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STEEL

ESTABLISHED 1882

Contents

Volume 109—No. 20 **November 17, 1941**

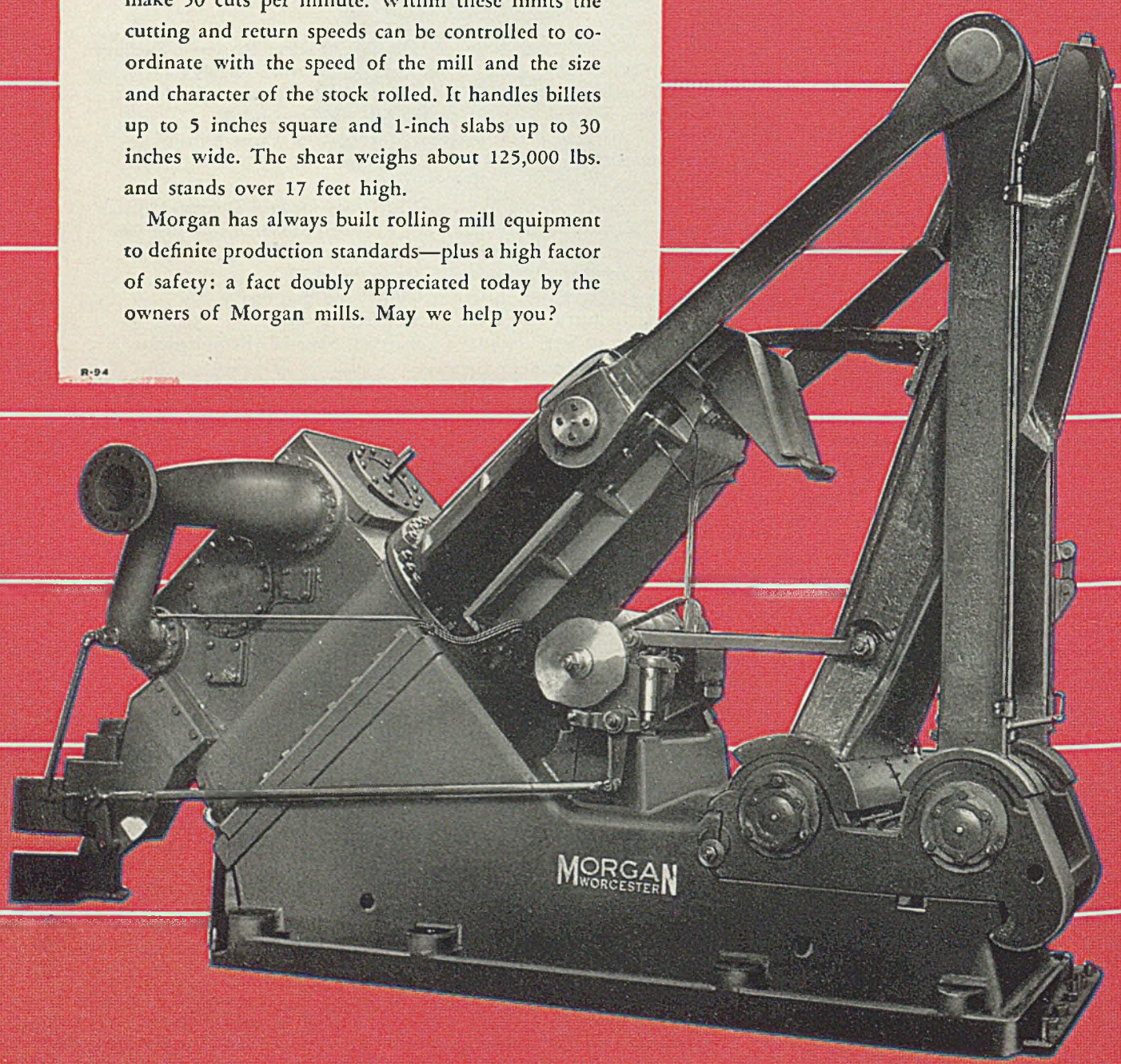
PRODUCTION · PROCESSING · DISTRIBUTION · USE

. . . IT'S THE *Largest Flying Shear* IN THE WORLD

It has maximum speed of 900 F. P. M., and will make 50 cuts per minute. Within these limits the cutting and return speeds can be controlled to co-ordinate with the speed of the mill and the size and character of the stock rolled. It handles billets up to 5 inches square and 1-inch slabs up to 30 inches wide. The shear weighs about 125,000 lbs. and stands over 17 feet high.

Morgan has always built rolling mill equipment to definite production standards—plus a high factor of safety: a fact doubly appreciated today by the owners of Morgan mills. May we help you?

R-94



MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

HIGHLIGHTING THIS ISSUE OF STEEL

■ AS THIS issue of STEEL went to press late Friday evening the captive coal mine issue loomed as the rock upon which the Roosevelt administration definitely would split with the group of labor radicals led by John L. Lewis. It became clear that this case and its outcome are bound to have a profound effect upon government labor policies for a long time to come. Backed by public opinion the President adopted a course from which it would be difficult for him to retreat. He declared (p. 21) the government never would compel workers to join a union by government decree; he told Congress he did not propose to allow the mines to be closed. Thus history is in the making on the labor front.

♦ ♦ ♦

For Raw Materials

In order to participate fully in the armament drive steel first must know what its task is, said Eugene G. Grace, the industry's spokesman at last week's conference. He recommended (p. 34) an OPM procedure of arranging for allocation of production and then arranging for production. . . West coast steelworks expansion will be discussed (p. 26) today. The Inland Steel and Babcock & Wilcox Tube expansions have been recommended to Defense Plant Corp. . . Expansion already authorized will bring ingot capacity up to 92,988,000 (p. 51). . . Formation of international "holding companies" to control the world's raw materials is proposed by Ralph E. Flanders as America's price for lease-lend aid to democracies.

♦ ♦ ♦

Building "Active"

H. C. Beaver (p. 40) believes a postwar slump is not inevitable. . . . October scrap statistics must be in the hands of the United States Bureau of Mines, Pittsburgh (p. 31), by Nov. 20. . . Defense manufacturers must apply to the War Department for amortization certificates (p. 27) by Nov. 29; general preference order M-14 on tungsten (p. 27) will be issued shortly. . . . Prices on stoves and ranges, metal office furniture and equipment, drop forgings have been frozen or will be; Rebuilders of machine tools (p. 32) rate A-1-c; the hardship clause of the Copper Conservation Order M-9-c may be invoked. . . . Preference Rating Order P-22 (p. 33) has been amended. . . The building industry faces (p. 49) an "active" year. . . Two new OPM plans cover construction of conveyor machinery (p. 33) and elevator and escalator repairs.

♦ ♦ ♦

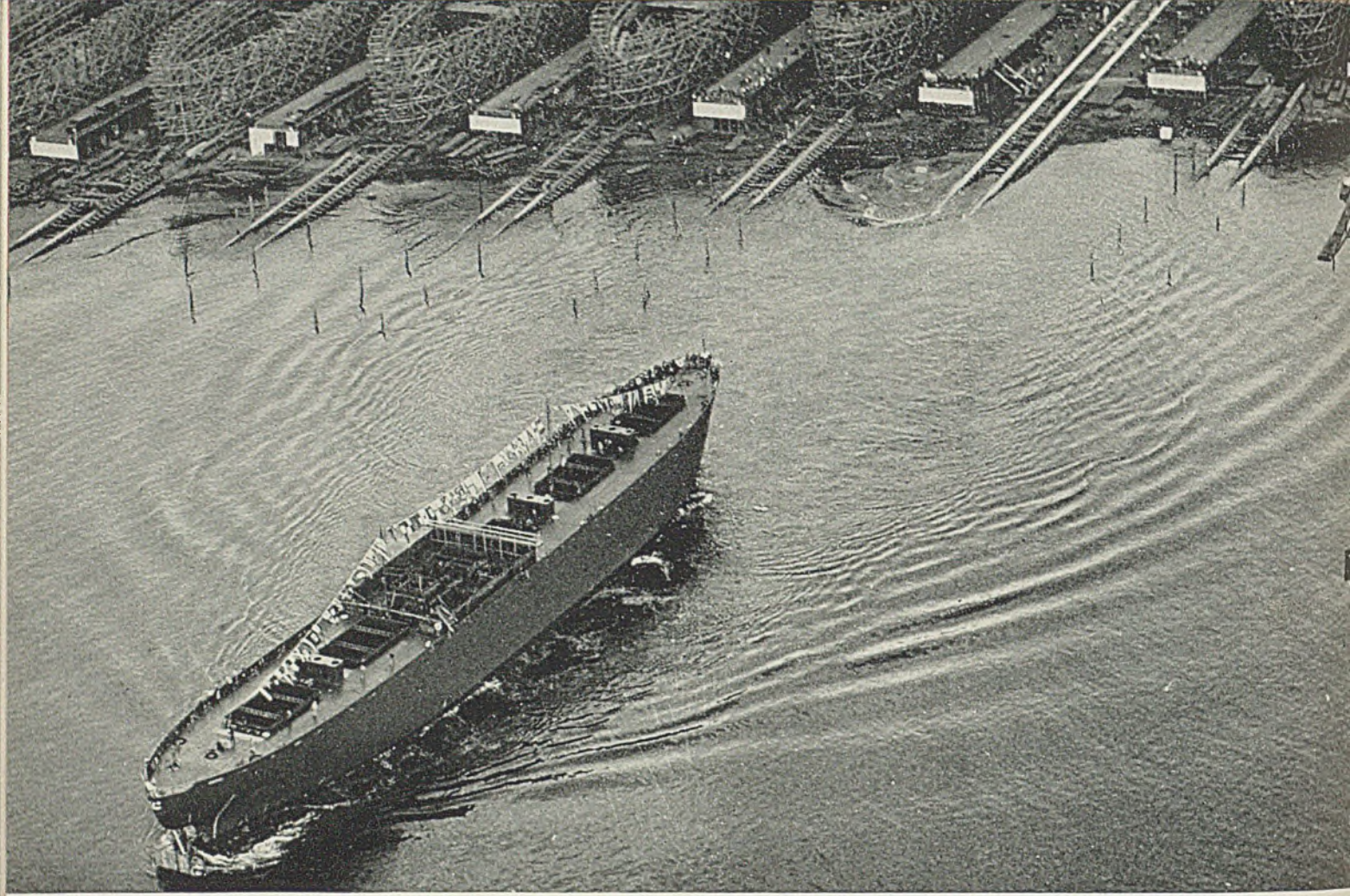
The MG-40 Aircraft Gun

This week Professor Macconochie traces machine guns (p. 58) from their early development to the present types. He describes in detail the action of the modern MG 40 aircraft weapon. . . . Welded 42-inch, 12-ton valves (p. 70) played a prominent part recently in the construction of the Stone Canyon reservoir out on the West coast. . . . Herbert E. Fleming (p. 76) relates how new ideas and methods helped a plant reduce the selling price of its product by 58 per cent. . . . The discussion on gas and resistance welding of the aircraft alloy SAE X-4130, STEEL, Nov. 3, 1941, p. 90, is continued in this issue by Harold Lawrence (p. 84).

♦ ♦ ♦

Increasing Production

By making a careful study, according to Henry V. Oberg (p. 56), capacity of production lines can be increased with present equipment and operators. . . . An automatic transfer mechanism (p. 64) combines into a straightline multiple-station processing job the work formerly handled on 11 individual machines. . . . Construction, operation, inspection and testing of rail clamps for blast furnace traveling bridge cranes are described by G. F. Wolfe (p. 72). . . . Charles L. Faust and H. A. Pray (p. 80) in a presentation on electropolishing stainless steel outline the effect of varying factors such as time, current density and bath concentrations. . . . A watchman's "walking stick" presented under Industrial Equipment (p. 95) sends a special "key" radio signal that operates the alarm system.



The launching of the "Star of Oregon" from the yards of the Oregon Shipbuilding Co.—one of the first Liberty Ships to slide down the ways. Hundreds of tons of Inland steel were used in its construction.

Inland Steel for Liberty Ships Rolls Overland to the Pacific

Hundreds of carloads of Inland Steel plates and structural shapes are rolling westward to Pacific Coast shipyards—playing an important role in building America's Bridge of Ships.

These new cargo vessels already are sliding down the ways. Soon they will be coming faster than ever before in our history.

Although the Pacific shipyards are more than 2,000 miles from our mills, Inland is doing its full part by shipping thousands of tons for this great program, so vital to National Defense.

We are working days, nights and holidays — in three eight-hour shifts—to supply steel not only for the Maritime Commission, but also for the Army, Navy, Lend-Lease Program and America's essential industries. This is Inland's No. 1 Job—and there will be no stopping until the job is done.

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No Closed Shop by Government Decree, President Roosevelt Declares

✦

Firm stand against defense production stoppages taken after Congress threatens to block neutrality act amendments . . . Pronouncement in captive mine dispute seen as warning to other unions

✦

WASHINGTON

■ WITH coal supplies in steel producing centers dangerously low—sufficient for only one week in some cases—the outcome of conferences between representatives of the owners of captive mines and the United Mine Workers was anxiously awaited at week's end.

Supporting the steel producers' position that union membership should not be made a condition of employment were the National Defense Mediation Board, the President, an overwhelming majority in Congress and the public.

Supporting John L. Lewis, UMW president, in his demand for a union shop in the captive mines were members of the UMW policy committee. A vote of confidence was given the UMW president by the group.

After the mediation board had refused to recommend the union shop in the captive mines, Mr. Roosevelt called E. G. Grace, president, Bethlehem Steel Co., B. F. Fairless, president, United States Steel Corp., and Frank Purnell, president, Youngstown Sheet & Tube Co., to Washington to confer with Mr. Lewis and other UMW officials.

In the firmest stand he has yet taken in regards to labor unions, the Chief Executive told the conferees the government would never compel workers to join a union by government decree. That, he continued, "would be too much like Hitler's attitude toward labor."

The President asked the steel men and the union leaders to go into conference and continue in conference through the week-end if an agreement were not reached.

"And," instructed the President, "let me have some kind of a report on Monday next—a report of an agreement or at least a report that you are making progress."

Mr. Roosevelt earlier had told Congress that he did not propose to allow the mines to be closed.

To the UMW representatives and the steel men he said that "if legislation becomes necessary toward this end, the Congress of the United States will without any question pass such legislation. And, as some of you know, the pressure on me to ask for legislation during the past couple of months for one reason or another has not only been constant but it has been very heavy."

Viewed as Test Case

The Chief Executive's assurance that there would be no closed shop by government decree was interpreted as a warning to other unions which have been causing stoppages in vital defense industries in attempts to force employers to accede to "union security" demands.

Both union leaders and industrial management have been watching the captive mine dispute anxiously, and it is no secret that other unions were prepared to make widespread demands for the closed shop if the UMW were victorious.

President Roosevelt's promise of a firm stand to prevent resumption of the captive mine strike was prompted by a congressional revolt within his own party, threatening to block passage of neutrality act amendments and prevent the arming of merchant ships and the sending of American flagships into belligerent ports.

The Chief Executive sent a letter to House of Representative leaders while that chamber was bitterly debating the neutrality act changes and many members were bluntly expressing their unwillingness to vote for the measure unless the government adopted a strong policy to prevent strikes in national defense industries.

In reference to the captive mine strike, the President wrote:

"I am holding a conference tomorrow in the hope that certain essential coal mines can remain in continuous operation. This may prove successful.

"But if it is not successful, it is obvious that this coal must be mined in order to keep the essential steel mills at work. The government of the United States has the backing of the overwhelming majority of the people of the United States, including the workers.

"The government proposes to see this thing through."

To many, the communication seemed to carry only a broadly stated promise, on par with previous sidestepping statements by the President regarding labor. However,

the promise was enough to swing rebellious congressmen back into line and insure passage of the neutrality act amendments.

The congressional expression of dissatisfaction was caused in large measure by the arbitrary attitude of Mr. Lewis and other CIO leaders in defying the government on the question of demanding a union shop in the captive mines.

The National Defense Mediation Board refused to recommend the union shop by a 9 to 2 vote after more than a week's deliberations. Only two members voting in favor of recommending the union shop were the two CIO members, Philip Murray, CIO president and vice president of the United Mine Workers, and Thomas Kennedy, secretary-treasurer of the mine workers union. Both Mr. Murray and Mr. Kennedy immediately resigned as members of the mediation board; CIO alternate members also resigned.

Among the nine members refusing to vote for the union shop were the four representatives of employers, three representatives of the public, and two labor representatives, both members of the American Federation of Labor.

The board's recommendation: "That the United Mine Workers of America and operators involved in this dispute proceed immediately to sign the Appalachian agreement, with the reservation that the provision of the Appalachian agreement which requires membership in the United Mine Workers of America as a condition of employment, be inoperative for the duration of the contract."

Mediation of the single issue in the captive mine dispute—the union shop—was handed to the board on Oct. 31, after a truce had ended the second installment of a strike which started Sept. 14. Its decision was handed down Nov. 10.

■ Philip Murray, right, CIO president, and Thomas Kennedy, secretary-treasurer of the United Mine Workers, resigned from the National Defense Mediation Board in protest against the board's refusal to recommend a union shop in the captive coal mines. NEA photo

The decision was the second one in which the board had refused to make a recommendation concerning the union shop clause. In mediating the first stoppage, the board made no recommendation whatever on the issue. It was that decision that led to the second installment of the strike—ended by the truce only after the President had made three appeals to Mr. Lewis for a resumption of work in the interests of defense.

Resignation of CIO members and alternates from the board was generally interpreted as "torpedoing" the board. Mr. Murray in resigning stated he believed the board had "outlived its usefulness." It was considered doubtful if the CIO would submit any future cases to the present mediation group.

Wire Plant Strike Ended

About 1000 workers at the Wickwire Brothers wire plant, Cortland, N. Y., returned to work last week after a 35-day strike. Company granted a 4-cent hourly wage increase, signed a 1-year contract recognizing SWOC as bargaining agency, and granted a modified union shop.

■ Strikers parade before the General Motors assembly plant in Linden, N. J., closed last week by a walkout ordered by the United Automobile Workers-CIO. Affected were about 4000 men. NEA photo

Copper Shortage Reported in Survey of Nonferrous Metals for Defense

WASHINGTON

■ In facing a demand for more than 150,000 tons of copper for direct military and lend-lease use during November, defense officials have received a report showing that only an estimated 128,197 tons is available.

An estimated 14,000 tons of scrap copper is expected to be salvaged, partly filling the anticipated gap.

While substitutes have been attempted, most of these are merely utilization of one metal for another, inevitably resulting in new shortages.

One prospect of a major saving of copper is seen in a projected substitute of steel for brass in cartridge cases and bullet jackets, but production on a large scale in this field probably will not be possible for another 18 months.

While demand for nickel to meet direct and indirect defense needs during December will approximate 17,000,000 pounds, production estimates are 500,000 to 1,000,000 pounds under this figure.

Of the estimated 900,000 tons of chrome which it is expected will be received through imports in 1942, the meeting was told more than one-third would be lost if only one out of three foreign sources were shut off through extension of war areas or lack of transportation.

Although a substantial tin supply is on hand the country faces a constant prospect of the tin supply from the Far East being cut off, and demands are steadily increasing, with substitutes introduced wherever possible.

It was also pointed out that the United States is at present importing about 40 per cent of current requirements of lead. Referring to manganese it is expected that a 10 per cent decrease in use of this metal can be effected without impairing steel quality.

In the current year also, according to another report, approximately 18,000 tons of tungsten has been available and has been entirely consumed, while in the face of an estimated demand for 25,000 tons for 1942, production is expected to reach only 23,000 tons.

Carnegie-Illinois To Receive Navy "E"

■ Presentation of the Navy "E" pennant to Carnegie-Illinois Steel Corp. will be made Nov. 21 at Pittsburgh by Admiral William H. Standley, U. S. N., retired, at appropriate ceremonies. More than 8500, representatives of the corporation's 106,000 employes from all Carnegie-Illinois plants, will witness the award. The pennant is presented for meritorious performance in production of defense requirements.

Accompanied by naval officers from Washington, Philadelphia and posts in the Pittsburgh area, Admiral Standley will open the program with an inspection tour through the company's Homestead Works.

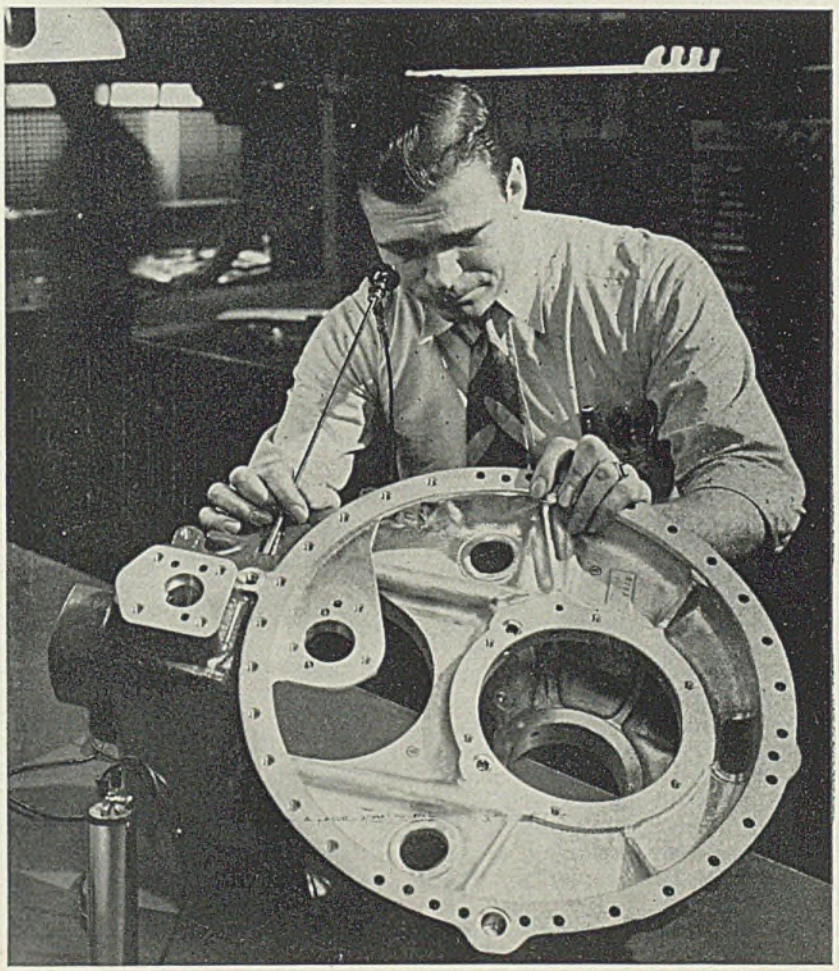
Carbon and Low Alloy Steel Castings Prices Frozen

Prices for carbon and low alloy steel castings, including railroad specialties, are "frozen" at current levels which are those prevailing since July 15, under a price schedule announced last week by OPA and effective Nov. 15. Maximum prices are referred to in the schedule.

Except for railroad specialties such maximums will approximate those in the Comprehensive Report of Price Lists of Miscellaneous Castings issued by the Steel Founders Society for the third quarter of 1941. Any miscellaneous castings for which prices are not determined by this publication are held at levels not exceeding the July 15 prices.

Special provision is made for prices of castings not previously produced by a manufacturer. However, the schedule requires that data on such castings must be filed with OPA along with the proposed maximum selling price when part of an order totals $100 or more.

Using Borescope on Allison Engine Gear



■ Inspection of enclosed oil-line joints in the gear reduction case of an Allison aircraft engine is made possible by this new instrument which permits inspectors to see around corners. Introduced by General Motors' Cadillac Motor Car Division for examination of tiny borings and oil connections in the Allison engine, the device works on the principal of the bronchoscope in surgery. Light bulb one-hundreth of an inch in diameter and an equally small mirror are located in the borescope's tip. Cross reflections on the angled mirror bring into relief through a microscope in the instrument any burrs or uneven spots

State Socialism Is New Deal's Ultimate Goal, Founders Told

NEW YORK

■ DECLARING that "union dictatorship" is hamstringing employers and employes and retarding the country's defense effort, W. D. Hamerstadt, president, National Founders Association, outlined steps for ending "this domination," at the association's convention here last week. He suggested two measures:

1—Repeal the Wagner act and abolish the National Labor Relations Board.

2—By federal and state laws declare the closed shop illegal, with penalties on both employers and unions for conspiring to make membership in a union a condition of employment.

"These steps would go a long way toward putting the control of business back in the hands of the owners and their employes, where it belongs," he said.

The convention presented a well rounded program, bearing on legislative and economic aspects of general business, foundry management, and developments in cast metals. All officers were re-elected, with Mr. Hamerstadt, Rockwood Mfg. Co., Indianapolis, again heading the organization. D. C. Bakewell, Blaw-Knox Co., Pittsburgh, will continue as vice president; A. E. McClintock, Chicago, as commissioner; and J. M. Taylor, Chicago, as secretary-treasurer.

Holds Wagner Act Responsible

Mr. Hamerstadt stated that the Wagner act was the start and is still the chief factor in building up union domination. The act, he continued, is so loosely worded that the National Labor Relations Board can do about as it pleases. Under the act the employer has no rights, only penalties, and "as a practical matter the workman has no rights, either.

"Already the American people are beginning to ask questions," he said. "Who controls the defense program? Is it the government or union leaders? What about these many strikes? Is it sabotage? Fifth column? Are the workers unpatriotic?

"Now they are beginning to get the answers. The people know, as well as you and I know, that the workers in our factories are nearly 100 per cent patriotic. They are helpless, that's all, with the union shackles the government has fastened on them."

He urged American industry to get squarely behind congressmen who are endeavoring to check the unbridled control by union leaders.

"The closed shop as a government policy or expediency means an end of the private enterprise system," he declared. "We can't afford to compromise with it, whatever the pressure. The work is up to us as individuals."

"The first business of today is to put our domestic house in order," Phil S. Hanna, editor, *Chicago Journal of Commerce*, declared in discussing various phases of the present emergency. "We cannot successfully stop Hitler or help others stop him if a handful of labor tycoons remain above the law. We cannot fight anybody long if we impoverish the citizen by ruinous taxes and let political hierarchy have *laissez faire*. We cannot have unity if the Supreme Court is to bend like reeds in the wind. Our farmers will not produce the food we need if we refuse to put currency on a sound basis."

W. D. Hamerstadt
Re-elected president, National Founders Association

Mr. Hanna emphasized the need for generally increasing the workweek and added there is time enough to talk of a reduction of "butter" in favor of guns when every citizen is working six days a week. "Uncle Sam's self-sustaining income is from 'butter,'" he declared. "As 'butter' income goes down, real national income goes down no matter how much we spend for defense.

"Defense spending circulates but once. It does not reproduce itself in new wealth or job-making things. It does not pay taxes."

State socialism, under the guise of reform, with destruction of the capitalistic system and American form of free enterprise and economy, is the ultimate goal of the New Deal administration, war or no war emergency, said George E. Sokolsky, author, columnist and industrial relations consultant.

"Under the surface of business and industrial mobilization programs growing out of the world upheaval, all the old forces rampant for collectivism, involving national production and distribution, are working at the same unrelenting pace. Strangely enough, the only real resistance has been from some labor racketeers and other labor politicians who fear the ultimate result of government control as it may later affect labor."

Business and industrialists were criticized for failure to combat, lawfully and under protection of the constitution, state and federal acts, measures and decisions which threaten their very economic existence. The nation, he declared, is being talked into war for a new system of economic reform with likelihood of less economic and political freedom to follow.

"No one who really wanted to give all-out aid to Great Britain would have put Harry Hopkins in charge of lend-lease," he said. "Aid to Great Britain has shifted to aid to Russia of late. No one who wished to aid Britain would have placed Sidney Hillman in charge of labor on OPM, or made him a member of the National Labor Mediation Board."

Leo Wolman, professor of economics, Columbia University, New York, was somewhat less pessimistic in discussing American labor policy and its effect on industry, but indicated industry made a mistake in failing to oppose and resist some legislative enactments and their administration sooner.

The great bulk of business, he said, must now make up its mind to fight for the integrity of the American economic system, at a time when the country has gone ultra-politically minded.

Tracing evolution in the loss of managerial control of production through labor organization with aftermaths of plant rules and regulations, Prof. Wolman indicated that unless this managerial control is maintained, unemployment to follow will make that of the 1930's appear mild. He questioned whether the country actually realized the importance of the Wagner act when passed, or that it was a move toward a universal, government-sponsored union, with compulsory membership as a condition for the right to work.

Unless business is willing to fight for the justice on which its existence depends, and take that fight to congress, a drab prospect is in store for it, asserted Rep. Clare E. Hoffman, Michigan. He criticized some of the present Supreme Court members for multiple interpretation of the labor laws.

While he would not outlaw strikes, he favors congressional amendment

making employes free to join or not to join labor unions, liberating workers from coercion and also prohibiting the check-off and closed shop.

Distribution of materials, equipment and supplies by allocation, taking into consideration the volume available with more definite information as to consumer inventories, will probably be more satisfactory than the priority system, according to E. L. Shaner, editor-in-chief, STEEL.

As emphasis is shifted toward allocations the flow of materials is likely to improve, he said.

If the available supply is not too limited, priorities work well, but too many preference ratings issued in relation to supply results in confusion, and industry has been experiencing that condition.

Allocation, which starts at the top, with due consideration of the amount of material available should bring better results, but even with allocation, or combination of allocation and priorities, operating at the highest possible degree of efficiency, there will still be grief, he said. One reason will be the unco-ordinated efforts of too many government agencies.

He stressed also the need of one directing head for defense production.

"Spirit of Unity" Required

Until a spirit of unity is generated among the people, the utmost in potential benefits from material resources will not be attained, regardless of how perfectly industrial resources are developed or how efficient the organization for mobilizing them for defense. A revival of the American spirit of 1918 is needed, declared Mr. Shaner, with renewed confidence in the merit of American institutions and an almost fanatical zeal to preserve the great advantages of freedom the nation inherited.

The foreman's role in management was discussed by H. O. Menck, works manager, Harnischfeger Corp., Milwaukee. He urged closer co-operation between management and foremen, notably in furthering successful labor relations.

The Association voted a resolution urging congressional laws guaranteeing American labor right to work without coercion, and opposing the closed shop or check-off system; favoring such enactments not only in federal but state statutes.

Developments in cast metals were reviewed by C. H. Lorig, supervising metallurgist, Battelle Institute, Columbus, O. There has been a definite improvement in pig iron in recent years by the introduction of the small pig, a closer silicon content classification and a greater uniformity in analysis of each carload lot, he said. Some furnace operators are

(*Please turn to Page* 118)

Raw Materials Commitments from Britain Demanded at Boston Meeting

BOSTON

■ FORMATION of international "holding companies" to control the world's raw materials after the war was proposed by Ralph E. Flanders as the price America should demand for unlimited lease-lend aid to the democracies and their colonial empires.

Mr. Flanders, of Springfield, Vt., is president of two nationally-known machine tool industries of that community and formerly was director of Machine Tool Priorities, OPM, Washington. He made his unusual proposal as president of the New England Council, at the council's seventeenth conference here last week.

"If these empires (those not under Hitler's control) are to be saved by our aid it is essential that their assets be put on the table as an offset to this aid, " he said. "The joint possession and control of such resources would be the best economic sanction available against any such rearmament as that which destroyed international order this time."

Mr. Flanders also advocated sending "not a few millions, but billions" of dollars worth of food to Spain in an effort to divide it from the Axis while Hitler is occupied in Russia. "Spain," he said, "now hangs in the balance, and her position is of vital importance in the winning of the war. All the visible influences tie her tightly to her Axis partners, but the tremendous invisible influences of disease, starvation, and physical waste of assets may be made to weigh in the other direction."

America's fate, Mr. Flanders said, is certainly "warfare, waged to the limit of our ability," but he declared himself opposed to our formal entry until we shall have obtained a commitment from Britain on the post-war control of strategic materials.

"It was clear as we stood here a year ago that we were not a united nation in facing the war which was bearing down upon us. No more are we united today. An outer unity is being impressed upon us more and more strongly by the force of an arbitrary and almost totalitarian government within, and by the pressure of enormous world happenings without. But we have not attained inner unity of comprehension and purpose. That we must attain before another year passes, if we are to make our fate instead of being made by it . . .

"The elected spokesman and leader of this great nation has not been able to show the same effectiveness in leading us into supreme effort and sacrifice, that he showed in the establishment of policies for redistributing the diminished productivity of this nation into the hands of more of its citizens. In part the difficulty of leadership is inherent in the situation. It is easier to lead the nation to a promised feast than it is to inevitable sacrifices. . . .

"Meanwhile, by mechanical and not by spiritual means, we are being bound more and more tightly into the totalitarian framework which is the necessary type of organization for total warfare. By mechanism we are being organized, not by the free and whole-souled acceptance of a necessity, electrified by a common national will; and there cannot help lying deep within the minds of the farmer, the worker and the employer alike the feeling that totalitarian control is being employed in part for its own sake, rather than solely as a regrettable necessity in the prosecution of a common purpose."

"Most Important Defense Area"

New England was pictured as the nation's most important defense area "in fact as well as in name," in a booklet published last week by the council. Presented to registrants at the conference, the pamphlet contains statistics on New England's part in defense manufacture.

Manufacturers in that area are reported to have received a total of more than $2,000,000,000 defense awards since June, 1940. This represents 40 per cent of the region's normal manufacturing output. New England shipyards are filling or have filled contracts for more than 255 ships, from minesweepers and sub chasers to aircraft carriers and a battleship. Combined value of ship contracts is about $1,330,000,000.

Plane production has increased 600 per cent, propeller output 500 per cent, engines 400 per cent and employment 470 per cent since 1939. Total Army and Navy expenditures for ordnance in the area are at the rate of $37,500,000 per month. New England shoe factories have turned out more than 6,000,000 pairs of shoes for the services since the defense program started, and vast quantities of yard goods have been purchased here.

Mr. Flanders was re-elected president of the council, Edwin C. Johnson, president, H. A. Johnson Co., Boston, was elected treasurer. Re-elected secretary and executive vice president, respectively, were Frank A. Sullivan, president and treasurer, Sullivan Granite Co., Westerly, R. I., and Dudley Harmon, Wellesley Hills, Mass.

Steel Companies and Government To Discuss West Coast Expansion Monday

WASHINGTON

■ A CONFERENCE will be held here Monday, Nov. 17 to discuss the West coast steel expansion program.

Officials of the Defense Plant Corp., Office of Production Management, and officials of Bethlehem Steel Co. and United States Steel Corp. will attend.

The entire project as now proposed will cost about $150,000,000.

It is reported that preliminary work has been done concerning the expansion programs proposed for Wheeling Steel Corp., Pittsburgh Steel Co., Otis Steel Co., and Alan Wood Steel Co.

Substantial Increase at Inland Plant Recommended by OPM

Proposal to increase materially the capacity of the Inland Steel Co. plant at Indiana Harbor, Ind., largely through a more advantageous use of existing finishing facilities, has been recommended to the Defense Plant Corp. by OPM.

The proposal is in addition to the 900,000-ton pig iron capacity increase at Inland, for which the Defense Plant Corp. signed an agreement to advance $34,000,000 on Sept. 29.

The new increase, according to the report of W. A. Hauck, OPM steel consultant, will, "by utilizing existing facilities including equipment and buildings be able to produce approximately 60,000 tons of ingots monthly with the use of the duplex process." By revamping the present strip mill, additional steel plate and other products vital to defense production can be turned out.

The report sets forth that the proposed installation will provide in the quickest possible time an estimated increase of 42,000 tons of finished steel products monthly, all of which are in urgent demand.

Of special advantage is the fact the proposal not only eliminates the necessity of providing scrap for the conversion of the increased pig iron capacity, but will provide additional home scrap for use in existing open hearth furnaces.

Demand for the type of products made at the Inland plant is larger than present capacity and is constantly increasing, the report says. Current schedules are made up almost entirely of defense orders and the total backlog of orders is now equivalent to six months capacity production.

Plant produces steel plates, structural shapes, bars, tube rounds, and shell steel forgings, blooms and billets.

The duplex process mentioned in the report is one where hot metal is placed in a bessemer, blown and then sent to an open hearth while it is still molten. Many hours of melting time are saved by the process, thus increasing production.

Babcock & Wilcox Tube To Be Asked To Increase Capacity

Program to increase production of badly-needed aircraft bearing tubing and tank-tread pins and bushings has been recommended to the Defense Plant Corp. by OPM Director General Knudsen.

An addition of 24,000 tons of electric alloy steel ingot capacity is proposed for the Babcock & Wilcox Tube Co. plant at Beaver Falls, Pa., together with various finishing facilities which will permit more of the plant's capacity to be turned to these special products.

Steel Expansion Program To Impede Arms Production, N.A.M. Declares

■ MANUFACTURE of defense materials will be impeded rather than accelerated by the government's 10,000,000-ton steel expansion program. This condition will continue to exist for at least two years, during the period of construction.

This is the basic conclusion reached in a study of the steel expansion program by the research division of the National Association of Manufacturers. Report will be submitted to the forty-sixth annual Congress of American Industry when it convenes Dec. 1.

Other conclusions reached include:

"Decision to increase steelmaking capacity to 99,000,000 tons a year appears difficult to understand as available data of overall steel requirements do not indicate a need for expansion on a large scale.

"The argument that Germany had six years start on war materials loses weight as figures show that in the six years 1933-38, Germany had available for all forms of domestic consumption only 88,000,000 net tons of steel, while, in 1941 alone, the United States is producing about 82,000,000 net tons of steel.

"There is at present unutilized capacity to the extent of 4,000,000 tons, or 40 per cent of the administration's steel expansion program, of which W. A. Hauck is the author. This unused, dormant capacity stems largely from a shortage of scrap iron. New ore-carrying ships and new blast furnaces will require steel and time to build.

"Direct defense requirements in 1941 will amount to about 12,400,000 tons and exports to about 8,500,000 tons, making a total of 20,900,000 tons. This leaves a steelmaking capacity of 65,100,000 tons for indirect defense and civilian needs, which compares favorably with the total output in 1929 of 63,205,490 tons.

Export Estimates Excessive

"The priorities system, bogging down under its own weight, has failed to solve the increasing difficulties for Army and Navy officials in obtaining certain types of steel, and has failed to provide an adequate check against hoarding and excessive accumulation of inventories.

"While the Office of Production Management has apparently been reasonably accurate in forecasting direct military needs, its estimates of export requirements both for 1941 and 1942 appear to be excessive.

"If government officials had paid less attention to overall ingot capacity and more to supplying the industry with a better idea of the particular classes of products required and in what tonnages, it is probable that steel supplies for defense would be more than adequate today.

"It is extremely doubtful whether the administration's steel expansion program could possibly be completed in time to ease the peak of defense program demands on materials, which is expected to be reached, at the latest, early in 1943. Even if it were possible to complete the work of construction of the new facilities within that specified period, the physical limitations imposed by supplies of raw materials would make it impossible to have much, if any, benefit of increased output from such steelmaking capacity earlier than 1944, if then.

"Capacity of 99,000,000 tons will create a serious problem of adjustment to post-war needs. In the light of steel consumption since 1900, it is not likely that future consumption of steel will exceed 60,000,000 tons, including exports."

Whiteside Resigns as Chief of Steel Section

WASHINGTON

■ A. D. Whiteside has resigned as chief of the OPM Iron and Steel Section, effective Dec. 1, and will return to his position with Dun & Bradstreet. When Mr. Whiteside accepted the position in OPM some months ago, it was understood he would remain there only long enough to perfect the section's organization.

Amendment to Preference Order M-14 To Be Issued

An amendment to General Preference Order M-14 covering distribution and use of tungsten in high-speed tool steels will be issued shortly, it was stated in OPM circles. The amendment has been in process of preparation for some time.

Under the original order which became effective June 11, 1941, consumers of high speed steel were required to purchase an equal amount of Class A steel when buying Class B. On Oct. 28, instructions went out revising the proportions from 50 per cent of each class to 25 per cent of Class B and 75 of Class A.

Class B steels cover those containing not less than 0.55 per cent carbon and more than 12.0 per cent tungsten. Class A covers those containing not less than 0.60 per cent carbon and more than 3.0 per cent molybdenum or containing not less than 0.60 per cent carbon, containing 7.0 per cent or less tungsten and more than 3.0 per cent molybdenum.

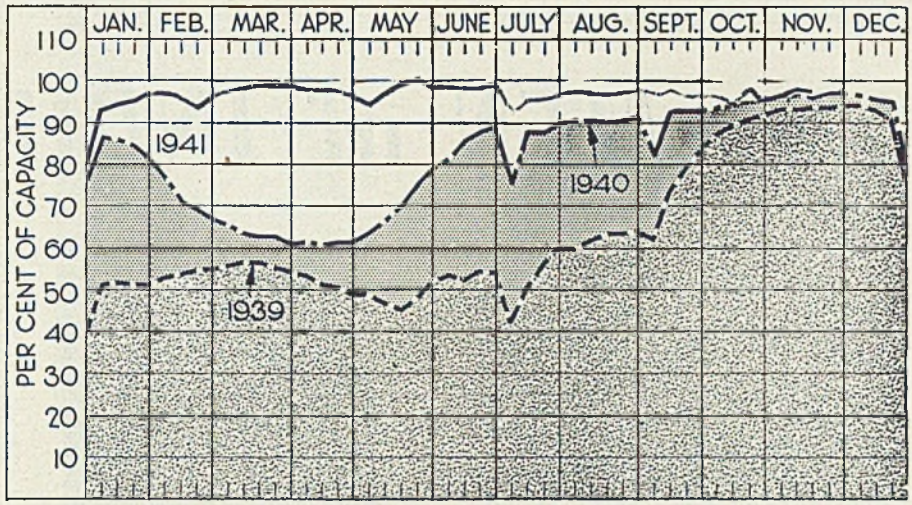
According to reports emanating from the trade, the amendment may not be issued or at least will be revised for the reason that certain consumers are encountering hardships under the order.

In the meantime, producers generally are reported adhering to the "verbal" order requiring a 1 to 3 ratio in place of 1 to 1. In actual practice, the order has not affected consumers to any extent as yet.

Amortization Applications Must Be Filed by Nov. 29

Unless defense manufacturers send their applications for amortization certificates to the War Department by Nov. 29, they will be unable to avail themselves of the new filing date provided in the amendment to the tax amortization bill which President Roosevelt recently signed.

The amendment gives a grace period for manufacturers who were late in filing their applications. They are now permitted to file before Dec. 1. This means that applications must be received by the War Department before that date. Since Dec. 1 is a Monday, applications must be mailed by Nov. 28 at the latest.



PRODUCTION . . . . Down

■ PRODUCTION of open-hearth, bessemer and electric furnace ingots last week declined ½-point to 97 per cent. Five districts advanced, three receded and four were unchanged. One year ago the rate was 96 per cent; two years ago it was 93½ per cent.

Youngstown, O.—With five open hearths idle because of scrap shortage, production declined 3 points to 94 per cent. Three units went down at midweek. Republic Steel Corp. has three furnaces idle at Youngstown and two at Warren. The rate is expected to be 91 or 92 per cent this week, with 71 open hearths and three bessemers active.

Chicago—Up 1½ points to 102½ per cent, with threat of curtailment because of scrap shortage.

St. Louis—Held at 98 per cent but lack of scrap indicates a decline before the end of the month.

Cincinnati—Advanced ½-point to 88 per cent as one producer operated all open hearths.

Cleveland—Rose 1½ points to 94½ per cent from previous week's revised rate of 93, as an additional open hearth was lighted.

Detroit—Up 1 point to 96 per cent, which is practical capacity, in view of open-hearth repair needs.

Birmingham, Ala. — One open hearth taken off for repair caused the rate to drop 5 points to 90 per cent. The same rate is scheduled for this week.

Pittsburgh — Maintained 99 per cent for the fourth week.

Wheeling—Declined 4 points to 91 per cent, the lowest point in nearly two months.

Central eastern seaboard — Although the scrap supply is critical, steelmakers continued production at 91 per cent.

New England—With one open hearth down briefly for repairs production advanced 2 points to 92 per cent.

Buffalo—With scrap supply still short the rate remained at 79 per cent, several open hearths being idle.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Nov. 15	Change	Same week 1940	Same week 1939
Pittsburgh	99	None	94	94
Chicago	102.5	+ 1.5	99	93
Eastern Pa.	91	None	94	87
Youngstown	94	— 3	93	90
Wheeling	91	— 4	98.5	93
Cleveland	94.5	+ 1.5	88	90
Buffalo	79	None	90.5	93
Birmingham	90	— 5	100	94
New England	92	+ 2	85	100
Cincinnati	88	+ .5	88	88.5
St. Louis	98	None	85	81
Detroit	96	+ 1	93	95
Average	97	— .5	96	93.5

Wickwire Spencer Declines Republic Offer

■ Directors of Wickwire Spencer Steel Co., New York, declined last week an offer of Republic Steel Corp., Cleveland, to purchase the former's assets. Proposed purchase price was reported to be $7,349,062 in cash, equal to $16 per share on Wickwire's outstanding capital stock. In addition, Republic offered to assume all Wickwire Spencer debts and the cost of dissolution and distribution of the proceeds of sale.

In a letter to holders of voting trust certificates, the directors reported net quick assets of Wickwire Spencer were equal to $16.64 per share. Earnings for the year 1941, on the basis of the first nine months' net profit, were estimated at $1,300,000 after all charges. The plants are operating at capacity, with 60 per cent of the manufactured products going into defense projects.

MEN of INDUSTRY

■ **H. D. TANNER,** vice president and manager of the Machinery Division, Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Conn., has been promoted to vice president and assistant general manager. He joined the company in 1920 as an engineer. **A. H. d'Arcambal** and **William P. Kirk** have been elected vice presidents, and will retain their previous duties. Mr. d'Arcambal, associated with Pratt & Whitney since 1919, is sales manager, Small Tool and Gage Divisions, and consulting metallurgist, while Mr. Kirk is sales manager, Machinery Department.

♦

Harold Sines Vance, chairman of the board, Studebaker Corp., South Bend, Ind., has been elected to the board of trustees, Illinois Institute of Technology.

♦

G. H. Smith, general merchandising manager, Edison General Electric Appliance Co. Inc., Chicago, has been appointed general sales manager.

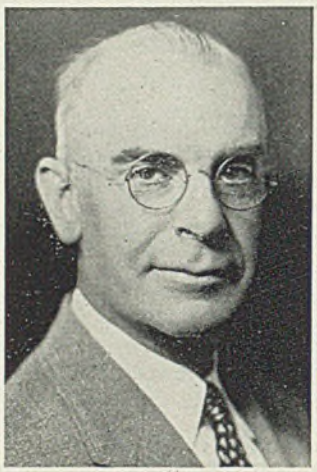
♦

Robert M. Kalb, heretofore research engineer, Bell Telephone Laboratories Inc., New York, has been appointed assistant chief engineer, Kellogg Switchboard & Supply Co., Chicago.

♦

Cameron N. Lusty, assistant chief engineer, Taylorcraft Aviation Corp., Alliance, O., has been appointed chief engineer, Mercury Aircraft Co., Menominee, Mich. He succeeds

William P. Kirk



H. D. Tanner

A. H. d'Arcambal

J. B. Baumann, who has resigned to join the engineering staff of Frankfort Sailplane Co., Joliet, Ill.

♦

L. E. Cooney, since 1924 associated with the Chicago sales organization of Carpenter Steel Co., Reading, Pa., is now district sales manager at Chicago. He succeeds the late John B. Guthrie.

♦

Robert J. Howison has been appointed sales manager, Automotive Division, Morse Chain Co., Detroit. Mr. Howison has had 20 years experience in the silent and roller chain industry.

♦

W. J. Thomas, who has spent nine years with the Process Equipment Division of Babcock & Wilcox Co. at Barberton, O., has been transferred to the executive department of the sales offices of Babcock & Wilcox Tube Co., Beaver Falls, Pa.

♦

Raymond S. Smethurst, Washington, attorney, has been named counsel, National Association of Manufacturers, New York. He has been identified with the association's legal staff in Washington eight years, since 1937 as associate counsel.

♦

Edward D. Monk, assistant manager, transformer sales, Central Station department, General Electric Co., Pittsfield, Mass., has been named manager, to succeed the late Leon L. Biche.

♦

James H. Watters, until recently president and general manager, Marion Steam Shovel Co., Marion, O., has assumed the presidency of the Union Asbestos & Rubber Co., Chicago, the post to which he was elected last month.

♦

Manly B. Brown, associated with Republic Steel Corp., Cleveland, since December, 1936, as assistant manager of sales, pipe division, has been promoted to manager of sales of that division.

♦

C. Wilson Jr., formerly associated with the New York office of Yarnall-Waring Co., Philadelphia, has been appointed district manager of Pittsburgh-Cleveland territory, while **C. N. Maxfield** has been made district manager of the Detroit

Robert J. Howison

area, covering Michigan and western Ohio. **Bernard R. Bristol** and **Charles H. Grosjean** have joined the New York sales staff, **A. E. Robinson**, the Chicago sales office, and **A. L. Aicher**, the Philadelphia sales office.

♦

Marvin W. Davis has been appointed sales manager, Suprex Gage Co., Pleasant Ridge, Detroit. He has been associated with the standardization, manufacture and sale of metalworking gages the past 23 years, recently as sales manager, Sheffield Gage Co. He is a member, American Society of Tool Engineers and Society of Automotive Engineers.

♦

Ambrose McNamara, 215 Lansing avenue, Utica, N. Y., has been appointed sales representative in New York state by Park Chemical Co., Detroit, for its heat treating products, grain cements and polishing compounds. **H. W. Case**, 52 Willow street, Springfield, Mass., will represent the company in the New England territory.

♦

W. H. Doerfner, since 1938 general manager, Saginaw Malleable Iron Division of General Motors Corp., Saginaw, Mich., has been appointed general manager, Saginaw Steering Gear Division, succeeding **Alva W. Phelps**, who has been appointed assistant general manager, Electro-Motive Corp., LaGrange, Ill. **James H. Smith**, works manager of Saginaw Malleable, becomes general manager of this division. **Samuel W. Haley**, assistant works manager of the Malleable Iron division, has been made works manager, while **French Bassett**, sales manager, has been given added duties as co-ordinator of the defense program for that division.

♦

Norman E. Donnelly, the past seven years eastern sales manager, Caterpillar Tractor Co., Peoria, Ill., has been named marine sales manager, Buda Co., Harvey, Ill.

♦

Cliff Bendle, sales engineer with Crobalt Inc. since its organization in 1932, has been appointed sales manager, with headquarters at the new Crobalt plant in Ann Arbor, Mich.

♦

Fred E. Leeming has been appointed district manager of the newly established southern California district office of Superior Steel Corp., at 9730 Wilshire boulevard, Beverly Hills, Los Angeles.

♦

James C. De Haven has been named to the technical staff at Battelle Memorial Institute, Columbus, O., where he has been assigned to the division of foundry research. He formerly was associated with American Radiator & Standard Sanitary Corp., Pittsburgh.

Marvin W. Davis

W. H. Doerfner

Alva W. Phelps

♦

Leonard C. Peskin has been appointed director of spring mill products, American Steel & Wire Co., Cleveland. He has been associated with the company since 1934, when he was engaged in the research laboratory at Worcester, Mass. In August, 1940, he was transferred to Cleveland as technical engineer.

♦

Leigh Willard has resigned as president of Semet-Solvay Co., wholly-owned subsidiary of Allied Chemical & Dye Corp., to become president of Interlake Iron Corp., Chicago. He succeeds **Frank Armstrong** who was named president of Interlake about a year ago, Mr. Armstrong returning to his varied industrial duties. The Interlake corporation has blast furnaces and by-product coke ovens in Chicago, Duluth, Toledo and Erie, Pa. **Albert E. Scherm**, vice president of Semet-Solvay Co., has been named president to succeed Mr. Willard.

♦

D. Clark Matthews has been appointed southern Ohio representative for Cowles Detergent Co., Cleveland, handling its complete line of alkaline metal cleaners. He will reside at 1231 East High street, Springfield, O.

♦

C. W. Moore has been made general credit manager, Wickwire Spencer Steel Co., New York, and **W. H. Carlson** has been named assistant credit manager. Joining Wickwire in 1930, Mr. Moore has been Pacific Coast credit manager since 1936. Mr. Moore and Mr. Carlson will be located in the company's Worcester, Mass., office at 80 Webster street.

♦

L. E. Osborne, former manager of manufacturing and engineering, Merchandising Division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed assistant to the president, in charge of the company's national defense subcontracting program. Mr. Osborne was granted a leave of absence by Westinghouse last January to join the staff of the Defense Commission in Washington, and served as chief of the heavy ordnance section, production division, Office of Production Management.

♦

R. E. Desvernine, who recently resigned as president of Crucible Steel Co. of America, has returned to the practice of law and has formed a partnership with **Eugene L. Garey**. The new firm will be known as Garey, Desvernine & Garey, with offices at 63 Wall street, New York.

♦

C. M. Kaltwasser, formerly head of Stinson Aircraft Division, Vultee Aircraft Inc., has been appointed vice president and general manager of Fleetwings Inc., Bristol, Pa. Prior to joining Stinson he was president, Marvel-Shebler Carburetor Co., Flint, Mich.

"Magnetic chucking saves time and fixtures."

"Operation is easy, quickly learned."

"Versatile, no lost time between jobs."

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"Fine finish, accurate flat surfaces."

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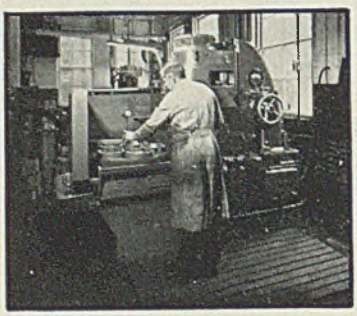

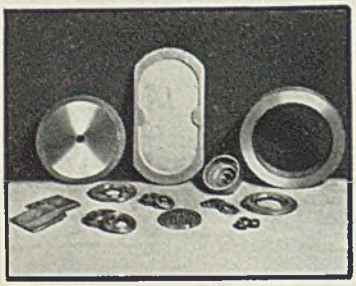

"Fine finish, accurate flat surfaces"..."High production even on small lots"..."Operation is easy, quickly learned"—these are the reasons for the esteem with which Blanchard Surface Grinders are held throughout the manufacturing industry. The Blanchard No. 18, at left, is typical of hundreds of installations where the full scope of Blanchard versatility is used. The parts shown include castings that are finished from the rough — rings with parallel faces — a circular knife ground concave (by means of the Blanchard concave grinding device). The No. 18 Blanchard is shown facing large rings at the rate of 96 per hour (former method produced 20 per hour). Perhaps Blanchard can offer *you* golden opportunities that you never realized. Just write —

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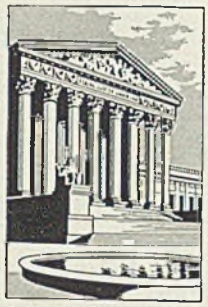
Windows of WASHINGTON

Scrap iron and steel reporting forms consolidated. Must be returned to Bureau of Mines at Pittsburgh . . . Steel cover lids for stoves to be eliminated . . . OPM acts to speed delivery of machine tools to Russia. Take precedence over United States orders . . . Treasury diverts foreign-owned materials in this country to defense manufacture . . . Repair and maintenance order broadened by amendments



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ MERGER of iron and steel scrap reporting requirements was announced jointly last week by the United States Bureau of Mines, the OPM and OPA.

Forms PD-149, 150 and 151 were issued to cover the entire field of iron and steel scrap reporting. All three forms are returnable to the Bureau of Mines, at Pittsburgh, and not to either the OPM or OPA.

Questionnaires sent out during November are designed to cover the October operations of scrap producers, dealers, brokers and consumers. They must be returned to the Pittsburgh bureau by Nov. 20. Further monthly report forms will originate in the Bureau of Mines.

Purposes of these reports are:

1—To develop a general policy for the distribution of scrap under General Preference Order M-24.

2—To assist in price control of scrap.

Form PD-149 applies to producers. Any person or corporation producing at least 50 gross tons of iron and steel scrap during October must file a return. Figures on stocks, shipments, estimated production, sales and unfilled orders, all by grade, must be reported for each plant or location. If the producer is also a consumer of scrap, he files only a consumer's form (PD-150).

Form PD-150 applies to consumers. It combines the former OPA Form 104:8, revised, and the Bureau of Mines Form 6-830a MC. It calls for figures on stocks, production, receipts, delivered prices and consumption, all by grades.

Form PD-151 applies to dealers and brokers. It replaces the Bureau of Mines suppliers' form 6-830a MD, and covers stocks, shipments, purchases, sales, unfilled orders and shipments, all by grade.

The one-time survey of alloy steel scrap provided in Form 144 issued by the OPM has been put on a monthly basis by including all alloy scrap grades in the revised questionnaires.

Failure to receive forms, it was announced, does not mean exemption from reporting but rather places an obligation on the producer, broker or consumer to obtain them on his own initiative. They may be obtained from the office of the Bureau of Mines at Pittsburgh, or from any Field Office of the Division of Priorities, Office of Production Management.

All forms may be reproduced.

Highspots of the Week's Washington News

Proposes Suspension of Duties on Scrap Metals for "Duration"

A bill (H.R. 5985) has been introduced in the house by Representative Casey, Massachusetts, to suspend tariff duties on scrap iron, scrap steel and nonferrous metal scrap for the duration of the emergency.

The bill, which has been referred to the house committee on ways and means, provides that "no duties shall be levied, collected, or payable under the tariff act of 1930, as amended, with respect to scrap iron, scrap steel, or nonferrous metal scrap imported during the period beginning with the day following the date of enactment of this Act and ending with the termination of the unlimited national emergency

proclaimed by the President on May 27, 1941."

OPA Studying Shipments Of "Dislocated Tonnage"

Steel companies are being asked by the OPA to submit data, in terms of tonnage and dollar value, on shipments of steel under the "dislocated tonnage" provisions of Price Schedule No. 6.

"Dislocated tonnage" means steel shipped by producers into areas not customarily served by them. Such shipments are now being required by the OPM in order to facilitate progress of the defense program. This in effect requires a modification of the basing point system used in the industry under which the price of steel at a given destination is ordinarily the same regardless of the mill from which it is shipped. This similarity of price is achieved by the more distant mills paying varying portions of the freight charges depending upon their distance from the customer.

Such unusual shipments of steel as required by the defense program would ordinarily require some mills to pay an excessive amount in freight on shipments to distant points. In order to meet this situation Price Schedule No. 6 was revised by OPA on June 20 to permit the mills to pass on to customers a portion of the freight charge on such "dislocated tonnage" shipped to distant points.

Complete Magnesium Control Ordered by OPM

OPM has ordered complete control of magnesium and magnesium products under a program designed to route supplies into needed defense operations pending completion of new magnesium plants that are to get into production in the summer of 1942. Holders of all forms of magnesium and its products, no matter by whom held, are to report their magnesium holdings to OPM before Nov. 30 to be held for sale to a producer or an approved smelter so the metal may become available for defense uses.

