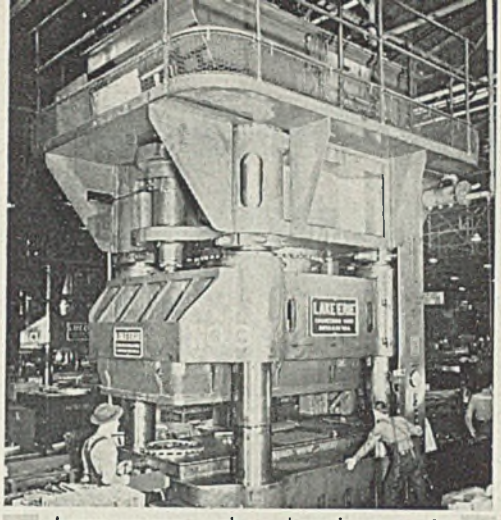

Large presses replace drop hammers in revamped Boeing plant. See p. 46

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Volume 110—No. 25 STEEL June 22, 1942

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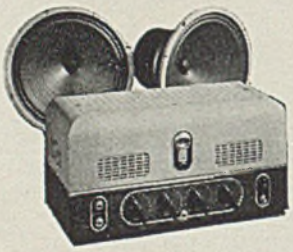
DO YOUR ACTION WORDS *Peter out in transit?*

Webster Electric Teletalk may be the answer

These Teletalk units speed up oral communication in plants or offices. A full line of equipment provides for any number of stations, one-way or two-way contact, "loud speaking" or confidential communication. Write GRAYBAR for Catalog Tel-7.



Webster Electric fixed and portable sound systems and amplifiers meet many plant public address requirements for management-to-employee communication. Simple to operate. Write GRAYBAR for Catalog RC-217.

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2. **To assure safety in emergencies,** you need facilities for immediate communication with any or all departments, gate houses, etc. Shop noise must not interfere with full understanding.

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All these objectives can be best accomplished by a system of plant communication that's planned as a unit, and integrated with plant alarm systems, paging systems and telephone service. It's the kind of a job that requires experienced specialists to lay out. This way, you avoid duplication, save expense, minimize wiring and maintenance costs.

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HIGHLIGHTING

this issue of STEEL

NEWS In this issue (pp. 52A-52H) is published the new Allocation Classification System in its final form. It was devised by the War Production Board to simplify the gathering of information on which to base distribution of strategic materials most effectively. It goes into effect July 1 and will affect nearly all manufacturers and consumers.

On the same date use of the Production Requirements Plan will become mandatory for practically all buyers, superseding all priority instruments excepting as they will continue to apply to certain groups not covered by PRP (p. 34); the present and future status of these other priority orders is explained.

Walter E. Watson is chairman of the new General Steel Products Advisory Committee of OPA (p. 39). Additional industry advisory committees have been formed. WPB has appointed a new nonferrous metals committee.

A limitation order covers types of steel for manufacture of hand tools (p. 40). Control over distribution of gages and measuring tools is tighter. Manufacture of innerspring mattresses is to be banned (p. 40). Shipments of certain types of space-heating units are under limitation (p. 38).

Republic Steel Corp. has formulated an advanced plan for wartime plant protection (p. 33). Steel (p. 41) is the third safest industry.

Alloy scrap segregation has been made mandatory (p. 36); vanadium content of high-speed tool steel is being reduced further.

PRODUCTION Steel production last week was unchanged at 99 per cent of ingot capacity for the fifth consecutive week (p. 31). Consumption of lake iron ore set an all-time record of 7,015,408 gross tons in May (p. 119).

"Wildcat" strikes are interfering with production at key plants here and there (p. 28). Railroads are operating with great efficiency, moving more goods with fewer cars (p. 57). R. C. Hill describes new techniques by which Boeing has speeded production of Flying Fortresses (p. 46).

SUBSTITUTION Electrolytic tin plate and chemically treated black plate are to be used extensively instead of hot-dip tin plate (p. 38).

Dr. Willard H. Dow sees Thiokol as a major solution to the rubber tire crisis (p. 51). London has a bus with a gas producer trailer, meaning an annual saving of 8750 gallons of gasoline (p. 54).

CONVERSION WPB is reorganizing its conversion unit so as to concentrate on converting more small manufacturers (p. 40).

TECHNICAL In Section XI of the forging series, Professor Macconochie discusses (p. 60) means for eliminating much machining of forgings, describes requirements for die materials and major steps in die making.

In addition to the thousands of plants converted to war production, our war output is being swelled by many special purpose plants designed specifically for mass production of needed war items. Operations at one such plant making nothing but crankshafts for radial aircraft engines are detailed (p. 62).

A study of alternate specifications for tin bronze (p. 68) shows that silicon bronze fulfills the requirements. But as it involves 90 per cent or more of copper, almost as important an element as tin, it may be better to go to the yellow-brass alloys, the manganese-bronze alloys, or the aluminum-bronze alloys where savings in both tin and copper may be effected.

In an examination of how best to use secondary copper in our war effort (p. 81), it is pointed out that an accumulation of at least 100,000 tons a year of "orphan" high-zinc brass is to be expected under the present setup, material denied to civilian consumption and unwanted by the war industries because of apparently excessively severe impurity restrictions.

J. M. Merle describes (p. 82) a film-impact process that is claimed to produce a casting with the crystal structure and physical properties of a forging. Process eliminates ingot stage.

MARKETS Metals Reserve Co. has set up stations for purchase of domestic manganese ores (p. 38). Copper Recovery Corp. is ready to buy frozen copper inventories. Aluminum scrap dealers are warned against price violations. OPA has revised some iron and steel scrap prices (p. 117). While the general level of prices has increased 30 per cent in the past three years steel prices gained only 1 per cent in that period (p. 56).

These Plants Are Anxious for War Work

They can start production at once on war contracts and subcontracts

Write, or wire, Inland for the names and addresses of any of the metal working plants listed below. They are representative of a longer list of Middle Western plants prepared by Inland for the purpose of speeding all-out war production.

We suggest that you get in touch with us even if the types of plants and equipment you need are not listed on this page, because in addition to the other plants on which we already have information, our list of available war-work plant capacity is continuing to grow.

IS-49 Large Wis. sheet metal bldg. prod. mfr. desires war work. Emp. 25 one shift. Sheet metal 14 to 32 ga. Equip. includes 11′ power sq. shear, 36″ foot sq. shear, power gang slitters, sheet metal pipe forming machine 2″ to 6″, hand and machine power rolling machines, No. 3 and No. 5 punch presses, No. 10—10′ power brake, No. 20 ga. cap. 30″ throat nibbler, spot welder, 10,000 sq. ft. fl. sp. Remodel or replace machinery for special govt. work. Capital and best of credit rating available.

IS-14 Large Mid-west spring bed mfr. in fireproof bldg. with over 40,000 sq. ft. fl. sp. located on railroad siding. Plant includes a full line of punch presses, coiling machines and various other equip. used in making bed springs. Have coilers for making special springs for aviation industry. Also two shapers, two lathes, milling machine, drill press, grinders, heat treating facilities and misc. mach. shop equip.

IS-51 Wis. dairy equip. mfr. emp. 100, has approx. 80,000 sq. ft. fl. sp. available for fabricating and welding custom built equip., ample shipping facilities. Equip. includes 8′ slip roller, lathes—polishing, turret, 24″, engine—12″, and bench; drill presses—hyd. horiz.; bending brakes, shears, drills, grinders, millers, shapers, welders, slashers, rip saws, jointers, sanders, and facilities for sand blasting and metallizing; hot dip tinning plant; spray booth painting equip., sheet metal and woodworking machines. Anxious for war work contracts.

IS-55 Well equipped Mid-western plant with over 300,000 sq. ft. of sp. emp. over 400 men. Desiring prime or sub-contracting work. Mfg. facilities include 4 planers, punch presses, forming, mach. shop, pressing, bending, forging, flame cutting, grinding, sheet metal, grey iron fdry., painting, riveting, brazing, gas, arc, spot welding, polishing, tool making, packing, shearing, machining, assembling, heat treating, wood working, bending, pattern making. Entire plant available for war work. Can mfg. parts or complete assemblies.

IS-13 Ohio mfr. of decorated metal dry package cans, signs and displays. Two plants, fl. sp. 370,000 sq. ft.; emp. 250. Dry package assembly line from 1½″ to 16″ dia. Automatic and hand-fed punch presses, complete decorating and baking equip., with facilities for coating and baking sheet metal. Lithographing, engraving and screen processes.

IS-50 Largest mfr. of kitchen utensils in the Midwest with complete facilities for fabrication and porcelain enameling of metal shapes up to 12½″ deep of 10 to 32 ga. metal (44″ max. blank size) wants volume production of stampings or porcelain enameling. Welcome all inquiries of this nature. Buildings available for limited expansion. Factory has 15 acres fl. sp., 400 emp.; produces its own power and water, and has its own police and fire protection to insure uninterrupted operation. Press equip. ranges from numerous light punch presses to 375 t. draw presses. (Complete facilities records available to bona fide prime contractors.)

IS-54 Ind. metal prod. mfr., 90,000 sq. ft. fl. sp., completely equipped for forming lighter gages of sheet metal, 50,000 sq. ft. for assembly of other production work, emp. about 140. Company operates own fleet of trucks.

IS-15 Long established Mo. fabricator heavy sheet metal, light plate and structurals. Equip. includes 10 ft. and 12 ft. press brakes, gate shears, 10 ft. rolls (plain and corrugated), punch and drill presses, welding and gas cutting equipment, many years experience in Government work and currently occupied on sub-contract basis. Working one shift only.

IS-11 Capacity of three large plants in the Middle West, 1,000 emp. For production of 10—24 ga. steel products including shearing, forming, stamping, drawing, welding, riveting, dip and spray painting and electro-galvanizing. Adequate capital and highest credit rating.

IS-52 Ind. water heater and boiler mfr., over 200 emp., has 143,000 sq. ft. fl. sp. with approx. 160,000 available for expansion, shipping facilities—2 railroad sidings and truck loading. War work desired for tank dept., welding, galvanizing and mach. shop. Equip. includes Nos. 3 and 4 turret lathes (15″), No. 5 (17″) multiple cut No. 6; No. 1, 2, 3, and 4 drill presses (singles to 6 spindles); punch presses die space 5½ to 7½″, 15 to 60 t.; horn press, gear punch press, die space 10½″ 75 t.; spud press, welding machines—circular, spot, seam, hand and semi-automatic; 10′ shear ¼″ steel; roller 6′; gal. to 36″ x 72″, pipe threading—⅛″ to 4″ incl., Hyd. testing machines, paint drying ovens—40′; boring machine 4 spindle, degreasing machine, press brake—6 and 8′; and nibbler.

IS-16 Thirty-year-old nationally known Mo. machinery mfr. emp. 250 including approx. 36 men on eng. staff, has 75,000 sq. ft. of fl. sp. for seven day week operation. Equipped to form standard and special shapes from sheet steel, channels, angles and Z-bars. Complete mach. and welding shop.

IS-53 Wis. mfr. specializing in light and medium stampings has 100,000 sq. ft. fireproof mfg. sp. on railroad side track, emp. about 200, has punch press equip. from 10 to 185 t., 6″ to 8″ stroke; draw work 2″ to 4″ deep; spot welding; assembling; enameling; and plating; special auto. equip. for mfg. rolled bushings; engine lathes and shapers. Forty-three yrs. experience.

IS-12 Large Ill. concern, 36 yrs. mfg. machinery, 20,000 sq. ft. of mfg. space with approx. 100,000 sq. ft. for storage. Slab milling machine, gear shaper for internal and external spur cutting, engine and spindle lathes, vertical boring mill, gear hobber, milling machine, sensitive, radial and vertical power drills, tapping machine, planers, cutting saws and electric welding machines. Have 38 men on three shifts, also training classes. Interested principally in war work sub-contracts for medium size parts.

Dedicated to Victory

INLAND STEEL CO.

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STEEL

June 22, 1942

UNLIMITED DEMAND MAKES MASS PRODUCTION CLICK

Thanks to conditions imposed by the war, American industry is being given its first opportunity to see what it can do with a virtually unlimited volume of demand. A few individual branches of industry have enjoyed brief periods in the past when they were pushed hard to fill orders, but this is the first time that a major sector of the nation's workshop has had a chance to produce without fear of flooding the market.

Management, labor, government and the public should make every effort to learn as much as possible from this unusual experience. It should afford lessons which will stand us in good stead during the postwar period.

For instance, we have known that unit costs go down as business volume goes up. But we have not been able to test this principle on a nation-wide scale. We know also that intensive activity all along the line enables essential services — such as transportation, communications, etc. — to function more efficiently.

Although production for war has not yet reached the peak, evidence already is available to indicate some interesting economies resulting from big volume. From April 1940 to April 1942, total industrial production as measured by the Federal Reserve Board's index has increased from 111 to 174. During the same period revenue freight car loadings have increased from a weekly average of 635,000 to 835,000 cars. Concurrently electric power output has risen from a weekly average of 2,513,000,000 to 3,319,000,000 kilowatt-hours.

Thus industrial production has gone up 57 per cent in two years, whereas freight traffic and electric power consumption have risen only 31 and 32 per cent, respectively. This means that industry — blessed with a big volume of business — is utilizing essential services such as transportation and consuming power more economically than in time of restricted demand. This also applies to almost everything industry employs in production.

The lessons we will learn from the mass demands of war should make us eager to find the key to volume demand in peacetime. It is the key the world was looking for in the thirties when disaster visited all industrial nations. It is the key to the four freedoms and to lasting peace.

E. L. Shaner

Editor-in-Chief

Showdown Approaches in Little Steel-USA Wage, Union Shop Controversy

✦

Public hearings before War Labor Board to start June 29 . . . Decision affects one-third of United States steelmaking capacity . . . Twentieth Century Fund analyzes problem of increased costs

✦

DECISIONS in the "Little Steel" —United Steelworkers of America (SWOC) case—which may affect the United States war effort profoundly—are due within the next few days.

The National War Labor Board panel which has been conducting hearings summoned principals to a final meeting late last week to review the panel's report to the board. The report is expected to be presented to the board early this week. Public hearings will start June 29.

The hearings, which opened before the panel last March, involve demands for a $1 a day wage increase and the union shop. Since the hearings started the full board has established a policy in meeting union demands for "security" by granting "maintenance of union membership"—defined by the Little Steel companies as a camouflage for the closed or union shop.

At least one of the companies has announced its intention to resist a recommendation for a "union maintenance" clause and all have declared that a dollar-a-day increase would contribute to inflation.

Directly concerned in the case are employes of four companies—Bethlehem Steel Co., Republic Steel Corp., Youngstown Sheet & Tube Co. and Inland Steel Co. Their total labor force at present is between 175,000 and 200,000.

The companies represent more than one-third of the nation's total steelmaking capacity.

Pertinent today is an analysis of the wage aspects made by the Twentieth Century Fund, New York. This organization for scientific research in current economic problems, was founded in 1919 by Edward A. Filene. Its income, administered as a public trust by a board of trustees, is devoted entirely to its own research activities. An abstract of the analysis follows:

Factors Behind Dispute

Behind the present wage controversy in the steel industry is a record of steadily rising output per worker, so that in 1939 the labor cost of producing a given amount of steel was approximately the same as in 1936, even though hourly wage rates rose nearly 25 per cent during that period. Improved production methods are largely responsible for the increased output per worker.

"The demand of the union for a blanket increase of one dollar per day in the 'Little Steel' companies is now before the National War Labor Board," the report states. "The issues in this case are better understood if we view them against the background of happenings in recent years."

Details of wage negotiations in the steel industry are set forth by Frederick H. Harbison, of the economics department, University of Chicago, now on duty with the War Production Board in Washington. Describing the "New Standard Agreement" negotiated in 1941 with most of the major steel producers after Ernest T. Weir had made his announcement of a voluntary 10 cents an hour pay increase for workers at the National Steel Co., Dr. Harbison says: "The Steel Workers Organizing Committee won its main demands for general pay increases and improvements in working conditions and schedules. The 10 cents an hour increase, granted after National Steel had pointed the way, raised average hourly earnings of steel workers to 97 cents."

(American Iron and Steel Institute statistics show average wage rates in April were 100.4 cents an hour.)

Setting forth some of the important technical developments that affect wage negotiations, past and present, Dr. Harbison says: "Recent managerial and technological advances have enabled the steel industry to offset higher wage rates by economies in the use of labor. In 1940, the major steel companies produced a 10 per cent larger tonnage than in 1937, yet the total number of man hours worked was 7 per cent less. Total pay rolls were 3 per cent less. In 1939 the labor cost of producing steel was approximately the same—for comparable periods of operations—as it was in 1936, although wage rates were nearly 25 per cent higher."

On the business management side, Dr. Harbison says: "Less spectacular, though equally important, are far reaching improvements in industrial management, just beginning to bear fruit. Industrial engineering departments have studied and recommended better production methods which have eliminated the need for one or two workers here and there over a wide range of operations. Job analysis and classification have proceeded at a rapid rate in recent years. Personnel departments have been developing more careful procedures of selection and training of employes. To what extent savings in labor are attributable to these measures is problematical, but steel executives apparently agree that such managerial improvements have perhaps been as important as technological changes."

Labor Fears Changes

Labor's attitude toward such developments is indicated by Dr. Harbison in describing steelworkers as having been "alarmed by the extent of technological unemployment . . . . Yet the union never attempted to press its demands through collective bargaining. On the contrary, Philip Murray made it clear that 'in the absence of universal collective bargaining, Congressional regulation of the introduction of large technological

changes is necessary.' . . . The defense boom has since made the issue of technological unemployment a 'dead letter' for the time being."

Details of how the steel industry, once regarded as an "impregnable antiunion stronghold," gradually developed collective bargaining are set forth by Dr. Harbison. He says:

"The last five years of labor relations in steel have marked only the beginning of collective bargaining in this great industry." Permanent organization of the union itself was not achieved until May 19, 1942, when the old SWOC was succeeded by the formation of the United Steelworkers of America, which adopted a new constitution and elected Philip Murray as its first president.

The new union has dissolved all ties with the parent body, the United Mine Workers, which established the SWOC in 1936. At that time, says Dr. Harbison, the SWOC, with Philip Murray as its chairman, "set out to build a strong industrial labor organization to match the massed strength represented by the American Iron and Steel Institute."

