Prefer foundry in Pittsburgh District, Ohio, or Chicago District with good reputation for quality production. Address Box 376, STEEL, Penton Bldg., Cleveland 13, O.

ASSISTANT SUPERINTENDENT OR GENERAL Foreman. 17 years' experience forging business in supervision of drop, board and upset forging. Married, age 41. Best of references. Available immediately, will go anywhere here or abroad. Address Box 374, STEEL, Penton Bldg., Cleveland 13, O.

PAYMASTER OR PERSONNEL MANAGER. Age 38. Have ten years' experience on Machine Tool Factory payroll accounting, auditing and keeping personnel records. Available within sixty days. Address Box 382, STEEL, Penton Bldg., Cleveland 13, O.

A MANUFACTURING AND SALES EXECUtive aged 50 with over 25 years sales experience with Detroit industry desires to represent an established and reputable concern in the Detroit area. Address Box 383, STEEL, Penton Bldg., Cleveland 13, O.

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