Stovemakers Asked To Eliminate Steel Cover Lids

Manufacturers have been asked to eliminate steel cover lids from domestic cooking ranges by Dec. 15, by OPA and the OPM Division of Civilian Supply.

These tops, usually finished in baked enamel, are used on many gas, electric, kerosene and gasoline stoves to cover the cooking surface when the stove is not in use.

By discontinuing these covers, manufacturers will reduce production costs and at the same time make available for more essential uses about 2500 tons of steel a year.

OPA already has requested makers of domestic cooking and heating stoves not to increase prices beyond the levels prevailing Oct. 24, pending completion of studies to determine the effect on costs of curtailed production resulting from defense program.

New Appeal Form Provided Under M-9-c "hardship" Clause

A special appeal form has been provided for manufacturers whose operations come under the special hardship clause of Copper Conservation Order M-9-c.

The new form, PD-167, may be obtained from any Priorities Division field office or by writing to the Priorities Division in Washington. Any appeal made must be filed on this form and must be mailed to the Director of Priorities, Reference M-9-c, Washington.

Most of the hardships arising under the order are unavoidable and are made necessary because of the serious copper shortage and the fact that available copper must be used for defense purposes.

In considering appeals, the Priorities Division will take account of such factors as sudden and harmful dislocations of employment and freezing of inventories which are in process.

In announcing the new form, Mr. Nelson emphasized: 1—No appeal will be considered unless it is made on the form provided; 2—the form should be used only in cases of especially serious hardship.

OPA Asks Metal Furniture Prices Be Held at Present Levels

Manufacturers of a wide range of metal office furniture and equipment have been requested not to raise prices above the levels of Nov. 6 by the OPA.

OPA's action followed by 24 hours issuance of an OPM limitation order sharply curtailing the amount of steel used in manufacture of metal office desks, chairs, filing cabinets, safes and many other items of clerical equipment.

Leon Henderson Hangs Out "Help Wanted" Sign

Executive sales engineers with extensive experience in the industrial machinery field are urgently needed for important duties in the OPA, Administrator Henderson announced last week.

A number of positions in the Industrial and Agricultural Machinery Section are open to professional men with technical training and practical engineering background in the manufacture of pumps, compressors, blowers, elevators, conveyors, cranes, measuring instruments, mechanical stokers, boilers, valves, refrigeration and air-conditioning equipment, construction machinery, fabricating machinery, farm machinery, and electrical generating equipment.

Familiarity with the problems and methods of cost analysis, estimates, and production is highly desirable.

Salaries range from $3800 to $5600 a year.

Drop Forgings Producers Asked To Maintain Prices

Producers of drop forgings made of steel and steel alloys have been requested by OPA not to exceed the prices that prevailed on Oct. 10, and a meeting of industry representatives has been called for Nov. 18 to discuss a longer-range price program.

Invitations to the meeting, to be held in New York, were sent to a representative cross-section of the drop forging industry.

Machine Tool Plants Ordered To Speed Russian Deliveries

To expedite aid to Russia the OPM Priorities Division has promulgated Special Allocation Order 1 to approximately 35 machine tool builders directing acceptance of specific purchase orders placed by the Amtorg Trading Corp., provided Amtorg meets regularly established prices and sales terms.

Manufacturers are required to make deliveries on such orders on specified dates, with some shipments to start at once and the remainder spread over the next 12 months. Orders involve between $10,000,000 and $15,000,000.

Importance of the order is indicated by the fact OPM directed the manufacturers that no preference rating or other order was to interfere with deliveries to Russia, unless the division so stipulated.

Machine Tool Rebuilders Granted A-1-c Rating

Rebuilders of machine tools have been granted the assistance of a preference rating of A-1-c in acquiring necessary scarce materials through Preference Rating Order P-77.

Rebuilders are defined as those who rework or replace worn or missing parts, test the repaired tool under power, and guarantee its performance for a period of not less than 30 days.

Materials to the acquisition of which the preference rating may be assigned are: Motors and other

electrical accessories; iron, steel, brass and bronze castings; alloy and carbon steels in bars, forgings, castings, shapes and tubes; cutting tools, including cemented carbides; abrasives; measuring instruments and gages; brass, copper and steel tubing and fittings; oil resisting hose; bearing metals; antifriction bearings; machine parts and accessories.

Rebuilders may make deliveries of rebuilt machine tools only to fill defense orders.

The A-1-c rating may be applied by the rebuilder by executing an acceptance of the preference rating order and filing it with the Division of Priorities, and furnishing one copy, with the acceptance executed, to each of his suppliers. The order is not extendible, and may not be applied by a supplier.

Repair and Maintenance Order Broadened by Amendments

Several amendments to Preference Rating Order P-22, covering repair, maintenance and operating supplies, were announced last week by the Priorities Division.

Amendment "A" embodies three changes designed to assist industries not formerly covered by the order.

The first of these brings natural gas, and hydrocarbons associated with petroleum, under the terms of the order, and extends its assistance to the transportation as well as the production of these items. This means that pipelines, railroads, and truck fleets engaged in moving the products of the petroleum industry, may now apply the A-10 rating to the acquisition of necessary repair and maintenance parts and operating supplies. Petroleum production was covered in the original order.

Another change brings within the terms of the order privately-owned irrigation systems, toll bridges and toll canals. Previously, units within these categories were assisted only if they belonged to governmental units.

A third paragraph extends the assistance of the order to those using tools or equipment to repair or maintain the property of other producers. Priority assistance is thus extended to independent contractors and others, such as machine and repair shops, blacksmiths, and similar repair and maintenance operators.

Amendment "B" defines operating supplies as before, but rewords the definition to state that such supplies shall not include "any material which the producer acquires solely to distribute, store, or transport."

Amendment "C" makes two important changes. It deletes the provision of the previous order which refused assistance in replacement of equipment by improved equipment, and prohibited replacements "unless such existing installation is beyond repair." It has been found impossible, and in many cases undesirable, to require replacement with equipment exactly like the old. The procedure frequently held the producer to the use of antiquated equipment, and sometimes made it impossible for him to obtain any replacement equipment at all.

Amendment "D" changes the method by which exemption of various industries from the restrictions on deliveries, withdrawals and inventories, may be granted.

The order excepts public utilities from the terms of P-22, if they are covered by Preference Rating Order P-46, as amended from time to time.

Mines not receiving the assistance of the mine repair order may benefit from the terms of Preference Rating Order P-22.

Treasury Diverts Foreign-Owned Materials to Defense Work

Large stocks of foreign-owned metals and other materials have been diverted to defense manufacture through operation of the Treasury Department's foreign funds control, Secretary Morgenthau announced last week.

In administering the executive order freezing certain foreign countries' assets, including those of the occupied countries of Europe, Japan and China, the department found stocks of aluminum, copper, shipbuilding materials and other supplies.

Defense agencies and companies working on defense contracts were given first chance to purchase the materials, or to requisition them. Shipbuilding materials and copper were made available to the Navy. A load of zinc arriving at New York for nondefense use was diverted to a company working on defense contracts. Machine tools held for blocked account were diverted to aircraft manufacture.

Elevator, Conveyor Machinery Builders Granted Assistance

Two plans to facilitate production of materials for repairs to elevators and escalators and for construction of conveyor machinery have been issued by the Priorities Division.

The orders are P-72 and P-78. They permit application of A-3 preference ratings to deliveries of the necessary materials for production. Orders are to be used by the producers of the items covered and their suppliers.

P-72 is designed to assure production of parts necessary to repair and maintain the country's 225,000 elevators and escalators.

The A-3 rating applies only to materials on the current priorities critical list to be physically incorporated in repair and maintenance parts for passenger or freight elevators or escalators.

This rating may be applied by the producer of such parts or his supplier, after an acceptance of the order's terms has been filed with the Industrial and Office Machinery Branch of the Division of Civilian Supply.

The rating cannot be applied to accumulate inventories, obtain materials not used in repair parts, obtain more materials than were consumed during the year ended Sept. 30, nor if the materials are available without a rating.

All types of conveyors, except platform elevators, are covered by order P-78.

The A-3 rating cannot be used for deliveries of any material containing aluminum or magnesium, and can be applied only to the following items: Castings and forgings; sheets, bars, shapes, plates and tubing (ferrous, nonmetallic and nonferrous to the extent permissible under the terms of conservation order M-9-c, generally known as the copper order); electrical equipment and accessories; mechanical equipment and accessories; cutting tools, including cemented carbides; and necessary maintenance and shop supplies.

The rating may be used by producers and suppliers after an acceptance form similar to that governing the elevator and escalator industry has been filed with the Industrial and Office Machinery Branch.

Requests for Calibration of Precision Gages Increase

Requests from manufacturers for the calibration of high precision end gages, required for mass production of interchangeable parts for airplane engines and other vital military equipment, are reaching the National Bureau of Standards at the rate of more than 800 a month, according to the Department of Commerce.

Extent to which such gages are used in industry is shown by the fact that during the years since this work was undertaken the bureau has calibrated more than 60,000 gages. The incoming volume has increased with the expanding defense program.

Tolerance of some machine work requires the precision gage of the shop to be correct within one or two hundred-thousandths of an inch. This, in turn, requires that the secondary or working standards used in the testing laboratory be correct within millionths of an inch.

Tell Us Our Task and We'll Do It, Grace Pledges Defense Officials

Steel industry committed to all-out co-operation in arms program . . . OPM figures reveal 60 per cent of unfilled orders bear ratings of A-10 or higher

WASHINGTON

■ FULL co-operation by the nation's steel industry in fulfilling every need of defense was pledged by Eugene G. Grace, president, Bethlehem Steel Co., at a meeting of 800 representatives of more than 200 steel mills in Washington on Nov. 11 with OPM, Army, Navy and lend-lease officials.

Conferees heard a message from the President, read by William S. Knudsen, director general of OPM, in which Mr. Roosevelt said: "No greater burden has ever been thrown on a single industry . . . The output of the steel mills serves as the backbone of the weapons, the tanks, the airplanes and the ships on which the fate of free government in this world rests . . . We must set aside any individualistic interest which interferes in the slightest degree" with defense needs and objectives.

Mr. Knudsen expressed appreciation of what the steel industry has been able to accomplish, and reported defense production now is measured in expenditures of one and a half billion dollars per month, and by this time next year will be at a rate of more than two billion dollars monthly.

Explaining that "We have some of everything in production," Mr. Knudsen said that additional plants would be built, and that the peak rate of capacity should be attained about the second quarter of 1942.

Mr. Grace, in responding to the President's message for the industry at Mr. Knudsen's suggestion, declared that this message was "orders" to the industry, as far as he was concerned.

"The President has told us in no uncertain terms what our job is" he added, and turning to Mr. Knudsen, said he wanted to assure him that "If there is more to be done, and if it is in the steel industry, that will be done."

Noting that steel production on the side of the United States and countries friendly with it combines to 130 million tons annually, against an outside of 59 million in Germany and the countries it dominates, Mr. Grace added that in the last eighteen months, the United States has produced 120 million tons, compared with a five-year total of 99 million by Germany in preparing for the present war.

"We have the steel available, maybe in certain forms when other forms are wanted, but in the overall picture we've got the goods, and it is up to us to control the situation," he continued, after voicing a plea that OPM follow the procedure of a private steel company, and first arrange for allocation of production, then arrange for production.

Predicts Improvement

"We must know what our task is," he said, adding that the industry wants the centralized control of emergency matters in Washington, where it is needed. Pledging that "As we go along and the problems are better understood down here, we are going to do better," Mr. Grace concluded.

"I wouldn't be Grace if I didn't say, "We are perfectly proud of what we have done."

Arthur D. Whiteside, head of the Iron and Steel section, OPM, presided and introduced the various speakers. Noting Mr. Grace's remarks about the industry's capacity, and suggestion for allocations to be arranged with production, he replied from the platform that it should not be overlooked that "If Russia and England go down, it leaves a production of 90 million tons on our side, and the rest goes to Hitler."

"At times," he continued, "we have tried to acquire steel which could have been produced, but found it had not been. I speak of steel shipbuilding plates."

Donald Nelson, Director of Priorities in OPM, warned that the defense program must come first, and that the whole problem under discussion was a grim business, becoming grimmer all the time. He said his organization had an additional responsibility to keep civilian economy going by giving it what it needs, but that "Before we get through it is going to be an unpleasant job for all of us, in which the requirement will be to take what we need and not what we want."

The meeting was warned by W. L. Batt, director of the Materials Division, OPM, that the steel industry's customers now are the Army, Navy, and Lend-Lease, and he added that "These customers are not satisfied."

He added that so far OPM had borne the brunt of this dissatisfaction to an extent not realized in the industry.

However, he added that "Grace has committed his industry, and I'm satisfied the industry is going to back up his commitment."

Jesse Jones, Secretary of Commerce, and also head of the federal lending agency, said:

"I want to add my voice to this appeal to the steel industry, to the executives of the various corporations, and to the men who work with their hands whether in the mines, or transportation, or in the factories.

"And I want to assure them and you and that your government will willingly provide the necessary capital on terms fair to you and those you represent; RFC financing of the national defense program presents no problems, imposes no condition, and contains no terms upon which

all reasonable men cannot agree."

"There must be expansion of capacity," he continued. "We know we are building a great many more plants than can operate in peace in steel, in aluminum, magnesium, munitions factories and what-not, but we will deal with this problem when the emergency is past."

Discusses Expansion Program

Leon Henderson, administrator of OPA, made an appeal for support of his price control measure now pending, and Sidney Hillman made a plea for co-operation of industry, labor and government, in the emergency.

During the afternoon session of the conference, W. A. Hauck, chief of the Plant Expansion Division of the OPM Iron and Steel Branch, discussed the expansion program. He gave a picture of how the program originated with the request for an expansion program of 10,000,000 ingot tons and then for suggestions for another 5,000,000 tons on top of that. He took occasion to state that the program is just for the emergency. He said, however, that future emergency demands may be even greater than the present ones. Mr. Hauck told the conference that it is the desire of his branch to put into operation any existing shut down plants.

He stated that more electric furnace capacity is needed and will be filled. Also, he said that additional blast furnace capacity will be allocated. He discussed the need for what he termed scrambled facilities. Mr. Hauck stated that the additional West coast capacity needed will be furnished by the U. S. Steel Corporation and the Bethlehem Steel Co. He stated that the entire expansion program of the present time should definitely be all allocated within the next few months and that all of the construction job should be ready in the next two years.

R. C. Allen, assistant chief of the Iron and Steel Branch in charge of raw materials, spoke to the conference on scrap and pig iron capacity. He spoke of the limited supply of steel available in 1941 because of the shortage of these two raw materials and predicted that finished steel will still be limited in 1942 and also in 1943 unless more pig iron capacity is available by that time. He said that steel capacity now is far in excess of the scrap and pig iron supply. Plans are now underway, he stated, for 34 new blast furnaces which will help to balance the material for the mills. There is a blast furnace shortage and a shortage of railroad cars for handling iron ore from the Great Lakes.

Mr. Allen told the conference that there are 23,000,000 net tons of scrap available and that will probably be the amount in both 1942 and 1943. He stated that 87,000,000 tons of steel could be manufactured next year and 93,000,000 tons in 1943 if the raw material is available.

Charles Halcomb, assistant chief of the Iron and Steel Branch in charge of priorities and administration, talked on priorities and how they affect the Iron and Steel Branch. The purpose of priorities, he said, is twofold and then he told the conference that they are to designate the relative need of end product and to effect delivery of the component parts required to produce the end product at the proper time to tie in with the required finished delivery date.

60 Per Cent for Defense

As of Oct. 1, he said, the overall backlog of unshipped steel orders showed: 1—October, 59 per cent of total volume was rated A-10 or higher; 2—November, 60 per cent of total volume was rated A-10 or higher; and 3—Nov. 30 and later —57 per cent of total volume was rated A-10 or higher.

Mr. Halcomb said that when the backlog figures are prepared as of Nov. 1 he believes they will show a further rise in rated tonnage. This will mean, he said, constantly increasing pressure.

Speaking of PD-1 applications Mr. Halcomb told the conference that the Iron and Steel Branch is receiving an average of 500 of these applications every day. Each application, he stated, after being case controlled is routed to the product section handling the items indicated.

In many cases, Mr. Halcomb said, these applications indicate the type of end product for which the steel is required, and in numerous cases, also indicate the rating previously established for such end product. Analysts carefully check the indicated needs and the inventory on hand at the date of the application. He then followed through the entire procedure to show the industry representatives just how much routine is actually necessary.

When a final rating has been established by the Iron and Steel Branch he said, the case is then reviewed by a representative of the Priorities Division for further check. This system of check and counter, check helps, he said, to develop a more uniform basis of ratings.

H. LeRoy Whitney spoke to the conference on standardization and simplification of standardization, as they affect iron and steel. He said that specifications should indicate clearly the physical properties of the steel desired for a specific purpose and called attention to the fact that in many instances a steel of given properties will serve many purposes. When heat or corrosion resistant qualities are desired, he said, the chemical analysis is most important, but specifications should not tell the steelmaker how to make the steel and at the same time demand physical properties.

Mr. Whitney called the confer-

(*Please turn to Page* 50)

Breakdown of Steel Industry's Backlog

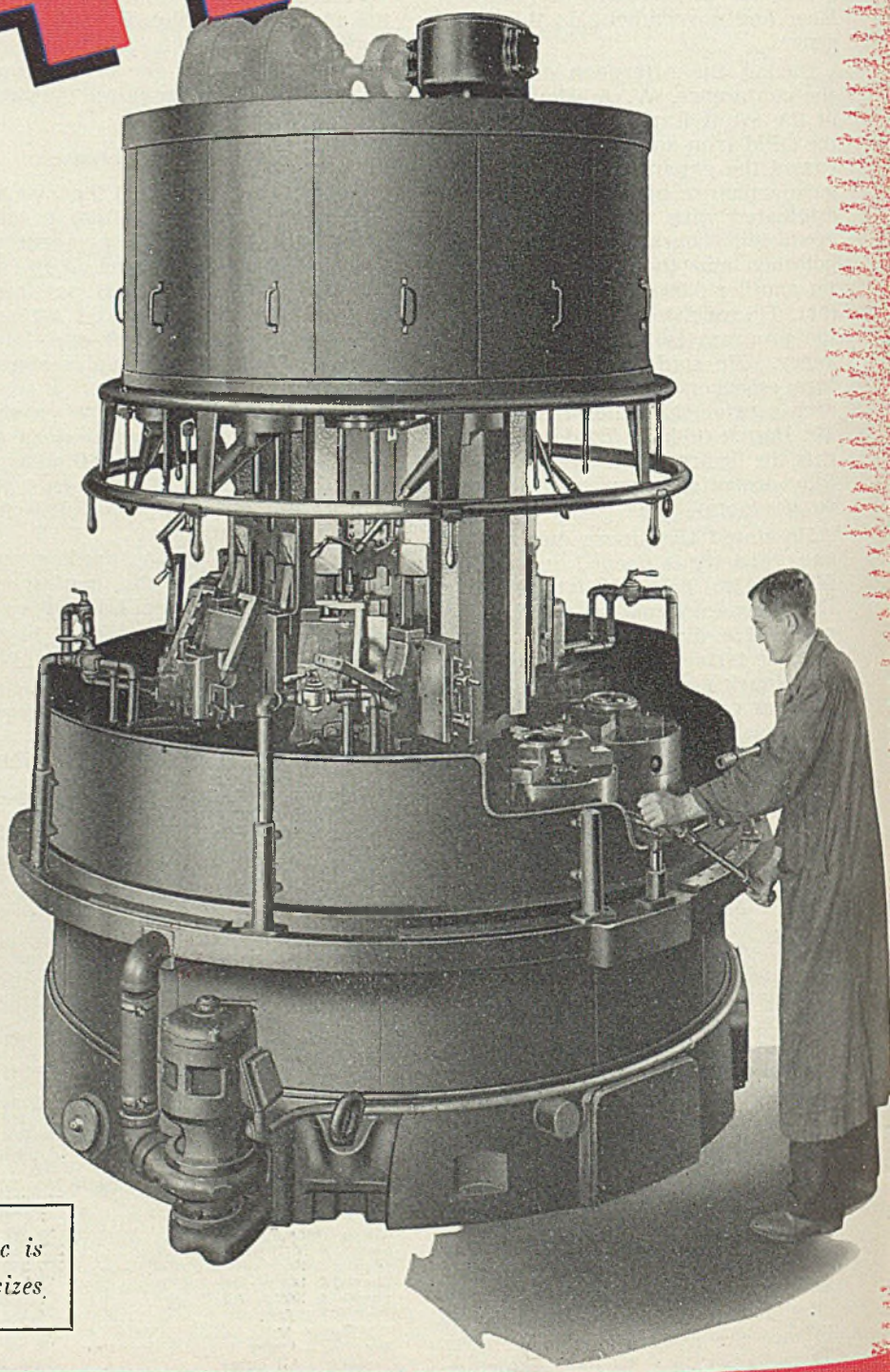
Statement of Unfilled Orders and Commitments Classified in Accordance with the definitions on Form PD-73 for Groups A (Army-Navy), B (other U. S. Government), C (Lend-Lease), D (Division of Priorities) and F (Warehouses) as of September 30, 1941.

(Net Tons)

Products	October 1941 Defense Orders	October 1941 Per Cent of Total	November 1941 Defense Orders	November 1941 Per Cent of Total	Later Months Defense Orders	Later Months Per Cent of Total
Ingots, Blooms, Billets, Slabs, Tube Rounds and Sheet and Tin Bars	446,438	79.2	433,347	81.0	787,289	68.1
Structural Shapes & Piling	333,063	81.7	281,263	76.8	1,101,385	74.0
Plates (Universal & Sheared)	485,260	89.6	465,436	91.0	2,884,598	87.1
Rails—Over 60 lbs.	128,982	93.4	116,387	80.8	1,070,518	67.1
Rails—All Other	9,766	84.5	4,607	73.7	38,067	70.4
Tie Plates & Track Accessories incl. Track Spikes	61,373	72.3	60,353	79.4	386,417	78.1
Hot Rolled Bars — Carbon incl. Hoops and Bands	376,584	65.8	351,784	68.0	1,219,294	55.6
Hot Rolled Bars — Concrete Reinforcing	152,734	87.2	156,026	91.2	438,381	79.0
Hot Rolled Bars—Alloy	94,513	61.6	69,925	57.6	219,592	68.8
Cold Finished Bars (Carbon & Alloy)	69,522	69.1	65,294	71.8	355,685	71.2
Pipes & Tubes	257,525	59.8	173,727	53.6	350,710	41.6
Wire Rods	54,361	52.1	45,850	46.1	93,281	28.1
Wire & Wire Products incl. fence posts	179,621	53.9	135,557	46.9	214,689	41.3
Black Plate	3,870	9.5	6,703	18.1	3,359	4.2
Tin & Terne Plate	38,487	10.1	37,013	11.4	81,277	10.6
Sheets & Strip—Hot Rolled	312,676	37.5	249,247	39.9	627,199	25.5
Sheets & Strip—Cold Rolled	107,552	24.6	57,665	22.5	199,153	18.4
Sheets & Strip—Galvanized	79,119	58.7	58,029	59.3	206,539	52.0
Sheets & Strip—All Other	9,262	33.3	8,498	34.9	24,444	24.8
Tool Steel Bars	4,128	70.7	4,219	74.7	10,813	78.3
Wheels & Axles	45,374	93.1	42,009	95.2	175,717	91.2
Forgings—Armor Plate & Ordnance	39,344	100.0	41,753	100.0	506,437	100.0
Forgings—All Other	10,667	87.7	8,543	89.5	61,620	93.1
Steel Castings	5,898	90.0	5,036	96.6	25,628	91.4
Skelp	9,864	13.0	9,009	12.7	80,058	40.5
All Other	13,910	74.3	11,618	72.4	45,021	72.1
Total	3,329,893	58.6	2,898,988	60.3	11,207,171	57.4

Number of Companies Included 113—which represent 94.0% of total estimated capacity of the industry.

The MULT-AU-MATIC Way To $AVE••



THERE is only one sound way to weigh (pardon the pun) the worth of a machine tool—cost per machined part.

One of the greatest services that Bullard has rendered to modern industry has been its part in making manufacturers dollar-conscious. It is true that our largest customers are big plants—that is natural. But it is equally true that **all** our customers are manufacturers who carefully weigh and study every angle of a machine tool purchase. "Show me" is a challenge which has to be met with every inquiry for a Mult-Au-Matic or a Vertical Turret Lathe. We welcome it—and we answer it with figures!

This Type D 8-spindle Mult-Au-Matic is one of a wide range of Mult-Au-Matic sizes.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

BULLARD

Mirrors of MOTORDOM

Supervisory personnel being spread thin by plant expansions. Foremen renewing talk about organizing union . . . Industry slashing merchandising budget but is hopeful of retaining semblance of new car business. Emphasizing importance of service and repair business to dealers . . . Plated and stainless screws O.K. for passenger cars despite blackout on bright finished parts . . . Chrysler president takes company apart to show what makes it tick

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ TRANSFER of men from automobile to defense plants, a process now under way with steadily accelerating pace, develops many unexpected complications. While problems connected with shifting the rank and file of workmen are bad enough, they do not compare with difficulties developing over supervisory personnel such as foremen, department heads, superintendents, managers and technical specialists.

In the first place, the supply of such personnel is limited and is becoming spread very thin, since it is necessary to have supervision in both defense and auto plants to maintain any semblance of efficient production. So, the question is: Where to find the supervisory talent? It is impossible to create a good foreman over night and, since unionization of the industry, the movement of men from the ranks up into foremen's jobs has slowed down to a walk.

On top of this is the matter of remuneration. Many wish they could give up their jobs as foremen and go "back on the line" because the boys there, with their overtime pay, are often averaging higher incomes than their own foremen. The answer to this is simply to pay foremen higher salaries.

Movement Has Been Revived

This became evident to a number of foremen a few years ago, at the time the UAW was in the final stages of organizing the automobile plants. The move was started to organize foremen in a separate bargaining unit, but various managements threw up their hands in despair and said they would never listen to this, because foremen were their sole means of control over workmen and if foremen should belong to the same union as the men, management would be left with no vestige of control or supervision. The movement died a quick death then, but in recent weeks it has been resuscitated by a group of Ford foremen who envision spreading foremen unionization eventually to all motor plants. How far the new plan will go cannot be foreseen, but the foreman problem remains acute.

There is still another angle which is most disturbing to supervisory personnel. For example, a foreman is placed in charge of a new department of a defense plant with a group of newly trained personnel and some definitely assigned production minimums. He is supposed to meet these minimums and at the same time upgrade his men just as fast as is humanly possible. By upgrading is meant pushing the machine operators and similar workmen ahead into jobs requiring more skill, to make room for a new batch of trainees. Thus, foremen are in the anomalous position of having to push production to higher levels with groups of hastily trained workmen who, as fast as they become accustomed to the job, must be moved on to something better. If that isn't a headache it is the next thing to it, but there is not much to be done about the situation, since obviously if the plant is to be staffed in the minimum amount of time, workmen must be moved ahead with all possible speed.

It is not hard to see how this disruption of regular working forces, plus the likelihood of having to improve the wage position of supervisory help, plus sharply curtailed production of automobiles, plus skyrocketing costs of alternate materials, plus sudden failures of shipments of vital materials to arrive at assembly lines on time is wrecking the normal pattern of motor car production and sales. Nearly all companies are believed to be well in the red so far on 1942 models and steps must be taken to correct this situation.

Advertising budgets and sales staffs have already felt the axe, and further price increases may be around the corner. One popular make of car in the medium-price field is said to be in for a $140 increase around the first of the year.

General Motors sales of cars and trucks to consumers in September were off 45.8 per cent from a year ago, and in October off 44 per cent. This is about in line with the rest of the industry, since GM still holds its 40 per cent share of total business. Sales to dealers did not show nearly as sharp a decline, being something over 20 per cent below a year ago. This reflects in part building up dealers' stocks which were virtually exhausted at the end of August.

Still Stress Importance of Aggressive Sales, Service

These pessimistic observations are not echoed, at least not in public, by sales departments of auto companies. The feeling there is that even with 50 per cent curtailment a reasonable amount of business should be left to avoid widespread mortality of dealers. Some dealers may take on other lines of goods to supplement the gap left by curtailed automobile output. The important task now at hand is to sell what cars are being produced. If Washington allocators should see a situation where the industry is not moving even the curtailed production quota, they might be disposed to apply still further restrictions on output.

A lot of the gloom being circulated about the automobile industry is chargeable to dealers who are still using scare tactics to drive in lagging sales. This policy worked to perfection earlier this year so it is being continued on many fronts.

One way in which the motor companies are seeking to bolster dealers who stand to suffer from curtailed car production is to help in

the development of thorough and efficient servicing activities. Training courses in service management and merchandising have been started by many of the motor companies, Buick's starting next Monday at General Motors institute in Flint, Mich. These courses have been developed as "Streamlined" training programs of classroom discussions and roundtable conferences, open to any representative delegated by a dealer, and aimed at improving the dealer's margin in service operations—a phase which, incidentally, has been sadly neglected in recent years.

Apportionment of new cars to dealers, now generally on the basis of a certain percentage of last year's sales, may have to be changed in view of the spotty economic conditions developing throughout the country. Certain areas are booming, such as those with large new defense plants, while others are lagging behind because of present and prospective curtailment of consumer goods manufacture. Allotment of new cars may have to be changed to become dependent on business conditions in various areas, which might prove a serious blow to dealers in the "weak" areas.

The blackout on chromium car finishes is only a month away and despite Washington conferences it appears that bumpers and bumper guards will be the only parts to continue with bright finish. A good case was made out for the necessity of permitting plated finish on hub caps and door handles as a safety precaution, but it was turned down, and so these parts will be painted or lacquered.

An amusing story is making the rounds about one of the local car builders who is supposed to have large stocks of plated parts, enough to carry his assemblies beyond the Dec. 15 deadline. This interest, according to the story, is planning to continue using the plated parts, but with a thin paint applied over them. Then, on the car's windshield would be attached a sticker reading, "Caution! Do not use paint remover on parts now carrying paint instead of plating, because this will destroy the painted finish and reveal a brilliant chromium surface."

Approval has been given to continuation of both plated and stainless steel screws used in passenger car assemblies, the only stipulation being that such screws must carry a "defense chromium" finish—that is the customary mirror finish must be dulled or brushed to a satin finish (extra operations, incidentally) in the interests of defense.

Men and Machines Are Heart of Big Industry

A few weeks ago, before the Army Industrial College, K. T. Keller, president of Chrysler Corp., gave an interesting talk on fitting the tools of industry to defense. Much of his comment was familiar thinking to Detroit but perhaps not to the rest of the country. One significant plea he sounded was that "those of us in industry and in the Army who are responsible for producing the things that are needed should approach our job in a mutual desire to know our respective abilities, limitations and possibilities and work together to get the job done most effectively."

He gave an intimate picture of so-called "big" industry and of what makes it tick. He divided the 80,000 Chrysler Corp. employes into three groups. The first, covering 47,000, is the group to be most affected by curtailment of car production, and includes:

- 1,000 in sales, promotion and advertising
- 1,800 stenographers and typists
- 6,000 clerks and other office employes
- 1,300 janitors and cleanup help
- 11,000 materials handlers and truckers
- 17,000 assemblers
- 8,000 body painters, trimmers and assemblers
- 800 plant protection men
- 100 doctors and nurses

The second group, numbering 29,000, includes the men most readily adaptable to defense work:

- 21,000 machine operators who can handle machines after setup
- 7,000 operators who can set up, adjust and operate equipment
- 1,300 tool, pattern and die makers

The third group of about 5000 is the one which so far has been the busiest on defense activities:

- 50 manufacturing executives and plant managers
- 500 master mechanics, tool and die engineers
- 3,000 superintendents, foremen and assistant foremen
- 1,300 engineers, laboratory technicians, designers and draftsmen

Still remaining are 1200 men in the gray iron foundry, for which as yet there is no defense work, and 1800 others in miscellaneous classifications.

The corporation embraces 19 manufacturing plants with total floor area of 15½ million square feet. From these plants in a normal year comes about 800 millions in products, manufactured with the aid of 15,000 units of machinery.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,355
June	324,253	362,566	546,278
July	218,600	246,171	468,895
Aug.	103,343	89,866	164,792
Sept.	192,679	284,583	248,751
9 mos.	2,570,370	3,160,060	4,031,191
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
Oct. 18	85,600	114,672
Oct. 25	91,855	117,080
Nov. 1	92,879	118,092
Nov. 8	93,585	120,948
Nov. 15	92,990	121,943

†Comparable week.

Plants Pool Facilities To Obtain Defense Work

CHICAGO

■ Finding it difficult to keep their plants operating because of materials shortages, about 40 small metalworking plants here are pooling manufacturing facilities and preparing to obtain defense contracts. They have incorporated as the Metal Fabricators Institute, a nonprofit organization, and have established offices at 176 West Adams street, with E. H. Johnson as managing director and secretary.

Member companies will bid collectively or individually for prime and subcontracts.

C. G. W. Anderson, comptroller, Advertising Metal Display Co., is president of the institute. Vice presidents include Irving Naxon, president, Naxon Utilities Corp.; W. D. Phillips, president, Phillips Mfg. Co.; Harry Golden, owner, Gold Seal Mfg. Co.; and Robert Platt, vice president, Advertising Metal Display Co. Directors include the officers and T. H. Reynolds, president, Sherman-Reynolds Co.

Industrial Gear Sales Index 261 in October

■ Sales of industrial gears in October were up 7.4 per cent from September and were 20.8 per cent greater than in October, 1940, it was reported last week by the American Gear Manufacturers Association, Wilkinsburg, Pa.

Comparative index figure of sales in October was 261, compared with 243 in September, 276 in August, 298 in July, 299 in June and 216 in October, 1940.

Combined sales in the first ten months this year were 86.7 per cent greater than in the corresponding period in 1940.

Navy "E" and Ordnance Bureau Flags Awarded Monarch Machine Tool Co.

SIDNEY, O.

■ DURING a brief intermission between the first and second shifts in the late afternoon of Armistice day, an impressive ceremony was held in the erecting shop of Monarch Machine Tool Co., lathe manufacturer.

In the presence of 1500 employes of the company and a number of invited guests, including city officials and officers of the National Machine Tool Builders' Association, Admiral William Harrison Standley, U. S. N., personal representative of Col. Frank Knox, Secretary of the Navy, presented the United States Navy Bureau of Ordnance flag and the Navy "E" pennant, awarded Monarch for excellent performance in fulfilling naval ordnance contracts.

Workers Given Lapel Buttons

Only 39 awards of this kind have been made to date by the Navy. Monarch is one of the first machine tool builders to be included.

Admiral Standley, who was introduced by Wendell E. Whipp, president of Monarch, is a distinguished officer with 40 years of active service to his credit. He has just returned from a mission to Russia during which he paid particular attention to the industrial situation in that country. In his presentation speech he paid tribute to the stubborn resistance to invasion being put up by the Russians—a resistance which he is convinced will not break down. The Admiral compared conditions in war zones to those in America and drove home to the Monarch employes the vital role which they are playing in the world-wide battle for the preservation of democracy.

"Your skill, efficiency and effort," he said, "have earned for you an award which always has been highly prized in the Navy. To me it seems particularly fitting and appropriate that the good work which you men are doing in factories such as this should be recognized by the same emblem by which excellence in gunnery in the fleet is rewarded. Today the Navy is recognizing the fact that you have been playing your part in the defense of democracy. This award is concrete evidence of that. You may be sure that the men in the fleet recognize what you are doing and cheer you for it."

As a result of this Navy recognition, not only do the flags now fly over the Monarch plant, but also every employe wears a bronze lapel button bearing the Navy "E" and the crossed cannon of Admiral Dalgren who pioneered modern engineering methods in the Navy. Charles Buehler, oldest employe of Monarch, accepted the buttons in behalf of the entire organization.

Among the guests at the presentation ceremonies and at the dinner which followed was P. H. Mills, controller general of machine tools for Great Britain. Mr. Mills was accompanied by Charles Moore, well-known American machine tool expert and member of the recent Harriman mission to London to determine the immediate needs of England under lend-lease.

Mr. Mills, who in civil life is an official of the Avery Co., a 200-year old manufacturing organization directly descended from Boulton & Watt, pioneers in the steam engine field, drew a vivid picture of manufacturing difficulties under bombing and blackout conditions. He showed pictures of a plant apparently reduced to kindling wood by a land mine, which within a few weeks was back in action again with much of its original equipment rehabilitated.

He emphasized that the kind of action which his countrymen are getting from American firms like Monarch is one of the things which make for supreme confidence.

Holds Post-War Slump May Be Avoided

■ Severe post-war slump for industrial machinery companies is not inevitable, H. C. Beaver, president, Worthington Pump & Machinery Corp., Harrison, N. J., said last week.

Mr. Beaver listed five factors that will help to carry the industry successfully through the readjustment period: 1, continuance of present engineering research and development programs; 2, the current overworking of industrial equipment; 3, federal orders deferring much public works and housing activity; 4, maintenance after the war of an expanded military machine; and, 5, the demonstrated need of continuing during peacetime various basic industries now being built up to supply scarce materials for defense requirements.

■ Armistice day scene at Monarch Machine Tool Co., Sidney, O., as 1500 employes watched naval color guard raise U. S. Navy Bureau of Ordnance flag and Navy "E" pennant, following presentation by Admiral William Harrison Standley, U. S. N., representing Secretary Frank Knox

PRICE SCHEDULES ISSUED BY OPA

Address: Temporary Building "D," Independence Avenue and Fourth Street, S.W., Washington; Telephone Republic 5050.

No. 1—Second-hand machine tools issued Feb. 17, 1941, effective March 1, 1941; amended Sept. 24, 1941. Maximum prices in terms of percentage of March, 1941 equivalent of new tools: Constructed before Jan. 1, 1920, rebuilt 70%, others 50%; Jan. 1, 1920-Dec. 31, 1929, rebuilt 80%, others 60%; Jan. 1, 1930-Dec. 31, 1935, rebuilt 90%, others 70%; Jan. 1, 1936 and after, rebuilt 95%, others 75%.

No. 2—Secondary aluminum and scrap, effective March 24, 1941; amended June 3, Aug. 14 and Nov. 1, 1941, correction May 5, 1941.

Secondary ingot, cents per lb. lots of 30,000 lbs. or more, f.o.b. shipping point: 98 per cent pure and silicon alloys 15.00, No. 12 and piston alloys 14.50, deoxidizer 13.50. Add ¼-cent for 10,000-30,000 lbs.; ½-cent 1000-10,000 lbs.; 1 cent under 1000 lbs.

Scrap, sales by makers or dealers, in cents per lb., f.o.b. point of shipment, for lots of less than 1000 lbs., 1000-20,000 lbs. and 20,000 lbs. or over, respectively: Pure clips and cable 10.00, 11.00, 11.50; alloy sheet clips mixed or segregated 8.50, 9.50, 10.00; old sheet and utensils 9.50, 10.50, 11.00; old and new cast and forged scrap 10.00, 10.50, 11.00; borings and turnings, incl. No. 12 7.00, 8.00, 8.50; pistons free of struts 10.00, 10.50, 11.00, with struts deduct 2 cents.

Above prices reduced Nov. 1, 1941 in line with 2-cent cut in virgin aluminum to 15.00c.

No. 3—Secondary zinc and scrap, effective March 31, 1941; amended Oct. 17, 1941. Secondary zinc, cents per lb., carlots, E. St. Louis: 8.25, brass special 8.35; intermediate 8.50. New zinc clippings and trimmings (cents per lb.) 7.25, engravers and lithographers' plates 7.25; old zinc 5.75, f.o.b. point of shipment; add ½-cent for single shipments of 10,000 pounds or more. Unsweated zinc dross 5.80; die cast slab 5.80, f.o.b. point of shipment; no premiums for quantity. New die cast scrap 4.95; new and old radiator grills 4.95; old die cast scrap 4.50, f.o.b. point of shipment; add 1 cent for single shipments of 20,000 pounds or more. "Single shipment" means deliveries within 48 consecutive hours. Grades may be combined.

No. 4—Iron and steel scrap, effective April 3, 1941; amended May 7, June 18, June 21, Sept. 5, Sept. 22, Sept. 26 and Oct. 10, 1941.

The maximum price at which any grade of scrap (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock.

The maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. For instance, Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the $1 "springboard" limit over the Youngstown base of $20.

A shipping point is the point from which the scrap is to be shipped to a consumer. The maximum shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. For instance, No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located. Exceptions are the New England area which must use the Johnstween base minus the all-rail freight from the shipping point to Johnstown, and the Metropolitan Area of New York which must use the Bethlehem base. Where scrap is shipped from a basing point, the shipping point price is determined by taking the basing point price and deducting local transportation costs to consumers located within the basing point.

Railroads operating in two or more basing points may use the highest base except on material shipped from Chicago switching charges of 84 cents a ton must be subtracted. Brokers allowed 50-cent commission above maximum prices to consumers.

Base prices on No. 1 heavy melting and compressed sheet scrap $20, delivered consumers' plants at Pittsburgh, Johnstown, Weirton, Steubenville, Youngstown, Warren, Canton, Sharon; $18.75 Chicago, Coatesville, Claymont, Conshohocken, Phoenixville, Harrisburg, Sparrows Point; $19.50 Cleveland, Cincinnati, Ashland, Ky., Portsmouth, O., Middletown, O.; $18.25 Kokomo, Ind., Bethlehem, Pa.; $18 Duluth; $17.85 Detroit; $17 Atlanta; $16.50 Minnequa, Colo.; $14.50 Pacific Coast Points. For No. 1 dealer bundles and No. 2 melting steel, deduct $1. For No. 2 dealer bundles deduct $2. For No. 1 railroad heavy melting steel add $1 except Bethlehem, Pa., Atlanta and Minnequa which are not basing points.

No. 1 cupola cast $21 delivered consumers' plants at Pittsburgh, Johnstown, Weirton, Steubenville, Youngstown, Warren, Canton, Sharon, Radford, Va.; $20 Chicago, Kokomo, Ind.; $22.50 Bethlehem, Pa.; $23 Coatesville, Claymont, Conshohocken, Phoenixville, Harrisburg; $22 Sparrows Point, Bridgeport, Phillipsdale, Worcester; $22 Cleveland; $20 Buffalo, St. Louis, Birmingham; $21 Cincinnati, Ashland, Portsmouth, Middletown; $20.35 Detroit; $18 Pacific Coast Points.

Chart showing complete details available on request.

No. 5—Bituminous coal, issued April 2, 1941 fixing prices at levels prevailing March 28, 1941. Revoked May 1, 1941.

No. 6—Iron and steel products, issued April 16, 1941 freezing basing point prices at levels prevailing March 31, 1941; revised June 20, 1941 to establish base prices at April 16, 1941 levels.

Covered are iron or steel ingots, semi-finished products, finished hot or cold-rolled products and all products further finished by galvanizing, enameling, plating, coating, drawing, extruding, etc.

Basing point prices are those announced by (1) U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing point; or (2) those prices announced or customarily quoted by other producers at the same designated points. Exception: Base prices under (2) cannot exceed those under (1) except to extent prevailing in third quarter of 1940. Extras mean additions or deductions from base prices in effect April 16, 1941. Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific points are deemed basing points except producers may charge governing basing point prices plus rail rates to the latter two areas where water transportation is not available.

Domestic ceiling prices are the aggregate of (1) governing basing point price (2) extras (3) transportation charges to point of delivery as customarily computed. The governing basing point may be (1) the basing point nearest the consumer providing the lowest delivered price or (2) the basing point at or closest to the place of production or origin of shipment.

Export ceiling prices may be either the aggregate of (1) domestic basing point nearest place of production (2) export extras (3) export transportation charges or the f.a.s. seaboard price of the U. S. Steel Export Co. on April 16, 1941.

No. 7—Combed cotton yarn, effective May 26, 1941; amended July 19, 1941.

No. 8—Nickel scrap and secondary materials, effective June 2, 1941; amended Sept. 8, 1941. Maximum prices to makers on nickel and nickel alloy scrap unprepared for consumption, cents per lb., f.o.b. point of shipment:

Nickel scrap containing 98 per cent or more nickel, not more than 0.50% copper 26.00 per lb.; 90-98 per cent nickel 26.00 per lb. of nickel contained only. Converters (dealers) allowed 2-cent premium in selling to consumers. Shipments of 2000 pounds or more by maker or converter take ½-cent premium.

Ferro-nickel-chrome-iron scrap containing 20-90 per cent nickel 26.50 per lb. of nickel contained, 8.00 per lb. of chrome. Converter's premium 1½ cents. Quantity extra ½-cent 10,000 pounds or more.

Ferro-nickel-iron scrap containing 14-90 per cent nickel 26.50 per lb. of nickel contained.

Converter's premium 1½ cents. Quantity extra ½-cent 10,000 pounds or more.

Monel metal clippings 20.00 per lb.; soldered sheet 18.00; No. 1 castings, turnings 15.00. Converter's premium 2 cents. Quantity extra ½-cent 20,000 pounds or more. Cupro-nickel containing 90 per cent or more combined nickel, copper 26.00 per lb. of nickel contained, 8.00 per lb. of copper, only. Converter's premium 2 cents. Quantity extra ½-cent 10,000 lbs. or more.

Basic maximums on stainless (add $10 for briquettes) and nickel steel scrap, f.o.b. point of shipment (brokers allowed 5% commission on stainless before $10 briquetting extra, 2% on nickel steels):

Stainless (16-20% chromium, 7-10% nickel) $90 gross ton for sheets, clippings, solids, $60 for borings and turnings.

Other chromium-nickel stainless grades 28.00c per lb. of nickel and 9.50c per lb. of chromium contained for sheet, clippings, solids. Deduct $30 gross ton for borings and turnings.

Straight chromium-type sheets, clippings, solids $35 gross ton for 12-14% chromium, $40 for 14-18%, $40 plus 9.50c per lb. for each lb. chromium in excess of 18% for grades containing over 18% chromium. Deduct $5 ton for borings and turnings.

Secondary Monel ingots and Monel shot 27.00c per lb., copper-nickel shot 25.50c.

No. 9—Hides, kips and calfskins, effective June 16, 1941; amendments effective Sept. 13, Sept. 18, and Oct. 22, 1941.

No. 10—Pig iron, effective June 24, 1941, freezing prices at levels generally prevailing in second quarter of 1941. Governing basing point prices (gross tons):

No. 2 foundry $25 Bethlehem, Everett, Swedeland, Birdsboro, Sparrows Point; $24 Erie, Neville Island, Sharpsville, Buffalo, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit; $24.50 Duluth; $20.38 Birmingham, $22 Provo.

For basic iron deduct 50 cents from above except Duluth and Provo which are not bases. Birmingham base $19.

Malleable $25.50, Bethlehem, Everett, Swedeland, Birdsboro; $24.50 Erie, Buffalo, Duluth; $24 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Hamilton, Toledo, Youngstown, Detroit.

Bessemer $26 Bethlehem, Everett, Swedeland, Birdsboro; $25 Erie, Buffalo, Duluth, Birmingham; $24.50 Neville Island, Sharpsville, Chicago, Granite City, Cleveland, Toledo, Youngstown, Detroit.

Low phos $29.50 Steelton, Birdsboro, Buffalo. High silicon silveries (6.00-6.50% base) $29.50 Jackson County, O., $30.75 Buffalo. Gray forge $23.50 valley or Pittsburgh. Charcoal $28 Lake Superior, high phos. $28.50, Lyles, Tenn., low phos $33 Lyles.

Ceiling prices are aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to place of delivery as customarily computed. Exceptions: Struthers Iron & Steel Co. may charge 50-cent premium, Pittsburgh Coke & Iron Co. at Sharpsville only.

Governing basing point is the one resulting in the lowest delivered price for the consumer.

In the case of exports only, basing point nearest place of production may be used.

Differentials: Silicon 50 cents for each 0.25 points in excess of 1.75-2.25 base. Phosphorous 38 cents for content of 0.70% and over. Manganese 50 cents for each 0.50% over 1.00%.

No. 11—Cotton textiles (grey goods), effective June 28, 1941; amended Aug. 23, 1941.

No. 12—Brass mill scrap ("byproduct of fabrication of materials produced by brass mills") effective July 22, 1941; amended Oct. 3, 1941. Maximum prices cents per lb. f.o.b. point of shipment for heavy scrap, rod ends and turnings, respectively: Copper 10.25, 10.25, 9.50; yellow brass 8.62½, 8.37½, 7.87½; 95% plus commercial bronze 9.50, 9.25, 8.75; 90-95% commercial bronze 9.37½, 9.12½, 8.62½; 80% min. red brass 9.12½, 8.87½, 8.37½; 71-80% best qual. brass 8.75, 8.50, (no turn., price); 5% nickel silver 9.25, 9.00, 4.62½; 10% ni. sil. 10.12½, 9.87½, 5.12½; 15% ni. sil. 10.87½, 10.62½, 5.12½. Above prices for less than 15,000 lbs. any kind or grade; add ⅝ cent for 15,000-40,000 lbs. shipped at one time, 1 cent 40,000 or more.

No. 13—Douglas fir plywood, effective May 1, 1941; amended Sept. 24, 1941

No. 14—Raw silk, issued Aug. 2, 1941 fixing prices at levels prevailing July 21, 1941.

No. 15—Copper, effective Aug. 12, 1941; amended Aug. 28, 1941. Maximum base prices for electrolytic, lake or other fire refined copper in wire bars or ingot bars made to meet ASTM specification B5-27 for electrolytic and B4-27 for lake 12.00c lb. delivered in carlots Connecticut valley. Casting copper in wire bars or ingot bars fire refined to 99.5% purity, including silver as copper, 11.75c lb., f.o.b. refinery in carlots.

Apply usual delivery differentials for other points. Add ½-cent on l.c.l. lots purchased from producers. Prices are gross before deduction of discounts and include commissions.

For other kinds, grades, shapes, forms apply customary premiums or discounts in effect Aug. 11, 1941. Other than producers (dealers) may charge following premiums: 0-499 lbs. 2c; 500-999 1½c; 1000-4999 1c and 5000 to carload ¾c.

No. 16—Raw sugar, effective Aug. 14, 1941; supplement issued Sept. 19, 1941. Maximum 3.50c lb., duty pd. del. New York.

No. 17—Pig tin, effective Aug. 16, 1941; amended Sept. 19, 1941. Prices ex New York dock or warehouse for foreign tin, ex producers plant for domestic. Grade A 99.80% or higher 52.00c lots of 5 tons or more (includes Straits, Banka, Billiton, Katanga, Chempur, Hawthorne refined, Mellanear guaranteed, Lempriere, Pyrmont, Regis, Vulcan Electrolytic, Metal and Thermit refined, No. 1 and electrolytic). Grade B 99.75-99% pure inclusive and 99.80% or higher not meeting grade A specifications 51.62½c.

Grade C cornish refined (99.808%) 51.62½c. Grade D 99.00-99.74% pure, inclusive, 51.12½c (includes Chinese, YTC and PKMA brands, English Mellanear L & F brand).

Grade E below 99% 51.00c for tin content. For 2240-11,199 lbs. incl., add 1c; 1000-2239 incl. 1½c; 500-999 incl. 2½c; under 500 lbs. 3c.

No. 18—Burlap, effective Aug. 16, 1941.

No. 19—Southern pine lumber, issued Aug. 16, 1941, effective Sept. 5, 1941; amended Sept. 5, 1941.

No. 20—Copper scrap, effective Aug. 19, 1941; amended Oct. 17, 1941. Maximum prices in cents per lb. on other than material of brass mill origin (see No. 12) f.o.b. point of shipment, applying to any sale: No. 1 heavy copper and wire 10.00; No. 2 and mixed heavy copper containing 96% copper 9.00; light copper containing 92% copper 8.00. For each percentage point variation in copper content add or subtract 0.11775 cent.

No. 1 copper in crucible shape takes 1¼-cent premium. Premium on shipments of 40,000 lbs. or more at one time (incl. by truck within 48 hours.) ½-cent. OPA may grant on application special premium on "special purpose" scrap such as for steel mill and iron foundry use.

No. 21—Formaldehyde, effective Aug. 20, 1941. F.o.b. shipping point prices, cents per lb., carload lots, in tank cars 4.25, in drums 5.40.

No. 22—Pennsylvania grade crude oil, effective Aug. 23, 1941. Pennsylvania Bradford crude per barrel $2.75; Southwest Pennsylvania crude $2.40; Eureka $2.34; Southeastern Ohio $2.30; Oil City-Titusville, group A $2.68.

No. 23—Rayon grey goods, issued Aug. 24, 1941.

No. 24—Washed cattle tail and winter hog hair, issued Aug. 16, 1941.

No. 25—Fats and oils and their products, effective Aug. 29, 1941; amended Sept. 11, 1941.

No. 26—Douglas fir lumber, effective Oct. 1, 1941. Amended Nov. 10, 1941.

No. 27—Anthracite coal, effective Sept. 12, 1941; revoked Sept. 18, 1941.

No. 28—Ethyl alcohol, effective Sept. 15, 1941. CD12, CD13, CD14 (188-192) 32.50c per gallon f.o.b. shipping point in tank cars; in drums, carloads, add 7c per gallon, 19 drums add 9½c, 1-18 drums add 12½c.

No. 29—By-product blast furnace and foundry coke, issued Sept. 19, 1941, effective Oct. 1, 1941. By-product foundry coke f.o.b. cars at ovens: Alabama $8.50; Chicago $11.50; Ashland, Ky., Ironton, O., Portsmouth, O., Fairmont, W. Va. $10, Detroit, Buffalo, Erie, Pa., Philadelphia $11.75; Kearny, N. J. $12; Painesville, O. $11.25; Chattanooga, $9; Milwaukee $12.25. Delivered prices: Chicago, Detroit, Erie $12.25; St. Louis and East St. Louis $12.02; Indianapolis, Terre Haute $12; Buffalo $12.50; Cincinnati $11.75; Cleveland $12.30; Philadelphia $12.38; St. Paul, Minn. $14; New England states $13.75 less 15 cents for cash ten days.

By-product blast furnace coke: 75 cents net ton above weighted average f.o.b. oven price in first quarter 1941. Does not apply to sales or shipments at less than $6 f.o.b. after Sept. 18, 1941.

No. 30—Waste paper sold east of the Rocky Mountains, effective Oct. 1, 1941. No. 1 mixed $13 net ton, f.o.b. point of shipment.

No. 31—Acetic acid, effective Sept. 29, 1941. Prices 7.25c per lb. for glacial acid of wood origin, 6.25c for synthetic, in tank cars delivered.

No. 32—Paper Board sold east of Rocky Mountains, effective Oct. 1, 1941. Maximum delivered prices per net ton: Single Manila Lined board $60, chipboard $45, white patent coated news board $75.

No. 33—Carded cotton yarns, effective Oct. 6, 1941. Prices keyed to spot market for raw cotton.

No. 34—Wood alcohol, effective Oct. 10, 1941. Denaturing grade, pure methyl, 95% methyl and 97% methyl alcohol in tank cars 60.00c per gal. East of Mississippi River, 63.00c West. Add 6c per gal. for carloads in drums or other containers.

No. 35—Carded gray and colored yarn cotton goods, effective Oct. 21, 1941. Prices automatically adjusted to price of spot, raw cotton.

No. 36—Acetone, effective Oct. 27, 1941. Maximum prices cents per lb. delivered in Eastern territory, (add ½-cent for Western territory): 7.00 in tank cars, 8.50 carloads in drums, 9.00 less-carloads in drums. Eastern territory includes New Mexico, Colorado, Wyoming, Montana and states east thereof.

No. 37—Normal Butyl Alcohol (butanol), effective Oct. 27, 1941. Maximum prices cents per lb. delivered in Eastern territory (add ½-cent for Western territory): 10.75 in tank cars, 11.75 carloads in drums, 12.25 less-carloads in drums. Territories same as in No. 36.

FINANCIAL

Iron and Steel Group's Rate Of Return Is Fifth Lowest

■ ANNUAL rate of return on net worth earned by 31 companies grouped as "iron and steel" in the first nine months of 1941 was 9.7 per cent, fifth lowest in 17 industrial classes, according to the National City Bank of New York. In the period last year the same group showed a rate of 7.5 per cent, third lowest. Not only producers, but fabricators and manufacturing concerns were included in the division.

Net profits of the companies used in the tabulation were compiled as reported after depreciation, interest, taxes and other charges and reserves but before dividends. Net worth included the book value of outstanding common and preferred stocks, and surplus account at the beginning of each year.

STEEL's tabulation of the net income of 18 major steel producers, representing more than 83 per cent of the industry's ingot capacity, showed their profit for the nine months was at an annual rate of 7.6 per cent on their combined capitalization. (STEEL, Nov. 3, p. 34). In this case, combined capitalization represented total value of outstanding preferred and common stocks, surplus account and funded indebtedness, all as of Dec. 31, 1940.

Highest rate of return in the nine months among the 17 industrial groups compiled by the bank was that of the automobile industry, 19.4 per cent. Automobile equipment manufacturers had a combined earning rate of 19 per cent, machinery builders 18 per cent, and office equipment fabricators 16.2 per cent.

Average Return 12.5 Per Cent

Average return for 295 manufacturing companies comprising the 17 industrial divisions was 12.5 per cent, compared with 10.2 per cent in the corresponding period in 1940. For 350 companies, representing a cross section of industry, the rate was 12.3 per cent, against 9.9 per cent in the first three quarters last year.

Federal income and excess profits taxes of 140 companies giving tax details for the nine months more than trebled compared with the period last year, taking 83 per cent of the increase in net income and cutting net gains over the year from 91 to 22 per cent.

The federal income and excess profits taxes not only took the major share of the increment in net income of the 140 companies in 1941, but also exceeded total net profits available to the credit of stockholders. These taxes alone, in the period, were equal to $1.21 for every $1 of net profit remaining after taxes.

Following is a summary of the bank's tabulation of profits in the first nine months:

No.	Industrial Groups	Annual Rate of Return % 1940	1941	Per Cent Change†
8	Baking	7.5	6.9	— 7.7
21	Other food and beverage	12.7	15.1	+21.5
12	Textiles and apparel	10.8	11.6	+11.0
12	Paper products	9.1	9.5	+ 8.5
28	Chemicals, drugs, etc.	14.8	15.5	+ 8.9
18	Petroleum products	7.1	9.2	+29.3
16	Stone, clay and glass	10.7	11.9	+13.8
31	Iron and steel	7.5	9.7	+31.8
9	Building equipment	8.2	10.3	+21.6
14	Electrical equipment	13.0	14.3	+13.0
24	Machinery	13.4	18.0	+43.8
5	Office equipment	11.4	16.2	+45.1
9	Automobiles	15.1	19.4	+31.9
20	Auto equipment	16.0	19.0	+28.0
10	Railway equipment	6.5	9.0	+42.6
35	Metal products—misc.	7.7	12.0	+57.9
23	Misc. manufacturing	7.5	11.6	+58.6
295	Total manufacturing	10.2	12.5	+25.1
10	Coal mining	1.0	3.5	+....
9	Metal mining	8.6	10.3	+20.0
11	Mining, quarrying—misc.	15.1	17.4	+13.2
16	Trade (whol. and retail)	5.0	7.6	+55.5
9	Service and construction	6.6	9.5	+46.3
350	Average	9.9	12.3	+25.7

†Increases or decreases of more than 100 per cent not computed.

