STEEL

The Magazine of Metalworking and Metalproducing

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FEATURES

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Rust Preventives for Preserving Metal Parts
Facilities and Operating Practice at Columbia Steel
The Problem of Making Steel from Battlefield Scrap
Improved Shot for Peening Metal Surfaces

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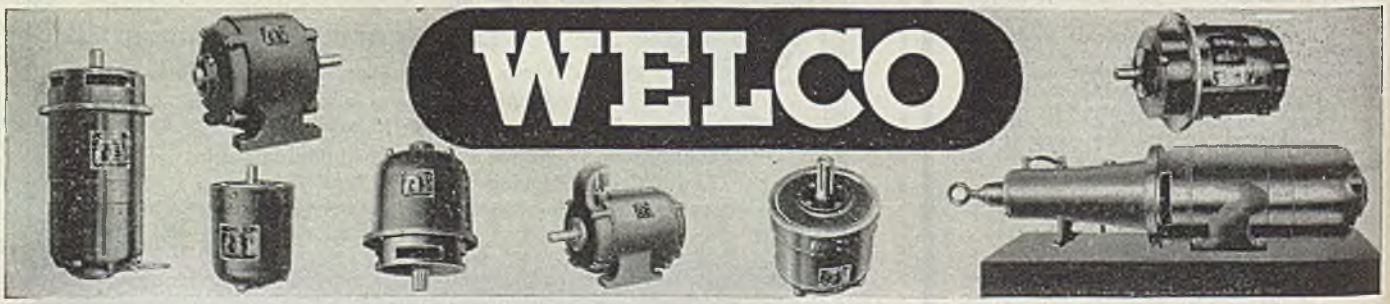

STEEL
March 26, 1945

Decentralization

This war has progressed to the stage where the bombing of enemy industrial centers is a matter of daily routine. Cities like Berlin, Hamburg, Essen and Dortmund in Germany and Tokyo, Nagoya, Osaka and Kobe in Japan have become regular targets for aircraft of the United Nations.

Assume for a moment that the fortunes of war had turned against us and that the decisive battles were being fought in the United States. In that case, the targets for incendiary bombs and block busters would be the North Jersey meadows, the Philadelphia-Chester, Pittsburgh, Youngstown, Cleveland-Akron, Detroit-Dearborn-Pontiac, Gary-Indiana Harbor-Hammond-South Chicago, St. Louis-Granite City, Los Angeles, San Francisco bay and similar areas of heavily concentrated industrial activity.

It is these areas in which the unemployment problems were most acute in the dark days of depression in the thirties and in which the problems of transition from wartime activity to peacetime activity will be most difficult when the war ends.

If we were certain that wars and depressions are inevitable and that they are bound to recur at periodic intervals, everybody would favor decentralizing our industries—to disperse the targets for bombs and the spots of weak resistance to depression. But in planning for the world of tomorrow, we are striving to outlaw wars and depressions. Need this groping for Utopia blind us to the real advantages of a broader and more beneficial distribution of industrial activity?

We think not. Regardless of our efforts to prevent wars and depressions in the future, we should study anew the effect of a more widely distributed industrial activity upon the economic problems of the nation. For instance, to what extent would reasonable decentralization enhance the purchasing power of employes and thus assist in employment stabilization?

At present we have only meager data with which questions of this kind can be answered. More facts are needed. For example, assume that the ABC Co. is contemplating a new plant to employ 500 persons. The plant could be in a city with a population of a million or in a country town of 12,000.

Would it not be wise to compare the purchasing power of a payroll of 500 employes in a metropolis with that of the same payroll in a similar rural community? A study of this kind might throw new light on the question of where new employment opportunities can be located most advantageously.

SIGNIFICANT REPORT: U. S. Steel's annual report always is interesting not only because it is indicative of the state of affairs in the steel industry but because its records, running back unbroken to 1902, afford an excellent opportunity to study long-term trends.

For the leading American steel producer, 1944 was a year of record-breaking production, of unprecedentedly high employment costs, of lower tax payments in relation to 1943 and 1942, and of moderate net income. Most significant in the report is the revelation that in the year of its greatest productivity, the corporation had available for future needs a sum of less than a million dollars. Except for 1936 and for depression years when substantial operating losses were incurred, this is the lowest residue from income available for future "rainy days" in the 43-year history of the corporation. Its reserve for contingencies, which would defray 1944 wages and salaries for only one week

(OVER)

and five days, was increased by only $39,624 in 1944.

Philip Murray and other CIO leaders will do well to study this report carefully. It contradicts much of the propaganda about exorbitant profits and reserves appearing in CIO literature and it poses vital questions regarding the soundness of current CIO wage policy. —p. 62

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DON'T FORGET 1923! President Roosevelt has asked War Mobilization Director Byrnes to make a study of guaranteed wage plans. A committee consisting of Eric Johnston, Philip Murray, Albert Goss and Anna Rosenberg will conduct the study.

Lest history repeat itself, we should remember that at the May, 1923, meeting of the American Iron and Steel Institute, Judge E. H. Gary read a report explaining why the steel industry could not at that time abolish the 12-hour day. This report was approved unanimously by the members present. At the October, 1923, meeting of the Institute, Mr. Gary announced abolition of the 12-hour day. President Harding, with the support of public opinion, had prevailed upon steel men to reverse their position over night.

Many persons think a guaranteed wage is impossible now, but that is no reason why a study of the problem should not be undertaken. It will be good to weigh the pluses and minuses of a guaranteed income. —p. 65

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ELECTRO TIN PLATE: While research has ironed out many difficulties involved in the development of electrolytic tin plate, two problems remain unsolved. They are aging of the surface and lack of uniformity in corrosion resistance.

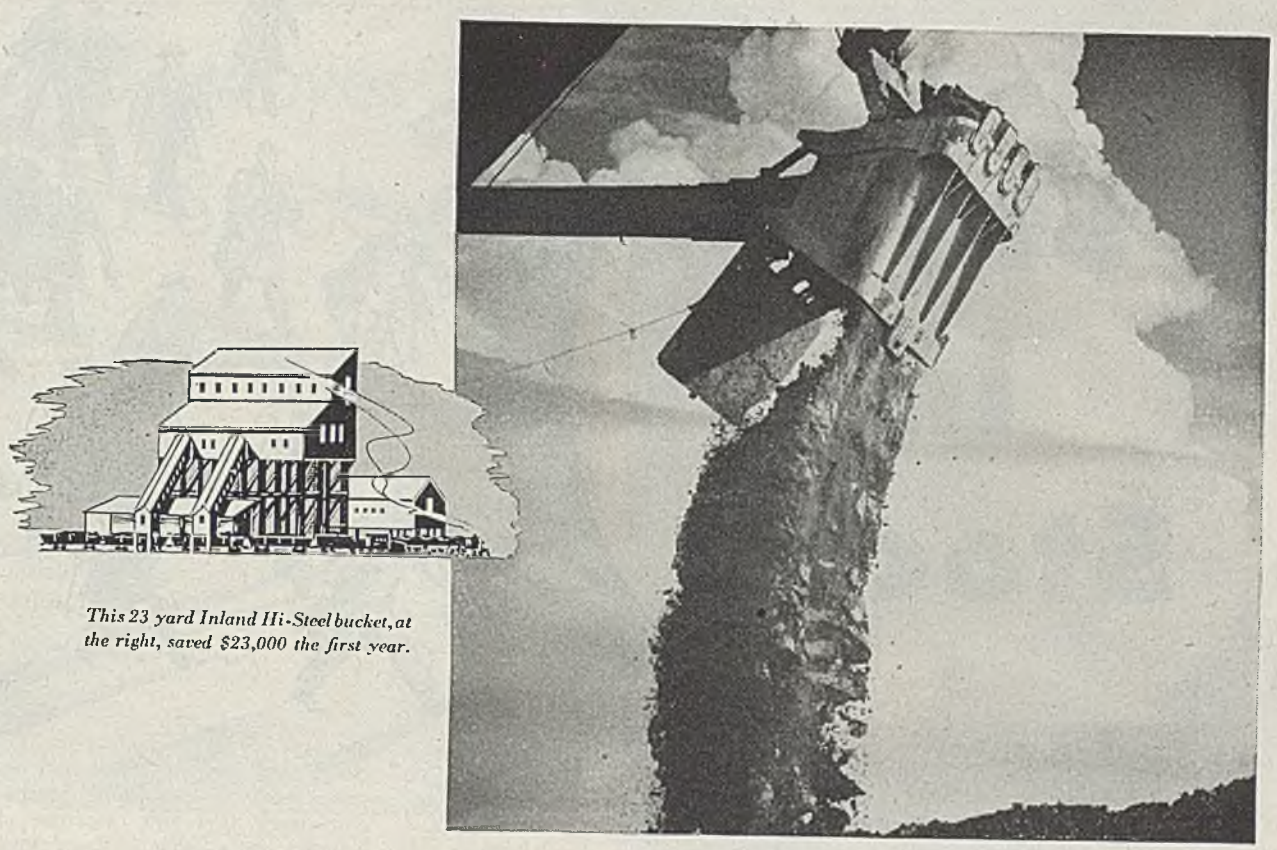
According to Dr. K. W. Brighton, research engineer of American Can Co., full use of the nation's electrolytic tin plate lines must await the solution of these problems. Production of electrolytic plate in 1945, he predicts, will amount to 20 million base boxes, which represents operations at 50 per cent of capacity. This rate may prevail for the duration of the war and for at least a year thereafter.

As tin supplies increase after the war, there may be a shift back to hot dipped tin plate for certain food packs, but this reduction in the use of electrolytic plate may be offset by increased demand for other types of cans. Apparently uniformity will be the last big hurdle for the electrolytic product. —p. 66

SIDELIGHTS ON WAR: First ships to carry lend-lease cargoes to Russia by way of the Black Sea have reached their destination (p. 71). During the 15 months ended Jan. 31, shipments to the Soviet Union from the United States have included 1305 locomotives, 9450 railroad cars and substantial tonnages of steel rails, car wheels and axles . . . . Remember how seriously robot bombing was viewed by some authorities last summer? It was said Germany would have won the war if her V ones and twos had been developed six months earlier Now comes Charles F. Kettering with the statement (p. 76) that robot bombing is "one of the most expensive ways I know to deliver a ton of explosives." He predicts that when the facts are known "it will be revealed that the Germans lost a lot more of their own people in launching and handling the robots than is generally believed." . . . . U. S. Navy's shipbuilding program has been increased by orders for 84 additional combat vessels (p. 71). Assuming no interim losses, the present schedule would give the Navy at the end of 1947 a total of 1532 combat ships aggregating 6,485,823 tons . . . . Tapering off of merchant shipbuilding in the San Francisco area is releasing shipyard workers more rapidly than had been anticipated. WMC says from 25,000 to 35,000 workers in this area will be dismissed by July 15 (p. 81). Only a portion of this force will be needed on ship repair work . . . . That planes may be able to lay army telephone wire over rough terrain exposed to enemy artillery fire is indicated by the feat (p. 82) of the crew of a C-47 plane in laying 16 miles of wire in the Great Smoky mountains in less than seven minutes of flying time . . . . Bailey bridge sections are versatile. Mounted on pontoons in the Irrawaddy river in Burma (p. 70) a Bailey assembly served as a ferry in the British advance on Mandalay . . . Reproducing original drawings on sheet metal by photographic processes to make templates, tools and actual parts (p. 92) has saved thousands of man-hours in the aircraft industries . . . . Shortage of carbon black (p. 112) is responsible for the present critical situation in tires. John L. Collyer of B. F. Goodrich has been enlisted as trouble-shooter in this latest rubber crisis. . . . Adverse weather caused munitions output in February to fall 2 per cent behind schedule (p. 67) but output of critical items was up 9 per cent over January.

E. L. Shaner

EDITOR-IN-CHIEF



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

INLAND HI-STEEL SAVES $23,000

Facts and figures prove advantages of using Inland Hi-Steel where light weight and high strength are needed.

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

(1) The first cost was 40% lower.
(2) Maintenance was cut in half.
(3) Weights were decreased as much as 32%.
(4) Capacities went up an average of 51.6%.

The cost logic behind the use of Inland Hi-Steel was summed up by a Maumee official when he said, "We estimate that our 23 yard Inland Hi-Steel bucket saves three tenths of a cent a yard over the bucket previously used. In one year this 23 yard bucket moved 7,671,000 cubic yards of overburden at a total saving of $23,000." Scores of products and processes for war and peace are utilizing the corrosion-resistant, abrasion-resistant, high-strength and light weight characteristics of Inland Hi-Steel. Write us if you would like further information.

Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

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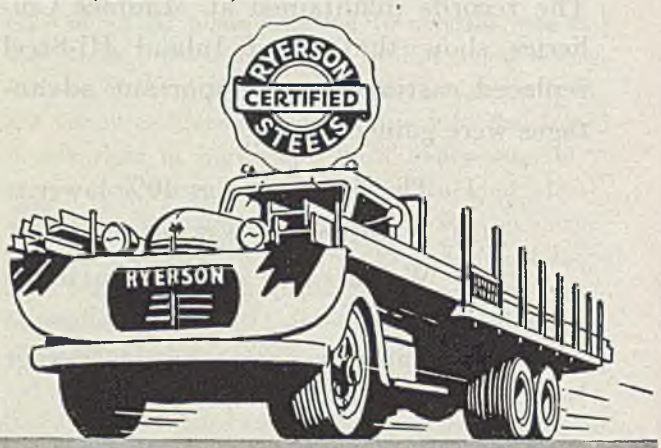
Hi-Steel

No!—buyers don't run to the 11 Ryerson Steel-Service Plants to buy steel, as they do to a cigarette counter when the "in stock" sign is out . . . but we sometimes have almost as much difficulty keeping up with demand. Every week thousands of orders speed steel from Ryerson stocks to war plants and essential industries throughout the country.

Why? . . . The reasons are simple and basic. Ryerson plants stock more than 10,000 kinds, shapes and sizes of steel . . . Service is personal, intelligent and helpful . . . Equipment and "know-how" are at hand to cut and otherwise prepare steel the way you want it . . . Deliveries are quick. But most important is Ryerson dependability, demonstrated by 102 years of steel service, and the determination to deliver to you, if humanly possible, the steel you want when you want it.

Ask your Purchasing Executive to let you see the Ryerson Stock List. You'll realize what we mean by 10,000 kinds, shapes and sizes of steel. If your Purchasing Executive is without the Ryerson Book be sure he gets one from our nearest plant.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.



RYERSON

BARS · SHAPES · PLATES · SHEETS · TUBING · STRUCTURALS · CARBON AND ALLOY STEEL · TOOL STEEL · ALLEGHENY STAINLESS

WPB Moves To Build Stocks of Heavy Scrap

Launches new "speedup" campaign to stimulate flow of heavier steelmaking grades, shortage of which is reported growing acute. Light material plentiful. Collection and preparation hampered by shortage of labor

Household scrap not sought in drive. Authenticated News photo

WITH scrap steel inventories reported down to 1942 levels, at which time shortages forced shutdown of some open-hearth furnaces, the War Production Board last week launched a new national drive to build up stocks of the heavy grades. Household and similar light material will not be sought.

Steel mill purchased scrap requirements are placed at approximately two million tons monthly, and in announcing the drive government officials emphasized a deficit of 250,000 tons between requirements and present monthly supply must be made up immediately.

Need for the drive is questioned in some quarters. Rather than a shortage of scrap, what is lacking is a shortage of labor in the scrap yards to enable prompt handling of material, state leading scrap interests. On the other hand, a spokesman for WPB states confusion regarding the situation has been accentuated by reports that scrap is plentiful, whereas only turnings scrap is readily available and vital heavy scrap is in extremely short supply. The recent cutback in plate production for the U. S. Maritime Commission has caused a sharp drop in a former good source of heavy scrap.

To build up inventories of No. 1 and No. 2 heavy melting scrap, the WPB Scrap Industry Advisory Committee has concurred in a speed-up program including an industry pledge that it would "buy up to a 45-day supply of usable scrap iron and steel (where inventories are below that level), and maintain such inventories as long as urgent war needs prevailed (based on a 90-day order backlog)."

The committee reported, however, that it did not represent the majority of the steel mill scrap buyers and, accordingly, the members would endeavor to enlist the support of the industry's standing scrap iron committee in the revitalized program.

The new collection program provides that: 1. WPB emphasize to scrap dealers that they are included in urgency rating bands III or IV in order that responsible manpower priority committees may take the proper steps to insure labor referrals to plants where manpower is required; 2. WPB's Salvage and Conservation Division inform scrap dealers that they are entitled to aid in securing:

(a) Additional gasoline to move scrap to their yards.

(b) Use of prisoners of war (if they can be employed in sufficient number at one location.)

3. Additional farm, railroad and automobile graveyard scrap be generated; 4. Industry institute a better check on government surplus property inventories of scrap and report to WPB; 5. Steel mills and foundries maintain inventories of 45-day minimum of usable prepared scrap.

"The scrap industry, naturally, will be glad to co-operate with WPB in the program of expanding inventories of consumers to 45 days of usable scrap," stated Edwin C. Barringer, president of the Institute of Scrap Iron and Steel, commenting on the government's action. "It is certain, however, the trade's ability to move more scrap will be greatly improved if various government agencies will be more co-operative with dealers in helping them retain skilled workers and in recruiting a moderate number of additional men.

"Dealers are confident they can increase shipments to consumers measurably if provided labor to prepare scrap already in their yards. This would enable dealers to reach out and bring in more unprepared material."

Mr. Barringer pointed out that the dealers regard as a severe handicap the omission of their industry from the list of those which last week were permitted occupational deferments from military service of young workers in excess of the generally allowable 30 per cent. The Selective Service ruling last week increased allowable exemptions for iron ore and every other phase of raw materials of the steel and foundry industries, Mr. Barringer said.

"Breaking the bottleneck of labor shortage in the scrap yards is the first step toward an improved flow of scrap, since this would enable the yards to prepare whatever additional supplies are generated by the government's new industrial and farm collection drive," said Mr. Barringer.

Success of the WPB program will hinge largely on manpower. Unquestionably, in the opinion of the trade, there is scrap to be had. Over the past several months there has been a noticeable accumulation at automobile graveyards and industrial and agricultural material is available. However, there has not been the labor to make the collections and there also has been an increasingly tight labor supply in the yards where material is prepared.

Labor agency band ratings, such as are mentioned in the new program, have

been available at limited periods. However, for one reason or another they have not been extensively applied. Some dealers complain about the difficulty and the red tape involved. Others seem to know little about the procedure which might have given them a temporary lift, state manpower officials. Possibly in view of the emphasis now being placed on the availability of these ratings and the indicated desire to expedite their application, the scrap manpower situation will improve.

The situation in the various scrap producing and consuming areas differs. On the whole, however, the inventory situation does not appear too critical. Reports from STEEL's district editors follow.

Labor Shortage Felt

PITTSBURGH—Although there isn't an over-supply of scrap here, mills are not short. Chief difficulty is in transportation, with manpower in scrap yards a close second. Car shortages have prevented shipment of a considerable volume which in turn has resulted in a lower inventory position at some mills, particularly smaller consumers. This scrap, however, will be shipped in good time. Meanwhile, inventories have the appearance of being much lower than they should be.

The manpower shortage in scrap yards is serious. Considerable tonnage is available but there is no labor to prepare it. Scrap yard wage scales continue comparatively low, and there isn't any possibility of using women or returned veterans in preparing scrap.

Industrial tonnage, which makes up most of the currently moving material, is carrying the load. Turnings volume is on the increase as shell production, major source of turnings, increases. Shell lines in this district are producing a record-breaking tonnage of long turnings, and a part of this tonnage is going through the crushers to make it suitable for charging. Heavy open hearth scrap is scarce outside the home scrap produced by the mills and cast scrap is extremely tight.

Cleveland Situation Improves

CLEVELAND — Marked improvement in the Cleveland area scrap supply has developed within the past two weeks. Consumers are little concerned over the adequacy of supplies with easing in severe weather conditions, and resulting freer movement of material.

One leading consumer in this region within the past week increased inventory at one of its plants to a 30-day supply.

Both Republic Steel Corp.'s Corrigan McKinney plant and Otis works of Jones & Laughlin Steel Corp. have inventories exceeding 45-day supply. Corrigan McKinney plant is still building inventories. However, Otis works is out of the market, stocks being replenished regularly by shipments of about 15,000 tons monthly from Jones & Laughlin's Aliquippa plant and considerable tonnage is under contract for delivery by vessel throughout the navigation season, with initial shipment of 16,000 tons expected in April.

Mills and dealers are hesitant to build up too large inventories of scrap in view of possible early termination of European war and resulting sharp reduction in prices.

With milder weather an encouraging improvement in preparation of farm and railroad scrap has occurred. Shipyard scrap has fallen off, however. Production scrap, involving 80 per cent turnings in many instances, continues to flood the market.

Well Received in East

PHILADELPHIA — With consumers' current stocks equivalent to about ten days supply in eastern Pennsylvania, the scrap trade is swinging into action as rapidly as possible on the new drives for No. 1 and No. 2 melting steel.

Colley S. Baker, executive secretary, Salvage Division, WPB, General Salvage Branch, Harrisburg, Pa., has called a meeting of the state advisory committee for April 5 to perfect plans for the speedup drive for melting steel scrap in this state. Various sectional meetings will be held later.

Use of prisoners of war in preparing scrap has not been tried out in this district as there are no nearby encampments, and for this reason, principally, the trade does not look for such help to be of assistance in the future. In the Baltimore area, war prisoners have been used in one or two instances, it is said, but with only moderate success.

With stocks at present so low it will probably be a while before the appeal to industry to keep 45 days' stock on hand will have an opportunity to take hold. Open weather conditions of late combined with somewhat easier traffic situation have improved the flow of scrap, but some believe it will be well into next month before inventories can be built up to even the modest scale now proposed.

A special effort will be made to canvass farms before the planting season sets in so as to be able to obtain the greater co-operation of the farmers in making collections. Particular effort also is going to be made to collect such railroad and automotive scrap as may be available. As the grades principally sought fall in the heavier categories, household scrap will be by-passed.

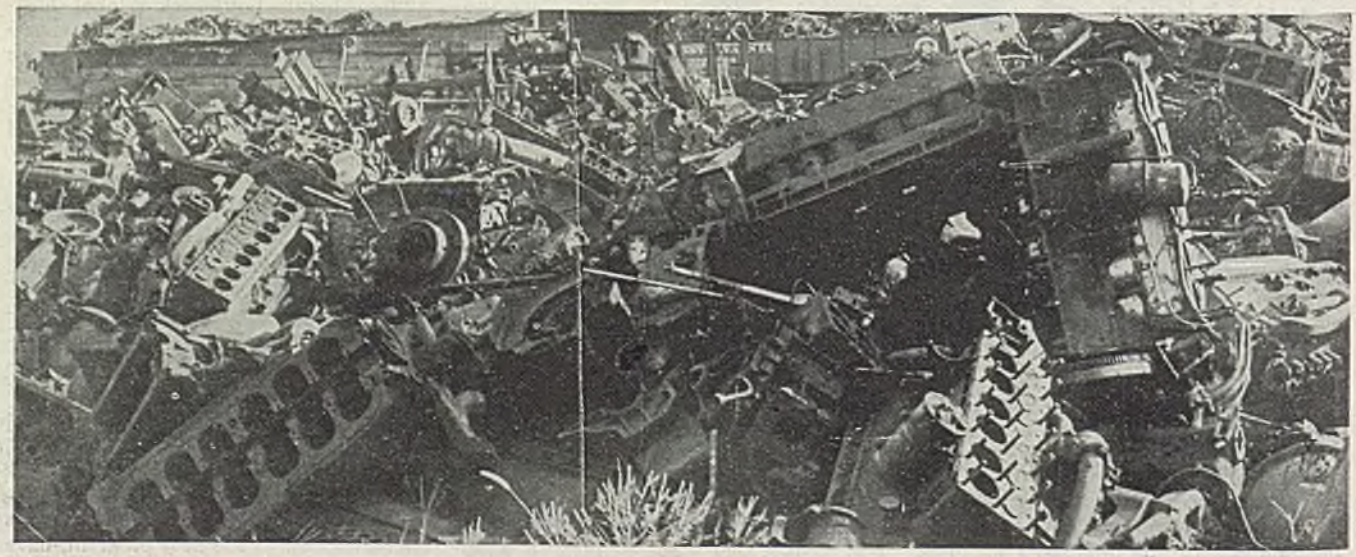
Drive Arouses No Enthusiasm

CHICAGO—Suggestion of a scrap drive meets with no enthusiasm in this area. Consumers, dealers and brokers are unanimous in their views a drive is not needed.

Except for cast, no shortage has existed recently or is in prospect and overall supply is more than adequate for requirements. Better grades of heavy melting

(*Please turn to Page* 176)

Considerable automobile graveyard scrap has accumulated in recent months. If labor is provided the scrap shortage could be eased from this source. Below is shown a typical scrap pile at a central salvage depot. Authenticated News photo.



Draft Eased in Five Critical War Industries

More young workers in steel, coal, metal, transportation, synthetic rubber to get deferment from military service

SELECTIVE Service last week authorized deferment from military service of an estimated 145,000 younger men in five vital war industries—steel, coal mining, transportation, synthetic rubber and nonferrous mining, including copper, lead and zinc.

Exemption of these men means heavier drafting of men 30 years of age and older from essential jobs, it was said. Draft calls are not being reduced and expectations are even though older men are called they will be drawn from industries other than those for which the younger men are to be exempted.

It is said that as a result of the latest Selective Service ruling the five preferred industries will get more than half as many deferments of young men as all essential industries previously were scheduled to receive. Estimates place the number of deferred men in the age group 18-29 at about 870,000.

Under the new Selective Service policy, certifying agencies are authorized to exceed the previous limit of 30 per cent for certifications of requests listed with them for the five named industries. This means that the federal agencies which control the five industries now will be permitted to issue deferment certificates to local draft boards for men under 30 as follows: War Production Board—60 per cent of young workers in steel and foundry operations, or 60,000 men; 67 per cent in copper, lead and zinc mines and smelters, or 10,000 men; Solid Fuels Administration—Almost all young coal miners, or around 30,000 men; Office of Defense Transportation—Possibly 85 per cent on the railroads, or some 41,500 men; 90 per cent in air transportation, or about 4300; 90 per cent for Great Lakes shipping and 80 per cent for inland waterways; Rubber Reserve—Twelve chemists and chemical technicians in synthetic rubber, the only deferments sought in that field.

Expectations are that pressure for similar relief will be forthcoming from other directions.

Screw Machine Group Asks Labor Draft Deferment

Request for 100 per cent deferment from military service for men under age 30 in the screw machine products industry was made last week by the National Screw Machine Products Association, Cleveland.

Seriousness of the industry's manpower plight was stressed by Orrin B. Werntz, executive secretary, in telegrams to Lieut. Gen. Brehon B. Somervell, Munitions Assignment Board; J. A. Krug, chairman, War Production Board; and Brig. Gen. R. E. Hardy, chief, Ammunition Division, Office of Ordnance, War department.

Mr. Werntz pointed out that in the industry there is considerable dissatisfaction with the government regulation limiting deferments in an industry to only 30 per cent of the men under 30 years of age.

"Anything less than 100 per cent deferment is almost a guarantee that parts will not be available when needed for assembly," Mr. Werntz declared.

He pointed out the ammunition program calls for the industry to take up slack on idle machines and produce 770 million parts a month over December production, or a 20 per cent increase. If 100 per cent deferment is not granted for the few men remaining, it may be necessary to discontinue night shifts, which will mean 30 to 40 per cent less production, he warned.

"Most companies in our industry have only critical men such as toolmakers, set-up men, and operators left in age bracket through 29. Loss of a set-up man results in loss of production of nine machines. Work of a set-up man often results in full production for 17 workers. Shifts operate so thinly now that loss of night foremen means loss of night production, 20 or 30 machines per plant," Mr. Werntz pointed out.

"If you want increased production we urge deferment of 100 per cent of the critical men left in this industry. We believe this would add only 1500 men in addition to the number allowed under the 30 per cent rule," Mr. Werntz declared.

Present, Past and Pending

■ REA PLANS TO DOUBLE ITS SIZE AFTER WAR

WASHINGTON—Officials of the Rural Electrification Administration are planning to double the size of that agency after the war, William J. Neal, acting administrator, told a House Committee last week. A contemplated three-year plan involves expenditure of $585 million, mostly for new distribution lines.

■ BRITAIN ALLOTS SPACE FOR PEACETIME PRODUCTION

LONDON—Nineteen British government factories have been allocated for peacetime production. The factories include farm machinery plants, roller bearing factories and rubber goods plants. They will provide employment for 50,000 workers.

■ CIVILIAN EMPLOYMENT DECLINES 1.5 MILLION

NEW YORK—Civilian employment in January was approximately 1.5 million lower than in January, 1944, according to the National Industrial Conference Board.

■ FIRST MACHINE SHOP BARGE COMPLETED

NATIONAL CITY, CALIF.—First of two million-dollar "floating machine shops" has been completed by Concrete Ship Constructors here and turned over to military officials. The 265-foot machine shop barges will be used to repair battle-damaged war vessels overseas.

■ BUDD WHEEL AUTHORIZED TO BUILD PLANT ADDITION

DETROIT—Budd Wheel Co. has been authorized by the War Production Board to construct a $2,350,000 building addition to its Detroit plant to produce new divided-rim wheels for trucks.

■ CARNEGIE-ILLINOIS SLOWDOWN COSTS 27,774 TONS STEEL

CHICAGO—A 10-day slowdown by workers on the pickling line of Carnegie-Illinois Steel Corp.'s sheet and tin mill at Gary, Ind., caused a loss in production of 27,774 tons of plates and sheets required for bombs, ration cans, ammunition containers and other war items.

■ REPUBLIC STEEL CONTRACTS FOR TEXAS ORE SHIPMENTS

CLEVELAND—Republic Steel Corp., Cleveland, has contracted with Lone Star Steel Co., Daingerfield, Tex., for 100,000 tons of concentrated East Texas iron ore, to be shipped at rate of about 25,000 tons monthly by rail to corporation's Birmingham and Gadsden, Ala., plants.

■ RAW MATERIALS PRODUCERS ASKED TO SPUR OUTPUT

WASHINGTON—J. A. Krug, chairman, War Production Board, last week addressed a letter to iron ore producers, foundries, forge shops, refractory and ferroalloy plants, and the scrap industry regarding plans to increase steel production urgently needed for military use in coming months.

U. S. Steel's War Earnings Fall While Production Volume Mounts

Employment costs more than doubled in past five years. Provisions for future needs are cut sharply. Government's take diminishes in face of increased operating costs. Stockholders' share unchanged

EARNINGS by the United States Steel Corp. have declined steadily through the war years, despite an ever increasing volume of production and sales.

The Corporation's employment costs have more than doubled in the past five years.

The return to the stockholders has held unchanged.

The amounts carried forward for future needs have declined sharply since the war started.

These facts are graphically presented in the 1944 annual report of the Corporation, just issued, and are shown in an accompanying table. U. S. Steel's experience in realizing lower profits on vastly expanded volume of business is paralleled by a majority of steel producers.

So sharply have operating costs, largely wages, increased that the government for the past two years has realized a dwindling take in taxes. From a recent peak of $201.3 million in 1942, U. S. Steel's taxes have declined to $125.9 in 1943 and to $105.8 in 1944. Taxes still are nearly double profits, however.

For the year 1944, the Corporation's earnings amounted to $60.8 million, a decrease of 2.9 per cent from the $62.6 million earned in 1943. A total of $2,082 million was received for goods and services sold last year, an increase of 5.6 per cent over the $1,972 million received in 1943.

Peak volume of sales by the Corporation during the first World War was in 1918 when a total of $1,345 million was received; profit on this volume amounted to $125.3 million. This was lower than the company's earnings in 1916 and 1917 when net profits were $271.5 and $224.2 million, respectively.

The lower earnings for U. S. Steel despite the record volume of business was occasioned to a large extent by the retroactive wage increases, estimated to amount to $30 million for 1944, ordered by the National War Labor Board in November.

An accompanying table sets forth the Corporation's history of sales, taxes and other costs.

While products and services sold increased from $1,079 million in 1940 to $2,082 million in 1944, and labor costs of all kinds spiralled sharply from $464 million in 1940 to $957 million in 1944, amounts carried forward for future needs diminished from $42 million and $56 million in 1940 and 1941 respectively to less than $1 million in 1944. Labor costs in 1944 increased $44 million over 1943, despite a decrease of 25 610 in the average number of employes during 1944, caused by manpower shortages.

"In 1943, the shift of the rising costs of U. S. Steel became apparent," the report stated. "Sales increased by $109 million over 1942, but the amount for workers increased by $130 million or $21 million more than the increase in sales. Taxes decreased by $75 million and there was a further decrease of $9 million in the amount carried forward for future needs. That is, in 1943 an increased volume of sales was accompanied by an even greater increase in the amount for workers and by sharp decreases in amounts to the government and for future needs.

"In 1944 this shifting continued. The sales increase over 1943 was about the same as in the previous year, but the amount for workers increased $44 million and taxes decreased $20 million. Less than $1 million was carried forward for future needs. It is apparent that the increases in wage costs since 1941, largely brought about by directives of the National War Labor Board, have been primarily at the expense of the public as taxpayers.

"Thus the War Labor Board's directive of Nov. 25, 1944, by which certain wage increases were made retroactive to Jan. 4, 1944, increased U. S. Steel's costs for 1944 an estimated $30 million. This works out to reduce U. S. Steel's taxes by 25.7 million and to reduce its income by $4.3 million.

"Therefore," the Corporation's report states, "the public must assume 85.5 per cent of the increased cost, less the small amount paid in additional taxes by the employes receiving these increased wages."

The order of the board, Mr. Olds said, "amounts to the indirect granting of a substantial wage increase, which is not justified by a contention that earnings of steelworkers have not kept pace with the increases in the cost of living since January, 1941.

41 Per Cent Wage Increase

"The average hourly pay of wage earners in the steel producing subsidiaries of U. S. Steel increased about 41 per cent between January, 1941, and November, 1944, when this decision of the board was made. Their average weekly earnings increased about 67 per cent during this period. In November, 1944, the Cost of Living Committee appointed by President Roosevelt reported an increase in the cost of living since January, 1941, of between 29 and 30 per cent.

"The average weekly pay of U. S. Steel's wage earners during 1944 was at a new high of $54.37, including the estimated amount of the retroactive wage increases recently ordered. Weekly hours of work for wage earners of all subsidiaries averaged 44.1. After eliminating the effect of employe turnover, the 1944 average pay of wage earners in the steel producing subsidiaries, including the retroactive wage increases, was $57.38 for an average work-week of 45.9 hours. This is equivalent to $1.25 an hour for this group of wage earners.

"Under imposed checkoff provisions, deductions of $2.9 million were made from the wages of employes during the year for union dues, fees, assessments and fines, and were paid over to authorized union officers."

Numerous strikes and work stoppages at the Corporation's subsidiaries caused an estimated production loss of 871,000 tons of steel and 339,000 tons of coal, as compared with 318,000 tons of steel and 2,600,000 tons of coal lost in 1943. Estimated man-hours lost by work stoppages last year were 1,783,000.

To supply the raw materials required for a record-breaking production of ingots and finished steel products, U. S. Steel's mining and transportation subsidiaries produced and transported the greatest quantity of raw materials in their history. Its coke plants produced record amounts of chemicals which enter into the production of synthetic rubber, aviation gaso-

Five-Year Summary of U. S. Steel's Financial Record

	(000,000 omitted)				
	1940	1941	1942	1943	1944
Products and services sold	$1,079	$1,622	$1,863	$1,972	$2,082
Products and services bought	358	579	649	707	793
Wear and exhaustion of facilities	73	99	128	134	139
Additional war costs (*net*)		25	25	24	21
Interest on indebtedness	14	6	6	6	5
Workers°	464	628	783	913	957
Taxes—Federal, state and local	68	169	201	126	106
Dividends to owners	60	60	60	60	60
Carried forward for future needs	42	56	11	2	1

°Wages, salaries, Social Security taxes and pensions.

line, plastics, nylon, explosives and medicines. Its shipbuilding subsidiaries delivered a total of 154 ships.

The history of U. S. Steel's operations since 1902 is shown in an accompanying table.

The report sets forth that the 13 steel producing, fabricating and distributing subsidiaries of U. S. Steel, whose war contracts are subject to renegotiation by the government, had been notified that no excessive profits under their contracts were realized for the year 1943. In the case of Federal Shipbuilding & Dry Dock Co., the remaining subsidiary subject to renegotiation, a reduction of $4.5 million in the selling prices of ships to the Navy during 1943 resulted from the renegotiation proceedings. After taxes, this resulted in a reduction of $816,804 in reported income of the Corporation for 1943. The management believes that no excessive profits were realized under such contracts during 1944.

Looking to the future of U. S. Steel and the steel industry, Mr. Olds disclosed that important advances were made by the Corporation during 1944 in both fundamental research and in the application of technological findings to specific improvements in steel products.

"Wartime research and technical advances in steelmaking will aid in the development of new and improved products for the postwar period," he said. "Undoubtedly there will follow an expanding use of light-weight steel structural shapes in residences and small buildings, and of corrosion resistant high-strength steels in the construction of rolling stock and other mobile equipment. Stainless steel with enhanced properties will be ready in the postwar era for more general use in residential and commercial construction and equipment. Steels for superior performance at high temperatures will be available."

He reported that since Jan. 1, 1940, U. S. Steel has authorized the expenditure of more than $500 million of its own funds for additions, improvements and replacements of properties, and that a total of $46.9 million was so expended last year. With a view to entering the postwar period with equipment for the efficient manufacture of products of a character and quality to meet changing requirements, U. S. Steel has pursued a constant course of improvement of its facilities, Mr. Olds said.

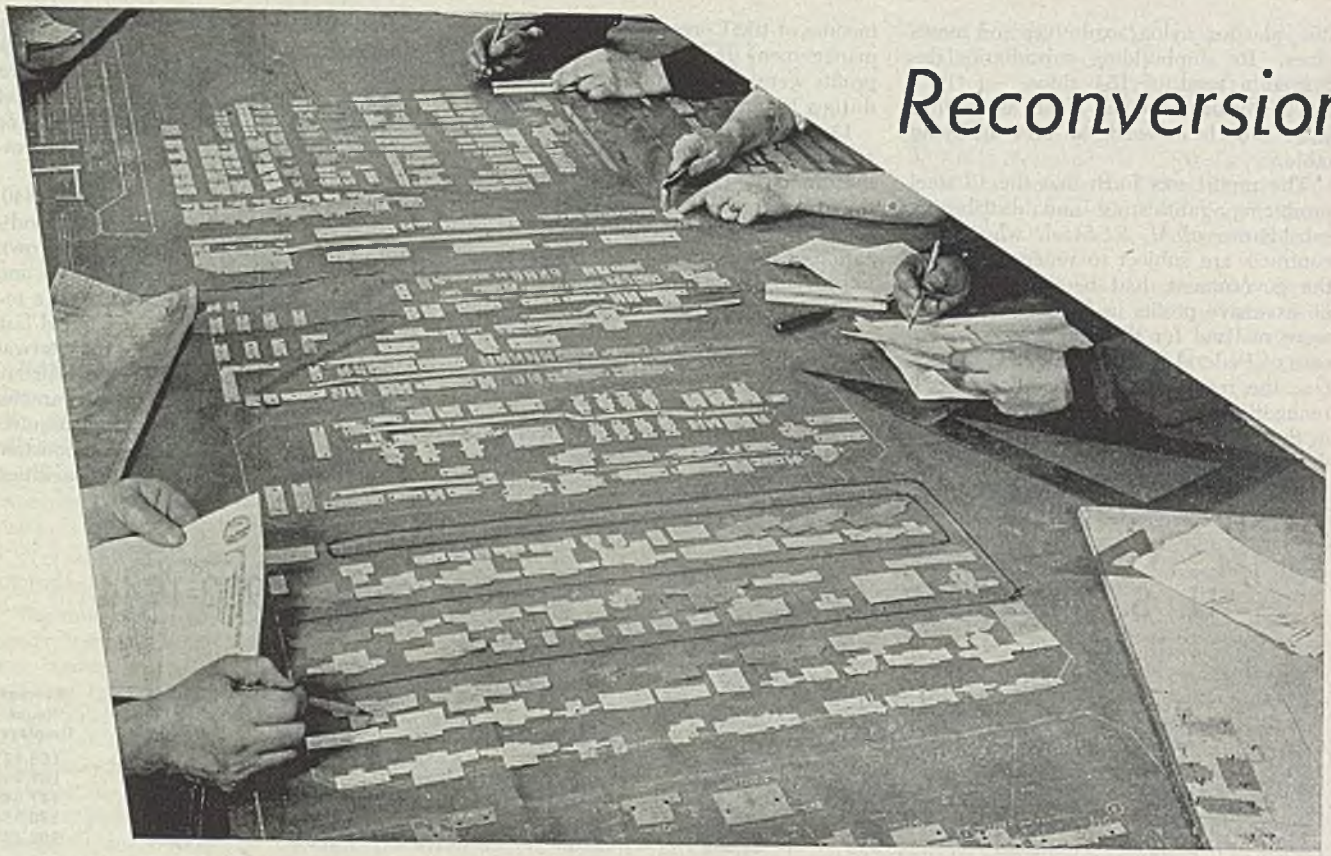
U. S. Steel Corp.'s Operating Story—Years 1902-1944

(In Thousands of Net Tons)

Year of Oper.	Total Ores Mined	Total Fluxes Produced	Total Coal Mined	Total Coke Produced	Total Iron Produced	Ingots & Castings Total Production	Ingots & Castings % Capacity Operated	Finished Steel Shipped	Average No. of Employes
1902	17.991	1,471	13,813	9,522	8,933	10,920	97.2	8 913	168.127
1903	17 207	1,421	12.660	8,658	8.153	10.275	81.8	8,129	167,709
1904	11,763	1,560	13,718	8,652	8.254	9,422	72.8	7.325	147.343
1905	20.705	2,203	17,228	12.243	11,393	13.447	93.2	10,142	180,158
1906	23,123	2,495	18,533	13,295	12,619	15,153	100.6	11,254	202,457
1907	26.858	3,585	24,279	13,545	12.794	14.944	88.6	11,511	210,180
1908	18.662	2,448	15,799	8,170	7,767	8.779	50.3	6.820	165,211
1909	26.243	3,916	23,790	13,590	13,013	14.958	77.8	10,612	195,500
1910	28.275	5,606	26,365	13.650	13,251	15.881	79.5	11.777	218.435
1911	22,326	5,416	24,326	12,120	12,034	14,284	70.5	10,340	196,888
1912	29.600	6,859	30.639	16,719	15,889	18.929	89.8	13,771	221,025
1913	32.187	7,099	30.787	16,663	15,770	18.655	90.1	13 387	228,906
1914	19.079	5,238	21,162	11,174	11,259	13.246	62.3	9.935	179,353
1915	26 510	6,491	26.628	14,501	15,278	18,342	85.2	12,826	191,126
1916	37,358	7,866	32,768	18,902	19,721	23,420	100.6	17,105	252,668
1917	35.596	7,274	31,497	17,462	17,531	22,719	91.9	16.919	268.058
1918	31,733	5,758	31,748	17,758	17.854	21,934	88.2	15 570	268,710
1919	28,474	6.536	28.893	15.464	15,274	19,264	77.0	13.470	252,106
1920	30 264	6,699	30,828	16,208	16,277	21,591	86.2	15,534	268,004
1921	18,646	5,160	21,628	9,825	9,720	12,282	48.3	8,758	191,700
1922	24.392	6,309	23.293	13.237	13,470	18,012	70.9	13.127	214,931
1923	34,737	7,365	35,290	18,838	18.737	22,770	89.1	15.870	260,786
1924	27.747	5.638	27,738	14,408	14.206	18,456	72.2	12,705	246,753
1925	31,357	5,986	31,476	16 301	16,575	21,167	81.7	14,753	249,833
1926	32,778	6,175	34,295	17,336	17,590	22,743	89.1	15,771	253,199
1927	28.725	5,215	27,430	14,507	15,438	20.705	79.8	14,310	231,549
1928	29,834	16,352	28,691	15.993	17,066	22,518	84.6	15,400	221,702
1929	34.214	16,535	31,827	17,355	18,463	24.493	90.4	16.813	254,495
1930	27,211	16,365	25,388	13,113	14,289	18,762	67.2	12.798	252.902
1931	15,233	8,595	15,575	7,041	7,864	11,292	37.5	8,399	215,750
1932	4,050	3,587	7,047	2,966	3,498	5,521	17.7	4.324	164.348
1933	9,347	6,060	10,227	4,880	5,629	9,013	29.4	6 354	172,577
1934	11.283	6.769	11.724	5.382	6,174	9.700	31.7	6 501	189,881
1935	12,810	7,842	15,095	7,328	8,307	12.467	40.7	8,086	194,820
1936	21,306	12,031	23,581	12,034	13,501	18,937	63.4	11,905	222,372
1937	34,080	14,696	24,504	14,190	16,171	20,756	71.9	14 098	261,293
1938	12.303	7,818	13,842	7.006	7,632	10,525	36.4	7.316	202,108
1939	24,225	12,852	21,624	12,092	13,656	17,626	61.0	11,707	223,844
1940	34,047	15,730	29,528	16,144	18.367	22,934	82.5	15,014	254.393
1941	43,314	19,176	29,076	18,563	22,321	28,963	96.8	20,417	304,248
1942	46,947	20,864	32.317	19.275	23,496	30,030	98.1	20,615	335,866
1943	50,776	19,478	29,046	19,028	23,660	30.540	97.8	20,148	340,498
1944	49,615	19,208	30,709	20,503	23,445	30,815	94.7	21,052	314,888

Production and shipment data are for all operating subsidiaries and are grouped in broad product classifications. The production data include all production of the materials by the operating subsidiaries and exclude all materials purchased. The item "Total Ores Mined" includes iron, zinc and manganese ores. In addition to limestone, dolomite and fluorspar, "Total Fluxes Produced" includes cement rock and other similar materials. In addition to pig iron, "Total Iron Produced" includes production of ferro-alloys. Although Tennessee Coal, Iron & Railroad Co. was acquired November 1, 1907, its production and shipments for the entire year are included. Prior to 1929, the full time equivalent rather than the actual number of employes is shown.

Reconversion



Months are required to plan placement of machinery in a mass production plant. Cut-out scale models of machines are fitted into huge jigsaw-like patterns, above, at the Packard Motor Car Co. Such planning must be done before the war ends if a serious lag in employment is to be avoided, management spokesmen contend

RECONVERSION planning, which went into an almost total eclipse when the Germans launched their counter-offensive last autumn, is re-emerging—as it habitually does when the war news is favorable.

Growing shortages of critical civilian goods, indications that victory in Europe is not far off, increasing unrest on the part of labor as to what will happen after V-E Day are combining to bring forth plans for resuming production of peacetime commodities.

Preparations for partially reconverting were well underway last summer after the Allies' spectacular dash through France. Under a 4-point program developed by Donald M. Nelson, former War Production Board chairman, industry was permitted to: 1. Use aluminum and magnesium for non-war production; 2. build experimental models of postwar products; 3. place orders for machinery and tools to be used in postwar manufacture; 4. start actual production of civilian goods, where manpower, materials and facilities were available, under "spot authorizations" of the WPB.

When the Allied drive slowed down and American military authorities asked for greater quantities of materiel, the reconversion program was curtailed sharply. When the Germans started their counter-drive in December, reconversion was dropped and even the word became virtually taboo.

After several weeks of uninterrupted advances in Europe pressure for resumption of preparations for reconversion again has appeared in both industry and Washington circles and within the next few weeks probably will be receiving as much or more attention as it was getting last fall.

Promises "Much Better" Plans

One of the first indications of this was given by J. A. Krug, WPB chairman, in a recent press conference. Breaking the winter's silence on reconversion planning, Mr. Krug revealed the government is working out "much better" plans for reconversion than it had last fall. He said he could promise that reconversion procedure will meet the problems of V-E Day.

"We will drop our controls at the earliest possible date consistent with securing all-out war effort against Japan."

Mr. Krug discussed the possibility of having one motor company build a nameless automobile if the Japanese war continues for a considerable period. Although he denied the plan is being considered now, he believed it "might prove desirable" if civilian needs became extremely pressing before it became possible to release the entire industry.

"I think you will find that when the time comes," Mr. Krug said, "the plans will not only be as good as the plans under certain circumstances developed last summer, but will be much better, affording greater flexibility for dealing with the problems."

The WPB chairman indicated that the reconversion problem probably will be more simple than most people believe. "I think everyone gets the idea that reconversion is something like a Goldberg cartoon—you tip something up here and something turns up 14 stages below. It isn't that at all. We now have resources channeled into war production. All we have to do to turn it back into peace production is take off the stops that presently retard the flow of materials and components from peacetime production. Industry is set up to do the remainder of the job."

The extent to which civilian production will be permitted after V-E Day and how soon remained a mystery. Army Service Forces estimate, according to hints in official quarters, that the curtailment in war materiel procurement will amount to only about 10 per cent in the six months following Germany's defeat, gradually deepening to around 33 per cent in the next six months.

WPB statisticians suggest a 35 per cent drop in all munitions and reckon that

Planning Starts Again

Taboo lifted as continued Allied gains presage victory in Europe. War Production Board chairman says agency is working out plans for shift to peacetime goods when war materiel procurement programs are cut back

IRA MOSHER

the tapering of the program will extend over a year.

These figures from Washington are cautiously conservative when compared with the forecast of C. D. Howe, Canada's reconstruction minister, that cutbacks in the munitions programs of Canada, the United States and United Kingdom would be 35 per cent after V-E Day. This would clear enough plants to produce a considerable volume of civilian goods, he said, and would result in the transfer of many workers from munitions production to peacetime jobs.

Washington officials were disturbed by Mr. Howe's announcement, exceeding as it did their own forecasts of munitions cutbacks. Industry observers were puzzled by the apparent conflict in cutback plans, especially inasmuch as Mr. Howe apparently is in close touch with the Combined Production and Resources Board which co-ordinates the war effort of the western Allies.

Army, Navy Policies Criticized

The cautious estimates of American munitions cutbacks after V-E Day are interpreted by some analysts as representing the influence of Army and Navy officials who have been pretty much in the saddle since last autumn. The military has pushed for greater war production at the expense of the domestic economy and in the opinion of many have gone farther than necessary in this direction. Considerable criticism has arisen over the Army and Navy policies of issuing directives for munitions programs far in advance, which not only have precluded some essential civilian manufacture but actually have disrupted war production lines.

Recently civilian agencies have challenged the size of military's procurement programs. WPB Chairman Krug last week said he has asked the armed services to scale down their demands in order to protect a "bed rock" civilian economy. However in any clashes of policy between the WPB and the military, the latter appear to retain an advantage as long as they have final victory to win. As long as the news from the fighting fronts continues favorable, however, pressure for early and substantial civilian production can be expected.

That the time has come for industry to discard the government's taboo on management's even mentioning reconversion is the contention of Ira Mosher, president, National Association of Manufacturers. Conditions have changed since the taboo was imposed during the German counter-offensive, he points out.

"If industry, which has been responsible for its share of the jobs heretofore in this country, and which has been a prime mover of prosperity, is not allowed to prepare for V-E Day and for eventual peace, the penalty of unpreparedness, which is failure, will be paid not only by industry, but by society as a whole.

"To say that we may not think or talk of reconversion now is to sentence us to peacetime default in our responsibilities which might put the whole economic system in the hands of the government. Such a sentence would disestablish us in advance. Therefore, let us get busy on our preparations for reconversion."

Mr. Mosher said privately-owned American manufacturing industry can provide from 3,400,000 to 4,400,000 more jobs after reconversion than it did in prewar 1939.

"The manufacturing industry employed 10,600,000 persons in 1939," said Mr. Mosher. "Add the minimun of 3,400,000 additional industrial workers which our survey indicates will be needed, and we have a total of 14,000,000 men and women who will be needed to produce peacetime goods.