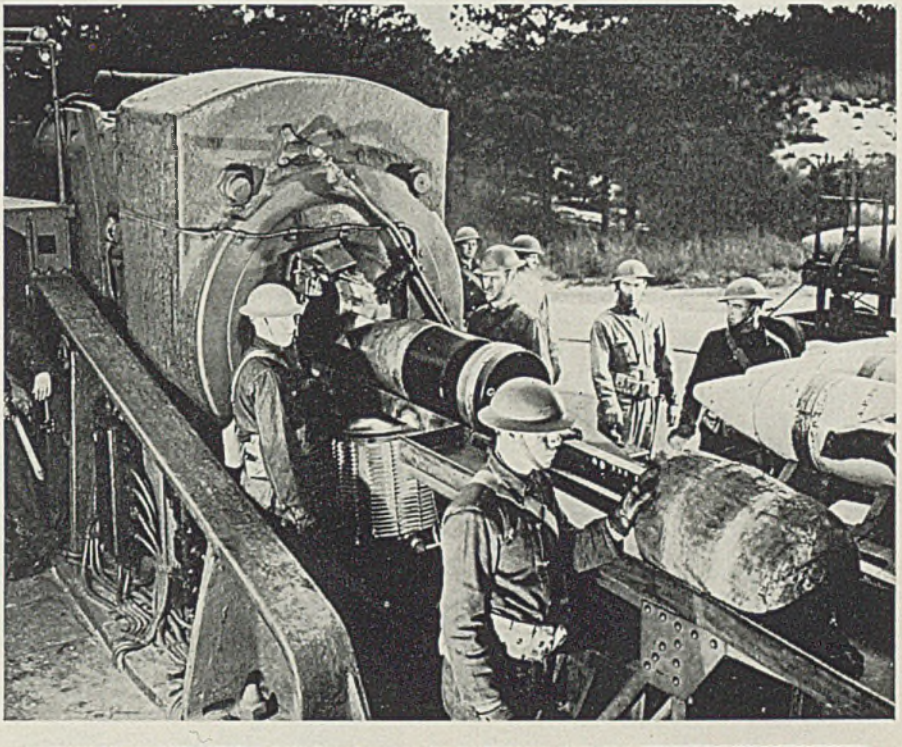
At the present time, Dr. Harbison points out, the steelworkers' union "bargains with each steel company separately. At the outset, its aim was to establish collective bargaining on an industry-wide basis, for the major economic problems in steel are common to the industry as a whole and thus are beyond the scope of the existing type of collective bargaining." He stresses the fact that the union still hopes to achieve industry-wide collective bargaining at some time in the future.

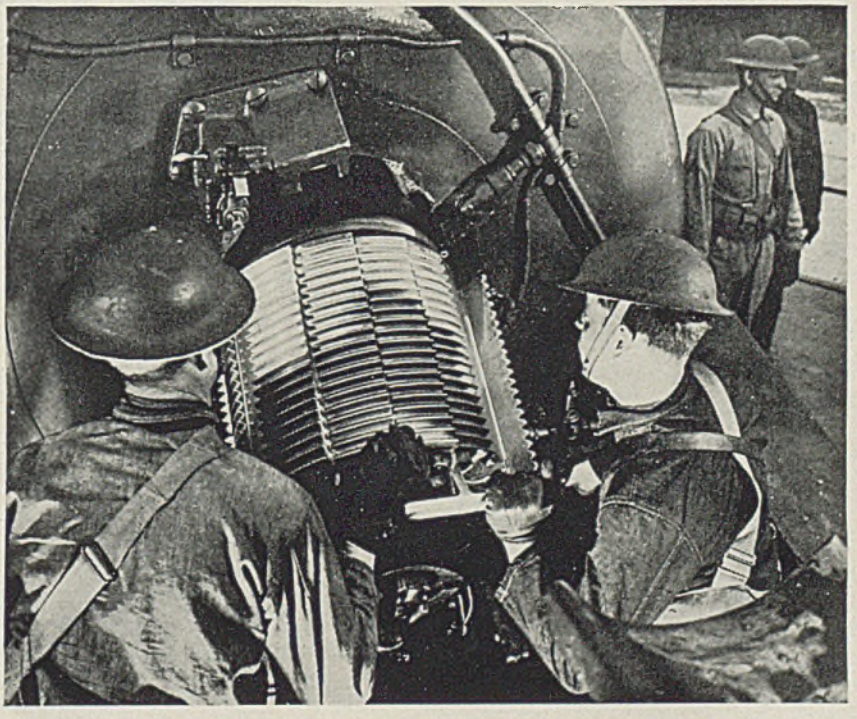
Surveying present working conditions in the industry, Dr. Harbison states: "Wages have been raised, hours reduced, qualified seniority rights recognized, and grievance machinery established. But where changes in process or equipment are involved, management still insists on its exclusive right to set new rates without union agreement."

Dr. Harbison observes that the union has tended to look upon a collective bargaining contract as "'a letter of introduction' or opening wedge for broadening the scope of the relationship"; whereas the company regards "a union contract as fixing the bounds of collective bargaining . . . To the large steel companies, in short, collective bargaining revolves mainly about the settlement of grievances."

The traditional opposition of the major steel companies to collective bargaining was dramatically changed by the agreement worked out between Myron C. Taylor of the United States Steel Corp. and John L. Lewis of the Congress of Industrial Organizations in March 1937. Dr. Harbison says: "U. S. Steel accepted neither the closed shop nor majority rule; it merely agreed to incorporate in a written contract what had been since 1934 the *stated policy* of the industry with respect to bargaining with representatives of employes. Yet a signed contract implied some degree of acceptance of the SWOC and the abandonment of the practice of opposing outside unions."

On the union side, one result of this agreement was that "it caused the SWOC to deviate from its original objective of collective bargaining on an industry-wide basis . . . . After 1937 there was no such thing as an industry-wide policy of col-





Soldiers at Work

GUARDING the right of industrial workers to "protect their social gains" are, in addition to the armed forces abroad, the soldiers in the Coast Artillery Corps. Accompanying photos, taken at Fort Story, Virginia, show how giant shells are slid along a conveyor into the breech of a 16-inch gun (above). Two men are required to close the breech (below) of these coast defense guns. OEM photos

WAR Production Board's special panel which investigated the "Little Steel" wage and closed shop case. Left to right are: Richard T. Frankensteen, director of aircraft organization, UAW; Arthur S. Meyer, New York state board of mediation, chairman Cyrus Ching, vice president, U. S. Rubber Co. NEA photo

lective bargaining. The large union companies followed one course, the smallest concerns another, and the 'little steel' groups a third policy."

During this period of organizing activity the membership of the steel workers' union has fluctuated greatly. Of the 600,000 members claimed by the SWOC in 1941, "perhaps 400,000 are in the basic iron and steel industry, which employs about 500,000 workers eligible for union membership. The remaining 200,000 members work in metal processing and fabricating plants, closely related to the steel industry." Dr. Harbison believes the steelworkers' union is in a strong position both from the standpoint of membership and of finances, at the present time.

Unauthorized Strikes Interrupt Vital War Materials Production

"WILDCAT" strikes, unauthorized and uncondoned by national union leaders who generally have observed their no-strikes for the duration pledge, are plaguing the war production effort.

Usually these work stoppages have been "surprise" walkouts or "quickie" strikes and have involved relatively few workers and have been of relatively short duration. However, they generally originate in a plant or division whose output is vital to other plants or divisions.

They are strictly unofficial, and the strikers often are back on the job before an authorized spokesman for them can be found. Technically, they may not even be violations of the union's contract.

W. H. Davis, chairman of the War Labor Board, who has been designated official agent for issuing strike data applicable to war industries, reports that 144 war plant strikes were called in May, compared with 95 during April. He explains, however, that time lost represented only 0.06 per cent of the total man-days worked compared with 0.08 per cent in April. Mr. Davis said that the May strikes cost 137,000 man-days and involved 47,800 men, compared with the April figure of man-days and 43,000 men.

Usually the work stoppages have been caused by demands for wage increases, a direct result of the refusal of the national administration and its various labor regulating agencies to adopt a firm wage and labor policy consistent with its general price-freezing policies.

Among strikes interrupting war production were the following:

One thousand workers, members of the Brotherhood of Railway Carmen of America, AFL, walked out and halted operations at the Pullman-Standard Car Mfg. plant in Chicago, June 16. The issue was said to be the inability of management and the union to agree on a contract on which negotiations have been in progress since April. Most of the plant's production is freight cars for the Army.

The Army late last week told the strikers and the company that if strike were not settled promptly contracts for cars would be withdrawn.

Six hundred employes at a Cleveland plant of Lamson & Sessions Co., engaged exclusively in war work, staged an unauthorized strike, in defiance of union officials. The walkout was termed a "surprise" by company officials, who at first did not know what the strikers were asking.

Three other Cleveland plants, Aluminum Co. of America and Cleveland Graphite Bronze, and Osborn Mfg. Co., were closed briefly.

First "crack-down" on strikers who refused to comply with War Labor Board rulings occurred in Fall River, Mass., where the WLB asked the U. S. Employment Service to find replacements for 125 strikers who declined to return to their jobs in a textile mill.

Airframe manufacturers on the Pacific coast and representatives of their employes will meet in Los Angeles July 9 with government officials in an attempt to arrive at a wage stabilization agreement. Wendell Lund, of the WPB Labor Production Division, said the purpose of the conference was to "stabilize wages at a level designed to check inflationary tendencies in our war economy."

The AFL International Association of Machinists has asked the Curtiss-Wright Corp. at Buffalo for a 5 per cent wage increase.

United Steelworkers Win in Carnegie-Illinois Elections

United Steelworkers of America won a collective bargaining election in the plants of Carnegie-Illinois Steel Corp., according to tabulations by National Labor Relations Board officials.

A total of 70,141 employes in 23 plants voted for the union as bargaining representatives against 5708 who voted "no".

The Carnegie-Illinois elections concluded several months of polling among various United States Steel Corp. subsidiary operating plants, with a few exceptions. In all the plants polled, the union piled up a majority of 110,046 to 8777.

John F. LeBus, acting regional director of the labor board in the Pittsburgh area, complimented the company personnel for their cooperation in conducting the elections. J. L. Perry, Carnegie-Illinois president, in turn praised the arrangements which made possible

METALLURGY AT PEARL HARBOR: The Seabees (nickname for Navy's Construction Battalion) demonstrate their ingenuity with the "jury-rig" melting furnace (above) to salvage brass and copper. Note pipe leading in for air blast. Lower photo, casting the molten metal into ingots. Metal salvaging operations are important factors in making Pearl Harbor "one of the world's greatest naval bases". Official Navy photos

the elections with a minimum of interference with operations.

"This election," said Mr. Perry, "has demonstrated the freedoms of we Americans at a time when those freedoms loom so importantly in this world. It is with a certain regret, however, that I observe that only about 69 per cent of those eligible to cast a ballot took advantage of that American birthright, when ample time and opportunity was afforded them to vote."

So that no time will be lost from war production in its plants, the Bullard Co., Bridgeport, Conn., recently initiated a reward system for punctuality and attendance of employes, guaranteeing them a share in a weekly distribution of war savings stamps.

"Frozen" Steel; Offers To Sell as Work Is Shifted

NEW YORK

STEEL offered for sale from fabricators' frozen inventories, resulting from stop or limitation orders affecting further fabrication into finished products, is being liquidated at a more rapid rate than foreseen, notably standard material which may be worked into war supplies at relatively high ratings.

While much of this steel may be referred to as "distress" material, prices asked and being received remove it from that category. Allowed $2 a ton for handling, plus other legitimate costs, including accumulated freight, which figured in ealier transactions, the sellers' price to jobbers on some steel is $5 to $6 per ton higher than the price warehouses might pay mills in regular mill-base dealings. Nevertheless, considerable tonnage is being moved to jobbers, although the latter are limited by assigned quotas, as all steel purchased from frozen inventories is included in their allotments.

Steel that was rolled and finished for specific needs is being liquidated more slowly, but is moving steadily to other fabricators of war products with top ratings. Some is being offered to the original producers. Tonnage offered for resale by the automobile industry has been heavy, notably automobile sheets and bars. Close to 40 000 tons was diverted to Russia through lend-lease. Washing machine manufacturers are offering substantial volume of steel tubing, some in random lengths.

Warehouses Co-Operating in Liquidating Inventories

PITTSBURGH

A number of manufacturers have sought to sell to warehouses inventories they have been unable to use since their normal production was stopped. The American Steel Warehouse Association has co-operated by circulating among its membership lists of such material offered for sale. The difficulty in moving through these channels is that the greater part is in sizes, shapes and analyses not normally handled by distributors. Offers to handle some of the material at reduced price have not been accepted, holders not being willing to take a price that would give a profit to the jobber.

Total tonnage involved is not as large as otherwise would have been the case, as the WPB order allowed a month, from May 20 to June 19,

for manufacturers to continue fabrication of their inventory before the stop order became effective.

In some instances manufacturers who have converted to war production have found it possible to utilize at least part of their inventory in their new products.

Stainless Stocks Substantial; Difficulty in Matching Sizes

CHICAGO

Limitation and stop orders against civilian products and conversion of manufacturing plants to all-out war production are serving to freeze inventories of steel in miscellaneous lots ranging from a few tons to several hundred tons. Much of this material having been made, rolled and processed to specifications required for specific products, a goodly portion of it is not suitable for use in war goods fabrication, consequently how to utilize or dispose of it is a real problem.

In World War I, no such problem existed because consumers were permitted to dispose of excess material, either by direct sale to another consumer or to a steel warehouse or broker who could find a market for it. In the present war, government restrictions on priorities and maximum prices present obstacles which are not easy to overcome.

Aside from stop and limitation orders, some of the excess supplies of steel have accumulated through unbalanced inventories. Inability to obtain necessary types of material from mills or warehouses has prevented manufacturing plants from balancing stocks, and one short line forces discontinuation of fabrication of a product. Inventories of various types of steel in stock, therefore, become frozen.

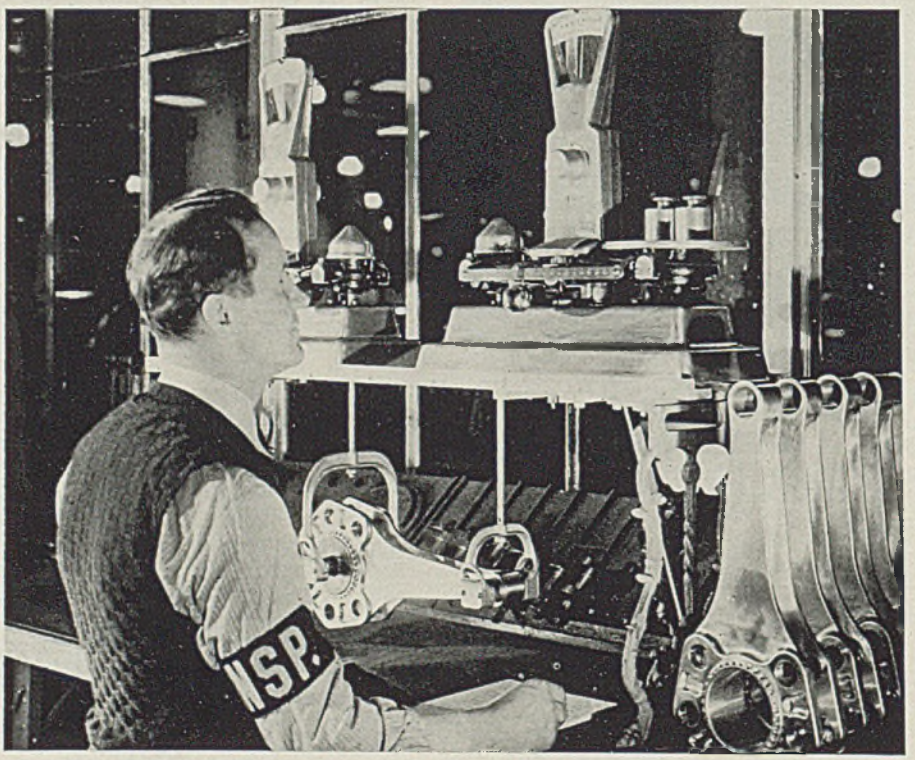
WPB regulations are such that this steel, when utilized or sold, must be for ratings of A-10 or higher. This immediately eliminates buyers lacking such ratings. Concerned solely with directing all of the nation's steel supply into essential war production, the government favors direct sale of frozen inventories by one manufacturer to another, but here the problem is that of locating potential users.

The alternative is to offer the material to a steel warehouse or organization engaged in buying and selling of steel, but several obstacles arise here, such as the limitations imposed by the warehouse quota. For most products, a warehouse has considerable leeway here, because with few exceptions receipts from mills for months have fallen below quotas. However, the steel may be located at a point which makes its resale unprofitable. Sale price cannot exceed the specified maximum, thus when freights are deducted, the seller finds he must dispose of the steel at less than the original cost and the margin for the warehouse is uneconomical.

Supplies of distress steel, observed for some weeks, are increasing, and are expected to continue to increase in the near future as stop and limitation orders become fully effective. Principal commodities involved are plain and stainless steel sheets and strip, some plates, a little wire, but practically no bars or pipe.

Demand for sheets has fallen off sharply in recent months, consequently little interest develops over the tonnages of frozen inventories now becoming available. Some warehouses have been able to acquire their mill quotas of cold rolled sheets and strip, and thus are not in a position to take additional tonnages.

The amount of excess stainless sheet and strip is surprising. Having been used extensively in a wide line of products now under ban, numerous tonnages of various grades and sizes are being offered for sale. They do not move speedily or well because of the difficulty in matching them up with war production requirements.



BALANCED WEIGHT. necessary to eliminate vibration is assured by this two-in-one scale which indicates weight at each end of a master rod for a "Cyclone 14," built by Wright Aeronautical Corp. Total weight not only must be correct to fraction of an ounce, but weight must be distributed to balance weight of the articulated rods which fit into a master rod and pass on 1700 horsepower to crankshaft

Harvester Dealers Gather 1,357,000 Tons of Scrap

Summarizing results of its scrap collection campaign three months after it assumed nation-wide scale, International Harvester Co., Chicago, last week reported that 1,357,000 tons of scrap metal had been gathered. This is equivalent to 35,000 railroad carloads.

Melted down and converted ton for ton into medium tanks, the scrap would build 30,000 fighting machines, 100 medium-size cargo vessels or 110,000 half-track military vehicles.

The collection of farm scrap was the most difficult, company stated. It was known that large quantities were on American farms, but it had been costly to gather through the ordinary collection channels because it was remote and widely scattered.

As the scrap began to move, observers noted that a high percentage was composed of old parts of farm machinery and other scrap obviously originating on farms. The drive was intensified in rural areas and is now being extended to Canada.

All of the metal collected has been marketed through scrap dealers at no profit to the company or its dealers who handled the collection.

Essential war construction this year is expected to exceed $13,500,000,000, topping the 1941 record by 20 per cent, according to WPB officials.

Interlake Iron Adds 140,000 Tons Capacity

In an effort to meet the growing war needs, Interlake Iron Corp. has been expanding its pig iron capacity at its South Chicago, Ill., plant. One of its two blast furnaces, which has been undergoing relining and enlarging, was lighted June 18. Further, proposed alterations to the second furnace and installation of a sintering plant, when completed, will increase capacity of the South Chicago unit of the corporation by 100,000 net tons a year.

Additional installation at its Toledo, O., property will increase production at that point by 40,000 net tons per year. This will make a total increase in capacity for the corporation of 140,000 net tons of pig iron per year. All of the alterations and expansions are being undertaken at the company's own expense.

Republic Enlarging Steel and Tubes Plant

Work has been started on an addition to the Brooklyn, N. Y., plant of Steel & Tubes Division, Republic Steel Corp., Cleveland, as authorized by Defense Plant Corp. It will increase by 50 per cent the productive capacity, area and employment at the plant, engaged exclusively on electric weld tubing for war purposes.