SEC Issues Reports on Ten Largest Steel Companies

Securities and Exchange Commission, Washington, has issued a booklet containing reports on steel manufacturing companies with assets over $100,000,000 each. The information is said to be based on registration statements and annual reports to the commission.

The volume was produced as a Works Projects Administration project, in a survey of American listed corporations. Its purpose is to make more accessible to the public information in the commission's files, under the policy of the Securities Exchange Act that reliable information concerning listed corporations be made readily available.

Ten steel companies are represented, for which balance sheets in great detail are shown, as of Dec. 31, 1940.

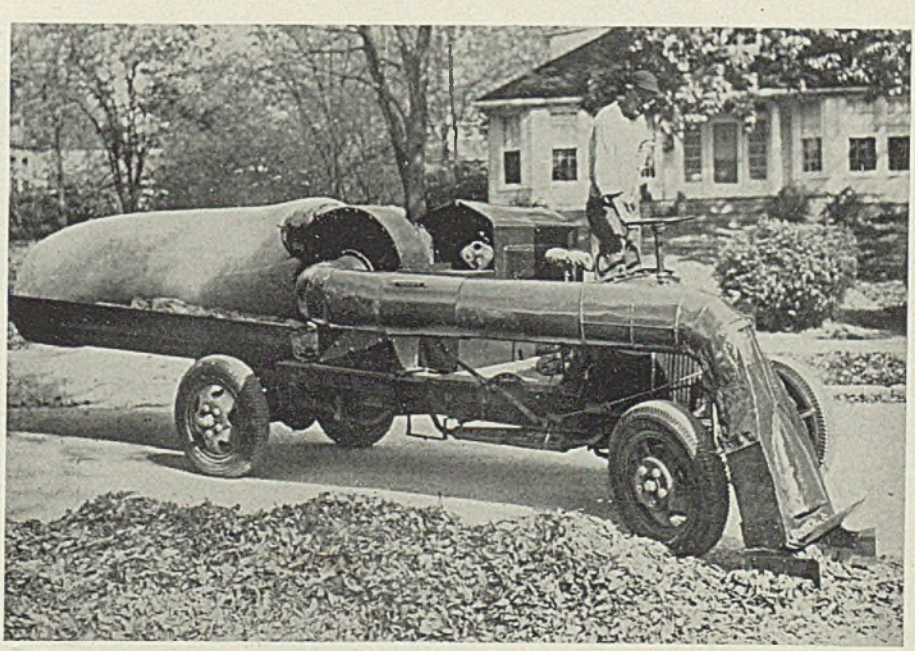
Sales to Army Increase Yellow Truck's Earnings

Effect of booming army truck sales on financial statements is ably pictured in the report of Yellow Truck & Coach Mfg. Co., subsidiary of General Motors:

	Three quarters, 1941	1940
Net sales	$159,707,285	$58,250,701
Net income before taxes	22,639,486	4,598,546
Net income after taxes	6,615,282	3,506,869

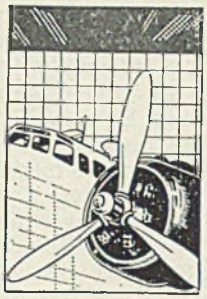
■ Caterpillar Tractor Co., Peoria, Ill., has adopted a five-day office work-week, affecting 1600 employes. Arrangements have been made for Saturday service necessary to avoid hardships or inconvenience to customers, and in all departments a sufficient number of persons will be on duty to meet emergencies.

Leaves Are "Raked" Automatically Now



■ Leaf-gathering is made "speedy and easy" with this device which operates on the principle of the vacuum cleaner. Engineered by the public service inspector of Wyoming, O., the unit is comprised of an old truck chassis, a used motor, a second-hand fan, sheet metal duct, and cloth bag. NEA photo

WING TIPS



Adaptation of British Rolls-Royce airplane engine to American production practice a complicated task, but Packard is on verge of volume output in less than a year. Still needs 11,000 men to staff engine plants fully . . . Plane engines being pushed up steadily in horsepower rating, chiefly by stepping up speed. Higher speeds impose greater loads on crankshafts, bearings and connecting rods; methods worked out to improve these parts . . . Planning 12 1/2-ton flying dreadnaught

■ ROLLS-ROYCE Merlin airplane engine, on which Packard in Detroit is now about 80 per cent tooled, is in its ninth design version since Packard first took the job over. Initially known as the Merlin 20, it is now the Merlin 28. This shows the rapidity of design changes in aircraft work, here being an engine not yet in production which has already had enough changes to require nine separate design numbers.

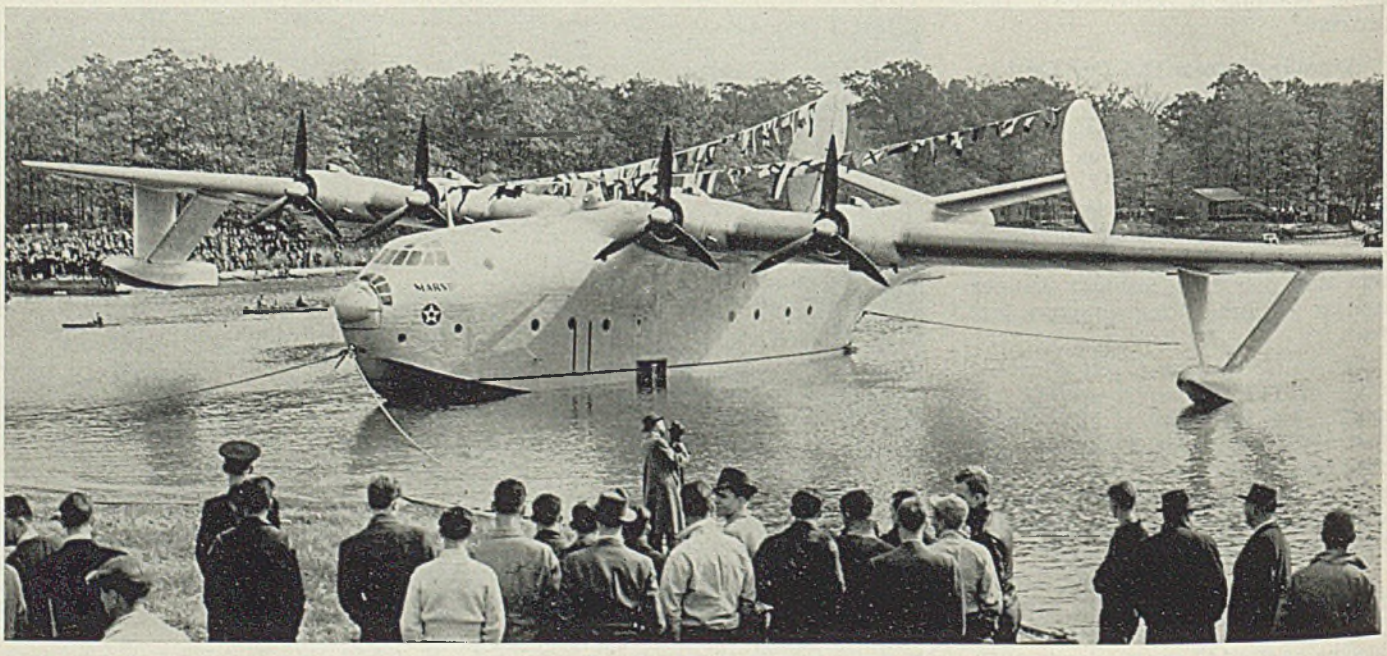
If ever there was a virtual sea of metalworking machinery it is in the Rolls-Royce machining department at Packard where there is crammed $18,000,000 of brand new machine tools, many of them yet to turn over for the first time. All of them are tagged as property of either the British government or the Defense Plant Corp., the apportionment being on the basis of two machines for the British for every one belonging to the U. S. Reason for this is that orders for the engine are in this ratio, and deliveries will be made the same way—two for the British and one for the U. S.

So far there have been shipped only about 40 completed engines, some of which have been installed in the Curtiss P-40-F pursuit ship of the army for flight testing. The engine, according to army engineers who witnessed a recent type test at Wright Field, exceeds all anticipations, and the army has told the Packard management that if it can do anything to expedite production, it will be only too anxious to do so.

It has been no simple job to take this British-designed engine and adapt it to American production and tooling methods. Thousands of hours of work was necessary in converting all specifications to American dimensional terms, and then turning out sample parts practically by hand to determine their suitability.

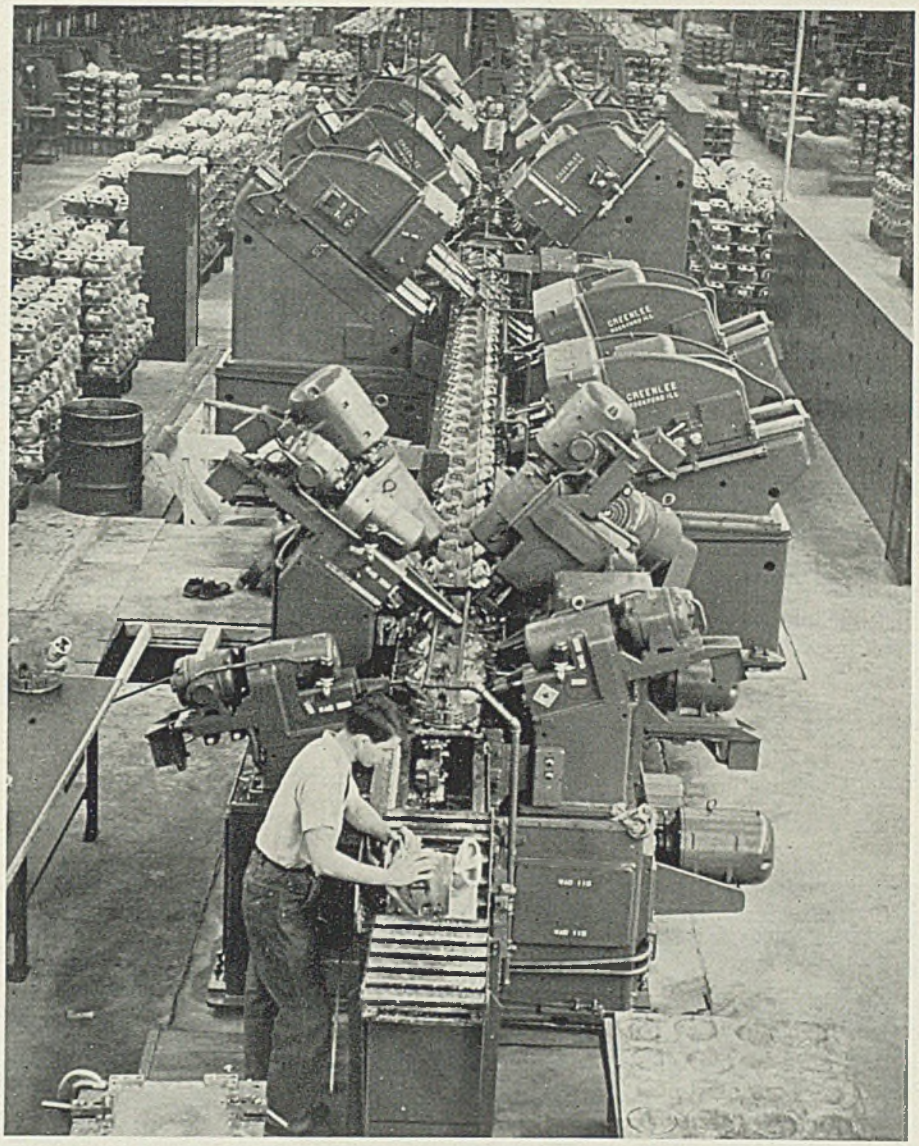
Many complications were stumbled onto. For example, a certain part of the supercharger was made according to British drawings and installed in a test engine. After a short run, the part broke. A check showed all dimensions well within limits on drawings, so the defective part was compared with a similar part produced in Britain. It was found that certain sections had been "beefed up" considerably over what the drawing showed. When questioned, British engineers recalled that instructions had been given to shop men in Britain to leave a little more

Navy Launches New Martin 67-Ton, 4-Engine Aerial "Battleship"



■ Launched recently at the Glenn L. Martin plant, Baltimore, was this aerial "battleship", the Navy's new 67-ton, 4-engine patrol bomber. Capable of carrying a bomb load to Europe and back, nonstop, and christened MARS, the giant $2,500,000 aircraft is reported by Martin to be the world's largest flying boat. NEA photo

■ Remarkable example of successful application of mass production principles to the aircraft engine industry is furnished by this co-ordinated grouping of machining units with built-in conveyor system for transferring cylinder heads from one unit to another. The assembly, which is 154 feet long, handles 72 pieces at one time—progressively drilling, reaming, boring and chamfering; and ejecting a completed part every 48 seconds. This machine was designed and built by Greenlee Bros. & Co. and is shown in operation at the new plant of Wright Aeronautical Corp., Cincinnati



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stock on certain sections of the aluminum forging, but that they had neglected to transfer these oral changes to the drawings. Things like this happened more than once during Packard's program of tooling for production.

Packard now has 6000 men at work in its Rolls-Royce division, most of them concentrated in the machining department, and must hire 11,000 more to attain the production goal of 40 engines a day, not likely to be reached before next summer, if then. These so-called production goals announced on airplanes, engines, propellers and the like, must be taken with several grains of salt. They are purposely set high—often very high—to provide a stimulus to suppliers of parts and equipment, as well as to workmen in the plant. Actually, they may never be reached, but if they serve to speed up deliveries of machinery and subcontracted parts, and to accelerate machine production and assembly operations they have fulfilled a useful purpose. In addition, there is the propaganda effect which such goal figures have on "the enemy." So when Packard gets to 25 or 30 engines a day you can figure the plant is close to hitting on all cylinders.

The race to keep airplane engines in the development stage one step ahead of the production stage is an interesting one. The Allison V-12 engine is a good example. Originally,

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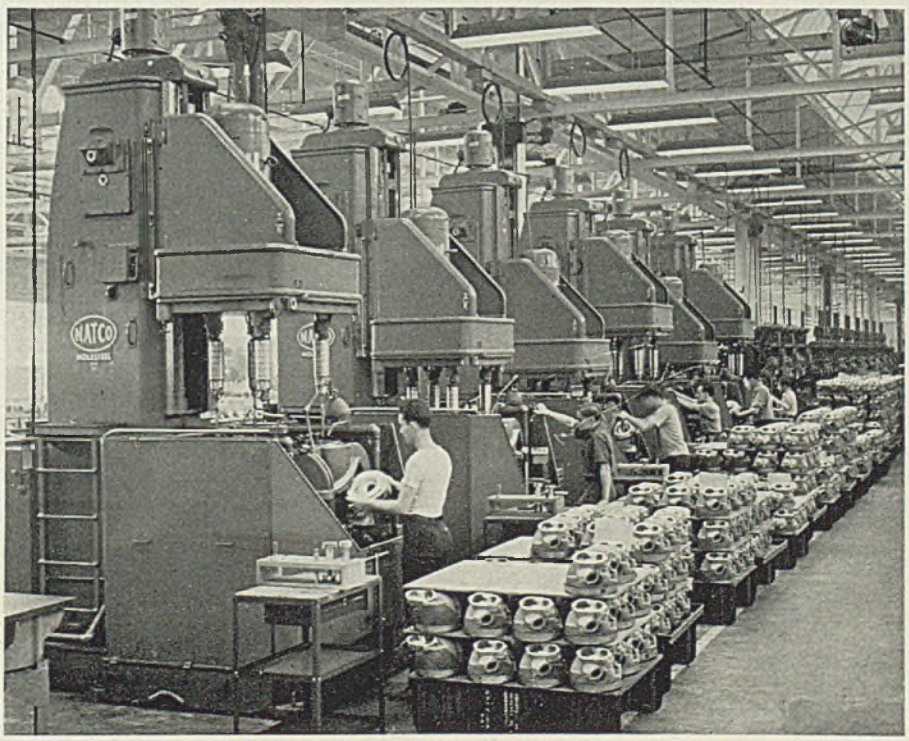
■ Line production, once a doubtful factor in the aircraft engine industry, has been applied to a high degree in the new 33-acre plant of Wright Aeronautical Corp., Cincinnati. Typical of scenes throughout this huge plant—from which engines were being shipped less than eight months after groundbreaking—is this battery of National Automatic Tool Co. multiple spindle drilling machines. These are specially tooled for handling cylinder heads of 1700 horsepower Cyclone engines, indexing fixtures being employed to minimize nonproductive machine time



this engine was designed to provide 700 horsepower. Subsequently, this was stepped up to 1040, then 1150, then to the present rating of 1325. Now it is being type tested at Wright Field on the basis of 1500 horsepower and when this is completed engineers will start shooting at 2000 horsepower. Here is almost a tripling of the original horsepower—and from the same basic engine.

How is it done? Primarily by minor modifications in accessories such as superchargers, and, more important, by gradually stepping up top speed. Thus the 2000-horsepower engine will have displacement very close to that of the original 700-horsepower model, or around 1700 cubic inches; but speed will be increased sharply.

Increases in speed throw extra burdens on moving parts—particularly bearings, crankshafts and connecting rods, so engineers must work out improvements in these parts to accommodate the higher speeds. In the Allison, for example, it was discovered that by shotblasting the crankshaft and connecting rods, strength would be improved to the point where there was an ample factor of safety for higher speed. Then, as speeds continued to go up, it was decided to nitride the crankshaft, which is now being done. Eventually it may prove worthwhile to nitride both shafts and connecting rods for still greater speed-strength.

The crankshaft is S. A. E. 4340 steel, not generally considered a nitriding steel, but it is being nitrided anyway—about 0.050-inch over the entire surface. The treatment is apparently working out so successfully that it is pointing the way to a continuation of the improved rating of the engine.

The matter of engine horsepower in airplanes is at best a touchy subject for discussion. One well-known executive of a leading engine manufacturing company literally tears his hair any time some one starts comparing horsepowers of different engines. He says horsepower is a vastly different thing in a pursuit ship as against a four-motor bomber, and furthermore the horsepower of an engine at 35,000 feet in the air is something else again from horsepower at takeoff.

Favor Guerin Process for Aircraft Stampings

Decision of some of the motor companies—Briggs and Ford, for example—to use standard types of mechanical presses and ferrous dies for production of aircraft stampings is being watched with interest by the established aircraft companies which seem to favor the Guerin process, involving hydraulic presses, metal male dies and a rubber pad for a universal female die. Aircraft builders feel this process, developed by Douglas and licensed to the entire industry, has advantages over mechanical presses and regular types of stamping dies in point of speed, economy and efficiency.

Combination of crude rubber and rubber resin is used in production of a material known as Plioform by Goodyear Tire & Rubber Co. The derivative plastic has been tried experimentally for fuel tanks of planes and combat vehicles, replacing aluminum, and is claimed to have properties of maintaining shape under gun fire and crash impact which make it ideal for use in self-sealing tanks.

At the recent unveiling of Navy's new 140,000-pound flying boat, MARS, or XPB2M-1 as it is known technically, Glenn L. Martin, president of the company which built the craft, said, "This vessel marks the transition from the flying boat to the flying ship. Ships of this type have a definite place in the Navy's scheme of things. But seagoing aircraft of much greater size will be forthcoming soon. As a matter of fact, our company already has plans for a 250,000-pound vessel. Even by multiplying engines of present maximum horsepower we can attain such sizes, but already we know that engine development soon will deliver much more powerful units."

New windowless bomber plant being built at Tulsa, Okla., for operation by Douglas, will have its 320 x 4000-foot area cooled by a York air conditioning system powered by seven huge turbocompressors with cooling capacity equal to the melting of 7000 tons of ice daily.

Work Projects Administration has constructed 222 new landing fields, built more than 500 miles of runways, and erected 886 new airport buildings in the past six years, according to a report issued by Howard O. Hunter, WPA Commissioner. One out of every three WPA workers throughout the country is now engaged in defense work.

Weighing Domestic Transport Planes

■ Twenty men, working a total of 800 hours, were required recently to weigh the Stratoliner "Quintuplets," reported the largest transport planes in domestic airline service.

Two sets of 15,000-pound scales were placed under each wheel. Another special set was suspended from the hangar roof by means of high-speed trolley hoists manufactured by Wright Mfg. Division of American Chain & Cable Co. Inc., York, Pa., and attached to the tail which was lifted to place the ship in flying position. When thus suspended, top of the fin is nearly 30 feet above the floor.

Wingspread of the Stratoliners is 107¼ feet; length from nose to tail, 74 1/3 feet. Empty weight of each plane is approximately 31,200 pounds. Gross weight, including all accessories and passengers, is 45,000 pounds.

Federal regulations specify that each of the planes be weighed once a year to determine its weight "stripped."

Plane, Parts Orders Comprise 80% of $335,133,055 Awards Placed by Army

■ MORE THAN 80 per cent of the $335,133,055 defense awards reported last week by the War Department were for airplanes, subassemblies, accessories and aircraft armament. Huge volume of orders for planes and parts in recent weeks reflects the Army's plans to expand substantially the earlier program for development of the air force.

Contracts placed by branches of the Army other than the Air Corps were mostly small and for widely varying materials. Orders reported by the War Department last week included:

Ordnance Department Awards

Ahlberg Bearing Co., Chicago, ball bearings, $4426.

American Air Filter Co. Inc., Louisville, Ky., dust collecting systems, $4270.

American Broach & Machine Co., Ann Arbor, Mich., special tooling, broaching and gun grooving machines, $152,995.

American Chain & Cable Co. Inc., Andrew C. Campbell Division, Bridgeport, Conn., swaging machines, $2897.

American Locomotive Co., Railway Steel Spring Division, New York, steel springs, $39,069.

Barwood & Co., Philadelphia, gages, $9469.

Bethlehem Steel Co., Bethlehem, Pa., steel, $4000.

Biddle, James G., Co., Philadelphia, testers, $12,798.

Bliss & Laughlin Inc., Buffalo, steel, $12,782.

Boye & Emmes Machine Tool Co., Cincinnati, lathes, $80,887.

Breeze Corps. Inc., Newark, N. J., parts for tanks, $2790.

Budd, E. G., Mfg. Co., Philadelphia, suspension bands, trunnion bands and cluster adapters, $26,177.

Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., tank tracks, $2,246,868.

Cape Ann Tool Co., Pigeon Cove, Mass., steel forgings, $9795.

Carnegie-Illinois Steel Corp., Chicago, plates for tanks, $77,159.

Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, grinders, $58,113.

Clayton Mark & Co., Evanston, Ill., steel tubing, $2883.

Cleveland Twist Drill Co., Cleveland, twist drills, reamers, end mills, tools, $277,603.

Cohn & Rosenberger Co. Inc., Providence, R. I., booster cups, $7797.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., back plate trigger spacers, parts for pistols, machine gun barrels, $51,967.

Columbia Machine Tool Co., Hamilton, O., crank shapers, $12,365.

Cushman Chuck Co., Hartford, Conn., lathe chucks, $5292.

Detroit Broach Co. Inc., Detroit, broach section details, $3081.

Disston, Henry, & Sons Inc., Chicago, files, cutters, $7750.

Eastern Bridge Co., Worcester, Mass., craneways, $4000.

Edgcomb Steel Co., Philadelphia, steel, $14,965.

Ex-Cell-O Corp., Continental Tool Works Division, Detroit, reamers, $29,460.

Federal Screw Works, Detroit, boosters, adapters, $473,000.

Federal Tool Corp., Chicago, gages, $3238.

Ferracute Machine Co., Bridgeton, N. J., bending brakes, $14,465.

General Electric Co., Schenectady, N. Y., spot weld comparers, protective short circuit equipment, $3039.

General Motors Corp., Detroit, guns, $9,489,570.

General Motors Sales Corp., New Departure Division, Bristol, Conn., ball bearings, $4963; Detroit Division, trucks, $1941.

General Time Instrument Corp., Westclox Division, LaSalle, Ill., fuzes, $965,000.

Gibson, G. M., Co., Bellevue, Iowa, drifts and punches, $5893.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., horizontal boring, drilling and milling machines, $75,800.

Greenfield Tap & Die Corp., Greenfield, Mass., taps, dies and diestocks, gages, $19,230.

Grenby Mfg. Co., Plainville, Conn., grinders, $2923.

Guiberson Diesel Engine Co., Chicago, parts for tanks, $85,052.

Hanssen's, Louis, Sons, Davenport, Iowa, wrenches, $4055.

Hodge Boiler Works, Boston, tanks, $4420.

Illinois Tool Works, Chicago, cutters, broaches, $3039.

Indianapolis Machinery & Supply Co., Indianapolis, grinders, $2925.

International General Electric Co. Inc., Schenectady, N. Y., high frequency changers, $3694.

International Harvester Co., Chicago, gun carriages, $2,476,875.

International Nickel Co., New York, copper nickel alloy rods, $10,235.

Jahn, B., Mfg. Co., New Britain, Conn., dies, punches, $6452.

JCH Automatic Machine Works, Philadelphia, inserts for drivers, dies and bushings, $5241.

Jones & Laughlin Steel Corp., Pittsburgh, steel, $2632.

Landis Machine Co., Waynesboro, Pa., tools, $105,171.

Lansdowne Steel & Iron Co., Morton, Pa., forgings, $3135.

Lees-Bradner Co., Cleveland, thread milling machines, $88,200.

Lehigh Foundries Inc., Easton, Pa., ammunition parts, $84,150.

Lewis-Shepard Sales Corp., Watertown, Mass., racks, $10,119.

Lincoln Park Tool & Gage Co., Lincoln Park, Mich., gages, $4407.

Lite Mfg. Co., New York, spare barrel covers, $46,764.

Ludlow Typograph Co., Chicago, typograph machines, $4499.

Lyon Metal Products Inc., Davenport, Iowa, boxes, $2580.

Masterform Tool Co., Chicago, cutting tools, $9799.

Mattatuck Mfg. Co., Waterbury, Conn., screws, $2500.

McArdle & Cooney Inc., Philadelphia, pipe fittings, $3068.

Mergenthaler Linotype Co., Brooklyn, N. Y., telescope mounts, telescopes and parts, $520,456.

Merz Engineering Co., Indianapolis, gages, $12,627.

Michigan Tool Co., Detroit, cutting tools,

Gets Defense Manufacturing "Report" First-Hand

■ First-hand information on defense manufacturing methods was obtained recently by Brig. Gen. Earl McFarland, assistant chief of ordnance, United States Army, during inspection of work at General Electric's Lynn, Mass., works. Accompanying General McFarland were other War Department, Army and OPM officials

$3197.
Miller Printing Machinery Co., Pittsburgh, traverse mechanism assemblies, gun mounts, spare parts, $509,122.
Modern Tool & Die Co., Philadelphia, gages, $16,521.
Monarch Machine Tool Co., Sidney, O., machine tools, $84,189.
Muncie Gear Works, Muncie, Ind., parts and assemblies for gun carriages, $68,000.
National Automatic Tool Co., Richmond, Ind., drilling machines, $60,825.
National Supply Co., Toledo, O., forgings, $16,167.
Niles-Bement-Pond Co., Pratt & Whitney Division, Hartford, Conn., grinders, precision locating and jig boring machines, gages, $58,492.
Nirvana Mfg. Corp., Nirvana, Mich., parts for tanks, $8515.
Norris Iron & Wire Works Inc., Bridgeport, Pa., storage shed, $5595.
O'Brien Machinery Co., Philadelphia, planers, $10,350.
Philadelphia Bronze & Brass Corp., Philadelphia, manganese aluminum bronze castings, manganese bronze bars, $80,310.
Platt Corp., Baltimore, fuze containers, $7276.
Poor & Co., Canton Forge & Axle Works Division, Canton, O., dies and forgings, $8532.
Pressed Steel Car Co. Inc., Pittsburgh, cars for furnaces, shells, $322,345.
Pullman-Standard Car Mfg. Co., Butler, Pa., shells, $945,000.
Reid Bros. Co. Inc., Beverly, Mass., tools, $94,594.
Republic Steel Corp., Cleveland, steel bars, $6309.
Revere Copper & Brass Inc., Rome, N. Y., brass bar and phosphor bronze, lower detonator sockets, $32,423.
Sharon Steel Corp., Sharon, Pa., strip steel, $11,316.
Shuler Axle Co. Inc., Louisville, Ky., steel forgings, $16,534.
Solar-Sturges Mfg. Co., Melrose Park, Ill., bundle packing accessories, $282,476.
Sperry Gyroscope Co., Brooklyn, N. Y., parts and services to modify director, ballistic cams and dials, $9075.
Steel & Wire Products Co., Baltimore, strapping steel, $8270.
Stokes, F. J., Machine Co., Philadelphia, presses, punches and dies, $5880.
Thompson, Henry G., & Son Co., New Haven, Conn., band saws, $5184.
Threadwell Tap & Die Co., Greenfield, Mass., rifling head cutters, $24,000.
Unexcelled Mfg. Co. Inc., New York, ground signals, $177,599.
United Shoe Machinery Corp., Beverly, Mass., forgings, $5508.
Vanhorn Machine Co., Blawnox, Pa., lower detonator sockets, $19,316.
Warnock Mfg. Co., Worcester, Mass., wrenches, $6390.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., charging machines, $20,000.
Westinghouse Electric & Mfg. Co., Sharon, Pa., transformers, $3914; Davenport, Iowa, Division, stabilizer units, $4007.
White Motor Co., Cleveland, parts for scout cars, $5295.
Wollaston Brass & Aluminum Foundry, Quincy, Mass., aluminum bronze castings, $4796.

Air Corps Awards

Air Cruisers Inc., Clifton, N. J., oxygen cylinders, $1,047,592.
Bendix Aviation Corp., Bendix, N. J., tool kits and aircraft instruments, $12,593,503. Eclipse Aviation Division, supercharger regulator assemblies, $2,208,450.
Boeing Aircraft Co., Seattle, parts for aircraft, $189,217.
Candler-Hill Corp., Detroit, fuel pumps, $820,000.
Chandler-Evans Corp., South Meriden, Conn., fuel pumps, $1,320,877.
Crawford Mfg. Co. Inc., Richmond, Va., container assemblies, $139,000.
Douglas Aircraft Co. Inc., Santa Monica, Calif., airplanes and spare parts, $78,264,093.
Edison, Thomas A., Inc., West Orange, N. J., thermometer indicators, $248,040.
Electronic Laboratories Inc., Indianapolis, parts for lighting inverters, $119,989.
General Motors Corp., New York, hardware, $478,774; Allison Division, Indianapolis, aeronautical engines and parts, $124,523,672.
Martin, Glenn L., Co., Baltimore, turret assemblies, $19,007,247.
Kidde, Walter, & Co., New York, fire extinguisher sets, $129,423.
Service Tool & Engineering Co., Dayton, O., aircraft fittings, $219,932.
Sperry Gyroscope Co. Inc., Brooklyn, N. Y., $56,403,980 for gyroscopic instruments. Of this total, $18,869,000 was previously awarded to the company by a letter of intent; remaining $37,534,980 represents a new award; also automatic pilots and maintenance parts, $1,152,022.
Square D Co., Kollsman Instrument Division, Elmhurst, N. Y., pilot tubes, altimeters, tachometer indicators, $2,997,565.
Wright Aeronautical Corp., Paterson, N. J., tools and engines, $418,521.

Chemical Warfare Service Awards

Acklin Stamping Co., Toledo, O., brass eyerings, $48,475.
Doehler Die Casting Co., New York, nozzles, $37,822.
Handy & Harman, New York, brazing alloy, silver alloy, $18,990.
Stanley Works, New Britain, Conn., outlet valve guards, $5430.

Quartermaster Corps Awards

Chrysler Corp. Parts Division, Highland Park, Mich., parts for trucks, $64,202.
Ford Motor Co., Dearborn, Mich., parts for trucks, $98,898.
Mack Mfg. Corp., Plainfield, N. J., parts for trucks, $140,751.
United States Hoffman Machine Corp., New York, washing machines, drying tumblers and extractors, $11,960.
Yellow Truck & Coach Co., General Motors Truck & Coach Division, Pontiac, Mich., parts for trucks, $461,156.

Signal Corps Awards

Alden Products Co., Brockton, Mass., keys, plugs, $9617.
American Automatic Electric Sales Co., Chicago, line and truck distributing frames, motor generator sets, telephones, switchboard equipment, attendants' cabinets, $130,253.
Bell & Howell Co., Chicago, cameras, $19,453.
Bunnell, J. H., & Co., New York, keys, relays, $10,541.
Caterpillar Tractor Co., Peoria, Ill., power units, $11,209.
Connecticut Telephone & Electric Corp., Meriden, Conn., test sets, $14,319.
Crosby Co., Buffalo, reels, $113,698.
Friez, Julien P., & Sons, Baltimore, anemometers, $5635.
General Cable Corp., New York, cable, reels, wire, $62,597.
General Electric Co., Schenectady, N. Y., switchboard lamps, coils, dynamotor units, $10,139.
Graybar Electric Co. Inc., New York, protector blocks, fuzes, wire, cable, reels, braces and pins, switchboards, cases for tuning forks, $687,651.
Greene, Eugene, New York, antenna equipment, $18,861.
Gussack Machined Products Inc., Long Island City, N. Y., mast bases, ratchets, washers, $58,989.
Joslyn Co., New York, brackets and crossarms, screws, rings, $34,497.
Karp Metal Products Co. Inc., Brooklyn, N. Y., cabinet racks, boxes, $4821.
Leich Sales Corp., Chicago, clamps, $4240.
Mitchell Camera Corp., West Hollywood, Calif., cameras, $116,968.
Murdock, William J., Co., Chelsea, Mass., headsets, $27,629.
National Cine Laboratories, New York, tripods, $14,999.
Par-Metal Products Corp., Long Island City, N. Y., cabinet racks, $2577.
Petroff, Peter A., New York, axles, $9396.
Pioneer Gen-E-Motor Corp., Chicago, dynamotor units, $20,939.
Radio Receptor Co., New York, radio equipment, $57,278.
Rauland Corp., Chicago, transmitting equipment, $58,292.
RCA Mfg. Co. Inc., Camden, N. J., amplifiers, sound recorders, microphones, radio equipment, latches, lockscrew and nut assemblies, $240,480.
Silman Mfg. Co. Inc., Pittsburgh, amplifiers, loudspeakers, microphones, shoulder harnesses, tripods, $99,739.
Technical Devices Corp., Bloomfield, N. J., radio equipment, $21,941.
Teletype Corp., Chicago, teletype equipment, $957,178.
Widin Metal Goods Co., Garwood, N. J.,

mast bases, mast sections, insulators, $40,156.

Corps of Engineers Awards

Dutton, C. H., Co., Kalamazoo, Mich., steam pumps, boilers and fittings, $14,152.

Kalamazoo Railway Supply Co., Kalamazoo, Mich., hand cars and push cars, $22,100.

Oliver Iron & Steel Corp., Pittsburgh, track bolts, $30,618.

Government Finances More Plant Expansions

■ More lease agreements, the War Department reported last week, have been completed between Defense Plant Corp. and manufacturers for establishment of new facilities for production of equipment considered essential to the Army. Title to facilities purchased and installed will be retained by the Defense Corp. The agreements, approved by the Office of Production Management:

Aviation Mfg. Corp., Lycoming Division, Williamsport, Pa., $3,714,277 for construction of a plant at or near Williamsport, together with acquisition of additional equipment and machinery for use there and in the company's existing plant for manufacture of aircraft engines.

Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., $405,000 for acquisition and installation of additional plant facilities at its existing factory at West Hartford, for manufacture of machine tools.

Jacobs Aircraft Engine Co., Pottstown, Pa., $13,077,727 for constructing and equipping a plant at or near Pottstown, and for acquiring additional machinery and equipment for use in the existing plant.

General Motors Corp., Fisher Body Division, Memphis, Tenn., $340,520 increase on a prior lease agreement, for acquisition of additional machinery and equipment to be used in the plant at Memphis for manufacture of airplane parts.

Hughes Tool Co., Houston, Tex., $17,760 increase in prior agreement, for acquisition of additional machinery and equipment to be used in the existing factory for fabrication of aircraft parts.

Holley Carburetor Co., Detroit, $98,708 increase in prior agreement for acquisition and installation of additional machinery and equipment to be used in the existing plant for manufacture of carburetors.

Additional Subcontract Opportunities Listed

■ Subcontract opportunities available to qualified manufacturers possessing facilities not currently engaged in defense production and adapted to the work required are regularly published by the various district offices of the Division of Contract Distribution, OPM. Following opportunities were issued last week and have not heretofore been published in STEEL. Further information concerning any item can be secured from the district office which issues the list. In most cases blue prints or actual samples of the desired article may be studied at the office:

Division of Contract Distribution, OPM, Federal Reserve Bank building, Boston, is seeking subcontractors for the following work:

1: Massachusetts manufacturer is seeking subcontractors to handle approximately 50,000 hours of work requiring the use of horizontal and vertical boring mills, universal, internal, surface and centerless grinding, engine lathes and profile milling. Close tolerances required. Also large amount of tools, jigs, and fixtures in connection with this work.

3: Facilities are urgently needed for production work on tools, jigs and fixtures, and small precision gear work. Concerns having facilities should register with this office immediately.

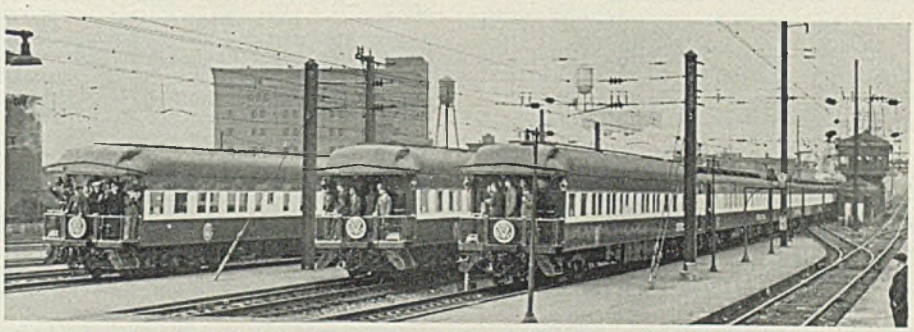
4: Concerns having electric furnace capacity for producing medium size manganese steel castings should contact this office without delay. Heat treating facilities also required. Quantities are large but quotations will be welcomed in any quantity for which capacity is available.

5: Heavy machine shop facilities required to handle Navy requirements for machining of rough cast steel cylinder housings. Work requires use of planer, radial drill and vertical boring mill with 25-inch capacity. Close tolerances. Considerable work for this and similar types is expected to develop on a continuing basis, offering excellent opportunities for concerns qualified to handle. Prints are available at this office.

6: Concerns capable of turning out minimum quantities of 100,000 monthly of 20 mm. and 40 mm. projectiles are urged to advise this office of their interest in this work. Type of equipment essential: Six-spindle automatics, stub lathes for turning, boring and waving, semisensitive drill press, ¼-inch tapper, No. 4 turret lathes, 1¼-inch tapper, presses for locating and seating bands, ⅝-inch tapper, stub lathes to rough and finish band, and incidental equipment. Prints and recommended machine procedure available at this office.

7: Capacity on No. 2 B. and S. automatics, No. 0 G. B. and S. automatics and No. 000 B. and S. millers, or equivalents, to handle a Navy requirement for tracer ignitors.

8: Concerns with engine lathes, swing 18 to 36 inches, and with minimum distance of 18 feet between centers, are urged to report at once. This equipment is required for gun boring using special attachments to be provided. Quantities large, permitting production over extended period.



"Defense Specials" Start 40-Day Tour

■ Carrying samples and exhibits of needed defense equipment and parts, the three "Defense Special" trains shown in the upper picture left Washington Nov. 10 on a 40-day tour of the country. Seventy-nine stops in different regions were scheduled to permit manufacturers, especially the smaller ones, to determine whether they can perform any defense work. Information available to prospective subcontractors includes name and address of the prime contractor, items available for contract, facilities required, material to be worked, tolerances, quantity and rate of production, and other pertinent data. Lower, the interior of one of the coaches, with the articles offered for subcontracting on display. NEA photos

Canada To Expand Antiaircraft Gun Production by 600 Per Cent

TORONTO, ONT.

■ PLANS have been completed to increase by 600 per cent the monthly output in Canada of 3.7-inch antiaircraft guns, it was reported last week by C. D. Howe, minister of munitions and supply. Expenditure of $9,000,000 has been authorized for expansion of production facilities for mobile mountings for this type of ordnance. Construction of the plant is to start immediately.

Canada, according to Mr. Howe, will soon co-operate with Great Britain on production of another antiaircraft gun barrel. Large contracts for barrel forgings and machining have already been placed with two Canadian companies.

Orders placed by the Dominion to date for ships of all kinds total more than $500,000,000, said Mr. Howe. Additional contracts are being negotiated for 55 more corvettes and 25 more minesweepers substantially larger than those formerly built. Sixteen trawlers, to be used for minesweeping during the war and for fishing afterward, have also been ordered.

Including orders now being placed for an additional 50 ships for delivery in 1943, the ultimate cargo vessel construction program envisages building 153 ships at estimated cost of $275,000,000.

Department of Munitions and Supply placed 3528 contracts in the week ended Oct. 28. Total value was $16,210,339, and included orders aggregating $511,326 placed with companies in United States. Awards included:

Shipbuilding: Halifax Shipyards Ltd., Halifax, N. S., $31,775; Lunenburg Foundry Co. Ltd., Lunenburg, N. S., $12,000; St. John Dry Dock & Shipbuilding Co. Ltd., St. John, N. B., $26,000; J. Fred Williamson, St. John, $5218; Robert Mitchell Co. Ltd., Montreal, Que., $45,360; United Steel Corp. Ltd., Toronto, $204,595; Ross & Howard Iron Works Ltd., Vancouver, B. C., $63,320.

Dockyard supplies: Canadian Allis-Chalmers Ltd., Toronto, $5380.

Instruments (technical): Overseas Requisition, London, England, $10,800; Sutton-Horsley Co. Ltd., Toronto, $69,600.

Machinery: W. D. Beath & Son Ltd., Toronto, $10,100; Horton Steel Works Ltd., Toronto, $14,160; Toronto Iron Works Ltd., Toronto, $21,830.

Tools: Stewart-Warner-Alemite Corp. of Canada Ltd., Belleville, Ont., $7452.

Electrical equipment: Overseas Requisition, London, England, $10,000; Peacock Bros. Ltd., LaSalle, Que., $621,250; Canadian Marconi Co., Montreal, $30,679; Haliburton & White Ltd., Montreal, $5265; R. C. A. Victor Co. Ltd., Montreal, $24,276; Hart Battery Co. Ltd., St. Johns, Que., $6961; Dominion Engineering Co. Ltd., Lachine, Que., $45,000; R. C. A. Victor Co. Ltd., Ottawa, Ont., $148,602; Ajax Engineers Ltd., Toronto, $5130; Canadian Laco Lamps Ltd., Toronto, $5307; Canadian Telephones & Supplies Ltd., Toronto, $5238; Canadian Westinghouse Co. Ltd., Hamilton, Ont., $6042; Outboard Marine & Mfg. Co. of Canada Ltd., Peterborough, Ont., $10,969.

Land transport: Eastern Steel Products Ltd., Montreal, $20,000; General Motors Products of Canada Ltd., Oshawa, Ont., $10,832; Massey-Harris Co. Ltd., Toronto, $11,902; Niagara Screens & Machines Ltd., Toronto, $54,257; Eastern Steel Products Ltd., Preston, Ont., $18,900; Brantford Coach & Body Ltd., Brantford, Ont., $175,791; Canadian Top & Body Corp. Ltd., Tilbury, Ont., $104,513; Ford Motor Co. of Canada Ltd., Windsor, Ont., $424,312.

Aircraft: Fairchild Aircraft Ltd., Longueuil, Que., $5248; Canadian Car & Foundry Co. Ltd., Montreal, $14,982; Canadian Vickers Ltd., Montreal, $20,687; Drummond, McCall & Co. Ltd., Montreal, $5212; Lyman Tube & Supply Co. Ltd., Montreal, $23,757; Ottawa Car & Aircraft Ltd., Ottawa, $59,817; DeHavilland Aircraft of Canada Ltd., Toronto, $927,258; Fleet Aircraft Ltd., Ft. Erie, Ont., $115,002; Macdonald Bros. Aircraft Ltd., St. James, Man., $21,912.

Ordnance: Overseas Requisition, London, England, $67,800; Ferranti Electric Ltd., Toronto, $109,325; John Inglis Co. Ltd., Toronto, $31,955; Ford Motor Co. of Canada Ltd., Windsor, $750,000.

Munitions: Canadian Industries Ltd., Montreal, $103,097; Dominion Arsenals, Ottawa, $35,692; Department of Transport, Ottawa, $294,000; Nelson Long & Sons, Ottawa, $8230.

War construction projects: W. C. Brennan Contracting Co., Hamilton, $268,173; M. Sullivan & Son Ltd., Arnprior, Ont., $99,000; E. G. M. Cape & Co. Ltd., Montreal, $1,260,000; A. Janin & Co. Ltd., Montreal, $1,000,000; Collet Freres Ltd., Montreal, $414,000; Marwell Construction Co., Vancouver, $954,268; A. W. Heise Co. Ltd., Saskatoon, Sask., $370,000.

Miscellaneous: Acme Steel Co. of Canada Ltd., Montreal, $5000; Beatty Bros. Ltd., Fergus, Ont., $10,537; Elgee Mfg. Co. Ltd., Toronto, $13,147; LaFrance Fire Engine & Foamite Ltd., Toronto, $67,785; B. Greening Wire Co. Ltd., Hamilton, $6038; Anthes Foundry Ltd., Winnipeg, Man., $5940; Partridge-Halliday Ltd., Winnipeg, $8000; Henry Borger & Son Ltd., Winnipeg, $70,000; N. B. Roantree Co. Ltd., Regina, Sask., $7000; Waterman-Waterbury Co. Ltd., Regina, $82,000; Bennett & White Construction Co. Ltd., Calgary, Alta., $18,000.

Welding Symbolized in South African Stamp

■ Part that arc welding is playing in the war effort of the Union of South Africa has been symbolized by issuance of a special postage stamp, depicting a welder using modern shield electric arc equipment. Photograph, supplied by the Lincoln Electric Co., Cleveland, shows two of the stamps. Stamps are printed both in English, as on the right, and in Afrikaans, as on the left

Protest Lend-Lease Act's Foreign Trade Policies

■ International Trade Committee of the Advertising Club of New York recently adopted a resolution protesting alleged injustices resulting from certain policies of the Lend-Lease Act. The resolution was addressed to Edward R. Stettinius Jr., Lend-Lease administrator, and other government officials.

The committee went on record as "opposing the present action of removing from the authorized business sources through which these (foreign business) transactions are regularly handled and transferring them to an agency established by a foreign government and thereby depriving American firms of their inherent right to do business under their former economic and authorized methods."

Mr. Stettinius acknowledged the resolution and recommended a committee representing the various trades concerned be appointed to meet with him, study the problem and determine what steps should be taken to eliminate any injustice in operations of the Lend-Lease Act.

Building Industry "To Have Active Year in 1942, Despite Limitations"

■ VOLUME of all construction in 1942 may be greater than in any year since 1930, with the exception of 1941, despite difficulties of building in nondefense areas, according to a survey by the OPM Bureau of Research and Statistics.

The construction industry as a whole, therefore, will have a very active year throughout 1942, irrespective of what happens to nondefense construction.

According to the survey, the monthly volume of total construction is expected to be very stable; nondefense construction will be dropping for the first part of the year, but defense construction may be rising.

Not all kinds of construction will enjoy this activity, it was added. Architects in certain areas may run short of work and material yards and laborers may be hard hit.

Present estimates suggest that there may be a drop of 65 per cent in strictly nondefense construction from 1941 to 1942. Including defense housing in the nondefense item, there may still be a drop of 50 per cent. There is, however, no assurance whatever that the critical items will be made available for even this restricted volume of nondefense construction. It is pointed out, therefore, that every effort should be made to make critical materials go as far as possible so that there may be as much building as possible.

The currently scheduled program for the construction part of government-financed industrial facilities is about $2,250,000,000. It was a little over $1,500,000,000 in July and it is anticipated that it may exceed $2,750,000,000 by January, approximately $4,000,000,000 by July of next year and approximately $5,000,000,000 by January, 1943.

These figures are tentative and are guided by the program of the Army and Navy and by events abroad.

Direct military construction program may increase from $3,500,000,000 last July to about $6,500,000,000 next July, and may possibly increase to more than $8,000,000,000 by 1943.

This is based on present estimates for the strengths of the armed forces. Should that program be increased, the program outlined here would have to be changed.

The total defense construction program in July, 1941, was less than $6,000,000,000; by January, 1942, it is expected that the cumulative program will approximate $9,000,000,000; by July of 1942 it may reach $12,000,000,000 and in 1943 it may reach $15,000,000,000.

$8,000,000,000 in Defense Building Started or Scheduled

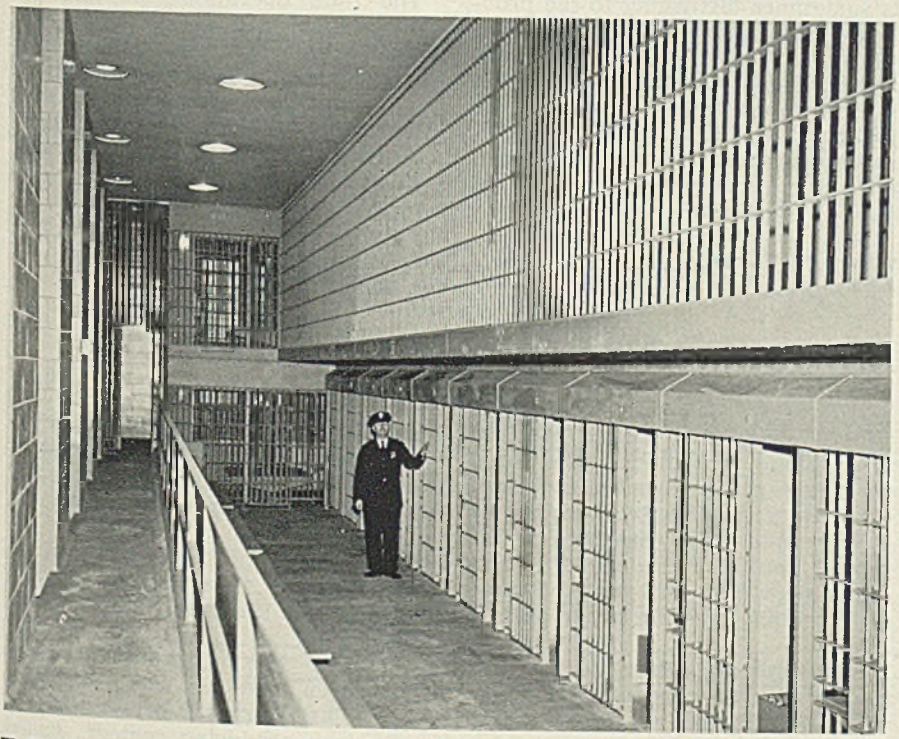
Value of defense construction, completed in progress and scheduled, amounted to $7,958,203,000 on Oct. 1, according to the OPM Bureau of Research and Statistics.

Construction valued at $3,647,426,000 was in place. This included completed and semicompleted projects, and represented 46 per cent of the defense construction program to date, 54 per cent of scheduled construction remaining to be completed or undertaken. Of the work in place on Oct. 1, $439,167,000 or 6 per cent of the total program was erected in September.

The military program involved construction valued at $4,649,793,000, of which $2,065,421,000, or 44 per cent, was in place on Oct. 1. During September $214,744,000 of the work, or 5 per cent, was put in place.

The nonmilitary defense construction program came to $3,308,410,000 of which $1,582,005,000 or 48 per cent, was in place. September construction was valued at $224,423,000.

These Puzzling Steel Bars Make a Prison



■ Steel bars believed to be file-and-saw proof are installed in New York's new city prison, as shown in the illustration. What appears to be a bar is actually a tube. Encased in the tube is a bar, which is free to revolve. When the would-be jail breaker cuts through the tube his file or saw encounters the bar, and the rest is just futile fiddling, for there is no way for him to grip the bar while he attempts to cut through it.

In the prison are seven floors, with 124 cells on a floor. One master control in the form of a long lever, on each floor, operates the mechanism that opens or closes all cell doors on the floor. Each cell is equipped with steel bed spring, sink, running water, toilet, table and seat. Wide World photo.

World Tin Output Lower in September

■ September world tin production was 19,400 gross tons, compared with 21,800 tons in September, 1940, according to the Tin Research Institute, Greenford, Middlesex, England. Nine months' production this year was 185,900 tons, against 165,400 tons in the first nine months, 1940.

United States deliveries in September were 12,715 tons, compared with 13,625 tons in August. For the first nine months they were 119,287 tons, against 81,814 tons in the comparable period in 1940. Consumption of tin in the United Kingdom in August was 2079 tons, compared with 2418 tons in July and 2322 tons in August, 1940.

Annual Steel Capacity and Additions Under Expansion Program

BLAST FURNACES, OPEN HEARTH, BESSEMER AND ELECTRIC FURNACES—and ADDITIONS MADE UNDER STEEL EXPANSION PROGRAM

	Blast Furnaces			Open Hearth Furnaces			Bessemer (Ingots)			Electric Furnaces		
	No.	Capacity	Average	No.	Capacity	Average	No.	Capacity	Average	No.	Capacity	Average
Capacity as of 6/30/41	213	56,838,310	266,846	960	76,079,130	79,249	35	6,793,400	194,097	176	3,272,370	18,593
Approved up to 11/5/41	16	6,319,000	394,940	34	4,139,300	121,744	..	.....	.....	21	1,109,400	52,826
Total	229	63,157,310	275,796	994	80,218,430	80,702	35	6,793,400	194,097	197	4,381,770	22,242
Company Financed ..	...	441,000	.....	5	430,000	86,000	..	.....	.....	4	116,000	29,000
Tentatively Approved ..	...	538,000	.....	7	1,053,000	150,430	..	.....	.....	4	180,000	45,000
Total	229	64,136,310	280,071	1006	81,701,430	81,214	35	6,793,400	194,097	205	4,677,770	22,818
Under Consideration .	7	2,374,000	339,157	4	600,000	150,000	..	.....	.....	...	.....	.....
Grand Total ...	236	66,510,310	281,993	1010	82,301,430	81,486	35	6,793,400	194,097	205	4,677,770	22,818

SUMMARY

	Blast Furnace	Open Hearth	Bessemer	Electric	Total Ingots
Total Operating 6/30/41	56,838,310	76,079,130	6,793,400	3,272,370	86,144,900
Total Approved to 11/5/41	6,319,000	4,139,300	.....	1,109,400	5,248,700
Total Company Financed	441,000	430,000	.....	116,000	546,000
Total Tentatively Approved	538,000	1,053,000	.....	180,000	1,233,000
Total Under Consideration	2,374,000	600,000	.....	.....	600,000
Grand Total	66,510,310	82,301,430	6,793,400	4,677,770	93,772,600

Notes: (1) Additional blast furnace capacity will also be obtained by air conditioning existing blast furnaces, enlargements, beneficiating iron ores, etc.
(2) The above figures represent capacities only and as 16 of the blast furnaces which have been approved will not come into production until late in 1943 the figures do not represent actual production for 1943. Blast furnaces producing ferroalloys are not included.
(3) In addition to above, a total of 5 bessemer converters have been added for the production of approximately 2,612,000 tons of synthetic scrap.

November 10, 1941

Office of Production Management, Plant Expansion Unit

Steel Leaders Pledge All-Out Co-operation

(*Concluded from Page* 35)

ees' attention to the fact that the industry is now faced with a shortage of many of the alloys used in the past. Nickel, he said, for instance, will not be available in sufficient amount to make the armor plate, stainless, and other nickel steels which the defense program calls for in 1942, if used or specified in the quantities now anticipated.

M. Brace, of the Iron and Steel Branch of OPM, talked on alloy and tool steels. He told the conference that in 1929 alloy steel production was 4,432,000 net tons of a total of 63,000,000 net tons, or 7 per cent. In 1940 he said it was 4,965,000 tons of a total of 67,000,000 tons, or 7½ per cent and this year it will be about 9,000,000 tons out of 82,000,000 tons, or 11 per cent. He said that the desired requirements next year are estimated at 12,000,000 tons and that, he said, includes a smaller allowance for civilian use than this year, not just smaller percentage-wise, but in total tons.

Mr. Brace said that alloy steel production is more complicated than the majority of tonnage steels. Many plant bottlenecks will have to be expanded with additional equipment to take care of volume alloy steel specifications. Some expansions, he said, may probably be avoided by getting around restricted facilities with changes in specifications, or methods of manufacturing the item, so careful study has to be given these problems.

One feature under their control, Mr. Brace told the steel men, which is sometimes disturbing to the problem of getting best results is the profit motive. Naturally this cannot be forgotten, but the question is how much influence shall it be permitted to exert. Some specifications, he said, are bound to be more attractive and more profitable than others. Some plants and branches of the industry are not going to be able to operate at a satisfactory rate, while others are overloaded. The total operations, he told the conference, will unquestionably be very satisfactory and total profits, after taxes, will certainly depend on many more important factors than whether the price on one specification is more satisfactory than on another.

Flow Chart of Steel Capacity and Materials Needs, to End of 1943

OPM chart, on opposite page, of steelmaking represents the total existing capacity, plus the increased capacity privately financed by industry, and that specifically approved for financing by the government, which will not be completely built until the latter part of 1943.

It is estimated that during 1942, the actual production of steel ingots will be 83,000,000 net tons, and in 1943—86,000,000 net tons.

This estimated low rate of actual ingot "production" compared with ingot "production capacity" is due to the deficiency of purchased scrap available, combined with the fact that 18 to 22 months are required to build blast furnaces.

If ingots, in excess of the present steel ingot capacity of 92,988,000 net tons, are to be made available in 1944, the construction of the necessary blast furnaces to make up the scrap shortage must be started soon.

Pig iron must be substituted for scrap in making steel during the next two years.

The only other possibilities of increasing the present ingot production during 1942 and 1943 are being developed:

1—Dry blast installations have been, and are being made on blast furnaces in the major iron producing centers, where there are varying climatic conditions;

2—Furnaces now not operating will be brought in as quickly as possible.

Additional ore boats on the Great Lakes must be obtained.

Provision has been made for the coke and fluxes required to meet the contemplated increase in ingot production.