"Manufacturing normally employs about 25 per cent of the total working force of the nation. Should the other elements of our economy be able to make similar increases in employment we would have about 56,000,000 individuals working in our stores, on our farms, in the various services, in local, state and federal governments, and in the other activities that make up our national life. This volume of employment must necessarily depend upon a favorable economic climate, upon how quickly the goverment lifts its ban on reconversion, and upon a national confidence shared by all elements of our society."

President Asks Study of Guaranteed Wage Plans and Their Possibilities in Industry

STUDY of guaranteed wage plans and the possibility of their application and future development in industry was asked of War Mobilization Director Byrnes by President Roosevelt.

The study, it was said, will be undertaken at once by the advisory board of the Office of War Mobilization and Reconversion. This board is composed of representatives of labor, business and agriculture. The subcommittee, which will make the study, will be composed of Eric Johnston, president, Chamber of Commerce of the United States; Philip Murray, chairman, CIO; Albert Goss, head of the National Grange; and Anna Rosenberg, labor and manpower expert.

The President sent to Director Byrnes a copy of a letter from the War Labor Board last December suggesting appointment of a commission to inquire into the guaranteed wage question.

"The inquiry recommended by the National War Labor Board," the President advised Director Byrnes, "is closely connected with the problems of reconversion and the transition from war economy to a peace economy."

At his press conference last week the President said he had been thinking about the advisability of guaranteed wage plans for the past ten years. He said the policy would be simple for some industries but difficult for others.

Reaction in congressional circles to President Roosevelt's recommendation that a study be made generally was favorable. Sen. Robert A. Taft (Rep., O.) said he felt such a study proper. He pointed out, however, that while the principle undoubtedly was practicable in some industries spokesmen for the steel industry had pointed out it would be ruinous if applied in their field.

Electro Tin Plate Output This Year May Total 20 Million Boxes

Research engineer tells Iron and Steel Engineers electrolytic lines will operate only 50 per cent of capacity. Lifting of wartime restrictions seen no immediate spur to demand. Hot dipped plate for food packs still favored

IF ALL wartime restrictions were suddenly eliminated tomorrow, there would not be enough demand for electrolytic tin plate to keep present capacity well occupied, Dr. K. W. Brighton, research engineer, American Can Co., Maywood, Ill., told the Pittsburgh sectional meeting of the Association of Iron and Steel Engineers recently. Dr. Brighton indicated that studies made by American Can Laboratories show lack of uniformity in electrolytic plate which makes the hot dipped product more desirable for most food packs, as the situation now stands.

He emphasized, however, that research by electrolytic plate producers aims at solving the problem. Two principal difficulties being studied are aging of the surface and corrosion resistance. All other problems have been satisfactorily solved to the satisfaction of canners.

Production of electrolytic plate in 1945, Dr. Brighton forecast will reach 20 million base boxes, for an operating rate on the electrolytic lines of 50 per cent. In all probability this will be the pattern for the remainder of the war, and for at least one year thereafter, with a possible increase during the first postwar year in non-food cans but only to a slight degree.

New Developments Expected

As soon as tin supplies begin to return towards normal after the war, there will be a shift of food packs back to the hot dipped plate. The reduction in electrolytic plate production caused by this action will be filled in by general line can demand, which probably will more than balance the volume lost to hot dip lines. There will, of course, be a number of new developments in packaging products in general line cans, and added volume will fill up some of the excess electrolytic capacity.

Of particular interest is the work being done on the 0.25-pound coating. Although there is lack of data on rust resistance on exterior of cans made from this light plate, this is a minor problem because most of the product is used in general line cans and lithographed on the outside. Packs now in storage tests will determine the degree of resistance to internal corrosion among the most widely used products. Because of the expected shortage of tin for some years after the war, cans made from 0.25 plate with C.T.S. (bonderized) ends will probably be the standard product for general line applications. This is already forecast by the Jan. 1, 1945, revisions in M-81 permitting use of this product in many general line applications. Unfortunately, shortage of steel and manpower has prevented widespread application of these provisions and it may be some time before the can companies are in a position to take advantage of them. Another advantage of this product is that it is the cheapest of the tin plates.

Because of the lack of sufficient data, it is not possible now to say that 0.25 plate is the proper weight for such applications. It has been determined that some weight less than 0.50-pound per base box is adequate, and a weight of coating somewhere in this range will almost certainly become the accepted general line can plate after the war.

Even the expanded demand for general line cans will be insufficient to fill up the electrolytic capacity, however. Food packs will have to come into the picture to maintain capacity operations. Enameled electrolytic plate has worked well during the war period, and it is possible this may be one answer, although most studies indicate it will be more economical to buy dipped plate than enameled electrolytic. The only apparent answer is to increase the corrosion resistance of the electrolytic plate so that it will be acceptable in uncoated form. Current studies of electrolytic plate show a lack of uniformity between the edges and center of the strip, and between the head, center and tail of the coils. Curves presented by Dr. Brighton plotting corrosion resistance of plate from six manufacturers showed numerous samples which were well above the requirements of the canners, although on the same coil were found many spots where cans failed in less than 30 days on a standardized corrosion test.

Iron and Steel Made for Sale in January

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS
Period JANUARY - 1945

Steel Products	Number of Companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production Net Tons	Production Per cent of capacity	Shipments (Net Tons) Total	Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	45	1	xxxx	xxxx	xxx	703,018	186,389
Structural shapes (heavy)	12	2	9,580,550	257,698	54.3	258,786	xxxx
Steel piling	3	3		21,324		19,800	xxxx
Plates (sheared and universal)	27	4	17,841,320	807,816	53.3	787,846	44,811
Skelp	5	5	xxxx	xxxx	xxx	57,521	48,066
Rails—Standard (over 60 lbs.)	4	6	3,669,000	193,189	62.0	184,324	xxxx
—All other	5	7	512,000	14,661	33.7	14,575	xxxx
Splice bars and tie plates	12	8	1,745,960	64,637	43.6	65,607	xxxx
Track spikes	10	9	349,400	13,356	45.0	13,774	xxxx
Hot Rolled Bars—Carbon	35	10	xxxx	721,552	xxx	544,540	93,125
—Reinforcing—New billet	13	11	xxxx	57,451	xxx	52,807	xxxx
—Rerolled	13	12	xxxx	5,394	xxx	4,347	xxxx
—Alloy	24	13	xxxx	271,756	xxx	200,376	25,465
—Total	45	14	22,149,300	1,056,153	56.1	802,070	118,590
Cold Finished Bars—Carbon	23	15	xxxx	150,734	xxx	146,519	xxxx
—Alloy	24	16	xxxx	37,558	xxx	32,876	xxxx
—Total	31	17	2,963,110	188,292	74.8	179,395	xxxx
Tool steel bars	17	18	261,560	11,164	50.2	11,184	xxxx
Pipe and Tubes—Butt weld	16	19	2,162,520	113,141	61.6	110,411	xxxx
—Lap weld	8	20	830,200	45,300	64.2	43,667	xxxx
—Electric weld	11	21	1,380,900	79,262	67.6	76,435	xxxx
—Seamless	15	22	2,756,100	204,050	87.1	206,749	xxxx
—Conduit	7	23	187,000	7,389	46.5	7,445	xxxx
—Mechanical tubing	12	24	1,117,600	71,501	75.3	60,902	xxxx
Wire rods	27	25	7,311,470	398,489	64.2	103,079	35,824
Wire—Drawn	41	26	5,674,140	324,622	67.3	184,368	9,908
—Nails and staples	19	27	1,253,360	52,343	49.2	48,852	xxxx
—Barbed and twisted	15	28	539,610	21,846	47.7	19,586	xxxx
—Woven wire fence	16	29	1,113,860	35,035	37.0	32,156	xxxx
—Bale ties	12	30	149,780	5,982	47.0	5,730	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	36,178	-
—Chemically treated	8	32	465,000	9,427	23.9	7,053	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,758,850	177,143	55.5	179,433	xxxx
—Electrolytic	10	34	2,231,850	71,206	37.6	57,339	xxxx
Sheets—Hot rolled	30	35	19,197,320	1,136,554	69.7	539,675	31,262
—Cold rolled	12	36	7,131,460	351,401	58.0	196,039	xxxx
—Galvanized	16	37	2,915,130	152,202	61.5	138,830	xxxx
Strip—Hot rolled	24	38	7,055,390	220,874	36.8	138,221	20,635
—Cold rolled	35	39	3,119,850	121,158	45.7	109,309	xxxx
Wheels (car, rolled steel)	5	40	319,400	23,659	87.2	23,450	xxxx
Axles	6	41	408,170	11,088	32.0	9,692	xxxx
All other	4	42	176,290	3,224	21.5	2,848	xxxx
TOTAL STEEL PRODUCTS	152	43	xxxx	xxxx	xxx	5,435,647	495,487
Effective steel finishing capacity	152	44	57,310,000	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	152	45	xxxx	xxxx	xxx	86.4%	xxxx

Gain in Output Of Critical War Goods Reported

Overall production in February fails to meet schedules but satisfactory increases are scored in "must" programs

FEBRUARY munitions output was at a higher daily rate than in the preceding month despite cold weather, snow and transportation difficulties, but fell 2 per cent behind schedule.

The cumulative effect of the hard winter and nuisance strikes and further loss of men to the armed services, make it difficult to meet the higher munitions output scheduled for 1945, Hiland G. Batcheller, chief of operations, War Production Board, reported last week.

Munitions output for the short month of February is estimated at about $4,736 million, which was less than the $4,829 million recorded during January and below September's output total of $4,864 millions.

While every major category fell short of the February established goals, and four of the seven failed to match January, the deficits were relatively small.

Aircraft output last month was 3 per cent behind schedule; same for ammunition production. Output of ships, guns and fire control equipment, and the general classification of "other equipment and supplies fell 1 per cent behind schedule. Communication and electronic equipment dropped 4 per cent below the February goal; while combat and motor vehicle output was 5 per cent behind schedule.

The critical programs did better in February than the munitions program as a whole, with the rate of increase gaining steadily in recent months. December output for the group was 5 per cent over November and January's production was 6 per cent over December, while February output averaged 9 per cent above January.

That industry is bumping up against a production ceiling due to raw material limitations, sudden and unanticipated changes in programs and manpower shortages, was the view expressed by Mr. Batcheller.

Army-Navy Course Aids in Settling War Contracts

An Army-Navy joint four-hour contractor training session is being conducted in 21 industrial cities to train contractor personnel to fill out contract settlement proposal and inventory forms in preparation for the time when their contracts are terminated.

The War and Navy departments realize that war contractors are busy and that when they take time off they must be compensated with useful information. This intensive four-hour work-session has been described as a "vitamin pill" because it gives the contractor quick aid at a point where he needs it most. For months now, contractors have heard about principles and philosophy and policies and procedures of contract settlement and they can absorb all this information and still not get far in contract settlement until they are able to fill out acceptable claims. By teaching contractors how properly to fill out the official standard proposal forms and the inventory schedules, this course puts the contractor on the road to prompt settlement and fast plant clearance. The job is done by traveling teams.

Each team, consisting of three men representing both Army and Navy, trains contractor-students to fill out properly all the settlement proposal and inventory forms, using typical examples. It has been found that training classes of 50 to 60 pupils is more effective than large groups. Small classes lend themselves to question and answer sessions which follow the course of instruction. It is believed that any contractor or his representative attending such a course will receive adequate information to meet his settlement problems insofar as the forms are concerned.

Early reports received from the various cities state that the course has been enthusiastically received by contractors. Each team conducts classes approximately four days a week, which would bring to approximately 200 the number of contractors trained by each team per week.

Nine Areas Put in Group 1 Labor Market Classification

Nine areas have been shifted into the War Manpower Commission's Group 1 labor market classification, denoting them as localities in which acute labor shortages exist or are anticipated. There now are 75 areas in Group 1 compared with 71 in February.

They all are from Group 2 and are: Anderson, Ind.; DeKalb, Ill.; Grand Rapids, Mich.; Indianapolis; Jackson, Mich.; Perth Amboy, N. J.; Peoria, Ill.; Toledo, O.; and Youngstown, O. In all of those areas there are plants on the "must" list where production is lagging.

In five areas, previously classified in Group 1, production adjustments, including cutbacks, required their reclassification into Group 2. They are: Meriden, Conn.; Pascagoula, Miss.; Racine, Wis.; Savannah, Ga.; Ventura-Oxnard, Calif.

POSTWAR PREVIEWS

TIN PLATE— Shift back to hot dipped plate for food packs predicted when tin becomes more plentiful. Electrolytic production will be used for general line cans. See page 66.

POOLING TECHNOLOGICAL KNOWLEDGE— Smaller War Plants Corp. plans to make American technological assistance available to friendly nations to aid in their rehabilitation. See page 68.

FOREIGN TRADE— Bill proposed by Representative Doughton would allow the administration broader bargaining power in arranging trade treaties with foreign governments. See page 70.

CRUSH DRESSING GRINDING WHEELS— A valuable production technique has emerged from American laboratories in the perfection of the method for profiling grinding wheels through the use of roller formers. This technique for increasing production of precision ground forms of various types seems likely to become widely used in postwar industry. See page 96.

STEEL MILL CANTEENS— Improved relations between labor and management achieved by inauguration of lunchrooms and small personal-item stores especially designed for workmen in steel mills foreshadow increasing attention to these "little things" that serve to increase production and stimulate morale. See page 106.

WELDING IN STEEL CONSTRUCTION— Although techniques of fabrication employing welding will find some limitations in postwar industrial applications, welding does seem likely to retain a large part of the ground gained. A cross-section of opinion from leading engineers and designers points out the possibilities for further development of this important production tool. See page 115.

American Technological Assistance Will Be Offered Friendly Nations

Aid in rehabilitating industries will be made available through technical advisory service of Smaller War Plants Corp. Non-confidential commercial information will be exchanged in reciprocity arrangement

FRIENDLY nations will receive American technological assistance in the rehabilitation of their industries under a new plan announced by Maury Maverick, chairman and general manager of the Smaller War Plants Corp. The medium through which this aid will be given is the SWPC's Technical Advisory Service which, said Mr. Maverick, has proved a great success in supplying technological assistance and managerial advice to thousands of small American business firms. "Of the manufacturers submitting problems," said Mr. Maverick, "78 per cent definitely have stated that they have been helped."

The movement to internationalize this service was launched at a meeting March 8 attended by representatives of 30 foreign governments. At that time it was explained that the contemplated arrangement was to be of a co-operative character by which the United States not only would supply information but receive information in exchange. The foreign governments were invited to organize their own counterparts of the SWPC's Technical Advisory Service to join in carrying out this objective.

Since then Mr. Maverick has been advised that the Canadian and New Zealand governments will proceed at once to organize Technical Advisory Services to represent their countries co-operatively. Mr. Maverick also has had a number of conversations with Chinese and South African representatives who are interested in the proposal.

"We have offered Canada everything we know or have without charge," said Mr. Maverick last week. "From here on the reports we will furnish to the manufacturers of America to assist them in solving their industrial problems will draw on the 'know-how' of our Canadian friends as well as everything we have in the United States."

The information to be exchanged, said Mr. Maverick, is nonconfidential commercial information which should be freely exchanged among all nations. "This information," he declared, "has been more or less available; the trouble up to now is that it has not been accessible. The technical advisory service is curing that shortcoming."

Every agency of the government, said Mr. Maverick, including the State Department and the Foreign Economic Administration, is enthusiastic about the potentialities of the program in improving world relations.

"If every nation has free access to the technical and scientific knowledge of the rest of the world, plus sufficient raw materials, and then organizes its industrial processes for full production and full employment (which under modern terms includes agriculture), then high standards of living throughout the world can be achieved. If this is done it will greatly minimize the probability of war."

Mr. Maverick said he visualized a world organization similar to the present Postal Union to direct and supervise the functioning of the proposed International Technical Advisory Service; in fact, he said, it might be feasible to have the Postal Union serve as the administrative agent during the initial period. Universities throughout the world, he said, should take part in the co-operative program and there should be an interchange of students and teachers.

Mr. Maverick said he also is launching a move to establish an International Patent Exchange Office, with branches in the United States and foreign countries. In these offices foreign patents would be on display, together with full information about them, to the end that manufacturers in each country might become familiar with, and obtain licenses under, foreign patents. In the United States, he said, this work would supplement that now in the hands of the alien property custodian.

IN ALLIES' PATH: Here is a recent airview of much-bombed Essen, home of Germany's vital Krupp Works, railroad and utilities center. It lies in the path of American Armies driving across the Ruhr. NEA photo

Foreign Trade for Small Business To Be Studied

To pave the way for increased participation by "independent small businessmen" in foreign trade, the Subcommittee on Foreign Trade of the Senate Special Committee on Small Business will open hearings on April 17 "to study the potentialities of foreign trade, the obstacles to the realization of a desirable foreign trade program, and the practical measures which may be adopted to overcome them."

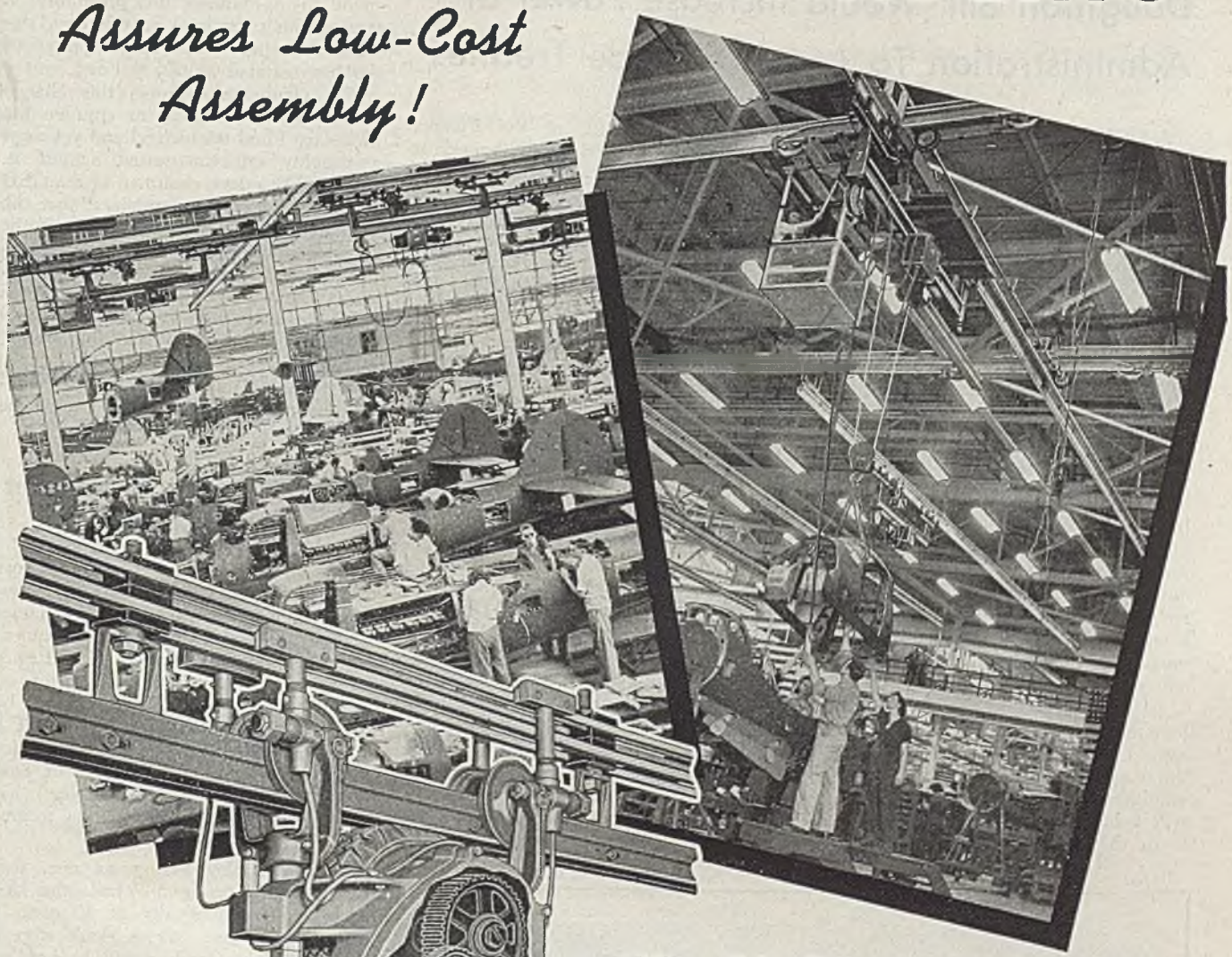
The subcommittee is convinced, states Chairman Claude Pepper (Dem., Fla.), that "full participation of small business in foreign trade requires a new and greater effort by government and business to bring home to small concerns the advantages of world markets."

Secretary of State Edward R. Stettinius Jr. will appear before the committee to explain the significance of the recent Mexico City conference in relation to our future commercial relations with the Latin American countries. Other government witnesses will be: Henry Wallace, secretary of commerce; Leo T. Crowley, foreign economic administrator; and Henry Morgenthau, secretary of the treasury.

Business spokesmen on the agenda include: Eric Johnston, president, Chamber of Commerce of the United States; Eugene P. Thomas, president, National Foreign Trade Council; R. F. Warner, president, National Council of American Importers; and Earle Webb, chairman, Foreign Trade Committee National Association of Manufacturers.

MOTORIZED HANDLING

Assures Low-Cost Assembly!



When all handling is done mechanically, as with American MonoTractor drives for cranes and hoists, unskilled help can spot heavy or cumbersome loads accurately and safely. In aircraft plants this kind of handling enabled inexperienced labor to complete highly technical assemblies.

Motorized equipment can be easily and inexpensively adapted to a wide variety of handling problems. Quite a number of automatic systems have operated successfully for the past five years by remote control between departments or from building to building.

An American MonoRail Engineer will gladly show how such systems have eliminated handling costs in assembly operations. Write today —no obligation.

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Doughton Bill Would Increase Power of Administration To Arrange Trade Treaties

A SIGNIFICANT new bill introduced in the House by Rep. Robert L. Doughton (Dem., N. C.), chairman of the Ways and Means Committee, would give the administration much broader bargaining power in arranging trade treaties with foreign governments. This bill, drawn up by the State Department to extend the Reciprocal Trade act for another three years, would permit increases or reductions of as much as 50 per cent from the January, 1945, level of tariff duties.

The new authority would be supplemental to that given in the original trade act which allowed the old 1930 Smoot-Hawley tariff rates to be changed by as much as 50 per cent. The new bill, to be the subject of hearings to start before the Ways and Means Committee early in April, will be fought bitterly by Republicans. Said Rep. Harold Knutson (Rep., Minn.), ranking minority member of the Ways and Means Committee:

"If that goes into effect it will be tantamount to signing the death warrant of hundreds of businesses and throwing thousands of workers out of employment. Republicans in the House will fight it to the last ditch."

In the Senate, Chairman Walter F. George (Dem., Ga.), of the Finance Committee, expressed unwillingness to do anything more with the proposed legislation than to lay before his committee such action as is decided on by the House. He conceded there would be a "sharp fight" over the proposal to arm the administration with such drastic powers to reduce tariff rates in order to encourage imports.

Senate Minority Whip Kenneth S. Wherry (Rep., Nebr.) said: "This goes three-fourths of the way toward bringing into this country foreign farm commodities in direct competition with the American farmer. . . . This is delegating more authority to a bureau to say what protection shall be given American labor and agriculture."

CED Would Broaden IBRD's Loan Powers

An amendment to the Bretton Woods proposals to give the International Bank for Reconstruction and Development "clear power to make loans for long-term and short-term stabilization purposes" has been suggested by the Research Committee of the Committee for Economic Development. The committee favors the international bank but urges the government to re-examine the possibility of strengthening the bank in this one "significant" respect before the adoption of the International Monetary Fund.

The committee believes this change would enable Congress to approve the Monetary Fund unchanged and yet meet a weighty criticism raised against it. Ralph E. Flanders, chairman of the CED Research Committee, explained that the recommendation was a "synthesis of the present opposing views about the Bretton Woods proposals, not a compromise between them." He expressed the opinion that the suggested amendment should easily win acceptance from the present 44 signatories of the proposals.

Without such an amendment, the committee points out, the fund "might be abused, with or without intent."

Bill Would Outlaw Payment of "Royalties" To Unions

Bill S.754 to outlaw payment of royalties such as those being paid by manufacturers of phonograph records to James C. Petrillo, head of the musicians' union, and those sought by John L. Lewis' United Mine Workers of America on coal production has been introduced by Senator Josiah W. Bailey, (Dem., N. C.). The bill was referred to the Senate Judiciary Committee whose chairman, Senator Pat McCarren (Dem., Nev.) has been requested by Senator Bailey to give it early hearing.

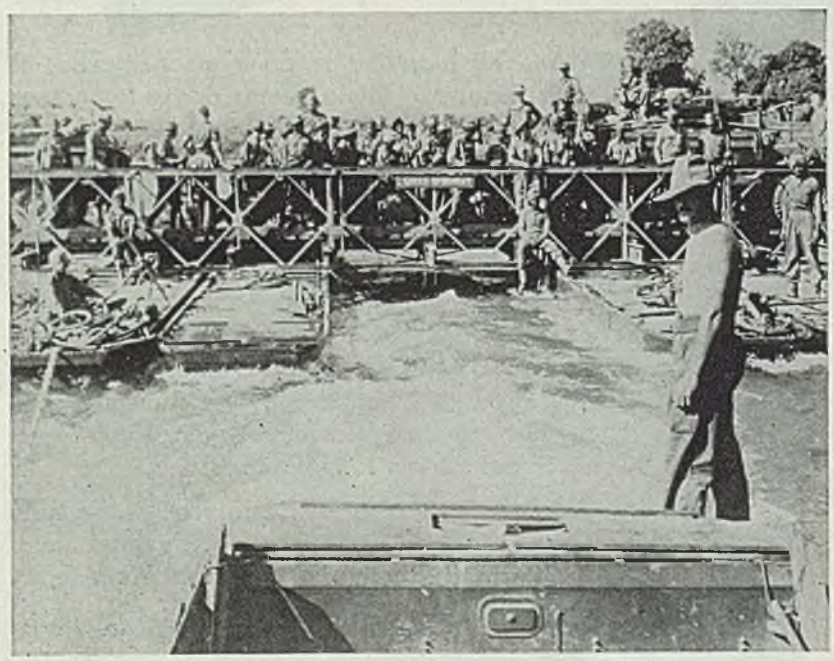
Senator Bailey told news men that Lewis picked up from Petrillo the idea of asking for a royalty of 10 cents a ton on coal and "if we don't stop it other big labor leaders will be holding up every industry and every store for the same thing. I want to stop it now before it becomes a general tax on consumers."

Brass Production Gains; Further Boost Necessary

Because of increased 1945 Army ammunition schedules, required deliveries of brass alloy strip, rod and tube for the second half of 1945 have been boosted, the War Production Board's Brass Mill Labor Advisory Committee was advised by WPB officials at a recent meeting.

January production of brass strip, brass rod, brass tube and copper products was 478,000,000 pounds, the highest since November, 1943, resulting in large part from co-operation between management and labor on production problems, WPB officials said.

Brass strip production increased 58,000,000 pounds in January, an increase of 23 per cent over December, 1944. Brass tube and brass rod production in January was the highest in the history of the industry. January brass rod production increased 12,000,000 pounds



BAILEY BRIDGE FERRY: Section of a Bailey bridge mounted on pontoons and towed by "ducks" is used as a ferry to haul supplies across the Irrawaddy river in Burma. This novel means of river crossing has helped speed the British advance south to Mandalay. British official photo from Acme

brass tube 5,600,000 pounds and copper products 3,500,000 pounds.

A huge job still faces the brass mills. Domestic production of alloy strip, which reached 306,000,000 pounds in January gradually must be increased to 384,000,000 pounds a month by September, 1945. Highest monthly production ever achieved was 361,000,000 pounds. Brass rod production must be stepped up to 130,000,000 pounds a month.

The forecast on castings, based on the industry's peak operation, is 76,000,000 pounds short of Army requirements.

Navy Combat Ship Program Increased by 84 Vessels

Navy construction has been increased by order of Admiral Ernest J. King for an additional 84 combat ships displacing 636,860 tons. Two hundred and eighty-eight combat vessels remained on the old construction program Feb. 1. Assuming no interim losses, completion of the old and the present extended combatant ship programs would give the Navy a total of 1532 combatant ships by the end of 1947, representing a total of 6,485,823 tons.

Opening of Black Sea Speeds Shipments to Soviet

Opening of the Black Sea has speeded delivery of vital war materials to Russia, says Leo T. Crowley, Foreign Economic Administrator, in announcing that the first ships to carry lend-lease cargoes from this country to the Soviet Union by way of the Black Sea have reached their port.

Much of the material now moving to Russia under lend-lease is designed to improve the Soviet transportation system feeding war supplies to the troops on the eastern front. In the 15 months ended Jan. 31 we sent Russia more than 10,000 separate pieces of rolling stock. This equipment included 1278 locomotives, 27 diesel electric locomotives, 8340 flat cars, 1000 dump cars, 100 tank cars and ten heavy machinery cars.

In addition, more than a quarter of the lend-lease steel sent to Russia since October, 1941, is being used in the railroad rebuilding program. This has included 509,580 tons of rails, 24,350 tons of mounted sets of railroad car wheels and axles, 35,554 tons of car axles and 29,944 tons of locomotive tires and 22,020 tons of rolled steel car whheels.

Totals of lend-lease materials supplied by the United States to the Soviet Union through Jan. 31 include 12,709 combat vehicles, 1821 ordnance service vehicles, 355,059 trucks, 301,842 short tons of explosives, 157,000 guns and mortars of various types, 701,400 tons of chemicals, 3,832,985 short tons of foodstuffs, and nearly $1 billion worth of machinery and equipment.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

METAL INSECT SCREENED CLOTH: Manufacturers of metal insect screened cloth may use AA-1 preference rating for their maintenance, repair and operating supplies. Formerly they were eligible to use the AA-5 preference rating for MRO supplies.

L Orders

CONSTRUCTION MACHINERY AND EQUIPMENT: Amendment to L-192 makes production schedules for orders placed by the military exempt from the carry-over restrictions imposed on Class B products. Also exempted from the carry-over restrictions is production specifically authorized by WPB on Form WPB-1689. Application for authorization to carry over production should be included with proposed new production on Form WPB-1689. The exemptions from carry-over restrictions apply to both Schedule A and Schedule B items of Order L-192. Schedule A items may be sold to war agencies without restriction and to other purchasers only on specific WPB authorization (Form WPB-1319). Schedule B items may be sold without restriction. Amendment of L-192 also makes procedure for obtaining emergency automotive repair parts identical with that established in Order L-158 (automotive replacement parts). The emergency certificate is prepared by the distributor, instead of by the prospective purchaser, and is filed by the distributor with his producer. The certification may be used only if the distributor does not have the repair part in stock. (L-192)

PHOTOGRAPHIC EQUIPMENT OR ACCESSORIES: Manufacturers of restricted photographic equipment or accessories, after rated orders are met, may fill non-military orders for less than $500 worth of new equipment or accessories without special authorization or preference ratings. However, only high preference ratings assure prompt delivery. Non-military orders for $500 or more must be authorized by WPB and must be accompanied by a preference rating assigned on Form WPB-1319. (L-267)

CAST IRON BATHTUBS: Direction 6 to Order L-42 establishes a new method of authorizing production. Authorizations will be given on Forms GA-1850 upon application from manufacturer by letter to the WPB, Plumbing and Heating Division, Washington. Production will be authorized only where the applicant's proposed use of labor will not interfere with local or inter-regional recruitment. A manufacturer unable to complete first quarter authorized production may make up any deficiency not exceeding 10 per cent during second quarter. The new direction also brings under distribution controls all bathtubs produced under spot authorization and shipped after March 14, 1945. (L-42)

M Orders

NATURAL RESINS: Issuance of Schedule 96 to chemical allocation order M-300 places natural resins under allocation control beginning April 1, 1945. No supplier may use natural resins or deliver them to any person except as specifically authorized in writing by WPB, upon application on Form WPB-2947. Filing date is the 20th day of the month before the proposed month of delivery or use. Separate sets of forms must be filed for each kind of natural resin. Any person placing purchase orders for delivery of more than 160 pounds a month of all natural resins, in aggregate from all suppliers, must furnish with each purchase order a statement of proposed use, followed by the certification "Use Certified-Ref: M-300". These purchase orders and certificates should be in the hands of the supplier not later than the 15th day of the month before the requested delivery month. (M-300)

UREA AND MELAMINE ALDEHYDE RESINS: Application for these resins must be made on Form WPB-2945 instead of filing purchase order certificates of proposed use. (Sch. 34 to M-300)

ANTIMONY: Order M-112 has been amended to permit consumers purchase of only 224 pounds of antimony monthly without allocation from WPB, a 90 per cent slash from the previous allowance of 2240 pounds. (M-112)

Price Regulations

RAILWAY STEEL CASTINGS SPECIALTIES: Amendment No. 14 to RPS-41 increases the maximum prices of certain railroad specialties. The increases are: For side frames, 8 per cent; for rigid yokes, 3 per cent, and for swivel yokes, 3 per cent. Effective March 22, 1945, the increases are price adjustments made on the "product standard" basis, and are designed to permit railroad specialties producers to cover "out of pocket" costs on the items.

DURABLE GOODS: Under Amendment No. 25 to Order A-2 of MPR-188, manufacturers may apply to Office of Price Administration, Washington, for price increases on: electric hot plates portable reed organs, parts (except electrical) for portable lamps, lamp shades and residential lighting fixtures. This should remedy the inequitable price situation under which some manufacturers are operating.

ESTER GUM: The base maximum price for ester gum containing gum rosin has been increased from $.115 a pound to $.1185 a pound, effective March 17, 1945. This increase is automatically reflected in the formula provided for pricing this type of ester gum contained in solution or mixture with other materials. (Amendment 8 to MPR 406)

Appointments-Resignations

Roy F. Hawkins has been appointed director of the Foreign Supply and Distribution Division, Petroleum Administration for War, succeeding William D. Crampton.

o o o

Fred L. Parker has been named director of the Fuel and Automotive Rationing Division, Office of Price Administration, succeeding John G. Neukom, recently appointed director of OPA's Office of Board Management.

o o o

P. N. Simmons will succeed Thomas H. Nicholl as director of the regional operations division of the Highway Transport Department, Office of Defense Transportation, Washington, April 1, and Alvin S. McEvoy will succeed Mr. Simmons as regional director of the ODT Highway Transport Department, New York.

o o o

Herbert Buckman, executive assistant to industry members of the Fifth Regional War Labor Board, has been appointed substitute member of the board.

Wounded War Veterans, Working Way to Health, Boost Materiel Output

Disabled men's production at Crile hospital shop high in quality and quantity. Program is popular with patients and several hundred are on employment waiting list. More industries invited to participate in project

By VANCE BELL
Assistant Editor, STEEL

INVESTMENT of a Cleveland industry's money, time, and effort in a unique program to help rehabilitate wounded servicemen at Crile General hospital, Cleveland, is paying dividends by increasing America's war production.

Under this program, as discussed in the March 12 and March 19 issues of STEEL, the Lamson & Sessions Co., bolt and nut manufacturer, is one of two firms that are operating a "war plant" at the hospital to enable veterans to "work" their way to health.

Like most other manufacturers, Lamson & Sessions found that increasing demands for war materiel and a diminishing labor supply made it difficult to keep pace with production schedules. And in several instances production was behind schedule.

The veterans constitute a labor force of about 450 men, and although they work not more than three hours daily they have been significantly instrumental in aiding Lamson & Sessions to bring up to date, or nearly so, some of the lagging phases of war production.

Although many of the veterans had no prior experience in the type of work they are doing at the Crile "war plant" and despite their physical handicaps, the servicemen's production rates have been sufficiently high to astonish officials in charge.

Limitation on the amount of time that a veteran can spend each day on industrial work contributes to a high production rate in that a veteran does not work so long that fatigue begins to cut down the rate. Knowledge that exercise derived from the work will help him heal is undoubtedly a powerful incentive to the veteran to do his best on the job.

That the veterans are doing an excellent job is attested by a statement by H. J. McMahon, general plants manager for Lamson & Sessions, tnat "quality of the work has been beyond criticism by our inspectors and foremen." In a letter to Capt. Max Goldenberg, chief of the reconditioning service at Crile hospital, Mr. McMahon said, "This project not only has served the purpose of reconditioning but has relieved a serious manpower shortage in two vitally critical war plants and we assure you and all concerned that our management is extremely proud and gratified in every way."

One phase of the Crile war plant work consists of putting a nut on a bolt. Failure occasionally to place a nut on a bolt might appear relatively unimportant, but necessity for thoroughness in that work was emphasized at the Crile plant where it was pointed out that many of the bolt and nut assemblies are used throughout the world by the armed forces in erecting storage tanks for gasoline and fuel oil. In many instances those tanks are erected under gun fire and men cannot be delayed because a nut is missing from a bolt, and where those tanks are erected there is no neighborhood hardware store to provide the missing part.

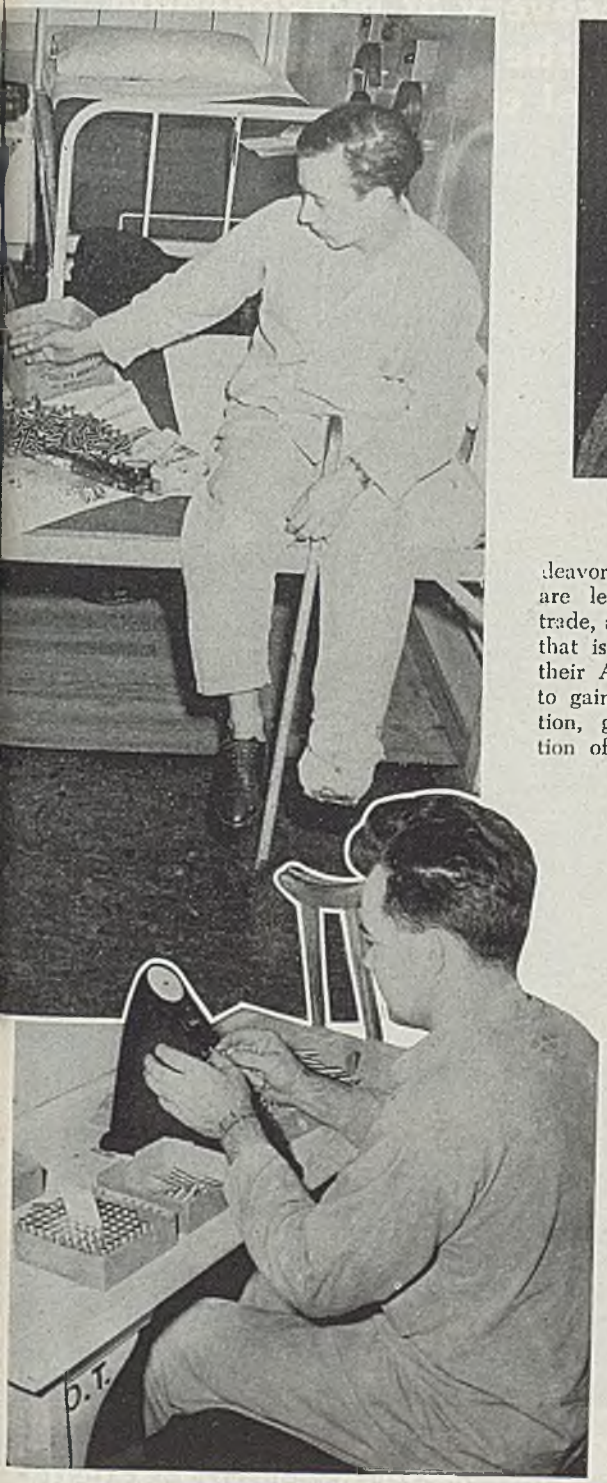
Production Is Speeded

Because of the need for millions of bolts and nuts the job of producing them is one of considerable proportions. Not only have the Crile war plant workers helped bring that production up but they have been responsible for big gains in gage inspection and drilling work.

For their work, each of the patient-workers receives the same rate of pay, so that none will refuse to volunteer for the employment exercise just because the work that would provide him with the needed exercise does not pay as much as some other task. The rate was established after consideration of various factors. An hourly rate rather than a piece rate was chosen so there would be no variations in hourly earnings which might discourage those whose physical handicaps prevent them from attaining the production of other patients, and also to prevent a patient from harming his recovery by overwork in an effort to earn more money. The rate was set high enough to encourage the patients and low enough to prevent the servicemen from getting the idea that premium benefits result from disability.

No patient at Crile is required to work. He is given an opportunity to volunteer. Attendance in the shop session is not required, and if a patient does not feel like working on any day he is not asked to do so. Despite this voluntary basis, however, absenteeism in the shop is low, and in fact, attendance compares very favorably with that in regular war plants.

Occupational therapy, of which the war work at Crile hospital is one phase, has a definite beneficial effect in diminishing the amount of permanent disabilities of servicemen, according to Captain Goldenberg. He cited one patient who had made little progress through three years of disability before entering Crile hospital. The patient was unable to go up or down stairs



H. J. McMAHON

CHESTER NIKODYM

When patients are unable to go to the work, the work is taken to the boys in wards as indicated in the two photos at the left. In the upper one, two servicemen are using dial indicator gaging fixtures to check bolt lengths. The lower photo shows a veteran using a dial comparator to gage pitch diameter of aircraft engine studs. Photos by Howard Meserve

and could walk only with great difficulty. After a period of physical therapeutic treatments he now is able to negotiate stairways, walk with ease, and can even run.

The Crile war plant program has been running three months, long enough to show that all that the participants set out to do is being accomplished, and more too.

Primary aim was to provide muscular exercise and mental occupation to help promote rehabilitation of wounded servicemen. The hospital's case records show worthwhile accomplishment in this endeavor. Meanwhile, the veterans are learning something about a trade, and are earning extra money that is a welcome supplement to their Army pay. Industry stands to gain by increased war production, good will, and a satisfaction of knowing it is aiding veterans when that aid is most urgently needed.

An idea of the popularity of the Crile war plant can be gained from the fact that names of 200 boys are on the waiting list for employment there, that the hospital wishes to greatly increase this type of industrial therapy, and that the Associated Industries, which helped start the project, has issued an invitation through its general manager, Chester Nikodym, to other firms to provide work at the hospital.

Rehabilitation of persons with physical disabilities is not a new activity for industry. Some companies have for a number of years conducted such a program among their own employes. However, the return of men from the armed forces will necessitate an increase in the scope of this work.

It is important for industry to have the "know how" for effective handling of the problem of fitting into the civilian economy men whose battle-impaired bodies and minds require rehabilitation. It also is equally important for industry to know how to deal with those who have not been injured physically or mentally. Many physically capable returned veterans will require considerable readjustment. In the case of many of these men readjustment will be relatively easy, but an employer's over-solicitousness, however well intentioned, might hinder rather than help to refit them into the pattern of civilian employment.

"Know-How" Will Be Valuable

Knowing the right technique to apply in every instance will be a valuable asset to both employer and employe. It is obvious that a physically handicapped man will need different consideration than a returned physically fit employe whose military experience has matured him to the extent he will want a better job than the one he left to go to war.

It is not difficult to see that the problem of handling veterans, where there will be so many diverse personalities to deal with, will be one of many facets. This is why early preparation by industry to deal intelligently with the problem is vital since delay will only intensify the problem later.

Just as determinedly and effectively as it is meeting the challenge hurled by the demands for war materiel, industry must meet the challenge arising from the problem of the returning veteran of World War II.

This is the third and final article in a series on the veterans rehabilitation program at Crile General hospital. The first appeared in the March 12 issue, page 73, and the second ran in the March 19 issue, page 82.

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

MIRRORS of MOTORDOM

Mead Committee investigation of manpower utilization in Detroit encourages revelations of widespread loafing and lax discipline in war plants. Spring brings new rumors of resumption of civilian automobile production

DETROIT

AFTERGLOW of the Mead Committee investigation of manpower utilization in automotive plants is proving to be as juicy as the investigation itself. Newspaper gripe columns are filled with assorted opinions and the whole story of widespread loafing and lax discipline in plants is coming out in all its sordid detail.

A workman at the Packard Aircraft Engine Plant has taken time to compose a 2500-word expose of working conditions there, which in most respects is pretty close to the truth, and applicable to other plants as well. This anonymous contribution, printed in the *Detroit News*, was considered by the editors to be a startling disclosure, but it was merely routine to anyone familiar with the true situation. Perhaps one explanation for the uproarious state of affairs lies in the words of the author, "war labor is made up today, in a large part, of cripples, 4-Fs, women, old crabs and politicians. The politicians become union stewards . . ."

Confronted with the comment, Packard's perplexed president, George T. Christopher, chewed his cigar and said wryly he could get much better production "if I could get a complete day's work out of somebody. We have to fight 316 stewards day and night to get the production we do get."

Three Groups of Employes

Drawing on 30 years of experience, he classified workers into three principal groups—one-third anxious to do the right thing and abide by rules and regulations, one-third susceptible to good or bad influences, and one-third against everything and unwilling to do anything they are told. The latter group, of course, is the breeding ground of today's troubles. Its influence spreads among the middle group with the result nearly two-thirds of the plant force borders on the uncontrollable. Normally, the lower third would be weeded out by an alert supervision, but the unionization of plants with accompanying seniority regulations, prevents this now. Add to this the tremendous expansion of working forces the war has made necessary—from 11,000 to 41,000 at Packard—as well as the thinning of supervision, both in numbers and experience, and you have the root causes of today's problem.

There have been a lot of plain and fancy words tossed in the direction of plant managements, accusing them of being responsible for dwindling productivity because of "cost-plus" contracts—that is, contracts under which costs are of no consideration since profits at a fixed fee are guaranteed. As explained by Mr. Christopher, straight cost-plus war contracts are illegal. Most contracts are on a fixed-price basis, and these fixed prices are continually being revised downward. The Packard aircraft engine contract is on a cost-plus-fixed-fee, while its marine engine contract is on a fixed price, yet there is only a 2.4 per cent difference in cost between the two and they are approximately the same size and horsepower.

On the aircraft engine job, Packard receives a 4 per cent fee on the estimated cost, and the 1520-horsepower engines cost $7.50 per horsepower, or $11,400 each. But in undertaking the program, which had previously been turned down by two of the big three motor companies, Packard had to build nine engines practically by hand, at a total cost of $6,250,000, or nearly $700,000 each. Out of this total, the company netted a profit of $6206. In one year, Packard's gross profits were $22 million, out of which $19 million were paid in taxes.

As of March 16, about three and a half years from the start of the Rolls-Royce project, 47,400 engines had been built at the Packard plant, while the Marine Division has produced an additional 13,000 engines.

Another curious fact brought out in the Packard worker's story, and substantiated by Mr. Christopher, is that everyone in the plant automatically gets a raise in pay and moves up in classification every 30 days. The company president said this was the result of union insistence, with the support of the War Labor Board.

Now that the Washington insiders have the European war won again within the next few weeks, the spring crop of new car production rumors has sprouted. The strange thing about them is that no one in Detroit seems to know anything about the matter except what they read coming out of Washington. Comment by J. A. Krug of the WPB to the effect a "nameless" car might be permitted to go into production is a case in point. This is just a rehash of an idea which first broke into print a year ago, but was pretty thoroughly squelched at that time. Like the crocuses, it again is pushing its head through the turf, and most surely will again be stepped on, in the light of considered opinion here indicating no automobile producer would be interested in any such proposition.

Various capital news services have been dropping hints there would be some new passenger cars before the end of

PREPARING ROCKET BARRAGE: Members of a tank crew of the United States Third Army make final adjustments on rocket launching racks just before the flaming charges were sent roaring toward the enemy. Note camouflage on tank. NEA photo

the year, and they may be right, but there is no evidence here supporting the likelihood. Motor car production departments, when they can spare the personnel, are lining up specifications and standards, and are holding frequent conversations with a long list of suppliers with whom tentative initial production orders for materials and parts have been placed. However, no change in the picture is apparent over the past several weeks, and the prospect for new cars appears further away now than it did early last December.

Some of the local engineering fraternities are knitting their brows and scratching their heads over the activities of a comparatively new group which calls itself the American Society of Industrial Engineers, originated in Detroit where chapter No. 1 now encompasses membership of an estimated 2000. The society apparently is directed by a group of men associated with a local engineering and contracting organization, although its headquarters are listed at another address, which investigation proves to be nothing more than a secretarial and telephone answering service.

Membership in the society now costs $10 yearly, although last year it was only $5, and the year before that $2. Meetings are held monthly at a hotel here, where dinner is served at $2.75 per plate. Membership pins are available at $2.50 each.

One of the primary purposes of the society appears to be the operation of a free placement or employment service, but participation in this activity is limited to the membership. At the monthly meetings, announcements are made of job openings, many of them at extremely good pay. A radio program has been broadcast urging listeners to join the society or to enlist its aid in engineering consultation. From the society's prospectus, the following:

Predict Scramble for Jobs

"There'll be a wild scramble for the most secure and best paying engineering jobs when the war is over—and even before then. For many, the past few years have been equivalent to a college education. Thousands of youngsters have come up. For a host of others there will be a return to their old—and more fitting—occupations. A word to the wise should be sufficient. For any intelligent engineer, with an eye on tomorrow, will identify himself with an up-and-going engineering society in order to be on the safe side, when jobs are scarce. For the first time in engineering history our society has engineered a plan to serve all of industry. For the ASIE will continue to catalog and grade all of the talents and abilities required by America's vast industry—banking, management, research and every branch of engineering and the allied arts—all who serve industry are being brought under the banner of the ASIE."

The membership blank of the society identifies it as a "nonprofit, nonaffiliated association embracing all branches of engineering and the allied arts." Some simple arithmetic, such as 2000 times $10 equals $20,000, suggests the question of where this tidy sum is being directed in the interests of promoting the welfare of the membership.

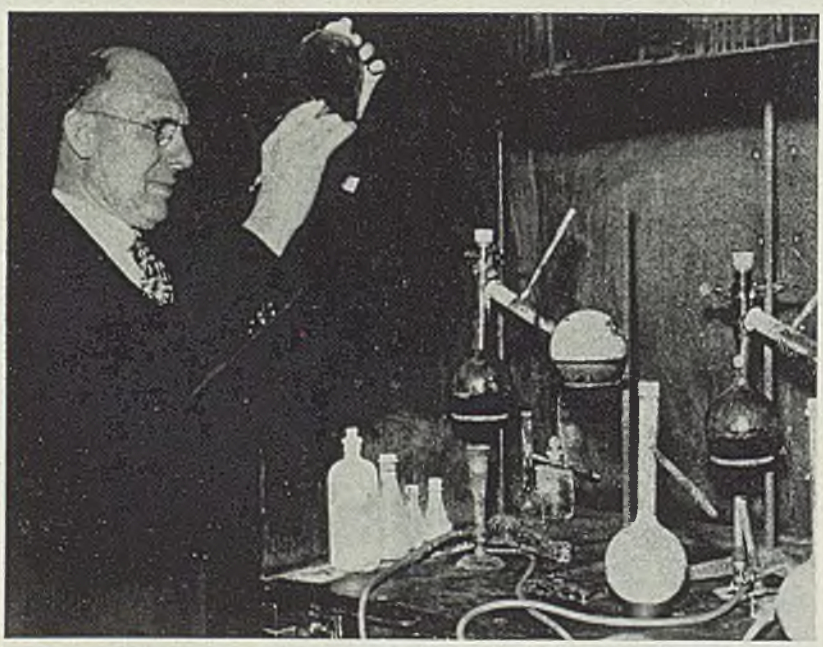
Cleaning of 46,800 feet of pipelines in the paint system at the building of the Ford Rouge plant, carried out every two months, is no small task. Eighteen of the 24 lines of all-welded steel pipe, averaging 2600 feet in length, supply various colors of paints for three assembly lines where war vehicles now are produced. To clean the system, the line containing the lightest color is flushed with nearly 3000 gallons of solvent. When it is clean, the other lines are washed in succession, in the order of intensity of the colors. Finally the solvent is drained from the last pipeline and processed to remove all pigments and impurities, after which it is reprocessed and used over again.