Granite City Expansion To Be Completed Ahead of Schedule

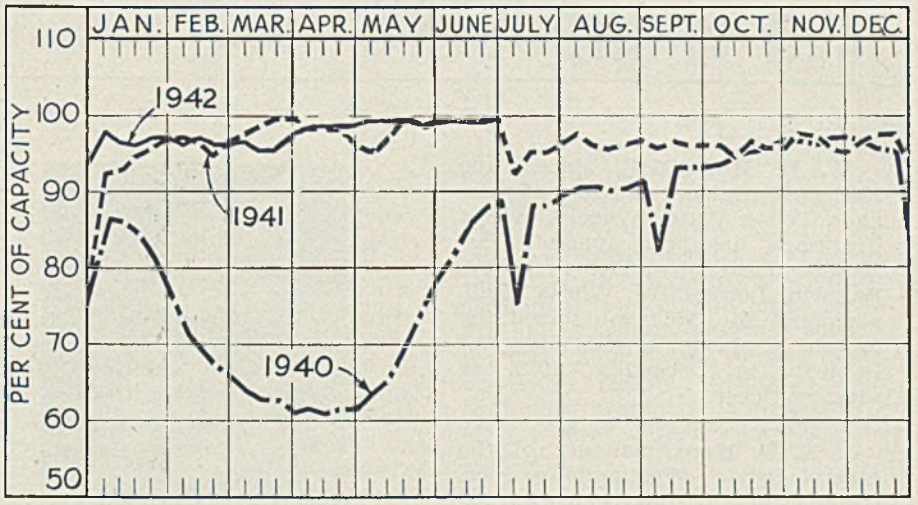
Spokesman for Granite City Steel Co., Granite City, Ill., said last week that company's $7,500,000 construction program now under way will not be altered by WPB's recent stop-construction order.

On the contrary, he said, facilities have been made available which will permit completion of the project in January, instead of August, 1943, as scheduled.

The new Manchester division of Scullin Steel Co., St. Louis, where armor plate will be produced, will be completed soon, ahead of schedule.

Carnegie-Illinois To Build New Coke Oven Battery

Construction of a new battery of coke ovens adjacent to the coke plant at Carnegie-Illinois Steel Corp.'s Gary, Ind., Works will be begun in the near future, it was announced last week. Carnegie-Illinois will act for Defense Plant Corp. in the construction and will lease and operate the new ovens, which will have a capacity of about 400,000 tons annually.



PRODUCTION . . . . Steady

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was unchanged at 99 per cent. Three districts advanced, two declined and seven were unchanged. A year ago the rate was 99 per cent; two years ago it was 88 per cent, both computed on the basis of capacity as of those dates.

Chicago — Receded ½-point to 103½ per cent, the lowest rate in 14 weeks. Decline is due entirely to necessity for furnace repair. Only two of six plants are operating at 100 per cent or over. Scrap supply allows small inventory gains.

St. Louis — Unchanged at 95½ per cent for the second week, with 26 of 28 open hearths producing.

Central eastern seaboard — For the third week steelmaking operations held at 96 per cent.

Cincinnati — With only one open hearth idle in the immediate district the rate was steady at 95 per cent.

Detroit — Advanced 9 points to 95 per cent as repaired furnaces were returned to service.

Buffalo — Furnaces going down for repair balanced those returned to service, holding the production rate steady at 90½ per cent for the sixth week.

Youngstown, O. — Though still hampered by scrap supply steelmakers maintained 95 per cent production last week, unchanged from the previous week. A blast furnace stack at Ohio Works of Carnegie-Illinois Steel Corp. was relighted last week after relining in the record time of 38 days. Indications are for 95 per cent operation this week.

New England — Up 5 points to 100 per cent, with indications for the same rate this week.

Pittsburgh — Held at 95½ per cent for the third week.

Wheeling—Gained 3½ points to 81½ per cent.

Cleveland — Furnace repairs caused a drop of 2 points to 92 per cent. Scrap supply is improving.

Birmingham, Ala. — Production remained at 95 per cent of capacity, which has prevailed for nearly five months. Ensley No. 3 blast furnace has been blown out for relining.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended June 20	Change	Same week 1941	Same week 1940
Pittsburgh	95.5	None	99	81
Chicago	103.5	— 0.5	102	93
Eastern Pa. ...	96	None	97	83
Youngstown ..	95	None	98	78
Wheeling	81.5	+ 3.5	88	90
Cleveland	92	— 2	95	84.5
Buffalo	90.5	None	90.5	90.5
Birmingham ..	95	None	95	88
New England .	100	+ 5	94	70
Cincinnati	95	None	95	85.5
St. Louis.....	95.5	None	98	68
Detroit	95	+ 9	94	89
Average	99	None	*99	*88

*Computed on basis of steelmaking capacity as of those dates.

Curtiss-Wright To Expand Buffalo Aircraft Factories

A $10,000,000 expansion program at the Buffalo factories of the Curtiss-Wright Corp.'s airplane division at Buffalo has been announced by William Davey, general manager.

Mr. Davey said wood and concrete will be substituted for steel where possible in the building program. The expansion will enable the company to increase production of the Curtiss (C-46) Commando, Kittyhawks and Warhawks (P-46) pursuits.

MEN of INDUSTRY

W. H. HOLCOMB, since June, 1939, vice president and general manager, Pelton Water Wheel Co., San Francisco, has been appointed assistant to executive vice president, Baldwin Locomotive Works, Philadelphia. Mr. Holcomb joined the Pelton company, a subsidiary of Baldwin, in December, 1919, as sales engineer.

♦

J. K. B. Hare, manager of the central district, Westinghouse Electric & Mfg. Co., has been awarded the Westinghouse Order of Merit "for his excellent management of the central district in constructive co-operation with headquarters personnel and for his successful administration of diverse sales activity in the major industrial areas of his district".

♦

V. I. Montenyohl, vice president, B. F. Goodrich Co., Akron, O., and a member of the organization 35 years, has resigned because of his health.

♦

John M. Lupton, the past two years associated with Robins Conveying Belt Co., Passaic, N. J., recently as advertising manager, has become advertising manager, Acheson Colloids Corp., Port Huron, Mich.

♦

George B. Botfield has been appointed assistant vice president, Botfield Refractories Co., Philadelphia. He will be in charge of the Pittsburgh territory, making his headquarters with the Pittsburgh Supply Co., Pittsburgh.

♦

Lester M. Goldsmith, chief engineer, Atlantic Refining Co., was granted the honorary degree of doctor of science by Drexel Institute of Technology, Philadelphia, at the annual commencement exercises June 13.

♦

Joseph G. Smith has been named compliance co-ordinator for Pittsburgh Steel Co., Pittsburgh. Associated with the company in sales capacities five years, the past two he has been assistant manager of the Pittsburgh district sales office.

♦

T. R. Johns, vice president and general manager, Industrial Collieries Corp., Johnstown, Pa., Bethlehem Steel Co.'s coal mining subsidiary, retired June 10, after 27 years of service. He has been succeeded by **K. M. Quickel,** who has become general manager. **T. J. Crocker,** formerly assistant to the general manager, succeeds Mr. Quickel as assistant general manager.

W. H. Holcomb

J. K. B. Hare

♦

George H. Bendell has been made superintendent of factories at Joliet, Ill., works of American Steel & Wire Co., and **Henry W. Spitzhoff** has been named superintendent of the wire mill at Joliet. Mr. Bendell formerly was assistant general superintendent at Joliet, while Mr. Spitzhoff has been chief industrial engineer since 1938.

♦

Sewall E. Voran has been named advertising manager, Pump Engineering Service Corp., Division of Borg-Warner Corp., Cleveland. Mr. Voran was formerly associated with Clapper Publications Inc., of Cleveland and Detroit.

♦

Walter E. Cummin, White Laboratories, Newark, N. J., has been elected president, Purchasing Agents Association of New York, succeeding **T. I. Savage,** purchasing agent, Murphy Varnish Co., New York. **James L. Crosbie,** Dexter Folder Co., Pearl River, N. Y., and **Millard W. Merrill,** United States Metals Refining Co., Carteret, N. J., have been elected vice presidents, while **E. V. Fielis** has been named treasurer.

♦

Charles D. Wiman, president, Deere & Co., Moline, Ill., has resigned to accept an appointment in the Army Ordnance department.

Burton F. Peek, since 1911 general counsel and vice president, Deere & Co., has been elected president, succeeding **Mr. Wiman.**

♦

John Morrow Jr., vice president in charge of purchasing, traffic and fiber operations since 1935, International Harvester Co., Chicago, is serving as colonel in the United States army service of supply. During his absence, **W. E. Worth,** assistant to vice president, will assume his duties with International Harvester.

♦

Andrew T. Kearney, the past 12 years partner in the management engineering firm of McKinsey, Kearney & Co., Chicago, has been appointed deputy regional director in charge of operations, WPB, Chicago.

♦

C. J. Whipple, president, Hibbard, Spencer, Bartlett & Co., Chicago, has been appointed a member of the management-labor policy committee of the War Manpower Commission.

♦

John G. Beach has been named a research engineer, Battelle Memorial Institute, Columbus, O., and has been assigned to the division of electrochemistry. He formerly was associated with Sherwin Williams Corp., Detroit.

♦

Dr. Foster D. Snell has been elected chairman, Society of Chemical Industry, Brooklyn, N. Y., for the 1942-1943 period. **Dr. Norman A. Shepard** has been elected vice chairman; **Cyril S. Kimball,** honorary secretary, and **J. W. H. Randall,** honorary treasurer.

♦

F. A. Melmoth, vice president, Detroit Steel Casting Co., has been elected chairman, Detroit chapter, American Foundrymen's Association for the 1942-43 period. **Omer L. Allen,** Pontiac Motor Division, has been named vice chairman, while **W. W. Bowring,** Frederic B. Stevens Inc., and **A. H. Allen,** Pen-

(*Please turn to Page* 105)

Emergency Plant Protection Plan Developed by Republic Steel Corp.

WITH a number of its important operations located in what the federal government designates as critical areas, Republic Steel Corp., Cleveland, developed a plant protection plan designed to meet every emergency which might result from enemy bombings. The company will have 7000 employes trained in some phase of protective work throughout its plants. Already set up in detail in its Cleveland mills, the plan is being rapidly expanded to other units.

So that there may be uniformity in organization and execution, the company has prepared a series of four booklets, which describes the organization in detail and outlines functions, and the course of instruction which should be followed.

The basis of the plan is the organization set up for emergency first-aid protection for employes. The fire prevention and protection organization follows the first-aid organization in detail so that there will be no division of authority at any point and all services will function as one close-knit unit.

Heading the emergency organization is the district manager, with superintendent of industrial relations acting as his lieutenant. Under the superintendent is the emergency protection supervisor, who is in detailed charge of the organization and execution of the plan. Under the supervisor the plant organization is divided into two main sections.

The safety department supervises all instruction, provides necessary equipment for carrying out the first-aid, rescue and fire work, trains the men and organizes them into brigades, keeps an accurate record of training, establishes an educational program for employes, and provides means of communication between the operating departments and the head of protection services.

The other branch provides for a detailed organization in each department. Wardens are appointed and men are assigned to the first-aid and fire brigades. A check is kept on all equipment, and inspections are made daily. Lists of the trained personnel are posted in each department and exact instructions are given so that each man knows exactly where in the plant, and how, he is to function.

Eight Main Divisions

The plant emergency protection system is divided into eight main divisions. These include:

Electrical Maintenance and Communications, which has charge of all communicating systems, trains for emergency blackouts, directs blackout activities, sets up lighting facilities, develops air-raid signals, trains and provides a messenger service, and maintains a close connection, through the safety supervisor, with the local civilian defense authorities.

Police and Traffic are responsible for the training of an organization of auxiliary police, the regulation of plant traffic, for the organization of first-aid transportation facilities, and see that division heads and alternates report immediately to the company's control center in case of emergency.

Safety and Health has direction of the training of squads to handle all types of bombs, is responsible for the handling of bombs which fall within the plant area, for providing food in case of emergency, and co-operates in the general educational campaign.

Transportation has charge of all railroad equipment together with its disposal and operation.

Fire—selects and trains fire brigades, is responsible for the removal of fire hazards, decides on the exact location of fire-fighting equipment, sets up and maintains a fire alarm system, develops regular fire inspections, keeps running check on water supply, selects and assigns fire watchers, and keeps in close contact with the local fire departments.

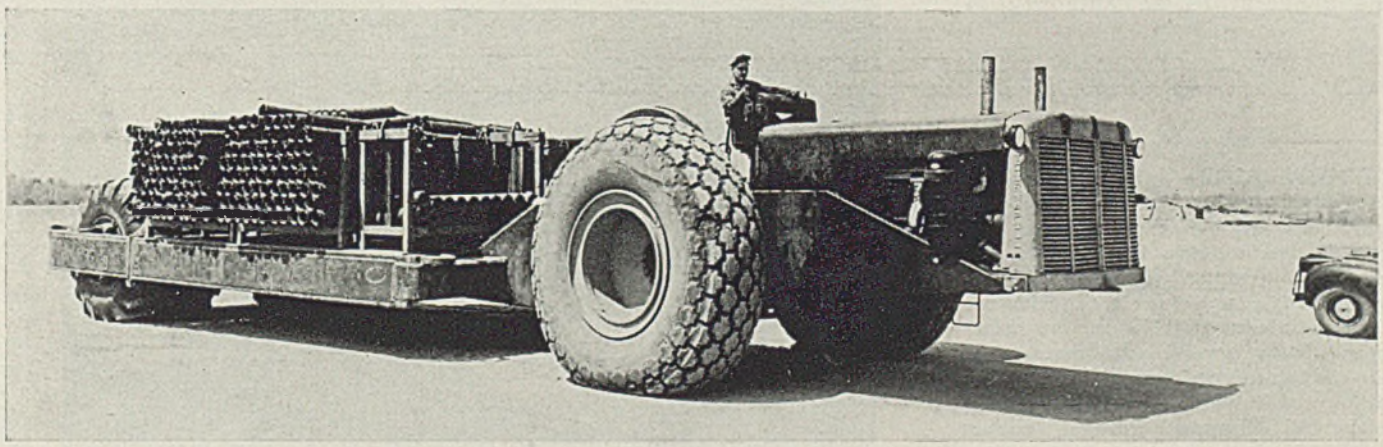
Mechanical Maintenance directs repairs, locates air-raid shelters, and has an available pool of trained men to handle emergency work.

First Aid trains and organizes first-aid squads, co-operates with the plant physician so that the dispensary can function as a base hospital, distributes and checks emergency first-aid equipment, locates first-aid stations, and keeps all records of men who are trained or are being trained.

Engineering supplies construction details of plants, buildings and equipment together with necessary diagrams, charts and boards for the operation of the plant control center.

Detailed instructions are given on the sequence in which plant executives are to be notified in case of an emergency, together with the activity which follows the receipt of the yellow, blue and red signals from the local civilian defense control center.

By thoroughly and completely training thousands of men in various phases of emergency protection, the company is at the same time performing a valuable service to the local civilian defense organizations, in that these men are available for service in their home sectors when they are not in the plants.



WELDED TRAILER EXCEEDS FREIGHT CAR CAPACITY: Although it weighs only 19¾ tons, this vehicle is capable of carrying 75 tons. Trailer is 30 feet long, 14 feet wide, and requires 24 x 30 tires equipped with air brakes. It is built by R. G. Le Tourneau Inc. with welding equipment supplied by Hobart Brothers Co., Troy, O.

Effect of New PRP Regulations on Priorities System Clarified by WPB

WASHINGTON

EFFECT on the priorities system of the new regulations concerning the Production Requirements Plan was explained last week in a statement issued by the WPB Bureau of Priorities.

"The Production Requirements Plan is the basic material authorization to buy, and supersedes all other priority instruments in the field it covers," according to J. S. Knowlson, director of Industry Operations. "The other priority instruments will continue in effect, however, for the groups not covered by PRP, and preference ratings will still be used as directives of delivery on finished products."

The text of the statement is as follows:

The Production Requirements Plan is the chief method of authorizing the purchase of basic materials. With a few exceptions, it is mandatory for all concerns using $5000 worth of metals a quarter and it may be used by other concerns. Approximately 90 per cent of the metal used will be covered by the plan.

For the third quarter of this year, PRP is based primarily upon one form, PD-25A.

This form is filled out by manufacturers as a specific application for authority to buy materials during the quarter. The PD-25A's will be reviewed and processed by the End Products Branches, including branches of the armed services, within the limitations of the general policy determinations as set forth by the Requirements Committee. Specific conditions within the individual company will be taken into account, however. The PD-25A will then be returned to the applicant as an authority to buy the amounts of material approved on the form.

Advance overall information already has been gathered from all large metal users on their metal requirements for the third quarter. The facts learned from them, together with information on supply furnished by the Materials Branches of the WPB, will be used by the Requirements Committee to determine how metal use can best be distributed.

Classification System Established

A third part of the picture is the Allocation Classification System (see page 52-A) which will be started during the third quarter so that it may become an effective part of PRP during the following quarter. The allocation system fits in as follows:

The present PD-25A requires information on the end uses of the applicant's products. However, the applicant often has no way of determining these end uses, especially if he is a subcontractor. And even when he knows the end use, he has had no standard method of stating it on the PD-25A. The allocation system, designed to rectify this, is an end use code in numerical symbols. Numbers from 1.00 to 23.00 have been assigned to all major classes of military, industrial and civilian uses. These classifications are subdivided as necessary. For instance, class 9.00 —power, light and heat—has under it subclass 9.10, electricity; 9.20, petroleum; 9.30, coal and coke; 9.40, gas. In addition, there are purchaser symbols.

Priorities Regulation No. 10 requires that the code be used on orders placed after July 1 and on all previously placed orders calling for delivery after July 31. In this way the end use will filter down through all layers of contractors and subcontractors to the concerns buying the basic materials.

As a result, when the applications are made under PRP for the fourth quarter, it will be possible for each manufacturer to state exactly, in terms of the code, what proportion of his products will go to what particular end uses, such as tanks, machine tools, or airplanes.

As previously stated, PRP grants authority to buy a definite amount of specific materials and also authorizes a lump allowance for operating supplies. Actual shipments of critical material now under allocation control still will be governed by month to month directions from

ORE SEPARATOR—Gaylord W. Penney, left, and George W. Hewitt, electrophysicists at the Westinghouse Research Laboratories, demonstrate an electrical invention which may be developed into a valuable machine for extracting vital metals from low-grade ores. Finely ground ores poured into the trough trickle through onto a rotating drum where they are held by electrical charges. Parallel copper wires, shown in front, are charged to 12,000 volts to draw off the metal particles. On the other side, similar wires remove sand from the drum

the WPB through the "M" orders covering the various materials. In brief, the "M" orders continue in effect just as before, except for the substitution of the new allocation classification for the various classifications now used. PRP, however, is intended to reduce the problem of allocation under the "M" orders by bringing total demand into approximate balance with total supply. This will make the specific scheduling of shipments the most important function of the "M" order.