Steel Industry Productive Capacities, and Raw Material Requirements

IRON ORE

LAKE SUPERIOR ORE

Present United States	89,500,000
Canadian Ships	3,000,000
Company Financed (5 Ships)	2,500,000
Govt. Financed (25 Ships)	10,000,000
Total	105,000,000

EASTERN & FOREIGN ORES

Present 6,200,000

PACIFIC ORES

Present	1,400,000
Govt. Financed	2,600,000
Total	4,000,000

SOUTHERN ORE

Present	9,300,000
Govt. Financed	900,000
Total	10,200,000

TOTAL IRON ORE CAPACITY

Present	109,400,000
Company Financed	2,500,000
Govt. Financed	13,500,000
Total	125,400,000

Blast Furnace Ore	116,200,000
Open Hearth Ore	9,200,000
Total	125,400,000

COKE

CAPTIVE BY PRODUCT OVENS

Present	48,131,000
Company Financed	2,013,000
Govt. Financed	4,559,000
Total	54,703,000

BEE HIVE OVENS

Present 7,300,000

Based on present production rate

MERCHANT BY PRODUCT OVENS

Total capacity 15,852,000

Present production rate of Furnace Coke 2,550,000

TOTAL COKE CAPACITY

Present	57,981,000
Company Financed	2,013,000
Govt. Financed	4,559,000
Total	64,553,000

PIG IRON

Ore required at Total Full production

116,000,000

Coke required at Total Full Production

60,700,000

Flux Stone required at Total Full Production

24,300,000

TOTAL PIG IRON CAPACITY

Present	56,937,000
Company Financed	3,501,000
Govt. Financed	6,980,000
Total	67,418,000

Total	67,418,000
For Merchant Iron	9,000,000
Availabe for Steel	58,418,000

STEEL (INGOTS & CASTINGS)

Pig Iron available at Total Full Production

58,418,000

Iron Ore required at Total Full Production

9,250,000

Fluxes required at Total Full Production

7,500,000

Recirculating Scrap available at Total Full Production

25,570,000

Purchased Scrap Required

15,447,000

TOTAL STEEL CAPACITY

OPEN HEARTH

Present	76,079,000
Company Financed	2,586,000
Govt. Financed	3,403,000
Total	82,068,000

BESSEMER

Present	6,793,000
Company Financed	-
Govt. Financed	-
Total	6,793,000

ELECTRIC

Present	3,276,000
Company Financed	222,000
Govt. Financed	629,000
Total	4,127,000

TOTAL

Present	86,148,000
Company Financed	2,808,000
Govt. Financed	4,032,000
Total	92,988,000

70% of 92,988,000 Net Tons Steel will make:

Rolled Steel and other Finished Products	65,100,000
Recirculating Steel Plant Scrap	25,570,000

STEEL

Let Those Who Know Do the Job

■ ONE reason why the defense program is not "clicking" is that the individuals in government and in industry who know how to do things effectively are compelled to work through too many intermediaries.

Every able man in Washington and every capable executive in the nation's workshops is slowed down and annoyed to distraction by the necessity of explaining what he wants to do or is going to do to a host of useless "go-betweens."

Defense could be speeded up appreciably if thousands of these good-intentioned but hopelessly futile individuals could be removed to jobs suited to their talents.

♦ ♦ ♦

Not long ago this writer went through a picket line to ascertain the facts regarding a certain strike. Every bit of information pertaining to it was offered for examination, including the union's demands, the company's counter proposals, all correspondence with Washington, transcripts of conferences between the company and the union's business agent and employes' committees, etc.

From this bulky file of information it was clearly evident that the strike was being prolonged by the confusion arising from too much duplication of mediation service. It is quite probable that left to themselves the two principals—the president of the company on one side and the business agent and his committee on the other side—could have agreed easily.

Unfortunately, before they reached an accord the mediators, conciliators, etc. began to arrive. Every time a new intermediary appeared on the scene, the principals had to break off their negotiations and explain the case to the new arrival.

In this instance, the well-intentioned outsiders were unable to contribute anything worthwhile to the negotiations. There were so many of them that they got in each other's way.

♦ ♦ ♦

Consider the set-up on production, priorities, allocation, etc. Today it consists of such an intricate array of offices, divisions, sections, authorities, co-ordinators, etc. that even the best informed defense officials in Washington cannot explain satisfactorily where the jurisdiction of one ends and that of another begins.

This crazy-quilt organization is heavily loaded with consultants, advisors, lawyers, statisticians, economists and experts of all kinds. Whenever a high official in the army, navy, lease-lend or national defense division seeks contact with the responsible heads of an industry, he seldom can communicate directly. The orders have to go through the time-consuming and fact-distorting sieve of intermediaries.

How silly this is, in comparison with the procedure employed in the first World war!

Then, Mr. Baruch was the sole head of everything that now is included under a dozen or more alphabetical agencies. He wanted an organization to help mobilize the steel industry. He called on Judge E. H. Gary. Mr. Gary put it up to the American Iron and Steel Institute. In a few days, committees were appointed. They functioned throughout the emergency —doing a difficult job satisfactorily.

Isn't it time—for the sake of the success of the defense program—that we give the men who know how a clear field in which to function?

E. L. Shaner

EDITOR-IN-CHIEF

Nov. 17, 1941

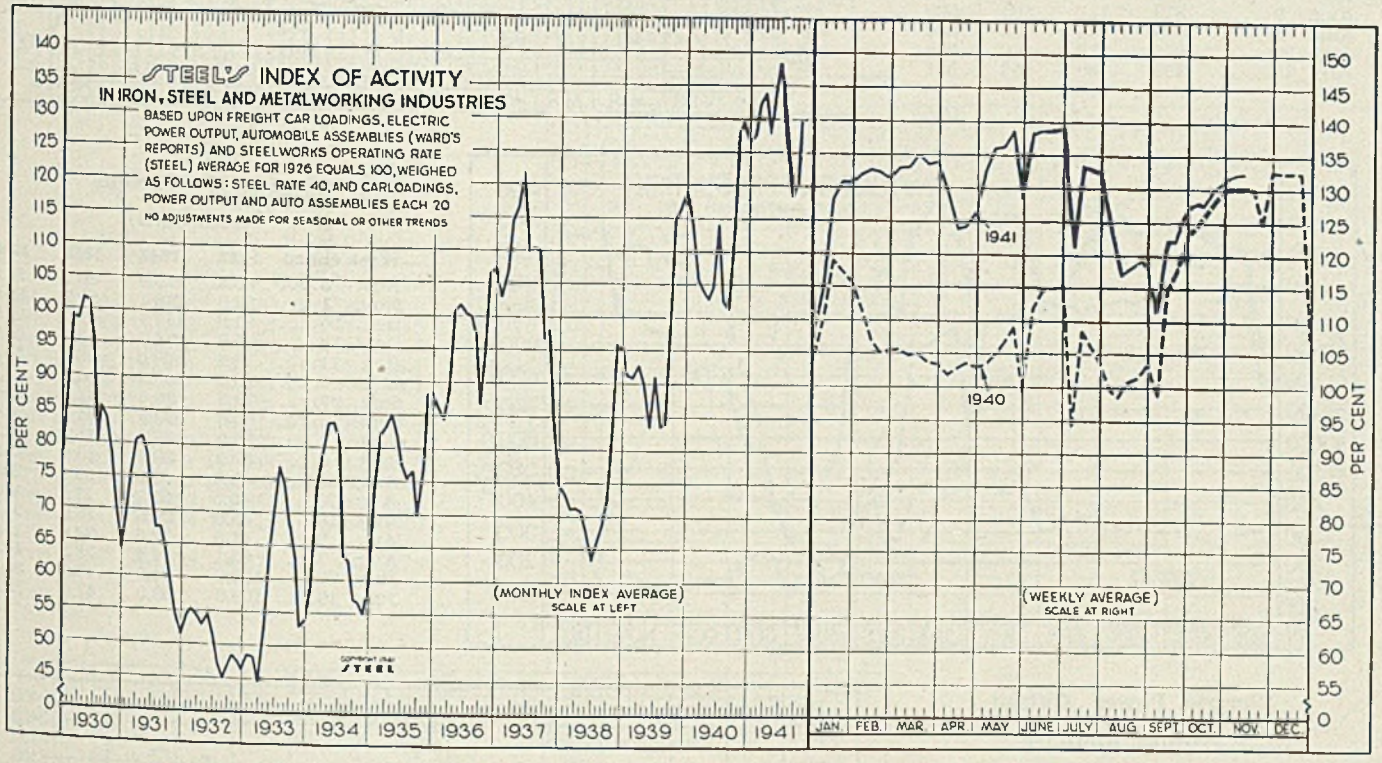
The BUSINESS TREND

Index of Activity Edges Upward

■ INDUSTRIAL activity holds near the record level despite difficulties in obtaining materials. Trend of production for defense continues upward, largely offsetting lower operating schedules in many civilian lines. Defense industries are gradually absorbing the employed from industries unable to obtain priorities. The trend from non-defense to defense output among those who formerly manufactured only consumer goods is developing more rapidly and is expected to be extended throughout the coming months.

STEEL's index of activity in the iron, steel and metalworking industries edged slightly upward during the week ended Nov. 8. For that week the index stood at 132.3, a gain of 0.4 point over the preceding week's figure of 131.9 and compared with 130.3 in the like 1940 week.

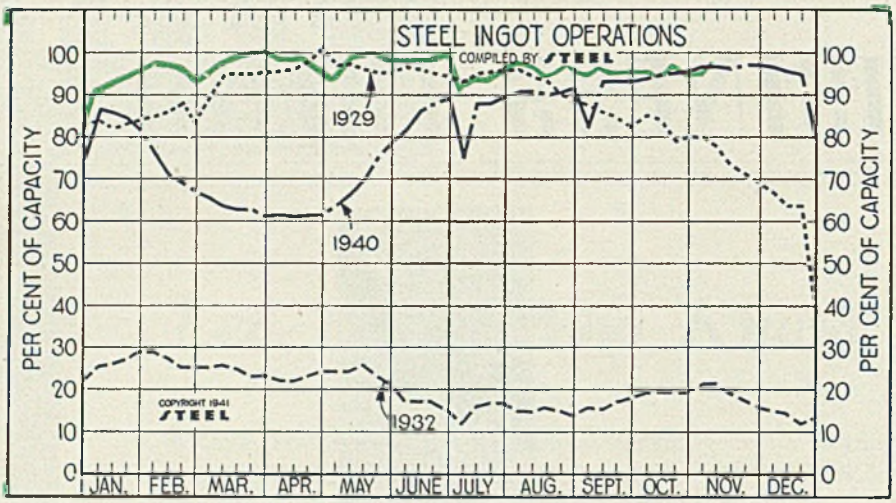
Steelmaking operations advanced 2 points to 97.5 per cent during the week ended Nov. 8. Automobile assemblies totaled 93,585, compared with 92,879 in the preceding week. Electric power output eased to 3,325,574,000 kilowatts, while revenue freight carloadings also declined during the latest period.



STEEL'S index of activity gained 0.4 point to 132.3 in the week ended Nov. 8:

Week Ended	1941	1940
Aug. 23	118.5	101.4
Aug. 30	118.2	103.5
Sept. 6	111.8	98.7
Sept. 13	122.3	114.9
Sept. 20	122.9	124.4
Sept. 27	127.5	122.8
Oct. 4	128.0	124.4
Oct. 11	127.9	126.0
Oct. 18	130.2	128.3
Oct. 25	131.4	129.9
Nov. 1	131.9	130.2
Nov. 8	132.3	130.3

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101 2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95 8
July	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	121.1	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	129.9	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64 3



Steel Ingot Operations

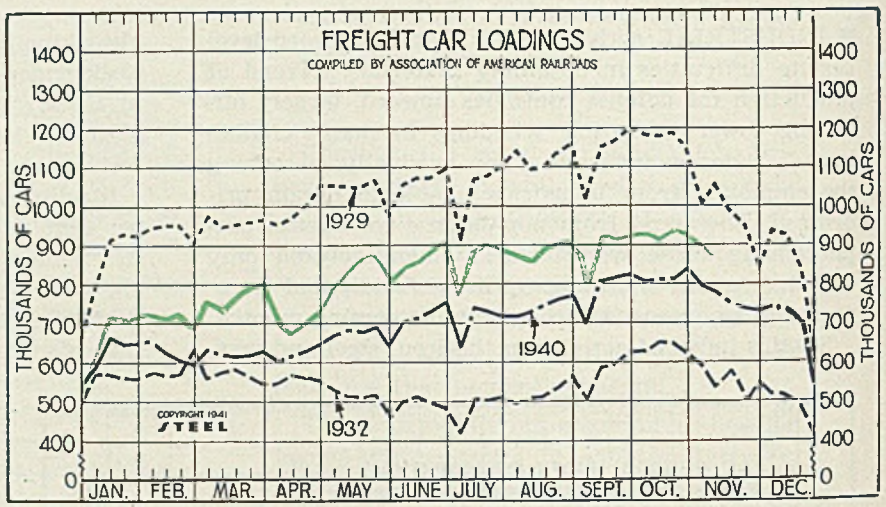
(Per Cent)

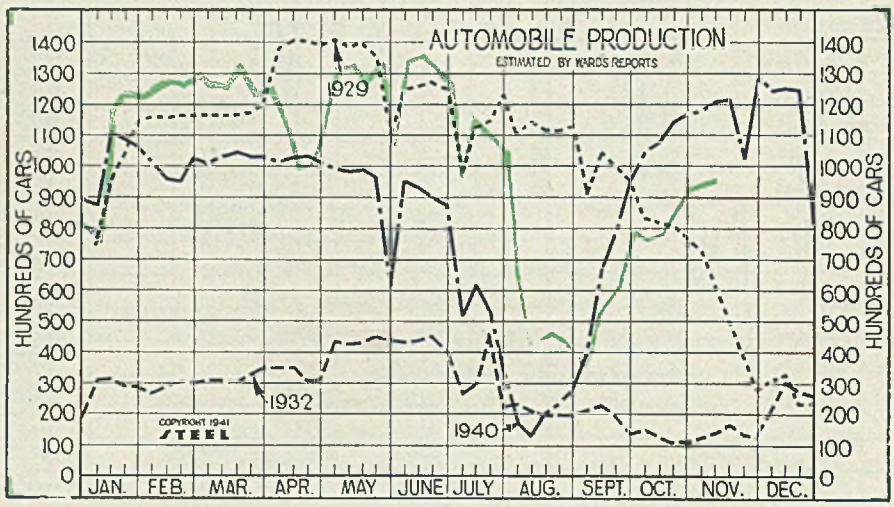
Week ended	1941	1940	1939	1938
Nov. 8....	97.5	96.5	93.0	61.5
Nov. 1....	95.5	96.5	93.0	57.5
Oct. 25....	95.5	95.5	92.0	54.5
Oct. 18....	96.5	95.0	91.0	51.5
Oct. 11....	94.5	94.5	89.5	51.5
Oct. 4....	96.0	93.5	87.5	48.5
Sept. 27....	96.0	93.0	84.0	47.0
Sept. 20....	96.0	93.0	79.5	48.0
Sept. 13....	96.5	93.0	74.0	46.0
Sept. 6....	95.5	82.0	62.0	41.5
Aug. 30....	96.5	91.5	64.0	44.5
Aug. 23....	96.0	90.5	63.5	43.5
Aug. 16....	95.5	90.0	63.5	41.5
Aug. 9....	96.0	90.5	62.0	40.0
Aug. 2....	97.5	90.5	60.0	40.0
July 26....	96.0	89.5	60.0	37.0
July 19....	95.0	88.0	56.5	36.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
Nov. 8.....	874	778	786	637
Nov. 1.....	895	795	806	673
Oct. 25.....	914	838	834	709
Oct. 18.....	923	814	861	706
Oct. 11.....	904	812	845	727
Oct. 4.....	918	806	835	703
Sept. 27.....	920	822	835	698
Sept. 20.....	908	813	815	676
Sept. 13.....	914	804	806	660
Sept. 6.....	798	695	667	569
Aug. 30.....	912	769	722	648
Aug. 23.....	900	761	689	621
Aug. 16.....	890	743	674	598
Aug. 9.....	879	727	665	590
Aug. 2.....	883	718	661	584
July 26.....	897	718	660	589
July 19.....	899	730	656	581





Auto Production

(1000 Units)

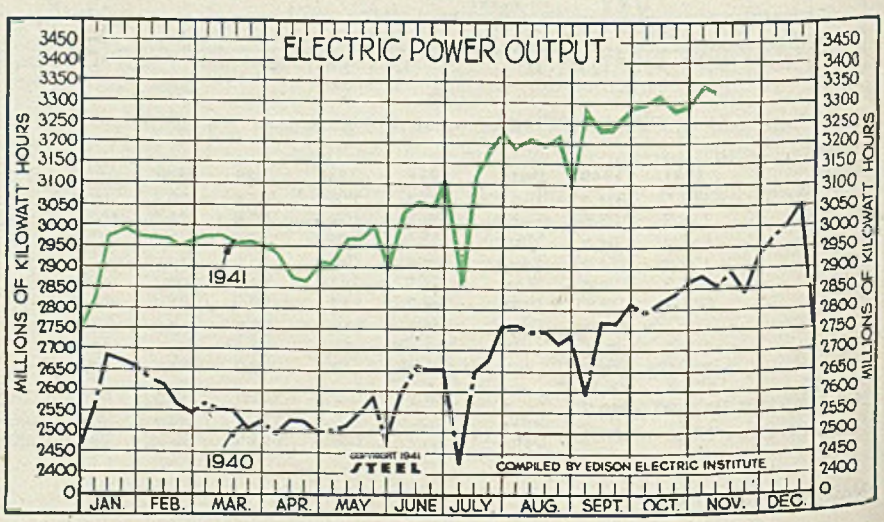
Week ended	1941	1940	1939	1938
Nov. 8....	93.6	120.9	86.2	86.3
Nov. 1....	92.9	118.1	82.7	80.0
Oct. 25....	91.9	117.1	78.2	73.3
Oct. 18....	85.6	114.7	70.1	68.4
Oct. 11....	79.1	108.0	75.9	50 5
Oct. 4....	76.8	105.2	76.1	37.7
Sept. 27....	78.5	96.0	62.8	25.4
Sept. 20....	60.6	78.8	54.0	20.4
Sept. 13....	53.2	66.6	41.2	16.1
Sept. 6....	32.9	39.7	26.9	17.5
Aug. 30....	40.0	27.6	25.2	22.2
Aug. 23....	45.5	23.7	17.5	18.7
Aug. 16....	45.6	20.5	13.0	23.9
Aug. 9....	41.8	12.6	24.9	13.8
Aug. 2....	62.1	17.4	28.3	14.8
July 26....	105.6	34.8	40.6	30.4
July 19....	109.9	53.0	47.4	32.1

Electric Power Output †

(Million KWH)

Week ended	1941	1940	1939	1938
Nov. 8.....	3,339	2,858	2,589	2,277
Nov. 1.....	3,339	2,882	2,609	2,271
Oct. 25.....	3,299	2,867	2,622	2,284
Oct. 18.....	3,273	2,838	2,576	2,281
Oct. 11.....	3,315	2,817	2,584	2,251
Oct. 4.....	3,290	2,792	2,554	2,229
Sept. 27.....	3,233	2,816	2,559	2,208
Sept. 20.....	3,232	2,769	2,538	2,211
Sept. 13.....	3,281	2,773	2,532	2,279
Sept. 6.....	3,096	2,592	2,376	2,110
Aug. 30.....	3,224	2,736	2,442	2,217
Aug. 23.....	2,193	2,714	2,434	2,202
Aug. 16.....	3,201	2,746	2,454	2,207

†New series: Includes additional governmental and power generation not previously reported.



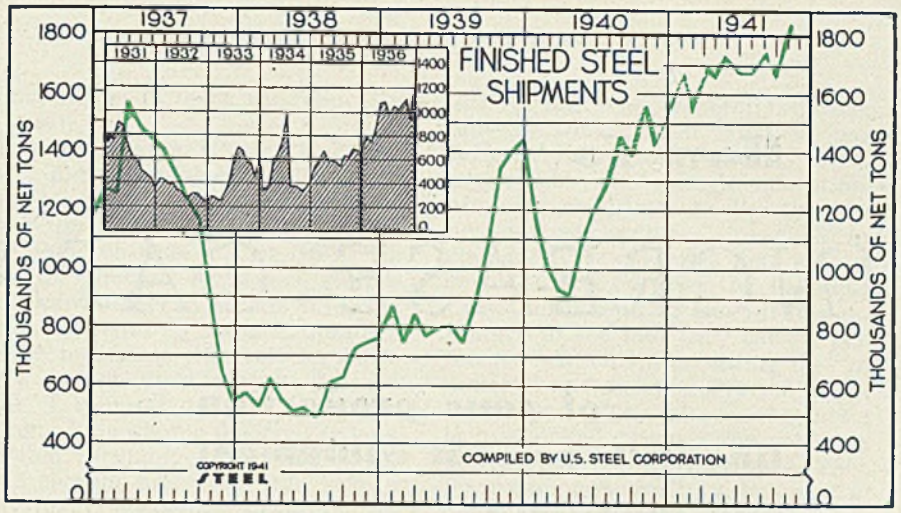
Finished Steel Shipments

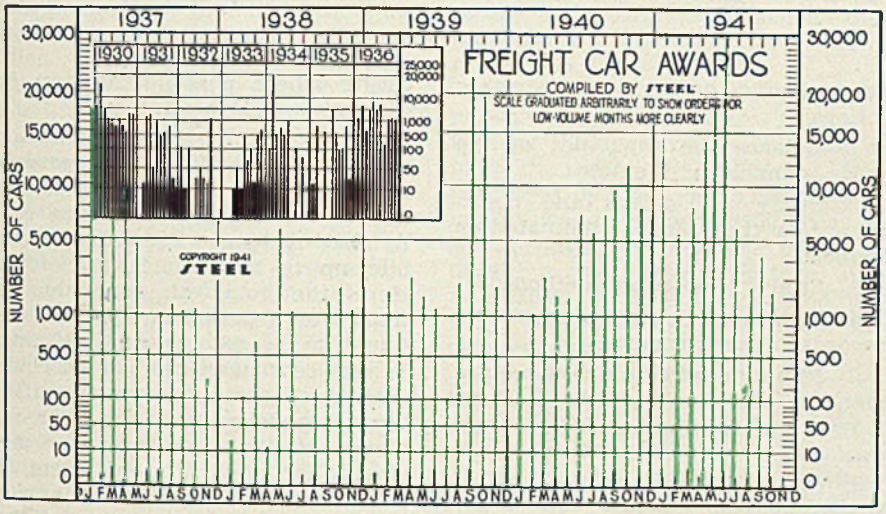
U. S. Steel Corp.

(Unit 1000 Net Tons)

	1941	1940	1939	1938	1937
Jan....	1682.5	1145.6	870.9	570.3	1268.4
Feb....	1548.5	1009.3	747.4	522.4	1252.8
Mar...	1720.4	931.9	845.1	627.0	1563.1
Apr....	1687.7	907.9	771.8	550.5	1485.2
May ..	1745.3	1084.1	795.7	509.8	1443.5
June ..	1668.6	1209.7	807.6	525.0	1405.1
July...	1666.7	1296.9	745.4	484.6	1315.3
Aug. ..	1753.7	1455.6	885.6	615.5	1225.9
Sept...	1664.2	1392.8	1086.7	635.6	1161.1
Oct....	1851.3	1572.4	1345.9	730.3	876.0
Nov. ..	.....	1425.4	1406.2	749.3	648.7
Dec....	.....	1544.6	1444.0	765.9	539.5
Tot.†.	.....	14976.1	11707.3	7315.5	14097.7

†After year-end adjustments.



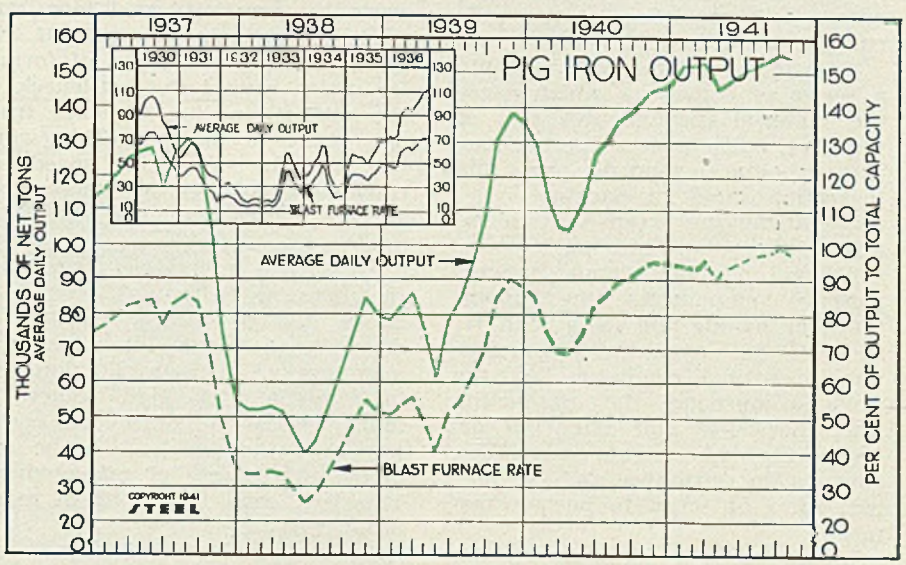


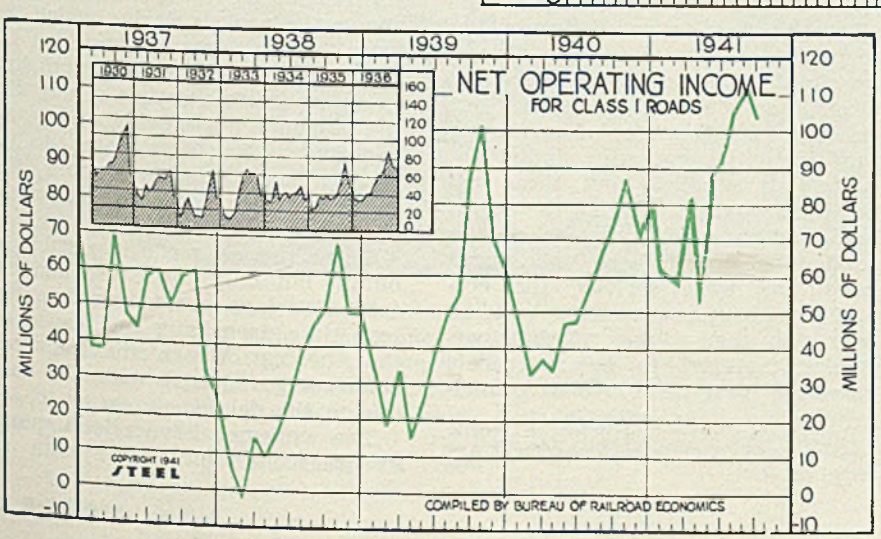
Freight Car Awards

	1941	1940	1939	1938
Jan.	15,169	360	3	25
Feb.	5,508	1,147	2,259	109
March ...	8,074	3,104	800	680
April	14,645	2,077	3,095	15
May	18,630	2,010	2,051	6,014
June	32,749	7,475	1,324	1,178
July	6,459	5,846	110	0
Aug.	2,668	7,525	2,814	182
Sept.	4,470	9,735	23,000	1,750
Oct.	2,499	12,195	19,634	2,537
10 mos....	100,871	51,474	55,090	12,590
Nov.	.....	8,234	2,650	1,232
Dec.	.....	7,181	35	2,581
Total ...	.....	66,889	57,775	16,303

Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151,707	105,502	86,465	96.3	69.5	56.1
Apr.	144,685	104,635	76,732	91.8	68.9	49.8
May	148,262	112,811	62,052	94.1	74.2	40.2
June	151,701	127,103	79,125	95.7	83.6	51.4
July	153,749	130,984	85,121	97.0	86.1	55.0
Aug.	154,343	136,599	96,122	97.4	89.9	62.4
Sept.	157,378	139,085	107,298	99.3	91.5	69.7
Oct.	156,637	143,152	131,053	98.9	94.2	85.2
Nov.	.....	146,589	138,883	....	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	....	84.3	62.6





Class I Railroads
Net Operating Income

(Unit: $1,000,000)

	1941	1940	1939	1938
Jan.....	$62.36	$45.57	$32.89	$7.14
Feb.....	58.49	32.86	18.59	1.91*
Mar.....	80.63	36.73	34.32	14.73
April....	52.57	33.82	15.32	9.40
May.....	88.63	47.08	25.10	16.67
June	93.26	47.42	39.10	25.16
July.....	106.31	57.08	49.01	38.43
Aug.....	110.02	66.01	54.59	45.42
Sept....	104.07	74.19	86.43	50.36
Oct.....	.....	86.99	101.62	68.57
Nov.....	.....	71.10	70.35	49.67
Dec.....	.....	78.79	60.95	49.37
Average .	.....	$56.84	$49.02	$31.02

*Indicates deficit.

How To

INCREASE CAPACITY

. . . . . of your production line with present equipment and operators

By HENRY V. OBERG
Armstrong Cork Co.
Lancaster, Pa.

■ FIRST, while the principles brought out by the studies and their application here are applicable to a wide variety of processing and production lines, a brief description of the particular operations in this line should be included for a better understanding of what was done.

Briefly, the operations comprising this production line consisted of:

—Weighing raw material and scrap according to formula.

—Placing raw materials into mixers for preparation of the batch.

—Pouring the mixed material onto a mill consisting of two rolls running at different speeds.

—Doctoring off the mill roll onto a series of conveyors which carry the material through two sets of finishing calenders, a coating machine, cooling system die press and inspection table to packing.

—Transferring scrap back to the mixing room for remixing.

As will be pointed out, our experience emphasizes the importance of having the facts with respect to the capacities under various operating conditions of the units comprising the production line, the cause and extent of delays, the effect of scheduling changes on capacities, and the normal ratio of scrap to perfect material.

In addition it showed us the importance of keeping adequate records of performance to give the foremen a tool with which to measure progress.

Although the job is not yet completed, only 2 months' work has increased the output 13 per cent. This is expected shortly to rise to 25 per cent—all with practically no added expense. In other words a detailed study and knowledge of operating difficulties along with a willingness to remedy them makes possible unexpected gains, and it is believed the principles can be applied to almost any production line.

The approach we found successful in increasing the output was as follows:

1—Balance the capacities of the units comprising the line.

2—Study the delays and determine how they can be eliminated or reduced.

3—Study production methods.

4—Maintain adequate and usable records of performance.

5—Improve scheduling of equipment.

Here are the details of how this was done.

First: A detailed study of the capacities of the units in line under various operating conditions was made. This included work of different sizes, gages, types of formulas which caused the bottleneck in the production line to shift from one point to another. This work was done by measuring speeds of conveyors, strokes of the press, surface speeds on rolls, length of mixing time, etc.

Let it be understood here that the increase in output mentioned above had practically nothing to do with the speed at which the men worked. This production line in common with many others is more or less a continuous operation, and the problems to be corrected were those of management. This is a condition found in many production lines.

In studying capacities, no consideration was taken of delays due to equipment faults as it is always possible to come back later and adjust for these if they can not be eliminated. After determining the capacities of the individual units, we studied how these capacities balanced under the varying conditions of operation of the production line. Where unbalanced conditions were serious, the economics of changes were studied based on the volume of that particular material to be run. This gave the first data available indicating where possible increases in capacity would be profitable.

Second: The next important step was to analyze delays and nonproductive time. It is amazing to see how small delays which can easily be overcome or reduced can pile up to an inconceivable total. Here the total of nonproductive time over a period of 2 weeks was found to be 26 per cent. Of this, 5 per cent was due to schedule changes, 7 per cent was caused by operating delays that could be reduced or eliminated by minor mechanical changes to equipment, 1 per cent was caused by improper co-ordination of the duties of the operators, 6 per cent was due to unbalanced capacity of equipment while running certain materials, 7 per cent was from causes too small for the operators to note the reasons.

Actually a finer breakdown of delay causes was had than the above, but this will show the important classifications. Actual delay times were obtained by Servis recorders placed at key points along the line. These are small time clocks which contain a swinging pendulum hooked to a recording chart. When placed on a continuously moving machine, the recorder chart shows a continuous line except for those periods when the machine is not in operation. Similarly, on valves and control levers, the recording chart shows the periods during which the lever was in a certain position. By studying these charts it was possible to approximate the time of day and the reason for the delay. By tying operators' reports in with the recorder charts in this manner, the actual time for a specific cause could be obtained.

These records made it possible to obtain not only the cause and extent of delays but to evaluate the lost time from any one cause so that the cost of corrective measures could be compared with the loss due to the delay.

The workmen have a loud speaker intercommunicating system at

From paper presented before a recent meeting of the American Management Association.

each station along the line, which makes it possible to transmit information quickly from one point to another.

Where the delays were registered by the recorder but were too small for operator to report, the cause of the delays was found by more detailed observation of the various pieces of equipment and the passage of material through them. This supplementary investigation tied down any loose ends.

Nonproductive time can be an important factor in practically every operation. Quite often the cause is so simple and obvious once it has been pointed out that little thought need be devoted to remedy the condition. At other times, the answer may be quite difficult. In any case, it is helpful to know the cause and extent of the lost time as this affords a means of determining what can be saved by an outlay to correct the difficulty, and so places the study on a sound economic basis.

Third: The study of production methods can be resolved into several branches. For instance, we found it advantageous to provide operators with adequate mechanisms for controlling their equipment, including temperature indicators, good control valves, planning devices and anything of this nature. The equipment always should be placed conveniently so it can be used with a minimum of time and effort. And do not forget to teach the men how to use it.

In one operation it was found that many improvements could be made to help the operator perform his job better. For instance, to change the gage on the mixing mill the operator had to leave his station and crawl under a platform. This generally required about 2 minutes. In the meantime, the roll temperatures varied and it took another 3 or 4 minutes to get back into swing. By a simple device it is now possible to change the gage in 10 to 15 seconds and to do this from a convenient operating position. By means of a counter attached, the mill can be set much more accurately, too.

As another example, our old temperature indicators were functioning, but the operator never bothered to follow them. He judged the temperatures by feel. As a result, the quality was never as consistent as it should have been. He had not been taught to use these indicators, and no records had been kept to find out what ranges were best suited for different materials.

Of utmost importance is the distribution of work among the men so it is balanced properly. While this is rather obvious, it requires some study to obtain best results. Where a group of men are working together, co-ordination of their efforts is extremely important. In addition, there is generally miscellaneous work which must be performed at certain intervals on a production line. Such operations often cause delays on the line for no apparent reason. In such instances, it is essential that careful consideration be given to assigning these duties among the various operators to see that they can be performed without interrupting flow of material and steady operation of the equipment. Too often this factor is overlooked because the job may be infrequent. However, any delay, no matter how small, is but part of a total that may be serious.

An important point as regards production methods is to set up operating standards or specifications in writing so the operator has something in black and white to follow. It is important to eliminate operator's judgment as regards temperatures, mixing times, end points, shapes of tools, etc. All such matters of selection should be tied down to the job specification.

So often one hears, "He's the only one who can determine when the batch is mixed." More often than not, such timing can be determined specifically by a number of tests or laboratory runs, thus eliminating this variable. A common argument against this is that variations in raw materials make it impossible to predetermine timing. However, it is quite possible to predetermine timing, even under such conditions, by varying quantities in formulas by laboratory specifications and based on previous physical or chemical tests of the raw material.

This point is offered for consideration as it is amazing what an effect on capacity and material costs it may have. So often such preconceived ideas are inherited from previous operating conditions which do not or need not exist today.

Obviously, there is a proper balance point between the quality-conscious operator and the cost-conscious operator, and this point should not be left to the worker's discretion.

Inspectors must be trained to judge quality consistently where appearances or tolerances must be left to judgment. It is important in such cases that periodic checking be carried on to maintain consistency. Inconsistent quality influences both customer complaints and costs. The balance point can generally be determined by mutual agreement between production and sales departments.

Fourth: Adequate operating standards and delay records are most essential if a record of performance is to be available to measure output and the trend of accomplishment. For instance, in this

(*Please turn to Page* 101)

Stockroom "Bottleneck Breaker"

Chief feature of these new Cellophane bags used by Leece-Neville, Cleveland, to package various auto parts is the white panels on the face of the bags superimposed with a special ink which permits stamped or pencil notations to be made on them. Supplied by the Dobeckmun Co., 3301 Monroe avenue, Cleveland, the bags simplify identification, provide a moistureproof covering for the parts and reduce storage space required for both the empty containers and the finished product

MACHINE GUNS

. . . . Development of Colt's Patent Fire Arms, the Gatling gun, the Maxim and Vickers, the Browning. A modern example of Colt machine gun design—the MG 40 aircraft weapon and details of its action

This Is Number 38 in a Series on Ordnance and Its Production, Prepared for STEEL *by Professor Macconochie*

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

■ ONE HUNDRED and eleven years ago a young sailor, India bound on the brig CORLO, observed in the arrangement of steering wheel spokes and the clutch designed to secure the gear in any desired position by holding each spoke in turn, the possibilities of a gun which would fire a number of shots in rapid succession. Unknown to the young inventor (he was but 16 at the time) guns had been invented which embodied the principle of revolving barrels, but none which involved the automatic revolution of the cylinder and the locking thereof by the cocking mechanism. This is the basic Colt patent.

Buried in the Ambrosian library at Milan, along with many other treasures of Leonardo da Vinci's brilliant intellect, were sketches of multi-barrel guns and organ guns, known as ribaudequins or orgues, consisting of six or ten musket barrels mounted side by side and used in siege warfare of the fifteenth and sixteenth centuries. These guns were fired by individual locks or, on occasion, by a single lock firing a quick match which ignited the barrels in rapid succession, as in da Vinci's designs. Thus Samuel Colt's invention, insofar as this related to multi-barreled weapons, was anticipated by nearly 400 years.

Typical of Leonardo's machine guns is that shown in Fig. 3. For mobility, it was mounted on wheeled carriages. The illustration exhibits a gun having no less than 33 barrels and a split trail for greater stability. These guns were all breeze loaders, ignition being accomplished by means of a train of gunpowder lying in a groove which connected with the touch holes. The application of a fuze to one end of the train fired all barrels on the same level in rapid succession.

As in the case of his proposals relating to mechanical flight, da Vinci was handicapped by the lack of facilities which did not exist until long after his death. Just as the invention of the internal combustion engine lent indispensable aid to the Wright brothers, so also the development of the percussion cap and fixed ammunition made the revolver and the machine gun practical possibilities.

History is alive with illustrations of the advantages gained by the possessors of rapid-fire arms. Among these—and of prime importance to the successful development of the

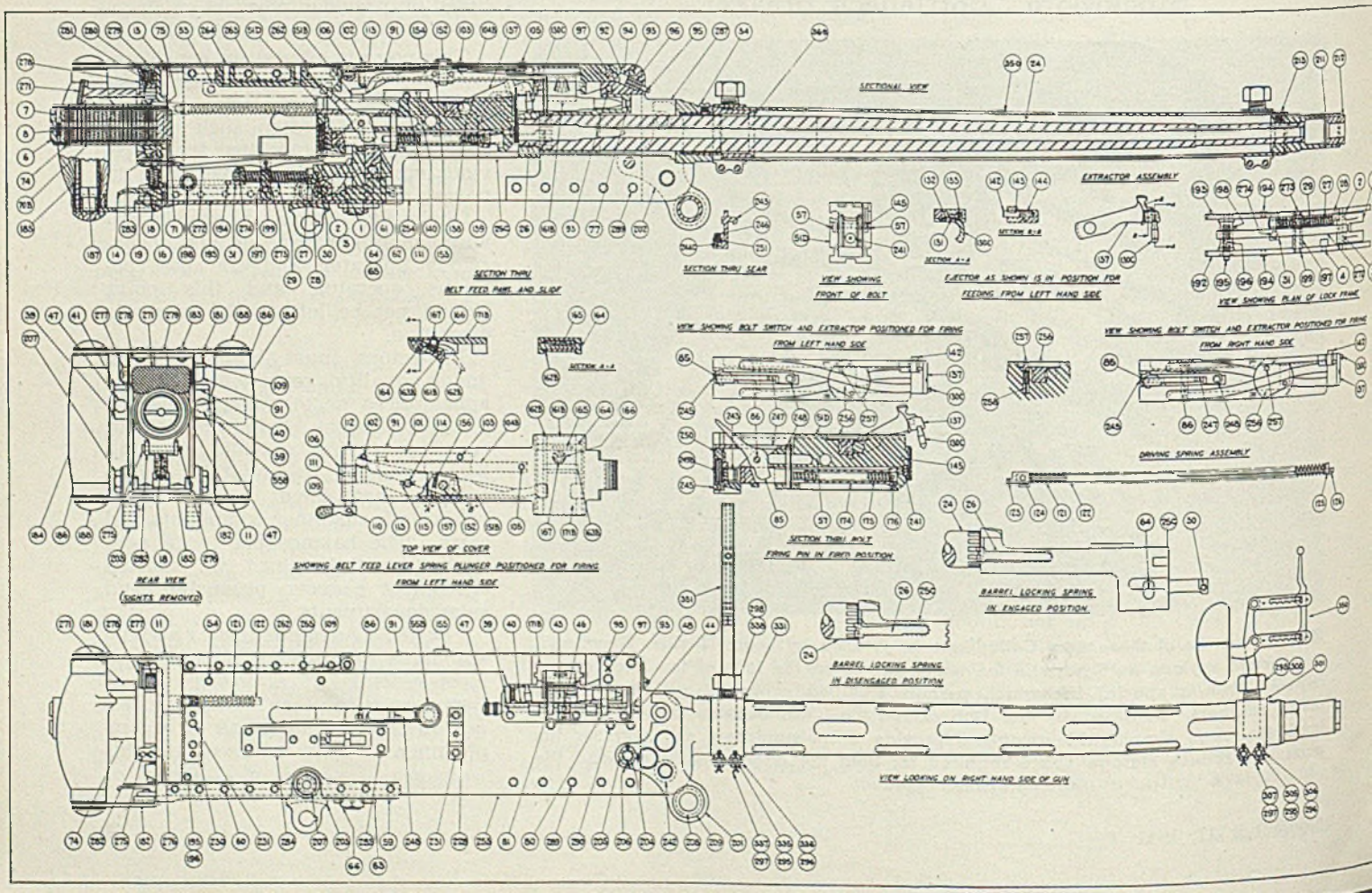


Fig. 1—A modern machine gun—the Colt light aircraft machine gun—rifle caliber (MG 40). See text for explanation of action. From "Instructions for Operation of Colt Light Aircraft Machine Gun", published by Colt's Patent Fire Arms Mfg. Co. who also furnished illustrations in Fig. 2

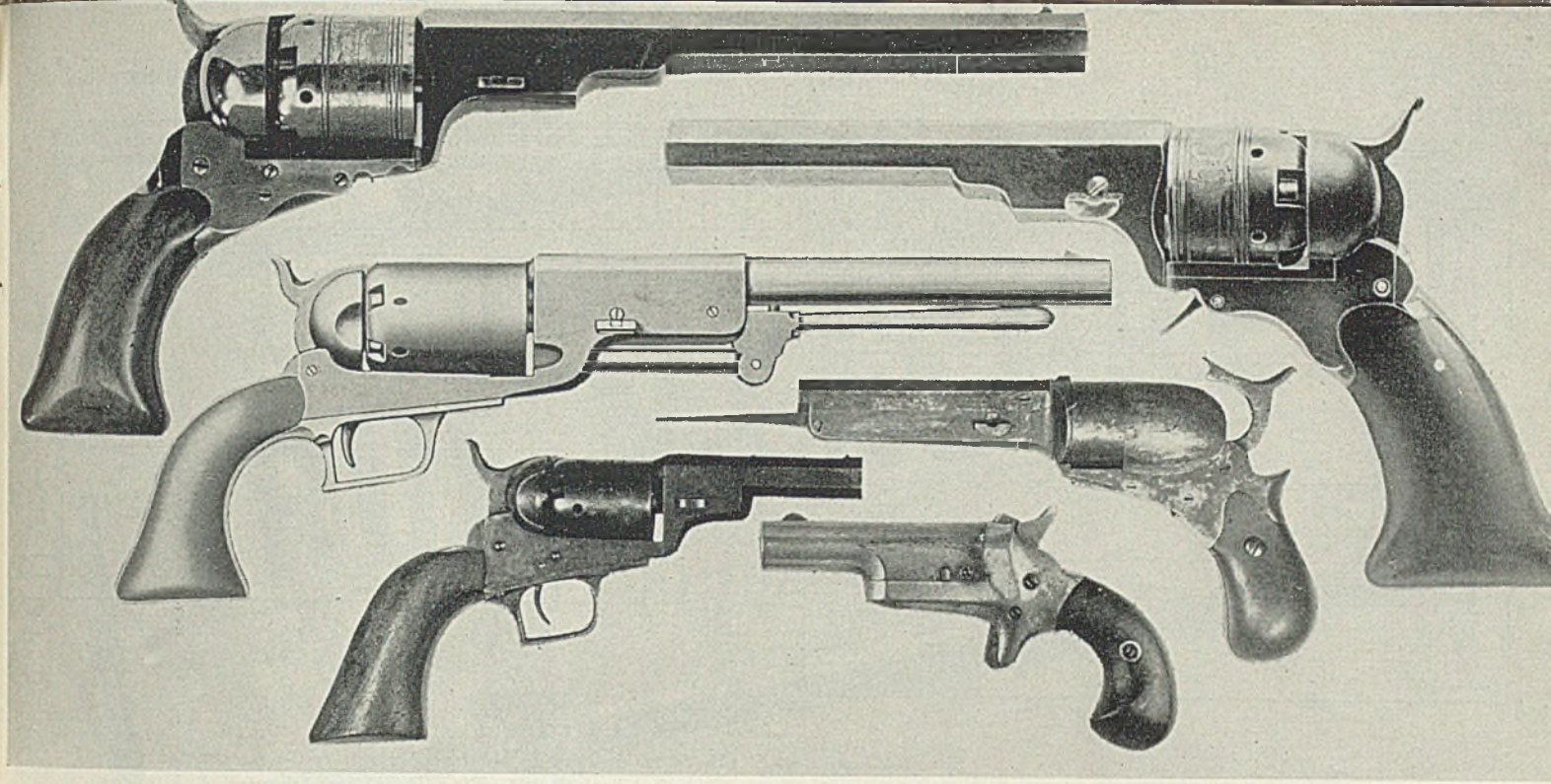


Fig. 2—Early Colt guns: Top left, the .34-caliber Texas Paterson revolver, one of first models made by Patent Fire Arms Co.; center left, Walker or "First Dragoon" model .44-caliber six-shooter with 9-inch barrel; top right, .34-caliber belt or pocket Paterson; center right, experimental Colt made in Hartford by Anson Chase; bottom left, "Wells Fargo" .31-caliber 5-shot model introduced in 1848 for express messengers; bottom right, small but deadly single-shot .41-caliber Deringer had short barrel, used rim fire ammunition, was introduced in the seventies

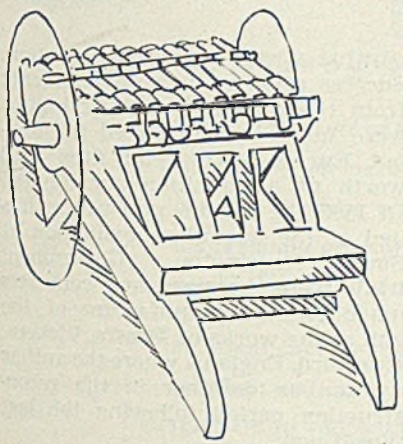


Fig. 3—This sketch by Leonardo da Vinci shows he recognized the importance of rapid fire and mobility long before modern military science had developed the concept of "fire power". From "Engineers & Engineering in the Renaissance", by Parsons, published by Williams & Wilkins

Colt revolver—was the war with the Seminole Indians, who had an unpleasant habit of drawing the fire of our troops and then swooping down upon them ere they had a chance to reload. This war gave Colt an opportunity to prove the worth of his revolving carbine. Then again the war with Mexico rather definitely established the Colt revolver in Texan favor. But many trials and tribulations were in store for the young inventor. In 1836, just a month after the historic Colt patent was granted in this country, the Colt Patent Fire Arms Co. was organized with a capital of $230,000 and an unused section of a silk mill acquired at Paterson, N. J. But quarrels, rivalries and lack of appreciation of the "modern methods" advocated by Colt doomed the enterprise to failure, and the company was dissolved.

Very early in his life on the farm Colt had made the acquaintance of a rather remarkable book entitled the "Compendium of Knowledge" in which he read accounts of the invention of gunpowder and the galvanic battery. This knowledge now came to his rescue in the midst of his distress since it enabled him to turn his active and fertile mind to other problems and to invent the submarine mine, which he fired with a battery and waterproof cable. The spectacular nature of this device won him newspaper recognition and that public acclaim necessary for the prosecution of his gun manufacturing ambitions.

During the five years devoted to the submarine mine, not a single revolver was manufactured by Colt's and when Gen. Zachary Taylor, urged by his Texas allies, sent an order for 1000 Colt revolvers, none was to be had. A new model, however, was designed and contracts placed with Eli Whitney (the well known inventor of the cotton gin) at his establishment in Whitneyville. This model was a .44-caliber six-shooter with a 9-inch barrel weighing 4 pounds 7½ ounces and later known to collectors as the "Walker" or "First Dragoon" model. See Fig. 2.

Thus by 1848, 18 years after he had dreamed of a gun which would shoot several times without reloading, Samuel Colt's dreams had come true. Guns and more guns for the United States Army and for the thousands seeking the pot of gold at the end of the western rainbow came from the Hartford armory. Not content with fame at home, he sought audiences with the crowned heads of Europe, pushing his wares wherever the name of Colt secured a hearing.

Sir Hiram Maxim relates in his memoirs how he met an American (Colt) in Vienna whom he had known in this country. "Hang your chemistry and electricity!" said his friend. "If you wish to make a pile of money, invent something that will enable those Europeans to cut each other's throats with greater facility." Thus was laid the train which led to the famous Maxim gun.

Following the re-establishment of his company in 1855, Colt proceeded to build the world's finest armory at its present site on the banks of the Connecticut River at Hartford, and to apply those principles of standardized production and the specialized assembly line which have made not only the name of Colt famous throughout the industrial world but which blazed the trail for American manufacture in general. Here have been cradled such renowned guns as the Gatling and the Browning, the former capable of 1000 shots a minute and rightly regarded as the grandfather of all modern machine guns.

In Europe the first machine gun which attracted general attention was the Montigny Mitrailleuse, invented by a Belgian, Captain Faf-

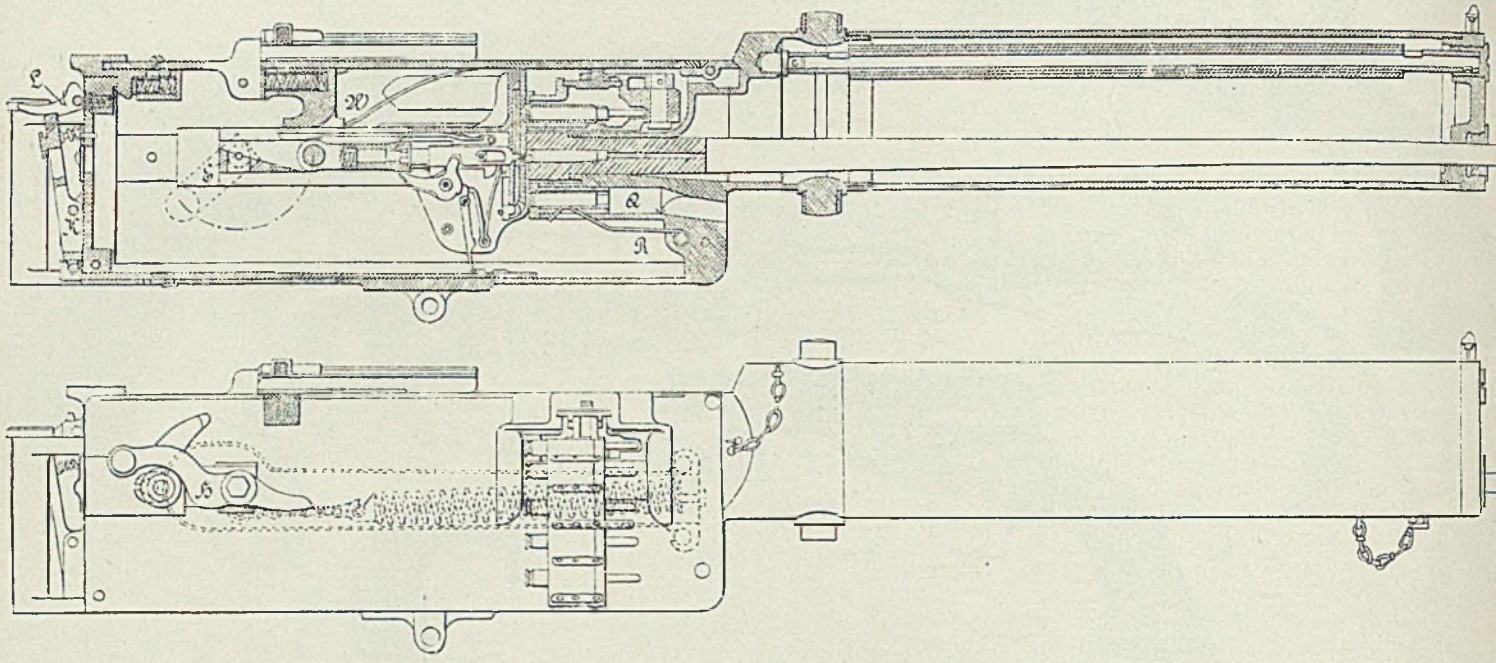


Fig. 4—Longitudinal elevation and cross section through a German type Maxim machine gun. From "The Book of the Machine Gun" by Longstaff & Atteridge, published by Dodd, Meade & Co.

schamps, some 20 years before its appearance in France in 1870. A series of 37 barrels was assembled in an outer wrought-iron tube. A rather massive breech action was controlled by a jointed lever. Cartridges were carried in steel plates drilled to correspond with the barrels, these plates being mounted in grooves in the block, thus pushing the cartridges home into their respective barrels and cocking all hammers. The firing handle could be rotated in about a second to discharge the entire 37 barrels in succession. Reloading was accomplished by raising the loading lever and thus opening the breech and withdrawing the plate with the spent cartridges in one major extraction operation. The plate being now removed and another containing live cartridges substituted, the gun was once more made ready to fire. Shortly after Colt's death during the Civil war, Dr. Gatling appeared with the gun which bears his name. A group of rifle barrels was mounted about a central axis instead of in a horizontal plane as in the older organ guns. The operating mechanism consisted of a cylinder driven by a crank handle at the side. Cartridges were placed in a feeding apparatus at the top of the gun and fell one by one into position for loading. As each cartridge dropped it was pushed into the barrel which happened to be at the top and driven home as the breech revolved, carrying it to the lowest position where ignition took place. During the second half revolution the spent case was extracted, leaving the way clear for the insertion of another round. The successive steps in this action are shown clearly in Fig. 6, p. 72, which shows a development (flat view) of the cam groove, rotating barrels and other parts.

The cycle being the same for each barrel, continuous firing was theoretically possible. But the Gatling gun suffered from a lack of uniform and reliable ammunition, as did all machine guns of the period. Extraction failures and jamming of the cartridge in the barrel occurred frequently. In trials of early Gatlings at Vienna, instead of the 500 to 700 shots a minute which might reasonably have been expected, actually only 280 shots a minute were obtained.

Other guns of the period which claimed attention included the Gardner, which in its original form resembled the Nordenfeldt, a gun of the organ type. Improvements in the action of the Gardner gun made possible a reduction in the number of barrels first to two and finally to one. Thus it forms a link with the era of completely automatic fire arms—a period inaugurated by Sir Hiram Maxim in England and toward the close of the century by Colt's in this country, who applied the concept of automatic action not only to the machine gun invented by John Browning, but also to the pistol.

To obtain sufficient energy for automatic action, Maxim permitted the barrel of his gun to recoil through a short distance determined experimentally in the first instance by apparatus which permitted variation. Success attended these experiments from the outset, and several guns were made and exhibited throughout Europe. The gun fired $150 worth of ammunition per minute. In 1885 the Maxim gun was exhibited at the inventions exhibition at South Kensington. Government trials were arranged and contracts made for the manufacture of the gun at the works of Messrs. Vickers, Crayford, England, where the author worked as designer in the reconstruction period following the last World war.

Fig. 4 exhibits the Vickers (Maxim) gun. In brief, the action is as follows:

Barrel and block recoil together for a short distance until the bullet is clear of the muzzle, the block being held in the closed position by the action of a toggle joint on the dead center. At end of this first part of the cycle, a cam throws the toggle off dead center, thus permitting the block to continue to recoil after the barrel has ceased to recoil. The energy thus imparted to the block is employed to eject the empty cartridge case, load a live round, cock the piece and compress a spring sufficiently to close the block and return both block and barrel to

What is the TRUE MEASURE of Tool Performance?

Is it the ***number of pieces*** the tool produces during its lifetime? Or is it the total output of the machine or press ***within a given period of time?***

The true measure of tool performance is not ***how many*** pieces a tool will make, but ***how quickly*** it will make them. Almost anyone could make a blanking die heavy enough to produce a million pieces, with frequent regrinding. The trick is to make a million-piece die requiring ***no*** regrindings . . . or at the most, only one or two. The real secret of high production is ***uninterrupted*** production.

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the first or original firing position.

Note that the force acting upon the barrel in the direction of its rearward movement arises from the reaction to the inertia of the rapidly accelerating bullet; while the force tending to separate barrel and block arises from the thrust of the base of the cartridge on the face of the lock. Obviously it is possible to so increase the mass of the block that inertia would neutralize any tendency to separation. But in a modern .30-caliber military rifle, a block weighing not less than 27 pounds would be required. Hence the more practical solution is the use of a toggle mechanism carried in bearings mounted in the recoil plates attached to the breech and thus offering a positive guarantee of association between barrel and block until such time as the latter has acquired the necessary amount of kinetic energy to perform its work and the bullet has left the barrel.

The precise manner in which this is done is exceedingly interesting. Referring to Fig. 5, the recoiling parts include the barrel *a*, the two recoil plates *b* attached to the breech of the barrel, the operating crankshaft *e* mounted in the recoil plate bearings and the breech mechanism which slides between the recoil plates and which is operated by the crankshaft. These recoil plates slide in grooves provided in the sides of the breech, the lefthand plate being extended in order to operate the feed mechanism above the barrel. The crankshaft projects on both sides through slots in the casing, the movement of the recoiling parts rearward being arrested as the shaft contacts the rear ends of the slots.

During recoil, and after it is safe to open the breech, the cam lever mounted on the crankshaft strikes a roller, thus breaking the toggle joint and permitting the further movement of the block backward as the chain attached to the end of the main spring winds around the "fusee." The fusee, incidentally, provides a means of regulating the resisting torque applied by the crank of the toggle mechanism. Large numbers of Vickers machine guns—modifications and improvements upon the earlier Maxim—were made by Colt's between 1914 and 1917 when manufacture of the Browning machine gun (a recoil-operated weapon, not to be confused with the gas-operated gun invented by Browning and manufactured by Colt's from 1898 onward to the earlier stages of the last World conflict) was commenced.