Ford spokesmen claim the company is the largest manufacturer-user of paints in the automotive industry. A number of special devices have been developed to handle mixing of these paints in large quantities. Included are mechanical shakers for 50-gallon drums and 5-gallon cans. By their use, a 50-gallon drum of enamel, for example, can be mixed in about 2 hours.

Aluminum Foundry Machinery Sold

Reports are heard new contracts for cast malleable axle housings may be placed with Ford, permitting acceleration of malleable production in the new steel foundry at the Rouge plant which never produced armor steel castings to any extent because of changes in ordnance planning. Meanwhile production equipment installed in the Ford aluminum foundry, at one time scheduled to cast aluminum cylinder heads for aircraft engines, is being sold by the DPC. Much of it, including molding machines, conveyors, ovens, sand handling equipment, etc., is new and has never seen any use after AAF procurement experts found themselves somewhat "overscheduled" on cylinder heads.

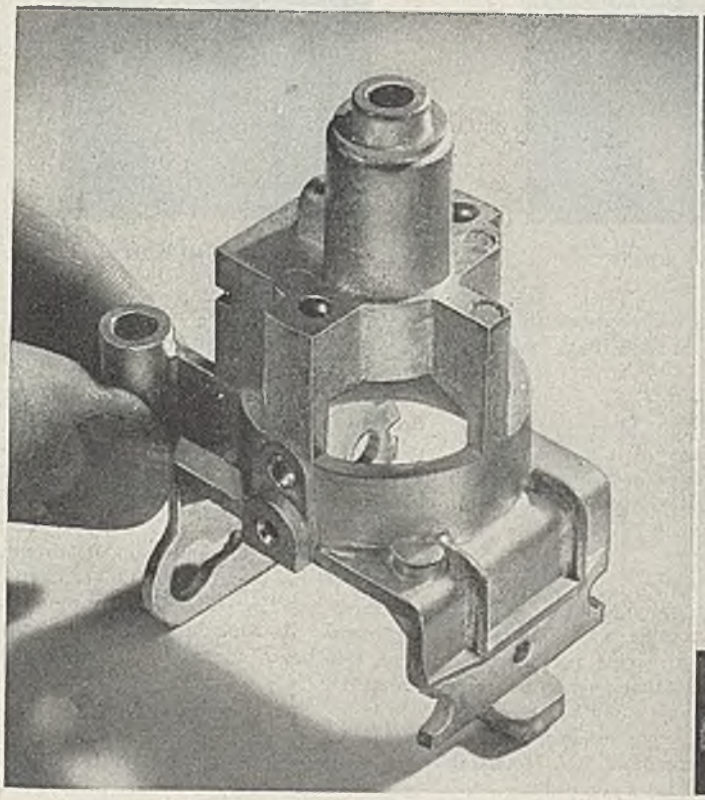
Another new postwar Fisher Body plant, to employ 7500-8000, has been announced for eventual construction at Columbus, O., to be operated by the Ternstedt Division of Fisher which supplied hardware and interior trim for motor car bodies. This is the second new General Motors plant on a list of 12 proposed projects.

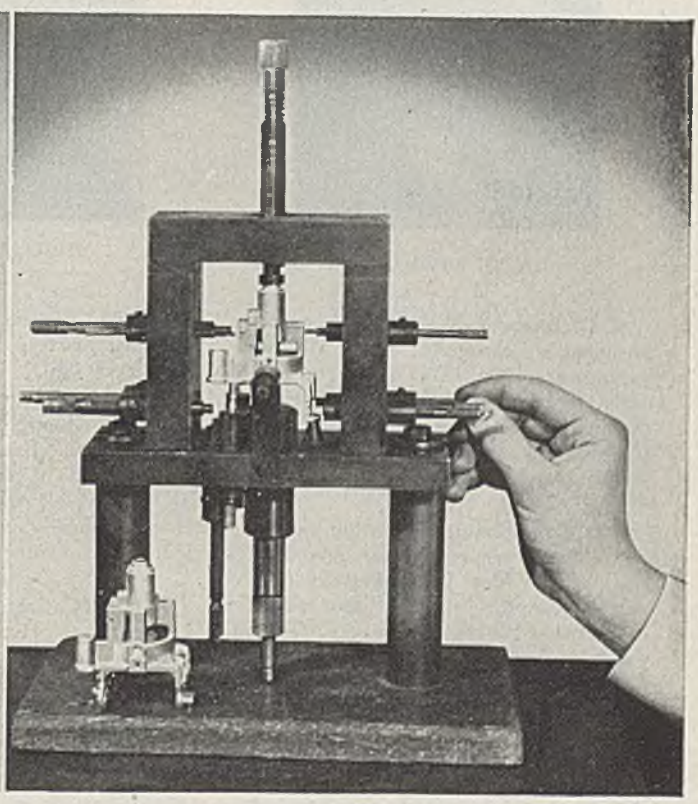


DOUBTS ROBOTS' PRACTICABILITY: Charles F. Kettering, General Motors research chief and inventor of one of the first robot bombs, last week said robot bombing was one of the "most expensive ways I know to deliver a ton of explosives" and expressed serious doubts as to whether robots could be launched from submarines or surface ships. Mr. Kettering said he believed that when the facts are known, it will be revealed that the Germans have killed a lot more of their own people in launching and handling the robots than is generally believed. NEA photo

ACCURACY!

—EXACTING PRECISION AT 60 POINTS ON THIS ZINC ALLOY DIE CASTING





This zinc alloy die cast speedometer frame must pass the critical test of the master gage shown at the right. 24 plug gages are used in this fixture to check approximately 60 dimensions of the casting. When it is considered that the specified *cast* tolerances run as close as ± .002″ in a dimension of 1.007″ between hole centers on two different planes, this casting becomes a testimonial to the dimensional accuracy of zinc alloy die castings.

Dimensional accuracy is not the only reason why this speedometer frame is die cast. There is no other means of production which could achieve such complexity of design in one piece. Think of the savings in machining and assembling operations—the savings in over-all cost! Furthermore, as a zinc alloy die casting this part possesses the required strength to assure efficient performance.

It is this unique combination of advantages which make die castings of zinc alloy the most widely used. *Every die casting company is equipped to make zinc alloy die castings,* and will be glad to discuss each of these advantages with you—or write to The New Jersey Zinc Company, 160 Front Street, New York 7, New York.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are specified with
HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

MEN of INDUSTRY

A. G. BUSSMANN

E. W. ROMIG

DAVID A. NELSON

A. G. Bussmann has been elected vice president in charge of sales, Wickwire Spencer Steel Co., New York city. Previously assistant to the president, Mr. Bussmann will have complete charge of all sales and merchandising operations of the company and its subsidiaries.

—o—

Sam K. Beetham, advertising and public relations counselor, has joined McClure & Wilder Inc., Warren, O., as vice president. Mr. Beetham recently left Owens-Illinois Glass Co., Toledo, where he had been advertising manager, Libbey Glass Division and Owens-Illinois Can Co.

—o—

Richard H. Rowland, previously vice president, St. Paul Engineering & Mfg. Co., has been elected vice president, National Battery Co., St. Paul, in charge of its Gould Industrial Division.

—o—

John F. Lebor, treasurer, York Corp., York, Pa., has been elected to the additional post of secretary, succeeding the late Vincent Keesey.

—o—

Howard B. Hall, consulting management engineer, has been appointed New York, northern New Jersey and Connecticut representative for Designers for Industry Inc., Cleveland, with offices in the National City Bank building, New York city.

—o—

John E. Ponkow, formerly chief electrical engineer and supervisor of experimental engineering, Federal Machine & Welder Co., Warren, O., has been made sales manager.

—o—

Nathaniel G. Gill has been appointed manager, Manufacturing Division, Bell Aircraft Corp.'s bomber plant in Marietta, Ga.

—o—

Walter E. Moore has been appointed district sales manager, New York district, American Cable Division, American Chain & Cable Co. Inc., York, Pa. Mr. Moore, who has been with the company 18 years, will continue to make his headquarters at 230 Park avenue, New York city.

—o—

E. W. Romig has been made vice president in charge of Cleveland district, Claud S. Gordon Co., Chicago. He has served the Cleveland plant as chief engineer since 1938 when he joined the company.

—o—

J. L. McCaffrey, second vice president International Harvester Co., Chicago, has been elected first vice president to succeed **M. F. Holahan,** who has resigned after 50 years with the company and one of its predecessors. Continuing as a board member, Mr. Holahan will be available in a consulting capacity. **W. E. Worth,** vice president in charge of supply and inventory, has been made second vice president and **Mercer Lee,** assistant to the vice president, has been elected vice president. He will be in charge of supply and inventory. **Peter V. Moulder,** general manager, Motor Truck Division, **R. P. Messenger,** general manager, Farm Implement Division, and **Ralph C. Archer,** general manager, Farm Tractor Division, have been elected vice presidents, and will continue as executive heads of their respective divisions.

—o—

Fred D. Danford has been elected treasurer, American Rolling Mill Co., Middletown, O., succeeding the late M. A. Brawley. Others appointed to new positions are as follows: **Edson D. Dronberger,** assistant district manager of the company's Berkeley, Calif., office; **James W. Schofield,** manager, Kansas City district; and **W. A. Danner,** assistant district manager, Chicago. **B. F. Carothers Jr.,** recently discharged from the U. S. Army Air Corps, has been transferred to the Chicago office, and **H. H. Compson,** returned war veteran, has been assigned to the Minneapolis district.

—o—

Arthur C. Omberg has been appointed chief research engineer, Bendix Radio Division, Bendix Aviation Corp., Baltimore.

—o—

David A. Nelson, manager, Detroit Broach Co.'s West Coast plant for the past year and one-half, has returned to Detroit as vice president and general manager.

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C. Frederick Cunningham, chairman of the executive committee, Oliver Corp., Chicago, has been elected chairman of the board. **A. King McCord,** vice president, has been elected to the executive committee.

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Ray W. Rowney has been elected assistant treasurer and **Mrs. J. H. Flagg,** assistant secretary, Sawhill Mfg. Co., Sharon, Pa.

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Donald B. Hornbeck has been elected president, National Bronze & Aluminum Foundry Co., and its subsidiary, National Aluminum Cylinder Head Co., Cleveland.

—o—

Arvid E. Lyden has been appointed director, Patent Division, Pennsylvania Salt Mfg. Co., Philadelphia, succeeding **A. E. Gibbs** who continues as advisory technical director. Mr. Lyden had formerly been with Allied Chemical & Dye Corp., New York.

—o—

Dr. Zay Jeffries, General Electric Co., Pittsfield, Mass., has been awarded the annual powder metallurgy medal of Stevens Institute of Technology, Hoboken, N. J.

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William J. Sampson Jr., president, American Welding & Mfg. Co., Warren, O., has been elected president, Warren Chamber of Commerce.

—o—

Stuart E. Blasen, veteran of three major European campaigns and just retired as lieutenant colonel, U. S. Army Corps of Engineers, has been appointed application engineer for the San Diego area, Westinghouse Electric & Mfg. Co.

NICHOLAS GERTEN

MICHAEL J. DEVANEY

JOHN H. VOHR

Robert W. Pritchard, member of Westinghouse Lamp Division's sales staff, Bloomfield, N. J. for 20 years, has been appointed assistant to Russell E. Ebersole, lamp sales manager.

—o—

Nicholas Gerten, who left his post as managing director, Compagnie Francaise Blaw-Knox, French subsidiary of the Blaw-Knox Co., Pittsburgh, in 1940 when the Germans overran France, will resume his work in the French organization.

—o—

Louis Stettler Jr. has been elected a board member, Akron Brass Co., Wooster, O. He is the company's executive vice president, treasurer and general manager.

—o—

Walter H. Murphy has been named shell production manager at Victory Yard of Electric Boat Co., Groton, Conn. Until recently, Mr. Murphy has been superintendent, Valve Division, Parker Appliance Co., Cleveland.

—o—

Louis Polk, president, Sheffield Corp., Dayton, O., has been awarded the Gold Medal of the Army Ordnance Association, Washington, for outstanding service. Mr. Polk has been instrumental in the development of measuring instruments and gaging system standardization with ordnance. He is a director of the Cincinnati post of the association which includes southern Ohio, most of Indiana, Kentucky, and Tennessee.

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R. J. Linney has been appointed district manager, Port Henry District, and **W. J. Linney**, district manager, Chateaugay District, Republic Steel Corp., Cleveland. R. J. Linney was formerly general superintendent at Port Henry and W. J. Linney, general superintendent at Chateaugay.

—o—

George A. Davies, president, Eccles & Davies Machinery Co., Los Angeles, and southern California representative of Lester-Phoenix Inc., Cleveland, has been appointed machinery dealers' representative of the Society for Plastics Industry, New York city.

—o—

Michael J. Devaney, for 45 years with Carnegie-Illinois Steel Corp., Chicago, has been appointed assistant to the manager, Chicago district operations. Mr. Devaney, who for the past four years has been assistant general superintendent, South Chicago plant, has been succeeded by **John H. Vohr**, formerly assistant to the general superintendent of the South Chicago plant.

—o—

W. B. Pringle, manager, Berwick, Pa., office of Caterpillar Tractor Co., Peoria, Ill., has been appointed manager of the company's New York office, succeeding the late **George E. Churchill.** Mr. Pringle, formerly a company representative in the Scandinavian countries, had special assignments in North Africa, the Balkans and central Europe. More recently he was assistant to the president of Caterpillar Military Engine Co., at Decatur, Ill. Mr. Pringle is succeeded by **Don E. Kneer**, domestic credit manager and supervisor of priorities.

—o—

Frederick F. Robinson, vice president and secretary, has been elected president, National Aviation Corp., New York city, to succeed **Frank F. Russell**, who has been on leave of absence as head of Aircraft War Production Council and was recently elected president of Cerro de Pasco Copper Corp., New York city. **George A. West**, who has been elected secretary, will continue as treasurer. **M. E. Tindall** has been elected assistant treasurer.

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B. R. Newcomb, president and general manager, John Waldron Corp., New Brunswick, N. J., has been named to serve on the committee on patents, National Association of Manufacturers.

—o—

Mark C. Pope has been appointed southeastern district sales manager, ACF-Brill Motors Co., with offices at Atlanta, Ga., to cover Florida, Georgia, North Carolina, South Carolina, Alabama and eastern Tennessee.

—o—

John Paulding Brown, Washington, has been named assistant general counsel, War Production Board. Mr. Brown, who has been with the board for about 3 years, will continue as counsel for the Automotive Division and Rubber Bureau.

—o—

John F. Wallace, chief executive engineer, aircraft and automotive engineering department, Cleveland Pneumatic Tool Co., Cleveland, has been elected a board member, and **E. W. Cleveland**, special sales representative.

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W. E. Graves has been appointed sales manager, Steel Improvement & Forge Co., Cleveland, and **R. A. B. Williams** has been appointed sales representative for California, Oregon, Washington and Arizona with headquarters in Los Angeles.

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Robert J. Overstreet has been appointed to represent Reliance Electric & Engineering Co., Cleveland, in North and South Carolina and Eastern Georgia.

—o—

I. G. Grawoig of I. G. Grawoig & Associates, has been elected president, American Well Works, Aurora, Ill., of which he recently purchased control.

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Gerald M. Frank, M. B. Speer & Co. Inc., Pittsburgh, has been appointed chairman, public relations committee, Institute of Scrap Iron and Steel Inc., for 1945.

—o—

Seven employes of the Lamp Division plant, Bloomfield, N. J., of Westinghouse Electric & Mfg. Co. to receive the company's Order of Merit are: **Robert F. Tucker**, assistant to **Ralph C. Stuart**, manager; **William J. Massey**, manager of general lamp sales, **James W. Greenbowe**, manager, Lamp Division patent department; **Samuel G. Hibben**, director, applied light; **Dr. Charles M. Slack** and **Dr. John W. Marden**, assistant

directors of research; and **William G. Moran**, superintendent of electronic tube manufacturing.

—o—

William F. Stamets has been appointed sales engineer for the Special Products Division, Lodge & Shipley Machine Tool Co., Cincinnati, O. Formerly a quality control engineer with Standard Steel Spring Co., St. Louis, Mr. Stamets has also served Cincinnati Milling Machine Co.

—o—

Frank P. Rhame has been elected president and **Homer E. Lunken**, vice president, Lunkenheimer Co., Cincinnati. Mr. Rhame, formerly vice president and who has been with the company for 25 years, will continue as general manager.

—o—

William H. Higginbotham has been elected chairman of the board of directors of Edgar Allen & Co. Ltd., Sheffield, England.

—o—

Robert H. Kittner has joined Glenn L. Martin Co., Baltimore, as manager of its newly created Plastics and Chemicals Division. **Clayton F. Ruebensaal** has been appointed technical director of the new Martin Division.

—o—

George R. Carr has been elected chairman of the board of directors, Dearborn Chemical Co., Chicago. Mr. Carr who succeeds the late chairman, Robert F. Carr, will remain chairman of the executive committee.

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Eugene R. Gardner, former eastern sales manager, Warner & Swasey Co., Cleveland, has been elected a member of the board.

—o—

W. E. Mullestein, who has been acting as assistant sales manager, Lukenweld Inc., Coatesville, Pa., has been granted a leave of absence to serve in an overseas capacity with the U. S. War Department.

DONALD J. REESE

Who has resumed his duties with the Development and Research Division, International Nickel Co., New York, having been with the Steel Division, War Production Board since April, 1942, noted in STEEL, March 19, p. 97.

—o—

William E. Barger has been appointed sales manager, Eastern Brass & Copper Co., New York city.

—o—

Dr. Sidney M. Cadwell has been appointed an assistant general manager of United States Rubber Co.'s Tire Division, with headquarters at Detroit. He will be responsible for production, development and engineering for this division.

—o—

George Ericson has been appointed head of the patent department, American Car & Foundry Co., New York. Mr. Ericson will also handle patent matters for the associated and subsidiary companies of American Car & Foundry Co., with headquarters in New York and branch offices at St. Louis, Berwick, Pa., and Washington.

—o—

David Levinger, director and vice president, Western Electric Co., New York, and manager of its Hawthorne Works, Chicago, celebrated his 35-year service anniversary with the company, March 21.

—o—

William A. Rock has been appointed to represent Foxboro Co., Foxboro, Mass., as resident engineer in the Corpus Christi area. **James M. Tuttle** has joined the staff of engineers at Foxboro's Pittsburgh office.

—o—

Samuel L. Baraf has become director of sales and merchandising, United Transformer Corp., New York City. **Ben Miller** has joined the company as general sales manager.

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Dr. Norman A. Skow, formerly of Bakelite Corp., New York, has assumed his new post as director of research, Synthane Corp., Oaks, Pa.

—o—

Gordon N. Gray has been appointed works manager, St. Clair plant, Bryant Heater Co., Cleveland.

—o—

John P. Camm has been appointed plant manager of the Osborn, O., plant, Universal Atlas Cement Co., New York. **W. O. Lawrence** has been made acting plant manager for the company at Leeds, Ala., to succeed Mr. Camm, who has been manager there since 1942. **Wade W. Postelle** has been appointed local auditor of the company's Independence, Kan., plant, having been at Leeds since 1942.

OBITUARIES . . .

M. A. Brawley, 65, treasurer, American Rolling Mill Co., Middletown, O., died recently in a Coluumbus O., hospital. An authority on commercial law, Mr. Brawley was made manager of credit and claims in 1915 and credit manager in 1921. In 1932 he was made assistant treasurer and in 1936, treasurer. Mr. Brawley was widely known throughout the steel industry.

—o—

Howard Melville Hanna, chairman of the board, M. A. Hanna Co., Cleveland, died there March 17.

—o—

Lester F. Gilbert, 60, vice president, Tube Manifold Corp., Buffalo, and formerly treasurer, North Buffalo Hardware Foundry, died recently.

—o—

Franklin E. Gillmore, 84, at one time crane designer and engineer for Brown Hoisting Machinery Co., Cleveland, McMyler Interstate Co., Bedford, O., and Victor R. Browning Co., Willoughby, O., died March 17 in Cleveland.

—o—

Clifford G. Brockman, 56, president and general manager, Smith & Mills Co., Cincinnati, died in that city recently. Mr. Brockman, who had been with the company 30 years, was named head three years ago.

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Louis Schultz, 68, president, Sunlite Mfg. Co., Milwaukee, died there recently.

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Charles F. Cone, vice president, George J. Hagan Co., Pittsburgh, died March 15. Mr. Cone was treasurer, Industrial Furnace Manufacturers Association, New York.

—o—

Walter H. O'Neall, 60, president, W. Q. O'Neall Co., Crawfordsville, Ind., died there recently.

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Clifford E. Heidenreich Sr., 40, production controller, Diamond Chain & Mfg. Co., Indianapolis, died recently at Martinsville, Ind.

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George Terry Horton, 71, president and manager, Chicago Bridge & Iron Co., Chicago, died there March 19. Mr. Horton joined the company in 1893 and had been its president since 1912.

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Herbert R. Allen, New York district manager, Square D. Co., Detroit, died at Mount Vernon, N. Y., March 16.

—o—

Arthur Charles Rohde, 49, purchasing agent, Globe-Union Inc., Milwaukee, died March 18 at Wauwatosa, Wis.

—o—

Byron H. Newell, 54, assistant manufacturing manager, Buick Motor Division, General Motors Corp., Detroit, died at Flint, Mich., March 12.

—o—

H. B. McKinley, 71, former assistant treasurer, Caterpillar Tractor Co., Peoria, Ill., died recently at Hollywood, Fla.

See Collapse of Shipbuilding Boom

Labor unions clamor for lifting of government labor restrictions in San Francisco Bay area as shipyard employment goes into drastic decline. Ship repair work not materializing to take up slack

DEVELOPMENTS in San Francisco's wartime picture have been exploding with machine gun rapidity following disclosure that shipyard employment has been declining sharply and will drop off to a fraction of its peak before the yearend.

Collapse of the shipbuilding boom has had these repercussions:

Ninety shipyard unions have asked the government to remove the San Francisco Bay area from the "critical industry" manpower classification. Representatives of the War Production Board have forwarded a recommendation to Washington that such removal be authorized.

It has been revealed that an enlarged ship repair program promised for this area has not materialized and repair work has been shifted to areas which have less than a "critical" manpower rating.

Union leaders have asked federal agencies to put all their cards on the table because "conflicting rumors" about shipbuilding and repair work have caused "absenteeism and loafing," and many workers have "abused" foremen in order to be fired and thus obtain releases from an essential industry.

Shipbuilding Near Completion

Back of these disturbances is the actual or prospective reduction in shipyard forces, and the apparent certainty that the shipbuilding job will be virtually completed before the year closes. (This situation was forecast in the March 12 issue of STEEL).

The War Manpower Commission has announced that 25,000 to 35,000 workers will be dismissed from San Francisco area yards by July 15. Only a part of them will be employed in ship repair.

An informal survey also shows that the decline in employment already has been substantial. Compared with the 1943 peak employment, the following yards show these drops in payrolls: The four Kaiser yards at Richmond have gone from 93,000 to 40,000; Western Pipe & Steel from 15,000 to 5200; Marinship from 23,000 to 12,000; Moore Drydock from 36,000 to 16,500.

By September or October all of the Kaiser yards will have completed construction of new ships and approximately 24,000 more Kaiser employes will be discharged by autumn. Only one Kaiser yard now is being shifted over to repair. Moore Drydock will drop another 8500 workers in the next four months, and Marinship will discharge 6500 before July 1.

Government and military authorities have emphasized that many of the former shipyard workers are sorely needed for other essential work in this area, but union officials countered by saying that the agencies were not placing men in new work and the resultant effect "is harming the overall war effort."

Many of the discharged workers are trying to get out of the area. Local ration boards were reported to be swamped with requests for extra gasoline to enable immigrants to return to their homes in other states. Railroad and bus ticket offices reported an increase in demand for one-way tickets to out-of-state points.

If San Francisco is removed from the "critical manpower" classification, it will mean that many so-rated "essential" workers will be able to get employment in private industry and in non-essential jobs from which they now are barred. A limit to such employment is found, however, in the overall restrictions against reconversion of civilian industries.

Because of normal ups and downs in ship repair jobs, plus the admitted fact that some repairs have been diverted to the East Coast from San Francisco, the repair program here thus far is not as active as had been hoped for.

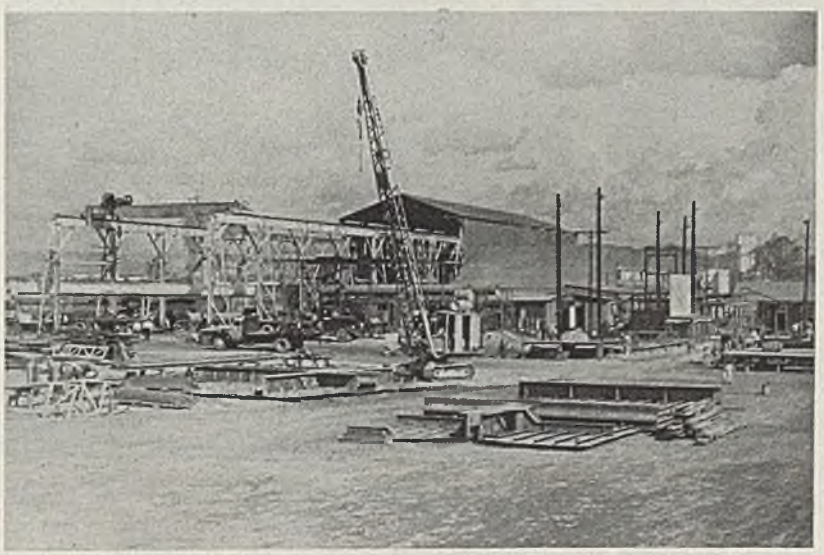
A considerable part of the confusion and reaction of workers to the situation is claimed by unbiased observers here to be due to government agencies' mishandling and lack of candor. They point out that at the time workers were actually being discharged from shipyards in large numbers, federal officials continued to publicize a "labor shortage" and to campaign for "more workers."

Shipyards Unaffected as Yet in Los Angeles Area

Los Angeles shipyards remain virtually unaffected by those developments which have brought announcements of wholesale layoffs among yards working comparable contracts in other West Coast yards.

War Manpower Commission officials declare that out of 86,000 workers in all yards here, 80,000 will still be on their jobs by Jan. 1, 1946. Slight and gradual reductions will be made through nonreplacement of "quits" rather than discharge of active workers.

Officials of Consolidated Shipbuilding Corp., employing some 20,000, say that current contracts will last to the first of next year, and beyond. At California Shipbuilding Corp., with a labor force of 27,500, some 3000 "quits" will not be replaced during coming weeks, resulting in a gradual cutback to this degree, mainly due to use of more efficient methods and gain of know-how among key workers. Activities at other yards are comparable.



GROWING IN THE WEST: Simpson Steel Co., Los Angeles, formerly the Davenport Mfg. Co., has increased employment from 33 in 1941 to 650 at present, now has a monthly output of $450,000, mostly war material. Company recently received the Maritime Commission "M"

WING TIPS

Society of Automotive Engineers organizes Special Aircraft Products Subdivision to undertake co-ordinated research and development in fundamental aeronautical engineering fields. Four projects already initiated

ORGANIZATION of a Special Aircraft Projects Subdivision of the Aeronautic Division, Society of Automotive Engineers, to undertake co-ordinated research and development in fundamental aeronautical engineering fields, was announced recently by Arthur Nutt, Aircraft Engine Division, Packard Motor Car Co., Toledo, O., who is division chairman.

The subdivision already has initiated four projects. They are: Development of a standard aeronautical drafting room practice manual; test procedures and design requirements for helicopter powerplants, transmissions, and drive mechanisms; standardization of inspection stamps and symbols used in the aircraft manufacturing industry; and aircraft engine cold starting requirements.

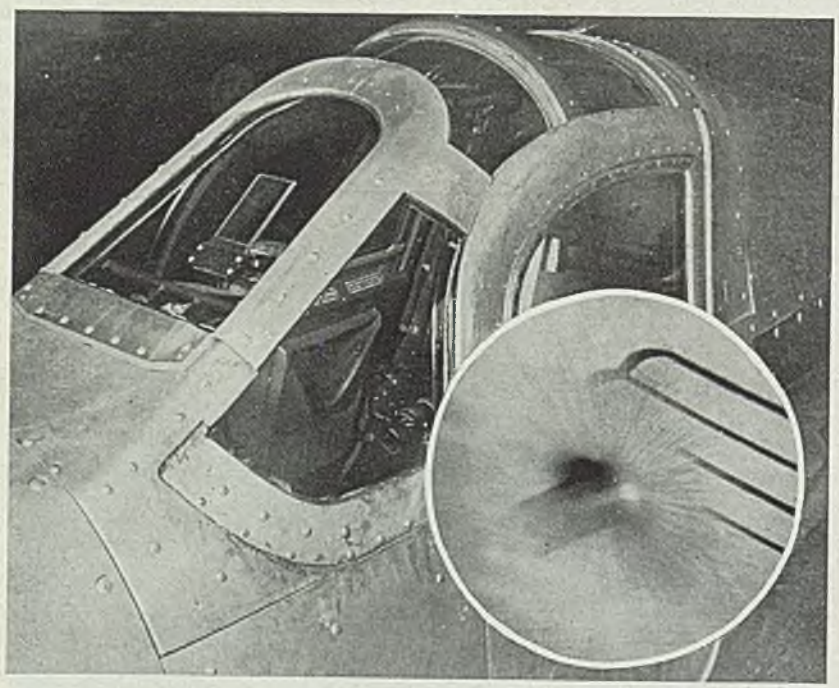
The subdivision's work will be coordinated with continuing projects of the Division's Aircraft Engine, Accessory & Equipment, Propeller, and Materials & Processes Co-ordinating Subdivisions, which are active in the fields of standardization, recommended engineering practices, and specifications. The new subdivision, however, will concentrate on fundamental engineering research and development problems underlying the work of the other subdivisions.

Peter F. Rossman, general manager, Development Division, Curtiss-Wright Corp., Bloomfield, N. J., has been elected chairman of the subdivision. Preparation of the aeronautical drafting manual has been assigned to Committee S-1, Otto E. Kirchner, chief engineer, American Airlines Inc., as chairman.

Committee S-2 on Helicopters is comprised of R. W. Prewitt, Kellett Aircraft Corp., Upper Darby, Pa., chairman; Commander R. E. Doll, Bureau of Aeronautics, Washington; Michael E. Gluhareff, Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn.; Laurence LePage, Platt-LePage Aircraft Co., Eddystone, Pa.; J. P. Perry, G & A Aircraft Inc., Willow Grove, Pa.; Frank Piasacki, P-V Engineering Forum, Philadelphia; Stephen H. Rolle, Civil Aeronautics Administration, Washington; Major K. S. Wilson, AAF Air Technical Service Command, Dayton, O.; and R. A. Wolf, Bell Aircraft Co., Buffalo.

Committee S-3, Inspection Stamps and Symbols, has as chairman E. H. Kelley, Chevrolet Division, General Motors Corp., Buffalo. The members are: E. A. Brittenham, Goodyear Aircraft Corp., Akron, O.; Gustav Carvelli, Wright Aeronautical Corp., Paterson, N. J.; R. E. Cummings, Thompson Products, Cleveland; J. H. Q. Dohse, Ford Motor Co., Dearborn, Mich.; R. B. Fehr, Packard Motor Car Co., Detroit; V. C. Frost, Republic Aviation Corp., Farmingdale, N. Y.; William Newberg, Dodge Division, Chrysler Corp., Chicago; and R. L. Nolf, Bendix Aviation Corp., New York.

Membership of Committee S-4, Cold Starting Requirements, includes: Chairman G. A. Bleyle, Wright Aeronautical Corp., Paterson, N. J.; Floyd Dougherty, Allison Division, General Motors Corp., Indianapolis; C. R. Paton, Packard Motor Car Co., Detroit; A. L. Pomeroy, Ranger Aircraft Engines, Farmingdale, N. Y.; B. J. Ryder, Lycoming Division, Aviation Corp., Williamsport, Pa.; W. H. Sprenkle, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, B. W. Geddes, Standard Oil Development Corp., Elizabeth, N. J.; and H. C. Riggs, Electric Storage Battery Co., Philadelphia.



FRANGIBLE BULLETS: To aid the training of aerial gunners under combat conditions the Army Air Forces developed the frangible bullet of plastic and lead which disintegrates when it hits a slightly armored surface, and permits it being fired at planes flown by AAF pilots. Photo shows cabin of a RP-63 Kingcobra with armored glass and dural which serves as a target plane. Circle shows frangible bullet at moment of impact

Telephone Wire Laid Over Rough Terrain from Planes

Laying telephone wire over rough terrain from low-flying cargo planes—one of this war's contributions to military science—has been perfected by the Air Technical Service Command's Engineering Division, Wright Field, O., working with the Bell Telephone Laboratories.

A C-47 airplane laid 16 miles of army telephone wire between Gatlinburg, Tenn., and Smokemont, N. C., in 6 2/3 minutes of flight time. Stretched over the rough, wooded slopes of the Great Smoky mountains with elevations between 1500 and 5000 feet, the wire was used by National Park rangers for five weeks before a break occurred after sleet sheathed it with an inch of ice.

Standard pole installation for that distance and terrain would demand many more men and days, and even an army field installation would use many men and hours.

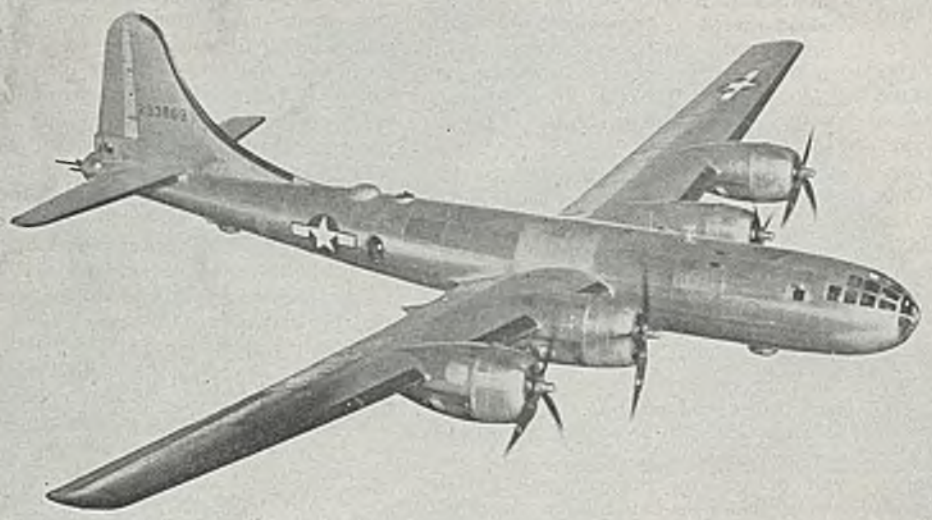
Besides the time factor, such a length of wire could be laid over an area open to enemy artillery fire.

Secret of the AAF operation is the method of boxing and winding, which controls wire action and eliminates snarls, broken wire, and other hazards.

Wooden boxes contain the wire, which is wound much like a ball of twine. The lead end runs through a round hole in the front of the box, unwinding from the center of the coil.

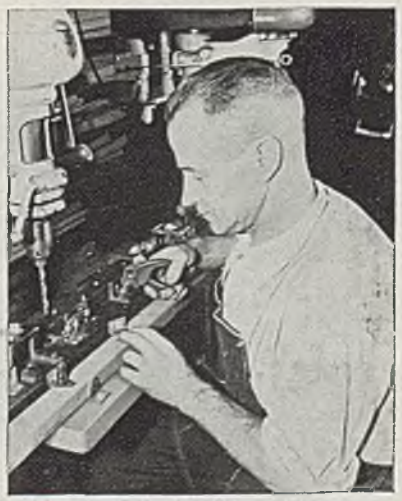
A metal shield fits into the hold and,

SPEED NUTS OVER TOKYO



Boeing uses thousands of SPEED NUTS on every B-29 Superfortress to make them lighter, faster and deadlier.

Photos courtesy of Boeing Aircraft Company



SPEED NUTS HELP THESE BOEING WORKERS BOOST B-29 PRODUCTION

TINNERMAN PRODUCTS, INC.
2039 Fulton Road, Cleveland 13, Ohio

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario *In England:* Simmonds Aerocessories, Ltd., London

Speed Nuts
PATENTED
*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

with a metal peg or center guide which extends through the center of the coil of wire, helps control payout. The rear tip of each coil is run through a similar hole at the back of the box and is spliced onto the lead end of the next container. Eight such containers, each holding about two miles of telephone wire, may be clamped in line in a C-47, standard AAF cargo plane.

From the front of the lead box extends a long metal tube like a gigantic camera lens. To the wire's lead end is attached a chain and parachute, which serve to provide drag once they are tossed from the plane's side door. Only four men, two crew members and a pilot and co-pilot, handle the 16 miles of wire in each plane. There are no special attachments or modifications to the plane.

Luscombe Airplane Corp. Plans Project for Texas

Luscombe Airplane Corp., Trenton, N. J., has bought 500 acres of level farm land near Dallas, Tex., on which to erect a modern aircraft plant and a complete new airport.

The $100,000 tract will permit further expansion of Luscombe's facilities for war production of precision all-metal elements for combat and other military aircraft, and development of a unique peacetime personal flying center devoted to manufacturing, maintenance and general operations.

Small Plane for Private Owner Needs Engineering Attention, Says W. B. Stout

ALLOWED to exist during the war, operating in a more or less clandestine fashion except in its unheralded military achievement, the private-owner plane has not been given much attention, according to W. B. Stout, Stout Research Division, Consolidated-Vultee Aircraft Corp.

"Its engineering has been neglected," he says. "Its power plants have stayed status quo. Its organizations have been disturbed, and its personnel and research hampered. The small plane nonetheless has done its full share of military helpfulness, in spite of military assistance, rather than because of it.

"While there will be a few big transport planes sold postwar for international work, and 100 or so for operation in our own country, at the same time there will be tens of thousands of private-owner planes marketed within the Americas for personal use to form the greatest postwar air industry of any of the manufacturing units.

"The world is taking to flying, and America, particularly—being a nation of individuals—is individually wanting to fly and to travel by itself. Most of this flying will be local, trips of 100 miles or so, for many years to come. We do not have the time nor the inclination nor the opportunity to spend 3 or 4 months of the year flying around the world or taking any long tours. With two weeks or a month's vacation, we would have to spend one week going each way, and private-owner planes will not have the speeds for the private-owner type of pilot to take long trips for some time to come. However, there will be plenty for private flying to do in our country, in Canada and in Mexico. Vast areas are not served by either railroads or roads. Unlimited space is available for colonization and for new living, provided means of transportation can be had in and out.

"The private-owner plane will furnish this means, and from it will come the growth of new cities and new population centers at remote spots now away out of the world, although within our own boundaries.

"If this plane is to have a market, however, it must be one that the pocketbook of the public can buy. Unless labor and its wages can afford to buy the plane, then the public cannot buy and there will be too small a market.

"Labor is chiefly valuable as a consumer, and unless labor can be given a price where it can buy, then the price cannot be made low enough for others to buy. Even on a credit basis, therefore, the private-owner plane postwar cannot sell for over $2000 of prewar money.

"That lays down the problem definitely for management, for engineering, for production, sales, distribution. It means planes cannot be as they are made now. They must be simpler. They must be lighter, which means smaller in overall dimension. They must be safer; first in vision, and next, in operation. They must have more performance. They must be much easier to fly, and have a greater measure of utility than any of the planes which have been offered so far.

"Where the small plane is going depends on designers who can figure out a plane or engine which is more logical aerodynamically, production-wise and otherwise."

"WING AND A PRAYER": This TBF was damaged when a plane flying overhead was hit by antiaircraft fire and fell on top of it, breaking off a section of the wing and cracking the fuselage just ahead of the tail. The pilot, by holding the stick in both hands and both legs, was able to fly the plane 100 miles to its surface group. All crew members were rescued. U. S. Navy photo from NEA

Pontiac Completes Rocket Fins in Advance of Schedule

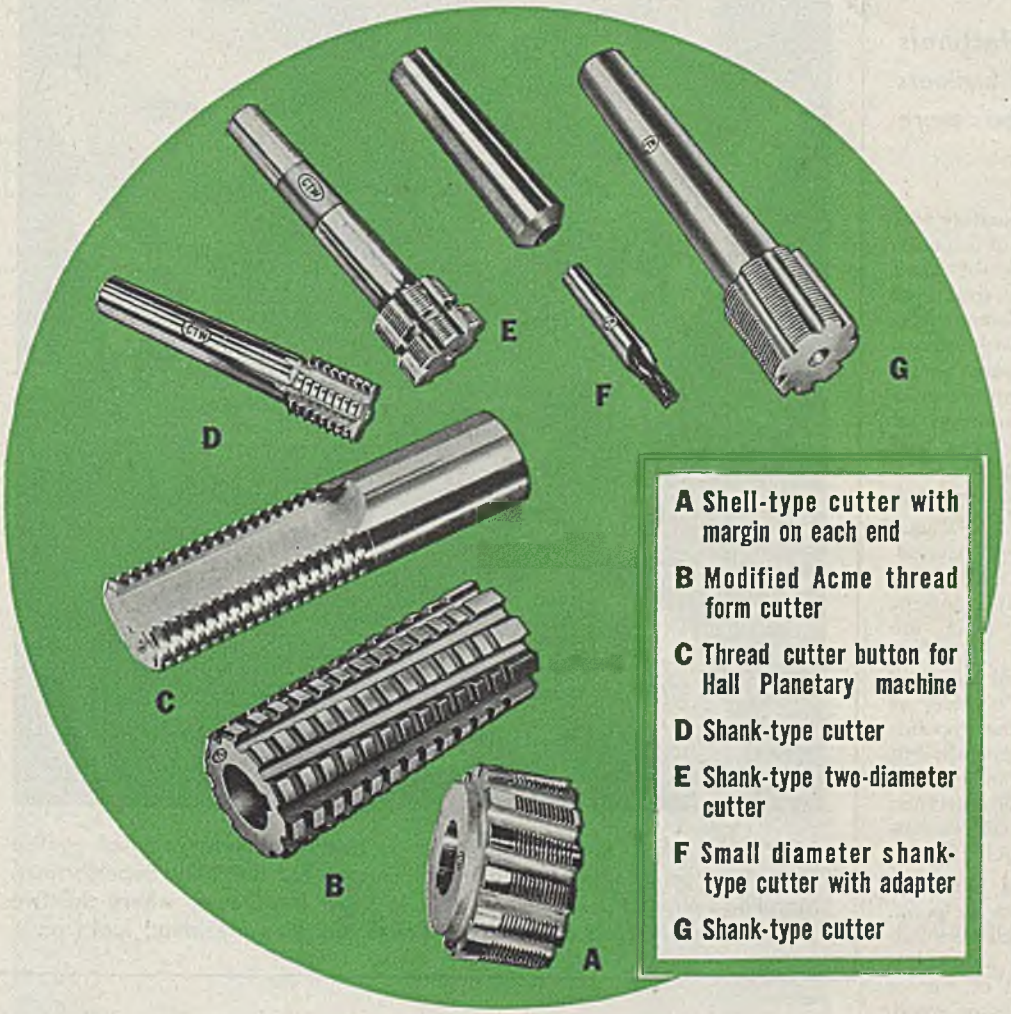
An urgent Army order for 200,000 steel fins for the 4.5-inch aircraft rocket within 10 weeks was completed ahead of schedule by the Pontiac Division of Fisher Body Corp., Detroit.

Pontiac, one of four plants participating in the fin manufacturing program, delivered its first 25,000 fins six days ahead of schedule and within five weeks after receiving a government go-ahead last December.

Ground Multiple

THREAD MILLING CUTTERS

by Continental



for fast, accurate production

Over 20 years' experience in precision thread grinding is built into CTW ground thread milling cutters . . . CTW ground thread milling cutters maintain dimensional accuracy on long production runs throughout the entire life of the cutter . . . Available in both shank and shell type, in National, Whitworth, Acme, V and special forms of thread. Many popular sizes carried in stock . . . For high production thread milling at lower tool cost, use Continental (CTW) ground thread milling cutters. Write to Continental today.

CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 6, MICHIGAN

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Continental
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- Broaches
  Broach Pullers
  Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacers
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools

45 40

Wallace Urged To Reconsider Small Business

Tool and die manufacturers group believes small business committee should be more representative

APPOINTMENT by Secretary of Commerce Henry A. Wallace of a special committee to study problems of small business has drawn from a group of small manufacturers the recommendation that "a first-hand and more authoritative picture of small business would be forthcoming if the present committee were augmented by addition of members who more directly reflect and represent small business itself."

In a letter to Secretary Wallace, Richard F. Moore, president, National Tool and Die Manufacturers Association, said "Who, other than small businessmen living with the daily problems of production, finance, and labor, are qualified to speak with any degree of authority of the needs of small business? We urge that you seriously consider at this stage of your program the appointment of members truly representative of small manufacturers as a further constructive step in attaining the objectives you have set for your special committee." (See STEEL, p. 76, March 12.)

"The special tool and die industry," Mr. Moore stated, "is a case in point. Despite its comparatively small sales volume, this highly specialized industry is essential to every implement of war or peace, whether metal, plastics or wood. Without precision cutting tools, dies, gages, jigs, fixtures and molds, the nation's machine tools, which are the basis of our entire mass production system, could not function.

"This was vividly brought home during the intensive special tooling periods that preceded our large scale war production program."

Wilputte Corp. Provides 682 Coke Ovens for War Output

Twelve batteries of underjet high and low burner by-product coke ovens totalling 682 ovens with an annual capacity of 5,951,900 tons are the contribution to date of Wilputte Coke Oven Corp., New York, to war demands on the metallurgical industry in the United States.

In four plants, the Wilputte corporation has installed the latest development in by-product equipment for production of ammonium sulphate, with size of crystals uniformly controlled.

DEWEY AT GE: Gov. Thomas E. Dewey hears an explanation of gunfire control system designed by General Electric for the B-29 Superfortress. Morehead Wright Jr. uses a model to show Mr. Dewey where the five turrets are located as Robert S. Peare, GE vice president, looks on

BRIEFS . . . .

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

Rheem Mfg. Co., New York, has received new orders from the Army for 75-millimeter shell forgings, and will operate a second plant in Birmingham, Ala., for their manufacture. It will begin production about Sept. 1.

—o—

Dixie Metal Products Co., Bessemer, Ala., has been awarded a contract for chemical mortar shells and will produce them in a plant on the ground floor of the main grandstand at the fairground at Birmingham, Ala.

—o—

Paranite Wire & Cable Corp. has changed its name to Paranite Wire & Cable Corp., Division of Essex Wire Corp., Detroit.

—o—

General Electric Co., Schenectady, N. Y., is building for Maumee Collieries Co.'s new open pit coal mine near Jasonville, Ind., some of the most powerful electric equipment ever constructed for mining. The equipment will be installed in one of the world's largest draglines.

—o—

Frank Phillips & Co. Inc., Baltimore, is increasing its plant size by acquiring a nearby building.

—o—

Wallace & Gale Co., 115 South Gay street, Baltimore, will transfer its general offices to an adjacent building, thus freeing space for its spraying and oven baking departments.

—o—

Electric Power Equipment Corp., Philadelphia, has completed a new organization prior to entering the refrig-

eration field. Marion E. Miller is the new president; L. R. Lewis, chairman of board; R. H. Shanaman, secretary-treasurer; and Ramsay G. Regester, advertising and public relations.

—o—

Dresser Industries Inc. has opened new, centralized administrative offices in the Terminal Tower, Cleveland. They formerly were located at Bradford, Pa.

—o—

Ohmite Mfg. Co., Chicago, has contributed $15,000 to Illinois Institute of Technology, Chicago, to establish a laboratory for precision measurement of electrical and magnetic quantities.

—o—

Bone Tool & Gauge Co., Detroit, has moved from its old plant into new, enlarged quarters at 9910 Freeland avenue.

—o—

Sheet Metal Fabrication Inc., Baltimore, has acquired a two-story building at 1024 Greenmount avenue for sheet metal work.

—o—

University of Iowa, Iowa City, will offer a management course from June 11 to 29 devoted to production planning, plant layout, motion and time study, wage incentives and related subjects.

—o—

Armco Drainage & Metal Products Inc., Middletown, O., a wholly-owned subsidiary of American Rolling Mill Co., Middletown, will sell Armco spiral welded pipe under a new commercial arrangement that consolidates all Armco pipe and fabricated product activities in one organization.

—o—

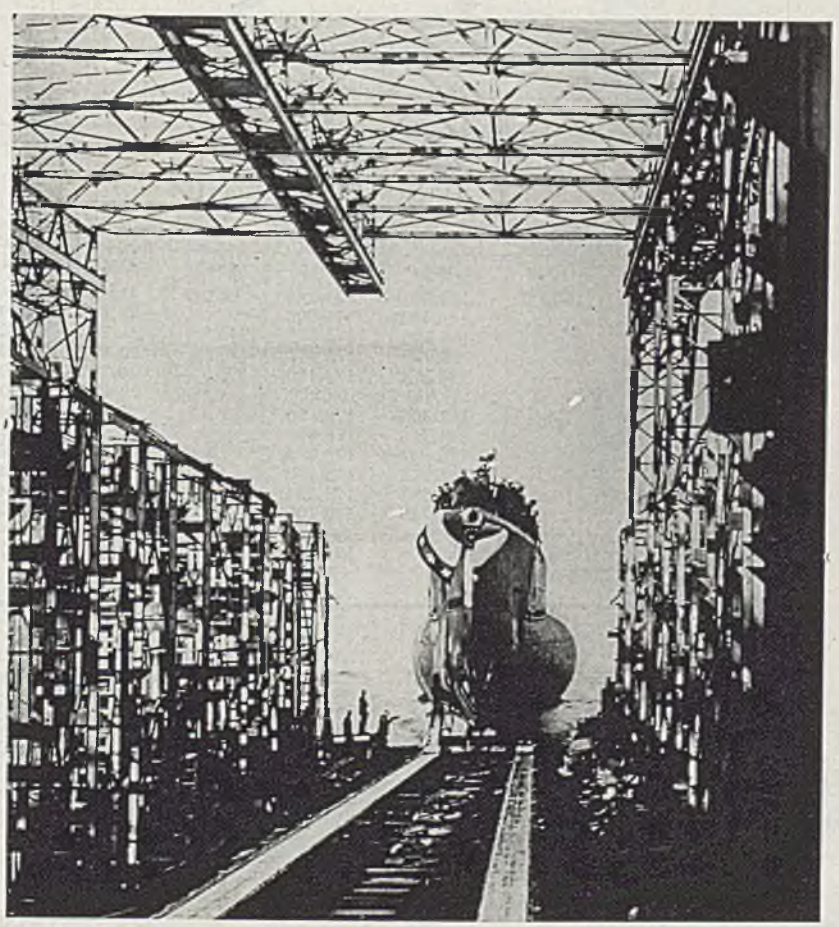
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announced that a Brooklyn, N. Y., girl and boy, Marion Cecile Joswick and Edward Malcolm Kosower, have won top awards in the Westinghouse fourth annual science talent search.

—o—

E. I. du Pont de Nemours & Co., Wilmington, Del., warned recently that flow of ammonia to essential war industries may be impeded if steel shippinig cylinders are not returned promptly.

—o—

B. F. Goodrich Co., Akron, O., has taken options on land at Avon Lake, O., as a probable site for an experimental war chemicals plant.