Priorities Regulation No. 11, the legal basis of PRP, provides that in addition to companies using less than $5000 worth of metals a quarter, the users engaged in the following nine classes of business may continue to work through the existing priority procedures:

Transportation of any kind; furnishing of heat, light, power, electricity, gas or water to others; mining or quarrying; production, refining, transportation, distribution or marketing of petroleum or associated hydrocarbons; communications; sewerage or drainage; sale of material the user has not manufactured, processed, fabricated, assembled, or otherwise physically changed, including sales as a distributor, wholesaler, retailer, warehouse, industrial or mill supply house or scrap dealer; extracting, smelting, refining, alloying, or similarly processing metal ores or scrap into raw metal; construction, at the site, of buildings, structures, or projects.

Provides Margin of Safety

A "kitty" will be provided as a margin of safety to take care of errors in judgment or changes in the overall program. In addition, the Requirements Committee will set aside a percentage of the total supply of materials for the nine exempt classes of users and for the users of less than $5000 worth of metal a quarter. Companies in these groups will continue to use all the regular priority procedures but WPB will restrict each group of users to the proportion of the reserve created for its benefit.

The form of applying and extending all preference ratings will be made uniform after July 1 in accordance with Priorities Regulation No. 3, as amended June 10. The amended regulation provides that any preference rating may be extended by suppliers and subsuppliers on orders for material which will be delivered to the person to whom the rating was originally assigned or physically incorporated in products to be so delivered. Companies not operating under PRP may also extend any rating to cover operating supplies such as small perishable tools

(*Please turn to Page* 123)

REVISIONS AND ADDITIONS TO
PRIORITIES – ALLOCATIONS – PRICES
as published in Section Two of STEEL, April 20, 1942

"M" ORDERS

M-15-b-1 (Amendment): **Rubber**, effective June 12. Requires use of more reclaimed rubber and less crude in manufacture of industrial pneumatic and solid tires.

M-15-d: Aircraft Tires, Tubes, effective June 12. Requires buyers to obtain certificate from Civil Aeronautics Administration stating necessity of the purchase.

M-21-b (Extension): **Iron and Steel Warehouses.** Extends blanket preference rating of A-1-k, due to expire June 30, to warehouses holding uncancelled A-9 rating certificates to and including Aug. 15.

M-81-a: Tinplate and Terneplate, effective June 13. Requires can manufacturers to substitute wherever possible electrolytic tinplate and chemically treated black plate for hot-dip tinplate in making cans for specified vegetables, fats and other products.

"P" ORDERS

P-56-a (Amendment): **Mining Machinery**, effective June 12. Requires that mining machinery made from material obtained on a preference rating be delivered by the producer only to an operator as defined in P-56 or P-58, or to a producer as defined in P-68 or P-73, and only to fill an order bearing a rating assigned under these orders.

"L" ORDERS

L-30 (Amendment): **Kitchen and Household Articles**, effective June 12. Permits unrestricted production of pails or tubs containing metal only in hoops, bails, ears and handles, provided total weight of metal does not exceed 15% of weight of article.

L-53 (Amendment): **Track-Laying Tractors**, effective June 15. Prohibits sale, lease or delivery of new tractors or new auxiliary equipment, except upon specific release issued prior to June 15, or upon specific authorization.

L-63 (Amendment): **Suppliers' Inventories**, effective June 15. Removes railroad supplies from controls imposed by original order.

L-78 (Amendment): **Fluorescent Lighting Fixtures**, effective June 13. Removes sales restrictions from fixtures using tubes rated at 30 watts or less. Permits high voltage fixtures to be made of materials already fabricated. Eliminates replaceable starters from restrictions of the order.

L-107: Extended-Surface Heating Equipment, effective June 13. Includes unit heaters, unit ventilators, blast heating coils, convectors and winter air conditioners. Prohibits delivery, except to Army, Navy, Maritime Commission or Coast Guard, unless authorized on PD-412a by Director of Industry Operations. Suppliers file PD-467 with WPB by 15th each month to report preceding month's deliveries.

L-128: Automotive Exhaust Valves, effective July 1. Permits use of chromium and nickel only in the valve head. Prohibits sale unless consumer turns in used valve which cannot be reconditioned. Valves made under specifications for medium and heavy trucks may not be used in passenger cars or light trucks. Order does not apply to orders placed within 90 days after July 1 by Army, Navy or Maritime Commission.

L-136: Church Goods, effective June 23. Bans production or assembly of church goods containing specified critical materials. Starting June 1, iron and steel use limited to 50% of amount of iron, steel and critical materials used in corresponding 1940 period.

L-144: Laboratory Equipment, effective June 12. Prohibits sale or delivery of equipment containing critical material except for certified essential uses.

L-150: Douglas Fir Plywood, effective July 1. Prohibits production or delivery after July 1 of types and sizes other than those listed in the order.

L-152: Baby Carriages, issued June 13. Limits production through July 31 to rate during year ended June 30, 1941. After July 31, metal use limited to iron, steel, gold and silver and iron and steel use per carriage restricted until Nov. 1 to 6 lbs., not including joining hardware; to 6 lbs., including hardware, after Nov. 1. Iron and steel use per stroller restricted Aug. 1 until Nov. 1 to 3 lbs., not including hardware; to 3 lbs., including hardware, after Nov. 1. Iron and steel use per baby walker restricted to hardware, starting Aug. 1. Production of carriages and strollers after July 31 limited to rate during year ended June 30, 1941.

"E" ORDERS

E-5: Gages, Precision Measuring Tools, Testing Instruments, Chucks, effective June 15. Requires rating of A-10 or higher for delivery. Certain specific types costing more than $200 may be sold only pursuant to rating assigned to buyer by preference rating certificate or order of P-19 series.

E-6: Hand Service Tools, effective June 12. Restricts sales by producers to orders rated A-10 or higher. Limits alloy steel use in making hand tools to SAE 1300, 4000 and 9200 series; NE 8000, 8100, 8200, 8300 and 8400 series. Other grades received by a producer prior to June 12 may be used.

PRICE SCHEDULES

No. 4 (Amendment): **Iron and Steel Scrap**, effective June 17. Adds quotations on No. 3 bundles, cast steel, tube scrap and automotive springs and crankshafts to schedule. Establishes premiums for certain contained alloys. Incorporates nickel bearing scrap quotations in schedule, removing them from No. 8. Lists specific switching charge deductions from basing point prices in computing shipping point prices within basing points. Includes Louisiana among states for which remote scrap quotations established.

No. 17 (Amendment): **Pig Tin**, effective June 22. Sets premiums for special shapes weighing 7 lbs. or more at 1¼c per lb. No premium allowed on heavier shapes.

For additional revisions and additions please see STEEL of April 27, p. 30; May 4, p. 46; May 11, p. 55; May 18, p. 46; May 25, p. 42; June 1, p. 36; June 8, p. 39; June 15, p. 39.

WINDOWS of WASHINGTON

By L. M. LAMM *Washington Editor, STEEL*

Segregation of alloy scrap to conserve scarce metals made mandatory . . . Eighteen classifications established . . . Industry finds lower vanadium content in high-speed steels satisfactory

WASHINGTON

MANDATORY segregation of alloy steel scrap to conserve scarce alloying materials and permit their re-use was ordered last week by WPB in Order M-24-c. The order sets up classifications of alloy steels, provides for their segregation by classification and prohibits mingling of segregated alloy scrap except in the melting process.

Important savings in the principal alloying elements, nickel, chromium, tungsten and molybdenum, are expected as a result of the order. Alloy scrap now is segregated by steel mills as it is produced, but only a limited number of fabricators of steel have practiced segregation.

Exact estimates of the amounts of alloy to be saved cannot be made, but the savings are expected to reach at least 50 per cent of the amounts now saved in steel mills.

When alloy scrap is thrown into a melting furnace without regard to its content the alloy is, in effect, lost. The steel produced from such scrap may have a content of alloys not called for. If it is segregated, however, and used to make National Emergency Steels, all of the alloys in the scrap can be taken into account in producing the new steel.

High percentages of nickel, tungsten and molybdenum in scrap are recoverable. Chromium is recoverable in electric furnaces and to a limited extent in open hearths, depending upon the melting practices employed. Thus segregation of scrap will permit its flow into channels where it will do the most good, particularly the production of NE steel.

Various methods are employed to segregate alloy scrap by those companies now engaged in doing it.

The new order sets up 18 classifications. The first nine are alloy constructional steels containing combinations of nickel, chromium and molybdenum. Classes 10, 11, and 12 are high speed tool steels containing tungsten and molybdenum, chromium and vanadium. The remaining classes except the 18th, are corrosion and heat-resistant alloys containing chromium and nickel. Class 18 is all other heat and corrosion resistant steels containing chromium, nickel, molybdenum, cobalt or copper.

Persons who produce 10 tons or more of alloy scrap per month in the first nine classes must segregate them and those who produce 1 ton or more of the last nine classes must do likewise.

The order does not apply to scrap dealers as they have no means to analyze the alloy content of scrap. It is directed primarily to steel fabricators, who know the content of the steel they are processing and can make exact segregation. The identification of each type of segregated scrap must be preserved by all persons who handle it until it reaches the melting furnace.

Accompanying table lists the 18 classifications.

Column 1 Classification		Column 2 Description	Column 3 Examples
Alloy Constructional Steels	1	Nickel steels (nickel 1%-2% inclusive)	2100
		Nickel-chromium steels (nickel 1%-2.25% inclusive)	3100 3200
	2	Nickel steels (nickel over 2% to and including 5.25%)	2300 2500
	3	Nickel-chromium steels (nickel over 2.25% to and including 5.25%)	3300 3400
	4	Nickel-molybdenum steels (nickel 1%-5.25% inclusive)	4600 4800
	5	Nickel-chromium-molybdenum steels (nickel 1% and under)	8600, 8700 8800, 8900
	6	Nickel-chromium-molybdenum steels (nickel over 1% to and including 5.25%)	4300
	7	Molybdenum steels (molybdenum .15%-.65% inclusive)	4000, 4100, 8000, 8100, 8200, 8300, 8400, 8500
	8	Molybdenum steels (molybdenum over .65%)	Mn-Mo Bullet Core Steel
	9	Chromium steels and chromium-vanadium steels (chromium .70%-1.75% inclusive)	52100 5100, 6100
Alloy Tool Steels	10	Class A high-speed steel (as defined in Order M-14, as amended)	
	11	Class B high-speed steel (as defined in Order M-14, as amended)	
	12	Tungsten-bearing hot work steels	
Corrosion and Heat Resisting Alloy Irons and Steels	13	Chromium 10%-14% inclusive	
	14	Chromium over 14% to and including 18%	
	15	Chromium over 18%	
	16	Chromium 16%-20% inclusive and nickel 8%-10% inclusive	
	17	Chromium over 20% to and including 30% and nickel over 10% to and including 20%	
	18	All other grades of corrosion and heat resisting alloy irons and steels containing chromium, nickel, molybdenum, cobalt, or copper	

NOTE: The steel series and other designations listed in Column 3 are for illustration only. Scrap of other analyses should be segregated in the appropriate classification according to the descriptions in Column 2.

Lower Vanadium-Content Steels Found Satisfactory

Reports from industry indicate that generally satisfactory results are being obtained from lower-content vanadium high speed tool steels introduced more than two months ago.

The 18-4-2 grade containing 18 per cent tungsten, 4 per cent chromium and 2 per cent vanadium previously requested by a number of manufacturers has been eliminated and the vanadium content of the more common 18-4-1 grade has been reduced. Vanadium in the latter grade formerly averaged from 0.90 to 1.20 per cent and tool steelmakers have been asked to hold to the minimum of the range.

Excellent results have been obtained by reducing the vanadium content of the so-called 6-6-2 grade, containing 5.50 to 5.75 per cent tungsten, 4.50 to 5.50 per cent molybdenum and 1.40 per cent vanadium. Vanadium content now is more generally 1.20 to 1.25 per cent and in some cases satisfactory performance is reported with even less. Some tool steelmakers did not regard the previous analyses as being in proper balance.

Vanadium has been eliminated entirely from a number of tool steels where about 0.25 per cent was added as a toughener.

Certain production steels, bearing vanadium, such as SAE 6150, now are being made only for such vital uses as aircraft valves, silicomanganese spring steel being substituted for this purpose in truck engines and the like.

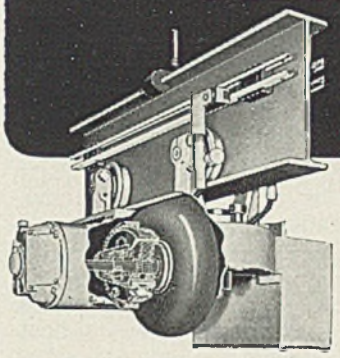
Rated Orders Required for Mining Machinery Deliveries

Mining machinery produced from materials obtained under a preference rating cannot be delivered except on rated orders, under the terms of amendment No. 3 to Order P-56-a. Amendment provides such machinery shall be shipped by the producer only to operators as defined in Orders P-56 or P-58, or to a producer as defined in P-68 or P-73, and only to fill an order bearing a preference rating assigned under these orders.

WPB also announced that materi-

AMERICAN MONORAIL EQUIPMENT

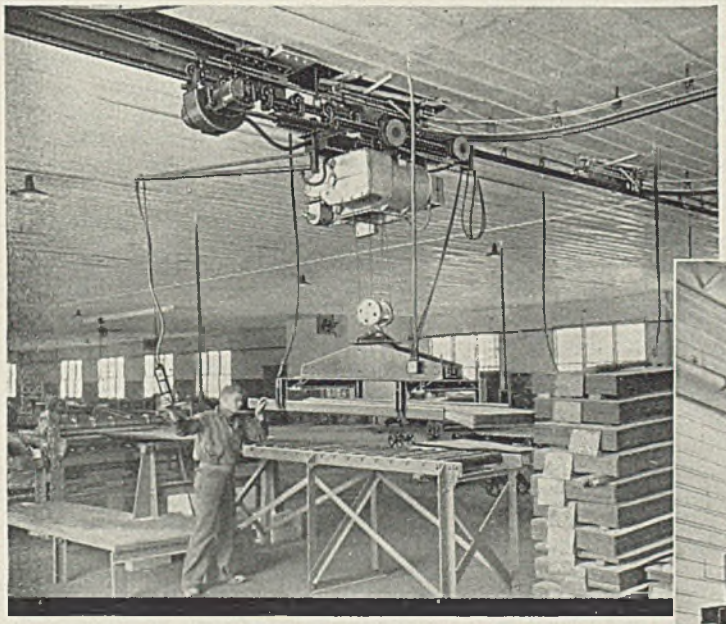
TURNS BACK-BREAKING HANDLING INTO FINGER-TIP HANDLING



Here are photos of two plants that have recently installed American MonoRail Overhead Handling Equipment. In both of these plants, tons of sheet steel are handled as easily as a small boy handles his electric train—with the same finger-tip control. The handling of heavy loads has become practically child's play. These two installations are typical of hundreds of others that have solved their back-breaking jobs with American MonoRail Equipment.

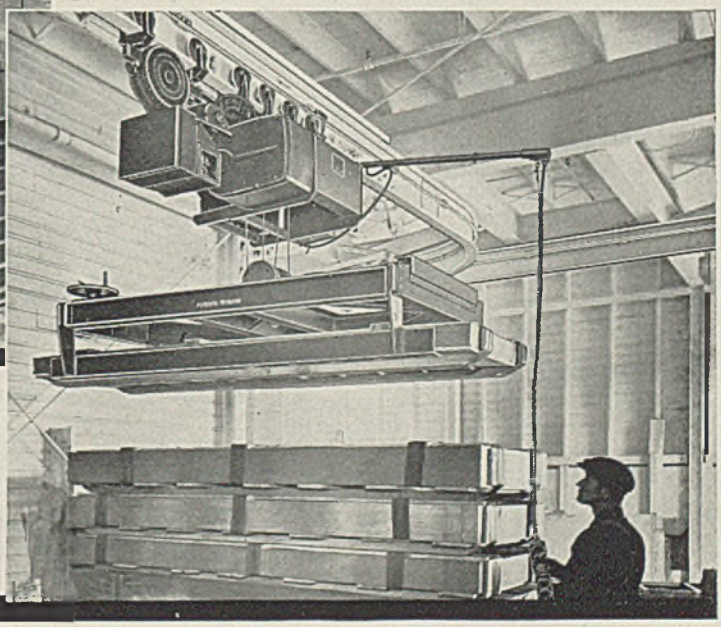
Today, production is handled with unheard of speed and efficiency. American MonoRail Equipment is playing an important part. An American MonoRail Engineer will gladly explain the advantages of this equipment in your plant. This service is without cost or obligation—furthermore, there is no delay or shutdown during installation. Write today.

WRITE FOR Blue Book illustrating hundreds of MonoRail installations.



◀ Push button switch controls Mono-Tractor, hoist and special grab operation.

▼ Five tons of steel travel overhead by finger-tip control.



THE AMERICAN MONORAIL CO.

13102 Athens Avenue Cleveland, Ohio

★ ★ ★

al necessary for the repair and maintenance of houses owned by a mining company and used to shelter the miners cannot receive as high a preference rating as material necessary for the actual operation of the mine.

Interpretation No. 1 to P-56, as amended, provides that an A-10 rating is available for repair and maintenance material. Material necessary for operation has an A-8 rating.

"Greatest Possible" Substitution For Tin Containers Required

Manufacturers of cans for several vegetables, fats, and a score of other products have been ordered by the WPB to substitute wherever possible electrolytic tin plate and chemically treated black plate for tin plate in Conservation Order M-81-a.

The Containers Branch said that for the remainder of this year, about one million base boxes each of electrolytic tin plate and chemically treated black plate will be substituted for the hot-dip tin plate now used.

A base box of tin plate, which averages about 100 pounds, contains 1¼ pounds of tin. Each million base boxes of electrolytic tin plate substituted for the hot-dip plate will represent a saving of about 350 tons of pure tin.

Since electrolytic plate mills are experiencing difficulty in obtaining materials necessary to build their lines, the order is somewhat less rigid than it would be if production during the next few months could have been accurately forecast.

MRC Begins Purchases of Domestic Manganese Ore

Metals Reserve Co. has started to purchase manganese milling ores with manganese content ranging from 15 to 35 per cent at sites where concentration mills are either now in operation or have been recommended by the WPB.

Purchases stations have been established at the following locations: Batesville, Ark.; Elizabethton, Tenn.; Butte, Mont.; Phillipsburg, Mont.; Deming, N. Mex.

Under the program miners in the listed localities will obtain an immediate outlet for their ores.

OPA Warns Dealers in "As Is" Aluminum Scrap

Persons who buy and sell aluminum scrap on an "as is" basis are running the risk of making themselves liable to the heavy penalties provided for violation of Revised Price Schedule No. 2 on aluminum scrap, according to OPA.

The schedule, which establishes maximum prices for aluminum scrap, specifically provides that maximum prices may be charged and paid only for scrap which meets generally accepted standards of the trade.