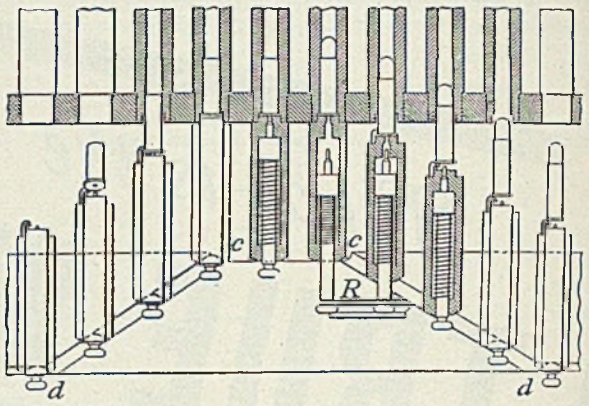


Fig. 6—Successive steps in action of the fast firing Gatling gun, the granddaddy of all machine guns, are shown in this projection of the 10 barrels that revolved. Note cam groove which operates the bolt and controls action of firing pin. Action is from right to left. From "Ordnance & Gunnery" by Tschappat, published by John Wiley & Sons. Fig. 5 from same source

A modern example of Colt machine gun practice is the MG 40 aircraft weapon. Referring to Fig. 1 p. 58, and commencing with the gun loaded and ready to fire, let the trigger 271 (at rear of gun) be pressed. This causes the front end of the trigger bar 272 to rise and act upon the sear spring holder 245 (see views of bolt). This sear spring holder is in close contact with the sear 243 (see section through sear). A cam formed on the sear and riding in a notch in the sear spring holder causes the sear to move laterally, releasing the firing pin 174, an action which is tolerably intelligible by reference to the section through the bolt. The firing pin, under the action of the firing pin spring 175, now flies forward and fires the cartridge.

As the powder in the cartridge explodes and the bullet commences its journey, the barrel 24 begins to move to the rear, carrying with it the barrel extension 25 C. See upper sectional view and detail of barrel-locking spring (the latter view is turned around). Moving with the barrel and barrel extension rearward is the bolt 51 D which is locked to the barrel extension by the breech lock 61.

When the barrel and the barrel extension have recoiled about ⅜-inch, the breech lock pin 64 (seen in upper sectional view) strikes the slanting surfaces of the lock frame projections, causing the breech lock 39, best seen in detail exhibiting barrel locking spring in engaged position, to leave its recess in the bolt and slide down the breech lock cam 62, as shown in upper section view. When recoil is complete at the end of the ⅝-inch stroke, the bolt is completely unlocked.

The barrel extension 25 C recoiling against the accelerator 1 forces it to the rear, the claw of the accelerator engaging with the shoulder on the bottom of the bolt 51 D, best seen in upper cross section, Fig. 1. This causes separation of the barrel and bolt and throws the latter rearward against the pressure of the driving spring 121, seen in position in the upper view and in detail to the middle right of Fig. 1. As the bolt moves to the rear, the extractor 137 draws the cartridge from the links (see detail of extractor toward upper right). As the extractor is forced down by the cover extractor cam—seen, unfortunately, only in plan in the top view of the cover—it pushes the cartridge down into the groove in the face of the bolt (see detail of front face of bolt). Meantime, the ejector 130 C, seen in side and end details, pushes the empty cartridge case downward out of the face of the bolt, leaving it free to drop away from the gun.

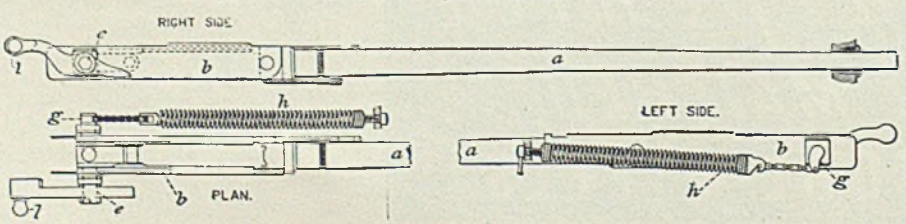
During the movement of the bolt to the rear, the firing pin 174 (see section through bolt) is cocked by the action of the cocking lever 85, whose tip swings upward into the cam recess provided for it in the top plate 262, an action which may be clearly understood by reference to the upper cross section of the gun. At the same time the belt feed lever 151 B, riding in its cam groove in the top of the bolt—well seen in the plan of the bolt—moves the belt feed pawl 161 B laterally into position behind the next cartridge.

These arrangements may be followed reasonably well by reference to the details of the belt feed pawl and slide and to these parts in position in the principal views of the gun. Meantime the ammunition belt is prevented from falling back by the belt holding pawl, exhibited in the lower view.

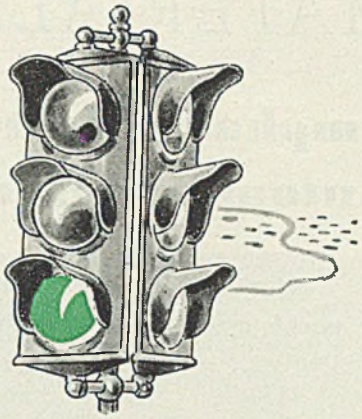
Ammunition "belts" are now made

(*Please turn to Page 79*)

Fig. 5—Recoiling parts of the Maxim gun. Crank at i. Operating spring h stores energy for returning the parts to the firing position



We Gave Our Green Men a Green Light



PHILLIPS SCREWS PERMITTED FASTER WORK WHERE SLOTTED SCREWS DEMANDED EXTRA CAUTION

THEY WERE RAW

New, inexperienced workers were slowing down assemblies. We couldn't use power drivers for fear of driver slippage. Still there were work-spoiling accidents.

BOTCHED WORK

Everywhere — particularly where *new* men were at work — we noticed slow, awkward, two-handed driving . . . scratched surfaces . . . screws fumbled, burred, not set up tight.

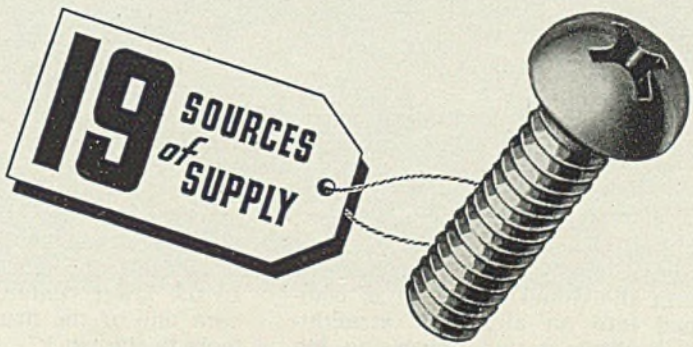
PRODUCTION OFF SCHEDULE

That decided me. Why not use screws that don't let the driver slip . . . that permit use of power drivers even by green men. So I said . . .

"Try Phillips"

And it worked! The assembly time saved permitted us to meet our delivery dates . . . and our overall cost was lower.

Investigate for your plant . . . get further facts about the many screw-using factories that have standardized on fast-driving, easy-seating Phillips . . . and get them *now*. Write to any one of the firms listed below.



PHILLIPS RECESSED HEAD SCREWS

Speed Product Deliveries by Cutting Assembly Time

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SPECIAL THREAD-CUTTING SCREWS · SCREWS WITH LOCK WASHERS

U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Lock Washer Co., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N. H.

MATERIALS HANDLING

Emphasized in Automatic Machining Line

. . . . as automatic transfer mechanism carries work successively to 11 machining stations spaced at 4-foot intervals along a 65-foot production line

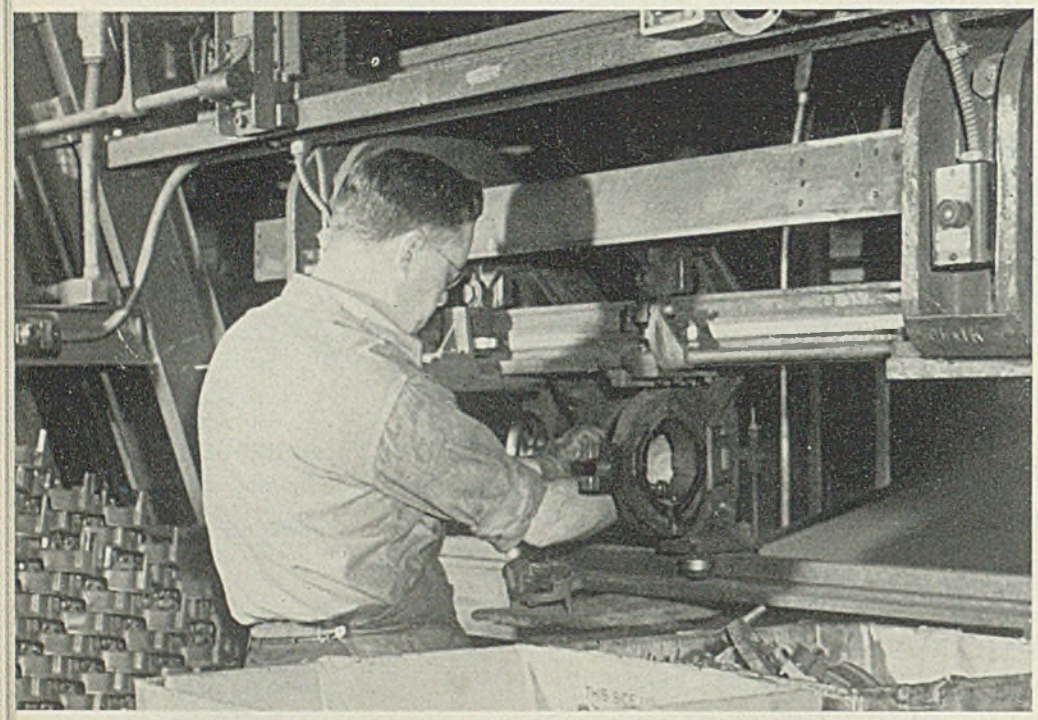

Fig. 1—Operator at loading-unloading station replacing a machined frame with a rough casting. The shift is accomplished within the 15-second machining cycle

■ AT THE West Lynn, Mass., plant of General Electric Co., work that ordinarily would be handled on 11 individual machines is combined into an automatic straight-line multiple-station processing job by means of a unique materials handling system which carries the work from machine to machine.

The part processed is the cast iron frame for the General Electric Type I-30 watt-hour meter. This part is held in one position in a locating jig while drills, counterbores and taps operate from five directions and the part is milled from two opposite sides. Of course, the system employed is equally applicable to a wide range of other parts and other processing work.

The equipment for handling these operations consists of 11 in-line machines. As seen in Fig. 2, p. 67, these 11 machines are driven from a common lineshaft or power shaft at floor level and to the rear of the machine. Power takeoff through positive drive keys the machines synchronized correctly at all times. In the lower center, Fig. 2, can be seen one of the drums feeding the tools to the work.

The 11 machining stations are placed at 4-foot intervals along the 65-foot two-level transfer mechanism. This transfer mechanism moves a series of rail-mounted jigs which carry the work from the loading station into position in front of each machining station in succession. When a jig passes the 11th station at the end of the automatic unit, it is raised to a pair of upper level rails and returned to the loading end by means of a roller chain. There the jig is returned to the lower level where an operator removes the finished part and reloads the jig with a rough casting.

Drive for the cutting tools is mechanical, but the transfers between stations are hydraulic because they are intermittent and operate at comparatively high speed. Movement of the cutting tools and of the hydraulic transfers is synchronized by means of a master control station which operates limit switches, in turn controlling solenoid valves in the hydraulic system.

Of course all the hydraulic transfers operate simultaneously since each machining cycle is set at 15 seconds, after which all the jigs supported by the lower rails are moved on to the next station in line, the last jig in the line being raised to the upper level by means of the automatic hydraulic lift shown in Fig. 3. Here a roller chain at the upper level carries the jig to the load-unload station at the starting end where the jig is automatically returned to the lower level at a convenient height for the operator to remove the finished part and reload the jig with a rough casting. The load-unload station is shown in Fig. 1. The 15-second machining cycle provides ample time for the operator to replace a machined frame with a rough casting.

One Man Does the Unloading

Only one operator is required to load and unload the jigs, the machining operations being handled without attendants. Another man regularly is assigned to take care of tool adjustments and replacements on the machines, and that man is responsible to the inspector for continuity of operation of the machines and for accuracy of the finished frames.

As shown in Fig. 4, p. 67, a special multiple-indicator gage arrangement is employed to check simultaneously all the critical dimensions of the meter frame finished in the automatic setup. This device utilizes a toggle advancing mechanism at each end, the operator working one toggle with each hand to advance the indicator points to the surfaces being checked on the meter frame. This allows rapid manipulation of the checking device so that 100 per cent inspection of the output from the machine line is easily possible. Of course it is not necessary to inspect all parts from an automatic setup such as this, the so-called "sampling" method wherein a part is checked at regular intervals being sufficient.

This straight-line setup of 11 machines is capable of a uniform accuracy not possible with conventional methods of handling a similar sequence of operations. For example, previous practice for doing this same work on the cast iron meter frame called for first securing the frame in a jig and subsequently performing all the operations possible in a rotary indexing-type machine, locating the work from points upon the rough cast-

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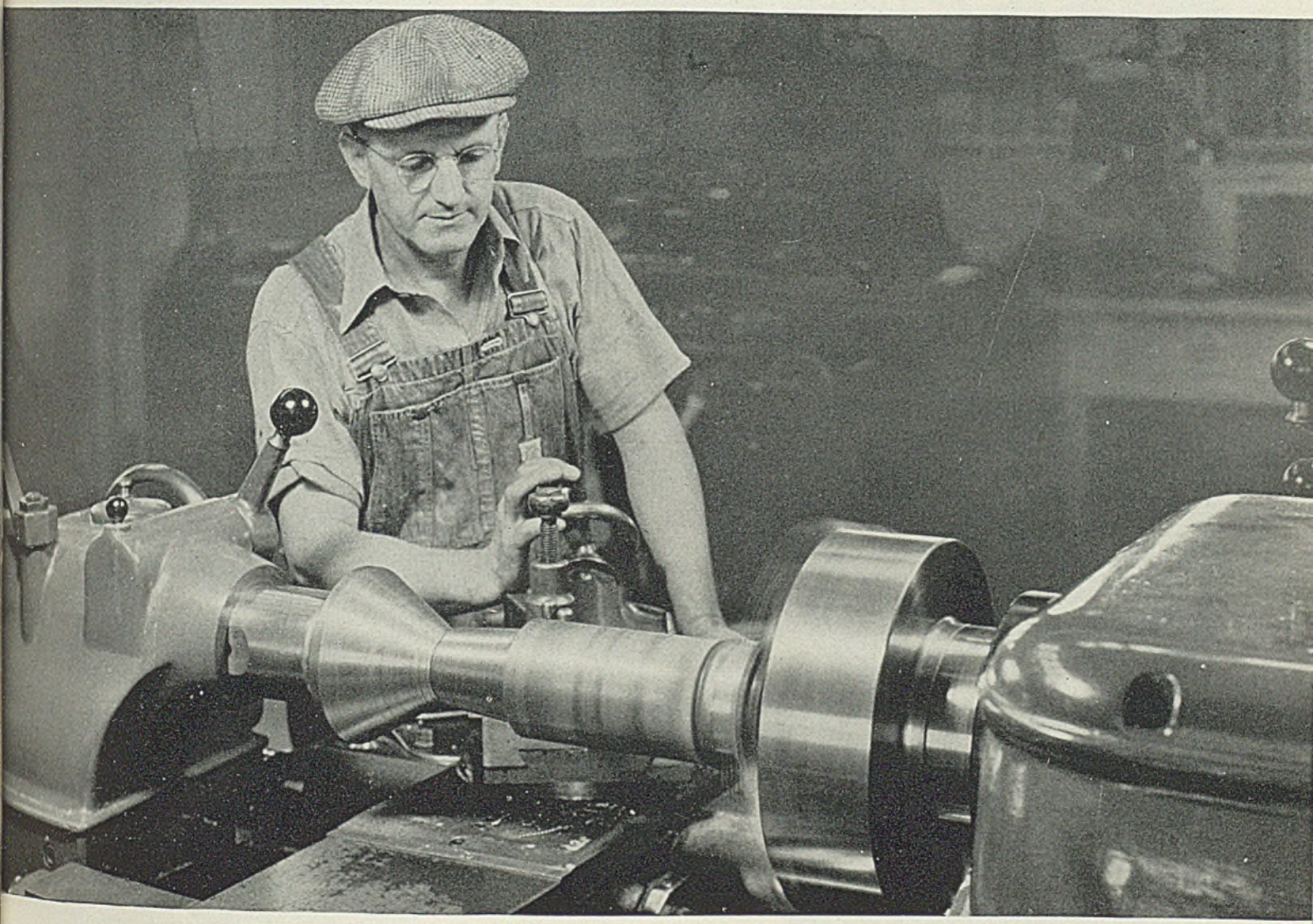

"Got to make some deep rough cuts on this job. Do I worry about that with this Axelson? I should say not! I speed up my feet-per-minute and dig in without a chatter. And this is no ordinary chunk of steel. When I get near the contour shown on the blueprint, the real fun starts. The job begins to shine like a mirror as she smoothes down. And she's going some. I'm away inside the time limit on the ticket. I give her a test mike. Once or twice over again and I'm less than the thickness of a coat of paint from the tolerance. Easy now. And there she is—with a finish that looks like she just came from a centerless grinder. This kind of work makes a fellow confident—and anyone can always be confident with these Axelson Heavy Duty Lathes."

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Erie Hammers are playing an important part in building a superior mechanized army for Uncle Sam, turning out many vital parts such as the crankshafts, shown above. In almost every forge shop in this country, you will find Erie Hammers working day and night, efficiently producing thousands of different types of forgings required for National Defense.

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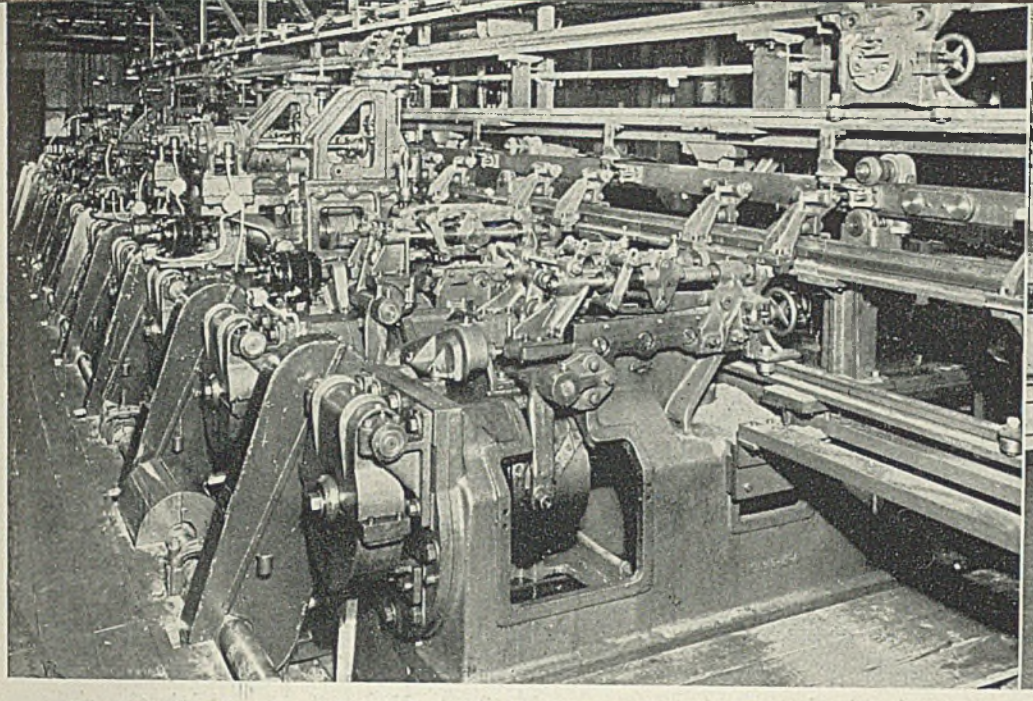


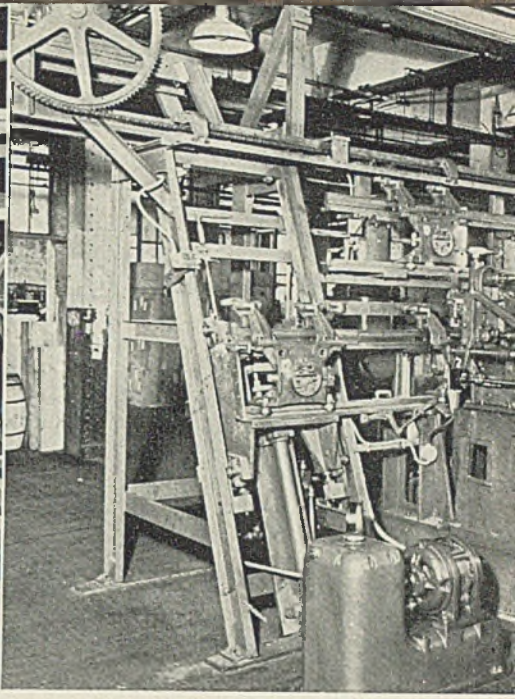


Fig. 2. (Left)—View from the rear of the first station showing 65-foot lineup cycle of 11 machines or stations which perform a total of 77 machining operations

Fig. 3. (Right)—Rear of the last machine or station showing the hydraulic lift and jig-transfer mechanism. Here the jig is raised to the upper rails for return to the loading-unloading station shown in Fig. 1

ing. This was followed by similar operations on other rotary indexing machines, a sufficient number of machines being employed to complete all the operations required—in this instance a total of 77 machining operations. In this process, when the product of the first series of operations is not completely uniform, locating the part by its finished surface in subsequent machines introduces a large number of error combinations which can easily increase the magnitude of any single inaccuracy by three times. This possible pyramiding of inaccuracies naturally follows any rejigging of the work.

Fig. 4—Multiple-indicator gage allows operator to check simultaneously all critical dimensions of meter frames finished in the straight-line setup. Note double toggles to facilitate advancing the gages to working position

This difficulty in obtaining uniform accuracy is in addition to the well-known limitation of a circular-type indexing machine which makes it impractical to change the number of stations, once the number of divisions for the index has been selected. It is evident that handling all of the 77 operations here without rejigging the work thus greatly increases the precision with which the machining operations can be handled.

Of course in processing other items it may not always be possible to jig the work in such a manner that access can be had to all surfaces for machining, drilling, counterboring and tapping various portions of the work. In those instances it may be possible still to obtain the advantage of the multiple operations providing certain slight changes in design of the part can be made. In any event, the greater precision possible by performing all the machining operations while the work is held in the same jig is a decidedly important factor in facilitating trouble-free conveyor assembly of parts for items such as these watt-hour meters. With frames on which the meters are built up now uniformly accurate, assembly is speeded greatly since one poor fit does not now delay the operations.

Likewise, there is no limitation as to the number of operations which can be handled by one setup in an arrangement such as has been described here. For it would be quite feasible to extend the line by adding more machines to accomplish additional machining operations if the object requires more complicated finishing. Certainly this method of materials handling from machine to machine has important possibilities which could be utilized to advantage in many types of processing and fabricating operations.

Approve Practice for Food Service Equipment

■ Proposed simplified practice recommendation for food service equipment has been accorded required degree of acceptance by manufacturers, distributors, users and others affected and has been approved for promulgation according to the Division of Simplified Practice, National Bureau of Standards, Washington.

The simplified schedule will be identified as simplified practice recommendation R182-41, "Food Service Equipment," effective Oct. 1, 1941.

The recommendation concerns not only sizes and dimensions of complete units of equipment but also details of construction. Free mimeographed copies of this recommendation may be obtained from the Division of Simplified Practice.

Describes Welding School

■ A new 12-page pictorial booklet entitled "You and Your Job in Arc Welding," recently published by Hobart Trade School Inc., Troy, O., is now available free of charge by writing the registrar of the school. It explains to anyone interested in taking up welding the functions and courses of study pursued at the school.

"...a tremendou

SHIFTING the economy of the world's greatest industrial nation from a peacetime to a wartime basis is a tremendous undertaking. It cannot be accomplished without hardship and confusion.

Thus far, the brunt of the transition has fallen upon the metalworking and metalproducing industries. Manufacturers in these fields are beset with serious problems. They are asking questions to which there are no specific answers.

How can I function to the best advantage during the present emergency?

What can I do to participate to the utmost in the defense program and yet preserve my business for the postwar period?

What can I do now to prepare for postwar conditions?

These and many other questions are in the minds of executives in the metals industries. No ready-made answers are available. The substance of the answers is to be found in the day-to-day developments in Washington.

STEEL reports these developments faithfully each week. They form the groundwork of information from which industry must make its decisions. They are the ingredients from which the right answers must be brewed.

These piecemeal developments ultimately will fit into a definite pattern—a pattern to which our wartime and postwar economy will be molded. To understand how each individual happening fits into the pattern of the whole requires a broad perspective—a long-range view of objectives and methods.

STEEL will provide this perspective in its Yearbook of Industry issue of January 5, 1942. It will furnish a background of understanding against which week-to-week developments, as they unfold, will make sense.

★ ★ ★

Outstanding in the 1942 Yearbook issue will be an overall analysis of the defense program and its effect upon the metals industries. Other studies will deal with the difficult problem of priorities and allocations, with the impact of the defense economy on small business, and with the probable scope of labor problems in 1942.

How far-sighted companies are preparing for post-war competition will be

undertaking"

the subject of another important study.

In the Yearbook issue, "Mirrors of Motordom", the widely-read weekly feature of STEEL, will be amplified to present a long-range perspective of the automobile industry's present status and of its 1942 prospects.

"Windows of Washington" will analyze developments at the national capitol in 1941 and will present a summation of the 1942 docket as it stands revealed at the year's end.

"Wing Tips" will review the aviation industry and examine its future as an outlet for metals and equipment.

Technical progress in metallurgy and in all phases of metal production, processing and fabrication will be presented in the form of reviews to be contributed by more than 160 outstanding engineers, metallurgists and production men.

A major article will cover steelworks expansion in 1941—the year in which large-scale government investment injected a factor that is bound to be of profound significance.

A review of the iron and steel industry of Europe will recount the extent to which its control has changed hands.

The 1942 Yearbook of Industry issue will, as usual, contain forecasts of activities in the principal branches of the metalworking industries, including railroads and other transportation, shipbuilding, construction, machine tools, tools and dies, automobiles, aircraft, agriculture, home appliances, forging presses, sheet working equipment, cold headers, materials handling equipment, nonferrous plant expansion and so on.

In addition there will be one of Mr. Shaner's trenchant editorials, an amplified "Business Trend" section, a review of the situation in raw materials, complete statistical information on prices and production, also the usual weekly presentation of market and general news.

E C Kreutzberg

Editor, STEEL

1942 YEARBOOK OF INDUSTRY ISSUE

January 5, 1942

42-INCH VALVES WELDED

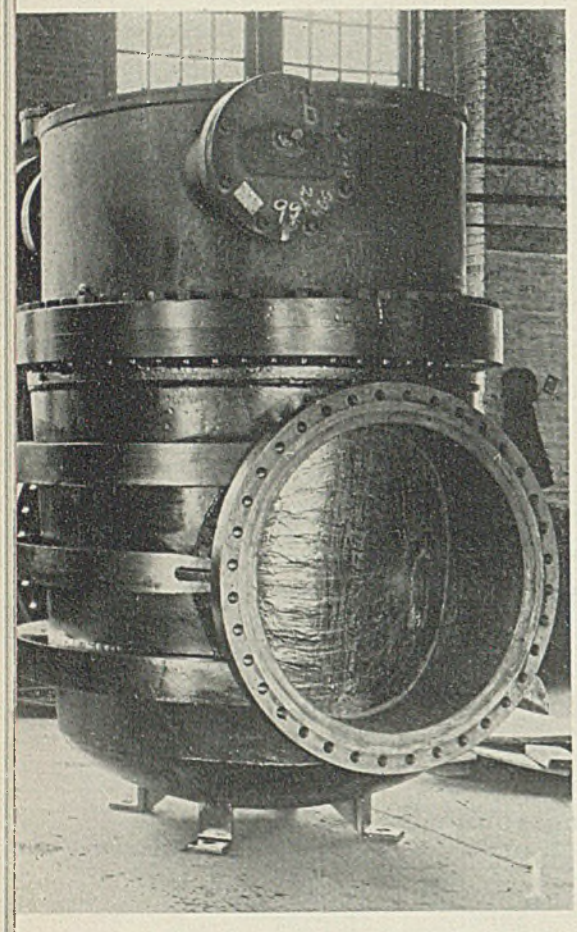


Fig. 1—One of the 42-inch manually operated cone valves of welded steel construction shown in the closed position. Weight—more than 12 tons

Fig. 2—Valve seats being arc welded to valve body. Work is mounted on large positioning machine so welding can be done in downhand position

Fig. 3—Valve plugs are also fabricated by welding steel plates and shapes. The three here are for 36-inch valves. A welded steel head for a 36-inch valve is in the foreground

■ WELDED steel construction figured prominently in the Stone Canyon reservoir and outlet line completed recently for the Los Angeles Bureau of Water Works and Supply. The line itself involves approximately 18 miles of welded steel pipe, fabricated in accordance with A. W. W. A. standard specification 7A-3-1940 for electric fusion welded pipe. Nearly 12 miles of this was 60 inches in diameter, the balance ranging down to 36 inches, with the exception of a few hundred feet of 78-inch size. In addition the work required 5581 feet of 36-inch welded steel pipe cement caulked joints; 6588 feet of 48 and 51-inch reinforced concrete pipe and 288 feet of 62-inch lock-joint steel-cylinder concrete pipe.

To control the flow of water through this system, 30 large valves were installed, 22 in the inlet line and 8 in the outlet line. These valves vary in size from 20 inches to 42 inches, the majority of them being manually operated and designed for working pressure of 175 pounds. Five are intended for 225-pound pressure.

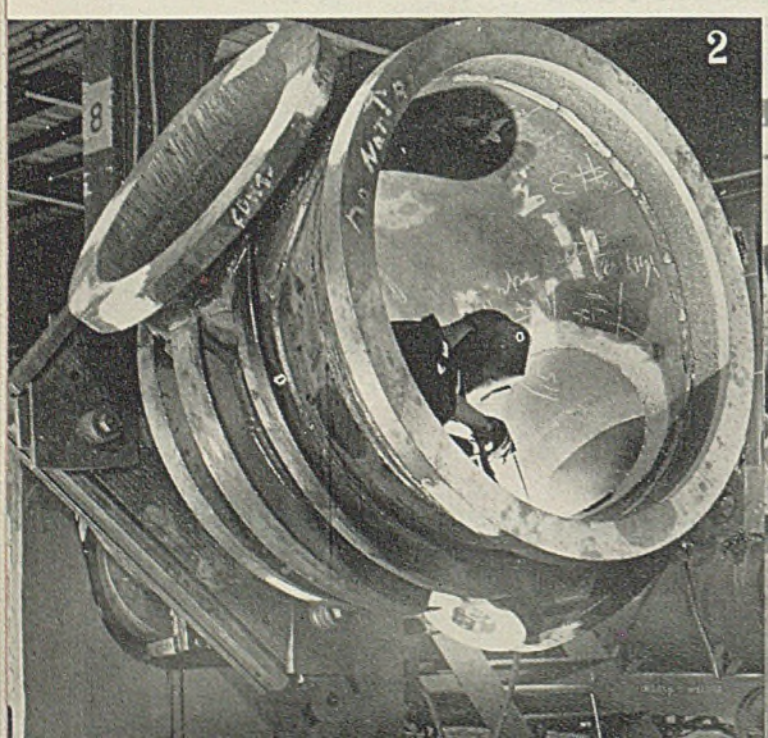
Most of these valves were furnished by S. Morgan Smith Co., York, Pa., and all of these except two 20-inch emergency line check valves are of all-welded construction. As its name implies, the Smith company's Rotovalve operates by rotation of a plug within the valve body, rather than by vertical travel of a disk as in the case of a gate or globe valve. The body has two seat rings around the waterway opening, and the plug has four seat rings which match the body seats in both the open and closed positions of the plug.

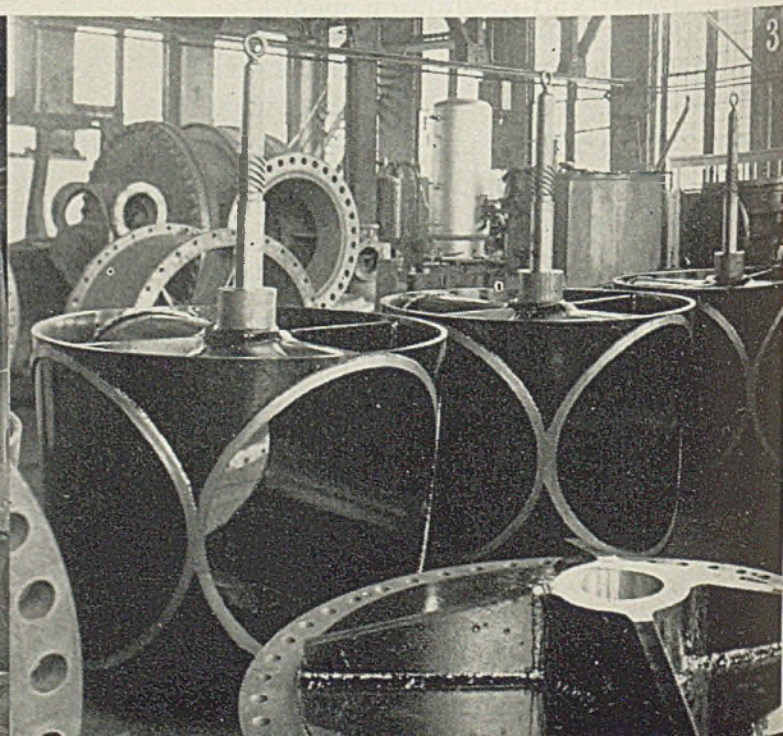
The conical shell and waterway cylinder for the bodies and plugs were made of rolled steel plate, formed to cylindrical shape and the joints welded. A flanged and dished head comprises the cover for the base of the body. Cast steel was used for the top flange and waterway flanges of the body, as well as for the bearing housing and the bearing trunnions on the plug.

The unit's mechanism housing, which is bolted to the top of the body, is also of welded steel construction with rolled plate employed for the barrel, ribs, head plate and flanges.

Seats of both the body and plug consist of a welded deposit of monel metal. Deposition of this facing, as well as other welding, was facilitated by mounting the assembled parts on positioning machines. This permitted all welding to be done in the down position. It also simplified the handling problem, which is no small matter in view of the fact the 42-inch valve, complete with operating mechanism, weighs approximately 25,000 pounds. The Smith company has fabricated valves of this type as large as 60 inches, one of this size having been built for the water supply system of Denver.

The preparation of base material for welding these valves conformed to paragraph U-72, Section VIII of the ASME boiler construction code for unfired pressure vessels. All welding was done with the electric arc and all welded parts were stress relieved before machining.





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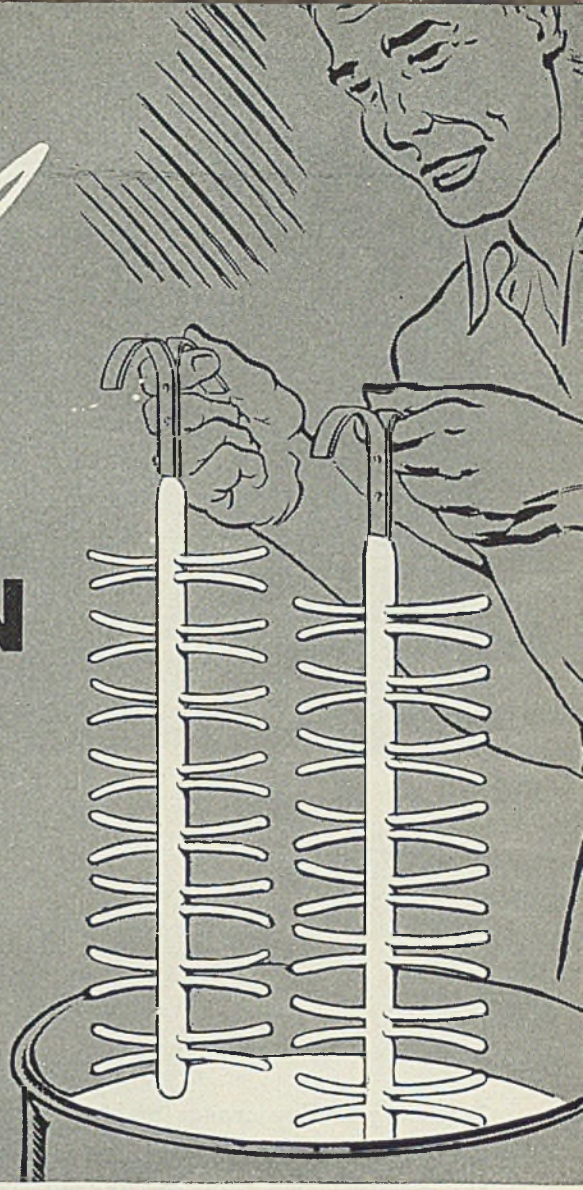

UNICHROME* "AIR DRY" RACK COATING

Insulation of plating racks has been a problem in many plants. Materials that are conveniently applied would not generally stand up well in service. Materials that withstood hot cleaners and all plating solutions had to be hot-dipped and force-dried.

But here is a tried and proved rack coating material —Unichrome* Air Dry—with all the advantages of both types. Remarkably resistant to wear and handling —unaffected by alkaline cleaners, acid dips and plating solutions—plus the convenient feature of being AIR DRYING.

All you do is simply dip your racks at room temperature and let them dry in air after each coat. Shipping container can be used for dipping.

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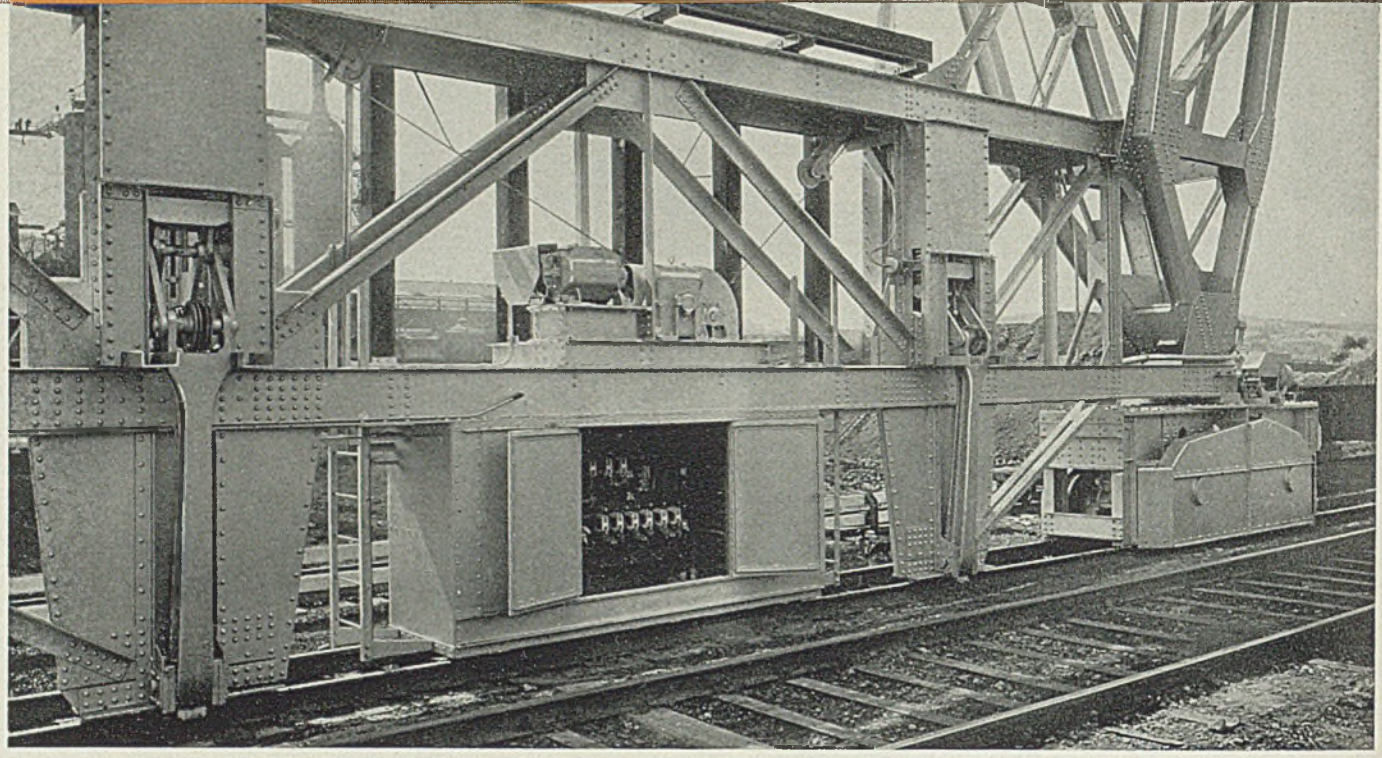

Fig. 1—Rail clamps are mounted in the main structure of the legs. Control house is located beneath sill and clamp-operating power unit

Design of RAIL CLAMPS for TRAVELING CRANES

Traveling bridge cranes at blast furnace and steel plants frequently are demolished by high-velocity wind forces. As a safety measure the structures are locked to the track by clamps. In the accompanying article the author discusses important details of construction, operation, inspection and testing of these units

■ PRODUCTION of steel — the backbone of the entire national defense program—requires the use of much mechanical equipment of which the traveling ore and coal bridges are indispensable. In addition to the traveling bridges at the mills there are many installations at unloading docks for transfer of coal and ore from boat to rail. The greatest enemy of this type of equipment is the common wind storm which has exacted its heavy toll with an average loss of two bridges per year since the century began.

These losses unfortunately are not given the publicity they deserve as we are too prone to conceal our misfortunes and particularly so if we feel that we may possibly have overlooked preventive measures.

Traveling bridges and gantry cranes offer a large wind area and definite means of protection should be afforded to safeguard them against the application of wind forces. The designer must provide a positive method of locking the structure to the track at all times when the bridge is not in motion and the locking apparatus must be capable of quick setting in case of emergency. Many of the earlier bridges had no mechanical protection for this purpose and the owners relied on the bridge operator who placed wooden wedges under the wheels at the end of the day's work. Sometimes the operators would forget about the wedges and find the bridge in a tangled heap at the end of the runway.

These losses soon resulted in the search for more positive protection and several types of safety devices were developed. Several different principles were used; one consisted of a set of steel wedges usually operated from a central control station while others consisted of various forms of clamps directly engaging the rail head. There were also developed various types of spuds or struts which were dropped into recesses in the track foundation or butted up against piers placed at various intervals. Of the different devices used, only one has survived and all modern bridges now are being equipped with clamps engaging the rail head commonly known as "rail clamps."

In the designing of such clamps the main consideration is the load to be resisted which is the product of wind pressure over the exposed area of the structure. In figuring wind loads and wind stresses there has often been the tendency to consider wind stresses in structures as something that is not critical and many specifications covering steel structures permit the increase of stresses for a combined dead load, live load and wind loading; little provision is made for actual wind loading.

The designer of rail clamps should not be misled by this practice nor should he be further misled by the general idea that wind stresses are of a static nature. In storms which have occurred in the Great Lakes district within the past year, anemometer records have shown that wind velocities have increased as much as 50 miles per hour within an interval of two minutes and have fluctuated from 50 up to 80 miles per hour for a period of from one to two hours, which would indicate that not only are dynamic stresses

By G. F. WOLFE
Special Engineer and Sales Representative
Dravo Corp., Pittsburgh

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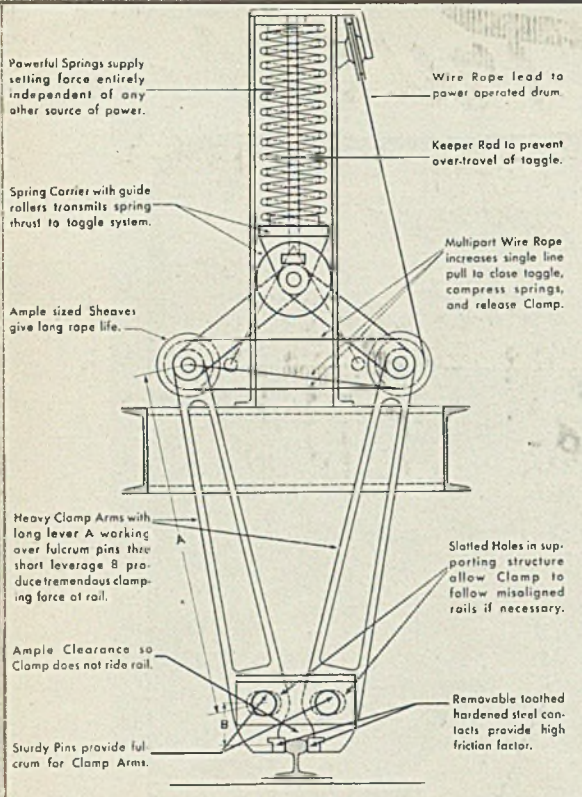


Fig. 2—Section of clamp in closed position. Unit is of simple and rugged construction

involved, but the stresses are subject to wide variation over a considerable time period. This sudden application of load dictates the type of rail clamps which will respond rapidly and which, when tied in with an anemometer, will produce positive results and will be entirely independent of manual operation.

Rail clamp installations should operate independently of the willful desire of a bridge operator as there is no point in equipping bridges and cranes with this type of safety device if the operator is permitted to render it inoperative. The writer has observed an operator "sneaking" up on a limestone pile with wind velocities varying from 40 to 45 miles on a recording anemometer set to cut out at 35 miles and with the siren sounding constantly.

The modern type of acceptable rail clamps are usually tied in with the bridge travel controller so that the clamps set automatically when bridge travel ceases and release just before bridge travel begins with a time interval of 6 to 8 seconds required for the full movement of the clamps. In case of current failure, the clamps are self-setting either by the action of springs or weights and under all conditions the clamping power is entirely independent of the electrical circuits.

A typical rail clamp installation is shown in Fig. 1. Fig. 2 shows the mechanism of this clamp which is spring set entirely and motor released. The power for setting is supplied by heavy helical springs acting through a toggle and lever arrangement which greatly multiplies the spring push. Release of the clamp is accomplished by a motor-operated wire rope winch and multiple purchase sheaves arranged as a double fulcrum and located in the upper end of the clamp levers.

Controls for the rail clamp motors are interlocked with the bridge travel motors so that the rail clamps are set automatically in case of power failure and at all times except when bridge travel motors are operating. No adjustments are necessary on the clamp to keep it in working order. The entire weight of the clamp is carried on the supporting structure so that it never slides on the rail.

No adjustable parts can get out of order. The only replaceable part is the toothed insert which engages the rail, and several such installations have required no repair after 10 years of usage except a resharpening of the teeth.

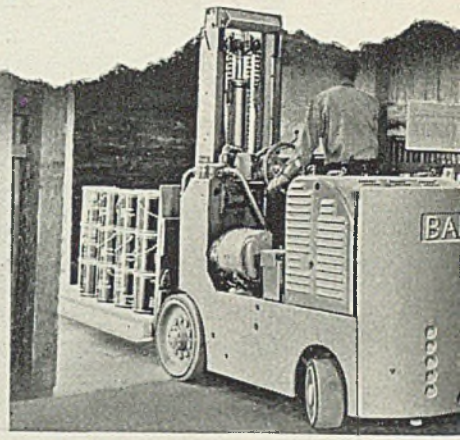
This clamp can be designed for a definite horizontal resistance as the strength of the compression springs can be varied to meet different pressure requirements. The clamp unit used on the heavy traveling gantry crane shown in Fig. 3 was given a test by placing a piece of rail in the clamp and attempting to push it through the jaws under a heavy press. The capacity of the press was reached without being able to budge the rail with a load on the end of the rail equal to 58 per cent of the total horizontal load at the jaws. Since in the design of such clamps a factor of only 25 per cent is used, it is certain that this type of clamp has a great reserve of clamping power. This clamp has been used successfully on three of the largest capacity bridges ever built and which are located in the Chicago district where exposure to the Lake wind storms dictated positive clamping. In these latest installations a geared drive replaced the rope drum mechanism for release of clamps.

In addition to the equipping of traveling bridges and cranes with adequate rail clamps periodic inspection and testing is advisable. Clamps are usually tested by energizing the travel drive with the rail clamps set and often up to the full horsepower of the travel motors. This is a fair sort of test, but not conclusive as the force supplied by travel motors designed to move the bridge against a wind velocity equal to 10 pounds per square foot of exposed vertical area is not sufficient to test clamps designed to hold the bridge against a hurricane of 30 to 45 pounds per square foot pressure, as generally specified. For adequate testing it will be necessary to provide a piece of equipment which will clamp to the travel track and, by means of hydraulic jacks or similar devices, exert a definitely measured thrust against the bridge. This method of testing would permit the application of loads up to or beyond those calculated to be exerted at the maximum wind velocities considered as a basis of design.

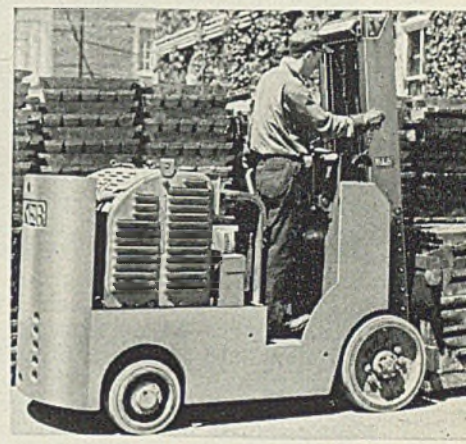
Fig. 3—All-welded screw luffing crane built with rail clamps

FULLER USES Baker Trucks TO HANDLE LEAD AND SAVE MONEY

1. Baker Telescoping Fork Truck tiering pallet loads of white lead in the Fuller warehouse. Loads weigh up to 4500 lbs.

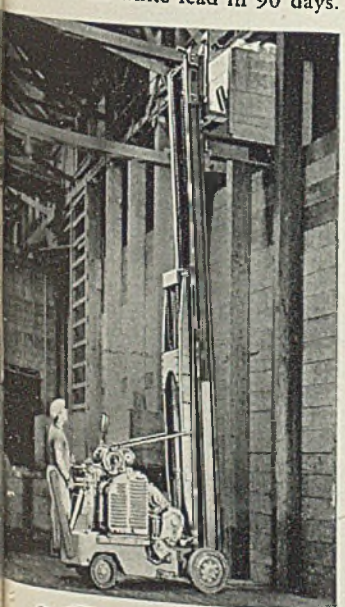


3. Baker Fork Truck handling pallet loads of white lead into cars from warehouse. Length of haul from 50 ft. to 200 ft.

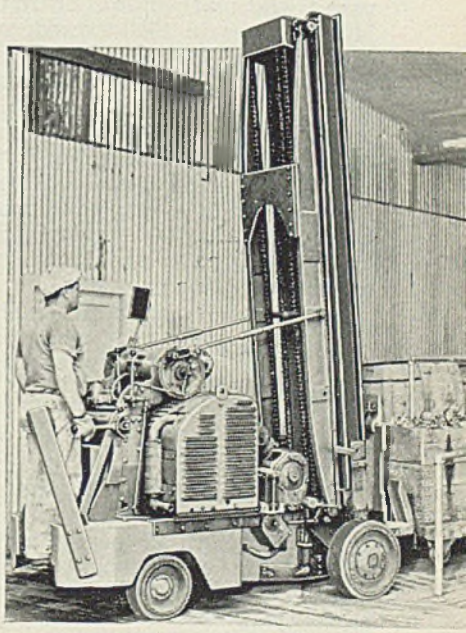


4. Baker Fork Truck handling pig lead from storage yard to remelting furnace. Loads run around 5000 lbs.—length of haul approximately 150 ft.

2. Stacking alternate layers of tanbark and earthen pots filled with remelted lead discs and acetic acid, to a height of 18 feet. Fumes from tanbark convert lead into lead carbonate for white lead in 90 days.



"The use of Telescoping Lift Trucks has resulted in the saving of several thousand dollars annually in our lead handling costs," says Mr. G. L. Gibson, general superintendent of W. P. Fuller & Co., South San Francisco, Cal. As in hundreds of other plants, these Baker Trucks are effecting savings over former methods by handling heavier loads, lifting them to greater heights, conserving man hours and cutting production time. Let us estimate savings possible in your plant.



5. Baker Fork Truck handling box loads of remelted lead from remelting furnace to stacks shown in photograph No. 2.

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By HERBERT E. FLEMING*

Fig. 1—Painting flux and placing copper rings in position in preparation for furnace brazing the aluminum gasoline tanks

A $300,000 modernization coupled with an open mind toward new equipment, new methods and new ideas has enabled Johnson Motors to change from being mostly an assembly plant to a point where now it manufactures about every part needed for its 10 models of outboard motors. While its number of productive employes has been tripled and thus overhead costs cut, not only have new lines of models been introduced each year, but the prices charged have been reduced greatly. For instance, in 1929 the lowest priced outboard motor in the line, a 1½-horsepower unit, sold for $125. A comparable though better motor in the 1941 line sells for $55. As a result, the unit volume of Johnson Motors sales in 1940 exceeded that of 1929 by 40 per cent.

In addition, it has put this plant in a position where it is able to make an important contribution to defense. It is now producing furnace-welded glycerine and alcohol tanks for windshield de-icing equipment on bombers. Also it is cutting gears and making parts for electric starters for warplane engines.

What has been accomplished in the last six years can be seen briefly from the following summary. Previous to 1935, all die castings, sand castings, magnets, bushings, bearings, gasoline tanks, gears, tools, dies and fixtures were purchased outside of the plant. To cut down overhead and do more of the actual production in their own plant, the manufacture of various parts on its own floors was introduced by years as follows:

1935—Gears, magneto magnets.

1938, first half—Bushings and bearings.

1938, last quarter—Furnace welding of streamlined aluminum gasoline tanks.

1939, first quarter — Diecasting aluminum cylinders, parts containing rotary intake valve for carburetor, connecting rod, and piston. Also hard iron sleeves were cast into the aluminum cylinders and bronze bearings into the connecting rod.

1939, latter part—Pistons and rods.

1923 to 1940—Replacement of overhead shafting and pulleys with individual drives on each machine.

1939—Added 30,000 square feet for a warehouse thus releasing that amount of floor space in the plant proper to accommodate additional manufacturing facilities there.

1940, summer — Added 25,000 square feet, to which service department was moved from main plant.

1940—Equipped, at cost of $60,000, a tool room employing 60 toolmakers.

Sand cast parts such as propellers and sleeves for engine cylinders and also other parts for the older models on which production is light are still bought outside. They are machined in the plant.

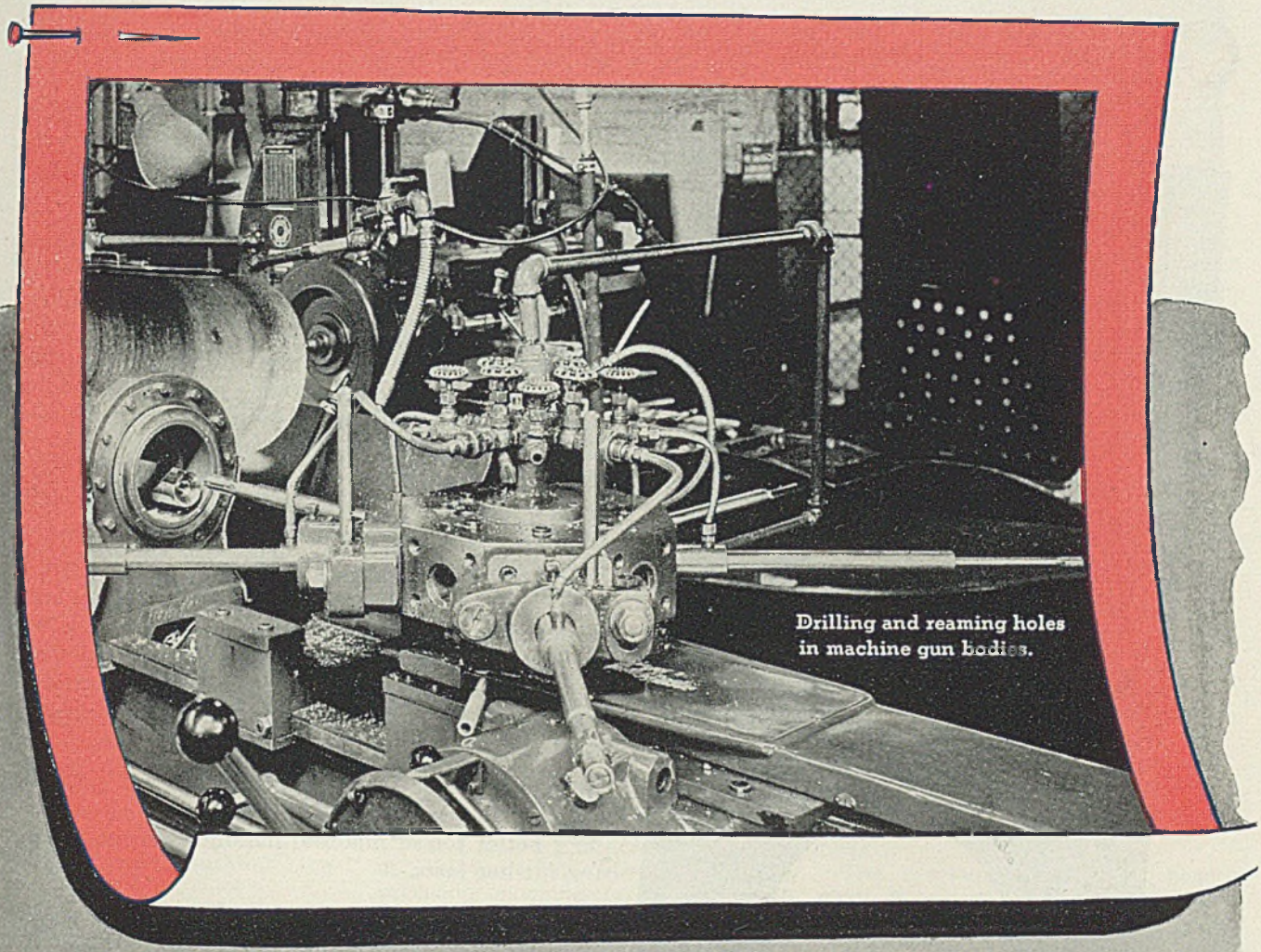
One of the outstanding features of product engineering was the introduction of furnace welding of gasoline tanks. New methods, new alloys, new materials, are being continually investigated. Hearing of experiments with furnace welding of radiator cores, the method was investigated and adapted to welding gasoline tanks for outboard motors. Previously this had been done by the slower process of hand welding with acetylene torches.