NEWEST SUBMARINE: The U. S. S. CLAMAGORE, latest addition to the Navy's underseas fleet, is launched at the Electric Boat Co. yards, Groton, Conn.

Firm Enlarges Facilities for Making Tubing

Babcock & Wilcox Co. installs equipment for manufacturing atomic hydrogen welded tubing and pipe

FACILITIES are being expanded to include manufacture of atomic hydrogen welded tubing and pipe at the Beaver Falls, Pa., plant of Babcock & Wilcox Co.

The atomic hydrogen welded process is advantageous in producing small sizes of tubing such as are used in the food and chemical industries, the firm said.

Among the new facilities being added are a salt bath for pickling and a conveyor furnace for heat treating.

The special equipment and consolidation of operations to one manufacturing unit will now permit the Babcock & Wilcox Co. to manufacture readily a complete variety of sizes and compositions of stainless steel tubing.

Some of the new stainless materials anticipated in postwar development probably will require processing methods at present considered unconventional, the company predicted. However, it pointed out that the processes now being used would have been considered unconventional a short time ago.

Cafeteria Service Quickly Restored Following Fire

Fire recently destroyed the cafeteria at the Otis works, Cleveland, of the Jones & Laughlin Steel Corp. and critical merchandise including 1200 dozen work gloves and 26,000 cigarettes. Partial service was restored following the fire through the combined efforts of Factory Stores Co. and plant officials. Additional equipment was installed in the lunch room located in the works administration building, thus obviating the inconvenience to which the men in the mills otherwise would have been subjected. Plans are being formulated to erect a new building to house a modern cafeteria.

General Electric Co. Sets All-Time Production Record

War equipment and combat apparatus were produced by General Electric Co., Schenectady, N. Y., at such a rate as to establish an all-time record volume in 1944, Charles E. Wilson, president, points out in the company's fifty-third annual report.

THE BUSINESS TREND

Output Tends Upward As New Orders Ease

PACE of industrial activity continues to tend upward, reflecting freer movement of goods as a result of milder weather and steady influx of munitions orders. However, there has developed a moderate tapering in new demand which is considered a natural reaction following the huge volume of orders placed during January and February. Incoming orders, however, continue to exceed output in most instances, resulting in further expansion in order backlogs.

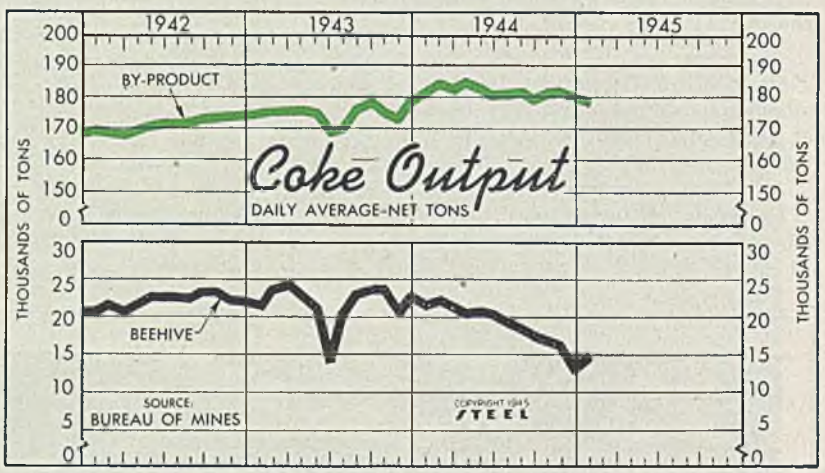
Lull in new ordering has not lessened the pressure for prompt delivery of most munitions items. Output of some key war products remains behind schedule, thereby forcing such programs as the heavy truck, ammunition, rockets, and aircraft to fall below projected production goals.

PRODUCTION OUTLOOK — Overall munitions production schedule for the second quarter calls for a 6 per cent increase in dollar value over that produced in the final 1944 period. Present plans call for further reduction in ship construction the next three months. Output of communication and electronic equipment is scheduled for a 9 per cent increase over the fourth quarter last year; even larger increases, about 14 per cent, are planned in output of combat vehicles. Aircraft production next quarter is expected to be about one-sixth greater than actual output in the December period. Ammunition production schedules call for a stepping-up in output of nearly 40 per cent over production in closing months last year. No substantial revision in output of guns and fire control, and also miscellaneous equipment and supplies is contemplated for the second quarter.

COKE OUTPUT—January production of both by-product and beehive coke amounted to 6,033,236 net tons, an increase of 25,051 tons over the December output. Gain in January coke output resulted from the increase of 51,950 tons from beehive oven production, as by-product coke output declined 26,899 tons during the period. Production figures for a year ago show a moderate improvement in both by-product and beehive coke over the current level.

Stocks of by-product coke at producers' plants decreased 235,368 tons during January, and on Feb. 1 were equivalent to 5.1 days' production at the January rate. Stocks of coking coal at by-product plants decreased 417,037 tons during January, and at the close of month were sufficient for 22.2 days' supply at the rate of consumption that prevailed in January.

Bituminous coal mining operations in several districts have recently been handicapped by shortages of railroad cars and flood conditions.



Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	By-Product			Beehive		
	1945	1944	1943	1945	1944	1943
January	179,879	181,501	174,044	14,742	21,933	21,440
February	.....	184,384	175,099	.....	22,248	23,987
March	.....	183,123	175,051	.....	21,529	24,369
April	.....	185,259	175,857	.....	20,457	22,948
May	.....	184,071	174,400	.....	20,783	21,200
June	.....	181,891	168,900	.....	20,472	14,000
July	.....	181,506	170,100	.....	19,531	20,400
August	.....	181,718	176,600	.....	18,572	23,100
September	.....	179,234	178,090	.....	17,305	23,637
October	.....	181,772	175,492	.....	16,994	23,495
November	.....	182,383	171,594	.....	16,199	20,421
December	.....	180,746	179,200	.....	13,066	22,900
Average	.....	182,359	174,465	.....	19,128	21,795

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	95	95	93	98
Electric Power Distributed (million kilowatt hours)	4,398	4,446	4,472	4,400
Bituminous Coal Production (daily av.—1000 tons)	1,828	1,892	2,031	2,050
Petroleum Production (daily av.—1000 bbls.)	4,774	4,768	4,781	4,385
Construction Volume (ENR—unit $1,000,000)	$40.8	$41.9	$43.9	$29.4
Automobile and Truck Output (Ward's—number units)	20,505	20,235	21,010	19,310

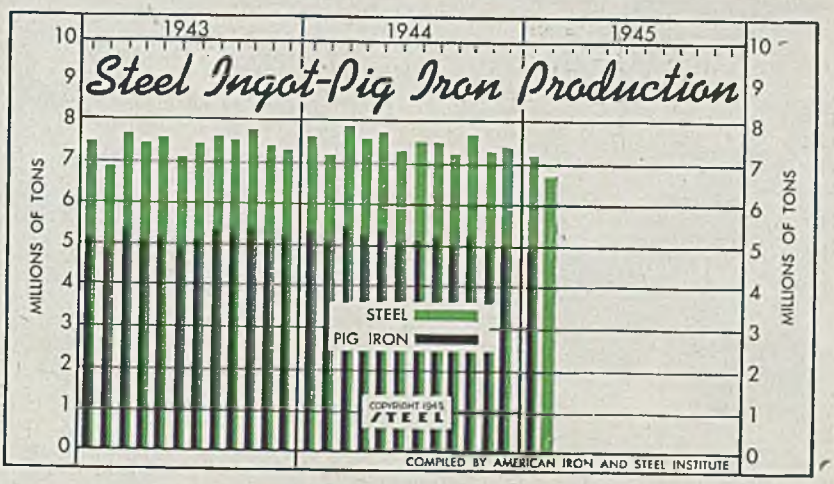
*Dates on request.

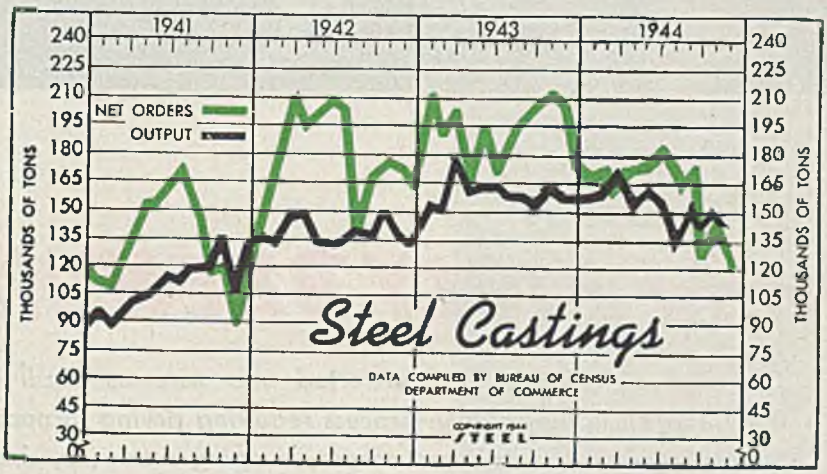
TRADE				
Freight Carloadings (unit—1000 cars)	775†	766	784	786
Business Failures (Dun & Bradstreet, number)	16	21	23	29
Money in Circulation (in millions of dollars)‡	$25,878	$25,864	$25,533	$21,006
Department Store Sales (change from like week a year ago)‡	+19%	+21%	+12%	+2%

†Preliminary. ‡Federal Reserve Board.

Iron, Steel Production
(Net tons—000 omitted)

	Steel Ingots			Pig Iron	
	1945	1944	1943	1945	1944
Jan.	7,204	7,587	7,425	4,945	5,276
Feb.	6,658	7,188	6,825	....	5,083
Mar.	....	7,820	7,675	....	5,434
Apr.	....	7,588	7,374	....	5,243
May	....	7,697	7,550	....	5,343
June	....	7,229	7,039	....	5,057
July	....	7,493	7,408	....	5,157
Aug.	....	7,493	7,586	....	5,210
Sept.	....	7,230	7,514	....	4,988
Oct.	....	7,616	7,814	....	5,200
Nov.	....	7,274	7,374	....	4,904
Dec.	....	7,361	7,266	....	4,999
Total	....	89,576	88,873	....	61,894





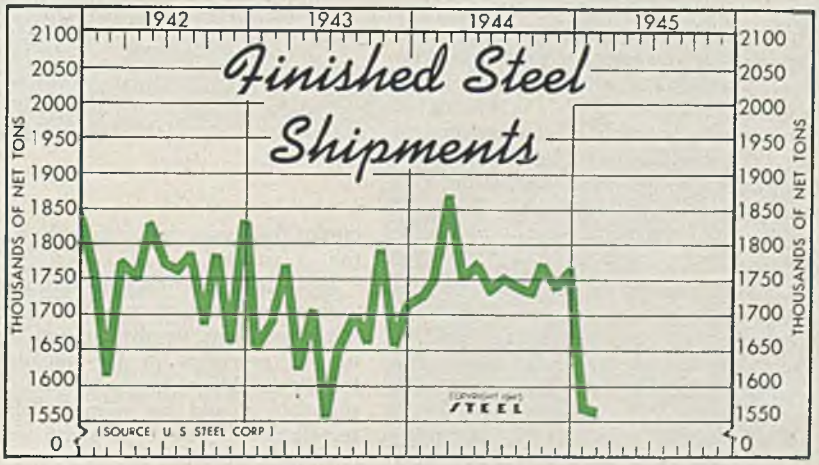
Commercial Steel Castings
(Net tons in thousands)

	Orders		Production	
	1944	1943	1944	1943
Jan.	167.7	213.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	177.0	192.5	161.8	163.8
June	181.8	171.8	157.4	163.9
July	169.9	187.3	131.9	158.8
Aug.	171.3	200.6	154.9	158.8
Sept.	129.8	214.1	144.5	157.8
Oct.	146.1	211.3	150.7	163.9
Nov.	120.7	209.3	146.4	158.8
Dec.	....	173.6	....	158.6
Total	....	2,333.4	....	1,928.6

Finished Steel Shipments
Net Tons

	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	.....	1,874,795	1,772,397	1,780,938
Apr.	.....	1,756,797	1,630,828	1,758,894
May	.....	1,776,934	1,706,543	1,834,127
June	.....	1,737,769	1,552,662	1,774,068
July	.....	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	.....	°97,214	°449,020
Total	.....	.....	20,147,616	20,615,137

°Decrease.



FINANCE

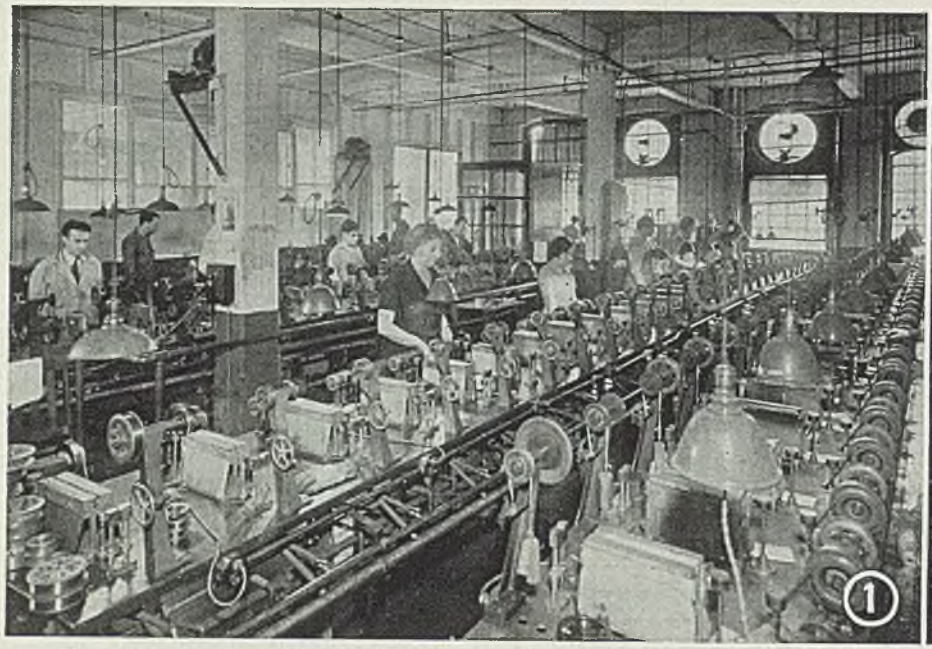
	Latest Period°	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,499	$10,929	$9,450	$9,374
Federal Gross Debt (billions)	$235.3	$235.0	$234.2	$187.4
Bond Volume, NYSE (millions)	$52.5	$53.3	$46.6	$56.9
Stocks Sales, NYSE (thousands)	4,503	8,966	8,320	7,484
Loans and Investments (millions)†	$58,424	$58,501	$59,007	$52,903
United States Gov't. Obligations Held (millions)†	$44,977	$43,912	$44,219	$38,552

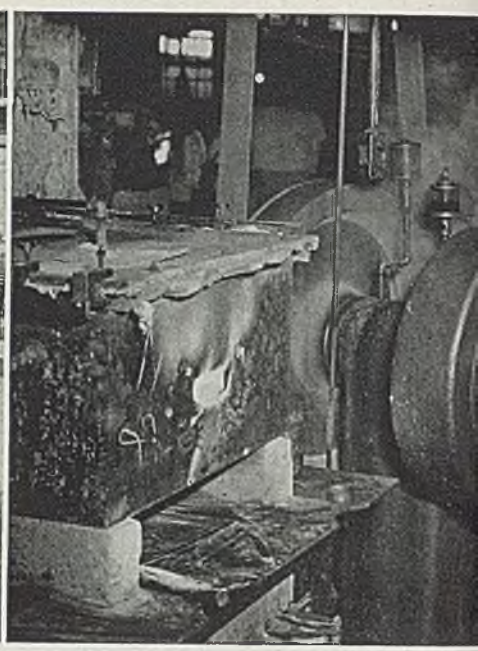
†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	105.1	105.0	104.9	103.4
Industrial Raw Materials†	116.2	116.2	116.0	113.3
Manufactured Products†	101.8	101.6	101.6	100.6

†Bureau of Labor's Index, 1926 = 100.





Drawing TUNGSTEN and MOLYBDENUM

Chemical compounds are converted into wire as small as 0.00055-inch in diameter in process requiring drying furnaces, hydraulic presses, sintering furnaces, swaging machines, draw benches and miniature drawing and annealing equipment

By IRWIN H. SUCH
Engineering Editor, STEEL

AS PART of plans for the expansion and broadening of its postwar markets, the Wickwire Spencer Steel Co., New York, acquired in July, 1944, the entire business and assets of the Sirian Wire & Contact Co., a wholly-owned subsidiary of the Sirian Lamp Co. Name of the company since has been changed to the Wickwire Spencer Metallurgical Co. and an aggressive new management is operating the plant in Newark, N. J.

The new Wickwire Spencer subsidiary manufactures a substantial percentage of all fine drawn tungsten and molybdenum wire and rods used in radio, electronic and electrical instruments for such purposes as filaments, heater elements, grids, plates and hooks for holding filaments. The company also makes a line of tungsten carbide dies and tools.

The plant is in charge of Lieut. Col. C. P. Young, executive vice president, assisted by L. D. Granger. Colonel Young retired as commanding officer of the Miami area for the Army Air Forces in December, 1943, to become executive vice president of Wickwire's subsidiary, the Wickwire Spencer Aviation Corp. He assumed his new position last July. Mr. Granger is vice president of still another Wickwire subsidiary, the American Wire Fabrics Corp., and has served the parent company and its affiliates in a number of capacities, including the superintendency of the Worcester wire plant.

No changes have been made by Wickwire in the basic processes involved in making tungsten and molybdenum wire but plant efficiency has been measurably improved with the result that total output has gone up although the payroll is smaller.

Production of tungsten and molybdenum wire, some of which is finer than the human hair, involves one of the most unique processes in the metalworking industry. More properly, the process probably should be termed "chemical-metallurgical", since it starts out with chemicals and ends up with pure metallic materials.

As the initial step in the production of tungsten wire, sodium tungstate is dissolved in water and tungstic acid precipitated out by the addition of hydrochloric acid. The tungstic acid is washed seven times to remove all impurities and converted to tungstic oxide by drying in ovens.

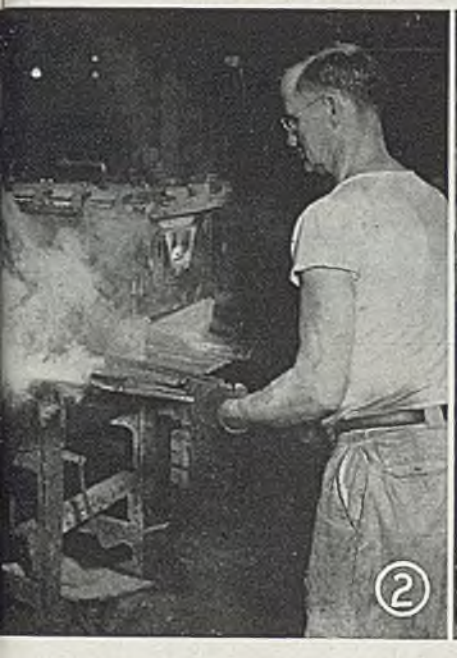
The tungstic oxide is mixed in batches of 1000 kilos and reduced to tungsten metal powder in the presence of hydrogen. This is accomplished by loading the oxide into small "boats" and charging them end-to-end into gas-fired tube furnaces, as may be noted in Fig. 4. Each furnace comprises eight tubes. The boats are forced progressively through the tubes as each additional boat is charged. The tubes have three heating zones, ranging from preheat of 900 degrees Fahr. to final heat of 1500 degrees. A stream of hydrogen is forced through the tube in reducing the oxide to metal powder.

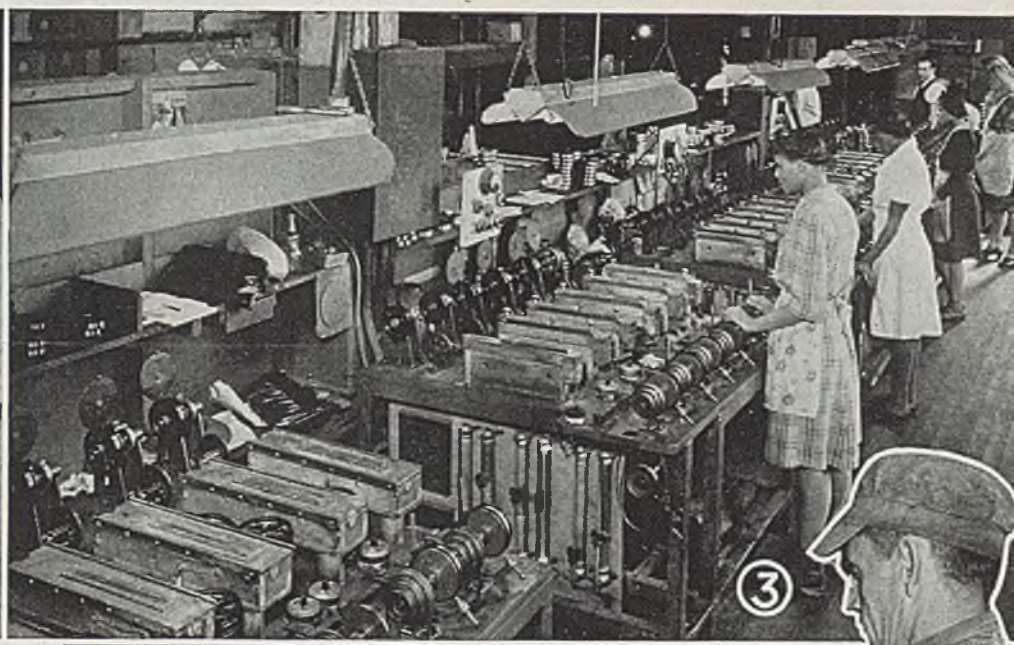
The tungsten metal powder, on removal from the furnace, is put through a 250 mesh sieve and stocked in bottles in readiness for the pressing and sintering operations which follow.

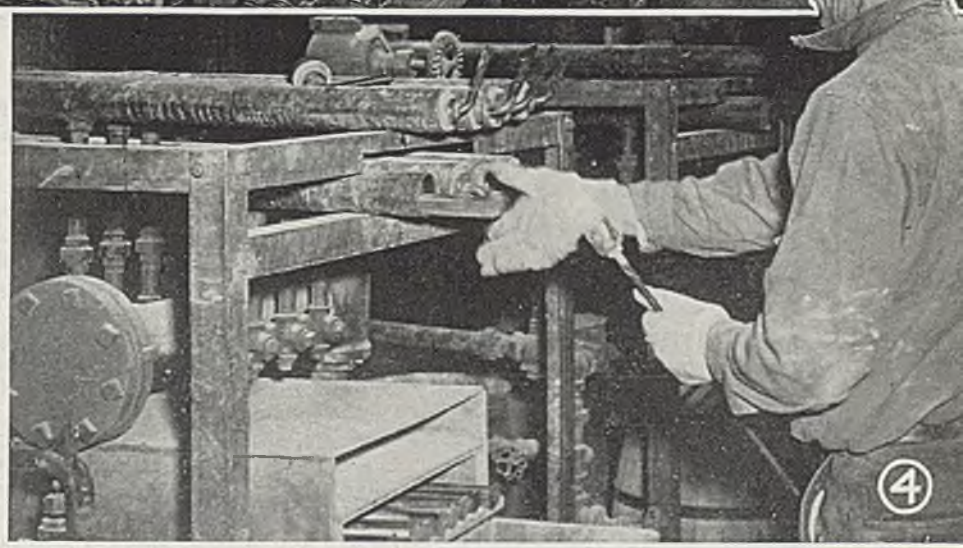
The powder is formed without the use of a binding agent into slugs ⅜-inch square by 18 to 24 inches long in a hydraulic press, as shown in Fig. 5. These slugs, of course, are extremely fragile, but still sufficiently strong to permit careful removal to a small furnace where they are sintered at 900 degrees Cent.

Sintering does not produce a sufficiently homogeneous structure so the slugs are next placed in cylindrical electric resistance furnaces in which the slugs themselves serve as the heating elements. In this operation, temperature is brought up to about 90 per cent of fusing point of 3340 degrees Cent.

The slugs or bars emerging from the resistance furnaces have very much the







WIRE

same characteristics as small steel ingots or billets produced by casting and rolling hot metal and are handled through succeeding operations in somewhat the same manner.

The bars are converted to the form of "wire rods" in hot swaging machines, of which Wickwire has five sizes, two being of the push-pull type and three continuous. One of the push-pull swaging machines with its accompanying heating furnace may be seen in Fig. 2. In the continuous machines, the rods are brought down to an average length of 18 feet and a diameter of 0.100-inch.

The rods then are subjected to a series of drawing and annealing operations, the number depending upon the final size of the wire specified. In the preliminary operations, the rods are given three or four drafts on conventional draw benches, reducing the diameter to about 0.060-inch. Wire smaller than 0.060-inch is handled on drums and spools, 12-inch drums being used for sizes down to 0.0155-inch; 6-inch drums down to 0.007-

(*Please turn to Page* 110)

Fig. 1—Tungsten and molybdenum wire is drawn hot in these machines down to sizes as small as 0.00055-inch. Tungsten carbide dies are used for larger sizes, diamond dies for smaller diameters

Fig. 2—One of the five swaging machines used by Wickwire in reducing tungsten bars into the form of rods which average about 18 feet long and 0.100-inch in diameter

Fig. 3—Many anneals are required between drawing operations. The wire is fed through these small, atmosphere-controlled furnaces at high speed

Fig. 4—One of the first steps in making tungsten wire involves the reduction of tungstic oxide to metal powder by heating it in small "boats" in these tube furnaces in the presence of hydrogen

Fig. 5—A hydraulic press is used for forming tungsten powder into small slugs which are then sintered and fused into bars ready for swaging and drawing into rod and wire

Photographic

New process developed for sheet-metal industry, to replace templates

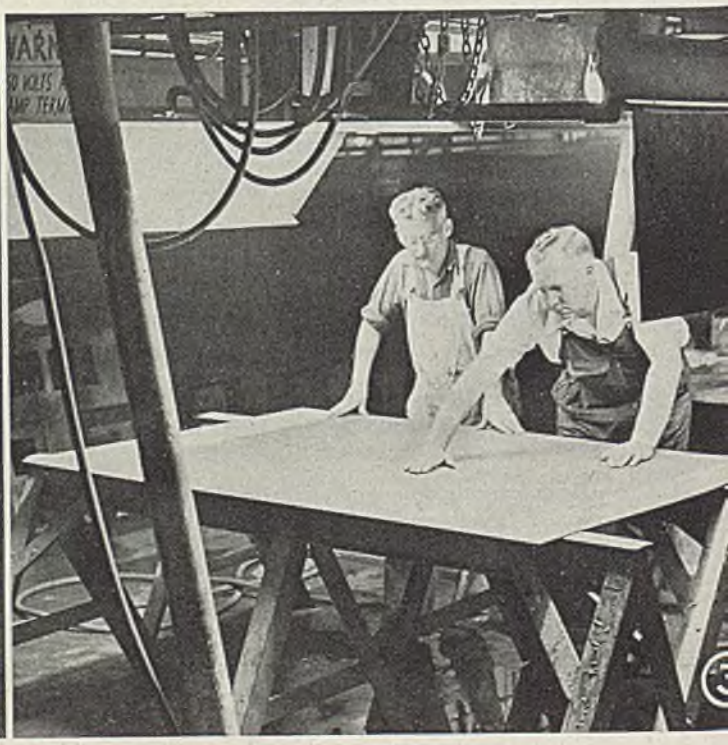
By A. R. ECKBERG and H. C. STAEHLE
Kodak Research Laboratories
Eastman Kodak Co.
Rochester, N. Y.

PHOTOGRAPHIC processes used in the aircraft industries during the past 5 years have saved thousands of man-hours of work and have speeded up the output of new models of planes by months. This has been accomplished through accurate photographic reproduction of original drawings on sheet metal subsequently used to make templates, tools and actual parts. The use of these methods has virtually eliminated the need for making a drawing more than once.

Briefly, the photographic process used in the aircraft industries involves first making a drawing on a specially prepared metal sheet. This may be either a white lacquered or a fluorescent lacquered surface. In the case of the former, reproduction is made in a high-precision camera, and in the latter case, by contact, using X-rays to excite the fluorescent lacquer.

In the first case, the camera negative is projected back through the same optical system onto a sheet of sensitized metal; in the second, a contact print on metal also is made by exposure to X-rays. By either method, as many replicas of the original drawing can be made as desired. Requirements of accuracy are particularly high. Tolerances commonly accepted are 0.001-inch per foot or less, and in many cases the size of the plates handled is as large as 10 x 6 feet.

Photographic processes entailed in practically all aircraft installations are closely related to those used in snapshot photography. That is, they involve silver halide sensitive layers, which must be handled in a photographic darkroom, and processed by development in an organic reducing solution, followed by fixing and thorough washing. Carrying out these processes requires considerable space and handling facilities, as well as either a precision camera or X-ray equipment. Nevertheless, savings



Layouts

resulting have rapidly paid for even the most expensive installation.

Some consideration has been given from time to time to the application of these methods to layout work on heavy steel plates, such as that in the plate shop or shipyard. However, the problems presented render such applications impractical. In the first place, for the process to be really successful, the layout would have to be applied directly to every piece of steel being fabricated, whereas in the aircraft industry the photographic reproduction processes are used primarily just for making templates, jigs and fixtures which are then used in forming actual parts. It is only in making the first model of a new plane, or in some modification in existing models, that the photographic process is used on the metal to be fabricated.

Templates used in steel fabrication are quite different from those used in the aircraft industry. It is entirely possible that photographic methods could be used to advantage in producing some of these templates, but, in general, they are still being made by hand, since it is seldom that more than one template is

(*Please turn to Page* 122)

Fig. 6 — Finished plate, overcoated with a thin coat of lacquer after completely dry

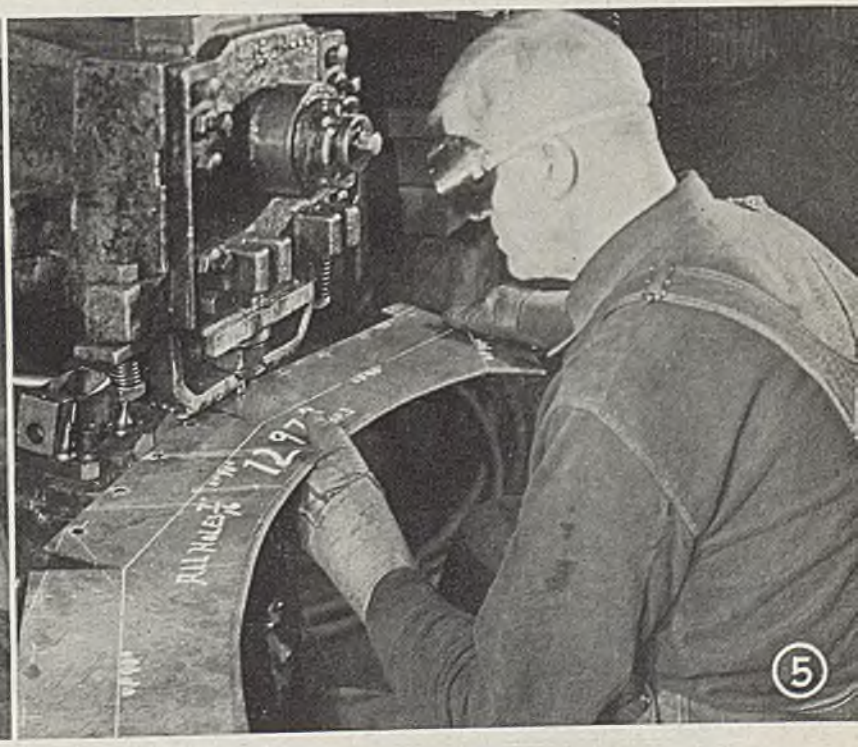
Fig. 1—Washing away exposed parts with a vigorous spray of water after swelling the coating with warm dilute ammonia water

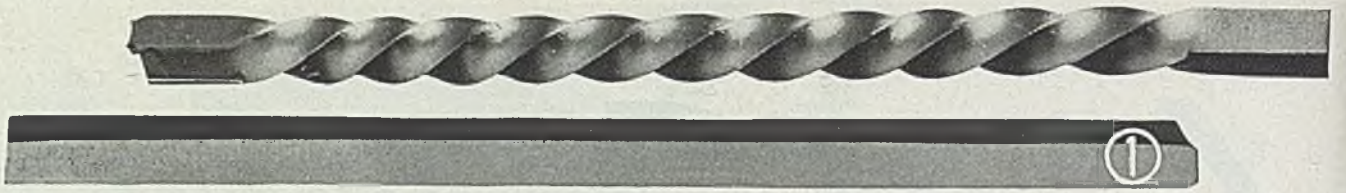
Fig. 2—Rolling the drawing and limp Vinylite blanket onto the sensitized metal

Fig. 3—Exposing the plate under strong lights

Fig. 4—Sensitive coating being sprayed onto the primed metal sheet

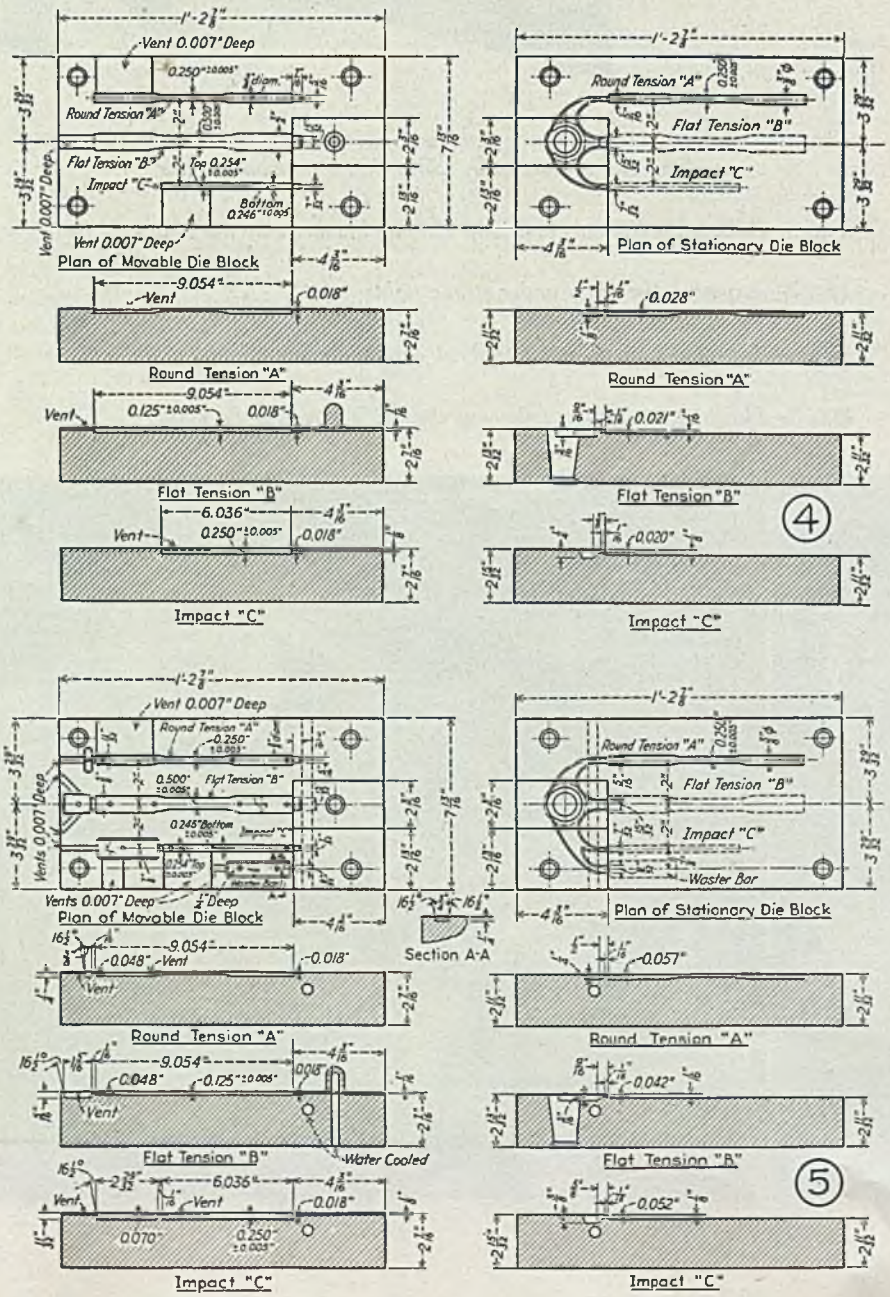
Fig. 5—Punching operation, following the guide lines on the plate





Stronger Die Castings

. . . . are obtained by proper die design



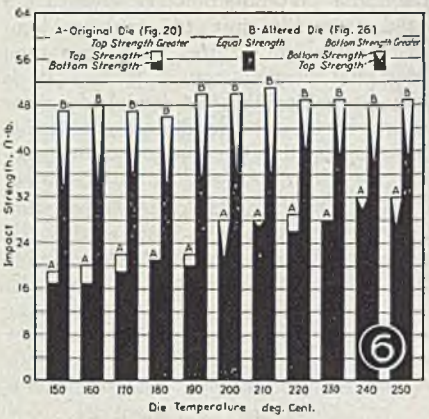


Fig. 1—Die cast test bars of square cross section: Upper unit has undergone torsion test, being twisted a full 2½ revolutions. All illustrations from New Jersey Zinc Co.

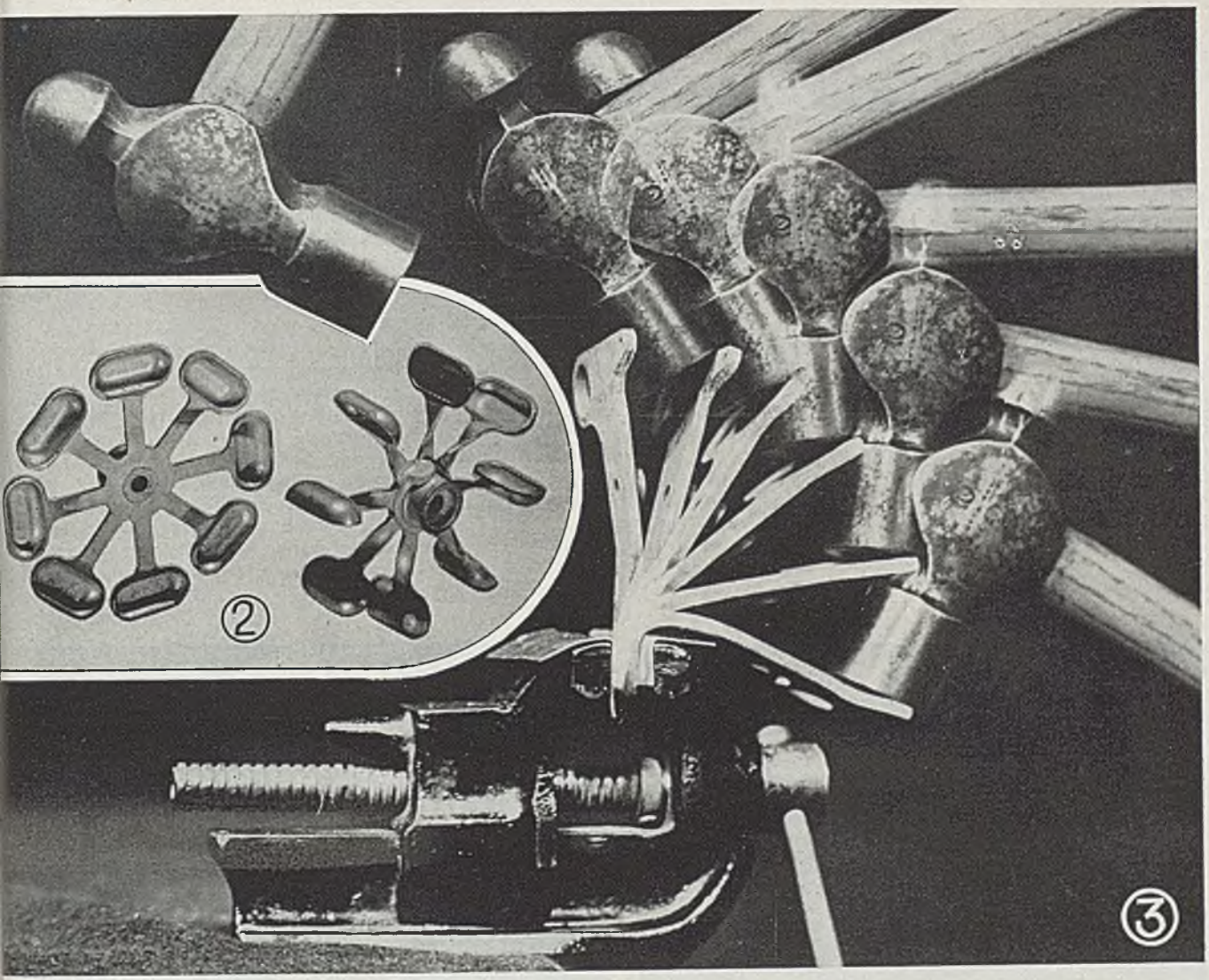
Fig. 2—Clear indication of excellent ductility of zinc alloy die castings is had in this impeller wheel whose blades are cast flat to minimize die cost, and later bent through a 90-degree angle as shown

Fig. 3—This zinc alloy die casting was hammered through an arc of more than 140 degrees, as shown by this composite picture, yet no cracking was experienced

Fig. 4—Original plan of ASTM die for production of ¼-inch test bars

Fig. 5—Net result of changes made to the die from its original construction shown in Fig. 4

Fig. 6—Total improvement effected in impact strength by changes in die shown in Figs. 4 and 5 are dramatically presented in this chart



METHOD of establishing values of impact strength, tensile strength, elongation and other mechanical properties of zinc alloys for die casting is to use data obtained from die cast test bars made under controlled conditions representative of what is considered best practice.

In making these test specimens, investigation brought out the fact that the design of the die had an appreciable effect on the properties of the casting made in it.

The effects of improved die design on certain properties were so startling that another series of test bars was made under the improved conditions and subsequent aging tests run.

As an example, the impact strength of Zamak-3 increased from 20 to 43 foot pounds, and that of Zamak-5 from 18 to 48 foot pounds.

Until recently, these data were not published because it was thought advisable to wait for the results of long-time aging tests. These tests have now been continued for seven years and so it is felt justifiable to publish the data.

Table I shows parallel sets of data under the headings "A" and "B." The values under the "A" headings are those obtained from test bars made prior to the study of the effect of improved die design. Values under the "B" headings were obtained from test bars made in 1936 following the improvements in die design and in casting technique mentioned. A study of the tables will emphasize the improvement in impact and tensile elongation, while other properties are hardly affected.

It must be emphasized that the im-

(*Please turn to Page* 128)

TABLE I

PHYSICAL PROPERTIES—AS CAST, AFTER ACCELERATED AND AFTER NORMAL AGING

	As Cast		95° C. (Dry Air) For 2 Years		Room Temperature For 7 Years		For 10 Years
	A	B	A	B	A	B	A
Impact Strength (Ft. Lb. on ¼ x ¼" Section)							
Zamak-3	20	43	23	36	24	41	24
Zamak-5	18	48	4	7	17	42	16
Tensile Strength of ¼-Inch Sections (P.S.I.)							
Zamak-3	40,300	41,000	29,900	31,000	34,600	33,800	33,900
Zamak-5	45,400	47,600	32,100	35,200	36,700	38,300	36,600
Tensile Elongation (Per Cent in 2 Inches)							
Zamak-3	5	10	11	17	10	16	9
Zamak-5	3	7	2	13	6	15	6

TABLE II

IMPROVEMENT OF MECHANICAL PROPERTIES OF ZINC DIE-CASTING ALLOYS AS A RESULT OF DIE DESIGN CHANGES

Properties As Cast	Before altering die*	After altering die
Zamak-3		
Charpy Impact Strength—Ft. Lb.—Gate end of ¼" x ¼" bars	20	43
Charpy Impact Strength—Ft. Lb.—Vent end of ¼" x ¼" bars	11	44
Tensile Strength—Lb. per Sq. In.	40,300	41,000
Tensile Elongation—Per Cent in 2"	5	10
Brinell Hardness	74	82
Zamak-5		
Charpy Impact Strength—Ft. Lb.—Gate end of ¼" x ¼" bars	18	48
Charpy Impact Strength—Ft. Lb.—Vent end of ¼" x ¼" bars	not tested	47
Tensile Strength—Lb. per Sq. In.	45,400	47,600
Tensile Elongation—Per Cent in 2"	3	7
Brinell Hardness	79	91

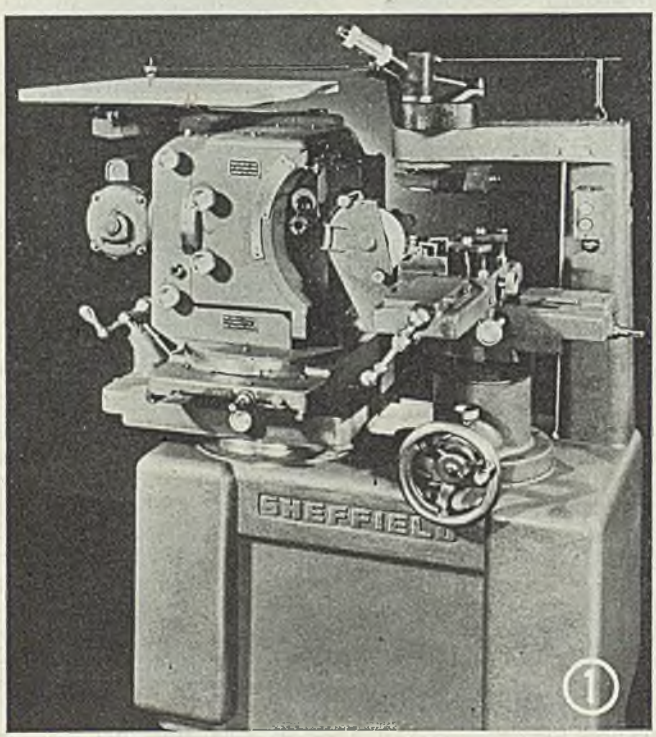
Crush Dressing of Grinding Wheels

Method of profiling grinding wheels through the use of roller formers has developed beyond the laboratory stage and now emerges as a valuable production technique

CRUSH dressing is a method of shaping a grinding wheel by means of a roll on which the desired work profile has been established. The reverse of the contour of the roll is impressed into the periphery of the wheel, the grits or grains of which are removed by the rolling action, under suitable speed and pressure.

Neither Europe nor America can claim all credit for the origin and development of crush dressing as a precision wheel forming method. Search of the records indicates that both continents contributed to this. However, it can be stated quite emphatically that American ingenuity has done much to remove it from the category of a laboratory method and made it a real "working tool" for increasing production of precision ground forms of various types.

Incentive for broadening use of crush wheel forming here in America came with World War II. New materials, harder materials and closer tolerances have forced industry in many cases to grind where previously it had machined with cutting tools. This increased grinder usage in turn has posed new wheel dressing problems before research engineers. They are the ones who have developed the specifications and the formulas which now make possible such successful shop applications of this technique as are presented later on in this article.



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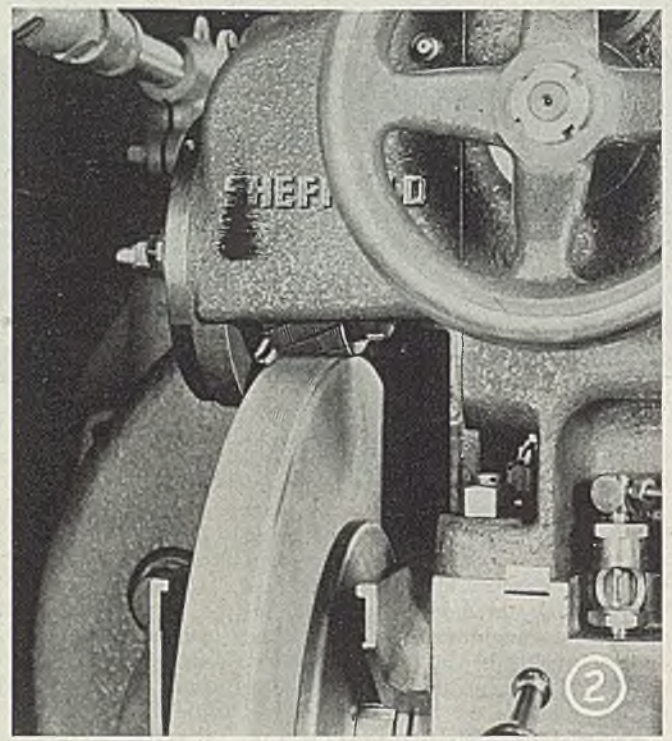
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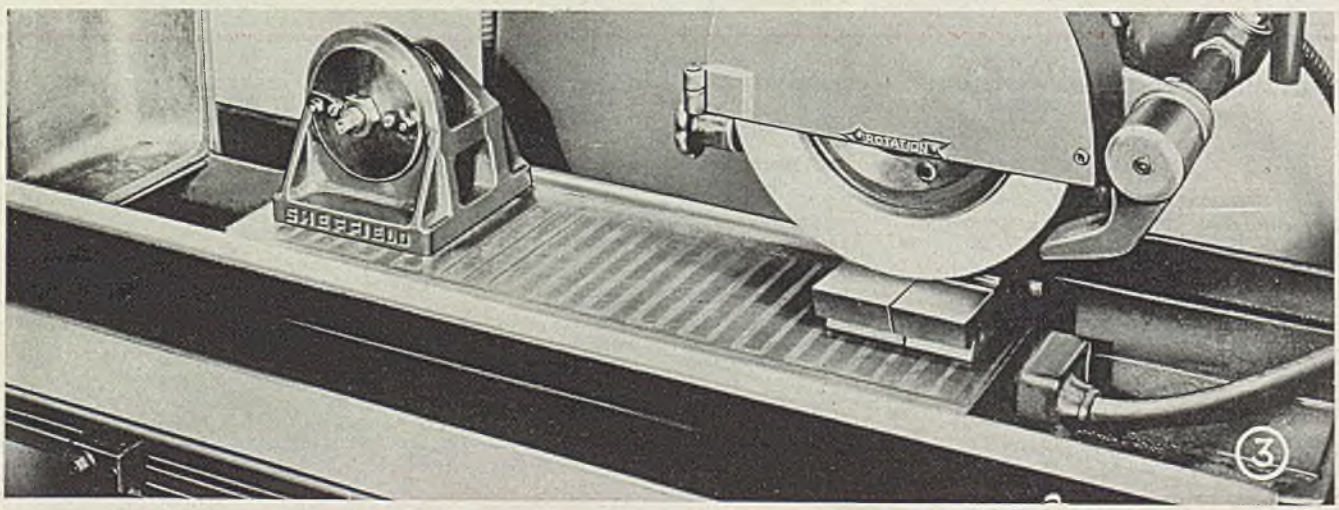


3

By CARL J. LINXWEILER
Manager Machine Tool Distribution
The Sheffield Corp.
Dayton, O.

In crush dressing, accuracy of form is dependent upon the accuracy to which it is possible to form a circular tool. Recent precision machine tool developments, particularly the microscope profile grinder shown in Fig. 1, have made it possible to fashion these circular tools (that is, the rolls) to limits as close as two or three ten thousandths of an inch.

In many cases the master roll thus produced is used to crush dress a cylindrical grinder wheel which in turn is used to grind the crusher rolls used to dress the wheels used in the grinders which carry on the actual production work. Thus the master can be preserved for future use. The rolls are made of hardened high speed steel.

Here are some of the advantages which we see in crush dressing, on the basis of our experience:

1. On a wide variety of profiles, crush dressing forms the wheel to the desired shape in an extremely short space of time.

2. Crush dressing produces fast, free-cutting wheel surfaces because it leaves the grains with their sharp cutting points intact.