"Low-grade scrap, scrap which is not clean and dry, and scrap which for any other reason fails to meet trade standards must be sold at prices proportionately below the established maximum prices," he pointed out. "Proper deductions must be made for oil, water and other contamination contained in borings, turnings and similar machinings.

Space-Heating Equipment Shipments Restricted

Shipments of certain types of space-heating equipment have been limited by the WPB to orders of the Army, Navy, Maritime Commission, and Coast Guard.

The action, embodied in Limitation Order L-107, replaces a telegraphic "freeze" order, issued on March 24, which prohibited shipment except on specific approval by the Director of Industry Operations.

The L-107 Order covers Extended Surface Heating Equipment, including unit heaters, unit ventilators, blast heating coils, convectors, and winter air conditioners. These products are made largely from steel, copper, and copper alloys, and are for heating large spaces or for industrial drying purposes.

Order prohibits delivery, regardless of the terms of any prior commitment or preference rating, except for the military or naval services noted above, unless delivery is expressly authorized on Form PD-412a by the Director of Industry Operations.

The order does not prevent the delivery of electric motors or controls necessary for repair purposes, or the delivery of any repaired heat-transfer element.

All persons affected by the order must file Form PD-467 with the WPB on or before the fifteenth day of each month, showing all deliveries during the preceding month.

Copper Recovery Corp. Ready To Buy 300,000 Tons of "Frozen" Inventory

WASHINGTON

H. O. KING, chief, WPB Copper Branch, has urged holders of "frozen" stocks of copper and brass products to exercise more care in filling out the forms sent out by the Copper Recovery Corp.

Mr. King said that only about one-third of the forms received are acccurately and completely filled out. This necessitates returning the forms and added work both for the holder and the Copper Recovery Corp.

The forms cover frozen and excessive stocks of copper and copper-base alloy materials which will be purchased by the Copper Recovery Corp. for use "as is", Mr. King said, in the manufacture of war goods. If the material cannot be used in this manner, he said, it will be shipped to refineries, brass mills or brass ingot makers, depending upon the best method of disposal.

More than 300,000 tons of copper and copper-base alloys now exist as idle and excessive inventories in the hands of manufacturers as the result of Conservation Order M-9-c as amended May 7, 1942.

More than 100,000 sets of forms have been sent to holders of the material by the Inventory and Requisitioning Branch of the Division of Industry Operations and must be returned to the Copper Recovery Corp., 155 East Forty-fourth street, New York.

Copper Recovery Corp., acting as agent for the Metals Reserve Co., will carry out arrangements made by WPB for the purchase and disposal of all material sold voluntarily. All purchases will be subject to inspection and verification of weight and specifications.

The offer to purchase will be made only for a limited period. Unless the offer is accepted promptly, the government will requisition idle stocks, under the President's requisitioning powers.

Three forms, as well as an affidavit, are involved:

Form WPB 843-A calls for detailed information on inventory of primary copper and copper-base alloy products still in the form in which they were received.

Form WPB 843-B calls for a detailed report on inventory of non-assembled, partly or wholly fabricated copper and copper-alloy products produced primarily and entirely from a single primary product.

Form WPB 843-C calls for information on all other copper and copper-base alloy materials.

Form WPB 843-D is an affidavit which must be returned with the foregoing reports. No other form is acceptable.

Copper ingot and refinery shapes and scrap will be purchased at OPA ceiling prices.

Steel Products Committee Formed by OPA, with W. E. Watson as Chairman

WALTER E. WATSON, vice president, Youngstown Sheet & Tube Co., has been elected chairman of the General Steel Products Advisory Committee, OPA..

Committee is one of four iron and steel industry advisory units set up to serve as liaison groups between OPA and the industry on any problems which may arise with respect to prices.

Other members are: Avery C. Adams, United States Steel Corp., Pittsburgh; J. W. Anderson, Sheffield Steel Corp., Kansas City, Mo.; Homer Butts, Niles Rolling Mill Co., Niles, O.; Norris J. Clarke, Republic Steel Corp., Cleveland; J. A. Henry, Weirton Steel Co., Weirton, W. Va.; Paul Mackall, Bethlehem Steel Co., Bethlehem, Pa.; J. L. Neudoerfer, Wheeling Steel Corp., Wheeling W. Va.; N. H. Orr, Colorado Fuel & Iron Corp., Denver; L. M. Parsons, Jones & Laughlin Steel Corp., Pittsburgh; and A. C. Roeth, Inland Steel Co., Chicago.

Stettinius Now Member of Board of Economic Warfare

Edward R. Stettinius Jr., former chairman of the United States Steel Corp. and at present lend-lease administrator, has been appointed a member of the Board of Economic Warfare.

John A. Hurley, formerly general sales manager, Nineteen Hundred Corp., St. Joseph, Mich., has been appointed chief of the Consumers Durable Goods Branch, succeeding L. C. Upton, president of the Nineteen Hundred Corp.

Committee Selected To Oversee War Output in Railroad Shops

Railroads, their employes and the government are represented on a committee appointed recently by Joseph B. Eastman, Director of Defense Transportation, to supervise the performance of war production work in railroad shops.

To make it possible for the railroads to produce war work under railroad labor standards, exemption has been obtained for the railroad companies from the application of the Walsh-Healy act and the hours provisions of the Fair Labor Standards act.

Otto S. Beyer, Director of the ODT's, Division of Transport Personnel, heads the newly-formed committee. Other members are: George A. Landry, chief of the staff service branch, WPB Production Division; Andrew Stevenson, chief, Transportation Branch, Division of Industry Operations; M. W. Clement, president, Pennsylvania railroad; W. M. Jeffers, president, Union Pacific railroad; Ernest E. Norris, president, Southern railway; B. M. Jewell, president, Railway Employes' Department, American Federation of Labor; F. H. Knight, general president, Brotherhood of Railway Carmen of America; H. J. Carr, vice president, International Association of Machinists.

George M. Harrison, grand president of the Brotherhood of Railway and Steamship Clerks, Freight Handlers, Express and Station Employes, will serve as an alternate for one of the other labor members when there is a matter up which affects his organization.

Mr. Beyer said that railroad officials are now working with representatives of the WPB, and with agencies engaged in contracting for war materials, on the types of war goods that railroad shops can produce.

Additional Industry Committees Appointed

Additional industry advisory committees in the metalworking field were announced last week by T. Spencer Shore, chief, Bureau of Industrial Advisory Committees, WPB:

Porcelain Enameled Utensil

Anthony F. Bisgood, section chief, Consumers' Durable Goods Branch, government presiding officer.

Committee members: F. S. Earnshaw, U. S. Stamping Co., Moundsville, W. Va.; Ralph M. Fawcett, Republic Stamping & Enameling Co., Canton, O.; D. S. Hunter, Enameled Utensil Mfrs. Council, Cleveland; Frank E. Jones, The Jones Metal Products Co., West Lafayette, O.; W. F. Lewis, Lisk Mfg. Co., Canandaigua, N. Y.; W. J. Vollrath, Polar Ware Co., Cheboygan, Wis.

Dairy Equipment And Machinery

L. S. Greenleaf Jr., chief, Special Industrial Machinery Branch, government presiding officer.

Committee members: E. Roy Alling, Rico & Adams, Buffalo; John Colony, Manton-Gaulin Mfg. Co., Everett, Mass.; E. C. Damrow, Damrow Brothers, Fond du Lac, Wis.; John W. Ladd, Cherry-Burrell Corp., Chicago; Harry L. Miller, Chester Dairy Supply Mfg. Co., Chester, Pa.; Timothy Mojonnier, Mojonnier Brothers, Chicago; Gilbert R. Olson, General Dairy Equipment Co., Minneapolis; George W. Putnam, Creamery Package Co., Chicago; Roland F. Smith, Waukesha Foundry, Waukesha, Wis.; H. J. Walker, Thomas D. McHale Mfg. Co., Los Angeles.

Hand Saws

John L. Haynes, chief, Building Materials Branch, government presiding officer.

Committee members: G. W. Dunnington, E. C. Atkins & Co., Indianapolis; S. Horace Disston, Henry Disston & Sons Inc., Tacony, Philadelphia, Pa.; F. G. Acomb, Pennsylvania Saw Corp., York, Pa.; James J. Dougherty, Central Hardwood Co., Philadelphia; E. A. Todd, Simonds Saw & Steel Co., Fitchburg, Mass.; H. J. Bradbury, Ohlen Bishop Mfg. Co., Columbus, O.; Walter C. Hecker, Curtis Saw Division of Curtis Mfg. Co., St. Louis.

Copper Producers

Harry O. King, chief, Copper Branch, government presiding officer.

Committee members: K. C. Brownell, American Smelting & Refining Co., New York; A. E. Petermann, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.; Robert E. Dwyer, Anaconda Copper Mining Co., New York; B. N. Zimmer, American Metal Co., New York; J. F. McClelland, Phelps Dodge Corp., New York; A. J. McNab, Magma Copper Co., New York; Carl T. Ulrich, Kennecott Copper Corp., New York.

Nonferrous Metals Committee Organized

A. I. Henderson, director, Materials Division, has announced the establishment of a nonferrous metals committee to integrate the work of the Copper, Lead and Zinc Branches of the War Production Board in connection with the war production drive in nonferrous metal mines.

Members of the new committee in the Materials Division will be: H. O. King, chief of the Copper Branch; George Heikes, chief of the Zinc Branch; and Erwin Vogelsang, chief of the Lead Branch. Mr. King will head the committee.

Associate Directors Named to Labor Production Division

Joseph O. Keenan, Chicago Federation of Labor, AFL, and Philip J. Clowes, United Steelworkers of America, CIO, have been appointed associate directors of the WPB Labor Production Division by Director Wendell Lund.

Mr. Lund also has named a six-member policy committee representing the CIO and the AFL to strengthen contact between the two labor organizations and the WPB.

Members of the committee are: Frank P. Fenton, director of organization, AFL, Washington; John P. Frey, president, Metal Trades Department, AFL, Washington; George Masterton, president, United Association of Journeymen, Plumbers and Steamfitters, AFL, Washington; Clinton S. Golden, assistant to the president, United Steelworkers of America, CIO, Pittsburgh; John Green, president, Industrial Union of Marine and Shipbuilding Workers of America, CIO, Camden, N. J.; and Walter P. Reuther, member of international executive board, United Automobile, Aircraft and Agricultural Implement Workers of America, CIO, Detroit.

Limit Use of Alloy Steels To Be Used in Making Hand Service Tools

WASHINGTON

TYPES of steel which may be used in producing hand service tools are limited in General Preference Order E-6, which also limits the orders which producers of such tools may fill.

Included among the hand service tools are chisels, hammers, snips, pliers, punches, screwdrivers and wrenches. The order provides that such tools may not be manufactured out of any alloy steel except those series specifically designated in an exhibit attached to the order.

However, producers who had always received prior to issuance of the order alloy steel of a series not listed are permitted to use it.

No producer of hand service tools, under the terms of the order, may fill any purchase orders except those rated A-10 or higher. This restriction applies only to sales by the producer; distributors and retailers may continue to sell as heretofore on unrated orders, after they have filled all orders with ratings.

It will hereafter be necessary for distributors of hand service tools as well as retail stores purchasing directly from the producer either to have rated orders which they may extend to the producer or to apply for a rating for their requirements on Form PD-1X, "Distributor's Application for a Preference Rating."

Those producers who have previously sold their tools to the ultimate purchaser through branches or branch stores directly owned and operated by them are excepted from the requirement that they sell only on orders rated A-10 or higher; such a producer may deliver tools without obtaining a rating subject to filling his rated orders as required by Priorities Regulation No. 1.

Control Over Distribution of Gages, Measuring Tools Tightens

Distribution of gages, precision measuring tools, testing instruments and chucks has been brought under stricter control in General Preference Order E-5.

No gage, precision measuring tool or testing instrument, may be sold except pursuant to a rating of A-10 or higher. Also certain specific types of gages, tools and instruments costing more than $2000 may not be purchased, except pursuant to a rating assigned to a purchaser by a preference rating certificate or preference rating order of the P-19 series.

The order also provides that no chuck may be sold except pursuant to a rating of A-10 or higher.

Producers' present delivery schedules for gages, precision measuring tools, testing instruments and chucks should be maintained for 30 days without change. Thereafter purchase orders are to be scheduled according to the terms of the order.

General Preference Rating Order E-1-a, revised, which formerly controlled the distribution of gages and chucks, was revoked and replaced by E-5.

The Tanks Are Coming! Hurrah! Hurrah!

LIKE huge elephants in a circus parade—only more spectacular, more inspiring—a fleet of the great new American tanks, with cast steel bodies, rumbled through the streets of New York recently in the demonstration of "New York at War". More than 2,000,000 persons saw at close range modern implements of war, marking the most rapid conversion from peace to war-time economy in history. NEA

Smaller War Plants Corp. To Be Established in WPB

WPB's conversion program is being decentralized.

A central office will be maintained in Washington but activities will be largely handled through the WPB's 13 branches located in Atlanta, Ga., Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Kansas City, Minneapolis, New York, Philadelphia, San Francisco and Seattle.

The Murray-Patman small business bill signed by President Roosevelt recently provides for the appointment by WPB Chairman Donald Nelson of a special deputy who shall assume the responsibility for the welfare of small concerns.

The bill sets up within WPB a Smaller War Plants Corp. with capital of $150,000,000, endowed with powers to provide money and facilities for conversion of small plants. The corporation will break up prime contracts among them.

Manufacture of Innerspring Mattresses To Be Banned

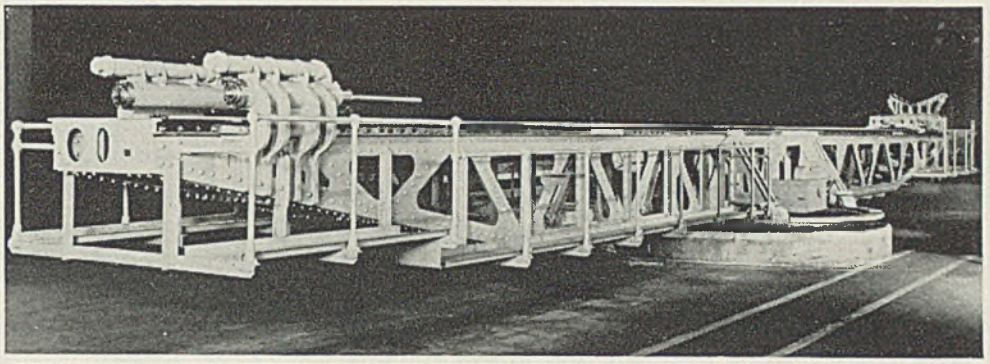
Production of mattresses or pads containing iron or steel is prohibited after Sept. 1 in Amendment 1 to Limitation Order L-49.

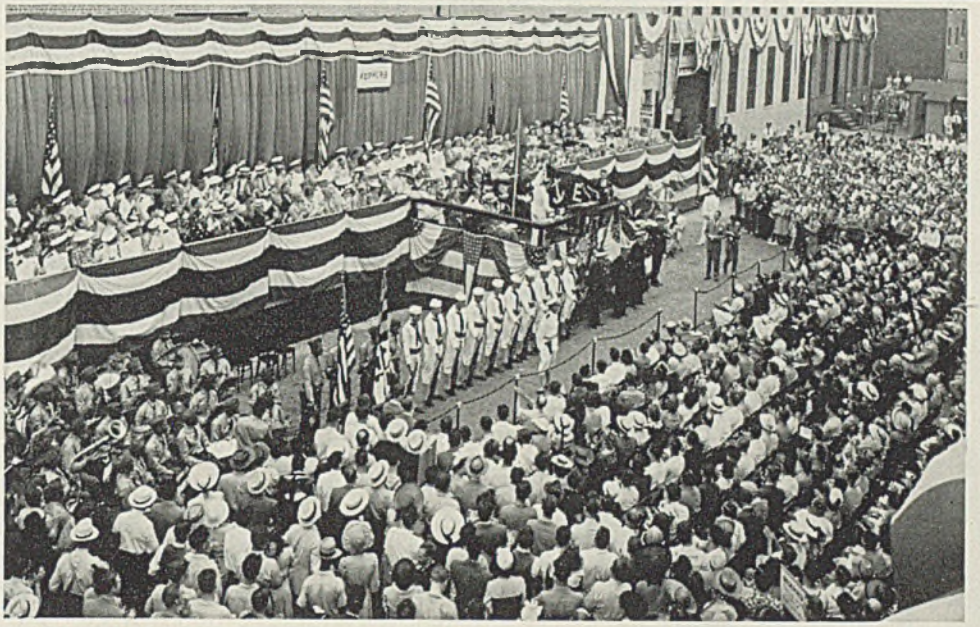
During July and August, a manufacturer of innerspring mattresses or pads may produce twice his average monthly production of such products in the 12 months ended June 30, 1941.

Order does not affect the manufacture of mattresses or pads filled with cotton, felt, or hair.

Malleable iron castings production in April was 71,150 net tons, compared with 69,737 tons in March and 76,170 tons in April, 1941, as reported to the Bureau of the Census. Total for four months was 274,768 tons against 274,451 tons in the comparable period last year.

Aircraft Catapults Win Navy Award





FIRST picture of catapults for launching aircraft from naval vessels, above, which are being built by Koppers Co., Bartlett Hayward Division, Baltimore, were released by the Navy last week. Seven thousand employes, members of their families and friends, below, crowded a plant street while Rear Admiral John H. Towers, of the Navy, presented the Navy "E" in recognition of the company's production of the catapults

Steel, Training Thousands, Rises In Safety Scale

STEEL rose to the rank of third safest among 31 leading American industries in 1941, compared with a rank of fourth in 1940, according to data compiled by the National Safety Council and correlated by the American Iron and Steel Institute.

"As a result of a long-continued campaign for the prevention of accidents, the steel industry has steadily climbed higher in the safety ratings of American industries during the past 30 years," the institute states.

The industry's accident frequency rate was over 54 per cent less than the average frequency rate for all industries in 1941.

In 1934, steel had risen to twelfth place among American industries in relative freedom from accidents. The industry was seventh in the following year, sixth in 1936 and fifth place in 1937. Since 1938, it has been either third or fourth each year.

Only two industries, tobacco and cement, had lower accident frequency rates than steel in 1941.

Although accident frequency rates rose slightly in steel in 1941 because of intensified war production, concerted campaigns undoubtedly were effective in preventing the occurrence of many accidents among inexperienced employes.

For each million man-hours worked in steel mills last year, there were 7.02 accidents, compared with 6.54 accidents in 1940, when the steel industry established its lowest accident rate.

The steel industry's frequency rate was less than one-half as large as the average rate of 15.39 accidents for each million man-hours worked in all industries in 1941.

Priorities Case Settled With Consent Decree

Suit against Jones & Laughlin Steel Corp., in which the government alleged violation of War Production Board's priority regulations, was settled in federal court in Pittsburgh last week with a consent decree. Judge Schoonmaker remarked that it was "a very happy disposition of the case."

The decree entered at the request of the government and Jones & Laughlin directs the corporation to comply with all such regulations. Jones & Laughlin did not at any time yield from the position it took in its answer filed June 2—a complete denial.