Each of these latest gasoline tanks is shaped somewhat like a large egg and surrounds space for the starter and power head of the outboard motor. Its top half or more overlaps its lower part, the shroud, which is like an oval basin.

Steps in furnace welding are as follows: The sheets that come to the plant for these parts are almost pure aluminum except that the inner side is marked to indicate that it is lined with aluminum containing 10 per cent silicon. This material will melt at a lower temperature than the rest of the sheet. Most of these parts are formed on a punch press, and then a flux is painted at the edges which will form the joints. See Fig. 1. Upper and lower parts are set together, and the tanks are pushed on trays into a high-temperature oven and left there during a heating cycle which melts the lining of the upper part and fuzes it with the rest of the assembly. As shown in Fig. 1 where these parts are being prepared, copper washers are inserted at certain points of the structure, also for brazing those portions while in the furnace.

Thus when aluminum glycerine and alcohol tanks for windshield de-icing of bombers were wanted, the

*Based on interviews with J. G. Raynlak, vice president in charge of engineering and manufacturing, Johnson Motors Division of Outboard Marine & Mfg. Co., and on visits to the plant at Waukegan, Ill.



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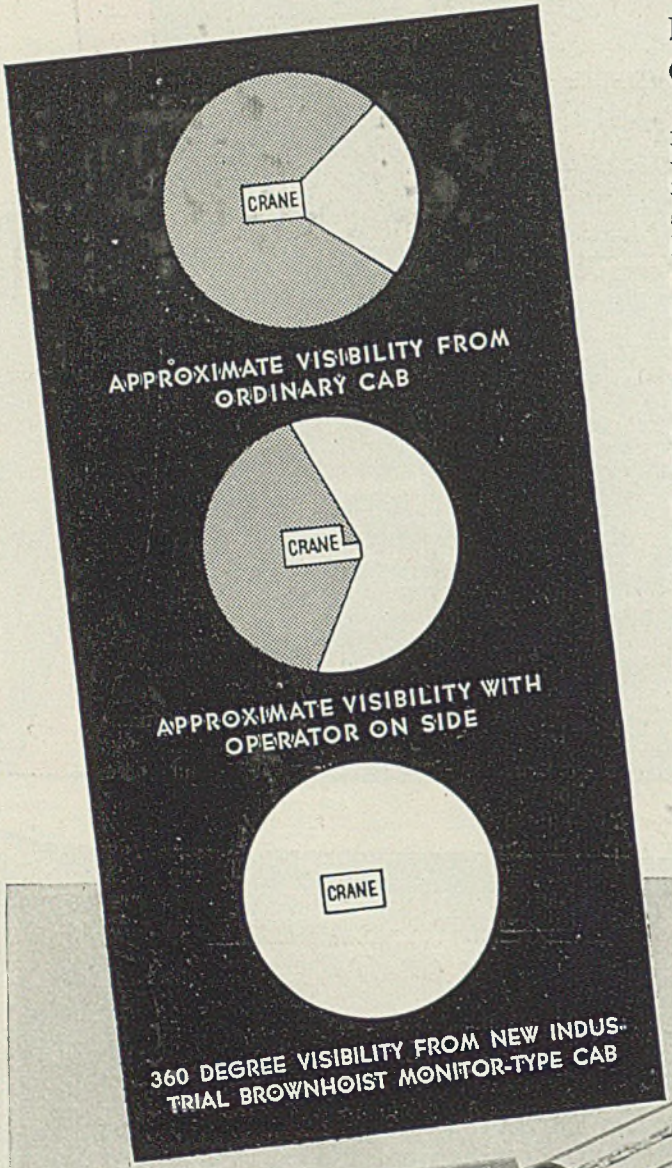

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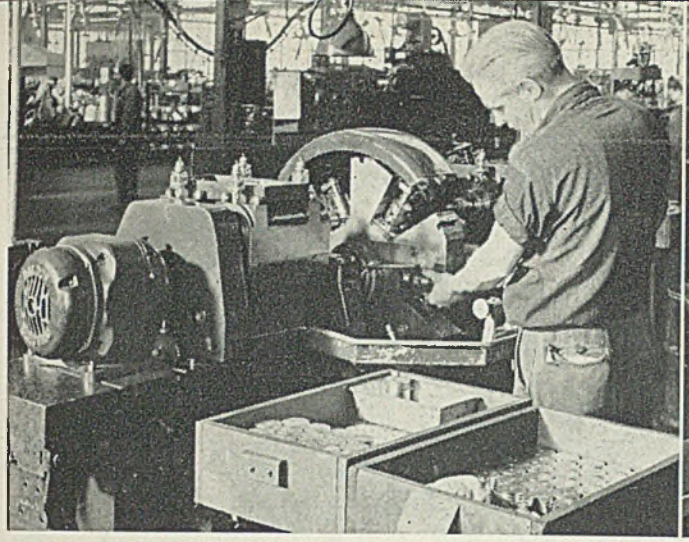


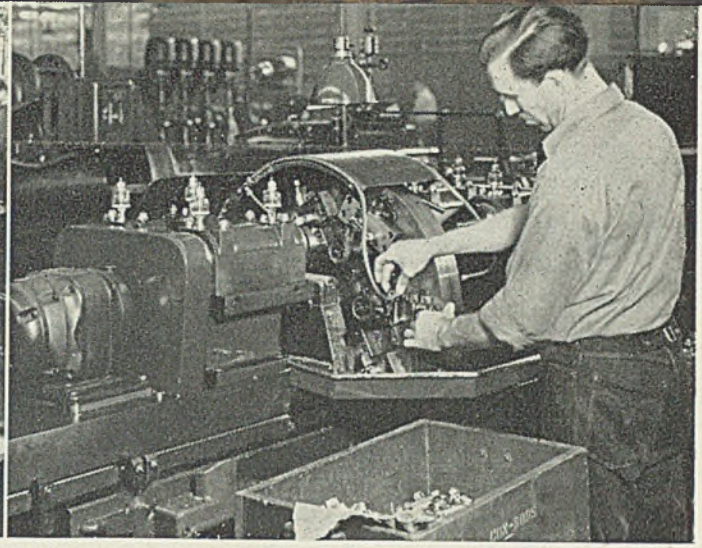


Fig. 2. (Left)—Special piston machine for accurately boring and finishing piston-pin holes (both sides) in small aluminum pistons for outboard motors

Fig. 3. (Right)—A special 4-spindle precision machine for rough and finish fly-boring of both ends of connecting rods for outboard motors

company already had a running start. Not only was the job done, but it was done on top of regular production. Other defense work includes gear cutting and heat treating as production of gears was one of the earliest portions of the modernization program. Similarly, die-casting with a battery of seven machines in their own plant has added to production efficiency.

For broaching bronze bushings and bearings, a unit is used which does this operation on three bushings at a time, thus increasing greatly the output on this part. Other special equipment has been installed for cutting piston-ring grooves accurately and for finishing the pistons.

Typical of these special machines is that shown in Fig. 2. This unit is a special machine for accurately boring and finishing the piston pin holes (both sides) in small outboard motor aluminum pistons. As can be seen from the illustration, a special indexing fixture is used in doing this work. The unit performs the operation under automatic control so the operator needs only load and unload the work at the unloading station and initiate the cycle of operations.

Fig. 3 shows another special set-up—this one being a special 4-spindle precision machine for rough and finish fly-boring of both ends of connecting rods. Here, also, a special rotating fixture is employed to index the work to the various working stations in the cycle.

These new machines have been more than satisfactory, a number of them having paid for themselves in less than one year. An overhead chain conveyor system also adds to the plant efficiency by helping to assure a smooth flow of materials through the plant and also by affording live storage at certain portions. For instance, at one point on the conveyor line beginning at a dip tank opposite a spraying booth, the conveyor winds around for 400 feet until it returns to that booth. It takes 4 hours for this trip, during which the sprayed piece travels 400 feet and dries completely.

The flexibility of the overhead chain conveyor system of handling has been valuable, too, for this conveyor system has been rearranged several times to accommodate relocation of machines and improved manufacturing sequences.

"Unscrambling" Device Sorts Metal Fittings

■ A device for "unscrambling" metal fittings used in lighting systems, or which can be used to sort all kinds of small steel or iron parts which have different effects on a magnetic field, is reported by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It was developed following an appeal by a manufacturer of malleable cast iron conduit fittings for apparatus that would sort out a mixture of heat treated and untreated conduit parts which looked alike.

The device was built by hooking up four pieces of electrical apparatus and winding two small hollow coils of fine wire. One piece of apparatus was an oscilloscope. When a fitting was inserted into one of the hollow coils a green line on the oscilloscope screen told whether or not it had been heat treated.

The test is based on the balancing of magnetic fields in the two coils. When treated iron was placed in a coil of wire carrying an electric current the magnetic field was increased more than when untreated iron was tested.

Machine Guns

(*Concluded from Page 62*)

up of metallic links, each composed of three staggered thimbles into which the cartridges are pushed by a hand-operated metallic link filler. Cartridges thus function as "pins" in a flexible chain, a thimble of one link fitting in between the aligned pair of thimbles of its neighbor and so on. This arrangement solves the problem of disposal since the individual links become separated again after they have served their purpose and drop away from the gun after the manner of the spent cartridges.

At the limit of the rearward travel of the bolt, the energy stored in the driving spring starts the bolt on its return journey. It may be recalled that on the rearward stroke of the bolt a cartridge was drawn out of the links by the extractor and forced down into the grooves in the face of the bolt. The curved portion of the ejector, well seen in the detail drawings of this part, now holds the cartridge in the correct position for entry into the chamber of the gun. No sooner has the cartridge entered the chamber than the extractor plunger 142 (see section on B—B of extractor assembly) riding on the cam 138 raises the extractor 137 as the ejector reaches the clearance cut in the side of the barrel extension, permitting it to swing out and leave the cartridge in the chamber.

As the bolt 51 D nears the end of its forward passage, it carries the barrel extension 24 C forward and with it the breech lock 61 which is forced to ride up the breech lock cam (see upper cross section of the gun) and engage the shoulder in the under side of the bolt, thus locking the latter to the barrel extension. If the trigger continues to be pressed, the sear spring holder 245, best seen in the section through the bolt, is pressed upward by the front end of the trigger bar. The sear spring holder, operating upon the sear, moves the latter sidewise, freeing the firing pin, which snaps forward and fires the cartridge.

ELECTROPOLISHING

Stainless Steel

. . . . . recommended baths and their operation; effect of varying the important factors of time, current density and bath concentration

By CHARLES L. FAUST
And
H. A. PRAY
Battelle Memorial Institute
Columbus, O.

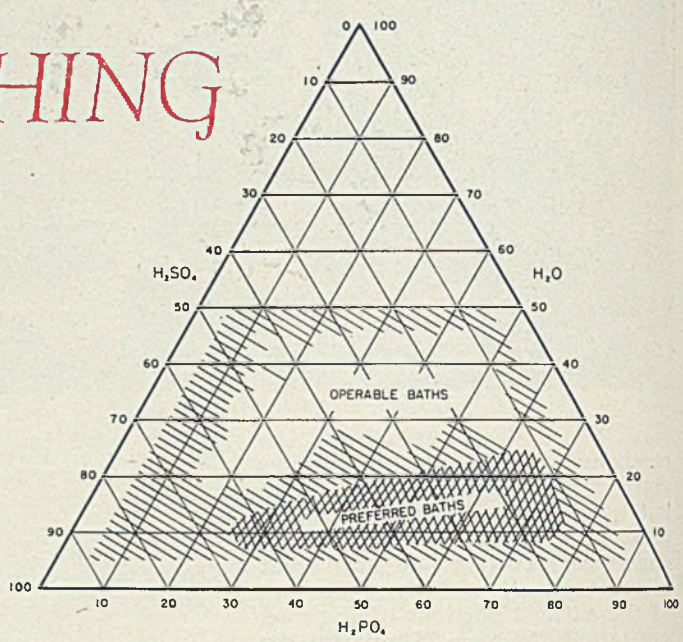


Fig. 1—Composition of sulphuric-phosphoric acid electropolishing baths for stainless steel surfaces

■ WHILE the methods described here relate primarily to the 18 per cent chromium, 8 per cent nickel type of stainless, they also are applicable to most commercial iron-chromium and iron-nickel-chromium alloys.

Principle of electropolishing is the reverse of electroplating. The work is made the anode and metal is removed rather than added. The actual result is comparable to wheel buffing rather than to wheel polishing. Minor surface irregularities are removed, while gross surface irregularities receive a brilliant and uniform luster. A certain amount of "smoothing" is secured since points or high spots are removed first by the action of the bath.

Electropolishing offers a new method for imparting a "finished" or a "quality" appearance to classes of work previously left unfinished because of a shape factor or extreme roughness. Thus it is particularly suitable for articles of complex shape as well as cast or sand-blasted articles which ordinarily involve extensive work for a brilliant finish. Not only can a brilliant surface be obtained on the roughest of parts but a range of unique and beautiful finishes from satin, to bright frosty, to mirror brilliant can be had.

Electropolishing baths are composed of sulphuric, phosphoric and chromic acids. Since sulphuric and phosphoric acids comprise the major constituents, these baths are termed the sulphuric-phosphoric type. Although chromic acid improves the electropolishing ability, sulphuric and phosphoric acid concentrations have broader influence on the overall results. Certain stainless steels can be electropolished in sulphuric acid alone but require current densities up to 2500 amperes per square foot and results are not uniform. Electropolishing in either sulphuric or phosphoric acid alone does not have commercial aspects.

cent sulphuric acid, 44 to 48 per When mixed, each acid exerts a beneficial effect on the other, the time is shortened and current densities lowered and a wide range of alloy compositions can be processed effectively. Concentrations and ratios of the two acids may vary widely.

However, Fig. 1 shows the various percentage ranges for operable baths and also the range for the preferred baths. Three preferred baths are as follows:

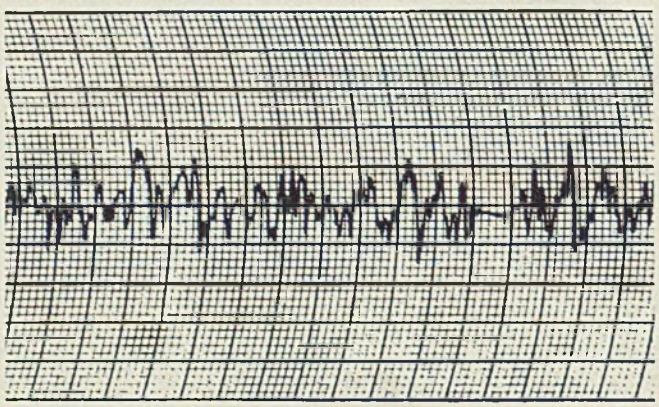
By weight 15 to 20 per cent sulphuric acid (H_2SO_4), 63 to 67 per cent phosphoric acid (H_3PO_4), with balance essentially water. This will be referred to as bath No. 1.

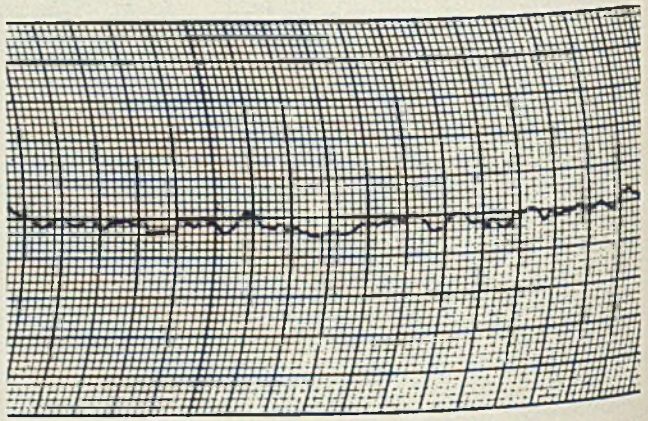
Preferred bath No. 2 is: 40 per

Condensed from a paper presented at the Boston convention of the American Electroplaters' Society, June, 1941, and published in full in its *Proceedings*.

Fig. 2. (Left)—Surface analysis chart of roughness remaining after wheel polishing with 120, 150 and 200 grit, dry. Horizontal magnification, 17 diameters; vertical magnification, 4000 diameters

Fig. 3. (Right)—Same surface as that shown in Fig. 2 but after electropolishing for a sufficient period of time to remove about 0.001-inch of metal from the surface. Note how the contour now is comparatively smooth. Same horizontal and vertical magnification





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cent phosphoric acid, with the balance essentially water.

Preferred bath No. 3 is: 60 per cent sulphuric acid, 30 per cent phosphoric acid, with balance essentially water. The above compositions do not preclude the presence of chromic acid, which is desirable in many cases.

An important variable in the bath is the water concentration, which should be held within a relatively narrow range.

Increasing the phosphoric acid content lowers the operating current density and tank voltage, while increasing the sulphuric acid content extends the current density range. The baths having 15 to 40 per cent sulphuric acid and 67 to 44 per cent phosphoric acid appear to have the wider range of operable current density. Note the three preferred baths listed are in this group.

Results are improved by the presence of chromic acid in amounts as small as 0.1 per cent by weight. For some alloy compositions, chromic acid is beneficial in larger concentrations, up to as much as 10 per cent.

Since all variables that control electropolishing are interdependent, it is essential in considering the effect of one variable that the others be held at specified values. Changes in operating variables which produce a change in anode polarization in the same direction have a similar effect on the electropolishing results. Thus a decrease in current density, an increase in temperature or an increase in water content decreases polarization. Therefore such a variation of these three factors similarly affects the appearance obtained.

Excellent results are obtained at current densities from 10 to 2000 amperes per square foot and even higher. The minimum practical current density for bath No. 1 given on p. 80, is 70 to 125 amperes per square foot; for bath No. 2, 150 to 250 amperes per square foot; and for bath No. 3, 250 to 500 amperes per square foot. The alloy composition and bath temperature determine the minimum current densities, while maximum current densities are determined by limitations in generator capacity, racking, tank voltage and tank cooling.

In bath No. 1, 18-8 stainless is electropolished at current densities from 100 to 500 amperes per square foot at 115 to 150 degrees Fahr. The same bath may be used to electropolish 18 per cent chromium as well as 29 per cent chromium, 9 per cent nickel stainless steels at 65 to 200 amperes per square foot at 170 to 190 degrees Fahr. When operated at 195 to 285 degrees Fahr., this bath will electropolish the 12 to 13 per cent chromium alloy that is used for cutlery stainless steel, requiring 125 to 250 amperes per square foot. The 13 per cent chromium and 18 per cent chromium types of stainless also are electropolished at 150 to 250 amperes per square foot in bath No. 2 at 170 to 195 degrees Fahr.

In general the alloys of higher chromium-nickel ratio require electro-polishing at lower current densities and higher bath temperatures.

Temperature is an important variable owing to its effect on anodic activity. The operable temperature range for each current density and bath is sufficiently wide for commercial control, generally being within 10 to 20 degrees Fahr. of the specified value. Actual operating temperatures are within the 80 to 300-degree Fahr. range and generally from 110 to 200 degrees Fahr.

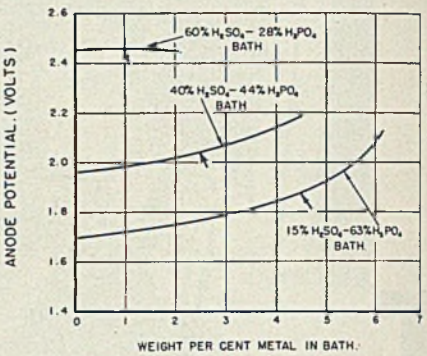


Fig. 5—Anode potential of electropolishing of 18-8 stainless in three different baths at various concentrations of dissolved metals; 250 amperes per square foot current density; bath at 112 degrees Fahr; voltage measurements referred to saturated calomel electrode

A large increase in temperature increases the anodic activity (decreases polarization and increases diffusion rate) so a higher current density is required.

Excessively high temperatures cause the electropolished surface to be "pebbly" although very lustrous. It also may result in a dull, pitted or even an etched surface in extreme cases. These same symptoms may also partially result from too high a water content, in which case a lower temperature is required.

Good "throwing power" in electropolishing is identified with uniform thickness of metal removed. Consequently the excellent throwing power of the sulphuric-phosphoric baths results in production of a uniformly brilliant finish on articles formed, stamped or cast to odd shapes that would be almost impossible to buff mechanically. This ability to "polish" recessed surfaces is one of the most important features of the process.

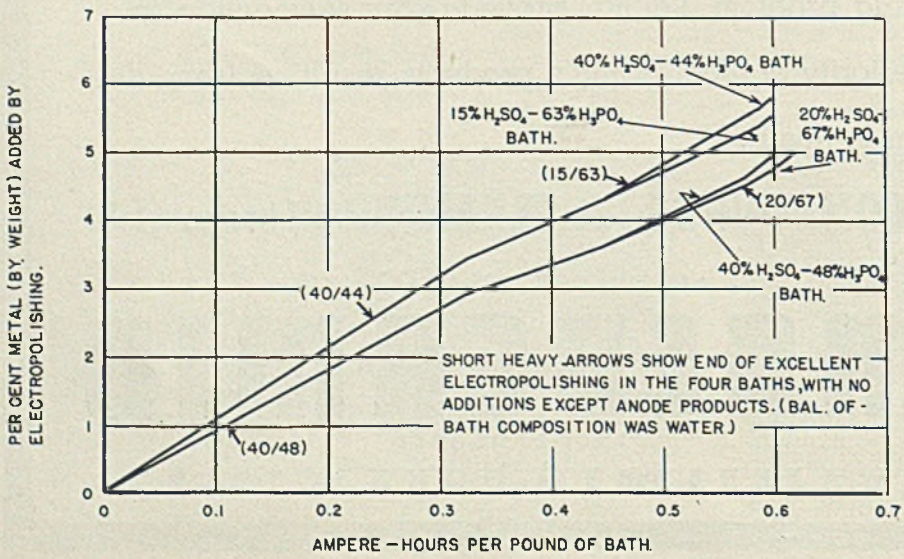
Tank voltage is within the limits of commercial operation with 12-volt electroplating generators. While current density can be set approximately by adjusting the tank voltage, current control is to be preferred.

The starting surface determines the final appearance that can be produced by electropolishing. The process removes the fine irregularities before appreciably smoothing the larger ones. All smoothing effects require the removal of a metal layer that is thicker than the depth of the irregularity. Removal of metal from the top of scratches is faster than from the furrow as is illustrated by Figs. 2 and 3, p. 80, which clearly show this "smoothing effect."

Some agitation during the process improves results because it changes the gas flow from a continuous straight line to an eccen-

(*Please turn to Page* 101)

Fig. 4—Shows rate and amount of metal content of various sulphuric-phosphoric acid baths during electropolishing of 18-8 stainless. Per cent metal is based on initial bath weight



Right: It's a quick conversion from tongs or bucket to a magnet for handling scrap.

Below: Handling billets—the Northwest made storage space available that would otherwise be costly to use.

Left: Handling coal here again the Northwest made expansion economical.

Below: It has saved us thousands of dollars on all kinds of odd jobs, including new construction.

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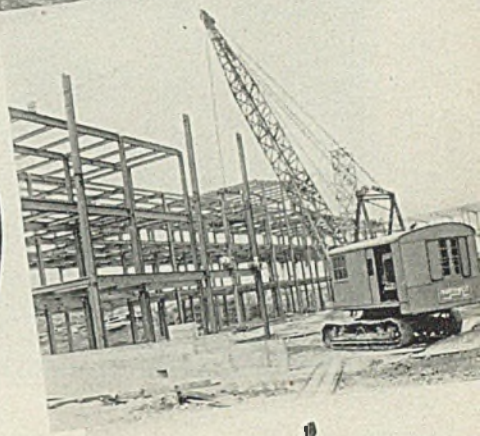

Right: Loading boxed or crated goods—no other type of equipment could do this so smoothly.

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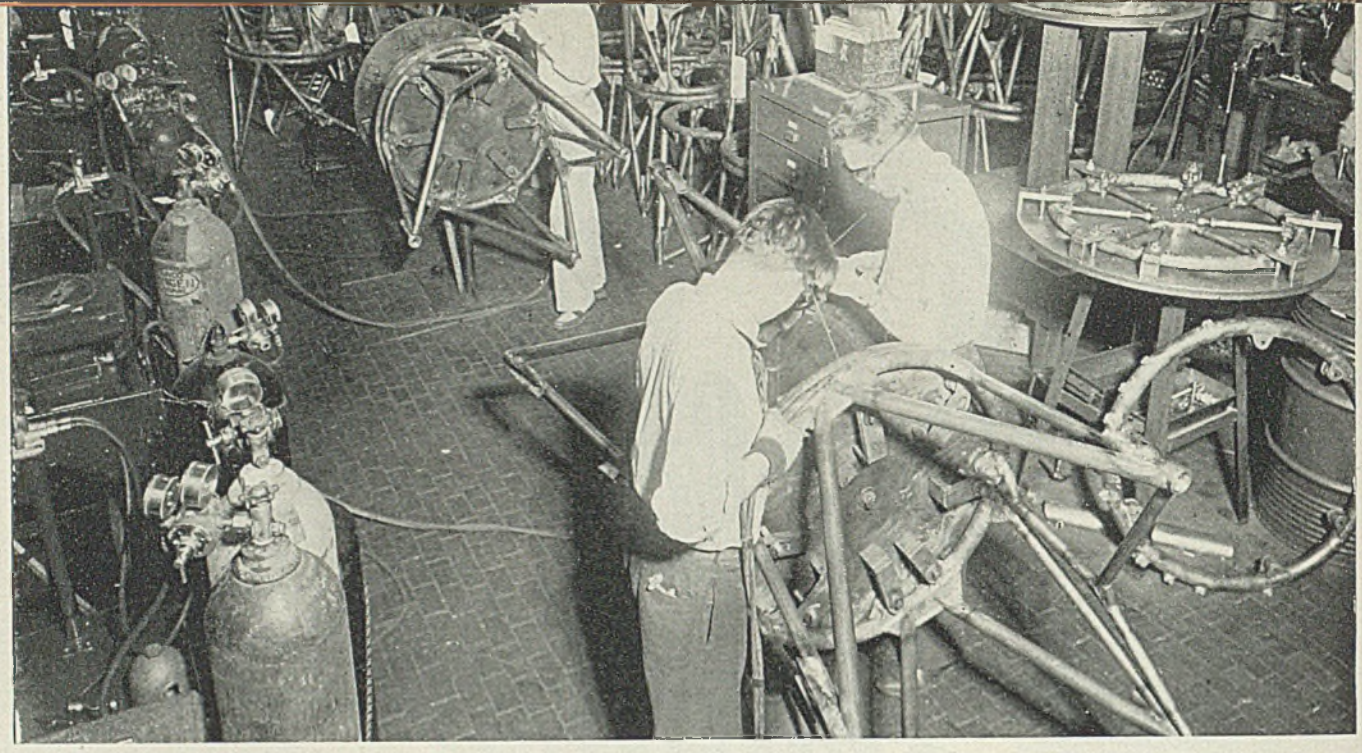


Fig. 1—A Harrison rotating jig for welding engine mounts at the Glenn L. Martin Co. plant, Baltimore. Two operators work on separate mounts, both of which are supported from a single floor stand. Note jig head at extreme right with parts clamped into place ready for welding

Gas and Resistance

WELDING

The Aircraft Alloy SAE X-4130

By HAROLD LAWRENCE
Welding Engineer

■ GENERAL welding characteristics and properties of SAE X-4130 as well as recommended procedure for arc welding it were given in STEEL, Nov. 3, 1941, p. 90. Here are outlined the factors involved in gas, resistance and atomic hydrogen welding this material, a discussion of welding jigs and fixtures, and procedure for heat treating the finished weldment.

Just as with arc welding, there is a definite place for special methods and equipment in the welding of SAE X-4130 steel by the oxyacetylene process. The same light sections and the identical combinations of thin tubing with thicker gusset plates will be found. And the identical need exists for perfect welds able to withstand high stresses.

The regulation of the welding gases is quite important to maintain a proper flame. No abrupt changes in the flow of either oxygen or acetylene can be tolerated. To assure a smooth, even flow of gases, most airplane plants resort to manifolds for oxygen cylinders with automatic acetylene generators of ample capacity. The two gases are carried to the welding stations through pipe distribution systems. Good regulators usually of the single-stage type guard the pressure and flow of the gases to the torches at the individual operator stations.

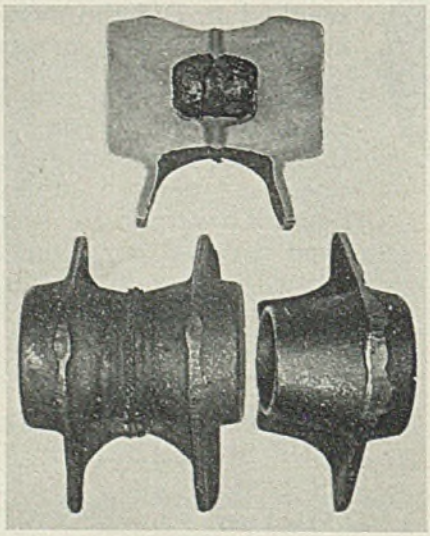


Fig. 2—Butt-flash welded engine mounting brackets, before and after welding and a cross section of welded pair. These were welded by machine shown in Fig 7

This arrangement allows the use of single-stage regulators at the piping outlets, relying upon large two-stage regulation at the manifold or generator to keep the lines at proper pressure to assure a uniform flow of welding gases.

For the oxyacetylene welding of aircraft structures, special torches have been developed, light in weight to permit steady use in all positions without operator fatigue. The need for quick, easy adjustment of the flame has brought designs that permit rapid adjustment of the flame during welding.

Torches and tips are further designed to give the particular type of flame that has been found most desirable in aircraft work. A long pointed flame enables the operator to secure a good, digging penetration when he is faced with the necessity of getting good penetration without excessive melting of a thin tube.

Although a neutral flame appears to be the most desirable, there is sufficient argument for a slightly carburizing flame to make its use worthwhile. It is difficult to set and maintain a strictly neutral

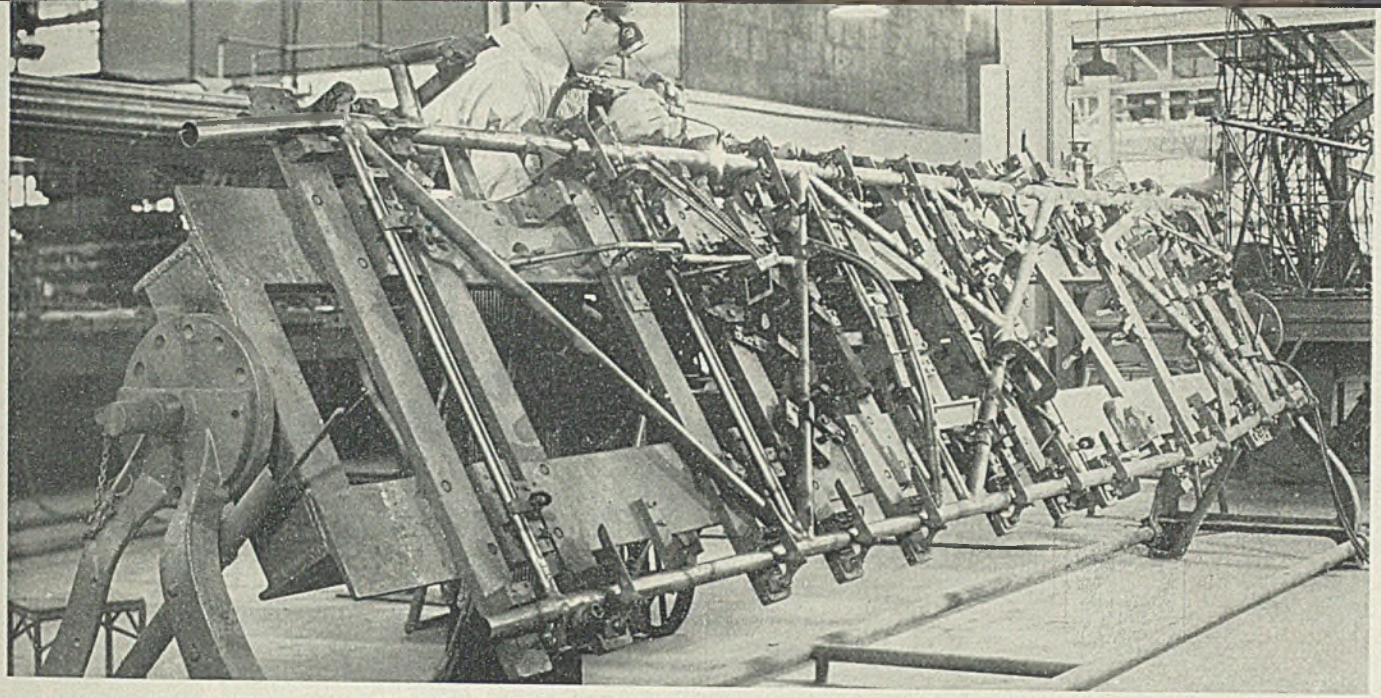


Fig. 3—Welding jig for side frame of Vought tubular fuselage. From **Aircraft Tubing Data** by Summerill Tubing Co., Bridgeport, Pa.

flame at all times. Since a slightly carburizing flame does no harm, in contradistinction to an oxidizing flame which may weaken the joint, there are many welding engineers who insist upon the carburizing adjustment. The slight amount of carbon deposited lowers the melting point of the steel and leads to better fusion.

Two types of filler metal are in favor—mild steel rods and alloy steel rods. The choice is dictated by the treatment of the weldment after welding. If used in the as-welded condition, mild steel filler metal is sufficient. Where heat treated after welding, the choice may well be an alloy rod. Too, the alloy rod is well suited to welding heavier sections where the dilution is little compared with that to be found in the welding of very thin sections.

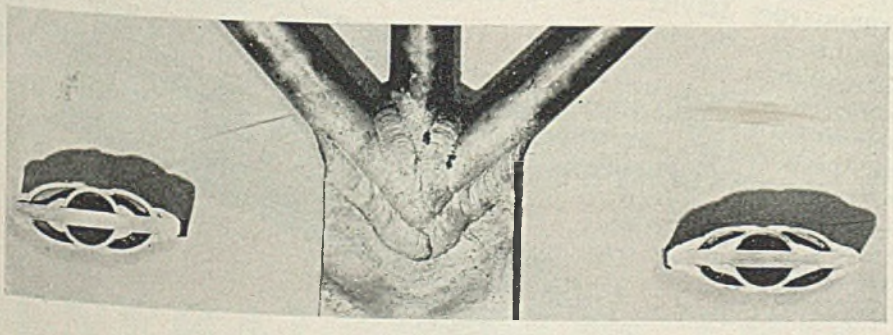
Techniques of welding with the oxyacetylene process in aircraft work are quite similar to those found in the welding of heavier structures. The usual forehand and backhand techniques are augmented by another approach known as scale welding. As a general rule the forehanded method predominates in aircraft work.

Particular care is demanded of the welder when using the forehand technique to make sure that he melts the sidewalls of the joint as he progresses. At all times the metal must be melted ahead of the flowing pool formed by the filler metal and the joint sidewalls. Never should the pool be permitted to flow ahead as imperfect fusion will result. Whereas lack of fusion is always to be avoided, the crime is much more serious in aircraft work.

In the backhand method, greater speed is possible and fusion is likely to be more certain. Here the torch is working on the sidewalls before the filler metal is brought into play. The finished weld may be a little rougher than that turned out by the forehand method, but the quality is every bit as good.

Scale welding is an aircraft technique that finds limited application when thin gage metal is to be welded with a minimum of distortion. Here the torch is used to melt the steel and deposit filler metal until a layer has been deposited. Then the torch is withdrawn slightly to allow the metal to solidify. Again the torch is played on the joint with more filler metal being added. This is repeated until the desired amount of filler metal has been added to complete the joint.

Fig. 4—Stress tested welded joints between tubing and plate. Note how plate strengthens the joint. Cross sections show center tube was welded first with other two tubes placed over and subsequently welded. Lockheed Aircraft Corp., Burbank, Calif., photo



In oxyacetylene welding, the torch supplies the heat and the protective atmosphere. There is much need for protecting the cooling metal from the oxidizing gases of the atmosphere, necessitating good procedure control. The skilled welder plays the outer flame of the torch on the weld until the metal has cooled to a dull, black heat. For the completion of every weld and every tack, the welder plays the protecting gases of the flame over the cooling metal until all chance of harmful gas solution is passed.

The dissimilarity of section thickness common in aircraft work calls for special treatments. Where heavy gussets and reinforcing plates are used, the heavy part must be thoroughly preheated before welding is undertaken. Quite often another welder or a welder's helper may do this preheating. The heavy material is heated to a good orange color before the weld is started. Sometimes the design necessitates the use of two men during the entire weld. One man plays his torch on the heavy part while the other man completes the actual weld. Much skill is brought into play as the very thin tube and the comparatively thick plate are joined in a perfect bond.

No particular preparation of the parts to be welded is undertaken. The regular rules of cleaning the joints of all dirt, rust, scale or grease are observed. Most of the parts are joined without grooving, although bevelling material over ⅛-inch thick is usual practice. There is a diversity of opinion on the included angle of bevel with generous figures such as 75 and 90 degrees predominating.

Shrinkage is an important consideration for two reasons—keeping within tolerances and avoiding large

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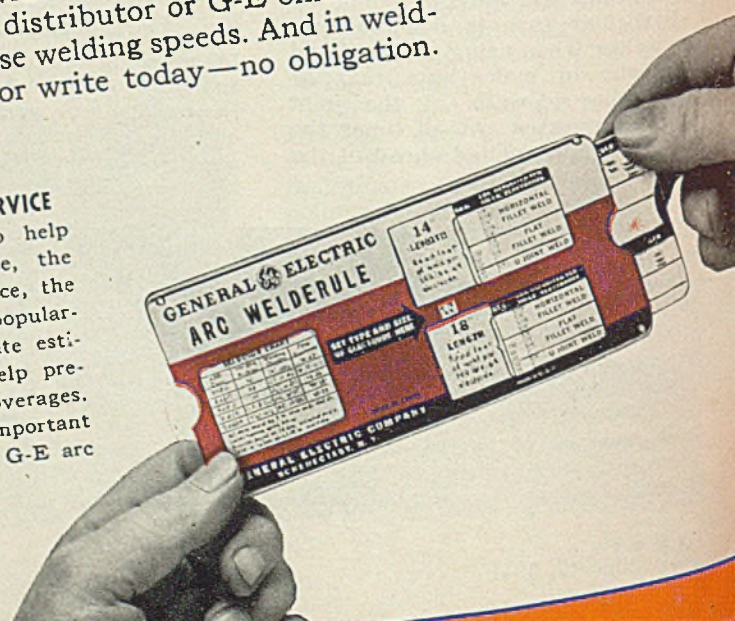

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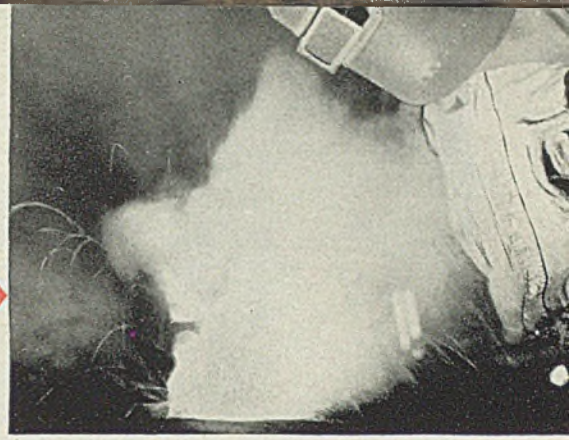

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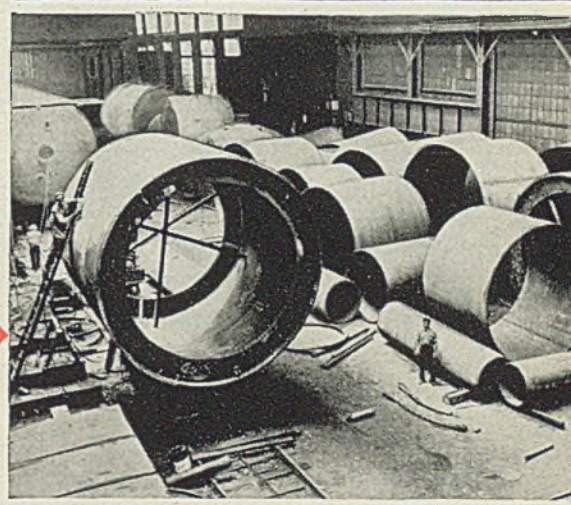

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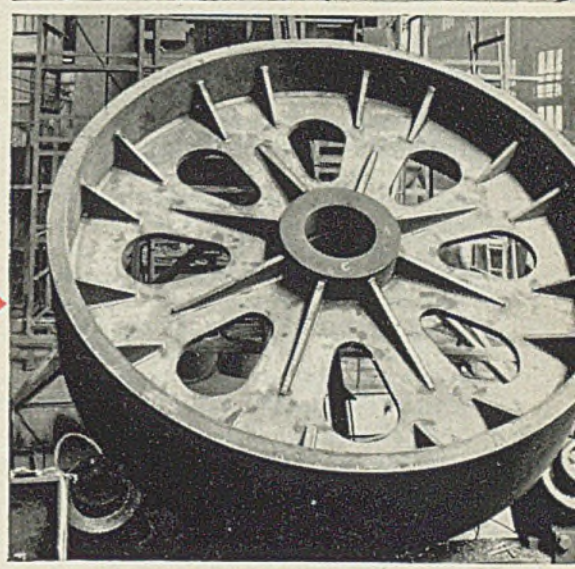

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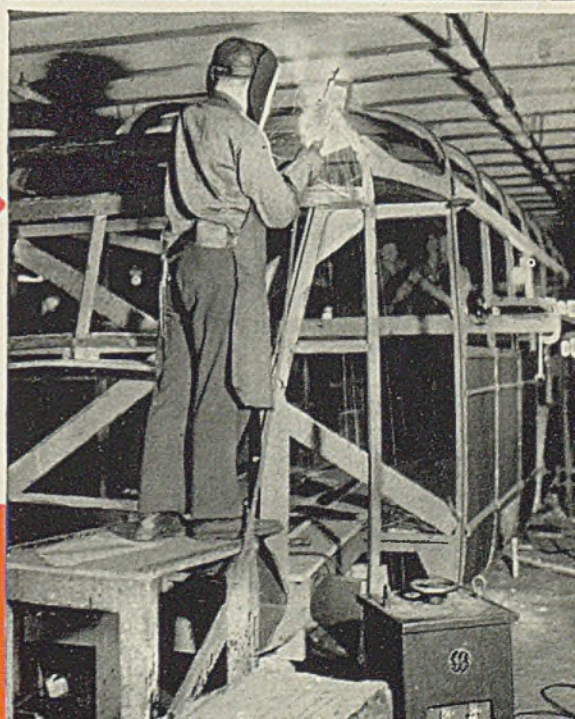

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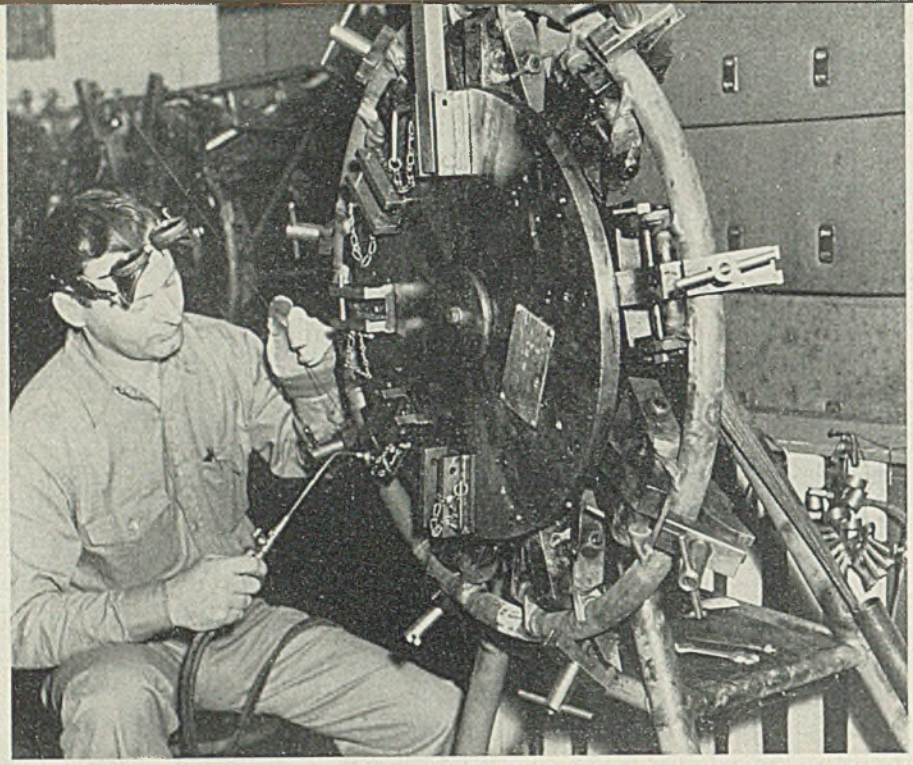

Fig. 5—Engine mount welding jig of single operator type as used at Lockheed Aircraft Corp., Burbank, Calif.

locked-up stresses. To hold to desired finished dimensions, sufficient allowance must be made for the shrinkage that takes place during welding. This varies from 1/32 to more than ⅛-inch, depending upon thickness of the parts. Gaps are left in the joints to bring the final dimensions within the desired range.

Locked-up stresses are particularly undesirable where flying stresses are likely to be added. Normalizing and heat treating the completed weldment is the only way to avoid such difficulties. Intelligent observation and planning, however, can lead to weld sequences and spacing of parts that will keep the degree of locked-up stresses to a harmless minimum. Much has been done along this line by studying actual parts during welding.

Great gobs of excess weld metal are to be rigorously avoided in aircraft work. The thickness at the weld should never exceed 1¼ times that of the material being joined. Extra metal above this amount prevents the smooth flow of stresses through the joint. Some buildup is needed, however, as the lower alloy content of the weld metal may require a little extra thickness for strength purposes.

Thorough penetration in all joints is a basic requirement. The torch is manipulated to produce a small hole or widening of the joint along the route of welding. Here the penetration will be complete.

Six Points To Watch: Before going on to a consideration of jigs, which are so important in either arc or gas welding of aircraft structures, there are six points that must be watched during any airplane welding work:

—Welding must be performed at a speed slow enough to guarantee the melting of the base metal to promote thorough fusion. Welds depend for their success upon perfect admixing of filler metal and parent metal. Laying filler metal into a joint without actually welding it in place cannot be tolerated.

—When welding materials of varying thicknesses, the thicker metal must be preheated. Sometimes the application of heat from a second torch is needed to make a sound joint. Too great a disparity in the thicknesses of the materials must be avoided as welding may then be impossible without oxidizing or burning the thinner material.

—Start all welds away from the edge of the joint and weld toward the edge. Cracks are prevented from starting by this procedure. At the same time enough metal must be deposited to afford sufficient strength in the joint until the weld is completed. Thin tacks often lead to cracks.

—If the welding is done with the joint under tension, a crack may appear when the metal cools. Jigs should be planned to keep the parts substantially load-free until the welding is finished.

—Do not begin a weld on a heat-treated part of high strength. The parent metal should be annealed, perhaps only locally, before the welding heat is applied. Otherwise a crack may result.

—Bent parts are straightened by heating the convex portion of the bend. Although this practice may be followed with safety on occasion, it is far better to design the work to eliminate any warping or bending in the first place. Extra heat may anneal the structure and thus detract from needed strength.

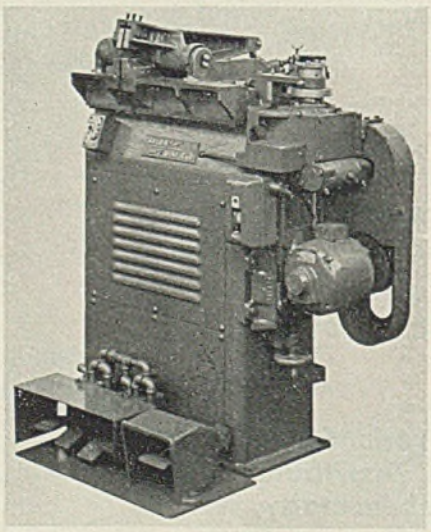

Fig. 6—Unit similar to that in Fig. 7 but adapted for butt-flash welding of clevises and other fittings to control tubes or rods. Foot lever controlled

Butt Flash Welding: At the present, arc and gas welding are used most widely for the steel parts of the aircraft structure where SAE X-4130 predominates. However, butt flash welding is coming to the front rapidly as airplane manufacturers become conscious of the need for mass production methods.

Butt flash welders are finding a place for themselves in a number of operations, especially in the welding to control tubes or rods of clevises and other fittings. Another type of machine has been developed for welding aircraft engine mounting brackets. Still another is being built for welding engine valves. And yet another is being assembled for the welding of landing gear assemblies.

Typical of the tests conducted on butt flash welds is the following where ½-inch outside diameter SAE X-4130 tubing is butt flash welded to SAE 1020 steel end attachments. The tubing has a 0.035-inch wall. No. 1 test broke in clevis at 4870 pounds. No. 2 test broke in clevis at 4500 pounds. No. 3 test broke in threaded stud 3575 pounds. No. 4 test broke in threaded stud 3150 pounds. These were straight tensile tests on parts that were normalized after welding. *In no case did a weld fail.*

Atomic Hydrogen Welding: In using the atomic hydrogen process for welding SAE X-4130, no particular differences from the welding of ordinary steel are noticed. Filler metal has about two points more of carbon than the parent metal to allow for the loss that takes place during welding.

As in oxyacetylene welding, preheating is often desirable. A separate source may be used for the preheat in some applications while the heat of the torch may be suffi-

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cient in other instances. Also as in straight gas welding, it is desirable to maintain the protective atmosphere of the gas stream around the part until it cools to a black heat.

Spot welding finds but limited use in welding SAE-4130 steel. The air-hardening properties of the material together with the stresses set up in larger sections during welding lead to cracks when multiple spot welds are attempted. For this reason the best applications of spot welding are found in the stainless steels and in the nonferrous metals rather than in this alloy.

Jigs and Fixtures: Whereas jigs have been of tremendous value in many welding operations, these devices have certainly come into their own in the aircraft industry. Jigs are relied upon to perform a multiplicity of duties that yield a finished welded structure of uniform strength, of consistent cost and of regular dimension.

Most airplane plants maintain separate departments where the many jigs are designed and built. For the most part, they are unpretentious, being built of odds and ends of scrap steel, but yet strong enough to hold the parts in alignment and light enough to enable the welder to position his work quickly.

In designing a jig, there are a number of important considerations to watch. Because SAE X-4130 steel is air hardening, jigs must be constructed in a manner that will keep large masses of the jig away from the weld. Otherwise a quenching action will result with the formation of a detrimental hardened zone alongside the weld.

Although vertical and overhead welding is possible on aircraft materials, the same reasons of cost and quality that preclude its use on many ordinary structures also exist here so each jig is built to allow positioning for downhand welding. This allows the welder to use his whole powers of concentration for joining the metals together, speeds the placing of the weld metal, allows assuming a comfortable working position, etc.

Jigs are usually provided with quick acting, positive clamps to hold the parts in proper relationship prior to welding. Clamps are located to leave all welding accessible while providing ample strength to keep the parts from moving during the expansion and contraction that takes place.

Too much reliance must not be placed in a jig. Quite often the tendency is to get too enthusiastic about the ability of jigs to produce parts within the specified dimensional limits. Unless enough attention is given to designing jigs within the limits of their capabilities, some expensive scrap is likely to result. Frequently the most economical approach is to hold the pieces a bit oversize in the jig depending upon a final machining operation to take care of the last few thousandths to bring the part to exact size. The overall expenditure of labor in this scheme is bound to be less than where too heavy a load is placed upon the work of setup men and welders.

All too often a jig is called upon to do work for which it was never intended—assembling pieces incorrectly machined. Since it is every bit as easy to machine a part to exact dimensions, there is no excuse for sloppy machining in the belief that welding will rectify any irregularities in dimension. Good machining before welding has a way of lowering both the labor and the overhead accounts while getting finished work off the line much more quickly.

Avoiding Arc Blow: Jigs for arc welding call for another special consideration. Arc welds are subject to magnetic glow as aircraft welding is done with direct current. Sufficient room must be allowed between the jig and the parts to be welded to avoid the setting up of an undesirable condition of magnetic interference with the arc.

Since SAE X-4130 is white-short above 2000 degrees Fahr. (lacks strength in tension), the jig designer must lay out his jig with this fact in mind. Expansion and contraction of the welds must be controlled by the jig in a manner that keeps tension stresses away from white-hot alloy steel. The best jigs keep a slight compressive force on the joint while it is in the weak state.

Heat treatment of SAE X-4130 aircraft weldments places the structure in the desired physical condition. Stress relieving is practiced on some parts (more properly normalizing when the higher temperatures are met) while full heat treatment for high strength is performed on others. However fuselages, wings and control surfaces have been placed in service in the as-welded condition without any service failures ever having been traced to this practice. Stress relieving of this alloy is carried on at temperatures between 1200 and 1650 degrees Fahr.

Quenching followed by tempering is performed on landing gear struts, tail wheel supports, center section struts and highly stressed parts of the fuselage and fittings. Best procedure is to use vertical furnaces with quenching tanks positioned immediately below them. Usually the furnace is elevated so the quenching tank may be wheeled into position immediately below the furnace bottom door. This allows a number of different quenching media to be used interchangeably where desired.

At the soaking heat, many of the light structures tend to warp. For this reason, special supports and jigs are provided to maintain the shape of the parts through the heat-treating cycle.

Another small point that must be taken into account is the provision for the escape of air from the tubular structures during heat treating. Some units must be air tight after welding. This factor as well as the release of air during heat treating may be provided for by drilling a hole, applying air under pressure, then testing all welds with soap suds. This will reveal any leaky, and thus faulty, welds and also allows the expanding air during heat treating to get out. More than one plant has witnessed the removal from the furnace of misshapen, sausage-like assemblies where someone neglected to drill the essential air hole.

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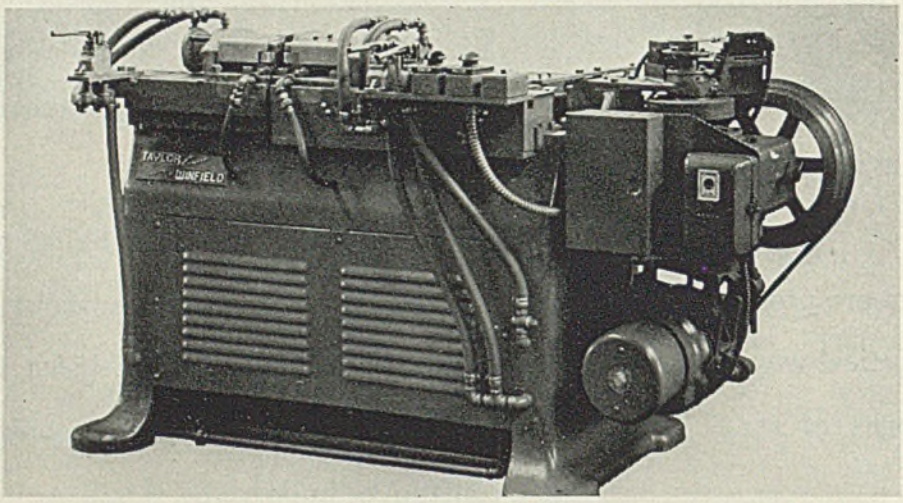
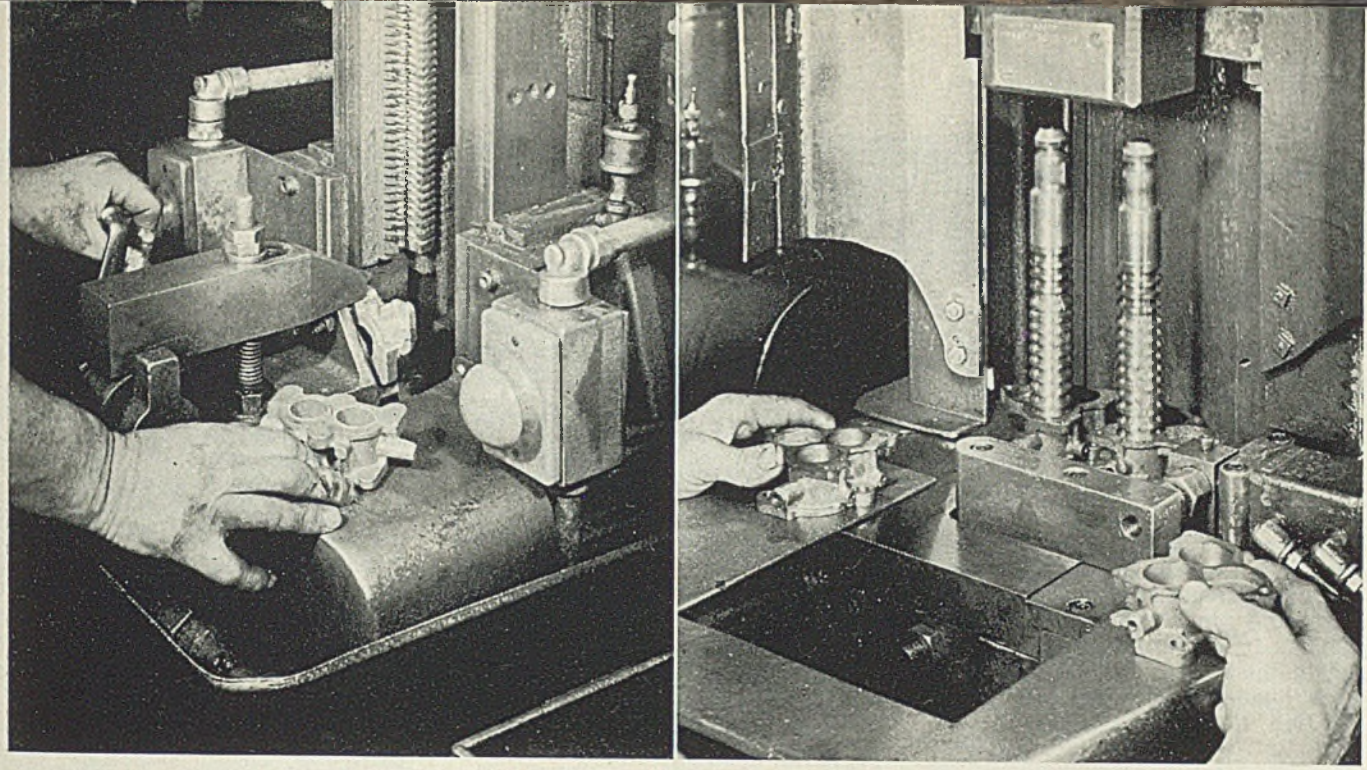


Fig. 7—Taylor-Winfield type B-9 motor-driven butt-flash welder with hand controls and special air-operated clamping fixture used to weld parts shown in Fig. 2



View at left shows a cam-operated vise holding the parts against the saddle of a Colonial pull-down broach in the act of snagging the flash from both ends of the carburetor throttle bodies

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provides more uniform fuel mixture for carburetors

■ TYPICAL operations which bring out the diversity of purposes to which the modern broaching machine can be adapted are clearly shown by two broaching operations being performed at the Milford, Mich., plant of Ford Motor Co., where carburetors for Ford and Mercury cars are manufactured. Both operations here are performed on the cast-iron throttle body of the carburetor—in this case a dual downdraft type.