3. A large number of pieces may be ground per dressing.

4. Cost of dressing tools is low, not only because of the number of pieces ground per dressing, but also because of the large number of dressings possible before the crusher roll itself has to be recut or replaced (see foregoing paragraph).

5. Long wheel life is obtained with crusher-forming because when properly used it removes only the dulled grits. The dressing operation itself does not tend to dull the abrasive grains of the grinding surfaces.

6. Crusher dressing allows closer grinding of work, it reduces hazard of burning the work, and minimum pressure is required to attain satisfactory stock removal.

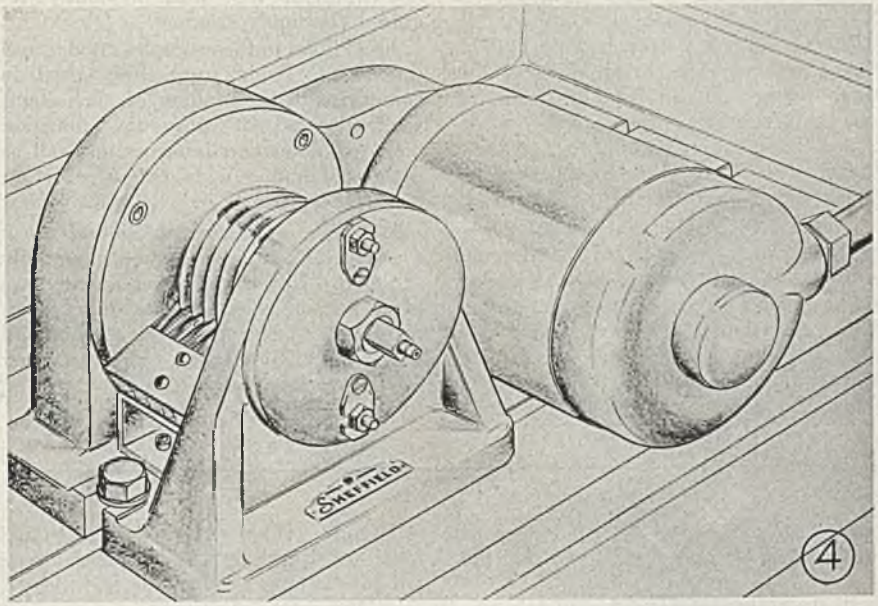
Please bear in mind that crush dressing and diamond dressing are not competitive. Each method has its advantages in form dressing grinding wheels and rarely do the applications overlap.

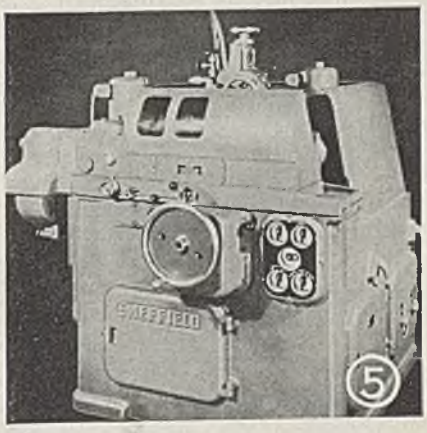
Diamond dressing devices have been in use for many years, therefore their operation and application are matters of rather common knowledge and so will not be dealt with here. The crush dresser, on the other hand, being a newer and less familiar device, deserves the following explanation.

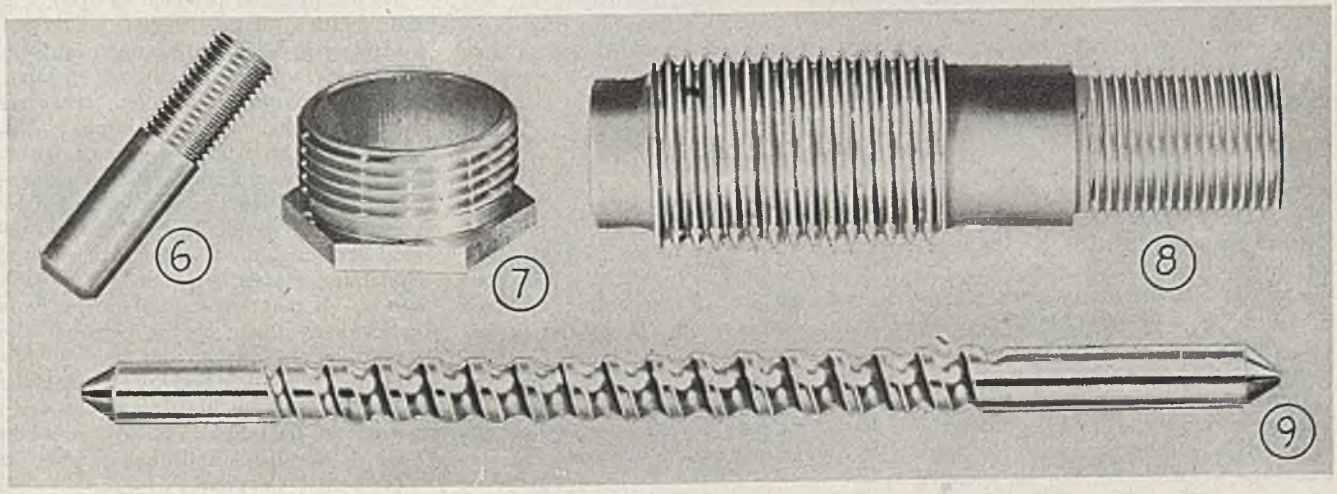
The main element of crushing device is the crusher roll. As already mentioned, this is similar to a circular form tool, and carries on its periphery the identical profile of the form to be ground. This precision roll is mounted upon antifriction bearings allowing no end play. This assembly is then mounted in a suitable fixture which is attached to the machine in such manner as to permit the roll and wheel to be brought into contact with one another at the time of dressing. Fig. 2 shows the crushing device in working position on a Sheffield thread and form grinder. Fig. 3 illustrates how an "idler-type" crusher unit can be mounted on the table of a surface grinder. A similar mounting likewise can be used for cylindrical grinders.

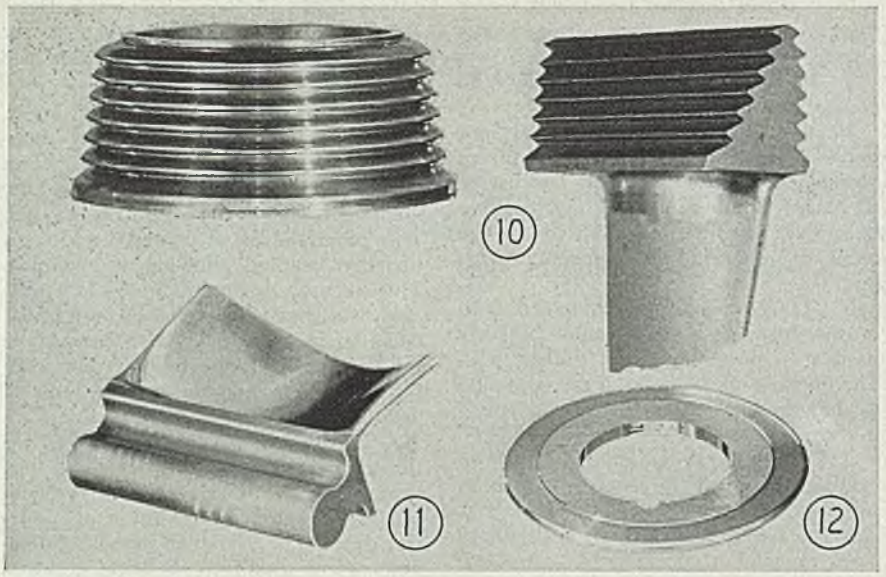
Where it is not practical or possible to have the wheel drive the crusher at crushing speed (250-300 surface feet per minute) as in the case just mentioned, the roll may be power driven to rotate the wheel. Such a device is shown in Fig. 4.

The actual crushing operation is remarkable for its ease and simplicity. The roll is lowered until it makes contact with the grinding wheel, both roll and wheel thus far being at rest. The grinding wheel is then rotated slowly under a stream of oil coolant while the crusher roll is gradually forced into the wheel to









the full depth of the form. The pressure required is relatively light because at this slow rotating speed the wheel acts like a friable object rather than like the hard, abrasive body which it becomes when run at high speed. At the most, this crushing operation requires only a few minutes.

It should be mentioned that only wheels with a vitrified bond can be crush dressed. Grit selection depends of course upon the material to be ground and finish desired. Wheels of 120 and up to 220 grit are the ones most frequently used.

As crush dressing does involve a certain amount of pressure between roll and wheel, the grinding machine spindle must be constructed to withstand this pressure without deflection. Experience has proved that best results are obtained when the wheel drives the crusher roll. This requires some sort of two-speed drive which provides one speed for crushing and the other for grinding.

Inasmuch as crush dressing was developed primarily to speed production of ground contour work, it will be of interest to consider some successful applications. The examples that follow were ground on the precision thread and form grinder illustrated in Fig. 5. Fig. 6 illustrates a ⅜-inch-24 NF3 stud with length of thread ⅝-inch. Material is SAE-3140 with rockwell hardness of 30-34 C. Using a ¾-inch wide 220NT Carborundum wheel crush dressed, the threads were ground from the solid in one and one-half turns of the work, action being similar to hobbing. An average of 300 parts were obtained (to Class 3 limits) per dressing of the wheel.

Fig. 7 shows a 1¼-inch-12 NF3 sleeve with thread 5/16-inch long. Material is SAE-2330, soft. Two parts were loaded on an arbor with flange at opposite ends. Using a Macklin 180L wheel 1-inch wide and crush dressed to 12 pitch, the threads were plunge ground from the solid in one and one-half revolutions of the work. Using a work head speed of 1.5 r.p.m., an average of 200 parts were obtained per dressing of the wheel.

Fig. 8 depicts a gas turbine stud having both Whitworth and U.S.S. threads. Material is stainless alloy. The 1-10 Whitworth thread 1½ inches long was ground from the solid in two passes of a ½-inch wheel, crush dressed. The ¾-inch-16 N3 thread 1 inch long was plunge ground. Both wheels were 220 grit, vitrified bond.

The small spiral broach presented in Fig. 9 is 1 11/16-inch long. This was ground from the solid in 30 seconds, using a wheel formed by a crusher.

The crusher roll shown at the left in Fig. 10 is used in dressing the wheel of a surface grinder to the intricate profile of the precision turbine blade root shown at the right in this same picture. Dressing with this crusher requires only two to three minutes.

Fig. 11 shows another form of turbine blade root likewise ground on a surface grinder using a crush dressed wheel. As in the previous instance, crush dressing requires only three minutes.

Fig. 12 illustrates a circular forming roll ground from a solid high speed steel blank by a 220 grit wheel crush dressed to required profile. This job was done in one-twentieth the time previously required for finish grinding.

In addition to the examples cited, crush dressing is being successfully used in connection with grinding of such items as circular and flat form tools, lamination dies, templates and broaches, as well as ball races and a wide variety of other production parts.

We believe that possibilities of crush dressing have as yet only been partially explored. In view of what already has been accomplished, it certainly seems reasonable to expect that this method will be an effective solution for many other difficult production problems involving form grinding.

Variable-Speed Drive Features Constant Torque

A new differential variable-speed drive, designed for applications not covered by a mechanical or electrical device, consists of two mechanical differentials and a standard variable speed reducer. It uses an 1800-revolution per minute squirrel-cage motor as a source of power, and output speed can be obtained from 0 to 800 revolutions per minute in one direction, or from 400 revolutions per minute forward through 0 to 400 revolutions per minute reverse. A distinctive feature of the unit is that the torque remains constant throughout the entire range, according to Ohio Gear Co., 1359 East 179th, Cleveland 10.

Output shaft may be made to duplicate any movement of the control shaft by means of a control box furnished with the unit. Control shaft may be operated with but a few inch pounds torque while shaft is said to deliver the full power of the unit.

In the differentials the bevel gears are made of alloy steel, case hardened and mounted throughout on antifriction bearings. Worms are hardened and ground, and worm gears are made from high grade gear bronze.

Vibration Recorder Is Self-powered

The Vibrograph, a machine made by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for recording vibration on the spot, is about ordinary box camera size, weighs less than 9 pounds, and requires no power connections. This device can write a permanent record of vibrations over the range of 600 to 15,000 cycles per minute and amplitudes as low as 1/10,000-inch or as great as 1/16-inch. The record and a timing wave are drawn by a stylus on transparent plastic tape 1-inch wide and viewed by a low-power microscope.

In the past the problem of recording the vibrations in some remote corners of a plant or in buildings far removed from laboratory facilities was difficult to solve. Although portable vibration recorders were available, most were large, heavy, and required an external source of power.

This machine is said to achieve mechanical amplifications of about eight by means of the same principle used to record earthquakes. It consists of a frame containing a mass suspended by a weak spring. A pointer attached to the mass indicates relative motion between the frame and mass when the frame is applied to a vibrating body. The machine makes its mark on the tape either when setting on the vibrating body or when held in the hand and the vibration is picked up by a prod.

WORKABLE!

Electric Welded Steel Tube by REVERE

These shapes are just a few of the thousands that have been made of Revere Electric Welded Steel Tube. It is so workable that a great number of parts and products can be made of it. Here are some of the operations customarily performed on these tubes:

Expand	*Plate*
Flange	*Flatten*
Bend	*Taper*
Bead	*Swage*
Machine	*Grind*

Weld

Revere Electric Welded Steel Tube is not just tube. It is available in various exactly-controlled hardnesses, and not only round but in almost any desired shape. It can be supplied in various tempers, annealed or normalized, as required. Dimensional tolerances are held to strict standards. We can so process the tube that it is impossible to ascertain the location of the weld. There is literally a Revere Welded Steel Tube for [illegible] steel tube use. Sizes up to 4½ inches O.D., wall thickness up to #7 B.W.G., .180 inch.

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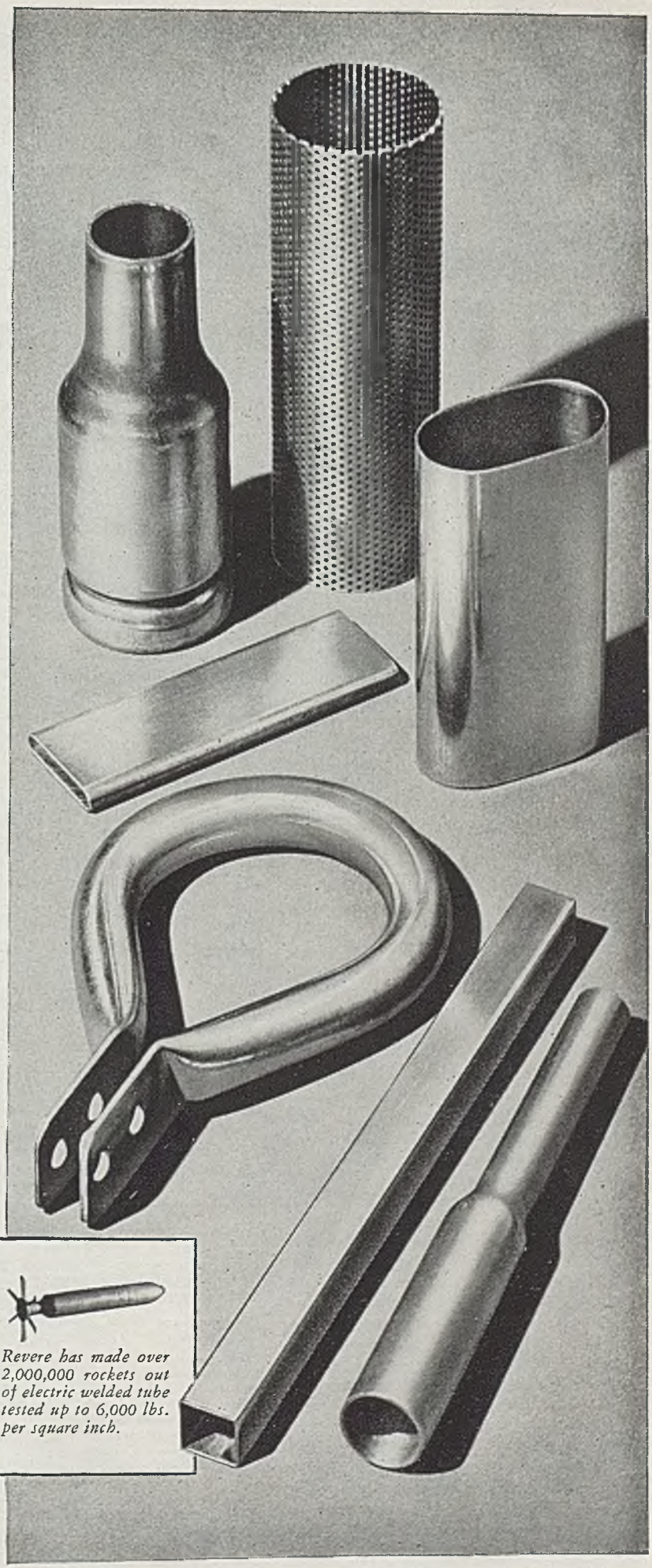

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Lubrication in Deep Drawing Metals

By SAMUEL SPRING
Associate Chemist
Frankford Arsenal Laboratory
Philadelphia

Second article in series defines and describes in detail what occurs in "boundary" lubrication, implemented by physical or chemical adsorption; in "extreme pressure" lubrication with sulphurized oils and other types; and in "wear" effected by abrasive or corrosive action, oxidation or welding of metals

BOUNDARY lubrication is accomplished by means of films that are adsorbed on metal surfaces by forces that are either physical (Van der Waal's adsorption) or chemical (chemisorption). The former types of adsorption result in films of lubricant which are held to the surface by weak forces of attraction and consequently are displaced with relative ease. As such, they are not efficient under conditions in which high shearing stresses are applied. On the other hand, chemisorbed lubricants are held to the surface very tenaciously. Chemisorption is usually monomolecular and frequently provides considerable improvement in lubrication. Intermediate between physical adsorption and chemisorption is another type in which the bonds between lubricant and metal are stronger than in the case of the former and weaker than the latter. This is due to orientation of polar lubricants and will be discussed later.

In addition to this strong attachment to the metal, there is required for good lubrication a portion of the lubricating molecule that is sufficiently large so that the sliding surfaces are kept apart to an appreciable extent. This effect has been found to be most efficiently provided by the use of fatty acids or similar materials in which the number of carbons in the chain is greater than 14[20]. It has been learned as a result of the classical researches of Langmuir[21] that fatty acids orient themselves with their active (carboxylic) groups at the surface and with the long chain of carbons standing out upright from the surface. Although this work was performed on water surfaces, substantial evidence for the formation of oriented fatty acids on metals has also been obtained[22]. As a consequence of this orientation, the surfaces are separated by a distance equal to twice the length of the chain of carbons when these fatty acids are adsorbed. This reduces the tendency towards welding and, in addition, because of the lack of attraction of the hydrocarbon portions of the fatty acids toward one another, there is little resistance toward slippage due to molecular cohesion of the lubricant[23].

The work of Hardy[24] has shown that under boundary lubrication conditions the coefficient of friction is dependent upon the molecular weight or the length of the chain of carbons attached to the active group and is also dependent upon the reactivity of this group. The carboxylic group present in fatty acids was one of the most effective active groups. While materials consisting of an active group and a long chain of carbons were effective as lubricants, other materials containing the carbon atoms in the form of rings were relatively ineffective[42]. It since has been shown[20] that this is probably due to their orienting themselves with the long axes of the rings parallel to the surface so that the molecules do not stand out from the surface to as great a distance as in the case of long chains of carbons.

While monomolecular films of fatty acids are quite effective, as is evidenced by a decrease in the coefficient of friction from 1.0 to 0.13 in one series of experiments performed by Langmuir with glass surfaces[25], they tend to be worn away quite rapidly[20]. It has, however, been found possible to build up controlled thicker layers of fatty acids. This has been done experimentally by an interesting technique devised by Langmuir and Blodgett[25,26] in which monomolecular films of fatty acids may be picked up from water surfaces, one on top of the other. It was found as a result of X-ray measurements[11] that these layers were built up in such a manner that the carboxylic groups and the hydrocarbon groups were next to one another forming doublets. It may thus be seen that it is possible to have layers of lubricant oriented perpendicular to the surfaces that are considerably thicker than the chemisorbed monomolecular film.

It is probable that when a lubricant which is effective under boundary lubrication conditions is applied to a metal surface, there are built up layers of oriented molecules to a considerable thickness. Some investigators have measured oriented films of polar molecules that were from 8500 to 20,000 Angstrom units thick, which is equivalent to 400 to 1000 molecules of fatty acids[11]. In the larger thicknesses, it has been found that the films were approaching dimensions sufficient for fluid lubrication. However, under high unit pressures a good many of these molecules may be displaced[27].

This orientation of polar molecules on metal surfaces is probably due to the fact that these molecules consist of two separate portions of opposite electro-

TABLE II

COEFFICIENT OF EXTERNAL FRICTION FOR VARIOUS MATERIALS—AFTER TICHVINSKY AND SCHNURMANN

Combination of Materials	Coefficient of Friction
Carbon—glass	0.18
Copper—mild steel	0.36
Garnet—mild steel	0.38
Glass—glass	0.40
Hard Steel—hard steel	0.42
Cadmium—mild steel	0.46
Ebonite—glass	0.53
Mild Steel—mild steel	0.57
Copper—copper	0.60
Nickel—mild steel	0.66
Cadmium—cadmium	0.80
Aluminum—aluminum	1.4

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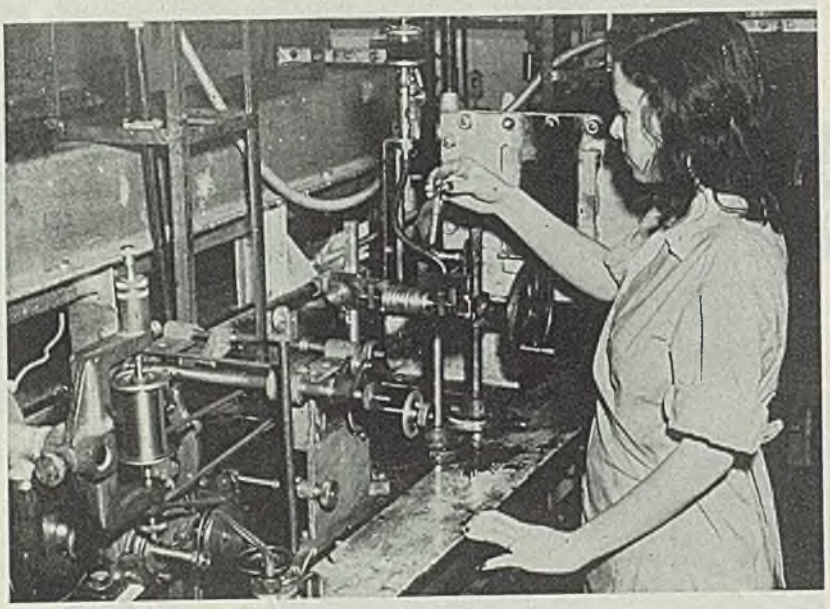

FIND THE WIRE: What at first blush appears to be an inactive machine is in reality an operating wire enameling unit in the Dobbs Ferry, N. Y., plant of North American Philips Co. Inc. The fine conductor is passing at a rapid rate around each of the pulleys of this machine which handles resistance wires as small as 0.0013-inch in size

static charge. This results in the formation of a dipole so that the orientation may be likened to the alignment of small magnets in a magnetic field. When the polar molecules are diluted with a nonpolar material such as mineral oil, the rate of formation of these oriented films depends upon the concentration of the polar molecules, and at very low concentrations it may take an hour, or more, for an oriented film of appreciable thickness to form[28]. When mixed polar molecules are used, there is preferential adsorption on the metal surface of the molecules with the more active group, if these are present in concentration of more than 0.7 per cent; under these conditions the coefficient of friction is almost the same as though the more active lubricant were present alone[29].

When the temperature of metal surfaces is elevated to some 40 or 50 degrees Cent. above the melting point of the fatty acids, a process of disorientation appears to take place which results in the disappearance of good boundary lubrication properties[29]. This effect may be important in view of the fact Bowden and Ridler[30] have found temperatures in the order of 600 degrees Cent. when two surfaces were caused to rub against one another at high speed even when fairly efficient boundary lubricants were employed. This disorienting effect also has been observed in some experiments performed by the writer, in which relatively thick films of acid soap were adsorbed by prolonged immersion in dilute soap dispersions[31]. Thickness of the film adsorbed, as well as lubrication performance, was considerably reduced when the immersion was at 60 degrees Cent. rather than at room temperature. This effect complicates studies of boundary lubrication to a great extent since actual temperatures at metal surfaces under most conditions have not been accurately determined. This is especially true in the case of metal-forming operations such as deep drawing in which heat also is generated by distortion of the metal. However, it is probable that surface temperatures are quite high.

It is obvious on the basis of our discussion of metal surfaces, that the rougher the surface the greater is the opportunity for contact between the high spots or peaks of the surfaces with consequent welding. The thicker the film of boundary lubricant adsorbed, the greater is the roughness of the surfaces than can be tolerated without these high spots making contact. Thus, in one series of experiments, it was found that the rougher the surface of journal bearings, the greater was the effectiveness of boundary lubricants[32]. It has been found generally advantageous to keep surface roughness to a minimum, in which case unit pressures are reduced because of the greater area of contact. In addition, thickness of boundary lubricant required for optimum performance is reduced when smoother surfaces are employed.

It may be mentioned that the classical mechanism of boundary lubrication as being due to separation of the surfaces by adsorbed films of oriented molecules, with slippage taking place at the hydrocarbon or inert ends of the polar molecules, has been modified by Beeck and his co-workers[33]. These investigators found that at relatively high speeds there was a drop in the coefficient of friction when polar molecules were used which was ascribed to a "wedging" effect in which additional quantities of lubricant were forced in between the layers of oriented molecules to cause greater separation of the metal surfaces and consequently better lubrication. However, it is likely that this type of effect can occur only under very special circumstances and that the former concept must still be applied to most boundary lubrication conditions. These authors also ascribe the beneficial effects due to boundary lubricants as being caused by a smoothing of metal surfaces which reduces unit pressures by increasing the area of contact.

"Polar" Lubricants

While fatty acids with long chains are very effective boundary lubricants, they tend to cause corrosion when present in sufficiently high concentrations. This, for example, was a prime cause of discontinuance of the use of small quantities of fatty acids in motor car oils (Germ Process)[34]. Consequently, a great deal of work has been done to obtain polar lubricants that are not as corrosive as the fatty acids, and hundreds of such materials have been patented[35], usually under the designation of "oiliness" agents. It is considered that the term "oiliness", which is widely applied to the type of lubricants discussed in this section, is not sufficiently specific and because of its concept-forming connotation has led to a great deal of confusion in this subject. It is believed that the terms "polar lubricants" and "boundary" or "polar lubrication" would be more apt in describing the phenomena discussed above and would reduce this confusion. The term "boundary film strength" has recently been suggested[36] and this is far more satisfactory than "oiliness" although this term also has popular connotations that are not exactly applicable to lubrication of this type.

Although the use of polar lubricants results in great improvements in lubrication under severe operating condition, due to the limited thickness of the lubrication films and disorientation at elevated temperatures there is always a certain amount of wear due to welding and possibly to another cause which will be discussed later under the wear of metals. Moreover, when operating conditions are very severe, such as in the case where unit pressures are extremely high and temperatures are high, polar lubricants such as those discussed here, used alone, are not able to separate the metal surfaces sufficiently. Under these conditions different types of lubricants, referred to as extreme pressure lubricants, must be employed.

Extreme pressure lubricants are materials that are capable of forming films

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of chemical compounds upon metal surfaces[37], which are stable to high temperatures. These compounds serve to separate the surfaces so as to reduce the forces of intermolecular attraction. These compounds, moreover, are maintained on the surface quite tenaciously, partially because they are solid materials and partially because they are to a considerable extent held by forces equivalent to those involved in chemical reactions.

The development of extreme pressure lubrication received great impetus in connection with the development of lubricants for hypoid gears for automotive applications. However, their use is by no means limited to these applications and is indicated under operating conditions in which pressures and temperatures are high. Their application to metal forming operations is, therefore, quite obvious. Although lubricants of this type were used in metal forming operations far earlier than the application of hypoid gears to automobiles, the information obtained as a result of this application has enabled a far more logical approach to metal-forming lubrication which has resulted in great improvements in this field.

As mentioned before, clean metal surfaces are extremely rare and almost all the surfaces that we have occasion to utilize are contaminated with films of oxide, water vapor, and compounds formed during cleaning operations. In fact, it was found by Fogg and Hunwicks[10] that uncontaminated surfaces could not be obtained by any method other than abrasion and, at that, these investigators probably did not obtain truly clean surface. An illustration of the contamination of surfaces may be cited, as follows: Iron does not amalgamate with mercury under ordinary conditions, but when the iron is fractured under a pool of mercury, amalgamation does take place[27]. These contaminated surfaces are very important in supplying lubrication under conditions of high unit pressures and temperatures and thus serve as extreme pressure lubricants.

Oxygen, present in air, is one of the most common extreme pressure lubricants although it is not generally considered as such. Practically no metal surfaces are used commercially that are not covered by at least a thin film of oxide. Under many operating conditions this quantity of oxide is sufficient to prevent welding between metal surfaces and, at other times, an oxidation procedure is resorted to in order to obtain a film of sufficient thickness to resist the high unit pressures that are encountered.

Of the materials used as extreme pressure lubricants, the most common is sulphur which is applied in the form of sulphurized mineral oils, flowers of sulphur, synthetic sulphur compounds or finely divided (colloidal) elementary sulphur dispersed in some vehicle. Compounds containing chlorine and phosphorus also are used quite extensively. These materials react with metals to form sulphides, chlorides and phosphides, respectively. While sulphur compounds are expected to form sulphide coatings, a recent paper in which X-ray analytical methods were used indicated that the action of elementary sulphur plus lead naphthenate on iron resulted mainly in the formation of lower oxides of iron and only occasionally in the formation of sulphides[37]. Nevertheless, it is expected that sulphides are formed under many other conditions and in the case of copper, the action of sulphurized oils has been shown to consist of sulphide formation.

Sulphurized Oils

In the case of sulphurized oils, the reactivity of the sulphur varies with the type of oil and the temperature and length of time during which the oil is treated with sulphur or sulphur chloride. Fatty oils treated with the sulphurizing medium for relatively long times at relatively high temperatures are of the type called noncorrosive because they do not form blackening due to the formation of copper sulphide when polished copper strips are kept in contact with the oil at the boiling point of water for several minutes. On the other hand, treatment of the fatty oil for a shorter time and at lower temperatures or treatment of many mineral oils results in sulphurized oils of greater reactivity. In the case of chlorine and phosphorus bearing extreme pressure lubricants, it is quite common to use relatively pure synthetic compounds, and the reactivity is thus dependent upon the choice of the molecular structure of the compound synthesized.

Because of the control of reactivity that can be obtained by suitably varying the method of preparation or by using well-defined synthetic products, it is possible to tailor-make lubricants to fit the widely varying needs of different metal-forming operations.

While relatively thick films of stable chemical compounds are very efficient in preventing welding, there is a tendency for thicker films to flake off due to the poor ductility of most of these deposits. If an excess of the extreme pressure lubricant is available, the metal surface which is exposed as a result of this flaking reacts almost immediately to form another protective film. However, this results in a loss of metal in the form of the chemical compound and

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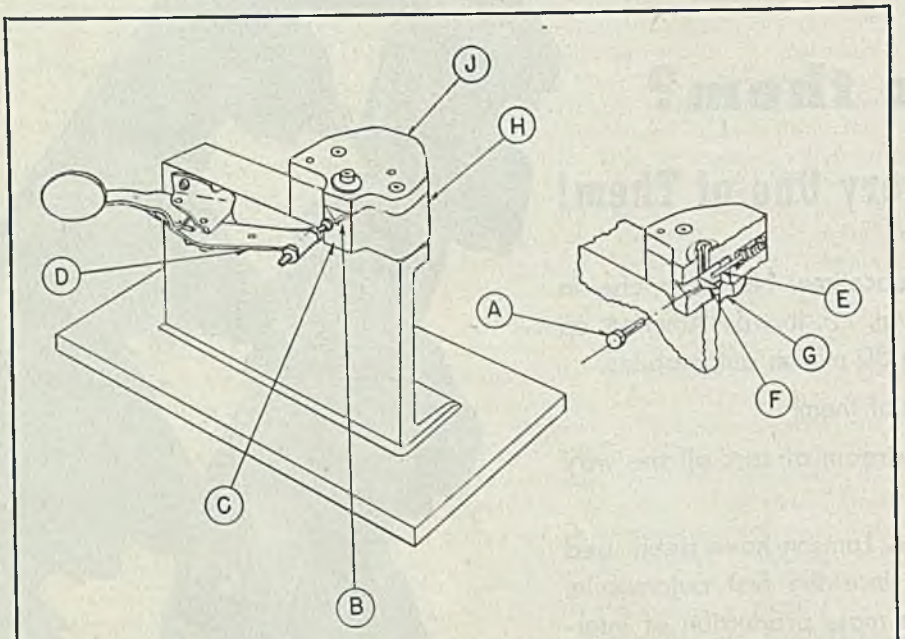

SELF-EJECTING drill jig, designed and developed at General Electric's Schenectady Works, is said to be effective in increasing production and in reducing drill breakage. The accompanying illustration shows various sections of this jig: A, the part to be machined; B, jig; C, surface; D, clamp; E, spring-loaded pin; F, chamfer; G, hole in channel; H, V-block; and J, bushing plate.

Part being drilled is placed in the jig, and underside of the head of this part is located and clamped against the surface. Having been depressed by the clamping action, springloaded pin ejects the machined part from the jig when unclamped.

Chamfer and hole in the channel in V-block of jig provide for removal of chips. Fabrication of a channel and base plate is support for V-block and bushing plate. Base plate is of sufficient size to permit clamping of drill jig with drill bushing positioned under the spindle of the drill press.

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STEEL MILL Canteens

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By JOHN D. KNOX
Steel Plant Editor, STEEL

Fig. 1 (right)—Different shapes and sizes of paper containers are employed to facilitate handling foods and drinks. Orders are packaged here in paper bags for "carry-outs"

WHO among seasoned steel plant veterans cannot recall the familiar scene in the days before the cafeteria became a part of the mill, of groups of workmen seated on the ground in any shady spot with a half a loaf of bread in one hand, a long bladed knife in the other, and the top tray of their dinner pail held between their knees. Dirt and graphite flying through the air made little difference between bites; sanitary conditions were of little importance to hungry men in those days.

Many a blowpipe at blast furnaces has been used for heating a pot of coffee. And who has ever tasted a better potato than one baked for a half hour in the hot sand of a cinder runner at a blast furnace after a flush has been made? Perhaps you have participated in the midnight feasts on the charging floor of an open hearth where thick, juicy beefsteaks were fried in skillets over a red hot disk of steel which had been heated in the port of the furnace, and fried potatoes seasoned to the king's taste. If you have never sat on the bench munching a midnight snack with the open-hearth crew when their heat is on the meltdown, you never have really enjoyed "home cooking."

But the cafeteria has changed all this; it has even helped solve the problem of men "drinking their lunch" which was so evident a couple of decades ago. To illustrate: Many a spectator has chuckled as he passed an open-hearth shop in a Pennsylvania city and witnessed the door pullup boy with a couple of tin buckets dangling from his belt emerge through a trap door and scale down a rope ladder. Once he reached the sidewalk, the rope ladder was pulled up just as quietly as it was let down, the trap door was closed and the boy with his buckets disappeared through a couple of swing doors on the opposite side of the street. Shortly thereafter he stood beneath the trap door, gave a signal and down came a rope. After the buckets were hoisted to the charging floor, down came the rope

Fig. 2 (below)—Dust-tight cases provide sanitary storage of pastries. This is a typical view of a canteen showing workmen who have an opportunity to drop in during a "spell"

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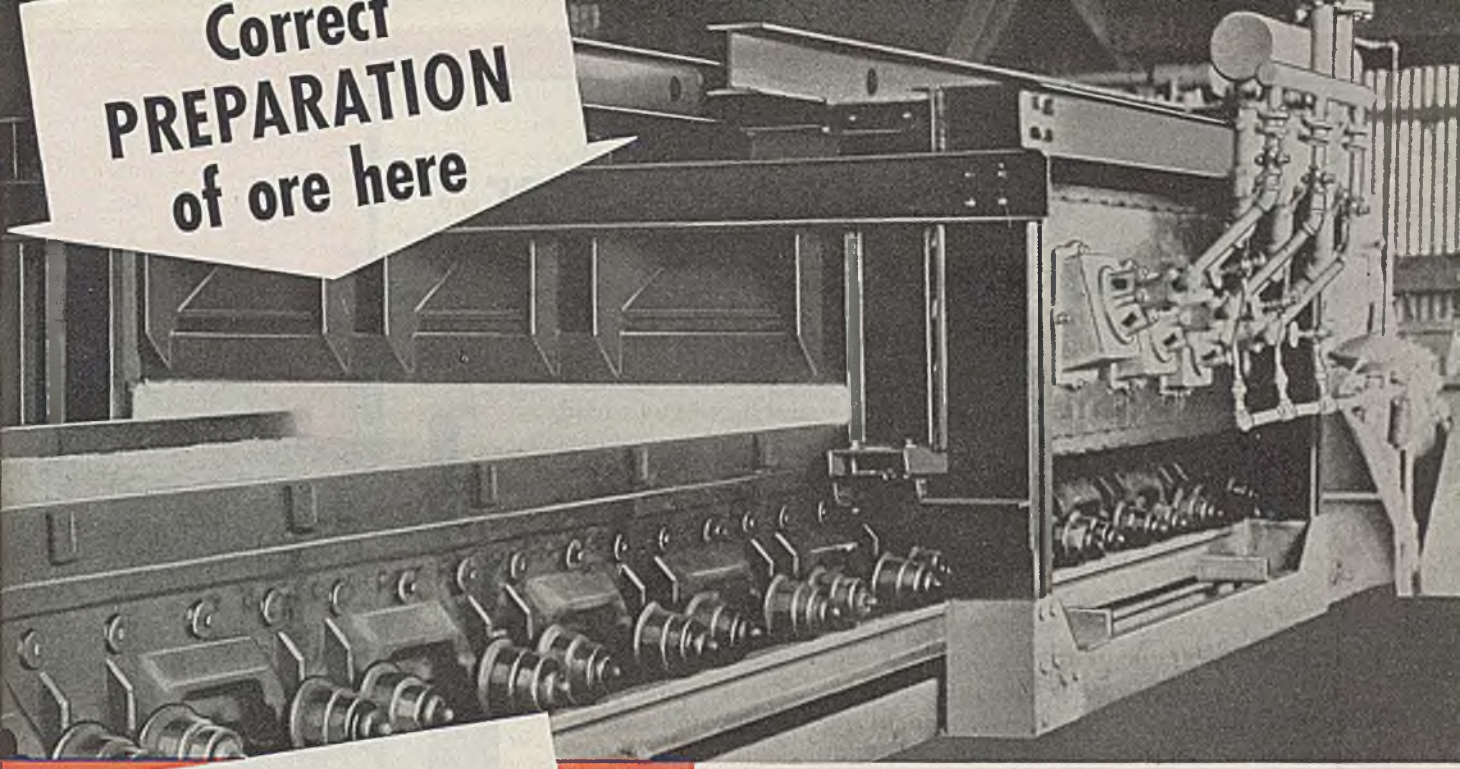

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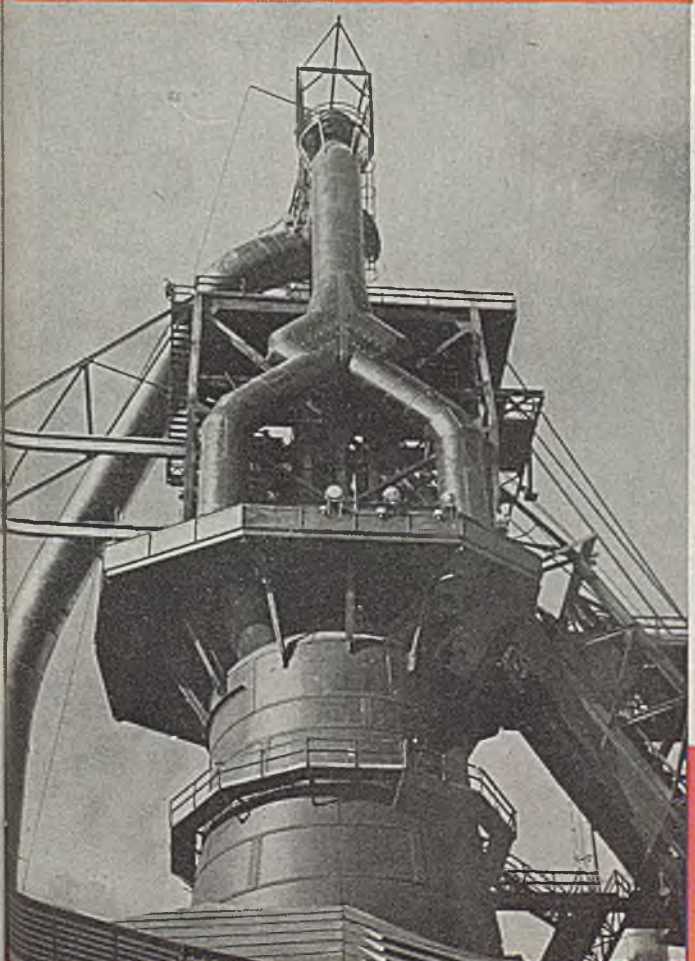

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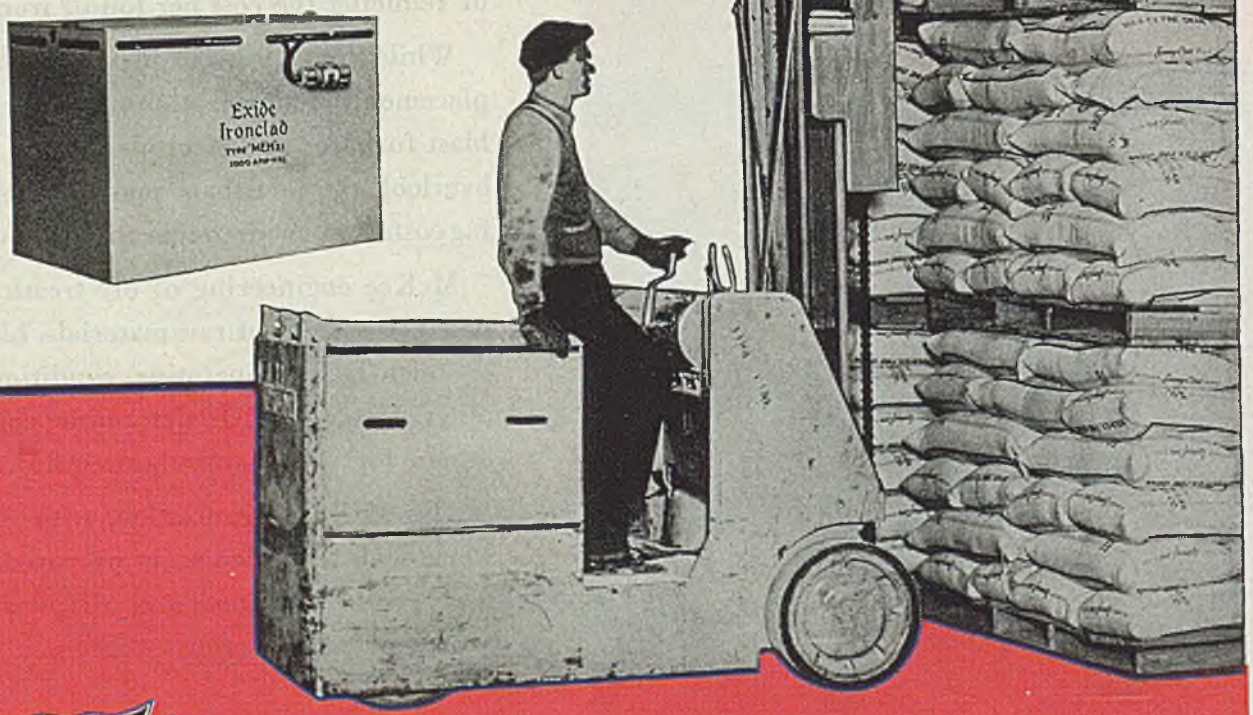

ARMY E ★★ NAVY

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ladder, up went the pull-up boy to return to his levers—his presence never being missed. Even though the boss melter observed the maneuvers, he usually stooped for a test piece at the sample box, studied it carefully with his back turned to the trap door, muttered something beneath his breath and headed toward No. 12 furnace down the line. Yes, many a steelworker "drank his lunch" in the days before the cafeteria became established inside the mill gate.

There was a time when the mill superintendent felt that to install a cafeteria on the premises meant just so much time wasted on the part of those who patronized them. He assumed the attitude of "let 'em find their own chow; we're here to make steel and keep 'er in the rolls—not to run a mess hall." But a study of conditions revealed a totally different situation. Even today it is difficult, if not impossible, to negotiate a loan for a new plant unless ample provision has been made for one or more cafeterias or canteens, depending upon the size of the buildings and the number of employes.

A workman is not on his job long after the start of the turn until he has a hankering for something to eat. His coffee pot, therefore, soon goes on the forge or on a piece of steel heated in the slab furnace. And with coffee at hand he takes a few minutes out of his workday to snatch a "bite." Less time might have been consumed had a cafeteria or canteen been handy.

Back in 1919 a little shop stocked with work gloves, caps, shoe strings and other "usables" in demand by workmen was opened in a small wooden building at the old Parrish-Bingham plant in Cleveland with each stack of merchandise fenced off with chicken wire. Later a gas plate was added and hot coffee, soup and sandwiches were made available. Take-out service soon followed. In 1920 the proprietors of the wooden snack house opened their first canteen at an Ohio wire mill.

Thousands Are Fed Daily

That was the beginning of Factory Stores Co., Cleveland, which today feeds about 225,000 workers daily through 90 units located at 40 plants in 23 industrial centers and six different states. These range from large well-appointed cafeterias for office and supervisory forces to compact and highly efficient canteens where 75 per cent of the space is devoted to food preparation and only 25 per cent to service—which is primarily on a "carry out" basis. While these include a large motor truck plant in Cleveland, electrical manufacturing plants in Sharon and Erie, Pa., and a rubber factory in Willoughby, O., the majority of their operations over the past 25 years has been in steel mills, which now total 30. These are located at Cleveland, Canton, Massillon, McDonald, Youngstown, Niles, Warren and Mingo Junction, O.; Pittsburgh, Clairton, Duquesne, Homestead, Irwin, Johnstown, Vandergrift, Sharon and Farrell, Pa.; Chicago and Waukegan, Ill.; and Gary, Ind., Gadsden, Ala., and Buffalo. Round-the-clock service is maintained; many of the units for the past 15 years never have closed their doors.

The men responsible for the growth of Factory Stores are Allen P. Doron, president, and Thomas L. E. Blum, secretary-treasurer, who at the start sometimes pinch-hitted for cooks, dishwashers and countermen. Today the company has 2000 employes. Since the initial cafeteria started 25 years ago, the principal aims of the founders never have been forgotten, namely, to make certain that the men in the mills are not left without food, to provide a wholesome lunch cheaply and thereby compete with the worker's wife, to provide eating facilities where the workman in overalls is spared the embarrassment of eating with the white collar man, and to relieve the employer completely of the work and expense of feeding employes.

All menus are planned in the company's main office in Cleveland by a qualified dietitian. Over 300 recipes are listed on a card system and a box containing a set of these recipes is supplied to each branch. Since the rationing of gasoline and since more wives of the employes are engaged in war work away from home, more men are eating their main meal at the plant with the result that there is a greater responsibility placed on the dietitian's staff to keep menus balanced.

Then, too, the menus sent into the main office by the field managers of the five districts of Chicago, Pittsburgh, Cleveland, Youngstown and Canton are checked by the dietitian against the locality and plant conditions. This is essential because workmen at southern plants want plenty of hot rolls and sweet potatoes, workers of foreign descent prefer stews, Americans go in for roasts, while the old timers have a strong liking for hot dogs. The latter type of meat still is the best seller though no one has been able to give a satisfactory answer as to why this is so, any more than they can tell you why a husky workman specializes on hot chocolate. Nor do the workmen ever explain why they order a drink composed of half coffee and half lemonade, or half coffee and half coca cola.

Back in the early twenties, before management warmed up to the idea of providing suitable facilities where their employes could purchase a warm meal quickly, at a reasonable price and nearby their workbench, it was not uncommon

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Fig. 3 (*below*)—*Cafeteria at a Mahoning Valley steel mill which serves* 2000 *workmen daily. Modern and sanitary equipment is used throughout*

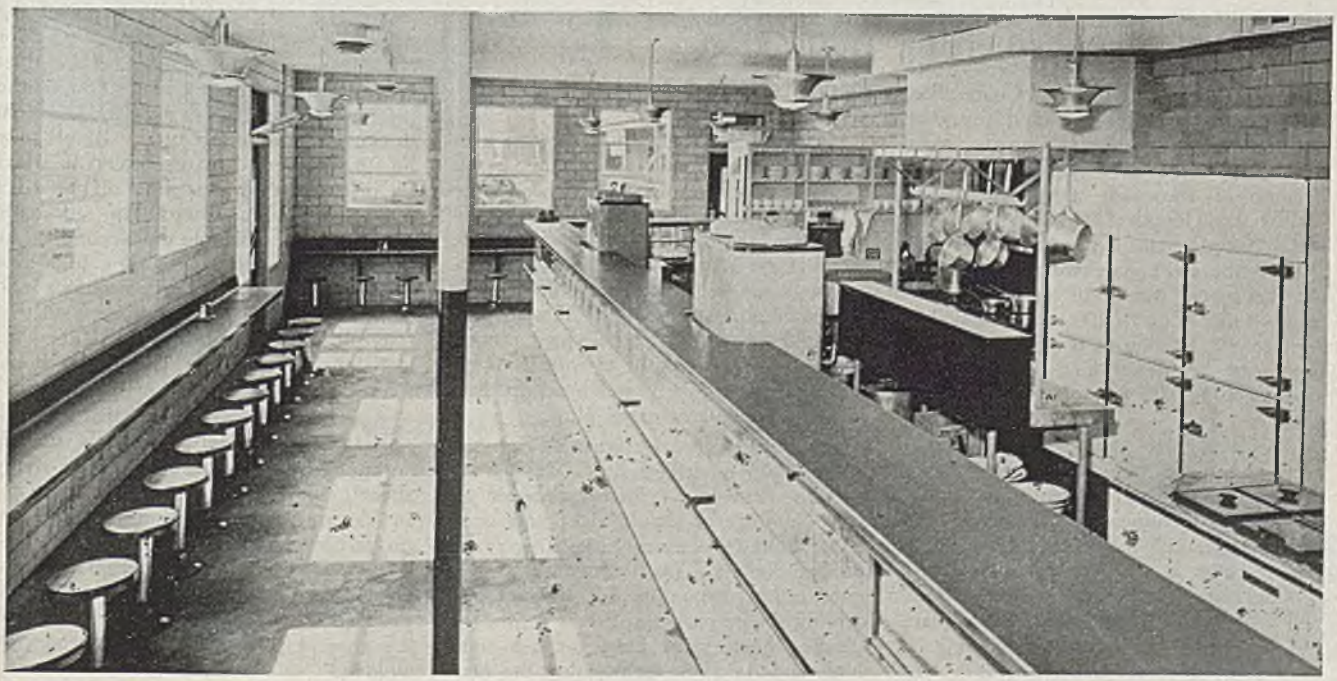

Fig. 6—This operator is inspecting ground rod for surface appearance. Small wire is checked for diameter by weighing 200 millimeter lengths

Drawing Wire

(*Concluded from Page 91*)

inch, 4½-inch drums down to 0.005-inch and 2½-inch spools down to 0.00055-inch.