The court's order noted the fact that government's counsel had said "the government made no charge or intimation that the defendent was guilty of any lack of patriotism."

"With the tremendous united effort the war requires from every one of us, Jones & Laughlin Steel Corp., is unwilling to engage further in any controversy with the government about priorities," said Elder W. Marshall, counsel for the corporation.

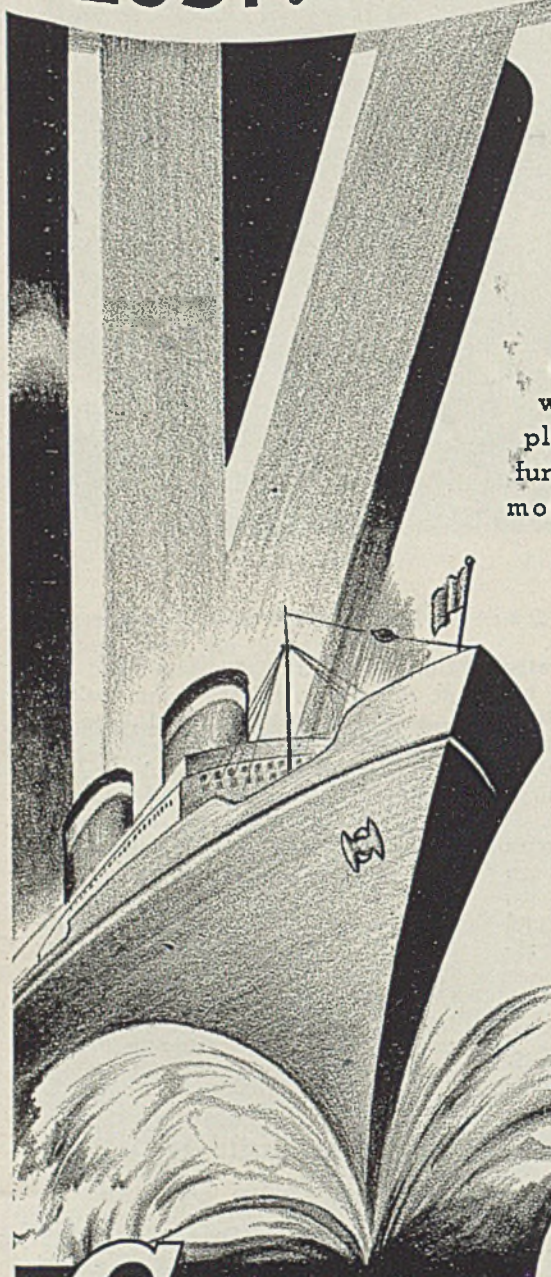
Wilputte Building 403 New Coke Ovens

Wilputte Coke Oven Corp., subsidiary of Semet-Solvay Co., a part of Allied Chemical & Dye Corp., New York, is building 403 by-product coke ovens to keep pace with increased iron and steelmaking capacity. All but one of the six batteries involved are for steel producers.

Wilputte has completed construction of five other batteries of coke ovens in recent months.

BIBLIOTEKA POLITECHNIKI

Our Willpower - Our Manpower - Lost! - Without Horsepower!

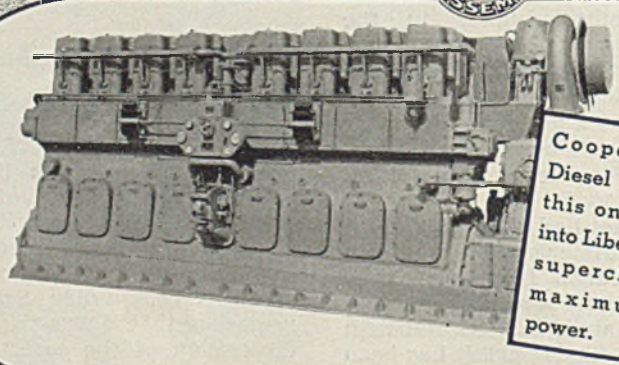


One of the first calls was for power for the Liberty Ships! . . . those ships that form a moving bridge of steel to every farflung battlement of Democracy! Making the cylinders for their huge steam engines presented a real problem. Cooper-Bessemer foundries solved that problem . . . evolved methods which were offered to other foundries immediately.

Those giant steam cylinders are just a part of the Victory drive at Cooper-Bessemer. There are diesel engines for warships, river boats, cargo ships, locomotives, and power plants . . . gas engines for pumping gas and oil and furnishing power for vital war industries . . . engine and motor-driven compressors for refineries, chemical plants and shipyards!

We give thanks for this company's 109 years of horsepower-building experience . . . experience which fits us for our part in this war to save the greatest possession of all men — Liberty!

THE COOPER-BESSEMER CORPORATION
MOUNT VERNON, OHIO
Plants: Mount Vernon, Ohio and Grove City, Pa.
New York City Washington, D. C. Gloucester, Mass. Los Angeles
St. Louis, Mo. Houston Seattle Calmes Engineering Co., New Orleans



Cooper-Bessemer Diesel Engines, like this one, are going into Liberty Ships . . . supercharged for maximum horsepower.

Cooper-Bessemer

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

MIRRORS of MOTORDOM

Motor capital speculates on war's length in concern for dealers' future . . . . Cutting tools and fixtures are current tight spot as aircraft plants use $1000 worth per engine

DETROIT

ON THE theory the most successful managements are often the best guessers or gamblers as to the pattern of the future, there is a lot of concerted guessing going on currently seeking to place the end of the present war. Automobile manufacturers are particularly anxious to foresee the end accurately, because they realize their dealer organizations will hold together only so long, and to get back in the retail field on a competitive basis it is essential to have some manner of dealer organization still functioning. One sample of top-side opinion is that the majority of dealers can hold out for at least two years, but certainly not for anything like six years.

So, everyone with an opinion is being interrogated, and staff meetings occasionally will concentrate on mapping a finish to the war, so that some definite thinking can be put in motion pointing to the day when the automobile business will reawaken from its wartime slumbers. The only difficulty is that from a military standpoint the record so far shows the United Nations to have "taken a hell of a beating" to use Gen. Stilwell's words—and a reeling prizefighter is in no mood to tell the crowd how soon he is going to receive the champion's belt.

Some Hint At Long War

The ultimate announced goal is complete military victory over the Axis powers. Granted that when they start to fall they will fall fast, nevertheless they are not going to start falling while they continue to advance and to feed their slave populaces on victories. Expert observers who have returned to this country from far-flung battlefronts do not re-echo any of the optimism which has been voiced in this country about an early end to the war. Some of them in fact are bewildered by the size of the task cut out for the U. S., and hint darkly at 15 more years of war if this or that eventuality does or does not take place.

Throwing aside the question of whether the national economy as it is now being blueprinted could endure 15 years of war, it may be well to examine what some of the current planning now is among automotive builders. In the absence of any concrete reasons for doing otherwise, one company is figuring the conflict will end by June of 1943; on this basis dealers will be supplied with new cars eight to nine months hence, or around March, 1944. Such cars will naturally be 1942 models, since it would take longer than that to develop a completely new model and get it into production.

The chief executive of this company—and it is one of the more important names in motordom—is a little cautious about expecting the immediate translation of what is being learned in manufacture of war products, such as airplanes and airplane engines, into future automobiles. Much has been written and said about the application of aluminum to automobiles since it will be more plentiful and less expensive in postwar years. However, the executive in question points out that the welding of aluminum is still in the embryonic state, while the welding of aluminum to steel is not as yet thoroughly practical. Furthermore, much remains to be learned about the electrolysis of the two metals in contact. Here are three problems in the way of the aluminum automobile.

On the score of price the outlook for cars of tomorrow is not for any major reductions. The average car involves about $800 worth of material, some 90 per cent of which is either iron or steel, plus approximately 100 man-hours of labor. Reductions in either of these items appear hardly likely, so costs are in a more or less static position. Furthermore there is the question of the size of the market facing car builders when they emerge. Will it be a 2,500,000-car or a 5,000,000-car year. Guesses vary between these levels, but one guesser argues that with 6 out of 10 wage earners slated to be on war work, a sudden collapse in the war production program would leave up to 60 per cent of such working people out of jobs and hardly interested in buying a new car; so he is inclined to be conservative on the outlook for sales.

Output Taxes Storage Space

It is all very well to say we are going to keep on producing war materials after the war is over, but the problem immediately arises: What to do with the terrific outpouring of products. Already, with the industry not on full production, output is taxing storing facilities, despite the fact large quantities are being dispatched abroad. Cessation of hostilities would dictate sharp reductions in the schedules of all war plants, suspension of many.

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Cherchez La Femme

While the percentage of women employed in war work is increasing, their induction is not as simple as just having them fill out a record blank and start to work. In most plants special restroom facilities must be provided, and the matter of supervision carefully examined. One plant here now has about 1100 women out of 21,000 total and expects to boost this percentage to possibly 30 per cent, but it cannot be done overnight. An interesting angle coming from an Ohio employer is that employment of unusually attractive women for plant work is frowned upon, older and more plushy workwomen being preferred, probably because of their lower distractive power on fellow workmen.

Accent on Cutting Tools

Cutting tools, perishable tools and fixtures are tight spots in the current production picture, in spite of doubling and redoubling of facilities for supplying them. There have been, conservatively speaking, a couple dozen new, small plants built in this area for turning out cutting tools and all of them are loaded down with rush business. Tool steel suppliers find themselves continually harassed by allocation orders for Russia or the British, upsetting schedules for domestic users.

The importance of such tools and fixtures can be gaged from the experience of a builder of aircraft engines, citing a total tool cost for June of $640,000, or roughly $800-$1000 per engine built. Between 15 and 20 cutters alone are required for every finished engine. Already emergency toolrooms and crews have been organized to step into the breach should present sources falter.

Along this line, the experiments which local companies have been making in the centrifugal casting of tools such as milling cutters should prove helpful if they mature successfully. By such casting methods, much time can be saved in finishing the cutters and pressure can be taken off overworked forging equipment. There are even grounds for belief that cast cutters show some advantages over the customary forged tools.

Substitutions because of the pres-

sure of war demands on critical materials are becoming more frequent. Wood and reinforced concrete for steel in plant structures, fences, craneways and the like has been a recent development of an anomalous character. Now it is learned, steel is giving way to wood in certain parts of hitherto all-steel cargo bodies for military trucks. One large builder on July 15 will switch to bolted wood sections in parts of these bodies to relieve partially the demand for steel. Talk is heard of wood being substituted for steel in gasoline tanks, although this has not been substantiated.

Steel Lends Brass a Hand

One of the most hush-hush subjects of the day, in the eyes of the colonels in the ordnance department, is the manufacture of steel cartridge cases to conserve brass. Little can be divulged except to state they are now nearing production in practically all sizes from 20-millimeter up to 105-millimeter. Several manufacturing methods have been proposed, none of which represents anything revolutionary as far as deep drawing of steel is concerned. Again, the problem of tools and dies is a critical one.

An industry committee on the work has been functioning for several months, attached to the office of chief of ordnance. There is the customary amount of inter-company jealousy over competitive practices —a healthy thing for the eventual perfection of the steel case. Companies involved in the project are predominantly automotive and automotive parts. One company is in the preliminary stages of setting up production equipment for 5000 a day of the 37-millimeter cases, at a reported price of 72 cents each.

All records for production of Browning machine guns by the AC Spark Plug Division of General Motors were smashed in May, the fourteenth month of gun manufacture, when output totaled 93 per cent above original schedules and 16 per cent beyond the April total. Expanded facilities, and introduction of the swing shift have been principal contributing factors.

With engines for powering tanks now running the gamut from twin diesels and quintuple automotive gasoline engines to radial aircraft-type engines, the shadow of a newcomer has appeared on the horizon in the form of a converted liquid-cooled in-line aviation engine. The design has been worked out, but no plans for manufacturing have been reported. The "converted" design is a 12-cylinder 650-horsepower plant, with this horsepower delivered at 2600 r.p.m. The engine has been planned definitely as a "lugger" in contrast to the "speedster" aircraft engine, which should make it better suited to use in tanks, where high torque at low speed is a primary consideration. Weight is not a first consideration in tanks, so the engine is designed with a cast iron block, into which are fitted steel cylinder sleeves.

Unique maintenance unit for emergency use has been developed by Fisher Body to supplement regular maintenance equipment. Shown in an accompanying illustration, the unit is designed to serve two purposes—to be effective in clearing away debris and in effecting repairs to plant operations; and to serve as a temporary unit to take the place of equipment which might be damaged. Thus the "handy Andy" is equipped with tools such as jacks, shoring timbers, crowbars, chains, acetylene and electric welding tools, floodlights, drills, vise, hoselines, and the like. Built around the conventional industrial truck, one of the units has been supplied to each plant of Fisher Body.

Geological Survey of the Department of the Interior has found in crushed feldspar "a cheap and easily obtainable material effective in extinguishing magnesium incendiary bombs."

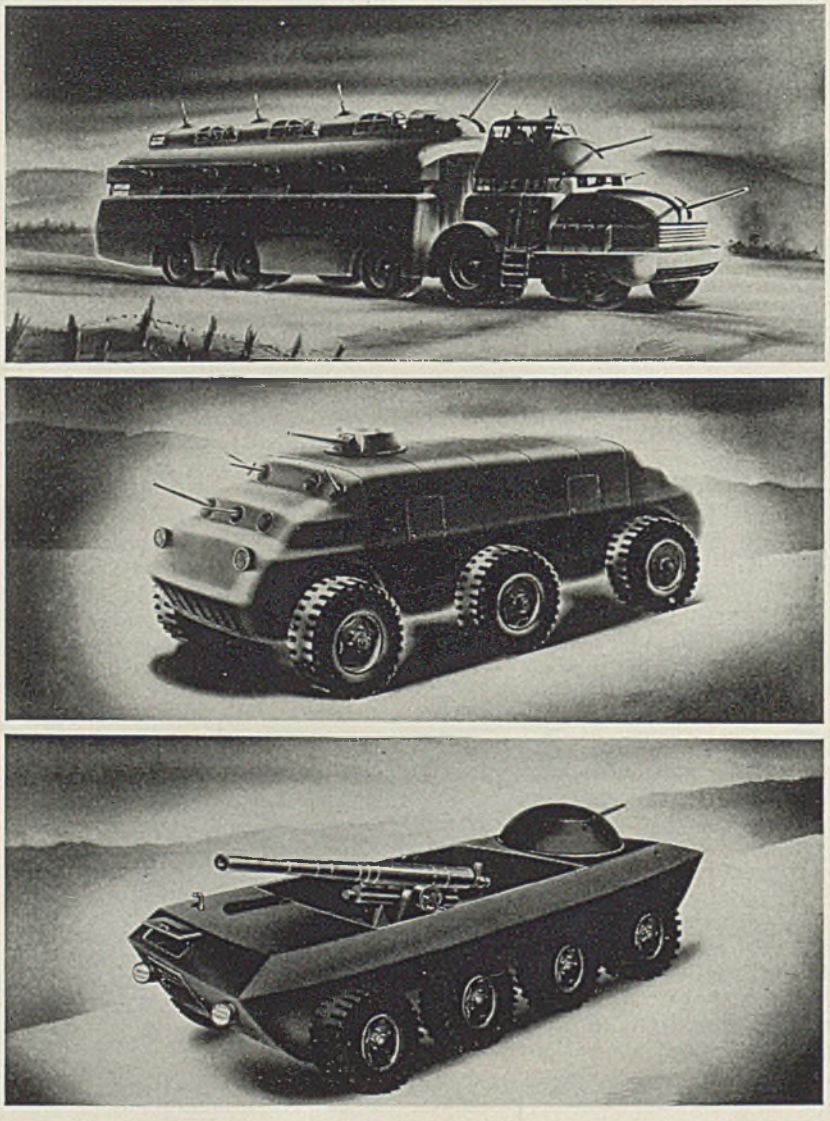
✦

INDUSTRIAL designers are turning their talents to military equipment of both combat and transport types, some of them working as consultants to the army. George W. Walker, Detroit, has evolved a number of original designs for motorized equipment some of which are shown here

Top, a well-armed and armored troop transport of the tractor-trailer type

Center, a six-wheeled heavily armored combat car, or tank on wheels. Vehicles of this type are already well through the design stages

Bottom, an eight-wheeled combat car mounting a heavy field piece, with full-revolving gun turret at the rear. Shape is suggestive of amphibian vehicles now being tested by the armed forces



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7 FORGINGS CAN TAKE IT: By the forging process, stamina is achieved through concentration of grain structure and fiber formation at points of greatest shock and strain. Forgings provide high fatigue resistance which underlies dependable performance, and continuous operation over longer periods of use.

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WING TIPS

Boeing among first major aircraft producers to change over to mass production methods. Flying Fortress now produced in three main sections, in turn broken down into many smaller sections

By R. C. HILL
STEEL Correspondent, Seattle

AMONG the first of the major airplane manufacturers to complete an overall job of retooling for volume production, replacing older, slower machines with new types, was Boeing at Seattle. A resume of some of the changes effected during the past year illustrates what has happened.

The foundation for retooling at Boeing was begun in August, 1940, with establishment of a new tool design department. Here the mass production machine tools for building the Flying Fortress were developed. Their designs were passed on to the new tool fabricating division, which has grown rapidly during the past year from a tiny corner in one building to a large department all its own.

The Flying Fortress, a 22-ton four-engine giant, previously had been completed largely as an assembly in one jig. In 1937 one bomber followed another through this final assembly jig, as Boeing turned out an order of thirteen Fortresses for the Army—a large contract for those days.

Today, through use of newly designed tools and breakdown jigs, the plane's fuselage has been broken up into three sections. Two of these are known as main sections; the third is the tail turret, much smaller than the others. Each of these three sections is, in turn, composed of many smaller sections assembled on smaller breakdown jigs. Each of the three principal sections is assembled in a separate jig, enabling many more men to work at one time on what is actually the same airplane.

Each of the three main fuselage jigs is duplicated many times, with dozens of exact copies of each set up on the production line. The advantage is more than just the use of added man-power, for available floor space can thus be used much more effectively.

From the jigs, completed body sections flow in orderly succession to a joining position, carried by installation cradles on tracks. Here they are joined and bodies are mounted on specially designed assembly floor.

Each airplane body is mounted on a set of three electrically operated jacks, one supporting each side and one under the tail section. The completed fuselage is lowered by the jacks to floor level for final reaming of the main wing terminals and installation of hundreds of accessories which must go into each huge airplane. When the wing installation is complete the jacks raise the fuselage to a position high enough to permit installation of the wheels and tail surfaces. The tail assembly can be raised to virtually any position desired, high or low.