A press broaching machine is used to "snag" the flash from the outermost ends of the throttle body previous to the first machining operation. "Snagging" was formerly done by hand, making it necessary to locate the part for the first machining operation from the rough surface of the casting. Broaching now provides a finished pair of surfaces to close dimensions. The amount of metal removed, including the flash, ranges from 0.015 to 0.060-inch. The productive rate averages 9 per minute or 540 per hour.

In the second application, broaching solved a peculiar problem having a direct bearing upon the performance of the carburetor in actual service. To obtain uniform distribution of the fuel-mixture to all cylinders of the V-type engines, absolutely identical diameters of the two holes through which the mixture passes is required. A variation of as much as 0.0002-inch between the two holes is considered enough to alter the accuracy of mixture distribution.

Preliminary tests showed that no matter how accurately alike two separate broaches were or how accurately the parts were held in a fixture, the allowable variation between the two holes was exceeded. Only by using the same broach for both holes could they be held within 0.0002-inch with one another. A larger variation between different throttle bodies was permissible, however, since adjustments for such differences could be made in manufacture of other parts.

To meet this requirement, and at the same time obtain sufficient production, the broaching machine carries two broaches so that two holes are broached simultaneously, but in two different throttle bodies. The same broach machines both holes in the same throttle body merely by providing a means of relocating each part in two positions on the platen of the machine. The operator repositions each part once in each pass of the broaches. One part is thus broached for each pass, the productive rate averaging around 250 pieces per hour.

In this operation a Colonial pull-down type broaching machine of 4 tons capacity and 24-inch stroke is used. The broach is of the built-up type, consisting of a series of high-speed steel half sleeves for rough and semifinished cutting and four tungsten carbide rings for final sizing. Its effective cutting length is 8 inches—overall 20 inches. The holes are finish broached following a rough reaming operation.

Markets Any-Angle Vise as Separate Item

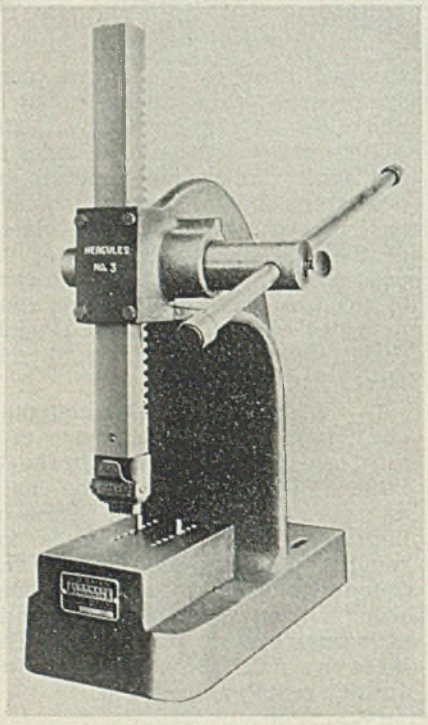
■ The Any-Angle tool vise to facilitate grinding chip-breaker grooves into tips of carbide tools and formerly furnished only as part of the Hammond 4 chip breaker grinder is now being offered as a separate unit by Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich.

Complete in itself, the vise is mounted on a lug base which is easily affixed to a machine table. It is constructed on a double-cradle principle permitting adjustment of grinding angles on three separate planes. Each block of the unit tilts 15 degrees either way from horizontal, and this adjustment combined with 360-degree selectivity of the circular piece at top provides almost any angle desired.

Industrial Equipment

Stamping Outfit

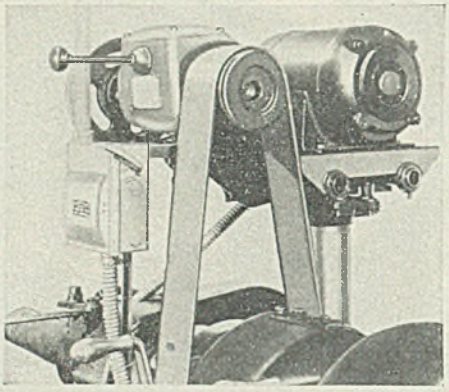
■ Acromark Corp., 251 North Broad street, Elizabeth, N. J., announces a new complete stamping outfit for stamping numbers into defense parts. It is suitable for numbering name plates, tool checks, workmen's badges, metal or fiber identification tags, gears and innumer-



able other items. The outfit consists of a precision constructed arbor press having a square ram, the latter being fitted with a press style type holder holding any number of pieces of interchangeable type up to the capacity of the press. The stamping block of the unit is cast iron, machined and finished smooth and parallel with the type face. It also has guide pins for locating the mark on the part to be stamped.

Transmission

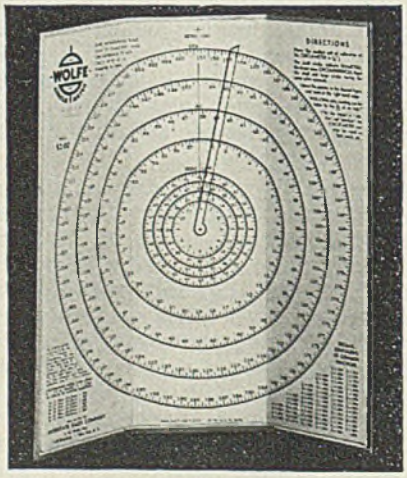
■ Western Mfg. Co., 3428 Scotten avenue, Detroit, announces a new improved Master transmission for use in motorizing cone pulley, belt-driven machine tools. More compact, and with its shifting lever moved into the main body of the transmission more positive action is available. The model is used with 1/5-horsepower motors. It is built for heavy loads with transmission case and covers of semisteel castings



that are oil-leak proof. The gears and spline shafts are of alloy steel. All revolving shafts are mounted on antifriction bearings. Moving parts run in an oil bath.

Angle and Circle Meters

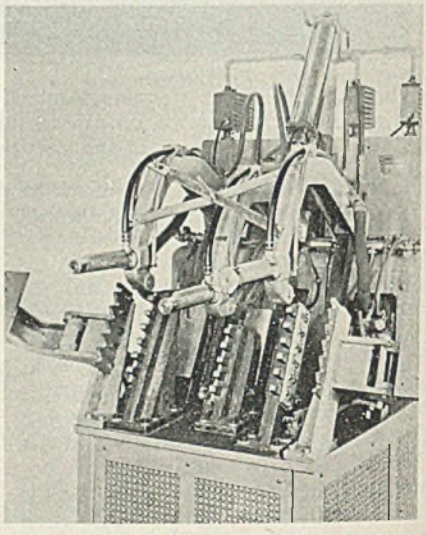
■ Interstate Sales Co., 1123 Broadway, New York, announces two new products—a Wolfe angle meter and circle meter. The first is a practical slide rule for laying out angles directly on pipe or sheet metal rapidly. It gives direct readings for any angle of bend up to 90 degrees in steps of 1 degree on diameters from 1 to 20 inches, the readings being for the completed angle of two pieces. No further calculations are required. A useful instrument for engineers, draftsmen, welders and sheet metal workers, it measures 12 x 4½ inches when folded and fits easily into a pocket or tool box. The second product—the circle meter provides instantaneous readings of diameters and circumferences of any circle up to 72 inches in diameter, in steps of ⅛-inch or smaller. It gives all readings in fractions of an inch making use of decimals unnecessary. The circle meter is printed in four



colors to distinguish each set of circles. Numbers and calibrations are large and easy to read. It measures 12 x 4½ inches when folded and also fits easily into a pocket or tool box. The unit is for use by sheet metal workers, designers and manufacturers.

Automatic Welding Guns

■ Progressive Welder Co., 3100 East Outer drive, Detroit, recently developed a welding fixture and gun assembly which features welding guns that locate themselves automatically for spot-weld assembling of units built up of a number of parts. It is provided with three guns mounted on arms projecting from a slide. The fixture is designed so welds can be performed in groups of three in five different positions of the welding guns, while in a sixth position, only two of the guns are actuated. This is ac-

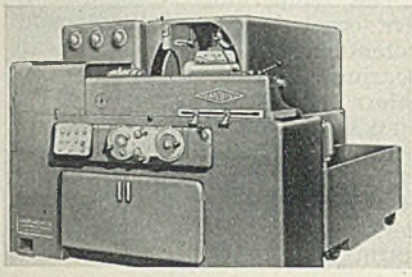


complished by equipping the slide carrying the guns with an automatic indexing device. After all welds are completed, the slide moves the guns to starting position, and stops, permitting removal of work.

Thread Grinder

■ Landis Machine Co., Waynesboro, Pa., announces a new No. 6 precision thread grinder for use in grinding various forms of thread on tangential chasers for die work and for radial and circular chasers for collapsible taps. Both its work and wheel speeds are practically infinite throughout the full range of the machine. The machine is suitable for grinding both right and left-hand external threads from 2 to 80 threads per inch, up to 6 inches in diameter—12-inch thread length on work having a maximum center distance of 24 inches. Single or multiple National Standard V Whitworth, Acme, modified buttress and worm threads having a maximum helix angle of 15 degrees may be ground on this machine. Studs, screws and other parts which do not have centers may be ground with the

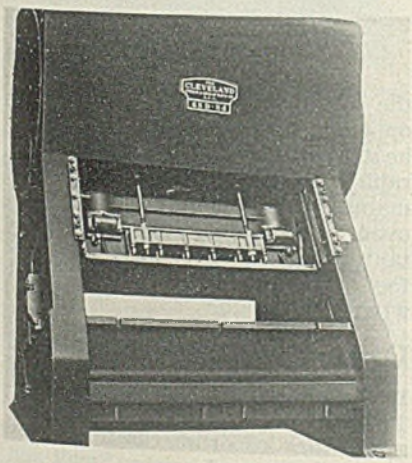
use of a collet type chuck or special work adapter. The flanged nose of the work spindle of the machine takes standard chucks of different types. A simplified change gear box construction allows a greater number of both English and metric



pitches to be obtained. The spare gear compartment is located directly below the change gear box, while the gear chart is attached to the inside of the gear box cover. Work table and wheel slide of the grinder maintain a constant length of bearing at all times. Distance of table travel in either direction is controlled by adjustable trip dogs. The leadscrew is mounted on antifriction bearings and is located centrally between the ways. The wheel head, which incorporates the grinding wheel spindle, is comparatively large and is cast in one piece. Grinding wheel trueing device is fully automatic.

Double Crank Press

■ Cleveland Punch & Shear Works Co., 3917 St. Clair avenue, Cleveland, has introduced a new straight sided double crank press of 4-piece tie rod construction. Of the single geared type, it is equipped with electrically controlled, hydraulically operated friction clutch and brake. The press is arranged with an auto-



matic single-roll feed, hydraulically operated, for feeding material 13/32-inch thick by 2½ inches wide, right to left across the dies. The unit, which is set at a permanent incline of 30 degrees for gravity discharge of the finished pieces into tote boxes at the rear, is designed with a box type crown. All gears run in a bath

of oil and the slide, which may be spring or counter-balanced, is arranged for hand adjustment. The slide has a 3-inch stroke, 3½-inch adjustment and operates at the rate of 45 strokes per minute. The area of the bed is 30 x 84 inches. Capacity of the press is 150 tons.

Sockets for Cap Screws

■ Plomb Tool Co., 2209 Santa Fe avenue, Los Angeles, is offering sockets for all sizes of socket head cap screws and set screws. These are for use wihh various types of attachments—socket sizes ranging from ¼ to ⅝-inch and hexagon openings from ⅛ to ⅜-inch. The drive plug of each socket is made separately from the socket itself.

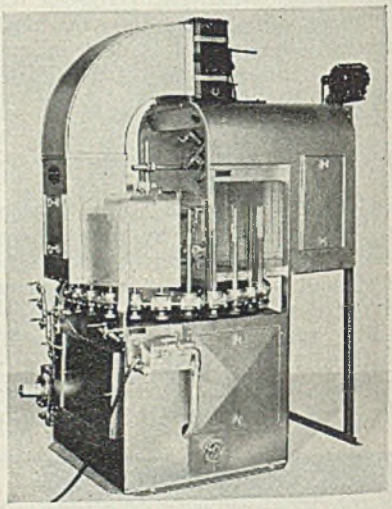
Protection System for Roll Neck Bearings

■ Brown Instrument Co., Wayne and Roberts avenues, Philadelphia, announces a protection system for roll neck bearings. It consists of three essential parts—temperature detection elements, temperature recording system and the signalling or alarm system. The detection elements are pencil-type iron constant thermocouples having an outside diameter of 0.405-inch. The thermocouples are held in position by a "quick disconnect" fitting which permits instant removal, merely by a slight pull and quarter turn.

The temperature recording system consists of a multiple record potentiometer which prints each bearing temperature in distinctive colors on a 12-inch wide chart. Balance step is used so that each temperature is recorded rapidly. The signal system consists of a relay, signal light, howler or other signal device, and a push button for resetting the relay.

Shell Sprayer

■ Eclipse Air Brush Co., 400 Park avenue, Newark, N. J., is offering an automatic spray machine to coat and dry the outside of small shell (20-40 millimeter), grenades, shot or boosters. It consists of an automatic turntable on which the pieces are carried on indexed spindles to a position in front of the automatic spray guns in a booth equipped with an exhaust fan. After being coated,

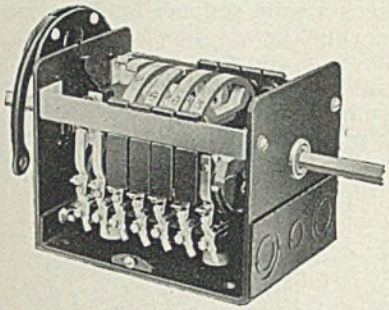


the pieces go through a small oven opposite the spray booth. A unit heater with blower fan dries pieces rapidly so that they can be removed manually as they emerge from the oven. The whole unit is compact, taking a floor space of only 4 x 4 feet. Working parts are enclosed wherever possible.

Drum Controllers

■ Cutler-Hammer Inc., 315 North Twelfth street, Milwaukee, reports a new line of drum controllers for small cranes and hoists. Small and compact in size, these Bulletins 5443, 9445, 9447, are offered in four to six speeds. In the new units, a rope operating lever, embodying a new equalized torque principle, entirely eliminates sheave wheel, rope guard and external return spring, and provides smooth operation even when the rope is pulled at an angle. Also

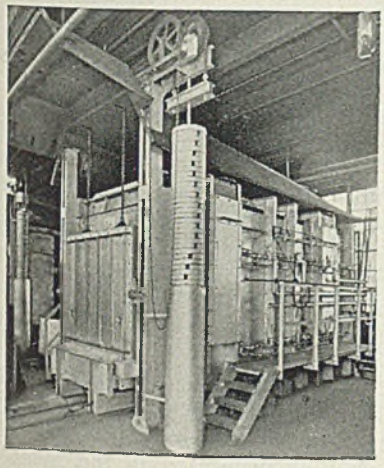
a new antiplug feature increases drum life by making it impossible to whip drum from full forward to full reverse position. The drum can be reversed quickly, but a definite



time delay is required in the off position. The controllers are being offered in self-centering rope lever, self-centering and nonself-centering radial lever types.

Heat Treating Furnace

■ R-S Products Corp., 4530 Germantown avenue, Philadelphia, has placed on the market a new heat treating furnace which assures proper metallurgical results. Illus-



tration shows one of a battery of four 5-ton heat treating furnaces used in the hardening, normalizing, annealing, stress relieving and tempering processes. Of the car hearth type, the new furnace is propane fired and features an individual electric motor drive. Another special feature consists of an automatic damper for atmospheric control. Units are available for oil, gas or electric firing.

Watchman's Protector

■ Rowe Radio Research Laboratory Co., 4201 Irving Park boulevard, Chicago, announces a watchman's protector, a new alarm system whereby a watchman or guard carries a small device known as "the walking stick". In event of trouble, encountering a suspicious person, or persons, or upon being attacked, the pushing of a small button on the "walking stick" handle auto-

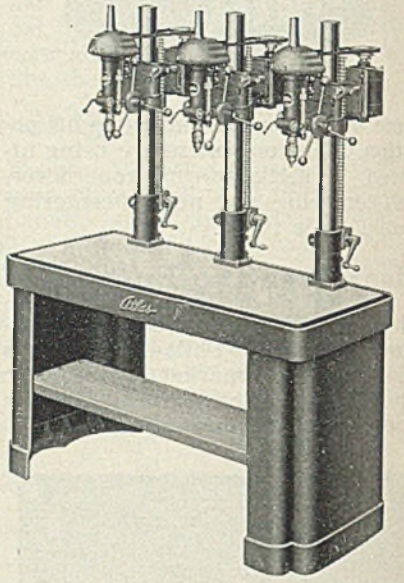
matically sends a special "key" radio signal which in turn operates an alarm. This will set off bells, sirens, etc., or privately warn other guards, police, or detective agency.

Welding Electrodes

■ Harnischfeger Corp., 4513 West National avenue, Milwaukee, announces Harmomang A and Harmomang B—two new types of welding electrodes for building up and reinforcing 11-14 per cent manganese steel or carbon steels where high resistance to impact and abrasion is desired. Type A is a coated manganese-molybdenum electrode on which the thin coating acts as an arc stabilizer and affords protection against loss of manganese and molybdenum. Type B is a bare manganese-molybdenum electrode providing an austinetic deposit. Both electrodes are suggested on such work as building up dipper lips and runners, hammer mill parts, dredge pump shells, rock crusher parts, railway frogs, road grading and mining equipment.

Drilling Machine

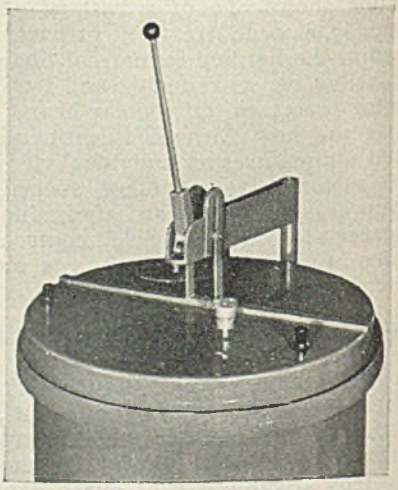
■ Atlas Press Co., Kalamazoo, Mich., has introduced a new series of 2, 3, and 4-spindle drilling machines for small-hole drilling and tapping operations. Drilling heads of these machines incorporate a ball-bearing equipment floating drive. Table weight of the 3 and 4-spindle machines (about 575 pounds) furnishes a solid support for the movement of heavy jigs, fixtures and parts in production quantities. Each drilling head is equipped with its own motor mounting and a new type of positioning control with crank handle. Machines are available with 0-½-inch Jacobs chucks or No. 1



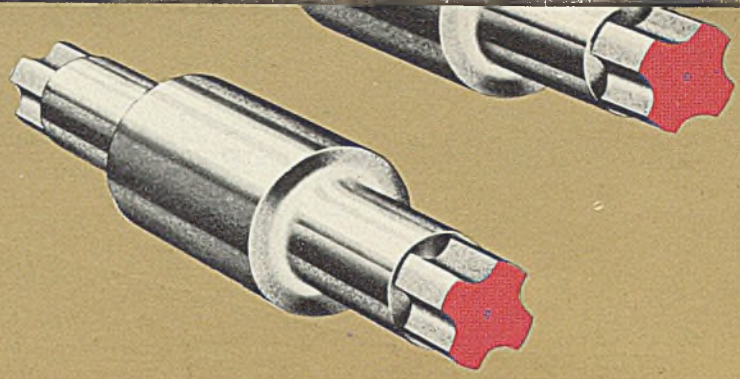
Morse taper spindles in place of chucks. The floor legs are heavy, solid well-braced iron castings, each held firmly to the table by three ½-inch cap screws. A wood shelf, 11 inches from the floor, provides a convenient place for tools and jigs.

Lid-Lifter

■ Leeds & Northrup Co., 4939 Stenton avenue, Philadelphia, announces that an improved lid-lifter is now incorporated in the Homo-



carb cooling unit. It consists of a lever acting on a roller-fulcrum, giving an easy horizontal lift that simplifies this operation for the heat-treater. Constructed for long service, this cooling unit expands



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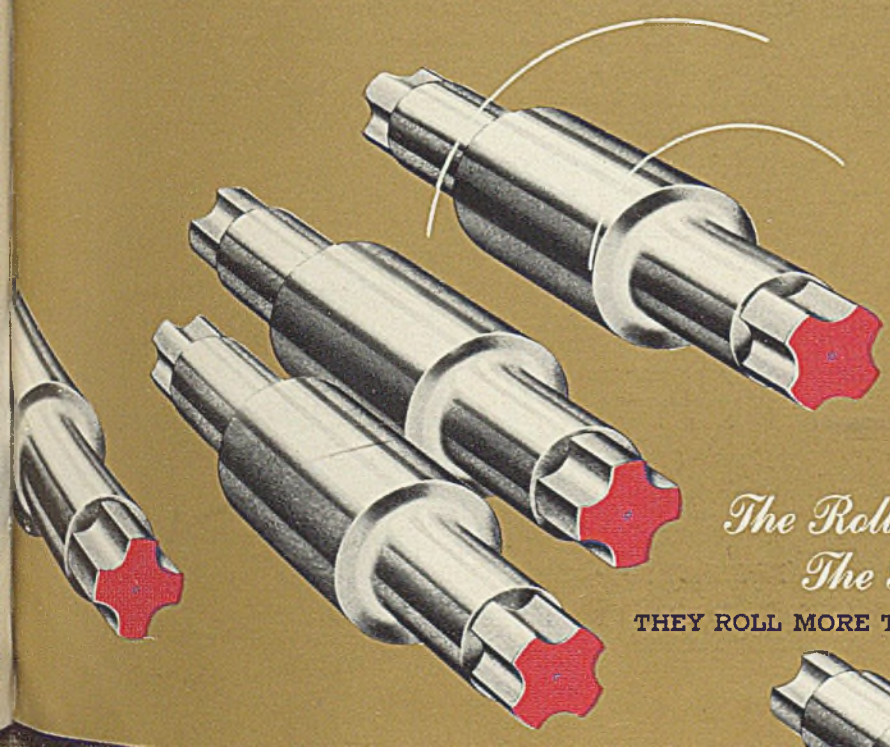
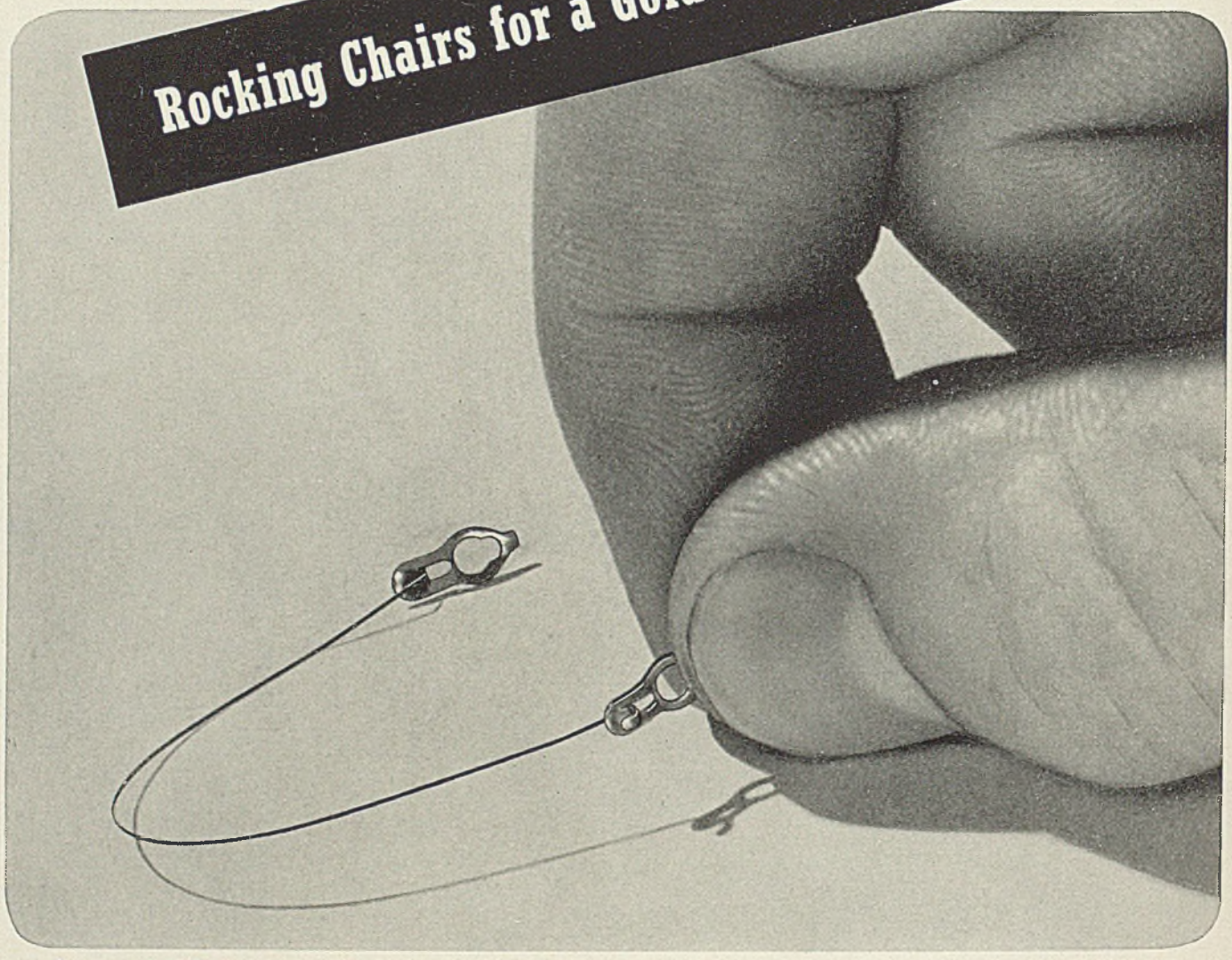


The Rolls with
The Red Wabblers

THEY ROLL MORE TONS PER ROLL-DRESSING

Rocking Chairs for a Gold "Whisker"!



TIME was, when all pyrometer galvanometer suspensions were merely wisps of ordinary metal held in crude soldered end-clamps. Acid atmosphere ate the metal . . . ends sheared off on the square edges of clamps . . . breakage was accepted as a necessary evil.

Even though it is the smallest, least conspicuous assembly in a Foxboro Potentionmeter Instrument, Foxboro engineeers were not content with this traditional galvanometer suspension. They engineered this detail, too, like a major part!

Gold suspensions were adopted to defy acids . . . with spot-welded instead of soldered ends. Smoothly-crowned end-brackets were designed, to give shear-free, "rocking-chair" snubbing action for these tiny gold "whiskers". Suspension life was indefinitely prolonged!

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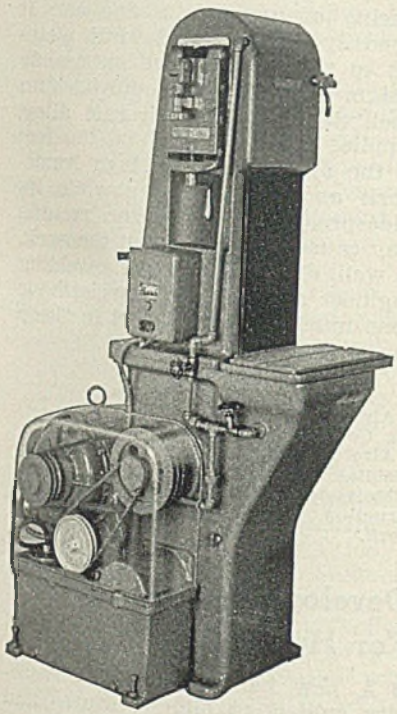
the capacity of the furnace equipment which gives the heat-treater "4-factor" control and enables him to carburize to exact specification.

Coolant System

■ Porter-Cable Machine Co., Syracuse, N. Y., has introduced a new circulating, force feed coolant system for its type G-8 wet abrasive belt grinder. It is connected to the base of the grinder and is operated by a V-belt connection to the ma-



chine's main drive pulley. Frame of the system is cast iron, housing a reservoir, gear-type pump, and a cylindrical straining screen. This circulating unit can be used in any part of the plant without connections to water or drain pipes.

Multi-Breaker

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has introduced a new multi-breaker for use on any normal-duty application. It is available in two types, M-1 and M-2 for use on alternating current circuits up to 230 volts. Its sheet steel enclosure is dust-resisting and embodies 10 concentric knock-outs for conduit or cable connections.

In operating, a bimetal thermal element is actuated by overload or short circuit and causes the breaker to trip. However, while the breaker trips immediately on short circuit or dangerous overload, an inverse-time characteristic allows it to remain closed during temporary harmless overloads. An indicating target on the enclosure cover shows when multi-breaker has tripped.

Spraying Equipment Hose

■ B. F. Goodrich Co., Akron, O., reports a new type hose for all standard paint and lacquer spraying equipment. Of synthetic rubber, it is offered with inside diameters of ¼, 5/16, ⅜ and ½-inch and outside diameters of ½, 39/64, 11/16 and ⅞-inch. The hose is strong enough to be used as an air hose with an ample margin of safety.

Anti-Slip Treads

■ National Bronze & Aluminum Foundry Co., East Eighty-eighth street and Laisy avenue, Cleveland, announces the availability of Ten-Lox, antislip treads for platforms, ramps, etc., in two sizes of grits—large grits which extend clear through the casting, and small grits which penetrate to at least a depth of 1/16-inch from the top. Thus with this combination the tread achieves utmost safety and durability—particularly so when wet, oily or greasy. Treads are offered cast in ¼-inch thickness, straight edge (no nosing), and 5 different styles of nosings. For floor tile they are cast in two sizes: 9 x 9 inches in ¼-inch thickness and 12 x 12 inches in both ¼ and ⅜-inch thicknesses. The ⅜-inch tile is for heavy-duty work. These treads are easily and quickly installed over new or existing surfaces.

Welding SAE X-4130

(*Concluded from Page* 90)

Surface decarburization of molybdenum steels is quite well known. Either a special atmosphere or some other means may be taken to keep the alloy from losing carbon at the surface. Detrimental as this effect is in heavy sections, the loss of carbon from the surface of thin aircraft parts brings about an appreciable reduction in strength.

Modern furnaces are equipped with apparatus for controlling the atmospheres within them. Scale free heat treating is possible with this type of equipment. And the subsequent structures are improved because no insulating scale has prevented the hardening desired.

In heat treating molybdenum steels such as SAE X-4130, we encounter molybdenum carbides that are quite stable. In these alloys, the carbides are reluctant to release their carbon and to allow it to go into solution. Therefore a certain minimum soaking period is necessary to guarantee that the molybdenum carbides have had enough time to get their carbon into solution.

Another attribute of heat-treated steel is its hardness and, in some instances, limited ductility. We can lower the hardness and the tensile strength a little while gaining a considerbale increase in ductility by tempering.

SAE X-4130 steel has presented the aircraft industry with a metal that is of the utmost value. Its strength leads to a greater strength-weight ratio. It is readily worked either cold or hot, leading to a variety of shapes and forms so essential to an industry where the exact placing of metal is a fine art. It is easily welded by several methods to save weight and streamline design. This chromium-molybdenum steel, definitely *the* aircraft alloy, supplies the backbone and the feet of the airplane as fuselage framework and landing gear while its widespread use in engine mounts may cause some to call it the neck, as well, of our eagles. The welding engineer and the metallurgist have done much with this steel to "keep 'em flying."

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Develops Babbitt Metal For Heavy Service

■ A new babbitt metal for bearings subject to high pressures and temperatures is announced by Magnolia Metal Co., Dept. 40, 120 Bayway, Elizabeth, N. J. Known as Power Nickel Genuine Babbitt, it has a tensile strength of 17,500 pounds per square inch, a yield point of 6500 pounds per square inch, a brinell hardness of 27. Its pouring temperature ranges from 950 to 1000 degrees Fahr.

The high softening and melting temperatures of the metal are said to make the metal resistant to extreme local heat. Nickel treatment of the metal is said to provide a hard glossy surface desirable for generators, motors and other high-speed applications.

Announces Report on Welded Ships

■ American Welding Society, 33 West Thirty-ninth street, New York, announces the availability of a report approved by its executive committee in July on the thermal stresses and shrinkage in welded ship construction. Prepared by the committee on welding in marine construction, it is embodied in about 10 pages and includes discussions on loss of dimension, distortion and residual or "locked-up" stress.

Increasing Capacity

(*Concluded from Page* 57)

particular production line, the foreman used to calculate his output by the number of boxes of material produced. Of course he knew that one material would result in fewer boxes than another material, but he employed a rule-of-thumb correction factor. He did not know that due to scheduling delays, avoidable mechanical difficulties, etc., that he was only producing 75 per cent of the output that he should have been reaching. Thus a definite yardstick is most essential.

Delay reports were installed as part of the procedure some time back, but foremen, while following them religiously, had never been taught to use them to advantage. As a result of not following up these reports, the operators became careless in reporting, and eventually the reports meant virtually nothing. Such reporting work should be reviewed periodically as changing conditions often make reports useless or unnecessary or else require a change of form.

Fifth: Proper scheduling, while too involved a subject to discuss in detail here, should be emphasized as one of the most important factors in any study of production. In this particular case, nonproductive time due to schedule changes has been cut in half. It is believed there exists a possibility of going still further. This matter of schedule changes is no easy problem as it necessitates working with sales department to determine delivery dates, priorities, inventories, etc.

A consideration of the above points as they apply to your own production line may be found valuable. At least they afforded in only two months' time a production increase of 13 per cent, with a 25 per cent increase already in sight and with no added expense for new equipment or additional operators.

Electropolishing Steel

(*Continued from Page* 82)

tric path, thus eliminating any furrows. Also it improves uniformity of film thickness and resulting luster while shortening the time required. Also mild agitation increases the temperature uniformity throughout the tank.

While an oscillating movement of the work rod is excellent in many instances, it may introduce complications in certain shapes. Here air agitation can be used to advantage. Agitation by propeller stirrer, with relative positions of work and of stirrer fixed, is fine in certain cases.

Time requirements depend upon the brilliance desired, initial surface, current density, temperature, bath composition and degree of agitation. Economical electropolishing times are in the range from 1 to 15 minutes. Cost and maximum metal thickness that can be lost set the upper limit.

The approximate time to produce a given result is inversely proportional to the current density. Maximum luster usually is reached in the first 1 to 15 minutes. Longer treatment adds no more to the brilliance but affords additional "smoothing" action.

Life of the bath is an important factor. Useful life depends on concentration of dissolved metals, state of oxidation of dissolved metals, and the sulphuric-phosphoric acid ratio of the bath. A considerable quantity of dissolved metal can be tolerated without affecting the results.

Dissolved metal is removed from the bath by precipitation as sulphates and by bath dragout. Iron and nickel sulphates are not soluble in the simple sulphuric-phosphoric acid bath to an extent that is harmful to the electropolishing results. When chromic acid is present, iron and nickel sulphates are not so readily precipitated.

Precipitation of metals from the bath is connected with the oxidation

state of the dissolved chromium and iron. For electropolishing dissolved iron and chromium as Fe^{+2} and C^{+6} are desired. For securing precipitation, Fe^{+2} and Cr^{+3} are desired. Chromium dissolves as Cr^{+6} and iron as Fe^{+3}, which is reduced at the cathodes to Fe^{+2}, which in turn aids in reducing Cr^{+6} to Cr^{+3}. Cr^{+3} is extremely soluble and is quite harmful to electropolishing results in concentrations of 2 per cent or more.

While rejuvenation is possible, it is not economical on the basis of acid costs (August, 1941) if the dissolved metal content that can be tolerated approaches about 4 per cent of the bath weight. Bath No. 1 can be operated with good results up to 4.5 per cent or more of dissolved metal. Electropolishing can be continued at least to this point when the bath is operated with no replacement of dragout and no chemical additions. Dragout tends to offset the metal buildup in the bath since replacement is made with fresh acid.

It is not possible to state how much surface can be electropolished in a given volume or weight of bath due to the effect of the starting surface, differences in finish desired, and differences in alloy composition. An approximation of translating 4.5 per cent metal into square feet of surface electropolished follows:

Where the original finish and structure of 18-8 stainless permits the desired finish to be produced with loss of 0.0005-inch of metal, solution No. 1 will finish about 2500 square feet per 100 gallons of bath while reaching a 4.5 per cent metal concentration in the absence of dragout replacement. This removal of 0.0005-inch of metal may take 12 minutes at 125 amperes per square foot or about 6 minutes at 250 amperes per square foot.

Fig. 4 shows relative electropolishing life of baths of several different compositions. Baths of higher phosphoric acid content give longer life.

The total acidity appears to influence the current efficiency more than the sulphur acid-phosphoric acid ratio.

Equipment Used

With increasing concentration of dissolved metals, the anodic activity decreases somewhat. Fig. 5 shows results of a special series of tests in which no additions were made to compensate for the dragout losses.

It is seen that the decrease here corresponds to an increase in anode potential of 0.1 to 0.3-volt. The metal concentration at which excellent electropolishing ended is shown by the short heavy arrows in Fig. 5. Thus operation can be carried at least to these points.

Chemical control consists of analyzing the bath for SO_4; PO_4; total metals—chromium, nickel and iron; and determining water concentration as an empirical value based on the analysis. Analytical procedures consist of routine methods easily followed. Since bath composition can vary over wide limits, frequent analysis is unnecessary.

All concentrations of acid encountered in electropolishing baths and rinse tanks can be handled in lead-lined equipment. When cool, baths of 30 per cent water content or less can be handled in iron or cast iron equipment for appreciable periods. Internal cooling and heating coils are made of lead.

Cathodes consist of lead sheets or strips suspended from busbars. Racks are most suitably made from copper. Best practice is to insulate the racks with an inert coating. Contact points for the work can be bare or coated with solder or lead as these materials show no appreciable anodic attack in these baths.

While corrosive gases are not emitted, exhaust fans are desirable to withdraw the small amount of spray evolved.

Defense Work Is More Widely Distributed

General allocation expected to supersede priorities. Heavy shell tonnages overhang market. Scrap continues production threat

MARKET IN TABLOID ★

Demand

Priorities apply to more tonnage.

Prices

Warehouse ceiling impending.

Production

Down ½-point to 97 per cent.

■ INCREASING proportion of steel inquiries carrying high preference rating is an indication of the spread of defense work among smaller manufacturers. Subcontracting is engaging a larger segment of industry in work for national defense.

This is a heartening sign as the larger the number of steel fabricators engaged in essential work the sounder the business situation and the fewer the shutdowns. Efforts of the government to spread work widely are being exerted to obtain quicker delivery of completed parts and to offer employment to as many as possible in all branches of industry. Such division of production tends to eliminate choke points and give better flow of parts to plants engaged in assembling complete units of armament.

Steel allocation is coming nearer as top priorities increase to the extent that some central authority is needed to sort out most pressing orders for first attention. Under present conditions steelmakers can not determine which of numerous orders bearing highest priority should be rolled and shipped first. Probably allocation will be applied gradually to various products as need arises. Plates already are practically on this basis without formal notice and other products are approaching a point where the whole picture must be seen to indicate most pressing need and decide the sequence in which steel should be produced and shipped. Success in pig iron distribution indicates what may be done in allocating steel, though the latter will be a much more complicated process.

Heavy tonnages of shell rounds are about to be allocated to supply government munitions plants coming into production. These will be rolled on rail and structural mills and will tend to reduce deliveries of regular products of these mills. Railroads have been asked to hold rail orders to a minimum consistent with safety. Most current rail business is for tracks in connection with defense munition plants. The government is also buying a number of locomotives to serve inside these plants.

Freight car builders are receiving larger supply of steel, mainly plates, and are operating at a better rate, though not yet at full capacity. Several roads have large programs of carbuilding in their own shops and are doing much repair work to add to available rolling stock.

Necessity for further curtailment in steel production because of scrap shortage is more imminent as the supply fails to increase and steel output is kept at a high rate. In some areas current supply is not over ten days and in others only 30 to 60 days under present conditions. Some diversion of scrap from one consuming district to another is being ordered in an effort to keep all plants going as long as possible. Open hearths already down remain idle as no additional scrap supply appears. Additional pig iron production makes up for some of the shortage but can not fill the gap to more than a slight degree. Flow of remote scrap has subsided after a spurt and little is now being received.

Steelworks operations are feeling the effect of scanty scrap supplies and the national rate last week receded ½-point to 97 per cent as a result, with indications of more severe contraction in the next few weeks. Chicago gained 1½ points to 102½ per cent, only a point below the all-time high reached a few weeks ago. Cincinnati rose ½-point to 88 per cent, Cleveland 1½ points to 94½ per cent, Detroit 1 point to 96 per cent and New England 2 points to 92 per cent. Birmingham lost 5 points to 90 per cent, Wheeling 4 points to 91 per cent and Youngstown 3 points to 94 per cent. Unchanged rates were: St. Louis, 98 per cent; Pittsburgh, 99 per cent; Eastern Pennsylvania, 91 per cent and Buffalo, 79 per cent.

Threat of renewed strikes in captive mines is disturbing to the steel industry as interference with coke deliveries would bring shutdowns within a short time. Coal supplies for coke ovens are estimated at not more than 30 days in general, with some operations holding stocks for only a portion of this period.

Automobile output last week was 92,990 units, compared with 93,585 the preceding week, a drop of 595. In the comparable week last year production was 121,943 cars. Weekly assemblies for the past month have been consistently close to 90,000, in conformity with orders of OPM to limit production.

Composite prices continue under influence of ceilings and are unchanged: Finished steel, $56.73; semifinished steel, $36.00: steelmaking pig iron, $23.05; steelmaking scrap, $19.17.

COMPOSITE MARKET AVERAGES

	Nov. 15	Nov. 8	Nov. 1	One Month Ago Oct., 1941	Three Months Ago Aug., 1941	One Year Ago Nov., 1940	Five Years Ago Nov., 1936
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$53.36
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	34.40
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	22.05	18.63
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	20.80	16.50

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Nov. 15, 1941	Oct. 1941	Aug. 1941	Nov. 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
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	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to $\frac{5}{32}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Nov. 15, 1941	Oct. 1941	Aug. 1941	Nov. 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.00	24.00	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$21.50
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	17.75	19.75
Heavy melting steel, Chicago	18.75	18.75	18.75	20.25
Rails for rolling, Chicago	22.25	22.25	22.25	24.55
No. 1 Cast, Chicago	20.00	18.75	18.75	18.25

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$4.75
Connellsville, foundry, ovens	7.25	7.25	7.25	5.75
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. mill, carloads.

Sheets, Strip

Hot-Rolled Sheets

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 2.10c
Granite City base 2.20c
Detroit, del. 2.20c
Pacific ports 2.65c

Cold-Rolled Sheets

Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, B'ham., base .. 3.05c
Granite City, base 3.15c
Detroit, del. 3.15c
Other Mich. pts., del. ... 2.25c
Pacific ports 3.70c

Galvanized Sheets, No. 24

Pittsburgh, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c
Granite City, base 3.60c
Pacific ports 4.05c

Corrugated Galv. Sheets

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, 29 gage, per square 3.31c
Granite City 3.38c
Pacific Ports 3.73c

Culvert Sheets

Pittsburgh, Gary, Birmingham, 16-gage, not corrugated, copper steel 3.60c, copper iron 3.90c, pure iron 3.95c.
Pittsburgh, 24-gage, zinc-coated, hot-dipped, heat-treated 4.25c.
Granite City, copper steel 3.70c, copper iron 4.00c, pure iron 4.05c.
Pacific ports, copper steel 4.25c, copper iron 4.55c, pure iron 4.60c.

Enameling Sheets

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c
Granite City, base 2.85c
Pacific ports 3.40c
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c
Granite City, base 3.45c
Pacific ports 4.00c

Electrical Sheets, No. 24

	Pittsburgh Base	Pacific Ports	Granite City
Field gr.	3.20c	3.95c	3.30c
Armat.	3.55c	4.30c	3.65c
Elect.	4.05c	4.80c	4.15c

Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip

Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c
Detroit, del. 2.20c
Other Mich. pts. del. ... 2.25c
Pacific ports 2.75c

Cold-Rolled Strip

Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c
Chicago, base 2.90c
Worcester, base 3.00c
Detroit, del. 2.90c
Other Mich. pts. del. ... 2.95c

Commodity C.R. Strip

Pittsburgh, Cleveland, Youngstown, base 3 tons and over 2.95c
Worcester, base 3.35c
Detroit, del. 3.05c
Other Mich. pts. del. ... 3.10c

Cold-Finished Spring Steel

Pittsburgh, Cleveland, base; add 20 cents for Worcester.
.26-.50 Carbon 2.80c
.51-.75 Carbon 4.30c
.76-1.00 Carbon 6.15c
Over 1.00 Carbon 8.35c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

TYPE	BARS	PLATES	SHEETS	H. R. STRIP	C. R. STRIP
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
304-20% clad	.....	*18.00	19.00	.....	.....
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
316	40.00	44.00	48.00	40.00	48.00
317	50.00	54.00	58.00	50.00	58.00
347	33.00	38.00	45.00	33.00	42.00
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
431	19.00	22.00	29.00	17.50	22.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

*Includes annealing and pickling.

Tin, Terne Plate

Tin Plate

Pittsburgh, Chicago, Gary, 100-lb. base box $5.00
Granite City $5.10
Pacific ports, f.o.b. $5.75½

Tin Mill Black Plate

Pittsburgh, Chicago, Gary, base 29 gage and lighter 3.05c
Granite City 3.15c
Pacific ports, boxed 4.27½c

Long Ternes

Pittsburgh, Gary No. 24 unassorted 3.80c
Pacific Ports 4.55c

Special Coated Mfg. Ternes

Pittsburgh, Chicago, Gary, 100-base box $4.30
Granite City $4.40

Roofing Ternes

Pittsburgh base per package 112 sheets 20 x 28 in., coating I.C.

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Steel Plate

Pittsburgh, Chicago, Gary, Cleveland, Birmingham,

Youngstown 2.10c
Coatesville, Sparrows Point, Claymont 2.10c
Gulf ports 2.45c
Pacific Coast ports 2.65c

Steel Floor Plates

Pittsburgh 3.35c
Chicago 3.35c
Gulf ports 3.70c
Pacific Coast ports 4.00c

Structural Shapes

Pittsburgh, Bethlehem, Chicago, Buffalo, Birmingham 2.10c
St. Louis, del. 2.34c
Pacific Coast ports 2.75c

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Duluth, base 2.25c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons 2.15c
Detroit, del. 2.25c
New York, del. 2.49c
Philadelphia, del. 2.47c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pac. ports, dock 2.80c
All-rail from Chicago.. 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000.....	0.35	3100.....	0.70
2100.....	0.75	3200.....	1.35
2300.....	1.70	3300.....	3.80
2500.....	2.55	3400.....	3.20

4100 .15-25 Mo. 0.55
4600 0.20-0.30 Mo.; 1.50-2.00 Ni. 1.20
5100 80-1.10 Cr. 0.45
5100 Spr. flats 0.15
6100 Bars 1.20
6100 Spr. flats 0.85
Carb., Van. 0.85
9200 Spr. flats 0.15
9200 Spr. rounds, squares 0.40
T 1300, Mn, mean 1.51-2.00 0.10
Do., carbon under 0.20 max. 0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pitts., Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pitts., Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pitts., Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail, Houston from Birmingham 2.59c
Pacific ports, dock 2.80c
Detroit, del. 2.25c

Iron Bars

Philadelphia, com. del. 3.06-3.50c
Pittsburgh, muck bar ... 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute com., f.o.b. mill 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails $2.55

(Per Pound)

Polished fence staples .. 2.55c
Annealed fence wire 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C. L. column) .. 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire at Birmingham)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., 10c higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg. $3.85

Alloy Plates (Hot)

Pitts., Chicago, Coatesville, Pa. 3.50c

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, Bham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.75c
Do., heat treated 5.00c
Car axles forged, Pitts., Chicago, Birmingham.. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs., up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .....63½ off
Do., ¾ to 1 x 6-in. and shorter .....61 off
1⅛ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	..

Hexagon Cap Screws

Upset 1-in., smaller .....60 off

Square Head Set Screws

Upset, 1-in., smaller ....68 off
Headless, ¼-in., larger ..55 off
No. 10, smaller .....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
⅞-inch and under .....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l .....$3.50 off

Tool Steels

Pittsburgh, Bethlehem, Syracuse, base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.50	4	1	8.50	54.00
....	4	2	8	54.50
5.50	4	1.50	4	57.50
5.50	4.50	4	4.50	70.00

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut-lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Welded Iron, Steel, Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	51
¾	66½	55
1—3	68½	57½

Iron

¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel

2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½

Iron

2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe, Plain Ends

Steel

1 to 3, butt weld.....	68½
2, lap weld	63
2½ to 3, lap weld	66
3½ to 6, lap weld	65
7 and 8, lap weld	64

Seamless, 3 pts. lower discount.

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham .. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to 47/64-in. incl. 2.15
Worcester up $0.10, Galveston up $0.25 and Pacific Coast up $0.50 on water shipments.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. .. 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered .. 12.25
Terre Haute, del. .. 12.00
Milwaukee, ovens... 12.25
New England, del. .. 13.75
St. Louis, del. 12.02
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol.... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.75
Do. (1000 lbs. or over) 13.00

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	.....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†.	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.50	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide. net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$23.00
Do., barge	23.00
No. 2 lump	23.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty pd., seab'd. $120.00; Carlots, del. Pittsburgh 125.33; Carlots, f.o.b. So. f'ces. 145.00. Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c; Packed 5.75c; Ton lots 6.00c; Less-ton lots 6.25c; Less 200-lb. lots 6.50c. Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25; Less-ton lots 2.30 (Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome) Carloads 13.00c; Ton lots 13.75c; Less-ton lots 14.00c; Less than 200-lb. lots 14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60; Do., 100-200 lb. lots 2.75; Do., under 100-lb. lots 3.00

Ferrophosphorus, 17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos. Contract $58.50; Spot 62.25

23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos. Contract 75.00; Spot 80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50; Packed 80.50; Ton lots 84.50; Less-ton lots, per lb. 4.00c; Less 200-lb. lots 4.25c. Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

Carbon	1½%	2½%
Carloads (contract)	$128.00	$118.00
Ton Lots (contract)	140.50	130.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.60-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots 1.23; Less ton lots 1.25

20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35; Less-ton lots 1.40 (Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium, 6-8% C 3-5% C

Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis $142.50; $157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90 (Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts 1.10; Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50; Packed 107.50; Ton lots 108.00; Less ton lots 112.50. Spot $5 a ton higher

35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c; Do., ton lots 15.00c; Do., less-ton lots 16.00c. Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Struc-tural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.10
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	6.00	....	4.42	....	....
Memphis	4.15	4.35	4.35	4.20	4.20	5.96	4.35	....	6.00	....	4.56	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	....	5.25	....	7.15	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.45	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 10 bun. in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis ,Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle, 1 to 99 pounds in Los Angeles; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.40	1	16	9
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract.	12.00

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.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton	.....

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	.....
So. African, 50%	68.00-70.00
Indian, 50%	68.00-70.00
Brazilian, 46%	68.00-70.00
Chilean, 47%	68.00-70.00
Cuban, 50-51%, duty free	.....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

OTHER THAN RAILROAD GRADES (a) (b)	Pittsburgh, *Wheeling *Johnstown, Weirton, Steubenville	Youngstown, *Warren, Canton, Sharon	Chicago	Kokomo, Ind.	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	Cincinnati Ashland, Ky. Portsmouth, O. Middletown, O.	St. Louis	Detroit	Duluth	Birmingham	Alabama City, Atlanta	*Pacific Coast	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50	$17.50	$17.85	$18.00	$17.00	$17.00(d)	$14.50	$16.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.50	19.25	19.50	17.50	17.85	18.00	17.00	17.00(d)	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	16.50	16.85	17.00	16.00	16.00(d)	13.50	15.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.50	17.25	17.50	15.50	15.85	16.00	15.00	15.00(d)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.75	14.50	14.75	12.75	13.10	.....	12.25	12.25	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	15.50	15.00	15.00	10.00	12.00
Shovel turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	16.00	15.75	16.00	14.00	14.35	16.50	16.00	16.00	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	19.00	18.75	19.00	17.00	17.35	17.50	16.50	16.50	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	15.00	14.75	15.00	13.00	13.35	13.50	12.50	12.50	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.25	15.00	†15.25	13.25	13.60	13.75	12.75	12.75	10.25	12.25
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.50	18.25	18.50	18.50	16.85	17.00	16.00	16.00	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00	20.00	20.35	19.00	20.00	.....	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50	18.50	18.85	17.50	18.50	.....	17.00	.....
Stove plate	19.00	.....	17.00	16.00	18.00	18.50	18.00	18.00	19.00	17.50	17.00	14.10	16.00	17.00	.....	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.50	24.25	23.50	22.50	22.85	23.00	22.00	.....	19.50	.....
Low phos. bar crops and smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	19.50	.....
Low phos. punch., plate scrap**	23.00(c)	23.00	21.75	21.75	21.25	21.75	21.75	22.50	22.25	21.50	20.50	20.85	21.00	20.00	.....	17.50	.....
Machinery cast cupola size***	22.00	22.00	21.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00	21.00	21.35	20.00	21.00	.....	19.00	.....
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50	21.50	21.85	20.50	21.50	.....	19.50	.....
Punchings and plate scrap†‡	22.00(c)	22.00	20.75	20.75	20.25	20.75	20.75	21.50	21.25	20.50	19.50	19.85	20.00	19.00	.....	16.50	.....
Punchings and plate scrap§§	21.00(c)	21.00	19.75	19.75	19.25	19.75	19.75	20.50	20.25	19.50	18.50	18.85	19.00	18.00	.....	15.50	.....
Heavy axle and forge turnings	19.50(c)	19.50	18.25	18.25	17.75	18.25	18.25	19.00	18.75	18.00	17.00	17.35	17.50	16.50	.....	14.00	.....
Medium heavy elec. furnace turnings	18.00(c)	18.00	16.75	16.75	16.25	16.75	16.75	17.50	17.25	16.50	15.50	15.85	16.00	15.00	.....	12.50	.....
GRADES ORIGINATING FROM RAILROADS															Kansas City		
No. 1 R.R. heavy melting steel	21.00	21.00	19.75	19.25	.....	19.75	19.75	20.50	20.25	20.50	18.50	18.85	19.00	18.00	17.00	15.50	.....
Scrap rails	22.00	22.00	20.75	20.25	.....	20.75	20.75	21.50	21.25	21.50	19.50	19.85	20.00	19.00	18.00	16.50	.....
††Rerolling quality rails	23.50	23.50	22.25	21.75	.....	22.25	22.25	23.00	22.75	23.00	21.00	21.35	21.50	20.50	19.50	18.00	.....
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	.....	22.75	22.75	23.50	23.25	23.50	21.50	21.85	22.00	21.00	20.00	18.50	.....
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	.....	23.00	23.00	23.75	23.50	23.75	21.75	22.10	22.25	21.25	20.25	18.75	.....
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	.....	23.25	23.25	24.00	23.75	24.00	22.00	22.35	22.50	21.50	20.50	19.00	.....

*Johnstown, Pa., and Warren, O., are not bases for railroad grades; Wheeling railroad only. Eastern Pa. includes Coatesville, Claymont, Conshohocken, Phoenixville and Harrisburg as bases only for "other than railroad grades"; Philadelphia and Wilmington are bases only for railroad grades. Pacific Coast bases are Los Angeles, San Francisco, Seattle, Portland. †Base price at Portsmouth; Middletown 25 cents less and Ashland, Ky; ††The term 'rails for rerolling' includes any rails which are sold to be used for rerolling, irrespective of whether or not such rails are usable for re-laying. **⅝-inch and heavier, cut 12 inches and under; ***may include clean agricultural cast; ‡‡under ⅝-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under. (c) add $1.75 at Pittsburgh. (d) Bases at Atlanta only.

OTHER BASE PRICES: Machine shop turnings $17.60, Alloy, W. Va., $13.35 Toledo, O.; **Shoveling turnings,** $14.35 Toledo; **cast iron borings,** $13.60 Toledo; **No. 1 cupola cast,** $19 Minneapolis and St. Paul, $20.50 Chattanooga, $21 Radford, Va. and $22 Phillipsdale, Bridgeport and Worcester; **Heavy breakable cast,** $20.50 Phillipsdale, Bridgeport and Worcester, $17.50 Minneapolis and St. Paul; **Stove plate** $16 Minneapolis and St. Paul, $17.50 Chattanooga, $18 Radford, Va., $15.60 Toledo and $17.50 Phillipsdale, Bridgeport and Worcester; **Machinery cast cupola size** $21.50 Chattanooga, $22 Radford, Va. and $23 Phillipsdale, Bridgeport and Worcester; **No. 1 machinery cast, drop broken** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester; **Clean auto cast** $22 Chattanooga, $22.50 Radford, Va. and $23.50 Phillipsdale, Bridgeport and Worcester.

(a) The grades specified are, except dealers' No. 1 and No. 2 bundles and uncut structural and plate scrap, as named and defined in the simplified recommendations R-58-36 of the Department of Commerce which shall be the governing specifications for iron and steel scrap hereunder (other than railroad grades). Dealers' No. 1 bundles shall consist of new, clean black sheet scrap, hydraulically compressed in the dealer's yard. Dealers' No. 2 bundles shall consist of old fender and body scrap, and shall in no case command a premium. (b) These grades (other than railroad grades) represent the major classifications of iron and steel scrap. The maximum prices of superior or inferior grades shall continue to bear the same comparable relationship to those major grade classifications as heretofore existed between the prices of such superior or inferior grades and the prices of the major grades.

Maximum price at shipping point: A shipping point is the point from which the scrap is to be shipped to a consumer. Maximum price at which a grade of scrap may be sold f.o.b. its point of shipment is the shipping point of such scrap. **For shipping points located within a basing point,** the shipping point price is determined by taking the basing point price and deducting actual transportation costs to the consumer's plant within the basing point. **For shipping points outside a basing point,** the shipping point price is determined by taking the nearest basing point and subtracting the lowest transportation charge. (Example: No. 1 steel shipped from Toledo takes the Detroit base of $17.85 minus transportation of $1.52 or $16.33. This shipping point price is the same to all consumers wherever located.) **Exceptions:** Shipping point of any grade not listed as having a basing point in New England is the Johnstown base minus the all-rail freight from the shipping point to Johnstown. Shipping point prices for New York City, Brooklyn, New York and New Jersey must be computed on the basis of the Bethlehem base although nearer to Buffalo in terms of barge transportation.