Drawing extremely fine wire requires literally dozens of draws and anneals as indicated by the long rows of miniature wire drawing machines and furnaces in Figs. 1 and 3. Although wire is reduced hot, annealing is necessary at intervals between draws. Annealing furnaces are atmosphere-controlled, electric-resistance type with pools of mercury at the entrance and exit ends serving as contacts. Tungsten carbide dies are used in drawing the larger sizes and diamond dies for the smaller diameters. Both types of dies are made in the Wickwire plant.

Checking the diameter of the infinitesimally small sizes of wire cannot be done satisfactorily with even the most accurate of micrometers and it is therefore necessary to determine diameters by weighing 200 millimeter lengths. For instance, 0.001-inch tungsten wire weighs 1.92 grams per 200 millimeter length.

The smallest size made by Wickwire, 0.00055-inch, of course weighs only a fraction as much and a single kilo would stretch 340,000 meters! Inspection and checking of larger-diameter material such as the ground rod being observed by the operator in Fig. 6 is comparatively simple, but even here size and finish must adhere to rigid standards.

While the description of the process has been confined to tungsten, molybdenum is handled in somewhat the same way. The "raw" materials are molybdenum trioxide and ammonium molybdate. The trioxide is reduced in a hydrogen atmosphere at 1000 degrees Fahr. to form molybdenum brown oxide. The ammonium molybdate also is reduced in the presence of hydrogen at 1000 degrees, driving off the ammonia to form molybdenum brown oxide.

Chemically, the oxides from the two compounds are identical with the exception that particles are fine in one case and coarse in the other. The two sizes of particles are mixed and reduced at a temperature of 2000 degrees Fahr. to metallic molybdenum powder. This powder is pressed into bars and sintered at 2300 degrees C. or 300 degrees below the melting point for molybdenum. These bars then are reduced in the same manner as tungsten.

Device Calculates Weight And Selects Size of Plate

A combination steel plate weight calculator and steel plate size selector has been developed by Lukens Steel Co., 237 Lukens building, Coatesville, Pa., for use by engineers and users of steel plate or equipment made from steel plate. Device is believed unique because of the wide range of gages, widths and lengths of steel plate for which weights can be calculated on it.

With the steel plate weight calculator the theoretical weight of any steel plate from 10 inches up to 200 inches in width, and from 3/16-inch to 6 inches in thickness, can be determined quickly with an inaccuracy factor of under 1 per cent.

The steel plate size selector permits rapid determination of the largest plate obtainable in any given length, in thickness from 3/16-inch to 25 inches and in widths to 195 inches. Included with this selector is a printed table giving decimal equivalents and weights which will be of value to the user of the plate weight calculator and size selector.

A Lukens steel plate weight calculator and a Lukens steel plate size selector will be sent free by request on a business letterhead.

Plastic Rivet Permits Blind Fastening

Plastic blind rivet permitting one man operation and blind fastening is based on a wedging action and takes advantage of the flow characteristic of plastic materials under pressure. Des-Rivets, made by Victory Mfg. Co., 1105 Fair Oaks, South Pasadena, Calif., are molded as one piece consisting of a head with plug attached by a thin breakaway section and tapered shank split to form four tapered fingers. Shank and head are hollow to same diameter as plug.

Rivet is applied by pressing tapered fingers into a drilled hole. Taper on outside diameter of fingers reduces inside diameter of shank, rivet and work being held in place by pressure of depressed fingers. Impact from the rivet gun, either manually or air operated, rapidly shears plug and drives it into the plastic shank until plug is flush with both ends of rivet maintaining the contour of the rivet head. Complete installation is said to be accomplished by this single operation.

Wedge action of plug in tapered shank expands fingers against the walls of the drilled hole and upsets shank end of rivet. The company states that this rivet creates its own upset end by flow of the plastic, permitting wide variation in thickness of materials used. Rivets may be single inserted or assembled in sticks by inserting undriven plug of one rivet into shank of another. An automatic rivet gun is available to accommodate rivet sticks, making possible a high rate of installation. A single operator and access to one side of the work is all that is required, eliminating normal need for a helper in handling the conventional rivet.

A variety of shapes and sizes is available in several plastic materials, including nylon. All conventional and many special colors may be obtained. For use in decorative applications, translucent properties of many plastics offer the possibility of combining improved functional value with decorative effect. Physical properties of these rivets depend upon the type of plastic from which they are molded.

THE FIRST CHECKER FLOOR PLATE ACTUALLY MADE WITH "CHECKERS"

For many months practically the entire output of **JAL-TREAD**, the new, improved, rolled steel checker floor plate, went to the Army, Navy and Maritime Commission for use wherever safe, sure footing was needed.

JAL-TREAD and Junior **JAL-TREAD** are made in a wide range of weights and sizes. Send for a copy of the new **JAL-TREAD** booklet giving the complete story of this new, safer, more economical floor plate that is easier to cut, bend, weld, and install.

Consult your local J & L office or favorite warehouse for delivery information or write direct to Jones & Laughlin Steel Corporation, Pittsburgh.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA
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J&L STEEL

Engineering NOTES

Stainless Fireplaces

One of the after-the-war markets for stainless steel now projected is for fireplace linings. Linings can be readily cut from 22-gage satin-finished stainless, cut to shape and sprung into position without the use of fastenings. Increased heating effect is obtained through the high degree of reflection provided by the bright surface.

° ° °

Boron-Cobalt Tools

Several additional companies have entered the cast cutting tool field. Some are casting these tools centrifugally and others in static molds. As for the alloys, one of the latest is a boron-cobalt type. Cobalt imparts red hardness to the alloy and boron is said to intensify the effect.

° ° °

Fractography

Further study is being given to fractography as an additional tool for providing engineers and metallurgists with more information about the properties of metals. Samples are obtained by fracturing sections in a brittle state, this being done at subnormal temperatures in the case of normally ductile metals. Studies of individual facets under a microscope already have provided some startling new facts.

° ° °

Corn Sugar on Ingot Molds

Pure corn sugar blown onto the inner surface of ingot molds is being used to help prevent splashed metal from solidifying on the walls of the mold. It is applied by a process patented several years ago.

° ° °

A Boost for Broaching

Retooling program contemplated by a washing machine manufacturer calls for approximately 65 broaching operations in production of postwar models compared with less than a dozen before the war. Output of washers first year after installation of new equipment is expected to be double that for any previous period. Closely affiliated with increased application of broaching in metal-cutting under mass production pressure is a wider range of work sizes, from a 0.04687-inch carburetor jet to 90-millimeter gun barrels and even larger diameters.

° ° °

Metal Stitches Tissue

The "neutral" metal, tantalum, is being used in many unusual ways. It has been found to be nonirritating to living tissues in addition to being ductile, malleable, and corrosion resistant. Now a wire so fine that it is invisible, and must be felt rather than seen, is used repairing nerves and making surgical stitches where appearance is important, as in facial surgery.

° ° °

Weirton Rolls Magnesium

Weirton Steel Co. has rolled considerable quantities of magnesium J-1 alloy in sheets 0.014-inch thick required for military equipment. Production of this material previously had been pronounced unfeasible.

° ° °

70% Plan Finer Machining

New data which will be available shortly show that nearly 70 per cent of the companies in the metalworking field plan to machine parts going into their products to closer tolerances and finer finishes than before the war. Superspeed milling will be used to a greater extent by 40 per cent and nearly 30 per cent will make more extensive use of negative rake machining.

° ° °

Professor Boston Investigates

Richard B. Smith, executive secretary of the Manufacturing Engineering Committee of ASME, reports that Professor O. W. Boston, University of Michigan, is engaged in an investigation of the milling of cast metals. With Professor Boston on the job, it is expected that no time will be lost in scrapping outworn theories and in getting some new ones established in line with new techniques, and at the same time improving those techniques by finding out exactly how the many variables should be balanced. Many people have faith in Professor Boston for the reason that his laboratory is half machine shop and he himself is a machinist as well as a scientist of national reputation.

° ° °

Steel Mill "Practice"

Cafeterias have become an integral part of the steel mill "practice". In fact, before DPC will grant a loan for the construction of a new plant either for steelmaking or fabrication, the blueprints must show that adequate provision has been made for feeding the workmen. CIO officials also are taking keen interest in cafeterias and more and more are stressing their importance when meeting with steel plant executives to renegotiate contracts.

° ° °

Carbon Black and Rubber

The current critical situation in tires is attributed to lack of carbon black which is required in compounding synthetic rubber. According to those familiar with the situation, insufficient forethought was given by Washington officials to the problem of keeping carbon black supplies in balance with the needs of the rubber companies. When the matter was given consideration some time ago, it was thought that reserve stocks would tide the industry over present peak requirements.

° ° °

New Threading Methods

Headless screws now are being threaded at high speed by a New York manufacturer on centerless grinders. The tooth profile is crushed into the grinding wheel.

° ° °

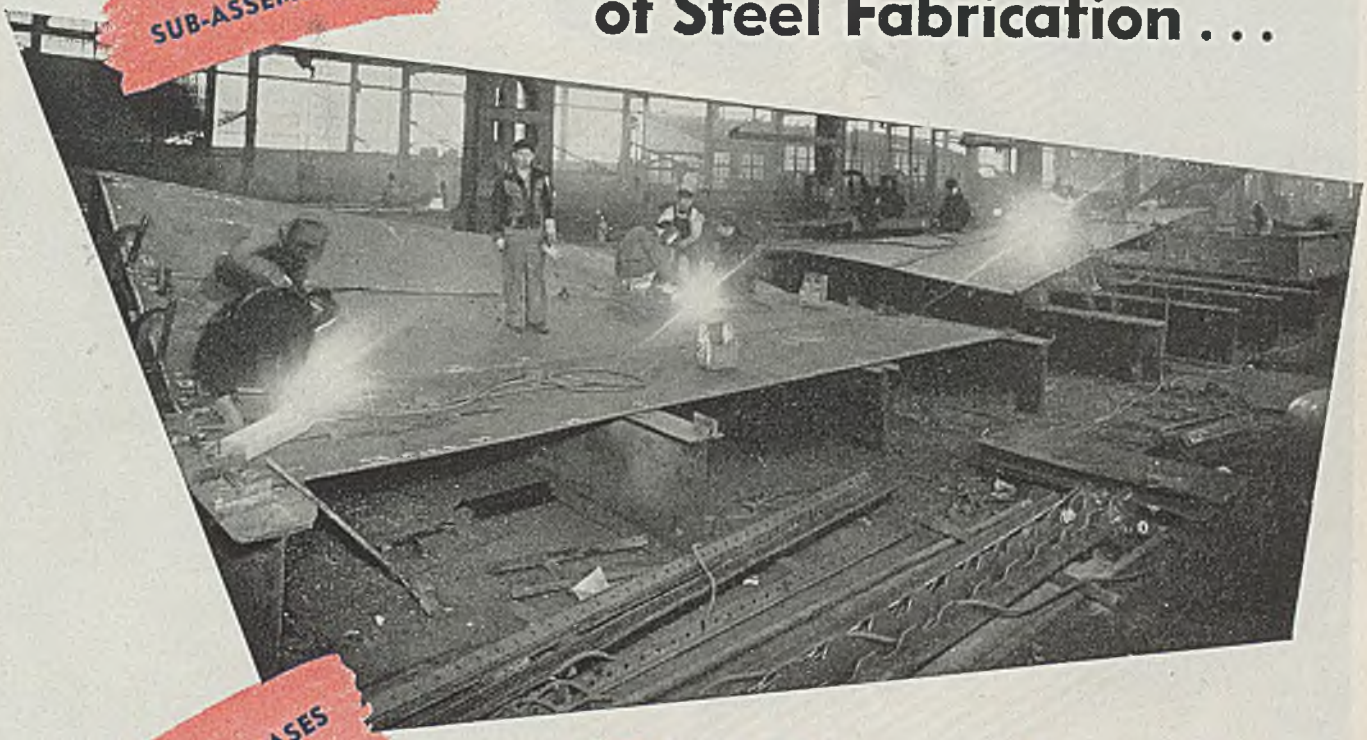
Combustion Stars in Picture

Colored moving pictures are one of the newer techniques for studying furnace combustion. In first studies of furnace beds during combustion, action of bed was speeded by taking exposures at intervals of seconds, making it possible to show in a few minutes the changes taking place over a period of several hours. Techniques also have been developed for taking motion pictures and showing them in slow motion. This method has been found useful in the study of stoker performance with various kinds of fuel. Flame-propagation may be considered as it takes place in gases over the fuel bed or in pulverized coal furnaces. Analyses are being made of overfire air application, effects of holes in the fuel bed, flame pulsations caused by fan blades supplying overfire air and variation in turbulence produced by change in nozzle location.

WELDING — RIVETING

SUB-ASSEMBLIES

if yours is a problem of Steel Fabrication . . .



FRAMES — BASES

PRODUCTION RUNS

HEAVY STEEL FABRICATION

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. . . Duffin does it!

Duffin Iron Company's long experience in heavy steel fabrication is your assurance that the finished job will be one you'll be proud to put your name on. The complete, modern shop facilities, skilled workmen and intelligent supervision here at Duffin, are at your service for on-time deliveries of small or large quantities of frames, bases and sub-assemblies of all types of welded and riveted structures.

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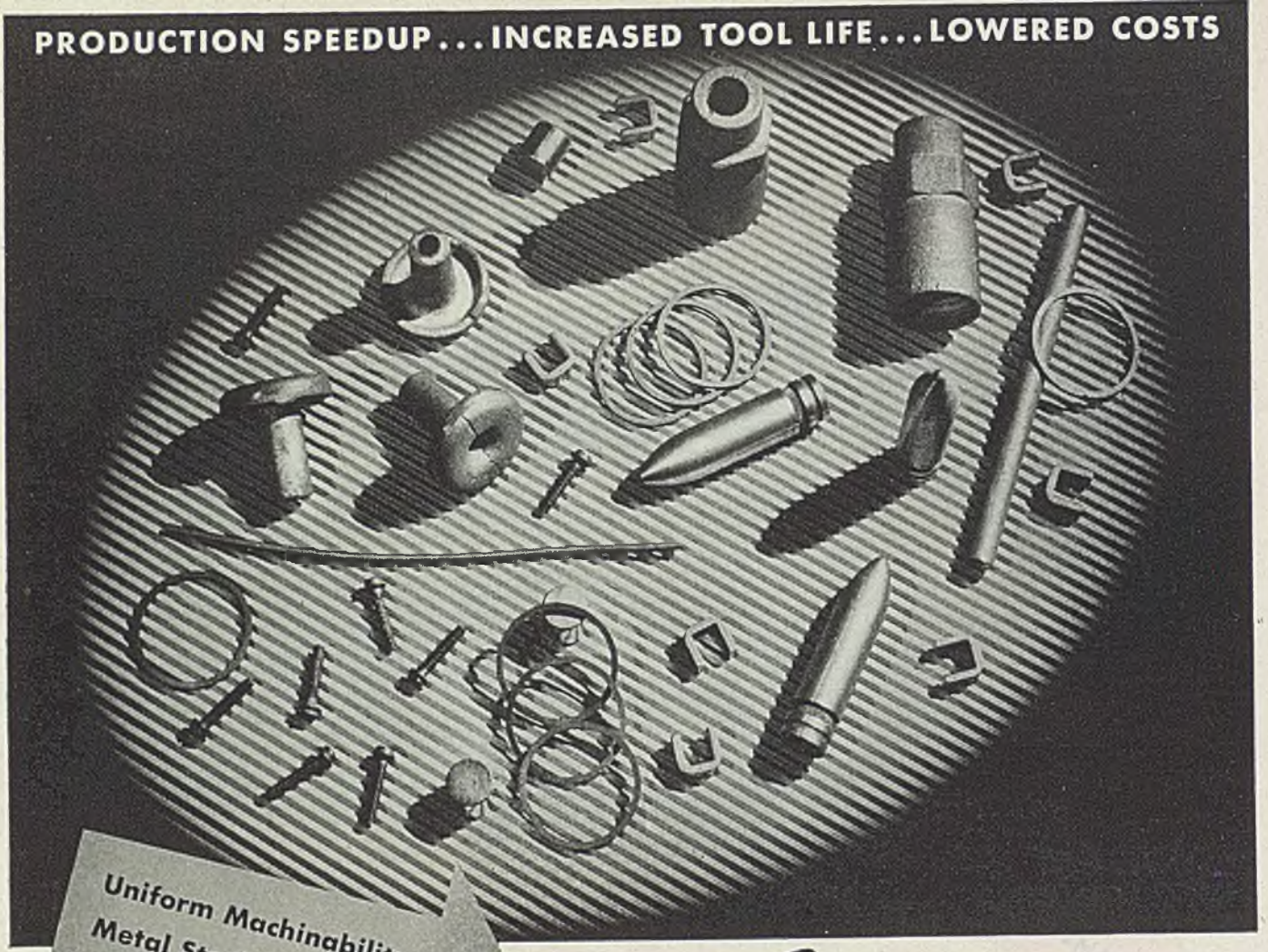
PRODUCTION SPEEDUP . . . INCREASED TOOL LIFE . . . LOWERED COSTS



Uniform Machinability of Metal Stock for Such Pieces Insured in 100% Non-destructive Inspection by the . . .

DuMONT Cyclograph

If you are buying or selling metal stock which is to be machined in automatic high-speed equipment, you will be interested in some of the non-*destructive* tests which can be done with the Cyclograph.

This instrument can be used to insure that *all* pieces going to an automatic lathe or other equipment are *reasonably uniform in machinability*. Pieces which are too hard may be rejected, re-treated, or run on slower machines with appropriate tooling.

The Cyclograph has successfully performed this service, but since machinability is a very complex quality, we must investigate any new problem of this type before recommending the use of the Cyclograph in such an application.

Submit Your Problem . . .

Send us that problem. We shall give you a detailed Engineering Report on the feasibility of using the Cyclograph in your plant. The savings in tool life and time alone which may be possible with this 100% non-destructive inspection, make it worth your while to investigate. Literature on request.

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WELDING
In Steel Construction Work

By L. E. BROWNE
Associate Editor, STEEL

THE extent to which the structural steel fabricating industry will operate in its broader scope of wartime activity is an absorbing, yet somewhat controversial question increasingly considered by engineers and designers.

Centered primarily in welding through the contribution of fabricating shops to the shipbuilding and heavy equipment programs, leading engineers differ as to the degree this process of joining steel in this branch of the metalworking industry will be adopted in the postwar period. As completion of the second of its outstanding war accomplishments nears, that of ship assembly, it is recognized new problems, affecting design, costs and other economic factors involved in the tremendous progress made in welding, will arise; these will differ in application in a normal economy.

Consensus is welding will retain considerable ground gained, especially in some types of shop work, but has limitation in others, including buildings and bridges, normal bread and butter of the industry.

With this in view STEEL presents opinions from a cross-section of leading structural shop engineers and designers; some connected with large-tonnage shops and others with smaller companies in all sections of the country. S. R. Webb, chief engineer, Carolina Steel & Iron Co.:

"Development of welding has been promoted in many cases by other considerations than economy of fabrication. In many shops a laxity of efficiency has been tolerated that must be eliminated when our government does not pay for it regardless. Economy of future developments, not present practice, must determine whether or not welding will replace riveting. In the meantime, the sales impetus of a new process will promote it in places where it would otherwise be abandoned.

"Welding will find a development in products that are produced in quantity, but in structures that are not duplicated, the necessity of jigs will make it too expensive.

"The use of welding in structures would require much more shop floor space and thereby increase overhead expense.

"The practice of an expert designing the frame of the structure, and the details, which are always the source of a failure, left to the inexperienced judgment of a draftsman, will result in some sad experiences. Many plans that cover important connections carry the note 'welded'.

"For economical work and wise design, riveted and welded work must be completely separated. Instructions in our office prohibit a combination on a given piece if avoidance is possible.

"The suggestion of one steel for riveted work and another for welding, if adopted, would result in endless confusion and nuisance in routine work of a fabricating shop. Certain important jobs would justify the use of special steels but I hope we never see it as a general practice in the industry."

Says F. A. Swertz, designing engineer for Harris Structural Steel Co. Inc., New York, a well known shop in the east which has played a notable lead part in the ship program, landing craft especially:

"Methods and techniques of welding and flame-cutting steel that have been developed and improved are going to have an important effect on postwar operations.

"Welding allows the designer far greater latitude in obtaining a desired result than riveting. Structural frames which, when riveted, resulted in cumbersome, and often unsightly details, can be made with simple and neat connections when welded. Also, demand for rigid or continuous structures to save steel during the war will be continued in peacetime, as welding lends itself with particular effectiveness to this type of structure.

"The designer does not have to hesitate about the shape of connection plates or angles, as improved flame-cutting devices accomplish this perfectly.

"One drawback to welding of structures is the fact stresses are set up in the structure. This can be greatly obviated by a careful analysis of procedure during welding and this drawback will be gradually eliminated, by gaining experience.

"Another war development which is bound to have a far-reaching effect on peacetime structures is the use of alloy steels. A great deal of research has been done on these alloys, and some have been developed which are capable of standing far greater unit stresses than ordinary steel. This envisages lighter structures (notably bridges) than we have heretofore seen.

"The problem again will be as to whether they will be riveted or welded —a problem that eventually will have to be solved."

A. M. Meyers, chief engineer for Kansas City Structural Steel Co., Kansas City, speaks frankly:

"Fabricators, generally, should resist all possible welded design for mill buildings, office buildings, railway and highway bridges. Our plants are fully equipped with machinery and manpower for riveted work. We cannot economically do both welded and riveted structural work in the same shop at the same time.

"The oil industry naturally requires welded work. It is more economical and is preferably fabricated in shops especially equipped for welding.

"Fabricators certainly would not approve the idea of providing materials especially for welding of a different grade generally used for punching and riveting. Our storage capacity is already congested by multiplicity of sizes; difficulty in distinguishing various grades would be great and, under the best of care and inspection, there would be no assurance the proper grade will always be used in the right place. Fabricators have had some experience in the use of silicon and nickel steels. After such jobs are completed, it is not unusual to have silicon or nickel grades left over and after investigation the only answer apparent would be that somewhere regular structural grade must have been used.

"The proponents of welding for structural steel have largely discarded internal stresses set up in steel by welding and have made little provision for relieving of such stresses. The fact that disastrous failures have not occurred is no reason for overlooking internal stresses. What has actually happened is that the factor of safety has been indeterminately reduced or that the design loads have probably never been attained. Fabricators now have an enviable record of having done things well, safe and sure and should not now start on a program of uncertainty.

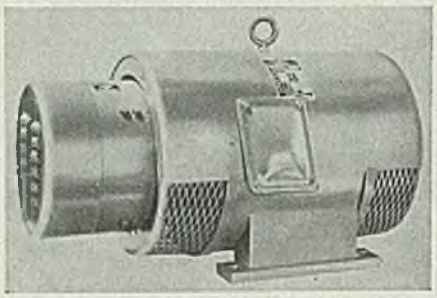
"Designs, specifications and contracts are now made far in advance ready for construction, based primarily on past experience and equipment. These proj-

(*Please turn to Page* 146)

INDUSTRIAL EQUIPMENT

Small Generators

A new line of small alternating current generators of the revolving field type, is announced by Electric Machinery Mfg. Co., Minneapolis. Built in ratings of 6.25 kilovolt-amperes, 1800 and 1200 revolutions per minute to 18.7 kilovolt-amperes, 1800 revolutions per minute, single and 3 phase; standard



and close regulation; 120, 120/208, 240 and 600 volts, these generators can be supplied as two bearing units for belted or coupled duty, or single-bearing for close coupling to driving engine. Drip proof generator and exciter construction is standard.

Some of the construction and operating features of the new generator line include construction to withstand heavy-duty service on stationary or portable power units; enclosed ball bearings; cartridge type bearings with sealed lubrication for trouble-free operation; high torque dampers keep parallel-operated generators running smoothly; revolving field construction; access to exciter brushes for inspection; slip-on louvered cover.

Clevis Ring

A new clevis ring has been introduced by Poulsen & Nardon Inc., Los Angeles. It is made to exacting dimensions from alloy steel, carefully formed to retain the full strength qualities of the steel. Each ring is cadmium plated and conforms to specification ANQQ-p-421. It fits any standard cable terminal.

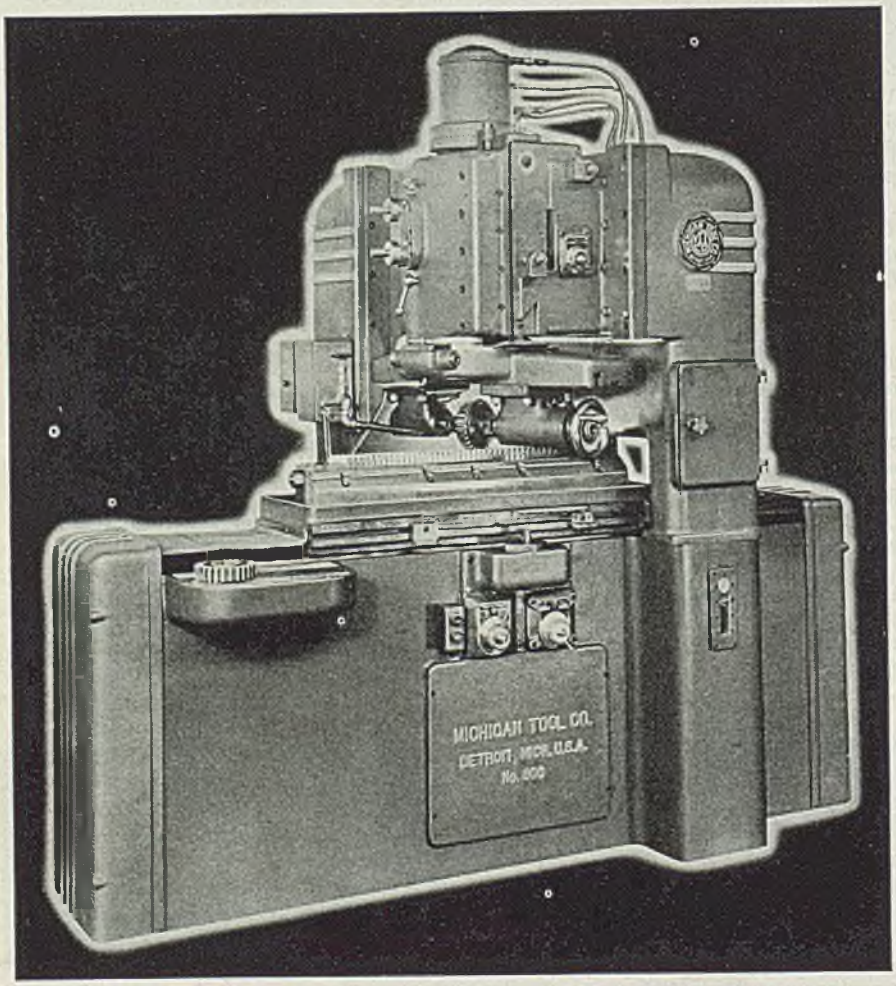
Gear Finisher

Michigan Tool Co., 7171 East McNichols road, Detroit 12, announces an improved line of its series 900 rack-type crossed axis gear finishing machines. Completely hydraulic in operation, the series 900 incorporates two separate hydraulic systems, one for the operation of the table and one for the head feed.

Lubricants and coolants have separate outlets, thereby reducing chance of contamination of one by the other and also permitting the use of coolant coolers if conditions make it necessary. Automatic lubrication has been extended to the rack table ways which are of hardened and ground dovetail. Improvements have also been provided in the control system to facilitate holding tolerances to closer limits. During the cutting cycle the work is reciprocated at a predetermined rate of speed across the rack while the rack reciprocates longitudinally in mesh with the work. Controls for both rates of speed are adjustable. A positive counter is provided to regulate the number of finishing strokes desired after vertical feed has been completed to bring the work to correct size on pitch diameter.

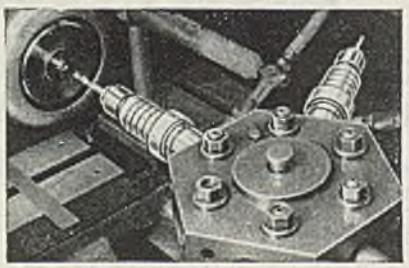
The hydraulic down-feed mechanism comprises a rapid approach and slower cutting feed for the head, but is supplemented by the more positive control for the finishing strokes at the end of the automatic down-feed. At the end of the finishing strokes, the head automatically returns to starting position for reloading.

The machine is designed to finish gears up to 8-inch diameter with maximum length between centers of 18½ inches. The design permits precompensating for possible heat treat distortion of gears subsequent to finishing.



Air Drills

A new line of air drills, designed for use on hand and automatic screw machines is announced by Keller Tool Co., Grand Haven, Mich. These drills may be mounted in the regular tool holders of automatic or hand screw machines. Com-



pressed air is fed to the drill through a valve arrangement which opens as the turret moves forward and closes immediately when the turret is backed away from the work.

The drills are available in three sizes and eight models, having speeds of 1200, 2800 and 3500 revolutions per minute. Drill capacities range from 1/32 to ⅜-inch diameter twist drills. All tools are powered by the company's standard rotary vane type pneumatic motors.

Metal Parts Cleaner

Incorporating all the features of active soak and swishing action, a new model B metal parts cleaner is announced by

(All claims are those of the manufacturer of the equipment being described.)

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THERE IS THE RIGHT TYPE AND SIZE OF CLEVELAND CHAIN

PROOF COIL & BBB CHAIN

Electric welded in sizes 3/16 to 9/8". Heavier sizes fire welded. Natural finish . . . For greater strength we recommend Super Steel Chain and Sterling Dredge Iron Chain for Sling Chains.

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Twist Link. Electric welded. Bright finish. 9 sizes . . . Packed 100 feet in a carton.

LIBERTY COIL CHAIN

Straight Link. Electric welded . . . Bright finish. 9 sizes, No. 6 to 7/0. Packed 100 feet in a carton.

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Twist or Straight Link . . . Twist link supplied unless otherwise specified. Electric welded. Bright finish. 9 sizes.

LOCK WEAVE PATTERN CHAIN

A flat, flexible, strong wire chain. Range of 9 sizes . . . Ideal for conveyors, rolling doors in use over sprockets. Finishes: Bright, Bright Galvanized and Hot Galvanized.

BUCKEYE PATTERN CHAIN

Also known as Brown Pattern. The most popular type weldless steel wire chain . . . Made in 10 sizes. Finishes: Bright, Electro Galvanized, Hot Galvanized or any plate.

SAFETY CHAIN

Made of Steel or Brass. 3 standard sizes, .018 to.028 gauge. Finishes: Bright, Bright Galv. and Coppered.

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Made of Steel or Brass . . . 9 sizes, Nos. 5 to 19 gauge. Also Double Jack in 6 sizes, Nos. 10 to 19 gauge. Finishes: Bright, Coppered, Bright Galvanized.

These and many other types of Welded and Weldless Cleveland Chains are serving hundreds of important war uses. Critical shortages of chain still exist but we are doing our best to supply all essential civilian demands for Cleveland Chain up to the limits of our war-restricted capacity.

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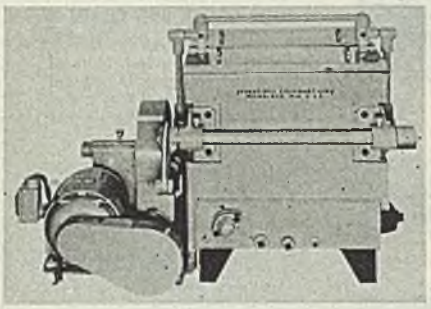
ALL TYPES OF CHAIN — WELDED & WELDLESS — CHAIN FITTINGS

Sturdy-Bilt Equipment Corp., West Allis, Wis. The operator loads the tray with objects to be cleaned, throws the switch and the action of the unit washes away all the oil, chips, dirt, etc., clinging to the parts. Hot or cold solution may be used.

In addition, a specially designed method of scum and oil removal has been incorporated into this model. A side tank receives the floating oil and scum by the

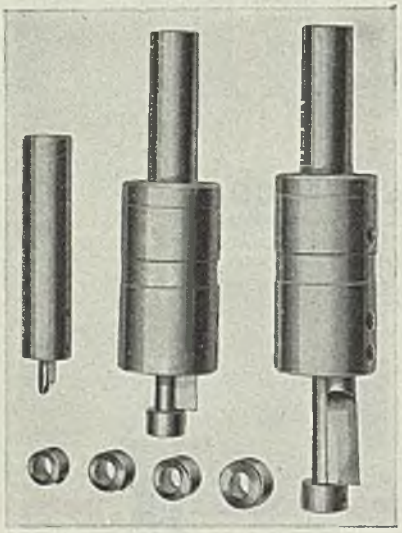


introduction of more soaking solution into the bottom of the main tank. There is no loss of the solution. When the oil removal tank is full it can be drained and the oil filtered for further use.

Uses include washing, slushing, cleaning, rinsing and dipping of metal parts, housings, crankcases, small assemblies, tools and small gears where cleanliness is required for faster production and finer quality finished products. Units may be installed singly in different departments or in series for special requirements.

Adjustable Counterbores

Counterbores of a new design adjustable to 0.001-inch over a range of approximately 1/32-inch, known as PML counterbores are now being marketed by Precision Mechanical Laboratory, 119 West Sixty-third street, New York 23. They can be run either right or left hand. The adjustable feature allows the bit to

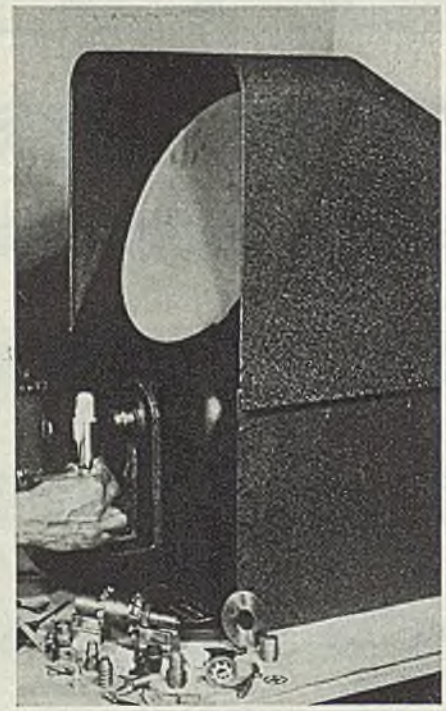


be reset even after many grindings to the desired recess size, retaining extreme tolerances on both standard and non-standard diameters.

The secured high speed steel bit gives a smooth, chatter-free cut. Deep recesses in laminates, plastics and the softer metals are cut at high speeds without withdrawing the tool. Only the end of the bit need be reground on a bench grinder. Any desired contour can be ground on the end of the bit for concave, convex and other desired recess bottoms. The tool bit can be removed from the holder while it is on the machine. These counterbores with desired pilots are available in sizes from ¼ to 1-inch with straight or tapered interchangeable shanks. Carbide tipped and alloy bits are also available.

Optical Projector

Portman Optical Co., 70 Mill road, New Rochelle, N. Y., is now marketing a new bench type optical projector. The optical system consists of optical lens components combined with scientifically



correct light source providing screen image definition at all magnifications.

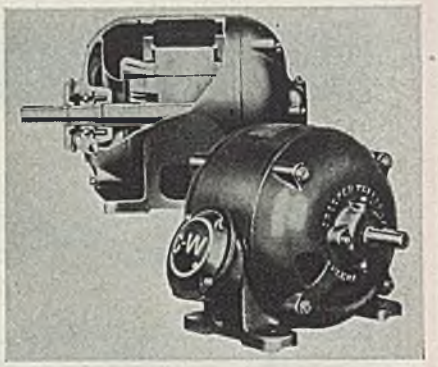
This unit, designated as model P2.5, has a large working capacity and is provided with a standard full size 14½ inch diameter working screen. Stage area of the projector measures 4 x 4 inches, the overall length is 42 inches. It can be furnished with a choice of X10, X25, X50 or X90, magnification lens unit and may be operated on ordinary light circuits of 110 volts.

Protected Motors

Combining the surplus capacity of the conventional open motor with protection against dripping liquid, falling metal chips and other foreign matter, a new electric motor has been developed by Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J.

At present, these motors are available in sizes up to and including the 284 frame. Mounting dimensions conform to the standards of the National Electrical Manufacturers' Association. There are no openings in the frame on shields above the horizontal center line. This, together with the shielded construction of the ventilating openings, makes these motors suitable for machine tool and similar applications.

Centrifugal seals permit use of softer



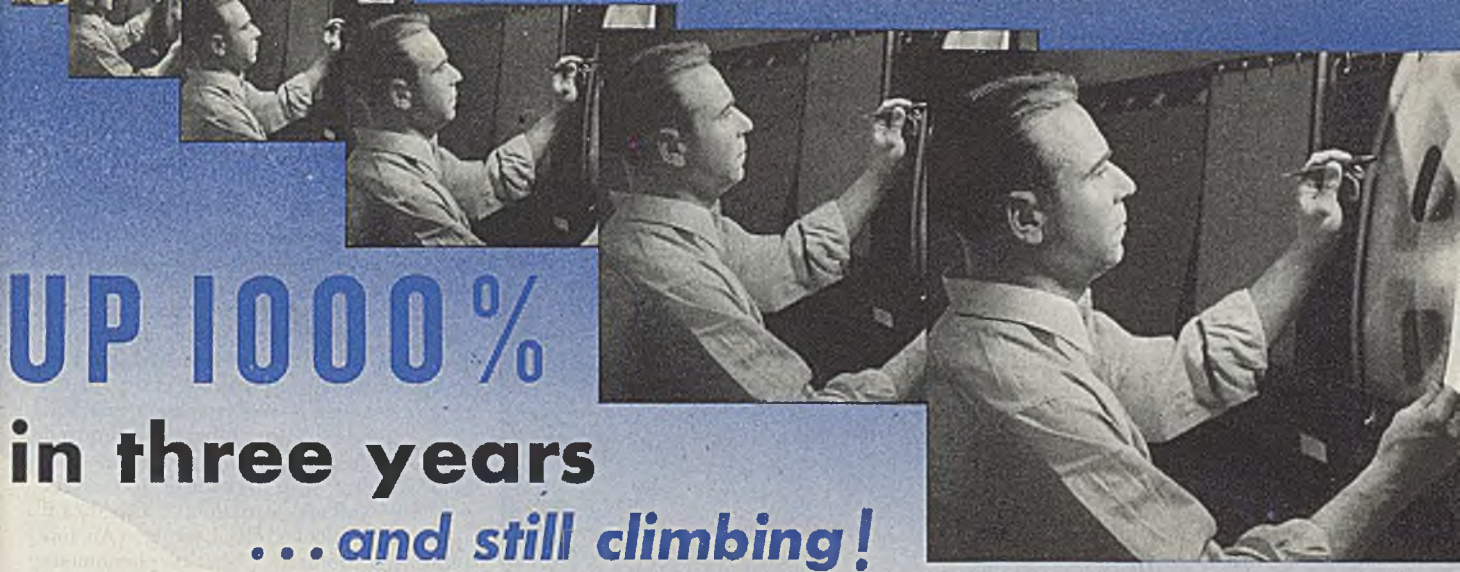
grease for better lubrication and longer bearing life. The company's Alucast rotor construction, in which the bars, fans and end rings are cast in one operation from aluminum alloys, is used.

Other features of these motors include heavy cast frame construction, coils protected by vinyl acetal insulation, interchangeable front and rear shields and specially designed guides for directing cooling air over all surfaces.

Demagnetizers

A new line of demagnetizers for completely demagnetizing magnetically soft materials, such as common irons and steels and partly demagnetizing permanent magnets such as alnico, is announced by Special Products Division, General

Electric Co., Schenectady, N. Y. The demagnetizers are designed to demagnetize tools, drills and punches in order to prevent excessive heat and wear caused by the adherence of magnetic chips. They are also desirable for demagnetizing various machined parts, releasing fine adhering particles which often cause severe wear and impair ac-



UP 1000%

in three years

. . . and still climbing!

RADIOGRAPHY'S PROMISE: extended horizons for your product . . . higher quality . . . lower costs.

A *fact everybody knows* . . . The war gave radiography the opportunity to demonstrate its ability to determine soundness or unsoundness of internal structure—nondestructively. *A fact not everybody knows* . . . Radiography has proved itself so widely to those who have had experience in using it that its growth has been spectacular—over 1000% in three years and it's still growing.

Let's look at some case histories. One manufacturer—faced with a probable 6-figure loss when *visual* inspection of his product showed hairline cracks in metal—called radiography to the rescue. Subsurface inspection—penetrating "x-ray" scrutiny—proved the "cracks" to be harmless surface "pleats" resulting from processing . . . not affecting structural strength. Thus, potential "scrap" went into effective use, hundreds of man-hours and machine-hours were salvaged.

Again, here's how radiography acted as a process "tool": Foundrymen told a motor maker that a new, highly efficient, lightweight, easily machined crankcase *couldn't be cast*. One foundryman took a chance, was troubled with shrinkage in the manifold exhaust. X-ray inspection of successive castings uncovered weaknesses. Seeing what was wrong, as the difficulties developed, made improvement possible. Today, this one progressive foundry is the sole supplier of all of the crankcases required.

And so it goes. More and more companies are finding radiography a great help in meeting today's rigid production schedules and high inspection standards. They know that the higher quality and lower cost resulting from radiography will be reflected in increased opportunities tomorrow. Eastman Kodak Company, X-ray Division, Rochester 4, N. Y.

PHOTO LAYOUT Cuts Template-Making Time 99%: Reproduces working drawings directly on metal, plastic, other sheet materials . . . with photographic speed and accuracy. Reproductions can be made by contact or projection . . . with unfailing precision . . . great savings in time.

RECORDAK Reduces Reference Time Two-Thirds: Saving dollars, time, space, weight, that's Recordak's contribution to industry . . . reducing bulky blueprints, drawings, papers to tiny microfilm. Photographically accurate full-size copies can be made quickly, and in quantity.

ULTRA-SPEED PHOTOGRAPHY "Magnifies" Time: Records motion too fast for the eye to follow . . . permitting study and analysis of moving mechanical parts, chemical reactions, air and liquid flow . . . smoothing production difficulties . . . saving man-hours, machine time, materials.

FUNCTIONAL PHOTOGRAPHY

Analyzes . . . Improves . . . Records . . . Reproduces

FUNCTIONAL PHOTOGRAPHY Serves All Industry: *Photo-Visuals* teach and sell, faster, with more lasting impressions. *Photomicrography* records microstructure of metal surfaces and effects of treatments. *Spectroscopy* analyzes complex substances, quantitatively and qualitatively, in a matter of minutes. *Electron Micrography* reveals detail beyond the limits of visible light, answers many hitherto unsolvable metallurgical problems. *Microradiography* probes into subsurface microstructures. *X-ray Diffraction* reveals the "invisible" by diffraction patterns, aids the search for better materials, processes. *Instrument Recording* provides a record on film for analysis and study of transient phenomena. *Stress Analysis* previews product performance.

Kodak

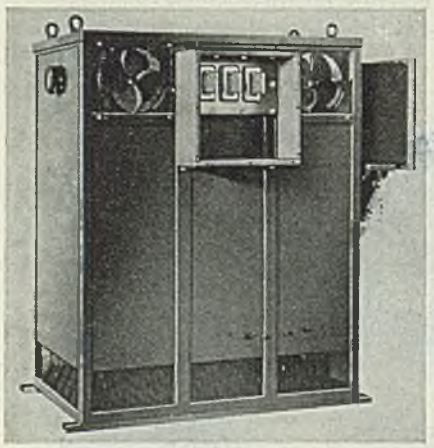
curacy and appearance. In addition, they can be used to adjust and stabilize the magnetic flux in permanent flux assemblies for such applications as electric instruments and control devices.

Consisting of a cylindrical air-core coil, mounted in a sturdy stand at a 45 degree angle, these units are available in a 4-inch size, rated 115 volts, 60 cycles, alternating current and in 8 and 12-inch sizes, rated at 220/440 volts. Long flexible leads for connection to the power line are provided with the 4-inch size, while a small connection box behind the coil of the larger sizes accommodates standard electric conduit.

In operation, rated voltage is applied and the material to be demagnetized is either passed directly through the coil or placed in its center and slowly withdrawn about two feet along its axis. At that point the magnetic field is negligible and the material is then demagnetized. For continuous operation, nonmetallic conveyor belts can be run through the coil, provided the parts being demagnetized are neither in metal containers nor in contact with each other so as to cause shielding.

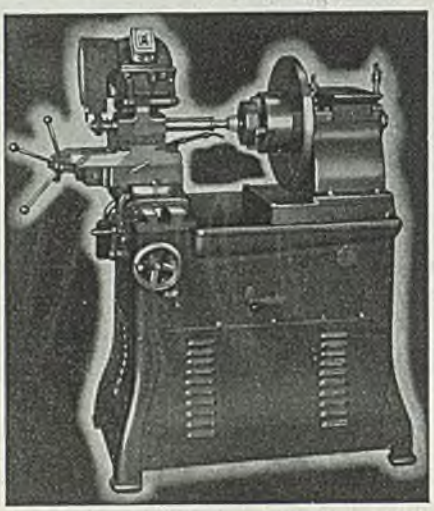
Dry Type Transformer

Designed for installation in limited space indoors, a new dry type transformer equipped with fans for accelerated air cooling is introduced by Standard Transformer Co., Warren, O. The transformer insulation is class B, NEMA standard for 80 degrees Cent. temperature rise and is composed entirely of inorganic materials such as fiberglas, mica, etc. Fans are thermostatically controlled and operate quietly. Terminals and attached switches or fusing are positioned in accordance with user's specifications. Available in ratings up to 1000 kilovolt-amperes, three phase or single phase, and voltages up to 4800.



Internal, Surface Grinder

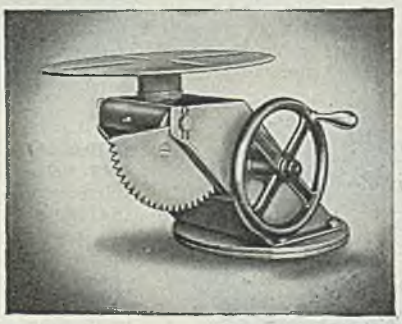
Micrometer screw adjustment on the automatic power cross-feed assures precision face grinds in the new model ACX internal and surface grinder offered by Lempco Products Inc., 5498 Dunham road, Bedford, O. Both rack and pinion and screw feed are available for longitudinal travel. Mechanical stops prevent spoilage. Jaw or magnetic chucks can be quickly mounted on face plate by a single draw bar through hollow work spindle. Eighty and 130 revolutions per minute are the quick-change



work speeds and 6000 and 12,000, the spindle speeds. The 2-horsepower grinding head motor and ½-horsepower workhead motor are self-contained. Retractible work head allows additional clearance for larger work. The unit turns and grinds internal, external, face and taper jobs. The built-in coolant system is accessible for cleaning. Automatic sizer mechanically duplicates size of successive pieces.

Bench Positioner

A hand-operated positioner provides a tool to facilitate production and repair welding, assembly, overhauling, grinding, drilling, hard-surfacing and similar operations on all small work. Its ability to handle small units efficiently makes model 1H a versatile machine for welding, assembly, maintenance and repair shops. The capacity of this model is 100 pounds with tilting range of 150 degrees. It revolves 360 degrees, can be locked in position at any degree of tilt. The 16-inch table top is equipped with 9/16-inch slots. Swivel base is available if desired. It is manufactured by Ransome Machinery Co., 1463 Second street, Dunellen, N. J.

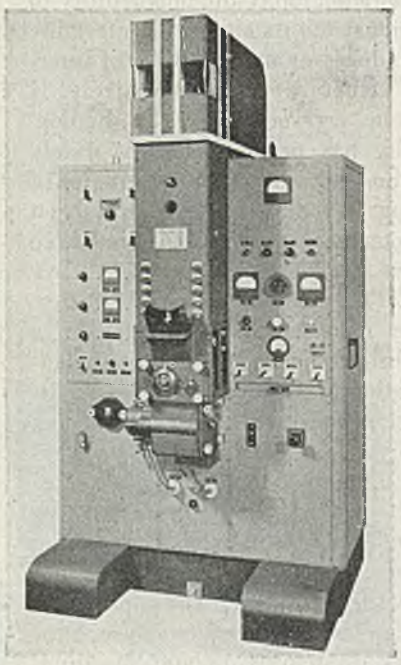


Electronic Oscillograph

For aircraft engine manufacturers, electric power companies and research laboratories, a new self-contained industrial electronic oscillograph which records characteristics of electrical phenomena lasting as little as a fraction of a millionth of a second is announced by Westinghouse Electric & Mfg. Co., Pittsburgh 30.

An instrument of the cold cathode type, the electronic oscillograph is capable of recording single electrical transients with respect to time, or two electrical phenomena with respect to each other, such as voltage versus current, in the form of diagrams produced by two pairs of electrostatic deflecting plates disposed at right angles to one another. The cathode of the tubes is energized from a 50 kilovolt-ampere, direct current rectifier with a control to correct for line voltage variation. The beam is normally blocked by a target. An impulse synchronized with the phenomena will trip the relay which bends the beam around the target so that it will strike the fluorescent screen or film below.

The unit consists of the oscillograph in front of the cabinet and the cabinet which houses all energizing and control circuits. Energizing terminals are enclosed except one bushing connected to the source of synchronizing impulse.



Concentrating coils, beam current meter and leak valve control the intensity and size of the trace on the film. Deflecting coils move the zero position of the beam so as to use the whole area of the exposed film for the record.

In addition to the fluorescent screen for direct observation, the instrument contains a stationary film holder taking a standard film for recording electrical phenomena lasting 1/1000 of a second or less, and may be operated with a rotating film drum for phenomen lasting from 1/1000 to 1/10 of a second. A photoelectric control which makes it possible to take an oscillogram in one revolution of the drum, regardless of speed, eliminates the possibility of superimposed waves in this unit.

LIKE SNUFFING OUT A CANDLE

● Just a hint of a blaze in petroleum products—or other flammable liquids—and a Kidde built-in system goes into action fast. A blanket of carbon dioxide covers it like a candle-snuffer...out goes the flame before it can spread!

Fast fire-killing is just part of the Kidde method. The "after it's out" advantages are equally outstanding. Regardless of the severity of the blaze, the use of the dry, inert gas permits rapid access for repair of pipe lines without loss of cleanup time. Prompt extinguishing prevents further breaks in other pipe lines, restricting blaze to point of disturbance.

Remember, too, that Kidde equipment is approved by the underwriters for protection against electrical blazes (Class C) as well as against flammable liquid fires (Class B). Carbon dioxide penetrates wiring and windings to smother flames quickly—protects the equipment against water-soaking or rotting of insulation.

Are *you* fully protected against these two types of tough fires? Look over the list of hazardous areas—if even one of them is unprotected, call in a Kidde representative. He's ready to share his fire-prevention know-how with you.

Kidde Kills Tough Fires

- STORAGE ROOMS
- PUMP ROOMS
- TANK TRUCKS
- ELECTRICAL EQUIPMENT
- PAINT STORAGE
- ANTIFREEZE ROOMS
- PIPE LINE PUMPING STATIONS
- CASE AND CAN ROOMS
- CONTROL ROOMS
- LABORATORIES
- BULK PLANTS

K Kidde

Walter Kidde & Company, Inc. • 140 Cedar Street • New York 6, N. Y.

Photographic Layouts

(*Continued from Page* 93)

ever required. In the aircraft industry, however, several templates are often made for a given part; for example, one template may be used to make a drilling jig, another for a stamping die, and two more for assembly jigs.