The jack erection layout is newly designed, patterned entirely for completing planes and getting them out of the plant swiftly and in quantity. Production of Flying Fortress is now 70 per cent ahead

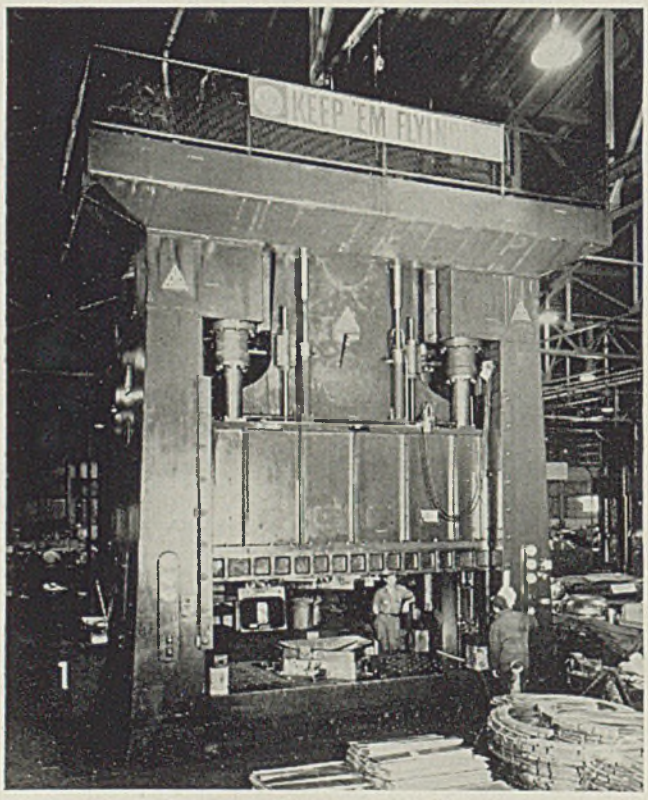

Fig. 1—Triple action 750-ton press used in forming complicated shapes to replace the slower drop hammer method. Low-cost Kirksite dies are used, and operators can be trained quickly to handle the equipment

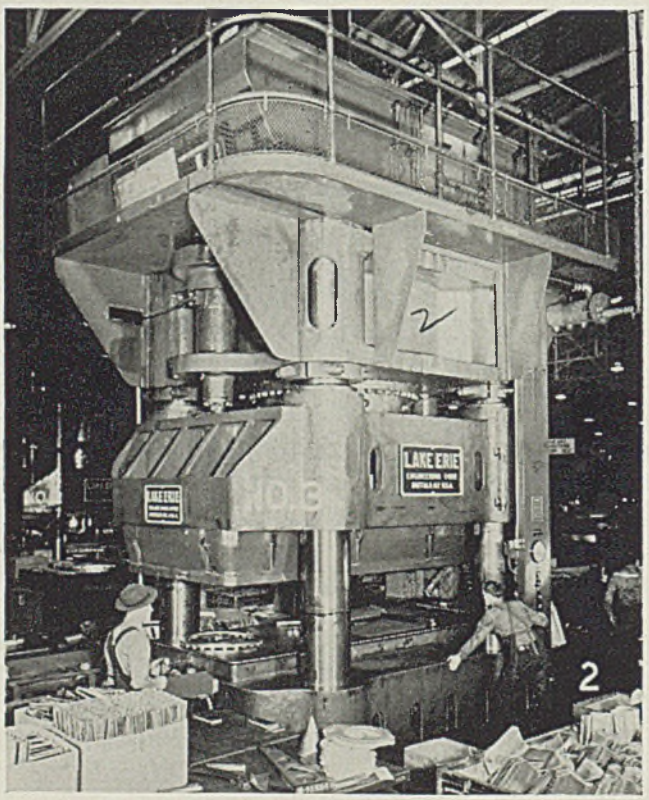

Fig. 2—Hydraulic press of 5000-ton capacity in operation at a Boeing plant. Movable tables, electrically operated, speed parts back and forth through the press almost as fast as the ram can be operated

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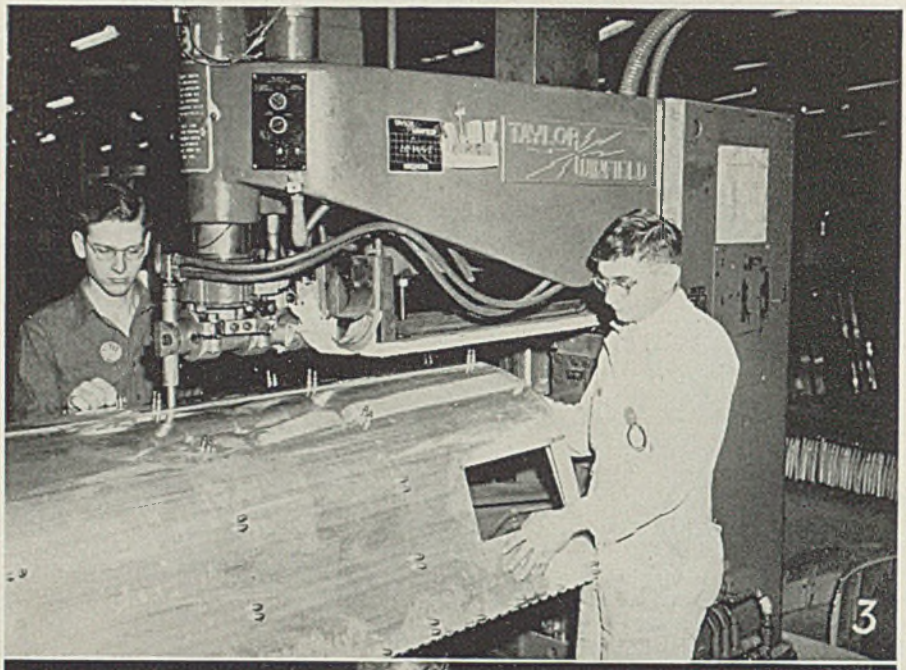

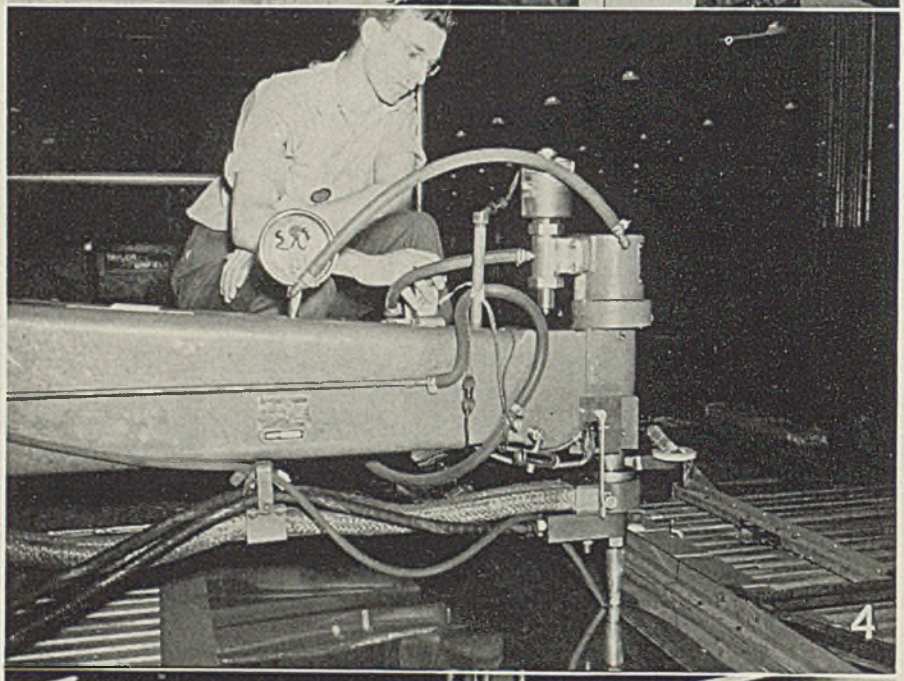

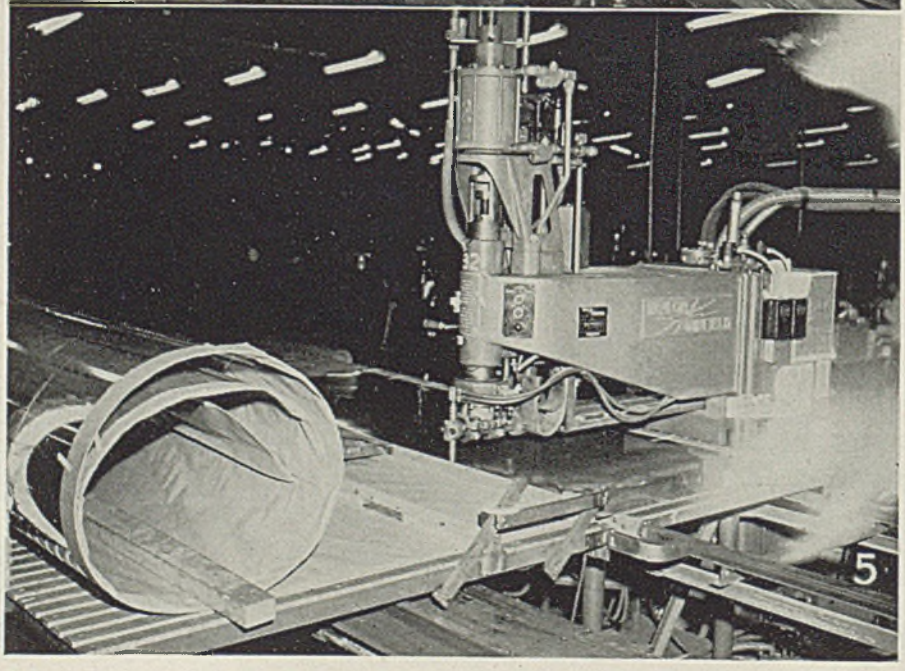

Fig. 3—Cabin assembly being spot welded at a Boeing plant. Cleco pins are used to keep the sheet and reinforcing stiffeners in position

Fig. 4—Closeup of Sciaky automatic spot welder used to join or stitch large sheets of aluminum alloy. Traveling carriage moves at predetermined speeds as the welding terminal spots the metal sheets together

Fig. 5—Taylor-Winfield automatic spot welder in operation on aluminum alloy wing skins. Note welded seam at top of coiled sheet at left

of original schedules.

A change has taken place in the metal-forming and subassembly sections as well. Millions of dollars worth of heavy machinery has been installed. Only recently, the last row of drop hammers was removed from the plant and replaced with presses.

The shift from drop hammers to heavy presses was no overnight process, and not an easy one to make. Presses have been used in the automotive industry for shaping sheet steel, an easily worked metal. But the airplane industry works with aluminum alloys and stainless steel Further, airplane parts must be formed to exceptionally close tolerances.

About half the presses at Boeing are hydraulic, half mechanical. The number is about evenly divided, too, between single and double action types. Largest is a 5000-ton unit, Fig. 7, capable of doing the work of a whole battery of drop hammers. One of the new multiple-action mechanical presses can turn out four parts per minute—the same parts that were pounded into shape at the rate of only two an hour by drop hammer.

In addition to speed of production, Boeing has found a second advantage in using the presses in that they do not require the long training period necessary for operators of drop hammers.

All punches and dies for the presses are made within the plant. Here, too, Boeing started from scratch early in 1941. Principal material in their manufacture is Kirksite.

For much of the increase in production speed, engineers have had to design new tools. There is, for instance, the ingenious machine known as the circumferential hydro-punch, designed and created in the Boeing plant.

This strange looking apparatus, shown in Fig. 8, has been so successful that it has been licensed for use in some other aircraft plants to help speed production. Its job is to clip the ends off and punch holes in circumferential stiffeners, the braces that give an airplane's body its circular form,

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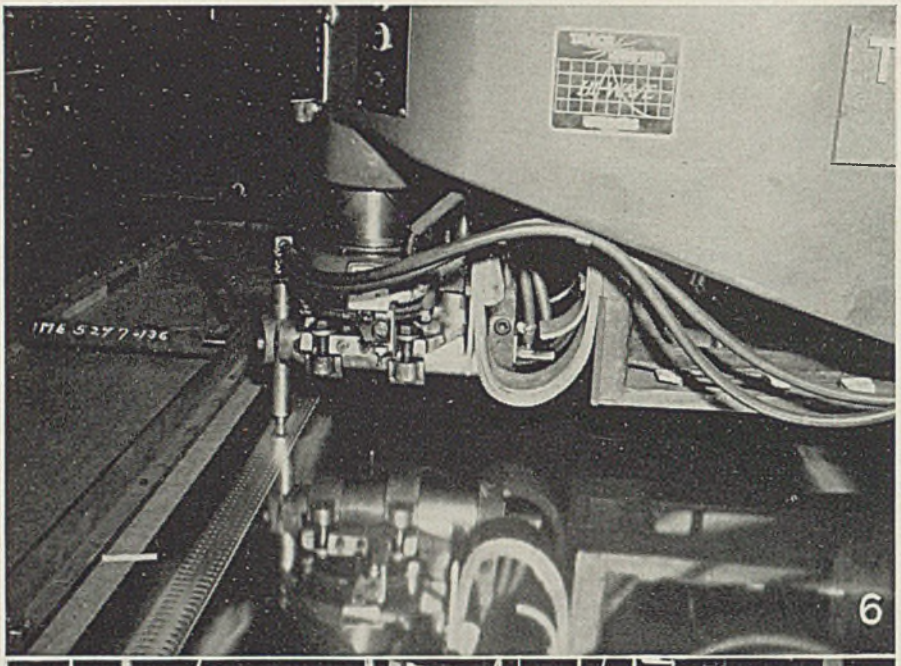

Fig. 6—Closeup of welding head of equipment in Fig. 5, showing uniform spacing of rows of welds

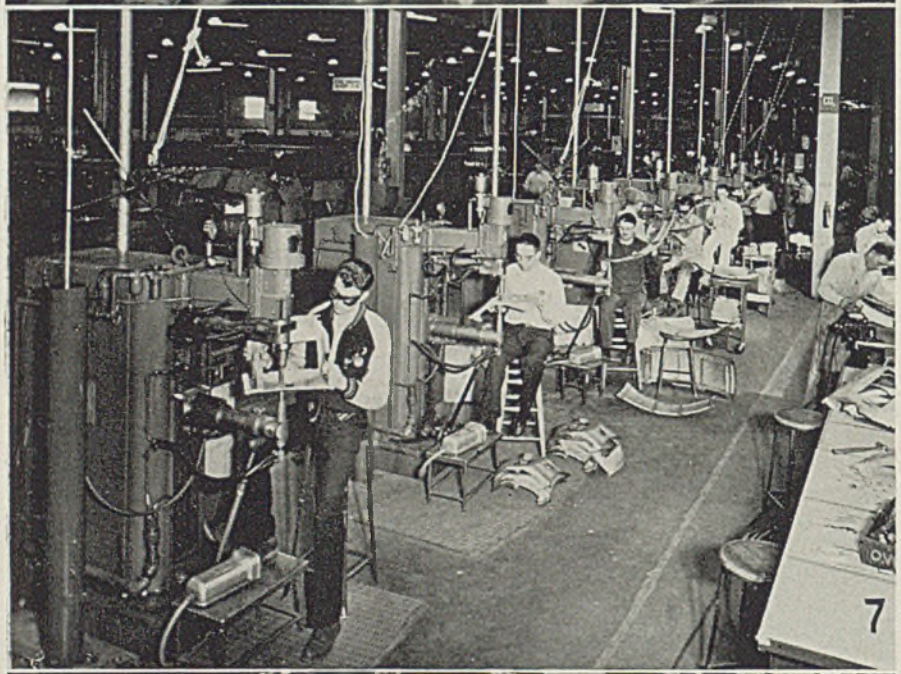

Fig. 7—Line of production spot welders used by Boeing to assemble parts of either stainless steel or aluminum alloy, principally nonstructural assemblies such as cabins, engine cowlings, fairings, etc. Note foot control switch at each machine

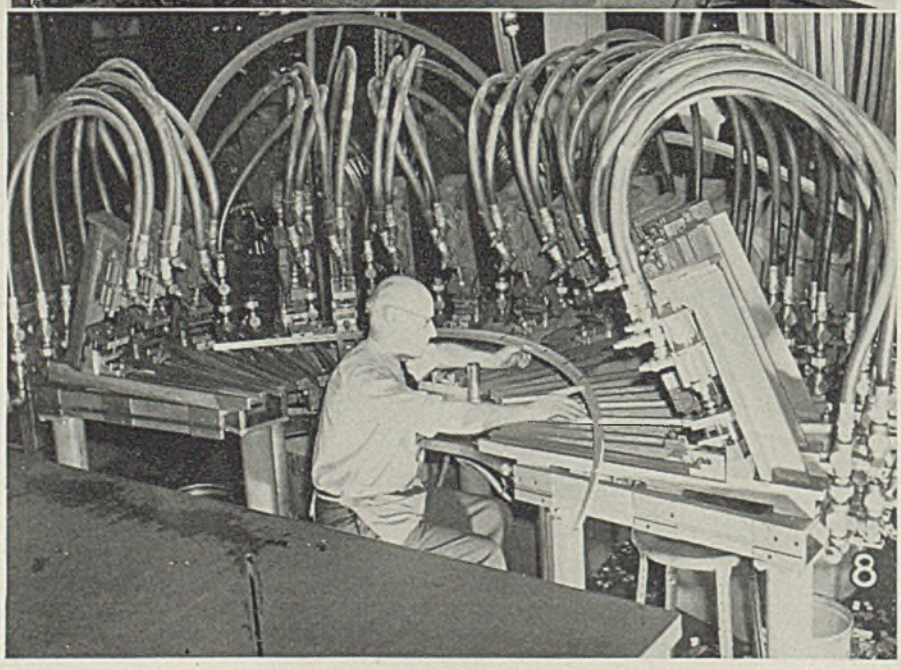

Fig. 8—Circumferential hydro-punch designed and built by Boeing engineers. It is used to perforate and cut off an entire fuselage circumferential section in one quick operation. Workmen have dubbed it the "octopus"

comprising part of the framework over which the skin is riveted.

The "Octopus", as the circumferential punch is called, has replaced a machine which was known as the "spider", greatly simplifying and speeding up the process of cutting circumferential stiffeners. It can turn out 45 times as many stiffeners per man-hour as its predecessor.

Circumferential stiffeners of dural arrive at the machine in the form of an oval ring. They must be clipped into sections of varying sizes. Slots must be punched in them, where they will be fastened to longitudinal stiffeners, the framework that runs lengthwise through the airplane's body.

In designing the new punch, complications arose from the fact that the circumferentials are not standard. They have different radii, must be cut for different sized circumferential sections and have a varying number and type of slots.

The hydro-punch is seated on a semicircular table or platform. Radiating from the center are fourteen slides or tracks, and along each of these moves a punch and die set. The machine is driven by a hydraulic double pump, operating off an electric motor.

Around the outer rim of the platform is a series of needle valves. Through them special oil is forced through steel-jacketed rubber hoses into double-action hydraulic cylinders, which in turn operate the punches. Two hose lines are connected to each punch and die set.

Circumferential stiffeners are inserted into the dies. The operator simply presses a button to throw the machine into action, driving the punches through the circumferential and piercing the slots.