Maximum prices to consumers: Maximum price at which any grade (other than railroad) may be delivered to a consumer wherever located is the shipping point price plus actual transportation charges. Where shipment is by water, not more than 75 cents per gross ton may be included for handling charges at dock. Maximum delivered price in no case shall exceed by $1 a ton the nearest maximum base price in terms of transportation charges. (Example: The $1 excess is the so-called "springboard" arrangement. Youngstown consumers can draw on the Cleveland area for No. 1 steel scrap by taking the Cleveland base of $19.50, subtracting the Cleveland switching charge of 65 cents and adding freight to Youngstown of $2.08. The resulting delivered figure of $20.93 is within the "springboard" limit of $1 over the Youngstown base of $20.)

Billet and bloom crops originating in the Pittsburgh district may be sold within or without the district at the Pittsburgh base price plus up to, but not more than $2.50 in transportation charges Maximum prices for **unprepared scrap** shall be $2.50 a ton less than the maximums for corresponding grade or grades of prepared scrap. **Remote scrap** is material located beyond the zone from which the railroad freight rate to Pittsburgh is $11.20 and a consumer may obtain permission from OPACS to absorb transportation charges necessary to obtain 500 tons or more.

Railroad grades: Where a railroad operates in two or more basing points, the highest base applies to consumers anywhere on the line. (Example: New York Central Railroad uses the $21 Pittsburgh base on No. 1 steel since the P. & L. E. operates there). Exception: Switching charges of 84 cents a ton must be subtracted from prices on scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. Where railroad scrap is shipped to an off-the-line consumer, the highest maximum on-the-line price or the nearest basing point price, whichever is higher, applies.

Commissions: Brokers are allowed a commission up to 50 cents a ton above maximum prices to consumers, including export.

Export prices: Maximum on No. 1 heavy melting steel (other than railroad) is the domestic shipping point price plus lowest transportation charge to point of export. Maximum price to a domestic consumer on line of the originating railroad plus transportation to point of export applies on No. 1 railroad steel. Customary differentials apply on other railroad and non-railroad grades.

Sheets, Strip

Sheet & Strip Prices, Page 104

High ratings for steel sheets for defense continue to increase and tonnage available for civilian use shrinks in proportion. Many producers are unable to consider anything but priority tonnage and scattered carlot deliveries against old contracts are diminishing steadily.

Stamping shops which have been unable to obtain defense work are adversely affected by this situation and many have almost reached the end of their stocks. Fabricators of small tanks are feeling the pinch, though they have had good inventories to work against.

Cuts ordered in household appliance manufacture have not yet made their effect felt in the sheet market but are expected to relieve the situation somewhat.

Shops with contracts for shipbuilding equipment, largely in the East and New England, are heavily booked with orders for ventilators, fans, blowers and miscellaneous units with high ratings. More sheets are required in ship construction than is generally realized and much of this is fabricated in outside shops.

Galvanized sheet production has dropped to 50 per cent of capacity, lowest since the week of Labor Day. A year ago the rate was 81 per cent and two years ago it was 78 per cent. Supplies of spelter are becoming somewhat better but sheets for galvanizing are not available in larger tonnage.

Plates

Plate Prices, Page 104

Even A-1-a rating on steel plates no longer is capable of bringing prompt delivery unless backed by OPM order. So much tonnage bears the top priority number that mills cannot schedule it intelligently to serve most needed projects.

Shipbuilding and freight car building are receiving better supply and little delay is met in the former, though car shops are not able to reach capacity production.

In some instances work practically completed is held up by lack of a few plates, causing delay in the project of which it is a part. In such cases appeal to OPM is needed to bring prompt delivery. In some instances premium prices have been paid to secondary sellers for small lots.

Plate mills are being called on to supply shipyards with more steel this month than in October. In consequence they are drawing on continuous mills for some of this tonnage, not for the navy, but for merchant shipyards. The latter are forced to shear much of this material in their own yards as many continuous mill producers are said to have insufficient equipment for this purpose.

As plates are being allocated to some extent mill rollings this month may include some lower priorities which otherwise would not be handled. Except for this allocation most mills would not be rolling much tonnage below A-1-c but as it stands they have to suppl railroads and carbuilders with substantial tonnage, though not as much as is desired. This takes A-3 rating.

PLATE CONTRACTS PLACED

9000 tons, wind tunnel, Moffett Field, Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

2500 tons, cell tanks for Basic Magnesium Corp. plant, Las Vegas, Nev.

375 tons, 8 to 20-inch welded steel pipe, quartermaster, Fort Ord, Calif., to California Corrugated Culvert Co., Berkeley, Calif.

200 tons, 500,000-gallon tank and tower, West Coast Air Corps Training Station, Santa Ana, Calif., to Darby Products & Steel Plate Co., Kansas City, Mo.

PLATE CONTRACTS PENDING

630 tons, three 56,000-barrel tanks, water and power department, Los Angeles; Chicago Bridge & Iron Works, Chicago apparently low bidder.

Bars

Bar Prices, Page 105

Pressure in steel bars and shapes is not as great as in plates and the range of priorities on tonnage now being rolled is not as great. A large eastern producer is rolling no bar or shape tonnage with priorities under A-3 this month. Others are able to supply some tonnage on lower ratings. The situation is relieving the position of warehouses,

as their customers are booking more defense work of high priority, which facilitates jobber replacements to that extent, while their A-9 rating yields little tonnage.

Additional contracts are being placed for small arms manufacture, requiring large tonnages of steel bars. On such materials specified monthly shipments reach into second half next year. These specifications tend to increase as prime contractors sublet additional work, ordering shipments routed to the smaller shops as needed. Heat treating continues a bottleneck but additional facilities are being built to relieve this. Special steels for cutting tools are in strong demand with supplies light, especially in tungsten steels.

Bolt and nut makers are filing heavy releases to meet demand for fastenings specialties.

Shell steel needs are expected to come out heavily within a short time, some allocations already being made. New shell-making facilities now coming to completion will require greatly increased supply of shell rounds, which will be of highest priority.

Pipe

Pipe Prices, Page 105

Merchant steel pipe demand continues heavy for building purposes and also for shipbuilding. Most demand is for defense. Resale inventories are kept low by limited mill shipments. Most important requirements are being met although assortments in hands of suppliers are badly broken. Metal furniture requirements are slackening under curtailed priorities. Boiler tubes are most difficult to obtain and railroads are feeling the pinch in locomotive repairs.

Cast pipe orders for non-defense purposes can be filled in eight to ten weeks but most tonnage carries some form of rating. Cast pipe makers are unable to obtain sufficient pig iron to build inventories of standard sizes usually carried in stock. Utilities are buying only for defense expansions. Most orders from contractors are in small lots.

CAST PIPE PLACED

704 tons, water and sewer system, west coast replacement center, Santa Ana, Calif., to Pacific States Cast Iron Pipe Co., Provo, Utah.

400 tons, class B, 6 and 8-inch, Providence, R. I., to Warren Pipe Co., Everett, Mass., $56.80 per ton; bids Nov. 10.

340 tons, 12 and 16-inch additional for Lewiston, Me., to R. D. Wood & Co., Florence, N. J.

280 tons, 4 to 8-inch, Fresno, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

240 tons, 4 to 10-inch, housing project, West Seattle, to Hugh G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; Boespflug Construction Co., Seattle, contractor.

CAST PIPE PENDING

4300 tons, 16 and 18-inch, water system, Defense Public Works, Los Angeles, for San Diego; bids Nov. 18.

2460 tons, 12- to 18-inch, water system, Defense Public Works, Los Angeles, for San Luis Obispo, Calif.; bids Nov. 18.

826 tons, 16-inch, cantonment, Fort Lewis, Wash.; bids Nov. 14.

100 tons, mostly 6-inch, Westover Field, Chicopee, Mass.; bids in to United States engineer, Providence, R. I.

Unstated, materials for water system expansion, Kelso, Wash.; bids Nov. 18.

Rails, Cars

Track Material Prices, Page 105

Better deliveries are being made on steel for railroad car building, although its rating is A-3 compared with A-1 for direct defense. Car-building shops have not yet reached capacity production. Increased use of bessemer steel plates for cars has helped as output of this grade has increased.

Rail mills are dividing production between rails and shell rounds. Additional export rail tonnages have been booked for the Near East war zone, on British account. Domestic rail buying is being held down as much as possible and present orders will be rolled over a long period. Most pressing demand now is for tracks in connection with cantonments and defense plants.

Railroad shops are operating at practical capacity on building new cars and keeping up repairs. No direct defense work is being undertaken.

LOCOMOTIVES PLACED

Arkansas Ordnance Plant, Little Rock, Ark., one 50-ton diesel-electric switch engine, to General Electric Co., Schenectady, N. Y.

Chemical Warfare Arsenal, Huntsville, Ala., two 65-ton diesel-electric locomotives, to General Electric Co., Schenectady, N. Y.

Johns-Manville Service Co., one 44-ton diesel-electric switch engine, to Whitcomb Locomotive Co., Rochelle, Ill.

Litchfield & Madison, one 1000-horsepower diesel-electric switch engine, to Baldwin Locomotive Works, Eddystone, Pa.

United States War Department, 20 meter-gage 2-8-8-2 type steam locomotives, for Yunnan-Burma railroad, China, reported placed with American Locomotive Co., New York.

CAR ORDERS PLACED

Bethlehem Steel Co., 120 fifty-ton gondolas; contemplated, for erection in its own shops at Johnstown, Pa.

CAR ORDERS PENDING

Navy, six 50-ton flat and ten box cars for Fallbrook, Calif.; ten flats and ten box for Mare Island, Calif.; six flats and four box for Thorne, Nev.; bids to Washington, schedule 9340, Nov. 21.

War Department, 450 miscellaneous meter-gage freight cars for Yunnan-Burma railroad, China; bids Nov. 17; A-1-1 rating is provided.

BUSES BOOKED

A.c.f. Motors Co., New York: Twelve 28-passenger for Conestoga Transportation Co., Lancaster, Pa.; five 37-passenger for Blue Ridge Transportation Co., Hagerstown, Md.; four 41-passenger for Florida Motor Lines Corp., Jacksonville, Fla.

Structural Shapes

Structural Shape Prices, Page 105

Fabricators of structural steel are operating at capacity or as nearly as receipts of plain material will allow. Mill deliveries are being maintained close to schedule in most cases. Buying for immediate delivery is difficult, even with the highest rating and impossible without some preference. Used structurals, especially in small sizes, are being made available by reconditioning. This applies to some material that normally would be scrapped. Inquiries are plentiful and many are being returned without bids or taken without suggestion of delivery date.

It is estimated that fully 50 per cent of structural material shipped into New England is for shipbuilding.

SHAPE CONTRACTS PLACED

5000 tons, wind tunnel, Moffett Field, Calif., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

2300 tons, third section, No. 2 power station, Union Electric Co. of Illinois, Venice, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Stone & Webster Engineering Co., Boston, contractor.

2055 tons, bridge superstructure, Tuscarawas river for protection project, Massillon, O., to Fort Pitt Bridge Works, Pittsburgh, $448,044.60; as follows on steel: 1783 tons, carbon structural steel, 9.74c per pound; 226 tons, silicon structural steel, 10.41c per pound; 56,000 pounds steel castings, 21.74c per pound; 36,000 pounds steel forgings, 25.30c per pound; bids Nov. 7, U. S. Engineer office, Huntington, W. Va., inv. 59; other bidders, American Bridge Co., Pittsburgh, $460,126.50, and Mount Vernon Bridge Co., Mt. Vernon, O., $471,310.30; government estimate, $500,875.

1800 tons, powerhouse, American Gas & Electric Co., Mishawaka, Ind., to Lehigh Structural Steel Co., Allentown, Pa.

1500 tons, steel sheet piling for Marine Park, Staten Island, N. Y., divided between Bethlehem Steel Co. and Carnegie-Illinois Steel Corp., through Charles Vachris Co., Brooklyn, N. Y., contractor.

610 tons, manufacturing building, Vickers Inc., Waterbury, Conn., to American Bridge Co., Pittsburgh.

500 tons or more, gantry cranes for Puget Sound navy yard; Washington Iron Works, Seattle, contractor, low at $288,800.

417 tons, state bridge, Clark Fork river, Mineral county, Montana, to unstated interest.

300 tons, addition, building 41, Watertown, Mass., arsenal, to Frank M. Weaver & Co. Inc., Lansdale, Pa.

275 tons, plate shop, Richmond Ship-

SHAPE AWARDS COMPARED

	Tons
Week ended Nov. 15	15,617
Week ended Nov. 8	18,755
Week ended Nov. 1	12,510
This week, 1940	29,373
Weekly average, 1941	28,256
Weekly average, 1940	28,414
Weekly average, Oct., 1941	22,530
Total to date, 1940	1,306,129
Total to date, 1941	1,297,739

Includes awards of 100 tons or more.

building Co., Richmond, Calif., to Judson-Pacific Corp., San Francisco.

200 tons, storage building, naval fuel depot, Melville, R. I., to James E. Cox Co., Fall River, Mass.

200 tons, two box girders, TVA, Gilbertsville, Ky., to Lakeside Bridge & Steel Co., Milwaukee.

135 tons, building, Robins Conveying Belt Co., Passaic, N. J., to Lehigh Structural Steel Co., Allentown, Pa., through Mahoney-Troast Co., Newark, N. J.

125 tons, hangar, Fairchild Engineering & Aircraft Co., Farmingdale, N. Y., to American Bridge Co., Pittsburgh.

100 tons, building additions, arsenal, Watervliet, N. Y., to Frank M. Weaver & Co. Inc., Lansdale, Pa.

100 tons, building, Quimby Pump Co., New Brunswick, N. J., to Frank M. Weaver & Co. Inc., Lansdale, Pa.; James F. Mitchell Inc., Newark, N. J., contractor.

SHAPE CONTRACTS PENDING

4000 tons, extension, Fairbanks, Morse & Co., Beloit, Wis.; bids Nov. 12.

2500 tons, five hangars, Bermuda airplane base; bids being taken.

2000 tons, three warehouses, naval supply depot, Oakland, Calif.; Judson-Pacific Corp., San Francisco, low.

1705 tons, southwest traffic viaduct, Kansas City, Mo.; bids Nov. 18.

1370 tons, state highway projects, including bridges, New York state; bids Nov. 19, Albany.

1120 tons, factory building, Lycoming division, Aviation Mfg. Corp., Williamsport, Pa.

1000 tons or more, navy drydock cranes; Colby Steel & Engineering Co., Seattle, low, $474,410 for Item No. 4, $277,160 for Item No. 5, and $262,500 for Item No. 6; Wagner Whirler Derrick Co., New York, low, $504,000 for Item No. 1, $234,000 for Item No. 2 and $270,000 for Item No. 3.

600 tons, bridge, Hudson river, Mechanicville, Rensselaer-Saratoga counties, New York; Frank E. Antolick, Schaghticoke, N. Y., low, $218,218.25; bids Nov. 6, Albany.

570 tons, unit 1, Tyrone power station, Kentucky Utilities Co., Tyrone, Ky.

500 tons, Illinois state highway bridge, Logan county; bids Nov. 18.

500 tons, plate girder bridge, Snyder county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 12.

500 tons, various concrete structures and plate girder bridge, Snyder county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 12.

460 tons, work on pier D, Philadelphia navy yard; H. E. Baton Inc., low.

400 tons, power house No. 5, Pit River, Calif., for Pacific Gas & Electric Co., San Francisco; Bethlehem Steel Co., San Francisco, low.

380 tons, gun protections, South Boston, Mass., for U. S. Corps of Engineers.

290 tons, manufacturing building, Arcrods Corp., Cuyahoga Heights, O.

240 tons, fixed wheel gates, specif. 1009, Coram, Calif., Bureau of Reclamation.

210 tons, I-beam bridge, Monroe county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 12.

187 tons, sheet piling, also 62 tons reinforcing, shore intake, South district filtration plant, Chicago, for City of Chicago; Fitzsimmons & Connell Dredge & Dock Co., Chicago, low on general contract; bids Nov. 5.

135 tons, bridge over Twelve Mile creek, Campbell county, Kentucky, for state.

125 tons, pipe and electric shop, Maryland Dry Dock Co., Baltimore.

Tin Plate

Tin Plate Prices, Page 104

Tin mill production continues at capacity. Non-integrated mills report better situation in semifinished steel, both tin bars and coiled strip, but there is no certainty this will continue. Demand for general line cans and miscellaneous uses is increasing as the packing season ends and backlogs are not diminishing. Some added tin plate is expected to be needed to replace copper, banned for domestic use.

Restrictions on tin plate for oil and petroleum products containers are expected. Mills expect the winter will give opportunity for building stocks to meet heavy spring demand.

Reinforcing Bars

Reinforcing Bar Prices, Page 105

Concrete bar bookings continue heavy, current tonnage being accepted only with A-10 priority or

CONCRETE BARS COMPARED

	Tons
Week ended Nov. 15	10,814
Week ended Nov. 8	18,781
Week ended Nov. 1	6,230
This week, 1940	8,780
Weekly average, 1941	14,453
Weekly average, 1940	9,661
Weekly average, Oct., 1941	9,894
Total to date, 1940	441,670
Total to date, 1941	664,840

Includes awards of 100 tons or more.

better. Placements are about equal to production capacity. Schools and highway jobs make up a large part of present demand. Contracts for first quarter delivery or later carry provision for prices in effect at time of shipment, although there is no indication of price revision.

REINFORCING STEEL AWARDS

5000 tons, ammonia nitrate plant and miscellaneous construction, Jayhawk Ordnance Works, Baxter Springs, Kans., to Sheffield Steel Corp., Kansas City, Mo., through F. H. McGraw Co. and Freete Construction Co., Pittsburg, Kans., joint contractors.

800 tons, Brighton dam (127-W), Rockville, Md., to Truscon Steel Co., Youngstown, O.; Ambursen Engineering Co., contractor.

687 tons, United States engineer office, South Pacific division, San Francisco for Wheeler Field, T. H., to West Virginia Rail Co., Huntington, W. Va.

600 tons, storage building, naval fuel depot, Melville, R. I., to Joseph T. Ryerson & Son Inc., Cambridge, Mass.

575 tons, plant addition, Bell Aircraft Corp., Niagara Falls, N. Y., to Truscon Steel Co., Youngstown, O.; Austin Co., Cleveland, contractor.

400 tons, Boeing Aircraft Co. plant addition, Wichita, Kans., to Sheffield Steel Co.

370 tons, state highway bridge, Carroll county, Kentucky, to Laclede Steel Co., St. Louis; Massman Construction Co., contractor.

300 tons, factory building, Finderne, N. J., to Bethlehem Steel Co.; Austin Co., contractor.

300 tons, switching station, Boston Edison Co., Everett, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Thomas O'Connor Co., Boston, contractor.

257 tons, includes 157 tons bars and 100 tons wire mesh, airplane engine supercharger plant, Allis-Chalmers Mfg. Co., Milwaukee, to W. H. Pipkorn Co., Milwaukee; Siesel Construction Co., Milwaukee; contractor; bids Nov. 7.

250 tons, service building, armory, Springfield, Mass., to Truscon Steel Co., South Boston, Mass.

230 tons, administration building, general depot, Atlanta, Ga., to Cosco Products Co., Atlanta; A. K. Adams & Co., Atlanta, contractor; Decatur Iron & Steel Co., Decatur, Ala., awarded structural steel.

185 tons, underground magazine and ordnance storage facilities, MacDill field, Florida, to Florida Steel Products Co. Inc., Tampa; Paul Smith Construction Co., Tampa, contractor; Bushnell-Lyons Iron Works Inc., Tampa, awarded 69 tons structural steel.

180 tons, aircraft laboratory and test building, Wright Field, O., to Pollak Steel Co., Cincinnati; F. Messer & Son, contractors.

170 tons, building, navy yard, Brooklyn, N. Y., to Ceco Steel Products Corp., New York.

170 tons, hangar, Ford Motor Co., Wayne county, Michigan, to Bethlehem Steel Co.; Bryant & Detwiler, contractors.

113 tons, addition, W. F. & John Barnes Co., Rockford, Ill., to Truscon Steel Co., Youngstown, O.

107 tons, addition, Whitney Chain & Mfg. Co., Hartford, Conn., to Scherer Steel Co., Hartford; Bartlett-Brainerd Co., Hartford, contractor.

100 tons, housing project, Augusta, Mo., to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING STEEL PENDING

8000 tons, shell-loading plant, Wahoo, Nebr.

3008 tons, Bureau of Reclamation, invitation A-33457-A-1, Coram, Calif.; originally bid Nov. 4, extended to Nov. 19.

3000 tons, Blue Stone reservoir, Hinton, W. Va.

2000 tons, Georgetown Corp. hotel, Arlington, Va.

2000 tons, navy yard dry dock, Boston; J. F. Fitzgerald, contractor.

1000 tons bars and 100 tons mesh, Jacobs Aircraft Engine Co., Pottstown, Pa.

717 tons, Bureau of Reclamation, Invitation A-22,522-A-2, Mountain Home, Idaho; new bids Nov. 17.

700 tons, Appalachian Electric Power Co. construction, Glen Lyn, Va.

515 tons, bars and mesh, state highway projects, New York state; bids Nov. 19, Albany.

447 tons, bridge, Washington and Tenth street, San Diego, Calif., for state; bids Dec. 11.

400 tons, navy yard storehouse, South Boston, Mass., Matthew Cummings, contractor.

358 tons, Invitation 2388, Bonneville Power Administration, Oreg.; bids opened.

200 tons, Bureau of Reclamation, invitation 38158-A-1, Odair, Wash.; bids extended to Nov. 19.

275 tons, optical shop, Frankford arsenal, Philadelphia.

209 tons, seven highway bridges, King county, Washington; bids to state highway department, Olympia, Wash., Nov. 25.

200 tons, Invitation G-832, Watertown arsenal, Watertown, Mass.

200 tons, building, Iowa Packing Co., Des Moines, Iowa; new bids Nov. 15.

170 tons, Alaska, War Department, in-

vitation 896-41-180; bids to Seattle Nov. 21.

165 tons, Bureau of Reclamation, Invitation 48,902-A, Friant, Calif.; bids Nov. 12.

160 tons, bridge over Salt Creek, Lincoln, Ill.

140 tons, various concrete structures, Snyder county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 12.

132 tons, Alaska, War Department, invitation 869-42-183; bids to Seattle Nov. 21.

106 tons, superstructure, low-lift pumping station, filter building and administration building, South district filtration plant, Chicago, for City of Chicago; bids Nov. 21.

100 tons, Bureau of Reclamation, invitation 48906A, Friant, Calif.; bids Nov 14.

100 tons, various concrete structures, Monroe county, Pennsylvania; bids to state highway department, Harrisburg, Pa., Dec. 12.

100 tons, mesh, highway project, route 44, section 12, Pennsville to Hood Road, New Jersey; Versaggi Bros. Construction Co., Wildwood, N. J., low, $134,527.70, bids Nov. 7, Trenton, N. J.

Pig Iron

Pig Iron Prices, Page 106

Pig iron shipments in November closely parallel those of October and consumers for the most part are being given sufficient for their needs. Complaints of small supply are less frequent as the allocation plan proceeds and distribution is more equitable. Foundries unable to obtain usual scrap supply are asking for larger pig iron allocation to make up the lack. Relatively little foundry interruption has occurred though the margin often is narrow.

Many melters able to obtain work for defense find their problem much easier but to the same degree those without preferred status find difficulty. Effect of allocations has been to equalize inventories and most melters now have little on hand beyond immediate needs.

Movement of pig iron into the New Jersey and Philadelphia districts is somewhat complicated by shortage of barges on the New York state canal, affecting Buffalo iron. Shortage is attributed to rush of grain to tidewater before the canal freezes. Some Buffalo iron will move by all-rail, at added cost to the consumer.

Scrap

Scrap Prices, Page 108

Dominant feature of the steel and iron scrap market is scarcity, all consuming districts being affected. Not only is current supply far below consumption but reserves are small and are being depleted by constant inroads to maintain steel production. In many cases plant operation is maintained on a day-to-day basis with threat of curtailment ever present. Open hearths already shut down are unable to obtain sufficient material to resume and further shortening is seen definitely within a few weeks.

In Chicago supply will not support full production beyond the end of the year and some shortening is expected soon after Dec. 1. Some tonnage is being diverted from that area to the Wheeling district on orders of the government. The governor of Illinois has ordered a drive to collect scrap from homes, farms and industrial sources.

St. Louis district melters have from ten days to four weeks supply, Foundries there have less scrap in stock than steel mills, except for one operation, which has a supply for four or five months. Shipment of remote scrap, which showed an increase a fortnight ago, has decreased to a trickle. Floods in the Southwest is one cause.

Buffalo steelmakers were aided recently by boat shipments from the head of the lakes but close of

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

For each 1% tungsten contained	
Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

navigation within a short time will cut off this source, with mills scantily supplied. The leading mill already has taken off five open hearths and expects to drop others soon.

Date for return of scrap questionnaires has been extended five days, to Nov. 20, to be filed with the Bureau of Mines, which has been handling similar questionnaires for some time. The new forms, which cover greater detail, are to be filed by brokers and consumers. Price information is being requested from consumers only.

The price situation continues mixed, most mill buyers adhering to the price ceiling while many foundry consumers are said to be paying premiums. Foundry grades are particularly scarce and it is common practice for consumers to buy directly from small collectors, taking in material in truck and wagon loads as quickly as accumulated.

Some confusion has developed as to when the 50-cent commission may be applied under the price regulation. Interpretations of OPA apparently are that no such commission can be charged where scrap is drawn from the seller's own stock, whether he be a producer or a yard man.

Pacific Coast

Seattle—Demand for steel items has eased during the last fortnight, due in some measure to the welders' strike, now settled. However, production at shipyards and fabricating plants has been retarded. Rolling mills have a four to six-month backlog, which is now declining as no new business, except for defense agencies, is being accepted. Some fabricating plants are nearing the end of their backlogs.

Preliminary construction is scheduled this month on the 90,000,000-pound per annum aluminum reduction plant to be built at Troutdale, Oreg., by Aluminum Co. of America. Word from Washington is that OPM officials have selected a 100-acre site at Fairview, Oreg., near Troutdale, on which it is proposed to erect a $20,000,000, 60.000.000-pounds a year, aluminum fabricating plant. Spokane reports a site close to that city has been selected for the site of another proposed aluminum plant.

Boeing Aircraft Co., Seattle, has an additional war department contract at $189,217 for furnishing plane parts.

Washington Iron Works, Seattle, is building gantry cranes for Puget Sound navy yard under a $288,800 award, involving 500 tons or more of shapes. Colby Steel & Engineering Co., Seattle, and Wagner Whirler Derrick Co., New York, are low to the navy for fabricating drydock cranes, involving probably 2000 tons or more, under six schedules.

Receipts of scrap have increased slightly in the last ten days. Freight adjustments are expected to give California mills entry into Southern Oregon while Northern Oregon will probably be able to ship to Seattle. Cast iron scrap is scarce and foundries are struggling under a handicap of insufficient raw materials.

San Francisco — Featuring the week was award of a wind tunnel at Moffett Field, Calif., to Pittsburgh-Des Moines Steel Co., calling for 9000 tons of plates and 5000 tons of shapes. Both the plate and structural markets were active and 9575 tons of plates were placed, bringing the aggregate for the year to 563,240 tons, compared with 183,911 tons for the corresponding period in 1940.

Most fabricators on the Pacific Coast have heavy backlogs and are unable to quote on private projects. Judson-Pacific Co. secured 275 tons for a plate shop for Richmond Shipbuilding Co., Richmond, Calif., and apparently is low on 2000 tons for three warehouses for the naval supply depot, Oakland, Calif. Two shipfitters' buildings at the navy yard, Mare Island, originally scheduled for structural steel, will be built of wood. Bookings totaled 6773 tons and brought the aggregate for the year to 564,343 tons, compared with 316,933 tons for the same period a year ago.

Practically every reinforcing bar mill is out of the market on inquiries from private sources. West Virginia Rail Co., Huntington, W. Va., booked an order for 687 tons for

the United States engineer office, South Pacific division, for delivery at Wheeler Field, T. H. Awards totaled 1722 tons, bringing the aggregate to date to 155,959 tons, compared with 152,587 tons for the same period last year.

Pacific Bridge Co. has booked nine small cargo vessels for the Maritime Commission, 248 feet long, 42-foot beam and 22-foot depth. They will require 1080 tons of plates and 720 tons of shapes. This is the first time this company has taken a contract for ships.

Canada

Toronto, Ont.—While steelmaking facilities in Canada are producing at capacity, supply of finished and semifinished materials is falling farther behind in meeting war demand and supplies to non-essential industry are being reduced continually. Further expansion in Canada's shipbuilding program was announced by C. D. Howe, minister of munitions and supply, during the past week, when he made special reference to new contracts for warship construction. It is stated that about 75 per cent of plate requirements will have to be imported from the United States. Steel Co. of Canada Ltd., Hamilton, Ont., is preparing to operate its plate mill at capacity but to do this it may be necessary to curtail output in some other departments as the company has not sufficient steel to maintain all out production on all rolling mills. The plate mill of Dominion Steel & Coal Co. Ltd., Sydney, N. S., will be put in production as soon as electrical equipment has been installed, and will add further to Canada's plate output.

Inquiries for sheets are heavy, but mills, with backlogs that will absorb all production for months, are not accepting orders except through government channels.

Mill representatives state that deliveries on merchant bars are being extended into 1942 and most current buying is directly associated with the war effort. Present demand far exceeds supply.

The government is continuing its wartime construction program, and while much of the work now underway consists of wood buildings, there is growing demand for structural shapes. Structural awards for the past week totaled approximately 9500 tons, with pending work involving about 12,000 tons. For the government's proposed $9.000,000 ordnance plant, it is estimated about 6000 tons of steel will be required.

Steel in Europe

Foreign Steel Prices, Page 107

London—(*By Cable*)—Iron and steel situation in Great Britain shows slight change and little delay is experienced in deliveries on war contracts. Demand for special steels shows constant expansion. Black sheets are in steady demand. Tin

Nonferrous Metal Prices

Nov.	Copper, Electro, del. Conn.	Copper, Lake, del. Midwest	Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-14	12.00	12.12½	11.75	52.00	52.00	5.85	5.70	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50-13.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	10.00-10.25
Cleveland	10.50-10.75
Chicago	10.25-10.50
St. Louis	10.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.50

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.00-6.25
Chicago	6.00-6.25
St. Louis	6.25

Lead

New York	5.25-5.37½
Cleveland	5.00-5.25
Chicago	4.75-5.00
St. Louis	4.75-5.00

Old Zinc

New York	5.00-5.25
Cleveland	4.00-4.12½
St. Louis	4.50-5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	14.50

plate mills remaining in operation are busy on domestic requirements.

Nonferrous Metals

New York—Based on a Washington report, available copper supplies this month will fall about 22,000 tons short of covering direct military and Lend-Lease requirements. Direct allocation of scarce defense metals will be effected within three months, says Donald Nelson, director of priorities.

Copper—Refined stocks rose last month to 67,260 tons from 63,670 as deliveries held steady at 121,313 tons and refined output rose to 86,617 tons.

Lead—OPM may take over direct allocation of all lead supplies under proposed SPAB program. American Smelting & Refining Co. is reopening its Murray, Utah, smelter.

Zinc—The 25 per cent increase in U. S. zinc smelter output in the past year has gone a long way toward assuring ample supplies for defense and substantial supplies for nondefense use.

Tin—Offerings were small since the cost of importing metal from the Far East remained in excess of the 52-cent maximum selling price here.

Equipment

Boston—Crane contracts totaling several million dollars have been placed for shipyards and Boston and Portsmouth, N. H., navy yards, American Hoist & Derrick Co., St. Paul, booked eight 20-ton jib cranes; A. M. Meyerstein, Brooklyn, screw luffing mechanisms for dry dock cranes, Brooklyn and revolving crane superstructure for the floating unit HERCULES, Boston; Orton Crane & Shovel Co., Chicago, locomotive cranes for various yards, including five 40-ton and three 25-ton for Ports-

mouth, N. H.; Shepard-Niles Crane & Hoist Co., Montour Falls, N. Y., two electric traveling bridge cranes, Brooklyn. These contracts were placed by bureau of yards and docks, Navy Department, with additional large requirements being allocated. Crane builders are heavily sold ahead, those erecting bridge units having backlogs through next year in several instances.

New York—Machine tool orders are up sharply to record peaks with indications this is the beginning of tremendous additional buying, a result of armament program expansion, which in some cases will be doubled. Contracts are being placed for bomber engine plant equipment and combat tank builders are placing large orders for tools. Bearings manufacturers are buying heavily to prepare for substantial increase in needs for aircraft and other defense needs. Torpedo manufacture requires many precision tools to be placed through the Newport, R. I., station, a large can-making company having a contract to fabricate the units in the Mid West. Heavy inquiry is coming out for machines for production of anti-aircraft artillery, a supplemental contract to move through the Watervliet, N. Y., arsenal; Raritan, N. J., arsenal is closing on 202 lathes of various types and 34 fourteen-inch heavy-duty shapers.

State Socialism "New Deal's Goal"

(*Concluded from Page* 25)

giving thought to production of low carbon pig iron for the foundry trade.

Improved cupola equipment allowing for more efficient melting has been an outstanding factor in gray iron foundry practice. More attention also is being given to control of all molding sand properties. Zircon sand cores have been remarkably successful in heavy metal sections where burning-in creates a cleaning problem.

"Outstanding developments during recent years in gray iron have been in the metal itself," said Dr. Lorig. "Through control of carbon and silicon contents and of structure, unalloyed irons are now being made consistently, in some foundries, with tensile strengths well over 40,000 pounds per square inch. Influence of carbon predominates over all other constituents. The gray iron industry also has available certain control practices, which improve iron quality by providing better arrangement of graphite, resulting in higher and more consistent physical properties and better resistance to growth, wear and galling."

Alloying Elements Introduced

Introduction of alloying elements in cast iron has helped to make the industry high-strength conscious, promoting sound growth in manufacture and use of irons whose strengths far exceed what previously was the rule.

A few foundries are producing short-cycle malleable, by application of the accelerating effect of higher silicon contents and higher annealing temperatures. That requires careful supervision of melting, a close raw materials check, and good annealing furnaces and practice. Some short-cycle malleable irons are malleablized fully in less than 15 hours as compared with regular annealing cycles of 75 to 125 hours. Various so-called pearlitic malleable irons are available, but they are being produced on a relatively small scale as yet, Dr. Lorig said.

Recent innovation is continuous casting of steel as practiced at the Ford plant. That is being done by utilizing electric holding furnaces for the metal and conveyors which bring molds direct to the pouring spouts. The system not only saves time but also produces more uniform castings because the metal of uniform composition is delivered at uniform temperature.

■ Steel castings production in September totaled 118,543 net tons, compared with 117,703 tons in

August and 64,122 tons in September, 1940, the Bureau of the Census reports. Production for nine months totaled 944,632 tons, against 547,007 tons in the corresponding period last year.

Illinois Manufacturers Nominate Officers

■ Sterling Morton, secretary, Morton Salt Co., Chicago, has been nominated president, Illinois Manufacturers' Association. He is now treasurer, chairman of the international relations committee and a member of the policy committee. Mr. Morton has been president, Teletype Corp., and is a director, Elgin National Watch Co.

H. G. Myers, president and general manager, Gardner-Denver Co., Quincy, Ill., is the nominee for second vice president.

Nominations for directors include Kenneth Curtis, Curtis Lighting Co., Chicago; M. F. Dunne, Pyott Foundry & Machine Co., Chicago; Howard Goodman, Goodman Mfg. Co., Chicago; Alfred Kauffman, Link-Belt Co., Chicago; R. F. Rucker, Aluminum Ore Co., East St. Louis, Ill.; E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill.; A. J. Wilson, General Time Instruments Corp., LaSalle, Ill.; W. M. Wood, Mississippi Valley Structural Steel Co., Decatur, Ill.; and H. C. Wright, Chicago Flexible Shaft Co., Chicago.

Election will be held Dec. 9 in connection with the association's annual banquet at the Stevens hotel. Over 2000 are expected to attend. Speakers will be Sen. Walter F. George, Georgia, chairman of the senate finance committee, and Charles F. Kettering, vice president, General Motors Corp., Detroit.

"In Time of War, Prepare for Peace"

■ Planning now for the post-war period was advocated by Luis Gibson, the George H. Gibson Co., New York, before a recent meeting of the Philadelphia chapter, American Society of Tool Engineers.

"In the post war scramble for business those enterprises offering the most to the user for the least in purchase price will come out on top. . . . Regardless of whether the wheels of industry have been retarded or accelerated, competition will be keen. New products, new processes and new materials will appear. . . .

"There is no question but that we will turn from looking for material to looking for orders as soon as the mad rush of war is over. There is no question but that, in the meantime, we will lose customers to other companies who can supply

while we cannot, and that new purchasing officials, unfamiliar with our products, will come into offices of influence. The very fact that our salesmen are not selling will break established contacts. Yet, when the war is over, you may give thanks for any customers retained."

Mr. Gibson insisted it is not too early to prepare for the aftermath. "Prepare your mind to anticipate changed conditions," he advised. "Prepare your product to serve better, at lower cost. Prepare your prospects to look to you for help, now and later. Prepare your markets to change methods, if necessary, in order to accept the improved product."

Westinghouse Division Faces Full Load in 1942

■ Orders for defense goods already on hand and in prospect promise a full manufacturing load and successful operation in 1942 of Westinghouse Electric & Mfg. Co.'s Merchandising Division, it was reported last week by B. W. Clark, vice president. This in spite of emergency curtailment in production of electrical appliances due to direct orders from Washington and to shortages in critical materials, he explained.

Although "bending every effort" to defense work, the division will be ready with plans and products to serve the tremendous market which will be starved for adequate supplies of household appliances when peace comes, said Mr. Clark. Meanwhile, with backlog on all types of household appliances highest in the division's history, it is inevitable that during the present emergency "we shall fall far short of meeting the normal demand."

Among defense items manufactured by this division of Westinghouse are antitank shells, binoculars, bomb fuses and air-conditioning systems for factories.

Republic Installs Electric Furnace in 52 Hours

■ Republic Steel Corp. recently installed a 50-ton electric furnace at its Canton, O., plant in the remarkable time of 52 hours, ready for operation. Its first electric furnace, installed less than two years ago, required 166 hours. This is the eighth 50-ton furnace added to its facilities since early in 1940 and gives electric steel capacity of 700,000 tons per year, compared with 146,000 tons at the end of 1939.

Steel Corp. Shipments In October Set Record

■ Finished steel shipped in October by United States Steel Corp. totaled 1,851,279 net tons, an all-time record, 97,614 tons greater than the prior record, 1,753,665 tons, made in August. Shipments were 187,052 tons, 11.24 per cent greater than in September; 278,871 tons, 17.74 per cent, over October, 1940.

Shipments for ten months were 16,988,715 tons, an increase of 4,982,580 tons, 41.5 per cent, over 12,006,135 tons in the same period last year.

(Inter-company shipments not included)
Net Tons

	1941	1940	1939	1938
Jan.	1,682,454	1,145,592	870,866	570,264
Feb.	1,548,451	1,009,256	747,427	522,395
March	1,720,366	931,905	845,108	627,047
April	1,687,674	907,904	771,752	550,551
May	1,745,295	1,084,057	795,689	509,811
June	1,668,637	1,209,684	807,562	524,994
July	1,666,667	1,296,887	745,364	484,611
Aug.	1,753,665	1,455,604	885,636	615,321
Sept.	1,664,227	1,392,838	1,086,683	685,645
Oct.	1,851,279	1,572,408	1,345,855	730,312
Nov.	.....	1,425,352	1,406,205	749,328
Dec.	.....	1,544,623	1,443,969	765,868
Total, by Mos.	.....	14,976,110	11,752,116	7,286,347
Adjustment	.....	†37,639	*44,865	†29,159
Total	.....	15,013,749	11,707,251	7,315,506

†Increase. *Decrease.

Construction and Enterprise

Ohio

AKRON, O.—A. A. Hoffman Co., 800 Patterson avenue, is building an addition to its factory at 318 Perdue court.

CINCINNATI—Queen City Steel Treating Co. and Cincinnati Mine Machinery Co. will build a one-story addition for use as a machine shop and steel treating plant. Cost $20,000.

CLEVELAND—Ohio Tool Co., 3160 West 106th street, will enlarge manufacturing space by 5400 square feet at cost of $25,000. Lester E. Butzman is president.

CLEVELAND—Bishop & Babcock Mfg. Co., Fred N. Mizer, president, 4901 Hamilton avenue, plans construction of a $35,-

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 112 and Reinforcing Bars Pending on page 113 in this issue.

000 furnace building for manufacture of small shells. Plant will be located on East Fifty-fifth street near the lake front and will be equipped with hardening furnace and quenching pits.

CLEVELAND—A. W. Hecker Co., 1976 East Sixty-sixth street, will purchase machinery and equipment for manufacture of aircraft parts, under a lease agreement with Defense Plant Corp. Cost estimated at $199,130.

CLEVELAND — Broden Construction Co., 22800 Lakeland boulevard, E. J. Keller, secretary, is having plans prepared for a $30,000 addition, 50 x 172 feet.

COLUMBUS, O. — Denison Engineering Co., 119 West Chestnut street, will build a plant with 50,000 square feet of floor space. The company is producing defense equipment, including shell-loading presses, testing equipment for airplane spark plugs, crankshafts, gun recoils and presses for assembling gas shells.

LORAIN, O.—City water department will install two boiler units and auxiliary equipment in waterworks station. Will ask bids soon.

LORAIN, O.—American Crucible Products Co., 1305 Oberlin avenue, has a lease agreement with Defense Plant Corp. for purchase of machinery and equipment valued at $20,348 for use in manufacture of aircraft precision-machined parts.

NEW PHILADELPHIA, O.—Plant, machinery, equipment and steel of Mid-West Aero Mfg. Corp. will be sold at public auction Nov. 18, 10:30 a.m., by Samuel L. Winternitz & Co., 38 South Dearborn street, Chicago.

Connecticut

BRIDGEPORT, Conn.—Peerless Aluminum Castings Co. will erect one-story, 65 x 144-foot foundry addition.

BRIDGEPORT, CONN. — Bridgeport Rolling Mills Co. will build a mill to be financed by Defense Plant Corp. Cost $110,000.

FAIRFIELD, CONN.—Rolock Inc., Station street, Southport, Conn., R. P. Wells, president, will build one-story 100 x 100-foot and two-story 24 x 40-foot plants on Kingshighway. Contract has been let to Burr Barry, Fairfield, at about $56,000. Lyons & Mather, 211 State street, Bridgeport, Conn., are architects. (Noted July 28.)

MERIDEN, CONN.—Cuno Engineering Corp. will erect two-story addition, 45 x 100 feet, to cost over $65,000 with equipment.

NEW BRITAIN, CONN.—Union Mfg. Co. will build one-story addition, 30 x 160 feet. Cost close to $40,000 with equipment.

Maine

SOUTH PORTLAND, ME.—South Portland Ship Building Corp. will build five additions, including one-story assembling works, 75 x 475 feet; one-story welding shop, 15 x 42 feet; one-story gate house, 21 x 25 feet; one-story storage and distributing building, 75 x 450 feet, two-story administration building, 30 x 55 feet. Cost over $350,000 with equipment.

New Hampshire

LACONIA, N. H.—Scott & Williams Inc. will erect an aircraft equipment manufacturing plant, to be financed by Defense Plant Corp.

New York

BROOKLYN, N. Y.—Vulcan Proofing Co., 5622 First avenue, has plans by William Higginson & Sons, 101 Park avenue, New York, for altering two-story factory. Estimated cost $50,000.

BUFFALO—Universal Smelting & Re-

fining Corp., 2548 Elmwood avenue, plans erection of smelting plant at cost of $500,000.

NEW YORK—South American Steel Products Co. Inc. has been incorporated with $20,000 capital by George Muchnic, 1270 Sixth avenue, New York.

NEW YORK—Browning Precision Tool Co. Inc. has been formed to manufacture tools, dies, machines, etc., by Henry Schwartz, 135 Broadway, New York.

ROCHESTER, N. Y.—Staynew Filter Corp., 25 Leighton avenue, will build 170 x 250-foot factory, costing $175,000. S. Firestone, 59 South avenue, engineer.

ROCHESTER, N. Y.—Symington Gould Corp. is considering building a foundry at cost of $500,000.

TUPPER LAKE, N. Y.—Artomatic Machinery Corp. has been organized with $50,000 capital, by Ralph Hastings, Tupper Lake.

WHEATFIELD, N. Y.—Bell Aircraft Corp., 2050 Elmwood avenue, Buffalo, will install electric power equipment in additions to its branch plant here. Entire project will cost about $8,456,200.

New Jersey

CAPE MAY, N. J.—Northwest Magnesite Corp., Farmers building, Pittsburgh, plans construction of magnesite factory here, to cost about $1,000,000.

HOLLAND, N. J.—New Jersey Power & Light Co., 38 Main street, will build steel power plant addition. E. M. Gilbert Engineering Corp., 412 Washington street, Reading, Pa., engineer.

Pennsylvania

ALIQUIPPA, PA.—National Can Co., 110 East Forty-second street, New York, plans installation of electric power equipment in new plant here, reported to cost $375,000. (Noted Oct. 20).

CHESTER, PA.—Penn Steel Casting Co. will install electric power equipment in connection with rebuilding portion of plant destroyed by fire.

CORRY, PA.—Ajax Iron Works will soon take bids for 9000-square-foot addition to plant, and moving and re-erecting a 10,000-square-foot building.

DANVILLE, PA.—American Swedo Iron Corp. will make improvements to iron and steel plant and also build additions. Cost estimated at $40,000.

EAST PITTSBURGH, PA. — Westinghouse Electric & Mfg. Co. is preparing plans for an addition to welding shop and loading platform at Homewood works.

ERIE, PA.—Erie Lighting Co. will install turbine-generating unit, high pressure boiler and auxiliary equipment in expansion of local steam-electric generating station. Entire project to cost over $2,500,000.

MEADVILLE, PA.—United States War Department will soon complete negotiations through Defense Plant Corp. for financing a $40,000,000 ordnance plant seven miles outside Meadville, to be called Keystone Ordnance Works.

Michigan

DETROIT—Falcon Tool Co., 12502 Greiner, will erect a new tool shop. L. B. Jameson, Hamtramck, Mich., architect.

DETROIT—National Broach & Machine Co., 11455 Shoemaker, has awarded contract to Barton-Malow Co., 1900 East Jefferson, for addition and alterations to factory. Estimated cost $32,600.

DETROIT—Briggs Mfg. Co. has awarded general contract to W. E. Wood Co., Detroit, for construction of turret manufacturing plant, to be erected at Outer Drive and Mt. Elliott avenue. Estimated cost $8,800,000.

GRAND RAPIDS, MICH. — Extruded Metals Defense Corp., Belding, Mich., recently organized unit of Extruded Metals Inc., plans installation of electric power equipment in plant here for production of aluminum alloy products, comprising about 250,000 square feet of floor space. Total cost of plant and equipment is estimated at $6,266,000.

LANSING, MICH.—Shoecraft, Drury & McNamee, engineers, Ann Arbor, Mich., have completed plans for construction of a $75,000 addition to sewage treatment plant here.

Illinois

DIXON, ILL.—Illinois Northern Utilities Co. will spend about $6,000,000 on a 50,000-kilowatt turbogenerating power plant here.

FRANKLIN PARK, ILL.—Continental Can Co., 4633 West Grand avenue, Chicago, plans construction of a $1,500,000 can factory here. The building is to be one and two-story, 400 x 1000 feet.

MATTOON, ILL.—Atlas Imperial Diesel Engine Co. has awarded general contract to R. Hart, Mattoon, for an addition to its plant here. Cost will exceed $40,000.

ROCHELLE, ILL.—Whitcomb Locomotive Co., 80 East Jackson boulevard, Chicago, has awarded contract for a one-story factory addition to cost about

$50,000, to E. L. Hallbauer Construction Co., 452 West Belden avenue, Chicago.

District of Columbia

WASHINGTON — Bureau of Supplies and Accounts, Navy Department, will take bids until Nov. 21, schedule 9393, 90 air compressors, delivery, Washington, D. C.; schedule 9401, two diesel marine engines, with spare parts and tools, delivery Washington, D. C.; Nov. 25, schedule 9382, six motor-driven horizontal, boring, drilling and milling machines, delivery Philadelphia, Mare Island, Calif., and Hunters Point, Calif.; Nov. 28, schedule 9394, 68 electric arc welding sets.

Mississippi

COLLINS, MISS.—REA has allotted $2,100,000 to South Mississippi Electric Power Association, O. L. Watson, president, to finance construction of transmission lines and generating facilities.

HATTIESBURG, MISS. — Mississippi Power Co., L. P. Sweatt, vice president, Gulfport, Miss., will erect 20,000-kilowatt steam electric generating plant.

Tennessee

CORDOVA, TENN.—National Fireworks Distributing Co., 3169 Johnson avenue, Memphis, Tenn., has received $300,000 building permit for construction of a munitions plant here.

Louisiana

WESTWEGO, LA.—Defense Plant Corp. has authorized execution of lease agreement with Avondale Marine Ways Inc. to provide for purchase of machinery and equipment at cost of $116,000 for building naval vessels.

West Virginia

FAIRMONT, W. VA. — Westinghouse Electric & Mfg. Co. has been authorized by Defense Plant Corp. to construct a $1,000,000 plant here for manufacturing electronic tubes for the Army and Navy.

HUNTINGTON, W. VA.—United States engineer's office will take bids until 10:00 a.m., Dec. 2, for furnishing labor and material and performing all work on construction of Thirty-fifth street, Richmond street and Oak street pumping stations.

Virginia

ROANOKE, VA.—Prest-O-Lite Co. Inc., a unit of Union Carbide & Carbon Corp., New York, plans to erect an acetylene manufacturing plant here.

Arkansas

DARDANELLE, ARK. — Planters Compress Co. will rebuild its compress. Estimated cost $45,000.

Wisconsin

OSHKOSH, WIS. — Wisconsin Axle Corp. will build factory addition, costing approximately $40,000.

WATERLOO, WIS.—Water and light commission plans improvements in steam-electric generating station, with installation of 750-kilowatt turbine generator unit, 330-horsepower boiler and auxiliary equipment. Cost about $100,000.

Minnesota

BENSON, MINN.—Stevens-Big Stone Co-operative has preliminary plans for generating plant. General Engineering Corp., 2944 Cedar avenue, Minneapolis, engineer.

Texas

HOUSTON, TEX.—Hughes Tool Co. has increase of $17,760 in prior Defense Plant Corp. agreement for additional machinery and equipment.

SPUR, TEX.—Dickens County Electric Co-operative, Joe M. Rose, president, has been granted REA allotment of $179,000 for construction of 255 miles of electric lines to serve 500 members.

Iowa

HAWARDEN, IOWA—City has rejected all bids received Oct. 15 on proposed municipal light and power plant addition, estimated to cost $92,000. Buell & Winter, 508 Insurance Exchange building, Sioux City, Iowa, consulting engineers.

Idaho

BOISE, IDAHO—United States Engineer, Portland, Oreg., will receive bids Nov. 25 for constructioln of emergency power house and additions to bomb-sight storage building at airport here.

California

LOS ANGELES—Conveyor Co. is erecting an addition, 75 x 125 feet, to its plant at 3260 East Slauson avenue, to cost approximately $13,000.

LOS ANGELES—United States Rubber Co. is building additions to its plant at 5675 Anaheim-Telegraph road, including unit for manufacture of self-sealing gasoline tanks for bombers and fighting planes; a rubber cement processing building and a tank testing building. Estimated cost $410,000.

LOS ANGELES—Metals Recovery Corp. has been organized with capital of $40,000. Directors: Ben C. Ludwig, Joseph Beder and C. A. Stutsman Jr., all of Los Angeles. A. J. Greenberg, 930 A. G. Bartlett building, Los Angeles, is representative.

NATIONAL CITY, CALIF.—Solar Aircraft Co., San Diego, Calif., will convert the Potter Radiator plant here into a factory for manufacturing exhaust manifolds for airplanes and other airplane parts.

Washington

KIRKLAND, WASH.—Bids for proposed $240,000 sewer system will be called early in December, followed by bids for disposal plant. Henry Sisler, engineer, has plans.

SPOKANE, WASH.—Bonneville Power Administration plans construction of $1,000,000 substation here, for which plans have been approved by Defense Plant Corp.

Canada

WINNIPEG, MAN.—Building Products Co. Ltd., 3 Maitland street, has called bids for erection of plant addition, to cost about $100,000, including equipment. H. E. Pringle is manager.

LEASIDE, ONT.—Sangamo Electric Co., 183 George street, Toronto, Ont., has given general contract to Anglin-Norcross Ltd., 57 Bloor street, West, Toronto, and also placed number of subcontracts in connection with plant addition here to cost, with equipment, about $150,000.

OSHAWA, ONT.—General Motors Corp. of Canada Ltd., William street, has given general contract to W. B. Sullivan Construction Co., 30 Bloor street, West, Toronto, for erection of plant addition to cost about $175,000, with equipment.

TORONTO, ONT.—Amalgamated Electric Corp. Ltd., 384 Pape avenue, will erect plant addition to cost $160,000, exclusive of equipment. General contract awarded to Foundation Co. of Ontario Ltd., 1158 Bay street.

MONTREAL, QUE.—Farand & Delorme division of United Steel Corp., 385 St. Martin street, will build one-story addition to cost about $225,000, with equipment.

SHERBROOKE, QUE.—Superheater Co. Ltd., 540 Dominion Square building, Montreal, is having plans prepared for addition to machine shop, to cost $20,000, equipment extra. G. S. Thompson is manager.

ST. JEROME, QUE.—Dominion Rubber Co., 350 Papineau avenue, will build addition to plant, and has given general contract to Richard & E. J. Ryan, 1808 William street, Montreal. Estimated cost, with equipment, $150,000.

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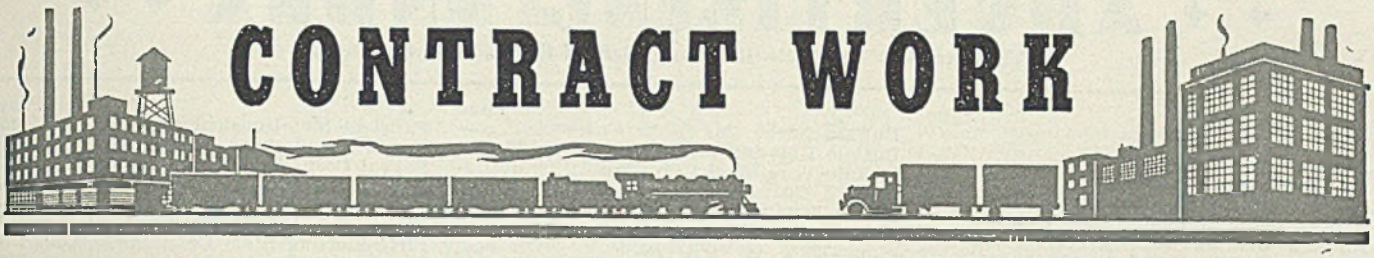

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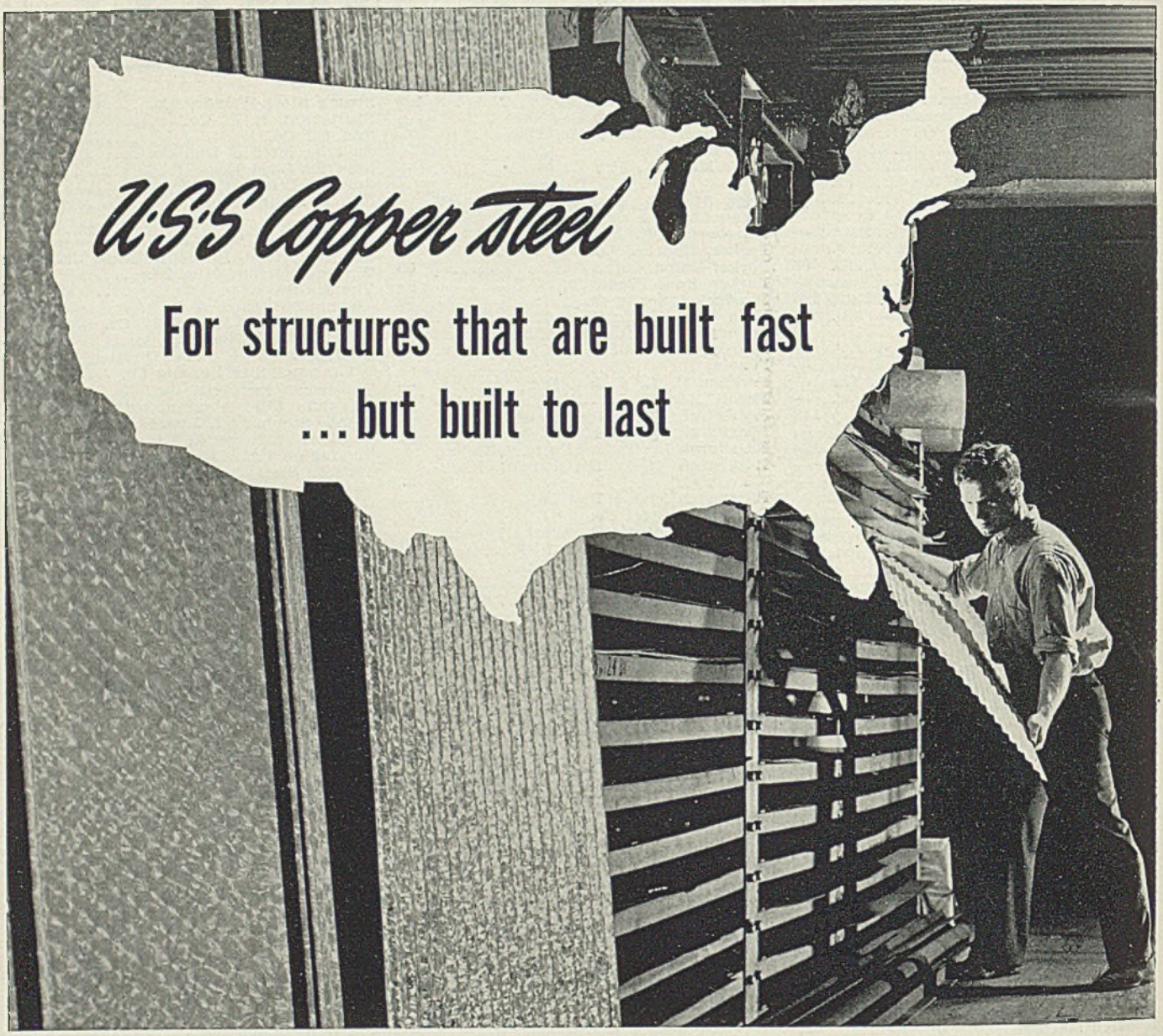

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