The possibility of either adapting an existing photographic process to heavy sheet-metal work or of developing an entirely new process which would be highly practical and relatively cheap was recognized as soon as the use of photographic methods in the aircraft industry became widespread. The requirements that such a process must meet to be of value in the average metal shop are as follows:

1. It should be simple enough to be carried out by a relatively untrained workman.
2. It should require no darkroom but be capable of being carried out under average shop conditions.
3. It should be low in cost.
4. It should be satisfactory with respect to flame cutting, bending, punching, shearing and other subsequent operations.
5. It should be reasonably resistant to weathering, since plates are often stored outdoors for a considerable period of time before fabrication.

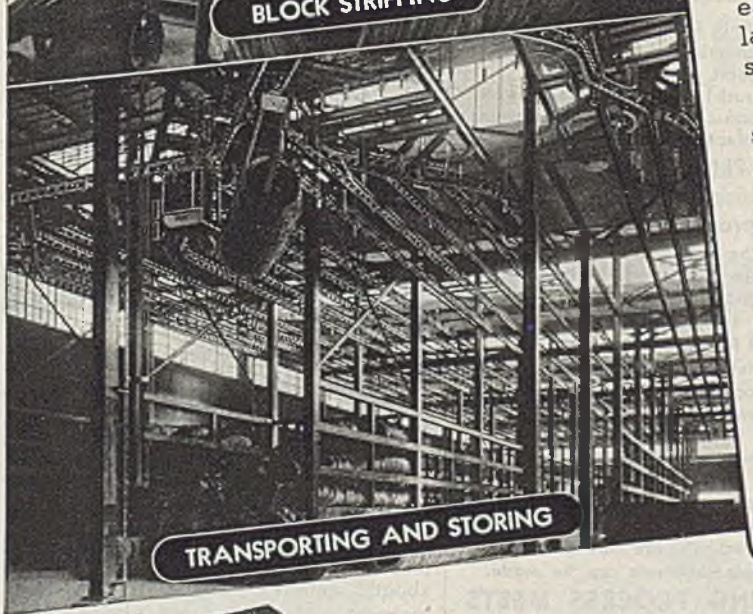
The Kodak Park Metal Shop has used for about 6 months, on an experimental basis, a new process developed in the Kodak Research Laboratories which seems to fulfill all these specifications, and promises to be of widespread applicability. The following paragraphs contain a brief description of the Kodak Transfax Process.

Sensitive material is a white paint which is supplied ready for use. This is applied with a spray gun as shown in Fig. 4 to practically any surface, such as stainless steel, aluminum, copper, bakelite, linoleum, galvanized iron, or hot rolled steel, and will even give reasonably satisfactory results on badly scaled, rusted or pitted steel. The surface first is cleaned reasonably free of loose dirt and grease and then sprayed with a very thin application of special primer which dries almost instantly. The white sensitive coating is applied in a thin layer, and it too dries quickly. Its sensitivity to light is such that the process can be carried out in ordinary room illumination.

The sensitized metal may be exposed immediately or it may be kept for some time before use, provided it is kept dark. The surface is exposed by placing a drawing made on a transparent or translucent material onto the sensitized plate as in Fig. 2, and exposing it for 1 to 5 minutes to an arc light or to a strong mercury-vapor light. (See Fig. 3.)

After exposure, drawing is rolled up and plate is flooded with warm water to which about 1 per cent ammonia has been added. The plate is washed with

ROD AND WIRE PLANTS *need* CLEVELAND TRAMRAIL



The hard work in the cleaning, drawing and handling of wire and rod has been made easy, fast and safe by application of Cleveland Tramrail equipment especially designed for the work.

Perhaps no other single factor has been so influential in increasing production and lowering costs in the wire or rod mill as properly designed and applied overhead materials handling equipment.

Today more producers and fabricators of wire and rod are enjoying the many advantages of Cleveland Tramrail than ever before and the list of prominent names in this industry is growing rapidly.

It costs you nothing to learn what Cleveland Tramrail can do for you, but it may be of tremendous importance in the immediate years ahead. Why not investigate now?

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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

a vigorous spray of water from a hose, as in Fig. 1, which carries away the entire coating where it has been exposed to light, but leaves undisturbed those parts of the coating which were protected from the light by the black lines of the drawing. The result is a reproduction of the drawing in white lines on the darker background of bare metal. In the case of black iron, this gives excellent visual contrast, but even when applied on metals such as aluminum and stainless steel, the visibility is quite good.

As soon as the exposed areas have been washed clean, the plate may be stood up on end to drain and dry, or the excess water can be blown off with compressed air. The plate is then sprayed with the lacquer primer which now serves to fix the image and to render it waterproof and resistant to abrasion. End result of this routine appears in Fig. 6.

Accuracy Depends on Drawing

The accuracy of reproduction of the process depends upon the accuracy and dimensional stability of the drawing, since the sensitive paint itself reproduces the drawing exactly. For work not requiring extreme accuracy, the drawing can be made on tracing paper or tracing cloth, with India ink. For work requiring higher accuracy, the drawing should be made on topographic acetate sheeting or on Vinylite sheeting.

The fineness of lines which can be held by this process is dependent solely upon the contact between the drawing and the sensitized surface. The process itself is capable of rendering at least 500 lines to the inch, providing perfect contact is made. Under shop conditions, however, it is not always easy to obtain perfect contact. Ideally, some form of a vacuum frame could be used, but a more practical solution is the use of a thick, transparent, limp Vinylite blanket. This is obtainable in widths up to 48 inches and 0.040-inch thick. It can be used either single or double on top of the drawing material.

Exposure is not particularly critical. A variation of as much as 50 per cent from the optimum will usually give acceptable results. Arc lights such as those used in graphic arts plants afford satisfactory illumination. A 60-ampere arc at such a distance as to cover an 8-foot plate will require an exposure time of about 2 minutes. The medium-pressure, mercury-vapor lamps can also be used satisfactorily. We have been using a pair of H-9 3½-kilowatt mercury-vapor lamps mounted on a rigid frame which is then handled by a crane. After exposure, the warm, dilute ammonia solution is poured on the plate and allowed to act for about a minute. This causes a marked swelling in the parts which have been exposed to light. The swelled portions are then removed by the subsequent spray of warm water.

The final image, after thorough drying and spraying, has excellent adherence so that it can be walked upon even

Sulphite-Treated
Alloy and Special Steels

BENEFITS TO USERS

- 25% Greater Machining Speed
- 200% Longer Tool Life
- Fewer Rejections
- More Uniform Physical Properties
- Fewer Operations
- Better Finished Product

SULPHITE-TREATED alloy and special steels, which we have produced for a number of years, have solved many problems for steel users. They have been most satisfactorily applied where machinability is of first importance.

Sulphite treatment can be applied to most types of steel. It has been used successfully in the production of shells, crankshafts, camshafts, axles, and gears.

If you believe that your company may have an application for sulphite-treated steels, our sales and metallurgical staffs are at your service. We have accomplished satisfactory results for others and are ready to serve you in the same way.

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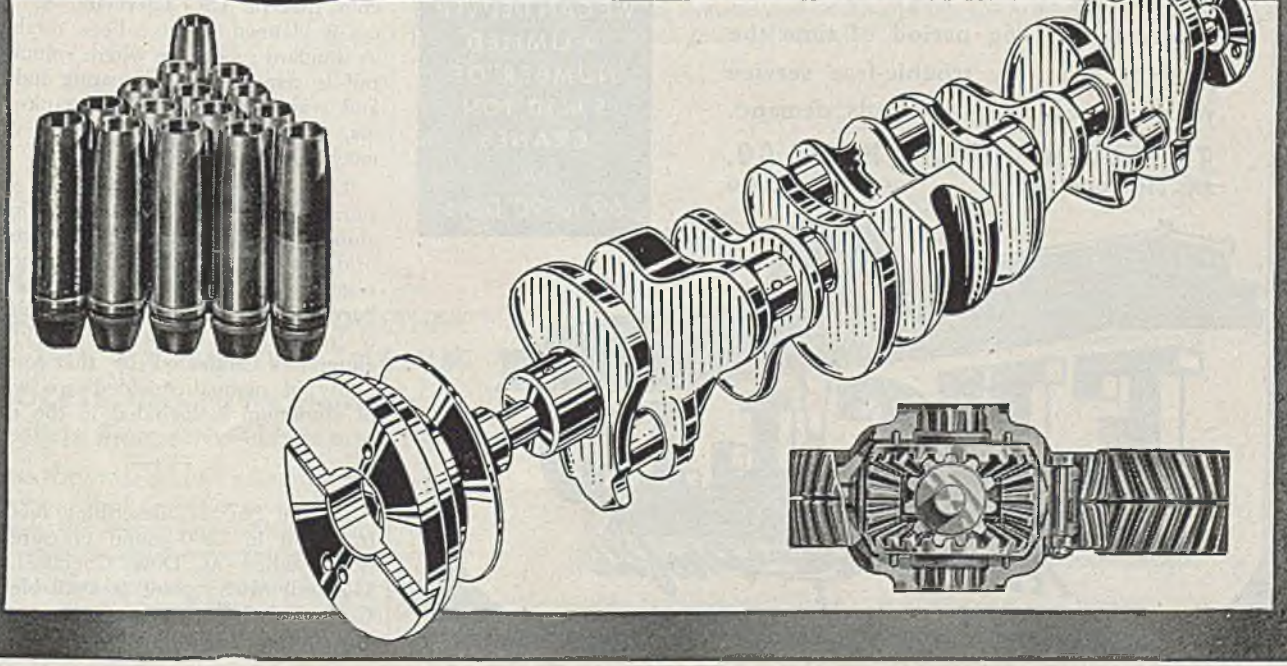

when wet without being seriously damaged. It will withstand bending, shearing, and punching (See Fig. 5) without showing any tendency to loosen, and will actually resist the application of a cutting torch up to the point where the molten metal carries it away, providing, of course, that the metal does not scale.

How widely applicable this process will be remains to be seen. Where only a single layout is to be made it is simpler to make it directly on the piece of metal in the conventional method. On the other hand, where a large number of parts, say 1000 or more, are to be made, there is sufficient justification for making elaborate tools and jigs. Therefore, it is in the production of a relatively small number of individual parts that this process will be most economical. Its usefulness also will depend somewhat upon the complexity of a given layout. Obviously, a simple layout consisting only of a few lines and holes would scarcely justify going through the photographic process even if a large number of parts were needed. On the other hand, some layouts may take quite a few man-hours and a substantial saving could be effected by a photographic process. Furthermore, along with the layout, many kinds of data, such as various identification numbers, and detailed instructions for subsequent operations, can be applied direct to the part to be fabricated. Once the drawing has been checked for accuracy, there is no possibility for mistakes to be made in reproductions.

Automatic Welding Fabricates Aluminum Parts

Automatic carbon arc welding is said to be the only method by which vitally needed aluminum parts for military bridges can be fabricated on a mass scale. Welding equipment used for this project is a product known as Electronic Tornado, manufactured by Lincoln Electric Co., Cleveland 1. Process is claimed to have been established as standard procedure where volume output is required in fabricating industrial and war essentials such as tanks, boilers, piping, automotive parts and various machinery items.

This welding method has been so satisfactorily applied to production of aluminum parts for special military bridge structures that 35 engineers representing 14 firms from 9 states have been attending a course on application of this product in automatic welding of aluminum conducted by the company. Study of manual shielded arc welding of aluminum is included in the course.

—o—

Reprint No. 37, describing feedwater treatment in 1400-pound pressure boilers installed at Dow Chemical Co.'s Midland, Mich., plant is available from Cochrane Corp., Seventeenth and Allegheny, Philadelphia 32.

A NEW METEOR ZOOMS ACROSS THE TOOL GRINDING SKY

SUPER-CUT
TRADE MARK
REG. U. S. PAT. OFF.

PRESENTS

TWO DIAMOND WHEELS IN ONE—FOR GRINDING AND FINISHING

•

PATENT APPLIED FOR

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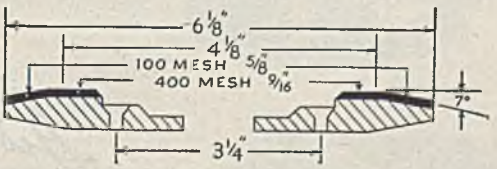
There's a fundamental COST CUTTING IDEA behind the perfection of the Dual Purpose Super-Cut Zurium Bonded Diamond Wheel. By a slight angling of the side or point of a carbide tool, it can be consecutively rough ground and super fine-finished in 6 seconds without even a shift of the operator's position.

NEW, BIG SAVINGS RESULT: There's no time and steps wasted for wheel change-over. With super fine-finishing added, better tool grinding is achieved. Tools stay sharp longer and last longer. Less grinding machines may be needed and thus floor space is saved.

There's no need to tolerate the quicker dulling of tools, rough ground only, when Dual Purpose Super-Cut almost automatically eliminates this costly condition. This wheel is also highly successful on quartz glass and ceramics.



This shows the close relationship of the two separate grinding surfaces. The outer (beveled) surface contains layers of coarse diamonds (100 mesh) for grinding. The inner (flat) surface is built up of fine diamonds (400 mesh).

EXCLUSIVE—
DIAMONDS BONDED TOGETHER BY THE EXCLUSIVE ZURIUM PROCESS—locking the diamonds securely in the matrix—layer upon layer

WRITE TODAY for complete information, literature, and demonstration of Super-Cut Zurium Bonded Diamond Wheels. Sold only through authorized distributors and representatives, and always under the name "Super-Cut."

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Stronger Die Castings

(*Continued from Page 95*)

provements referred to here have not been confined to test bars alone. Members of the die casting industry have continually striven to improve the art and the results of their efforts are reflected in the properties of the commercial castings being produced today.

The influence of die design on the soundness and uniformity of die castings was discovered while attempting to bring about a reduction in the number of specimens required to obtain significant results for routine tests. Description of this study was presented by G. I. Werley, American Society for Testing Materials, Volume 37, part 1, pages 233-255.

At the time the work was started a statistical analysis showed that 40 impact bars were required to obtain an average within plus or minus 10 per cent of the average of a very large number of specimens. Some of this nonuniformity of properties was due to the presence of porosity in the test bars.

The die design changes consisted of alteration in sizes of gates, vents, and overflow wells. Collectively, these changes improved the soundness and uniformity of the test bars. In addition, each individual change which improved the soundness and uniformity also increased the impact strength and to a lesser extent the hardness, tensile elongation and tensile strength.

Die Design Changed

Die design changes were made in the test bar die until (1) the castings showed no porosity in the test sections under radiographic examination, (2) the impact bars had the same strength at 21 degrees Cent. for both the gate and vent halves of the 6-inch bars, and (3) the average impact strength of any five bars taken at random was within plus or minus 10 per cent of the average of a large number of specimens.

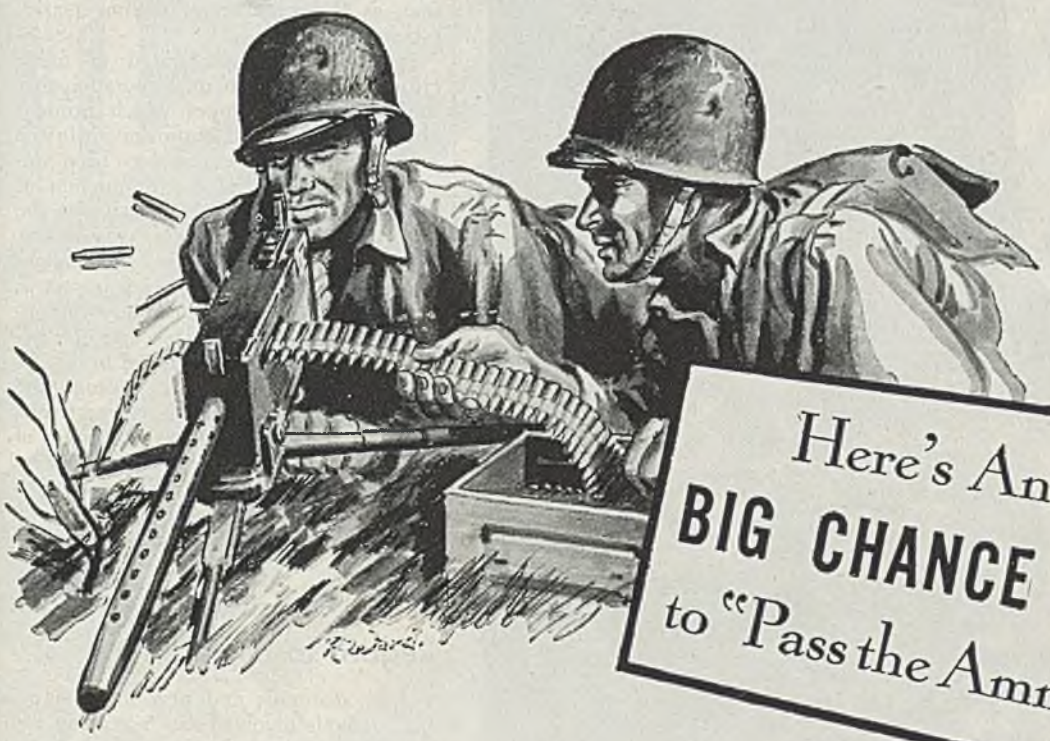
Changes in die design were made in individual small steps in order to study the effects of each change. This made it possible to recognize when the optimum condition for each type of change was reached. When the castings met the above requirements it was found that the depth of the gate had been increased from 0.03 to 0.08-inch; the depth of the runner to the overflow well had been increased from 0.03 to 0.09-inch; and an overflow well had been added and increased in size until its capacity reached 0.6-cubic inch.

These changes brought about the improvement in mechanical properties shown in Table II.

In order to require only color buffing prior to plating, recent years have seen a marked tendency toward the production of zinc alloy die castings possessing the so-called "hardware finish." This term is used to designate an exceptionally smooth surface suitable primarily for plating.

In many cases such a finish was attempted merely by raising the die tem-

TO COMPANY PRESIDENTS:----------



Here's Another BIG CHANCE FOR YOU to "Pass the Ammunition!"

Today—thanks largely to you and other industrial executives—22,000,000 civilian workers are speeding victory and achieving postwar security through the Payroll Savings Plan. Over 60% of the 6th War Loan subscriptions came from this source—and, between drives, this forward-looking plan has been responsible for 3 out of 4 War Bond sales!

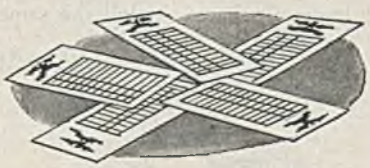
Good as this record is, the Payroll Savings Plan can be still more effective. Believing this can best be accomplished by giving Bond buyers a definite idea of the many benefits accruing to them, the War Finance Division has prepared a variety of active aids for employee education.

This new "ammunition" includes:

a—An entertaining, swift-paced moving picture, graphically showing the importance of buying—and holding—War Bonds.

b—An interesting, easy-to-read booklet, explaining how War Bonds may be accumulated to provide education for children, homes, retirement incomes, etc.

c—Attractive, handy War Bond envelopes, enabling Bond holders to note each separate purchase—and the specific purpose for which each Bond or group of Bonds was bought.



Passing this particular ammunition requires that you reappraise your own company's Payroll Savings Plan. Have your own War Bond Chairman contact the local War Finance Committee—today! They will welcome the chance to discuss this new program with you.

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

perature. However, this was a questionable and costly expedient because the temperature required was so close to that which produced other surface blemishes such as shrinkage areas, shadow marks, pits, and the like.

It has been demonstrated in many critical dies in commercial operation that the die design changes which brought about such a marked improvement in the mechanical properties, as has been described, also allowed the production of the desired hardware finish *without the necessity of raising the die temperature.*

Obviously the die design changes made in the commercial dies were not as drastic as those found necessary for optimum conditions in the test bar die, because of the difficulty involved in removing gates and runners measuring 0.08 and 0.09-inch in thickness, respectively.

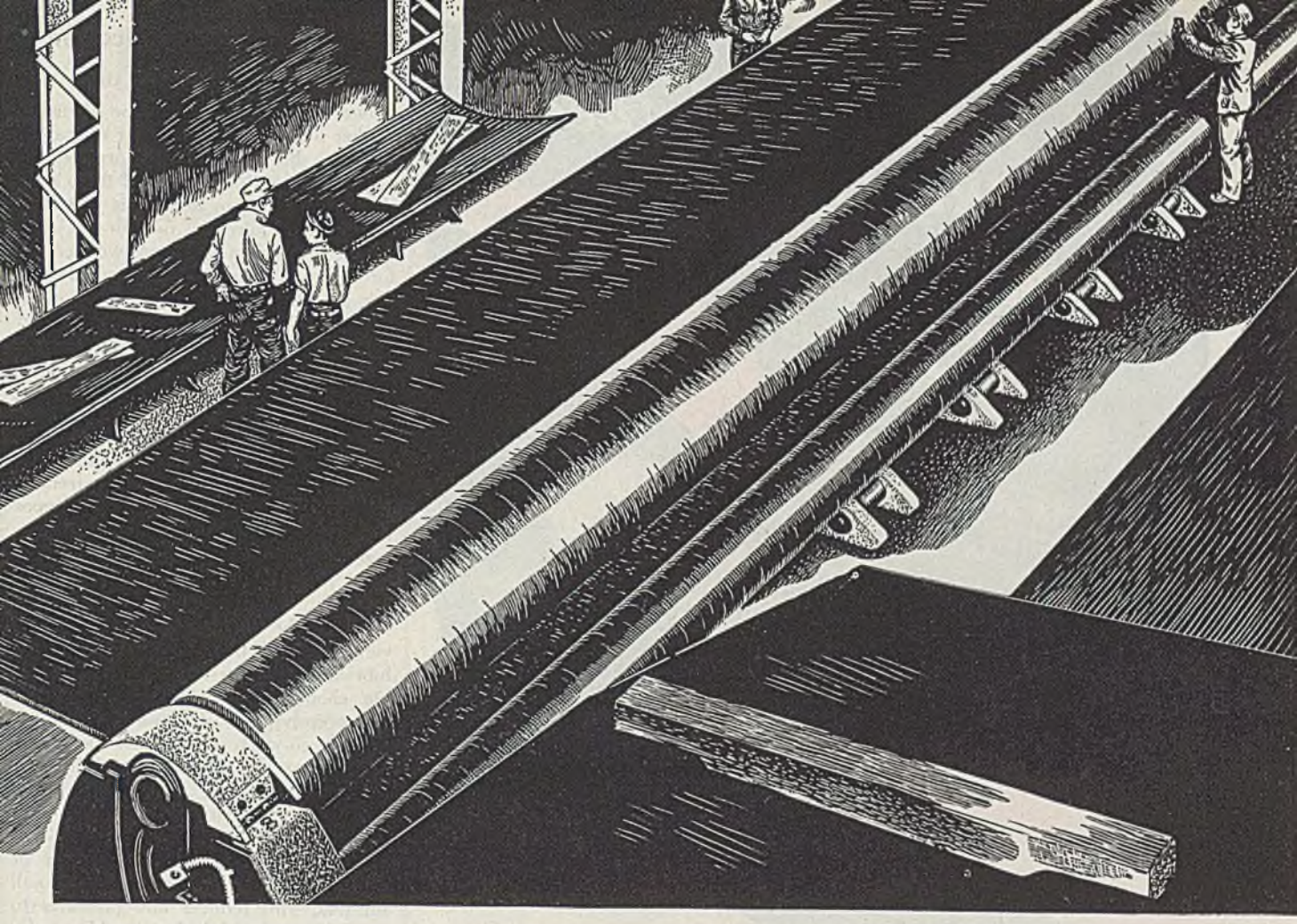
It was found that gates and runners of 0.05 to 0.06-inch in depth did not present unusual cleaning difficulty and that such changes aided materially in producing the desired finish on the die castings.

Alloys Classified in Regard to Explosibility

New materials and new manufacturing methods involved are increasing fire and explosive hazards of industrial plants, according to the Bureau of Mines, Department of the Interior, Washington 25, D. C. Laboratory and pilot plant tests prove that synthetic resins, metal powders, wood dust, and many other finely-divided substances can form explosive mixtures with air. A concentrated cloud of one of these dusts suspended in air needs only an ignition source of sufficient intensity to start combustion—spark from a tool or shoe nail, match of a careless smoker, welding or cutting flame, friction heating, or static electricity.

As a basis for development of safe operating practices, the Bureau recently tested and classified according to their explosibility more than 50 metals and alloys, including aluminum, iron, magnesium, and zirconium; and more than 50 synthetic resins and powders used in the plastic industry, including phenolic, urea, vinyl, and a number of molding compounds. Similar information is available for more than 130 carbonaceous dusts, including coal, grains, woodflour, powdered milk, spices, powdered sugar, drugs, and insecticides.

Methods outlined for preventing dust explosions include good housekeeping, equipment to collect dust at point of origin, and elimination of all possible sources of ignition. Several Bureau publications, including information circular 7309, "Industrial-Dust Explosions," are available. They present results of laboratory experiments with different groups of explosive dusts and refer to explosion prevention codes prepared by the Dust Explosion Hazards Committee, functioning as a technical committee of the National Fire Protection Association and as a sectional committee of the American Standards Association.



Hatching a HEAVYWEIGHT

...Huge Plate Roll Fabricated By Thermit Welding

You're looking at a large bending roll that functions above two smaller bottom rolls as a unit for forming steel plate. Fabricating this heavyweight roll threatened for a time to be a major difficulty. Few foundries were available that could make a single casting of the required size: 38 feet long by 31½ inches in diameter and 50 tons in weight. The problem was solved by making two castings of about 25 tons each and uniting them by Thermit welding.

It's Thermit welding's ready adaptability for such heavy tonnage jobs that makes it so suitable a process for both fabrication and repair of large castings and forgings.

Thermit welding joins smaller parts into large units to save time, money, shipping and handling problems. There's no limit to the size of a Thermit weld—no need for pre-heating or stress-relieving—no need to worry about the strength or permanence of the weld, for it's as strong as a forging of the same cross-section. And Thermit welding can be done in your own plant, by your own crew, under M&T supervison, or at the following Metal & Thermit Corporation Branches: Jersey City, New Jersey; Chicago, Illinois; Pittsburgh, Pennsylvania; or South San Francisco, California.

Thermit Welding

Deep Drawing Lubrication

(*Continued from Page* 104)

is one form of wear as will be discussed further in the section on wear of metals. Another difficulty that is experienced when relatively thick films of these nonductile deposits are formed, is that high forces are required to deform the nonductile deposit. In other words, the force required for stress deformation of the lubricant or lubricant friction is high. This may frequently be reduced by the addition of a suitable polar lubricant, but it is preferable to utilize an extreme pressure lubricant, in which reactivity is not too great, coupled with a polar lubricant for best results under most operating conditions. When the tendency toward welding is extremely great, however, the most reactive types must be used, but the other disadvantages also will be obtained.

Smoothing of Surfaces

While the more commonly accepted view of the action of extreme pressure lubricants involves the formation of stable chemical compounds, a hypothesis has recently been advanced by Beeck[38] and his co-workers in which the action is considered to be one of polishing of the metal surfaces. According to this hypothesis, low melting eutectics are formed by reaction with the lubricant which then flow under the influence of applied pressure to form very smooth surfaces. This reduces unit pressures to a great extent and thus enables polar lubricants to become sufficiently effective to supply adequate lubrication. It appears that the smoothing of surfaces is one action of extreme pressure lubricants.

Any material that tends to prevent metal surfaces from welding under conditions of high pressure and temperature may be considered to be an extreme pressure lubricant. If this concept is accepted, then thin films of dissimilar metals which are sometimes interposed between metal surfaces as, for example, copper or lead in the case of steel surfaces, or chemically inert fillers such as chalk or talc may be considered as extreme pressure lubricants.

Pertinent to the use of dissimilar metals as extreme pressure lubricants, it has been found (Table II) that the coefficient of friction (unlubricated) is lower when dissimilar metals are caused to slide upon one another than when the sliding metals are similar. This apparently is due to a decrease in the tendency toward welding, which might be due to differences in crystal structure. It generally is advantageous to utilize films of ductile metals so that frictional resistance due to the lubricant is not very great. While the coefficient of friction is reduced by the use of films of dissimilar metals, the values are still sufficiently high so that they must be used in conjunction with other lubricants, es-

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Two questions: (1) how many of these ten simplified operations are important in your business? (2) how many could be handled faster, better, at lower cost—*with temperature controlled* by application of air conditioning, refrigeration or heating equipment?

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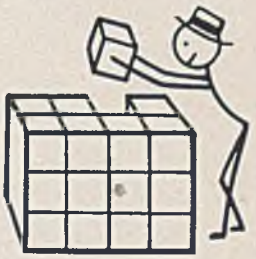
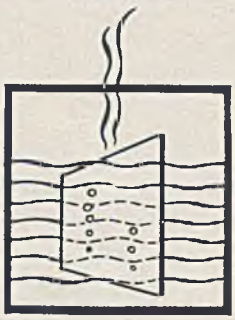


STORE



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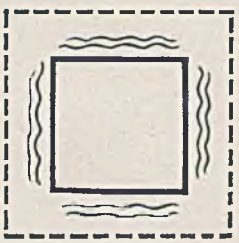

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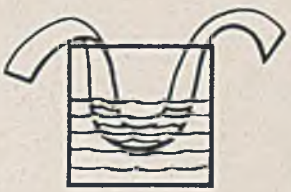
MEASURE



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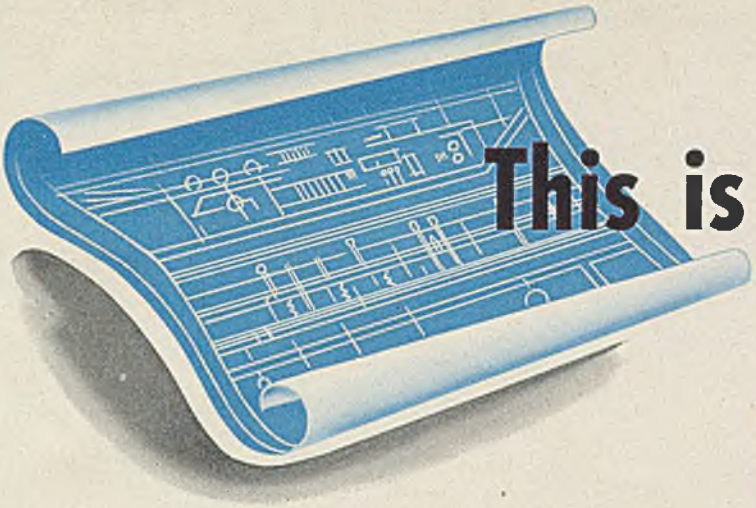

This is one of the

MOST steel mills grow and expand through the years. It is hard to plan ahead for a half century and leave space for all the things that may develop, so there often isn't enough room for long-established mills to maintain a perfect production arrangement. But at this steel mill, engineers were "given their heads" and allowed to plan the most efficient lay-out they could, and to build it all at once.

The coke plant comprises 252 Koppers-Becker Underjet Ovens with Waste-gas Recirculation in four batteries. The last of these recently went into operation. Two of these batteries may be underfired with blast-furnace gas or coke-oven gas as required to maintain the fuel balance of the mills.

The coke plant includes complete Koppers coal- and coke-handling systems, a byproduct plant, a Koppers Vapor-recirculation Dephenolization unit, a Koppers benzol plant equipped to produce motor fuel and nitration-grade light oils, a naphthalene plant, and two Koppers waterless gasholders, one with a capacity of 500,000 cu. ft. and one of 1,000,000 cu. ft.

The ovens carbonize 1,800,000 net tons of coal per year, and make 1,132,000 net tons of coke, 20,000,000 gal. of tar, 24,000 net tons of ammonium sulfate, 4,600,000 gal. of motor fuel or benzol, 1,140,000 gal. of toluol, 320,000 gal. of xylol, 265,000 gal. of heavy solvents and 265,000 gal. of naphthalene, and over 20 billion cu. ft. of gas.

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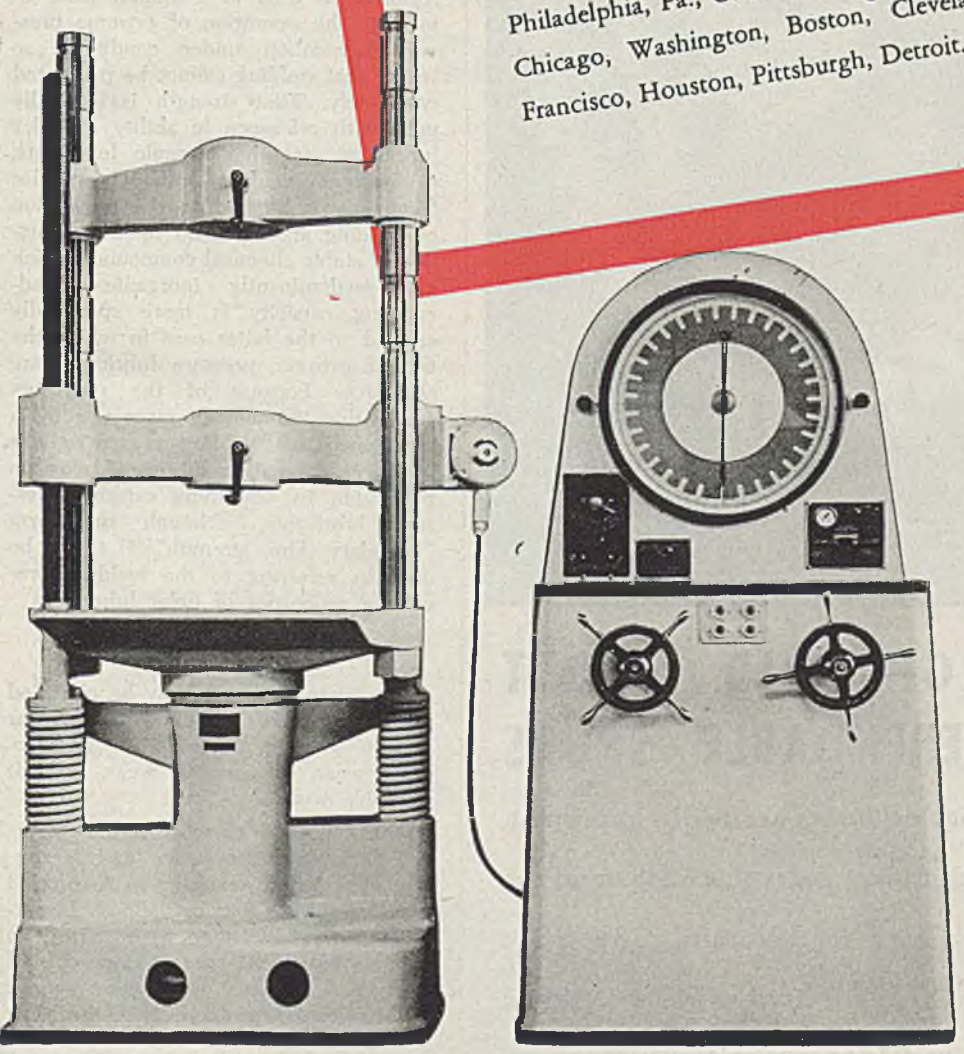

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CONTROL: Controlled rate of loading, controlled head speed, and automatic load maintainer.

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BALDWIN

TESTING EQUIPMENT

pecially in order to provide a weak link in the metal-lubricant-metal chain at which slippage is facilitated.

Another method that may be used to keep metal surfaces apart involves the use of chemically inert fillers, such as chalk or graphite, which become trapped between the metal surfaces under certain sliding conditions and thus serve as mechanical separators. Certain fillers that have weak cleavage planes, such as graphite or talc, have lower lubricant friction than those that pulverize under high pressure (as does chalk), but tend to be less efficient mechanical separators.

In discussions on extreme pressure lubrication, three terms are widely used: (1) Anti-weld activity, (2) film strength, and (3) load-carrying capacity. Of these terms, anti-weld activity, the most descriptive, is used in a limited sense to indicate the operation of extreme pressure lubrication under conditions so severe that welding cannot be prevented completely. Film strength is generally used with reference to ability of polar lubricants, or other organic lubricants, to prevent welding, although it also frequently is applied to the prevention of welding accomplished by the formation of stable chemical compounds which are predominantly inorganic. Load-carrying capacity is more specifically applied to the latter case in which the typical extreme pressure lubricants are operative. Because of the confusion which this terminology gives rise to, a term such as "welding preventive" or "welding prevention lubricant" may be preferable in describing extreme pressure lubricants, although the term "boundary film strength"[36] may be used in referring to the welding preventive properties of polar lubricants.

Wear of Metals

The wear of metals may be classified into four types, as follows: (1) Wear due to welding, (2) oxidation or reactivity wear, (3) abrasive wear, and (4) corrosive wear.

The first type of wear is due to insufficient weld preventive and is usually quite rapid, resulting in tearing of the surfaces (scoring or galling). In certain cases, the action is localized in that a scratch is gouged from one of the metal surfaces or a piece of one metal surface is welded on to the other surface. In order to utilize these surfaces commercially, it usually is necessary to remove the scratch or built-up metal by means of polishing or grinding. This grinding process results in the removal of metal from the entire surface—indirect result of welding wear.

The second type of wear is called oxidation wear by Fink[39] and also has been investigated by other workers[40, 6]. This is considered by the writer to be a more universal phenomenon than Fink recognized. It is believed that the designation of "reactivity wear"

How to *prevent* Corrosion

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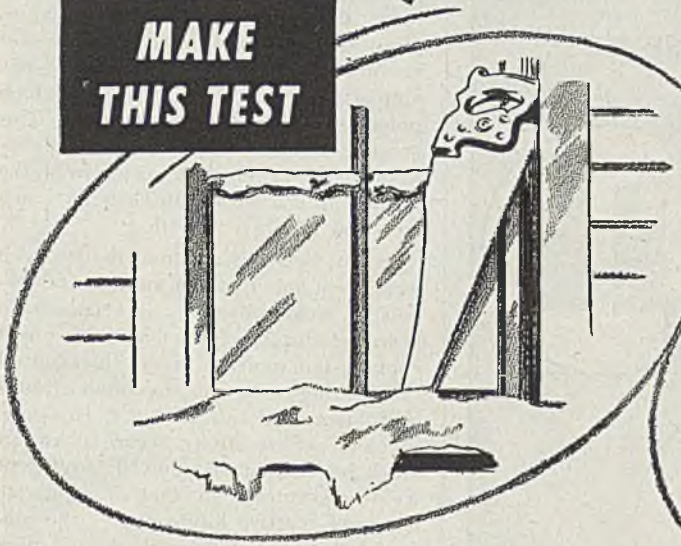

Coat a section of any piece of raw metal with a protective film of Anti-Corrode. Place it out-of-doors, and leave exposed to the elements.

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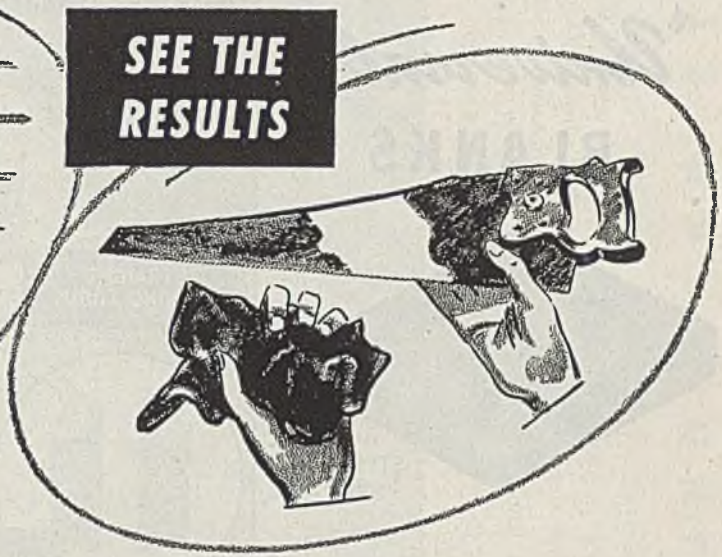

Rain, snow, changing temperature, dust and grime have eaten into and oxidized the unprotected metal. But note surface under Anti-Corrode film—bright and unharmed, in its original state.

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would be more appropriate. This type of wear is due to the formation of relatively thick films of oxide, sulphide, chloride, or phosphide by reaction with a reactive extreme pressure lubricant. These films being rather brittle, are displaced from the metal surface when the more ductile metal beneath them is plastically deformed. Since an excess of reactive lubricant is available, a new film is formed almost immediately which prevents welding from taking place. This process, if continued for some time, results in the removal of metal from the surfaces at a uniform rate, leaving a surface that is rather smooth.

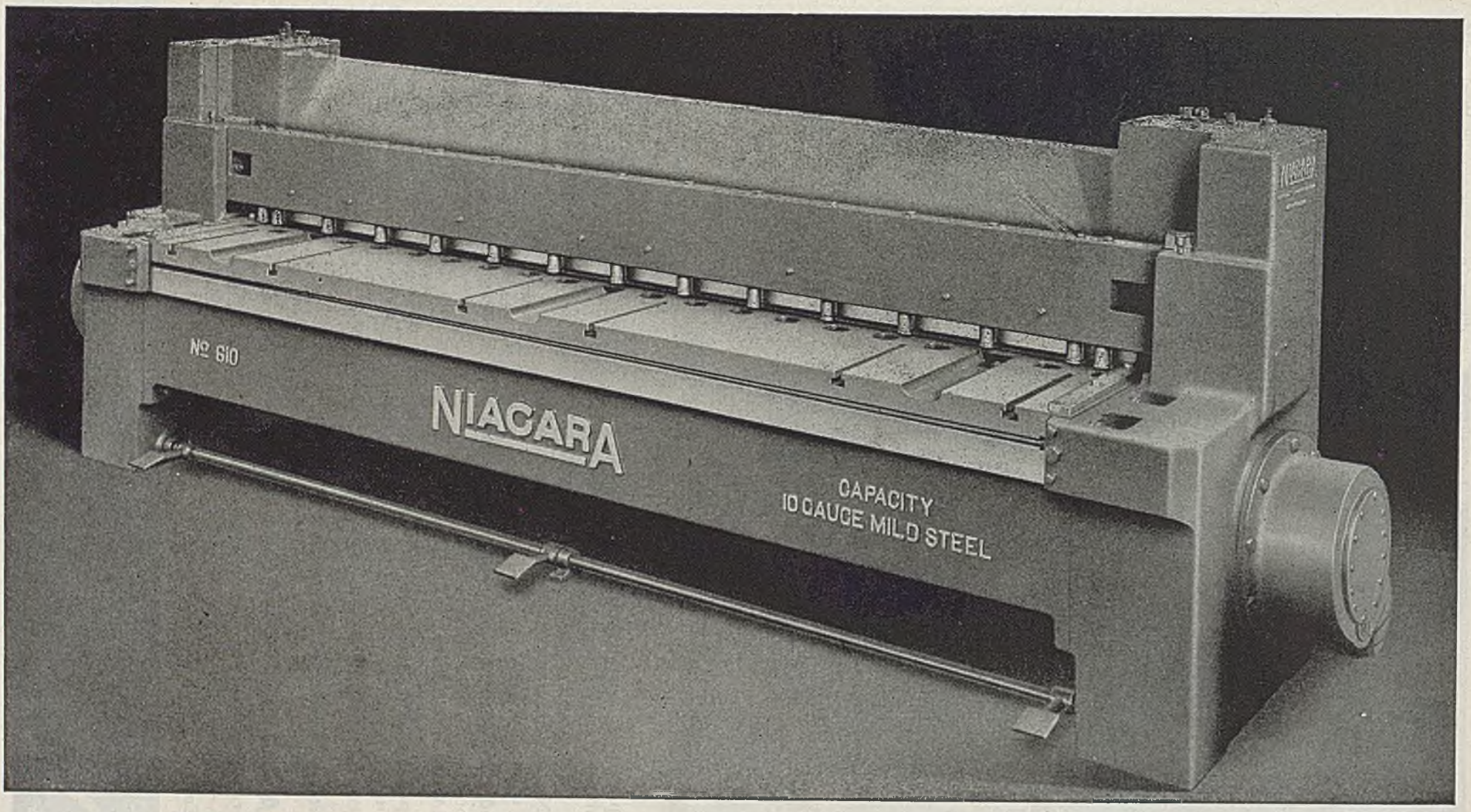
It thus becomes apparent that to keep wear to a minimum, a sufficient thickness of weld preventive is necessary to keep the surfaces from making frequent contact, but increase in the thickness of the coating over this minimum results in an increased rate of wear. However, the rate of reactivity wear is usually much lower than that due to insufficient weld preventive, so that a moderate excess of reactive lubricant is to be preferred to any deficiency. In a great many applications, the thickness of stable compound necessary to keep the metal surfaces sufficiently far apart. so that a low rate of wear due to welding is obtained, is so small that the coating is invisible to the unaided eye.

Possible Alternate Methods

Another method that may be utilized to a certain extent in reducing the rate of reactivity wear involves the adsorption of a film of polar lubricant in addition to the weld preventive. This serves to provide a region of easy slippage within the lubricant so that the tendency for displacement of the brittle deposit of stable compound is reduced.

A mechanism of wear reduction recently has been advanced[38] in which it is postulated that, by the action of certain lubricants in removing surface irregularities, the unit pressures and rate of wear are reduced. To a certain extent this concept is equivalent to the concept of wear given above, since this smoothing action may take place by virtue of the formation of stable chemical compounds on the surface, followed by removal of the high spots by displacement upon repeated contact. Because of the excess of the extreme pressure lubricant, however, this action is localized and as soon as a high spot is knocked off, a protective film reforms and prevents welding. The proponents of the concept of reduced wear due to smoothing of surfaces, however, ascribe this effect to the formation of low melting eutectics that flow readily and thus form very smooth surfaces.

A great many wear studies have been performed for unlubricated surfaces, or at least surfaces that are not consciously lubricated in order to determine the wear resistance of metals and coatings on sliding surfaces. Under these con-



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ditions, wear has usually been considered as abrasive in nature, that is, a harder surface causes the chipping off of portions of the softer surface with which it makes contact. However, many of these wear studies may have been faulty in the respect that there is no control of lubrication. Usually surfaces are used that are covered with layers of oxide or water vapor of greater or lesser thickness and these determine whether welding or reactivity types of wear will occur. However, these wear studies have determined that softer metals wear more than harder metals, although a great many exceptions exist to this relationship. This is probably related to the experimental fact that soft metals weld more readily than harder metals (Table II). One series of investigations has indicated that the melting point of the metal rather than the hardness determines the rate of wear[19], indicating that something more than abrasion is involved. Chromium plate and sintered tungsten carbide have been found to be highly wear resistant materials. At least part of this is due to resistance of these surfaces toward welding. This is partially due to the hardness of the surfaces and partially to the fact that when they are used there is made available a surface which is dissimilar in chemical composition to the other rubbing surface. The hardness of chromium plate and tungsten carbide also results in greater abrasion resistance but this hardness is coupled with considerable brittleness which is detrimental.

Corrosive Wear

Another type of wear is corrosive wear. In this condition, parts that are in intermittent sliding contact are corroded by exposure to a corrosive environment and during the sliding contact the corrosion products are displaced from the surface. In many cases this type of wear may be reduced by the use of protective finishes such as chromium plate or by the use of rust inhibiting oils. Corrosive wear is most frequently a result of the development of an acidic environment. This may be due to fatty acid present in the lubricant or formed by oxidation of mineral oil, hydrolysis of sulphur or chlorine-bearing lubricants to form hydrosulphuric or hydrochloric acids, solution in water of the products of combustion of fuels to form carbonic and sulphurous acids, etc. In the last case, wear of engine cylinders has been ascribed to the condensation of these acids on the cooler portions of the cylinders resulting in corrosion. In some cases, corrosion does not become appreciable until the surfaces are in sliding contact, as the corrosion products ordinarily protect the surface from further corrosion. An example has been cited by Wise[41] that clearly illustrates this point. Base metal alloy fountain pen points resisted corrosion by ink under static conditions but when rubbed against

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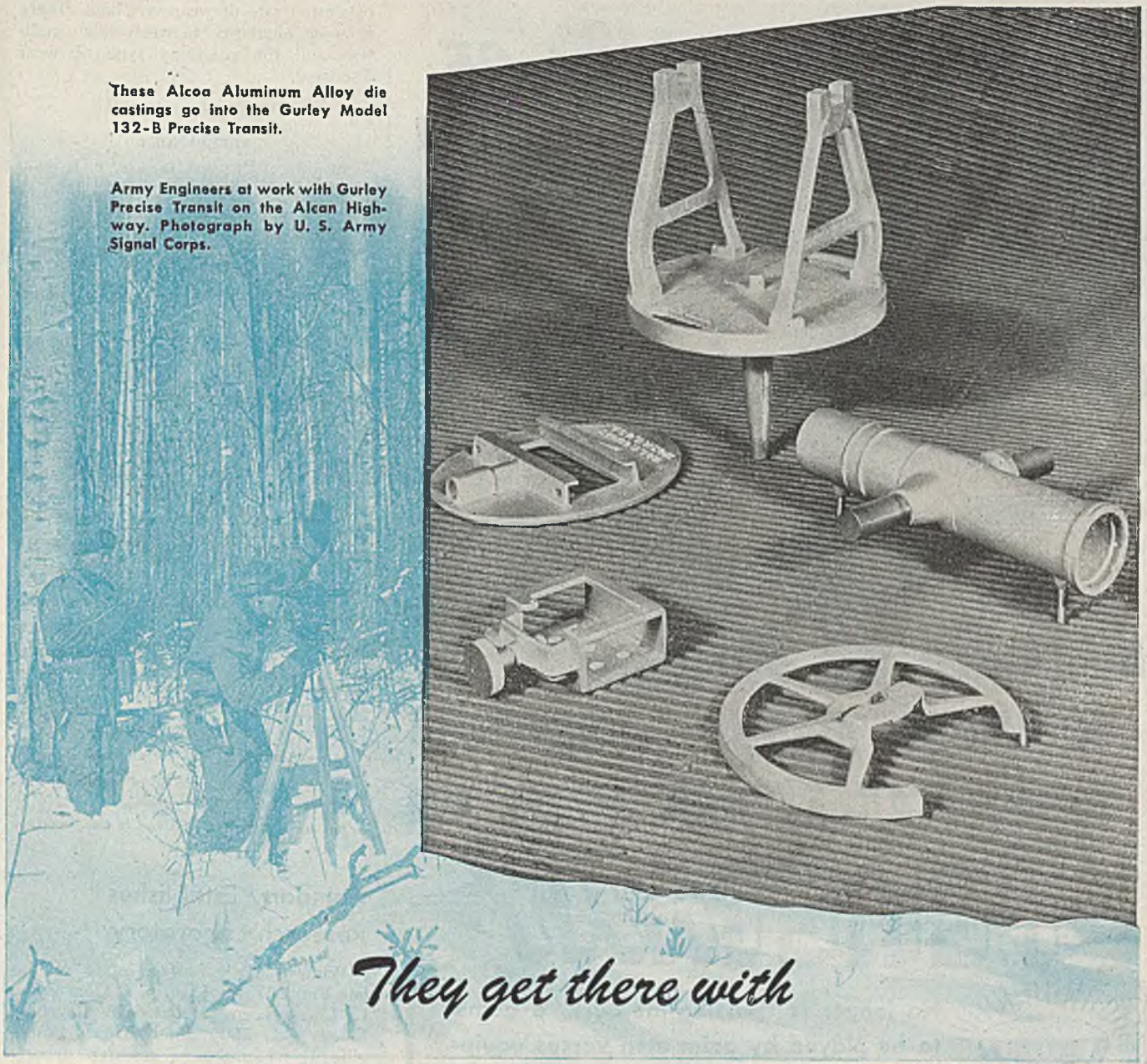
Army Engineers at work with Gurley Precise Transit on the Alcan Highway. Photograph by U. S. Army Signal Corps.



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Surveyors "stay on the beam" when they're working with this Gurley Precise Transit. Accurate when it leaves the factory, it stays that way, for the dimensions of these aluminum alloy parts are permanent. There's no creeping or growth when die castings are made of strong aluminum alloys.

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paper the rate of wear was high. There is some similarity between this condition and the reactivity type of wear discussed.

(*Continued next week*)

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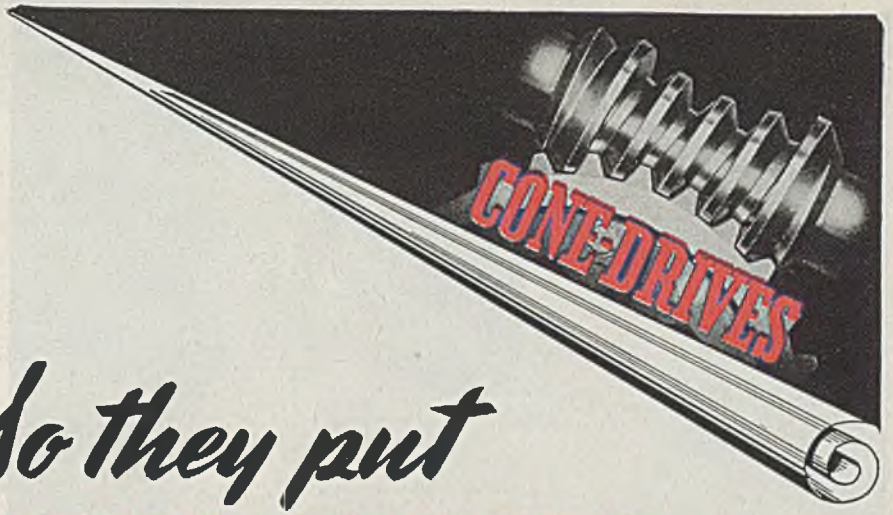
Company Establishes Research Laboratory

Winfield Hall, former estate of the late Frank W. Woolworth, at Glen Cove, L. I., has been purchased by Reynolds Metals Co., 2500 South Third, Louisville 1, for use as a research department. Work is now under way to convert one of the buildings, a two story and basement structure, into a composite modern laboratory and administration building.

To be housed in the same building is a library and information center which will function for the benefit of the research staff and various Reynolds companies. One of the larger rooms with a seating capacity of about 150 people will be converted into an auditorium and lecture hall. There will be equipment for research in refrigeration, quick freezing, and further studies on use of aluminum foil in food and drug packaging.

When in full operation, the laboratory is expected to offer facilities for scientific and engineering research and development for all of the Reynolds companies and for manufacturers who are using, or contemplate using their products. It will be staffed by about 150 technicians. The laboratory also will have its own machine shop and corps of machinists.



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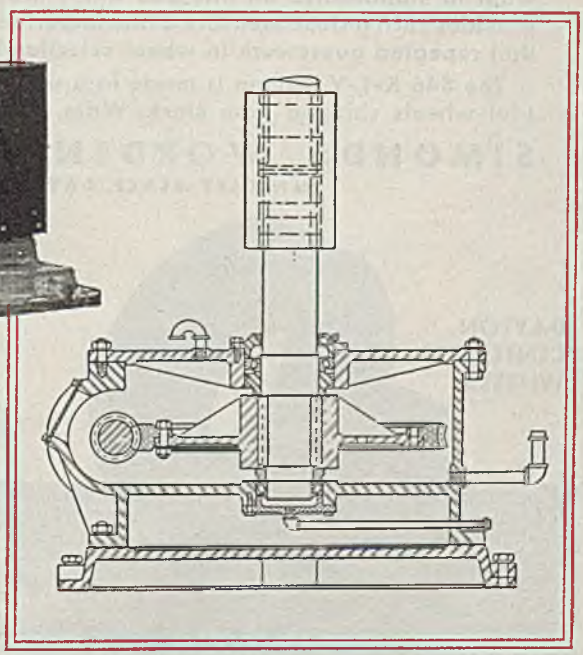

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Welding

(*Continued from Page* 115)

ects are ready to go ahead on a large scale as soon as materials are available. New practice, techniques and methods in structural design and fabrication will hamper the after-war program. New methods should come gradually, little by little, after the postwar program is well in advance.

"The war program has made fabricators conscious of their ability to take on work foreign to their past experience, and of the importance of work of large duplication. If every fabricator had a special article to make which would supply a continuous backlog, the fabricating industry would be highly benefitted. The idea of taking a job at any price in order to keep the shop running would be largely eliminated."

Takes Middle of Road View

A. R. Bergdolt, chief designing engineer for International Steel Co., Evansville, Ind., says:

"Without question the welding knowledge gained by structural shops in their wartime fabrication will be definitely carried on in peacetime fabrication. This practice, however, will bring up some factors that heretofore have not been seriously considered by many fabricators.

"It will not be sufficient merely to have trained all-position welders in order to produce satisfactory welded work of any or all description.

"In wartime operations too often the work has been of a continuous nature on any given particular job. A great deal of the work has been a duplication of the same item or similar items, which has not always meant diversification.

"It will be necessary for the aggressive fabrication shop to provide not only skilled and trained welders, but the proper welding technique as supplied by the supervisory force in the shop and supplemented by the engineer's knowledge of welding in design and also in detail.

"These factors must all be considered together, or the result will not be a good welding fabrication shop, and instead a shop without proper control and knowledge of the product that it is producing.

"As a result of the war work done in the fabricating shops, we should be able to carry into peacetime, methods that will permit closer tolerances, better fitting of steel in the field, and as a result, a better product. This is brought about by shops now producing work requiring much closer tolerances than were previously required.

"Due to difficult operations that have had to be performed, because the work being fabricated was not strictly structural fabrication, the fabricating industry as a whole would be in a position to

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● It is our conviction that the Copper Brazing (Hydrogen Brazing) process will continue to be used extensively in postwar metal product manufacturing, as it is so widely used in wartime. As the country's largest commercial copper brazing organization, our long and varied experience should prove beneficial to many manufacturers who wish to investigate the quality improvements and cost reductions which usually follow the adoption of this advanced fabrication method.

This service is intended chiefly to assist companies located so far from our plants that shipment is impracticable . . . or to aid organizations with such great volume that handling on a commercial basis is economically unsound.

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develop new methods of fabrication and, therefore, new products.

"In general, the fabricating shops should have gained a great deal of knowledge that should aid them materially in peacetime. Work has been produced in the shops that was thought impossible to produce before; it was done in larger quantities than had ever been thought possible; work was standardized, fabricated more along lines of production rather than job shop methods. These advantages cannot be thrown away and must be retained in peacetime operations."

Field in Prefabrication

These comments on welding are representative of engineering opinion. For many uses, notably in prefabrication, this method of joining will carry over. Great progress has been made in prefabrication. Large tonnages of cold-formed light gage steel have gone into war structures, hangars, barracks, storage buildings and others. This will also have a postwar influence, likely to stimulate demand for heavier sections rather than displace them. Light gages will be competitive with wood.

Frequently concern as to competition of lighter metals with steel is expressed, but these, although capacity has been tremendously increased, have far to go to meet steel on equal terms on a price basis. There is a railroad bridge under construction with a 98-foot single plate aluminum deck girder, but the owner is an aluminum producer. For most, such a girder would be too costly.

Spot Welding Discussed in Booklet

A new principle for spot welding of steel in heavy gages with a balanced three phase load is discussed in a booklet by Sciaky Bros., 4915 West Sixty-seventh, Chicago. All three phases of alternating line current are rectified to direct current and supplied to welding transformer through a system of reversing ignitron tubes. Tubes allow current to pass through the center tapped primary first in one direction, and then in the other. Thus the induced welding current in the secondary is a continuous alternating impulse of low frequency.

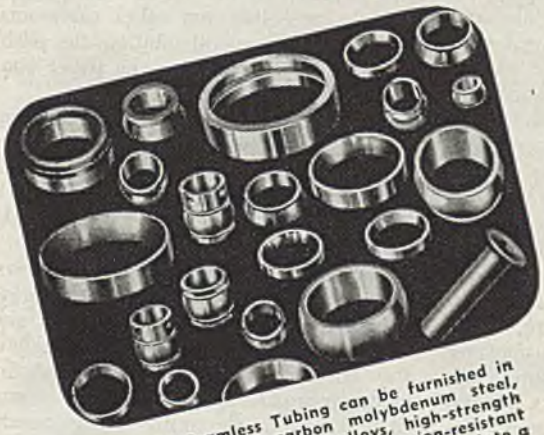
System helps overcome limitations encountered where single phase alternating current welders are subject to heavy loads. These are: Disturbance to the usual 3-phase supply by the unbalanced load, heavy reactive load which results in low power factor, and high power demand. Power installation and operating costs are said to be reduced by providing a balanced 3-phase load, operation at near unity power factor, and decreased power demand.

This principle has been satisfactorily applied to seam welders for aluminum, heavy duty projection and flash welders, according to the company.

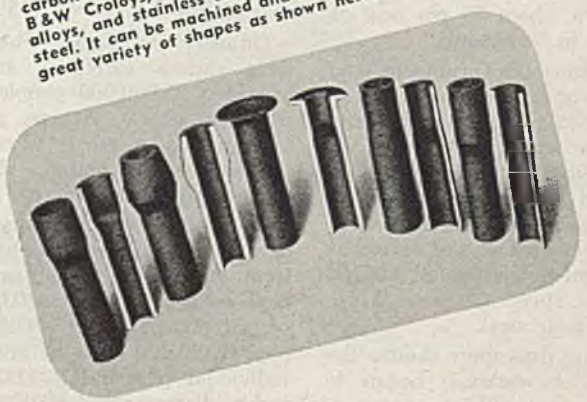
Photo by U. S. Army Signal Corps.

B&W Mechanical Tubing is being used by the Armed Forces for gun mounts, tank and tractor parts, rockets, burster shells, ammunition containers, fragmentation bombs, range finders and CO_2 bottles.

"on target"... WITH B&W TUBES



B&W Seamless Tubing can be furnished in carbon steels, carbon molybdenum steel, B&W Croloys, S.A.E. alloys, high-strength alloys, and stainless and corrosion-resistant steel. It can be machined and formed into a great variety of shapes as shown here.



Anti-aircraft gunners depend on the accuracy of this range finder to get them "on target." Many tube users are depending on Babcock & Wilcox to get them "on target" when it comes to selecting the tubing best suited to their mechanical needs. They know that from B&W they can always be certain of getting *unbiased* recommendations on their tube problems. That's because B&W furnishes tubing for practically any mechanical requirement, and is therefore in a position to match tubing to individual jobs without prejudice toward any type.

So, if you have a mechanical job for tubing to do, and if you're in doubt as to what type to choose, let B&W engineers help you select the right one. Their impartial advice is backed by more than 20 years of tube engineering and manufacturing, plus research that has produced a long list of "firsts" in tubing development.

B&W TUBES

SEAMLESS. Complete range of carbon and alloy steels
Sizes: ⅛ in. to 8⅝ in. O.D.

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B&W MAKES BOTH

TA-1389

Steel Mill Canteens

(*Concluded from Page* 109)

for an order to come out of the front office to move a pile of lumber or a pile of scrap in order to make room for a small wooden shanty that would serve as a snack shop with everything displayed out in the open regardless of flies and insects. But today all is changed. A well-designed building housing the cafeteria or the canteen graces a choice spot centrally located in the plant. All food is wrapped, kept under glass, or covered —never permitted to come in contact with the soot, grime, graphite and flue dust that permeates the atmosphere around a steel mill.

The outstanding feature of Factory Stores' canteen operations has been in the establishment of numerous compact, self-contained units at strategic locations throughout the larger steel mills. With plants that cover from 400 to 1500 acres, this principle cuts down travel time and insures hot food service through as many as 13 small units, each with its own cooks and kitchens, in a single plant.

Units Are Compact

The canteen units range in size from 12 x 13 feet to 30 x 60 feet. Each building includes a kitchen, a large refrigerator, precoolers for soft drinks, and show cases in which are displayed such items as work gloves, caps, shoe strings, hand soap, tobacco, soft drinks and milk. The remaining space is devoted to customer lines and stools. Each canteen has its own cook and various items on the menu are cooked fresh for each shift.

The company considers the sale of such things as shoe strings of prime importance. A knotted lace in the eyelets of a worker's shoe often turns out to be a hazard and, therefore, every means is taken by the canteen manager to have an ample supply on hand. As to the matter of stools, only a limited number is installed in the canteens. Inasmuch as the workmen are not encouraged to sit down, about 75 per cent of the food sales is in "carry-outs."

Employe patronage of canteens and cafeterias varies at different plants ranging from 60 to 85 per cent. Workmen come in crowds when the whistle announces lunch time, but at other periods during the turn the groups are spread out. Many of the men whose wives work in war plants now eat at the cafeterias or canteens when they come on and off shift rather than spend the time in going uptown for their meal.

As the working days grew shorter the existing habits of workmen began to change and their health to improve. They carried fewer sandwiches. Industrial lunch rooms, quick to discern the change, then supplemented the food in the worker's lunch box by something hot, even though his duties involved only the operation of a light machine.

The eight-hour day boosted supplementary hot foods. Factory Stores' type of take-out service was particularly equipped to fill this fast-growing demand.

"Runners"—men recruited by groups of steel workers from their own ranks, take the food back to the men on the job in sanitary covered paper containers specially treated to keep food hot for 20 minutes.

The runners handle from five to 20 orders in individual departments. Orders total about $4, an average of about 22 cents per lunch.

Coupon books may be purchased and are in demand because they assist the workmen's wives in budgeting their household expenses. Cost of the books are deducted from their pay.

Orders include variations of soups, hot and cold drinks, tomato and fruit juices, jello, cole slaw, salads, puddings, canned or fresh fruit and canteen "specials" of meat, stews, macaroni, pork and beans, etc. Within the paper bags containing each individual order is placed a copy of the menu for the next day, giving the canteen specials and other items along with the respective prices.

Before the paper service was inaugurated, any old tin can or pail was used to carry coffee and other drinks from the canteens to the mills. This soon became unsanitary and so a quart-size tin pail was pressed into service; this was followed by one made of aluminum —both for coffee and other carry-outs. After years of experimentation, the problem was solved by using the paper container.

The company finds that a strict regard for the workmen's eating habits pays off for the employer in greater satisfaction, increased production and a better working spirit and to itself, frankly, in a profitable business.

Winter months call for soups, stews, and vegetables. Summer months bring a constant demand for raw lemons and salt. In fact, many of the salt cellars that once bedecked the counters of the canteens or cafeterias are now permanent fixtures out in the mills where sweaty men perform their manifold duties in the heat of the day.

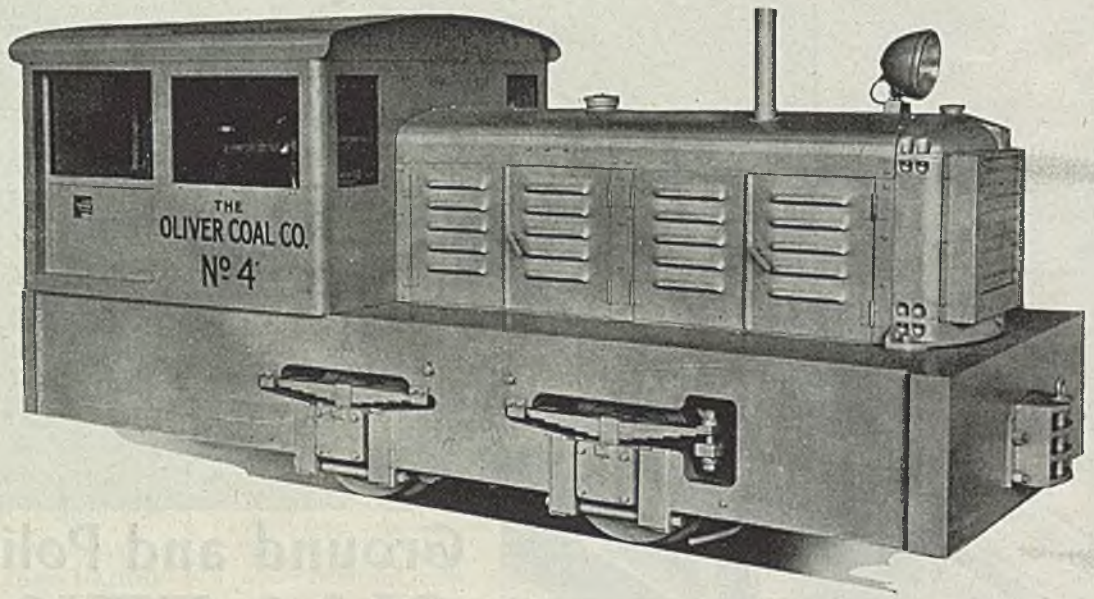
Officials of Factory Stores estimate their various cafeterias and canteens have fed 75,000,000 people during the past two years. At one plant in the Chicago district, where 12 cafeterias and canteens are operated, about 35,000 workers are fed daily.

The following figures give some idea of what steelworkers purchased in 1944 from the cafeterias and canteens operated by the company: 20,000,000 cups of hot chocolate, 25,500,000 bottles of pop, 3,120,000 pints of milk, 2,000,000 individual pies and 575,000 pies of 9 inches diameter and 50,000,000 cups of coffee.

—o—

A new bulletin describes a shuttle type chuck for locating part by small gear and worm while machining bore and both ends at one chucking. Manufactured by Garrison Machine Works Inc., Dayton 7, this chuck is said to insure close concentricity of all finished surfaces.

No Idle Chatter



Whitcomb Locomotives have been making low cost haulage records in scores of industries for over 35 years. Their rugged simple construction insures long life with peak performance and low maintenance cost.

You can be sure of obtaining these advantages when you purchase a Whitcomb Locomotive. Many satisfied users praise their merits. Mr. R. C. Oliver, General Superintendent, says, "We find the unit satisfactory in every respect. Very economical on fuel and handles heavy loads with ease."

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILLINOIS

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HELPFUL LITERATURE

1. Oxyacetylene Pipe Lines

Air Reduction—12-page illustrated booklet "Oxyacetylene Pipe Line Installations" covers typical oxyacetylene pipe line plans for various sized plants. It discusses advantages of gas piping systems for medium and large volume users of oxygen and acetylene for welding, cutting and other flame processes.

2. Thread Inserts & Service

Aircraft Screw Products Co., Inc.—Bulletin No. 240 illustrates and describes Heli-Coil insert kits which are used to repair and replace stripped and oversize tapped NC threads. Bulletin No. 260 describes production, maintenance and salvage use of these inserts in a prominent airline shop.

3. Self-Lubricating Bearings

S. K. Wellman Co.—6-page illustrated folder No. 5-1 describes eight basic types of Velvetouch self-lubricating bearings and outlines recommended applications. Method of production of these bearings is illustrated by a series of photographs.

4. Materials Handling

Automatic Transportation Co. Div., Yale & Towne Mfg. Co.— Series of ten bulletins in loose-leaf binder, covers uses of Transporter industrial trucks in various types of plants. Actual plant operating methods and studies of operations are discussed.

5. Fluid Handling Equipment

J. A. Zurn Mfg. Co.—12-page illustrated catalog No. 45 features complete line of suction and pressure line strainers and interceptors for grease, wax, fats, oils and solids and other devices for maintaining continuous flow through pipelines of industrial plants, power plants and plants of process industries.

6. Drill Jig Bushings

Acme Industrial Co.—12-page catalog No. 8 lists standard bushings, both A.S.A. and Acme Standard in readily identifiable tabular form for quick reference. Prices are given for all finishes and sizes. Supplementary sheet, form 150-DP, covers Acme Standard hardened and ground dowel pins.

7. Injection Molding Units

Watson-Stillman Co. — 4-page folder No. 621-A covers five models of horizontal injection molding machines with hopper feed capacities ranging from 6 to 24 ounces. It contains detailed drawings, including platen and die layouts, and data on operating features.

8. Industrial Lubrication

Alemite Div., Stewart-Warner Corp.—8-page illustrated booklet describes Dual Progressive system of oil and grease centralized lubrication for machines. Schematic drawings illustrate method of operation and sketches show applications for numerous types of machines. Dimensions and capacities are given.

9. Heat Insulation

Universal Zonolite Insulation Co.—8-page illustrated bulletin, "Zonolite High Temperature Insulating Cement," gives composition, characteristics, uses, specific applications, procedures for applying, coverage, data on thermal conductivity and results of tests with various mixtures. This heat insulating material is applicable for use on boilers, pipe lines, furnaces, process equipment and other apparatus.

10. Air Cylinders

A. Schrader's Son—6-page illustrated bulletin No. A-10 and price list supplement lists specifications of complete line of single-acting and double-acting air-operated cylinders which may be used for pushing, pulling or combination of movements. Also described are accessories such as speed control, available brackets, air strainers, foot valves, and two and three way valves.

11. Air Gun

Air-Way Pump & Equipment Co.—Two illustrated bulletins, Nos. 400 and 641 give details of Air-O-Chek air guns and casing valves. Many applications are pictured and information on sizes and prices is given.

12. Grinding Wheel Data

Abrasive Co.—120-page pocket-size Grinding Wheel Data Book and 24-page Supplement provide over-all discussion of types, selection, use and care of grinding wheels for all standard types of grinding. Recommended practices are covered in detail.

13. Flexible Couplings

Ajax Flexible Coupling Co., Inc.—12-page illustrated catalog No. 44 describes principle, construction and operation of seven types of this company's couplings and gives complete specifications of each.

14. Multiple Spindle Drillheads

Zimmer-Thomson Corp.—18-page illustrated catalog describes Thriftmaster multiple spindle drillheads. Cut-away drawings show construction and operation. Arrangements with bushing plate and holding fixture and for multiple drilling with indexing operation are shown.

15. Heat Treating Ovens

Young Brothers Co.—12-page illustrated bulletin No. 4T, shows 26 electric and gas-fired heat treating ovens in a wide range of sizes for industrial use. Brief descriptions and general specifications are given.

16. Castings, Patterns & Dies

Acme Pattern & Tool Co.—48-page illustrated booklet entitled "Acme for Action" shows personnel and equipment of various divisions and contains photographs of work in process.

17. High Speed Production Tools

Zagar Tool, Inc.—28-page illustrated loose-leaf catalog presents number of high speed production tools, including holding fixtures, index fixtures, vertical-horizontal fixtures, air-operated tools, speed chucks, collets, collet pads, internal collets, broaching machine, broach holders and drill heads. Specifications and prices are included.

18. Aluminum Bronze Electrodes

Ampco Metal, Inc.—1-page illustrated engineering data sheet No. 129 is entitled "Scrap Prevention with Ampco-Trode." Explained is method for reclaiming castings made of weldable material through use of coated aluminum bronze welding rod.

19. Wire Rope Sheaves

Vulcan Iron Works—24-page illustrated bulletin No. A-396 gives specifications and application data on line of Vulcan Allcasteel sheaves. Construction and advantages of these units which are claimed to prolong life of wire rope are explained.

20. Lathes

South Bend Lathe Works—64-page illustrated catalog No. 100-D contains complete information on line of precision lathes which includes toolroom, quick change gear, large swing, plain change gear and turret models. Also covered are attachments, design features and specifications of these lathes.

21. Rotary Blast Tables

W. W. Sly Mfg. Co.—4-page illustrated bulletin No. 99 explains features of Centri-Blast rotary tables which utilize airless blast to clean castings and other parts. Centrifugal force is employed to give abrasive sufficient velocity to do efficient job of impact cleaning.

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22. Industrial Coatings

Wailes Dove-Hermiston Corp. — 4-page illustrated folder No. 944 gives data on five types of Bitumastic coatings which prevent corrosion resulting from industrial atmospheric conditions and chemical fumes. It contains rules for selection of coatings to meet specific needs.

23. Hole Punching

Wales-Strippit Corp.—8-page illustrated bulletin H deals with horizontal hole punching units for punching holes in flanges, angles, container sides and similar shaped and formed work without making built-up, single purpose, cam action dies.

24. Corrosion Preventive

Valvoline Oil Co.—8-page bulletin entitled "Tectyl, Science's New Answer to Rust" deals with this liquid chemical which separates salt water from steel and forms oily protective coating on metal. Substance is electromagnetically attracted to steel and other electrically conducting metals forming polar films.

25. Metal Fabrication

Alco Products Div., American Locomotive Co.—16-page illustrated bulletin No. 1084 explains facilities of company for production of prefabricated piping, pressure vessels and fabricated plate work, and heat exchange equipment. Typical equipment produced and design features incorporated are outlined.

26. Dredging

American Manganese Steel Div., American Brake Shoe Co.—56-page illustrated bulletin No. 844-D is entitled "Amsco Manganese Steel for All Dredging Purposes." Properties and applications of this material in dredging equipment of all types are discussed.

27. Alloy Castings

Alloy Castings Co.—20-page illustrated bulletin covers planning, tooling and production of heat and corrosion resistant castings. Facilities and personnel of company are described. Typical alloy cast products produced are shown.

28. Electronic Tubes

Westinghouse Electric & Mfg. Co.—36-page illustrated booklet No. B-3260 "The ABC of Electronics at Work" covers fundamental principles of six basic ways in which electronic tubes function. Schematic drawings of tube construction and of typical circuits explain how electronic tubes rectify, amplify, generate, control and transform light into current and current into light. Industrial and military applications are described.

29. Thermocouples

Wheelco Instruments Co.—40-page illustrated data book and catalog No. S2-5 gives data to aid in selection of thermocouples, lead wire, protecting tubes, heads and insulators. Millivolt tables, temperature conversion tables and tables on wire resistance and pipe and wire sizes are also included. It describes products and includes price list.

30. Hydraulic Power Units

Vickers Inc. — 24-page illustrated bulletin No. 43-11 contains information on variable delivery piston type pumps for variable delivery hydraulic systems. Outputs available range from 3 to 340 gallons per minute at continuous duty pressures up to 2000 pounds per square inch and for intermittent duty up to 3000 pounds per square inch.

31. Welding Electrodes

Welding Equipment & Supply Co.—40-page illustrated manual presents data on metalic arc tool steel welding. It gives metallurgical characteristics and specific instructions for use of oil, water and air hardening; high speed steel and hot working types of electrodes.

32. Hot Liquid Dip Tanks

Aeroil Burner Co., Inc.—16-page illustrated booklet describes insulated, gas-fired dip tanks for metal cleaning, degreasing, rustproofing, black oxide finishing, paint stripping, heating, melting and dipping waxes, electrical components, rosin, glue, chemicals, ethyl-cellulose plastic strip coatings and similar compounds. Specifications and typical uses are shown.

33. Fittings

Weatherhead Co.—26-page illustrated booklet tells of development of company, its manufacturing facilities, laboratories, personnel, products and industries they serve.

34. Belt Drives

American Pulley Co. — 24-page illustrated catalog No. FBD-44 contains data on steel split pulleys and bushings, shaft collars, shaft hangers and bearings, split and solid conveyor pulleys, motor pulleys, belting and Econ-O-Matic units for short-center flat belt drives.

35. Fire Extinguishers

American-LaFrance-Foamite Corp. — 4-page illustrated folder No. AD6014 describes various types of foam applicators which are now available for use in combatting oil tank fires. Applications of equipment to storage tanks for flammable liquids are mentioned.

36. Aluminum Finishes

Aluminum Company of America — 64-page illustrated booklet "Finishes for Aluminum" discusses characteristics of aluminum, mechanical finishes, chemical finishes, electrolytic oxide finishes, electroplating, Alclad products, paint, lacquers and enamels. Application procedures and finish characteristics are described.

37. Welded Bases & Frames

Van Dorn Iron Works Co.—16-page illustrated bulletin entitled "Fabricated Machine Supporting Units" shows design, manufacture and typical welded steel machine bases and frames produced by company. Details of design service and facilities of company are outlined.

38. Blast Cleaning

Pangborn Corp.—24-page illustrated bulletin "Blast Cleaning Specials" features details of 21 unusual problems in blast cleaning that require special equipment for production handling. Each machine described was custom built after thorough study of problem involved and relation to production line of plant.

39. Welding Equipment

Victor Equipment Co.—102-page illustrated general catalog "Victor—makers of fine welding equipment" lists specifications, application information and other data on cutting and welding torches, complete sets, valves, regulators, torches, attachments and accessories produced by this company.

40. Air Compressors

Worthington Pump & Machinery Corp.,—8-page bulletin L-667-B1, gives data on type YC, motor driven, direct or belt-connected Feather Valve compressors. Design, advantages and specifications are covered. Large-scale cut-away drawings show construction.

41. Carbide Tipped Tools

Whitman & Barnes—4-page illustrated bulletin lists available sizes and prices of carbide tipped chucking reamers, both taper and straight shank. Other tools including drills, shell reamers and special styles are also illustrated.

42. Draft Blowers

L. J. Wing Mfg. Co.—8-page bulletin No. SW-1. Condensed bulletin covers Wing forced draft blowers, both turbine and motor driven, and auxiliary turbines. Information includes capacity curves, dimension tables, operating data and photographs of installations.

43. Chucks

Westcott Chuck Co. — 12-page illustrated catalog No. 600, describes independent, universal, combination, drill and light duty chucks. Specifications, replacement part list and prices are included.

44. Welding Electrodes

Allis-Chalmers Mfg. Co.—16-page illustrated booklet No. L6348 lists data on complete line of arc welding electrodes. Included are charts on physical properties of weld metal for each electrode and recommended current values. Both alternating and direct current types are listed and identified by AWS classification numbers.

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Steel Buying Below Peak But Still Tops Production

Deliveries being pushed further into future . . . Steelmaking rate improving as handicaps disappear . . . Scrap drive planned

STEEL buying continues at a high level, although somewhat less than the peak attained early this year, with orders still larger than shipments.

This is reflected most notably in further extension of deliveries on sheets and bars, tubular goods and some wire items. Shell and ammunition requirements generally still require largest quantities of steel and are disrupting schedules on other products indirectly by diverting steel from usual uses. Requirements are more diversified by attention now being given to parts replacements, such buying now being at a new high, with a heavier program in the offing.

Because of the flood of directives and other operating handicaps of the past winter many producers are still far behind on delivery schedules, in some cases two or three months. Recent restriction on use of directives, with better weather and improved transportation have allowed some improvement. In plates, demand for which is tapering, some producers believe they will be caught up by the end of April at the latest.

Some barmakers are sold on hot-topped quality bars well into next year, larger sections as far as February and March. On ordinary carbon bars little can be promised before fourth quarter. In sheets gaps resulting from cancellations have been filled by the War Production Board and delivery promises fall late in the year and even into next year. Pickled hot-rolled sheets are in greater demand, due to change in specifications by government agencies, and deliveries are delayed by lack of sufficient pickling equipment.

Tin plate production is at a high rate but inability to obtain box cars in sufficient number has caused makers to store finished material until storage facilities are practically exhausted and other type cars are being used where possible. Tin plate consumers have been forced to use other specifications than their usual requirements to keep up production.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Mar. 17	Change	Same Week 1944	Week 1943
Pittsburgh	91.5	+2.5	93	101
Chicago	101.5	+2.5	100.5	99
Eastern Pa.	95	+3	94	93
Youngstown	93	+1	96	98
Wheeling	98.5	+5	98	88.5
Cleveland	91.5	None	92.5	92
Buffalo	90.5	—2.5	90.5	90.5
Birmingham	95	None	95	100
New England	88	—4	90	95
Cincinnati	76	+4	88	80
St. Louis	80	None	77	93
Detroit	86	None	89	94
Estimated national rate	97	+2	°98.5	°99

°Based on steelmaking capacities as of these dates.

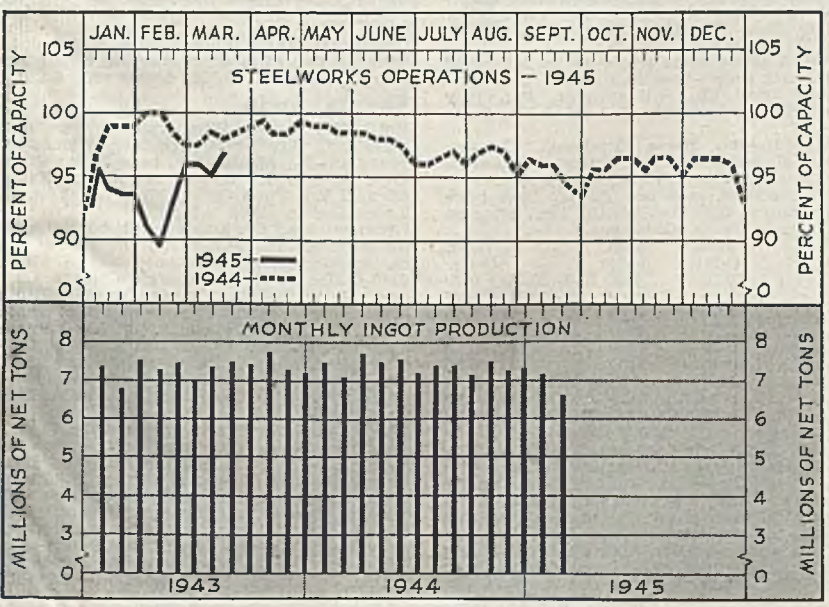
Naval contracting continues and announcement is made of award of four escort aircraft carriers of 12,000 tons displacement to the Tacoma, Wash., yards of Todd Pacific Shipyards Inc.

Steelmaking operations tend upward toward the level maintained before winter weather and other deterrents caused a drop. Last week the estimated national rate advanced 2 points to 97 per cent of capacity. Most important increase was 2.5 points to 91.5 per cent at Pittsburgh. Chicago rose 2 points to 101.5, Youngstown 1 point to 93, eastern Pennsylvania 3 points to 95, Wheeling 5 points to 98.5 and Cincinnati 4 points to 76. Buffalo lost 2.5 points to 90.5 and New England 4 points to 88. Rates were unchanged as follows: Cleveland, 91.5, Birmingham 95, St. Louis 80 and Detroit 86.

A speedup campaign is being launched by the War Production Board to increase supply of heavy steelmaking grades of scrap, the goal being set at 250,000 tons per month above present tonnage. The industry promises support, but in present labor shortage handling additional supply is difficult. Light grades are ample at present but lack of heavy steel is putting a burden on pig iron which would be eliminated by larger scrap supply.

With six more blast furnaces blowing March 1 than on Feb. 1 consumption of Lake Superior iron ore in February totaled 6,370,504 gross tons, compared with 6,982,619 tons in January, a longer month. In February, 1944, consumption was 7,207,342 tons. For two months this year total ore smelted was 13,353,123 tons, against 14,688,995 tons in the comparable period last year. Ore stocks at furnaces and Lake Erie docks March 1 were 24,576,589 tons. A year earlier they were 28,909,576 tons.

With OPA ceilings holding firmly average composite prices of steel and iron products are unchanged at recent levels, finished steel at $57.55, semifinished steel $36, steelmaking pig iron $24.05 and steelmaking scrap $19.17.



COMPOSITE MARKET AVERAGES

	Mar. 24	Mar. 17	Mar. 10	One Month Ago Feb., 1945	Three Months Ago Dec., 1944	One Year Ago Mar., 1944	Five Years Ago Mar. 1940
Finished Steel	$57.55	$57.55	$57.55	$57.55	$56.73	$56.73	$56.73
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron ..	24.05	24.05	23.05	23.55	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	16.55

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, 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. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	March 24, 1945	Feb., 1945	Dec., 1944	Mar., 1944
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	2.20	2.20	2.10	2.10
Plates, Philadelphia	2.25	2.25	2.15	2.15
Plates, Chicago	2.20	2.20	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.65	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.65	3.50	3.50
Bright bess., basic wire, Pittsburgh ..	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh ..	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.80	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 9/32-inch, Pitts ..	2.00	2.00	2.00	2.00

Pig Iron

	March 24, 1945	Feb., 1945	Dec., 1944	Mar., 1944
Bessemer, del. Pittsburgh	$26.19	$25.69	$25.19	$25.19
Basic, Valley	24.50	24.00	23.50	23.50
Basic, eastern del. Philadelphia ..	26.34	25.84	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides ..	25.69	25.19	24.69	24.69
No. 2 foundry, Chicago	25.00	24.50	24.00	24.00
Southern No. 2, Birmingham	21.38	20.88	20.38	20.38
Southern No. 2 del. Cincinnati	25.30	24.80	24.30	24.30
No. 2 fdry., del. Phila.	26.34	26.34	25.84	25.84
Malleable, Valley	25.00	24.50	24.00	24.00
Malleable, Chicago	25.00	24.50	24.00	24.00
Lake Sup., charcoal, del. Chicago ..	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	24.69	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$19.75	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.....	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill; Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—5/16 in. inclusive, per 100 lbs., $2. Do., over 5/16—47-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6 40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.37
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ¾ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	.$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75

By-Product Foundry

Wise county, furnace	6.75- 7.25
Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.85

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls., to jobbers	8.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	4.012[1]	5.727[1]	3.874[1]	4.106[1]	5.106[1]	5.374[14]	4.744[14]	4.144[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[12]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.868[1]	5.574[1]	3.690[1]	3.974[1]	3.974[1]	5.160[12]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.705[1]	5.272[1]	3.618[1]	3.922[1]	4.272[1]	5.168[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.694[1]	5.252[1]	3.494[1]	3.902[1]	4.252[1]	5.044[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.896[1]	5.341[1]	3.696[1]	4.041[1]	4.391[1]	5.346[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	4.071[1]	5.465[1]	3.871[1]	4.165[1]	4.515[1]	5.521[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.55[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.73[1]	5.26[1]	3.45[1]	3.819[1]	3.819[1]	4.90[15]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.81[1]	3.50[1]	4.80[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.50[1]	5.00[1]	3.45[1]	3.60[1]	3.60[1]	4.90[12]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.40[1]	4.90[1]	3.35[1]	3.50[1]	3.50[1]	4.80[12]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.50[1]	5.188[1]	3.45[1]	3.60[1]	3.60[1]	5.027[12]	4.40[24]	3.75[21]	4.45[31]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.40[1]	.....	3.35[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[31]	.....	.....
Detroit	3.450[1]	3.661[1]	3.709[1]	5.281[1]	3.550[1]	3.700[1]	3.700[1]	5.15[12]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.265[1]	5.765[1]	3.965[1]	4.215[1]	4.215[1]	5.758[19]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.165[1]	5.665[1]	3.865[1]	4.115[1]	4.115[1]	5.658[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.761[1]	5.291[1]	3.525[1]	3.675[1]	3.675[1]	4.975[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.55[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.35[1]	3.50[1]	3.50[1]	4.80[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.65[1]	5.15[1]	3.35[1]	3.60[1]	3.60[1]	5.381[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.787[1]	5.287[1]	3.487[1]	3.737[1]	3.737[1]	5.422[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.73[1]	5.23[1]	3.618[1]	3.768[1]	3.768[1]	5.068[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[3]	3.81[3]	3.91[3]	5.41[3]	3.61[2]	3.86[3]	3.86[3]	5.407[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.797[1]	5.297[1]	3.497[1]	3.747[1]	3.747[1]	5.322[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[3]	4.065[3]	4.165[3]	5.78[3]	4.065[3]	4.215[3]	4.215[3]	5.415[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.65[1]	5.903[1]	3.55[1]	3.70[1]	3.70[1]	4.90[12]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	4.00[4]	5.85[4]	4.158[4]	4.20[4]	4.20[4]	5.40[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.35[3]	5.50[3]	3.863[3]	4.313[3]	4.313[3]	5.463[15]	4.10[10]	3.65[23]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	5.05[4]	7.20[4]	5.10[4]	4.95[4]	6.75[4]	6.15[12]	7.20[5]	5.583[30]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.75[7]	6.35[7]	4.65[7]	4.50[7]	5.75[7]	6.50[15]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.85[27]	6.50[27]	4.75[27]	4.75[27]	6.30[27]	5.90[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.05[15]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.85[6]	6.50[6]	4.75[6]	4.25[6]	5.45[6]	6.10[15]	7.60[15]	5.783[21]	.....	.....	8.00[23]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles. [19]—100 to 749 pounds; [20]300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	18.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10 .15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70 .90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa. base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y.,del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.00-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phos- for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one phorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.,	$66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases	61.65

Silica Brick

Pennsylvania	52.85
Joliet, E. Chicago	60.65
Birmingham, Ala.	32.85

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash,, net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; **low carbon** eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed, 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-3% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% Max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car, 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max., sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate, to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide, approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract, carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20%, mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.), per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.03c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western, 36.55c and 41.05c; 93 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central, 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40; eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern, contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo. f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	12.50-13.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	14.00
Short Shovel, Turnings	16.00
Mixed Borings, Turnings	14.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.00-13.50
Machine Shop Turnings	12.00-12.50
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	16.25-16.75
Baled Mach. Shop Turn.	16.25-16.75
No. 3 Galv. Bundles	14.25-14.75
Machine Turnings	9.00- 9.50
Mix. Borings, Sht. Turn	9.00- 9.50
Short Shovel Turnings	9.00- 9.50
Cast Iron Borings	9.00- 9.50
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00
(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)	

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	12.75-13.25
Short Shovel, Turnings	14.75-15.25
Mixed Borings, Turn.	12.75-13.25
Cast Iron Borings	13.75-14.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	9.00- 9.50
Cast Iron Borings	10.00-10.50
Short Turnings	11.00-11.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	7.50- 8.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25
(Cast grades f.o.b. shipping point)	
Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ⅛c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $165 to $168 in smaller quantities

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.
Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.
Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls.33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¼c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more: New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 156

Sheet mills in general are covered for most of the year's capacity, little open space being available as late as November in both hot and cold-rolled, with galvanized available from October to February. Stainless steel sheets are in greater demand and delivery promises now are for July and August. Directives are being used sparingly but carryovers are still heavy. A few cancellations are being received.

New York — While sheet demand is only fairly active, continued expansion is noted in mill deliveries. Most producers are now well booked into late this year on hot and cold-rolled sheets, with few promises before November and most mills quoting December. In galvanized sheets the range is fairly wide, some producers quoting early October and others are booked into February.

Stainless steel sheets, reflecting the jet propulsion program in increasing degree, are being quoted for July and August shipment. High-silicon sheets are in strong demand for radar and other communications equipment, with deliveries in September. In the low silicon grades shipments of some mills have jumped substantially, due not only to requirements for fractional motors, but to the fact that so much capacity is being directed to high-silicon needs of the military services. One producer is now quoting June, 1946, delivery on the very low silicon grades.

Some cancellations are reported here on practice bomb tonnage, with action being taken by the War Production Board direct, which is also filling gaps in mill schedules with other more badly needed tonnage. Fairly good buying is noted here of sheets for shell containers.

Cincinnati — The sheet situation is tight despite reduction recently in number of directives. District mills are also pressed to get out shipments, reporting a scarcity of cars and dislocation of truck and railroad deliveries during the recent high water. At least five weeks' production will have been lost by the Andrews Steel Co., Newport, which expects to resume rolling about April 1. A few more days thereafter may be required in work on open hearths which will resume on shell steel. Serious damage to equipment was avoided.

Boston — While narrow cold-rolled strip buying has slackened, alloy deliveries are more extended, due to heavier loads on primary melting schedules at hot mills. Alloys are now in late fourth quarter and most carbon grades in October. Pinch in alloys is partly due to increased demand for jet propulsion aircraft, rockets and other war requirements. There are few cancellations; most tonnage likely to be subject to cancellation is so far back, elimination could have little influence on April schedules.

Cleveland — Mills are currently swamped with sheet tonnage that must be pickled, with aircraft landing mats an outstanding example of a major tonnage item switched from pain hot-rolled sheets to hot-rolled pickled. Cold-rolled sheet delivery is also more extended for these sheets require pickling also. Galvanized sheet deliveries are even more extended, due not so much to limitations of galvanizing equipment but manpower shortage. Although WPB has authorized increased galvanized sheet output, only about 60 per cent of prewar galvanized tonnage is being produced. All but a small fraction of restricted galvanized sheet output is absorbed by the war agencies, for warehouse buildings to hold surplus stocks and machinery and for barracks, storage sheds for supplies and Quonset huts abroad.

Pittsburgh — No change in the sheet situation has resulted from the freeze order. New tonnage is still developing but at a lower rate. No space is available the rest of this year on continuous mills, but there is some room on hand mills. Galvanized sheet production is completely filled for an indefinite period, orders being established for a year ahead and some tonnage yet unplaced. Steel supply apparently is adequate to support this volume of production. Cold mills hope for a better realignment of their product, particularly with the tin plate situation unsettled beyond April 1.

Philadelphia — While there have been some cancellations in sheets, gaps have been filled promptly under government direction, leaving producers to quote shipments, which in many cases extend well over the remainder of the year and even beyond in scattered instances. However, there still is lack of uniformity in promises offered, one large producer quoting cold-rolled sheets for October, while another has nothing to offer before January. Some galvanized sheet sellers quote September and October while others offer February. Deliveries on hot pickled sheets fall generally in November and December and plain hot-rolled in September and October. Difference between plain and pickled sheets may be ascribed to lack of pickling ca-

pacity. It is pointed out that demand has eased for plain sheets from shipyards and curtailment, compared with early in the year, due to restrictions on car building.

Chicago—Overload bookings of sheets in some instances are as high as 45 per cent above capacity and make for a situation which is virtually out of hand. Directives superimposed on directives to meet early deliveries of urgent military requirements are responsible. To bring order out of this chaos, WPB shortly will be obliged to specify the order in which mills shall roll sheets. March carryover on cold-rolled and galvanized sheets is particularly troublesome, representing practically a month's production. Carryover on hot-rolled is about two weeks. Thus far, cancellations are light. Army Quartermaster, Jeffersonville, Ind., still is reported unable to get on mill schedules with 36,000 tons of drum sheets needed in the next few months.

Steel Bars . . .

Bar Prices, Page 156

Bar needs continue heavy and while directives are in less volume some still are used to provide for most pressing needs. Deliveries are receding and most producers are booked solidly into fourth quarter on all but smaller hot-rolled sizes. Electric furnace alloy bars are easiest to obtain, some being available in September.

New York—While directives are much fewer, some are still being noted, especially for shell steel in some of the larger sizes. The latest, involving several thousand tons, has been placed here for delivery through April, May and June.

Delivery schedules are still expanding, with practically all sellers now booked solidly into fourth quarter on carbon bars on all but some smaller sizes. Cold-drawn carbon bar shipments also fall largely in last quarter, with relatively little tonnage available even then. Only in electric furnace alloys can shipments be had before October, with little or nothing available before late September.

Boston — Alloy bar deliveries, electric furnace and open-hearth, are more extended, mostly September-October for the latter, with electric furnace spread narrowing. Carbon bars are generally in late third quarter, notably cold-drawn, which are beyond that with more producers. Pressure for bars from jobbers has increased, but fabricators, having covered heavily against ordnance and component contracts, are placing slightly less tonnage. Tapering shipbuilding program has lowered marine hardware backlogs and chain requirements are below peak. Other forge shops, however, operate near capacity. Supply lines for numerous small tools, wrenches, files, etc., are well filled, and, while there are some sizable replacement orders, needs are below former levels. Small arms account for sizable lots of rifle barrel blanks. Some doubt is expressed as to ability to meet initial schedules for shells requiring billets. There is a shortage of key forge shop labor for this production, much equipment remains to be installed at several plants and in scattered instances new construction is involved. Bar specifications for bolts and nuts are maintained at a high rate.

Pittsburgh — Billet shortage may plague bar mills soon. Heavy increases in the shell program, which required substantially more billet tonnage for forging, have taken a big slice out of available billet tonnage, and increase in demand for bar mill products from other sources has been greater than anticipated. Monthly carryovers are increasing at most points, and production is limited by manpower and billet supply to present levels, although more bar mill capacity is available if it could be utilized. Cold-drawn bars are probably as difficult as any product at the moment, some mills reporting substantial fourth and first quarter tonnages now on inquiry.

Cleveland — Alloy bar delivery schedules are extended into August and beyond, while shipments on carbon bars in smaller sizes are promised for late third quarter and into 1946 on larger rounds. The gap between carbon and alloy bar deliveries has narrowed in recent weeks, reflecting increasing requirements for the large truck and tank, and rocket programs. Cold-drawers have larger order backlogs than at any previous time in the war period; forge shops are also hard pressed to meet urgent requirements. Railroad equipment and farm implement manufacturers report further falling behind on mill deliveries of regular CMP orders.

Philadelphia — Some sellers of hot-topped quality bars are now booked solidly until well into next year, to January on smaller rounds and February and March on larger. On ordinary carbon rounds only little tonnage can be had before fourth quarter. Alloy schedules also are being pushed back, with open-

hearth quality falling principally in fourth quarter and electric furnace alloys in September. In sharp contrast with declining schedules last fall, forging operations have become greatly extended, with the new navy program adding considerably to backlogs of heavy forgers. Drop forgers, whose schedules have been well sustained, are booked ahead in various cases, particularly on shell and gun components, in addition to maritime work.

Steel Plates . . .

Plate Prices, Page 157

Plate demand continues to lessen, with shipbuilding programs dwindling. Some tonnage can be promised for June but other producers have contracts extending further. Backlogs are being reduced considerably. Additional naval work is coming out, slowing the downward tendency of this market.

Philadelphia — Some plate tonnage still can be scheduled for June but some producers are booked solidly into July and one seller has nothing to offer on universal plate before August. Meanwhile, plate mills are getting somewhat caught up on schedules, with likelihood that by May 1 they may be in good position. Navy work is bolstering new orders, although the overall trend continues downward. As part of its latest program the Navy has announced award of four escort aircraft carriers of 12,000 tons displacement to Tacoma, Wash., yards of Todd Pacific Shipyards Inc.

Boston — Except for odds and ends, plate requirements for completion of other than navy ships have been placed and total tonnage is relatively small for delivery next quarter. Indications are the remainder of war tonnage will be for navy yards at Boston and Portsmouth, N. H., Bath Iron Works, Bath, Me., Bethlehem-Fore River, Quincy, and Electric Boat Co., Groton, Conn. Tapering are yards at South Portland, Me., Hingham, Mass., and Providence, R. I. These are the major yards; smaller units have halted or have reduced to skeleton forces. A decline in repair activity is also due next month. Only a fraction of this dwindling plate volume is made up in other directions, although an easing in overall tightness in steel might be expected to release some pent up volume.

New England Shipbuilding Corp., Portland, Me., is low on contract for construction of 12 coastal tankers, 230-foot T-1 ships, bidding $595,168 each. If awarded contract, the Maine yard's operations would be extended beyond midsummer. Current contracts for Liberty ships will have been completed by that period.

Pittsburgh — New tonnage is relatively light. Current operations are slightly better than 50 per cent of capacity and there is still little indication of an increase. The operating rate does not indicate a true picture, however, because the capacity now includes a substantial tonnage from sheet mills, which are not being used for plate production. Plate mills themselves are handling a fairly good volume, and might be pressed to turn out much more with the limited manpower available. Shipbuilding in this district, chief plate consumers here, continues to decline with further worker layoffs reported.

Cleveland — There is a further decline in plate requirements for merchant ships and shipments for this program are expected to taper through second quarter, after which a sharp drop in requirements is anticipated. Steel needs for naval vessels, freight cars and tanks continue large, but not sufficient to offset the drop in merchant shipbuilding.

Chicago — Although as a whole production of plates on continuous strip mills has dropped to about 27 per cent as compared with last spring and summer, 40 per cent represents the situation in this district. Plate specifications are such that these mills cannot be diverted back 100 per cent to sheet and strip output. Announcement by Maritime Commission that merchant ship program will be nearly completed in 1945 confirms opinions that production of plates for this account will continue to decline until almost eliminated in third quarter.

Tubular Goods . . .

Tubular Goods Prices, Page 157

Boston — Approximately 25,000 tons of 14-inch seamless tubing, ⅜-inch wall, for delivery starting second quarter and extending through the remainder of 1945 for the production of 500-pound bombs, first to be fabricated in New England, is seeking a place on mill schedules. Capacity for production of this section is filled for an indefinite period. Unless a directive or some artificial stimulant is given the inquiry, mills apparently cannot meet wanted delivery schedules