Oil is forced through one hose to each die set, driving the punch down. As the operator removes his finger from the button, the oil is released through the other hose, permitting the punch to rise. A solenoid valve is used for this purpose. The traverse stroke of the punch as it moves into position is

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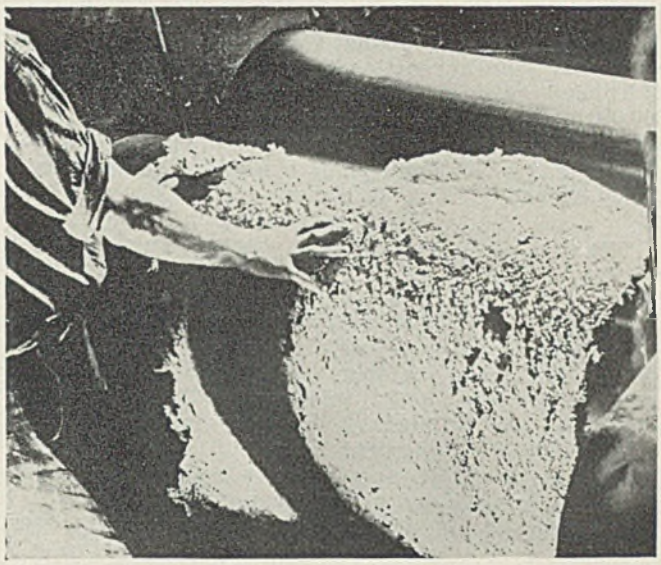

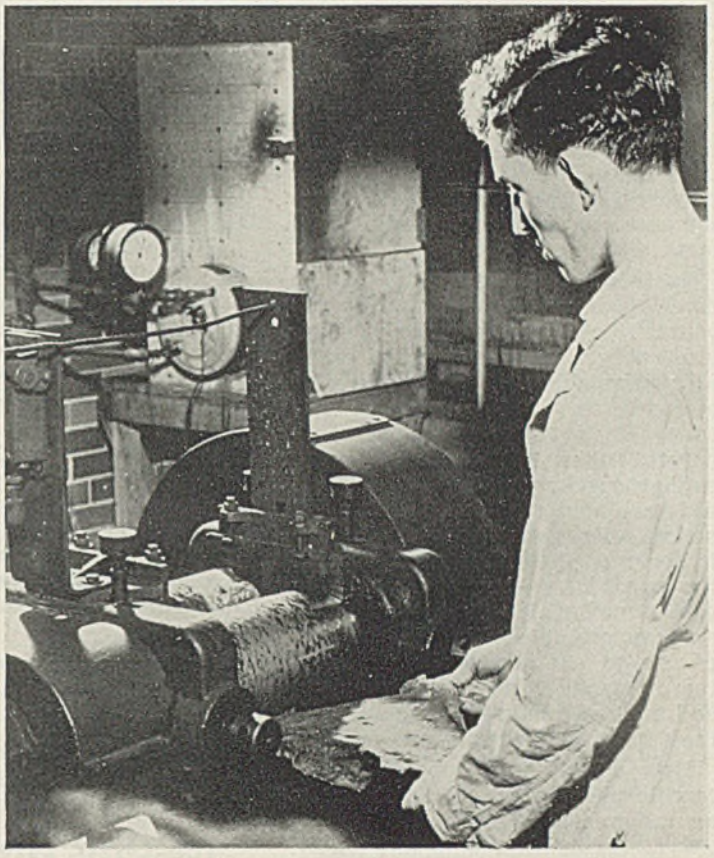

THIOKOL, synthetic rubber derived from sodium disulphide and ethylene dichloride comes off the compounding rolls (above) in a sponge-like mass. Right, passing through processing rolls. Plans are under way for facilities to produce enough to retread 1,000,000 tires a month, by late summer

Thiokol, an "Antifreeze" That Bounced, Points to New Industry, Hope for Tires

By ALLEN SHOENFIELD
Staff Correspondent, The Detroit News

AMERICA'S millions of automobiles may be kept coursing through the nation's transportation arteries, despite an Axis stranglehold on natural rubber, because a Kansas doctor, 13 years ago, failed to discover a cheap antifreeze. This was the story revealed recently by Dr. Willard H. Dow, president of the Dow Chemical Co., Midland, Mich., in reviewing progress of Thiokol for tires.

It was evident that, although Dr. Dow strove to maintain the scientist's traditional caution, he had glimpsed possibilities which had aroused his enthusiasm. These included:

Complete retreads for 250,000 automobiles monthly by late summer.

Whole tires made of a rubber-like plastic which, under test, are proving nearly equal to those of rubber under some conditions and superior under others.

Raw materials to be had in abundance without danger of creating shortages in the criticals needed for war.

Plants which can be quickly established, making use of relatively inexpensive and easily obtained apparatus.

Orders from the Rubber Reserve Co., government agency, for Dow to proceed with a plant to turn out Thiokol at a rate of 30,000-60,000 tons a year. This opportunity to expand was an order which Dow welcomed.

Here is the story of Thiokol:

In 1929, Dr. J. C. Patrick left South America where he had served as chemist for Armour & Co. to return to practice and to chemical research in Kansas City. He was interested in perfecting a cheaper antifreeze solution for car radiators. One day it occurred to him to mix the two chemicals, ethylene dichloride and sodium polysulfide. To his consternation, a gummy-looking mass instantly formed.

As he was about to discard it in disgust, he took up a piece between thumb and forefinger, squeezed it and then released it. The mass returned to its original form. Dr. Patrick examined it closely. In texture, it greatly resembled natural rubber. He dropped a ball of it on the floor. It bounced. Other elementary tests were quickly made. There was no doubt of it: Dr. Patrick's experiment had resulted in the nearest approach to natural rubber ever made by man to that moment.

It was two years before Thiokol reached the commercial stage. A corporation was formed and Dow was given orders for tons of sodium disulphide, ethylene dichloride, magnesium chloride and caustic soda for use in the eastern plant.

"Credit for Thiokol belongs to the Thiokol Corp.", Dr. Dow insists. But, since 1938, when Dow was commissioned to produce the spongy, yellowish substance at Midland, to save shipping costs, its chemists have steadily improved the process and varied the original formula to meet special needs. Soon, there was Thiokol "A", "B", "C", "D", "F" and more recently an "FA"—soon, a Thiokol "N", especially for tires.

The armed forces of the United States are employing the material in a score of ways which cannot be enumerated. One use, however, may be readily guessed. One of the peculiarities of the man-made rubber is that it is highly resistant to the action of oil, gas, gasoline and acids. Thiokol is the standard for non-swelling rubber in presence of oil; buna rubber comes second, while natural rubber is tenth on the list.

More than 1,000,000 pounds annually are used to replace not only rubber but leather and cork in hose for tank trucks and gasoline pumps, for submarine oil connections, vacuum power brakes, air sampling equipment, cargo handling, printing plates, ink-carrying rollers and blankets, for diaphragms, gaskets, packing rings, valve seat disks,

washers, cable sheathing, ignition cables, flexible nozzles, extension cords, for lining air-water-acid-tight tanks, for typewriter rolls, impregnated gloves and clothing, gas masks, gas cloth, balloon cloth, airplane gas lines and fabric, traffic markers, telephone washers, parts for gasoline gauges, gas tank grommets and pump parts.

Besides having resistance to the deteriorating action of oils and solvents, Thiokol is comparable to natural rubber in its recovery of shape after stretching. It has a tensile strength up to 1400 pounds per square inch—not quite as great as natural rubber but far greater when similar specimens of the two materials are subjected to solvent or oil action. Its resistance to abrasion is from one-half that of rubber to the equal of rubber under varying conditions. Thiokol will not check, crack or crumble with aging and exposure to air and sunlight. As a thermoplastic, it may be ground up and molded again and again with the application of heat and pressure.

How will it stand up under the terrific punishment administered to an automobile tire?

"The major tire companies are experimenting with Thiokol," Dr. Dow revealed. "Complete casings—and there are some on our own cars here—have run up to 10,000 miles without showing appreciable wear. To be ultraconservative, say 5000 miles for a retread. But the wear of a retread is directly proportional to the state of the carcass. We do not yet know what mileage may be had from a Thiokol tread on a perfect fabric body. We are advising that such retreads be not operated at speeds higher than 40 miles an hour. But, personally, I see no reason why higher speeds are not equally safe."

Thiokol Bonds to Rubber

In fact, Dr. Dow revealed, there is a reason why a Thiokol tread should prove superior to one of commercial camelback. This composition of reclaimed and crude natural rubber must be cemented to the buffed surface of the tire to be retreaded. But, merely with heat and pressure, the ribbon of Thiokol is firmly bonded to the rubber of the casing and becomes an integral part of it without the use of an adhesive.

The cost to the motorist?

"Retreads of Thiokol should be comparable in price to those of camelback, from $6 to $8 a tire," Dr. Dow said.

But would the material be available for civilian use? he was asked.

"I would think that, almost certainly, allocations will be made by the Government to workers in defense plants who cannot use public conveyances," Dr. Dow declared, while admitting that vast quantities would be earmarked for military use.

Expansion of the present plant at Midland, estimated to cost $1,000,000, virtually could guarantee continuous production of Thiokol sufficient to retread 1,000,000 tires a month by late summer, according to Dr. Dow.

Would there develop a shortage of essential chemicals?

"No", he declared. "Chiefly, we require four of them. The caustic soda and the chlorine we will derive from salt. Chlorine is being allocated at present, to prevent a shortage. But we can step up production to meet all requirements. Ethylene we can get from oil or, perhaps, better still, from corn, wheat or any agricultural waste or surplus by first converting it into alcohol. Texas alone can supply us with all the sulphur we shall ever need."

Dr. Dow describes the process as follows:

"We start with a clear liquid, sodium sulphide, and add another liquid, ethyl dichloride. The reaction is prompt. There is a breakdown into sodium chloride, or common salt, and what we might call the 'Thiokol reaction fluid.' As the salt solution is lighter than the Thiokol, it may be siphoned away.

"To the yellowish, opaque Thiokol fluid, acids are added to coagulate it and to form curds. The result is a mass resembling in texture a watery cottage cheese. This must be run through squeeze rolls to extract the moisture and later dried with heat. At this point, it begins to take on a spongy, rubber-like appearance.

"To this crude Thiokol—call it latex, if you like—we must add a pigment-dispersing agent, a reinforcing agent, a vulcanizing agent and a plasticizing agent."

Dr. Dow indicated some rather promising results were being obtained with painting the latex on a tire carcass to seal cuts and bruises, or even to coat the entire casing.

And he intimated large-scale production by continuous process would be begun at an early date. Tanks for mixing, coagulating, washing and filtering, he said, might be made of any available material. Agitators, squeeze rolls and drying machinery were accessible and relatively inexpensive. Unlike the apparatus required for manufacturing the so-called synthetic rubbers, no high alloy steels or scarce copper would be needed.

Ice-Grip Tire Studded With Steel

NOW in production for the Army Air Corps is this new plane tire developed by the United States Rubber Co. The tire has sharp cylindrical, crimped steel inserts which make the tread instantly effective on both hard-packed snow and glare ice. It is intended for use by United States forces in Alaska.
Wide World photo

Design New Machine for Producing Bullet Cores

CHICAGO

The plan to produce 30 and 50-caliber bullet cores in hundreds of small plants in this area through use of a specially-designed single-purpose lathe has been abandoned as impractical, according to the Chicago office, WPB.

Not satisfied with the performance of the lathe, which had been developed by WPB and a large lathe manufacturer, the Chicago Ordnance District, has designed a new type of machine in co-operation with the Cuneo Press, Chicago.

Advantages of the new machine over the lathe are: (1) One relatively inexperienced girl can operate several machines, whereas each lathe would have required a comparatively skilled operator plus set-up men; (2) the new machine can produce the cores at one-fourth the cost of the lathe, according to estimates; and (3) the new machine is entirely automatic and much faster than the lathe.

Cuneo Press, it is understood, soon will begin production in its own shops of both bullet cores and the new machine for producing them. Decision has not been made as to distribution of the equipment.

Industry Preparing for Swing to "End-Use" Allocation Plan, July 1

ALLOCATION classification system which will enable the War Production Board to trace the flow of materials in terms of end-use from primary producers to finished products has been established by the war production agency, as reported in STEEL, June 8, p. 36.

The new system will be used on all purchase orders and reports to WPB and will supersede a variety of use classifications now required under materials ("M") orders.

Allocation classification symbols must be used on all orders placed by manufacturers, fabricators and primary producers after June 30 and on all such orders which call for deliveries after July 31, regardless of when orders for materials were placed.

Essential features of Priorities regulation No. 10, establishing the classification, follow:

PRIORITIES REGULATION NO. 10—Allocation Classification System—(a) *Classification System Established.* There is hereby established an Allocation Classification System, in accordance with the Instructions issued by the Director of Industry Operations on the date of issuance of this Regulation. Except as provided in paragraph (b) below, the appropriate Allocation Classification Symbol and Purchaser's Symbol as required by said Instructions shall be indicated by every person placing a purchase order or contract on:

(1) All purchase orders or contracts placed after June 30, 1942:

(2) All purchase orders or contracts, either heretofore or hereafter placed, calling for delivery after July 31, 1942. Any person who has heretofore placed such a purchase order or contract may at any time whom such purchase order or contract has been placed of the symbols applicable thereto.

(b) *Exceptions as to Retail Purchases.* The provisions of paragraph (a) hereof shall not be applicable to retail purchases, purchases by retailers or purchases by distributors for resale to retailers. Industrial and mill suppliers, warehouses and other businesses performing similar functions for industry shall not be deemed retailers for the purposes of this paragraph.

J. S. Knowlson,
Director of Industry Operations.

Most metal users, who consume more than $5000 worth in a calendar quarter, will be brought under the Production Requirements Plan July 1, in accordance with Priorities Regulation No. 11 (STEEL, June 15, p. 34). The classification system will be used to obtain information on end uses to assist in controlling the distribution of metals.

Complete Official Text of Allocation Classification System

Purpose and General Instructions

I. Purpose

The purpose of the Allocation Classification is:

(1) To obtain standardization and reduce the rules of different forms for allocation purposes that industry now must submit to the War Production Board.

(2) To furnish information needed by the War Production Board in the allocation of materials.

To allocate intelligently, it is necessary to know the subdivision of the war, industrial and civilian programs for which materials are going to be used. For example, it is essential to know whether the materials are going to tanks, or destroyers, or railroads, or to office machinery and supplies in order to determine allocation policy. In addition, it is necessary to know in a general way what type of purchasers will eventually receive particular products of industry, i.e. whether the products will eventually be delivered to the Army, Navy, etc.

Accordingly, a dual classification system has been provided consisting of Allocation Classification Symbols (in the form of numbers), which will designate the particular kind of product for which material ordered will be used and Purchasers' Symbols (in the form of letters) to indicate the general type of purchasers to which delivery will be made.

Neither the allocation classification symbols nor the purchasers' symbol are intended to indicate order of importance, but are merely designed to provide a convenient means

(1) of identification of the subdivisions of the program for which the products or materials ordered are destined;

(2) of identification of the type of ultimate purchaser of the product; and

(3) of transmitting such identification on down through industry to the original suppliers of the material.

Retail purchases and purchases by retailers, will not transmit an allocation or purchaser's symbol on their orders. Since the retailer does not place an allocation or purchaser's symbol on its orders, the manufacturer, wholesaler or distributor receiving these orders will place the Purchaser's symbol DP, on these orders. Industrial and mill suppliers, warehouses and businesses performing similar functions for industry are not deemed retailers.

II. Allocation Classification Number System

A. General Description

Each business is assigned to a numbered Class with certain exceptions discussed in paragraph (2) below, and most Classes are, in turn, divided into subclasses indicated by a decimal number.

In general terms every purchase order is to carry its allocation classification symbol.

There are two principal kinds of situations to distinguish in selecting the proper classification:

(1) The business of the purchaser may

Reprints Available

Allocation Classification System, the general instructions, classification symbols and specific instructions of which are published herewith, becomes applicable to all orders placed after June 30 and on orders calling for delivery after July 31.

Copies of the regulations covering this system are available in an 8-page booklet, printed on high-grade paper. Address STEEL — Readers' Service Department, Penton Building, Cleveland, Ohio.

PRICES

1 to 25	10 cents each
25 to 100	08 cents each
100 to 250	07 cents each
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500 to 1000	05 cents each
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fall directly into one or more of the Allocation Classifications. In this case the business simply places on its purchase order the symbol representing the business for which the purchase order is placed.

For example, the manufacturer of tanks places the symbol 3.10 on all its purchase orders. The truck manufacturer uses 10.20. The railroad uses 10.10.

(2) The business of the purchaser does not fall directly into any of the classifications. In this case, the purchaser has no symbol to identify its own business but simply transmits the symbol it receives on the purchase orders which its customers have placed with it.

For example, the manufacturer of electric motors receiving an order from a railroad bearing the symbol 10.10 places the same symbol 10.10, on its purchase order.

Mixed cases are covered below.

Once a business has determined in which situation it finds itself, it should then place the proper symbol or symbols on every purchase order which is issued.

B. Procedure for Use of Classifications

(1) Each business should first determine whether or not its operations fall directly into one or more of the allocation classifications listed or whether it should use the Allocation Classification symbols that are on the orders which it receives from its customers.

To determine this, each business should consult the Specific Instructions and the detailed Classified or Alphabetical Lists. These should furnish the necessary information to enable each business to classify its operations properly.

(2) Each business directly falling in any class should consult the "Specific Instructions" covering its classification for any specific instructions that may apply to that classification alone.

(3) Where the operations of a business fall directly into one or more Allocation Classifications—

a. Any business whose operations fall directly into one Allocation Classification should place its classification symbols on all purchase orders that it issues regardless of what they are for. For example, a railroad ordering metalworking machinery would classify the order under Railroad (10.10) despite the fact that metalworking machinery is a separate classification.

b. Any business whose operations fall directly into two or more Allocation Classifications should transmit the symbol of each classification to the extent that it can trace the particular purchase to the proper classification under its established methods of bookkeeping or inventory control. Where this is not practicable, it should place on its purchase orders the percentage division between its sales for the latest available month. For example, a company engaged in the manufacture of household furniture and office furniture and maintaining a single inventory should place on its orders 16.00—60%, 19.00—40%.

(4) In the case of a business manufacturing parts of sub-assemblies, such as electric motors, air compressors, ball bearings, etc., which do not fall directly within any of the listed classifications—

a. Where an item can be traced directly to one Allocation Classification, the business should transmit the classification symbol for that item on its purchase order. For example, if a storage battery company orders materials to be used in the manufacture of storage batteries for automobiles, the symbol for automobiles (10.20) should be placed on the purchase order.

b. Where an item can be traced to two or more Allocation Classifications, the business should transmit on the purchase order for that item the percentage division between Allocation Classifications based on the dollar volume of its sales using the latest available month as the base period. The following principles should be followed in doing this:

1. Where the business falling under any one Allocation sub-class comprises 5% or more of the total business, that symbol and its percentage are transmitted on the purchase order.

2. Where the business falling under any one Allocation sub-class is less than 5% of the total dollar volume and can be grouped with other sub-classes falling under one main Allocation Class, it should be so grouped. For example, a percentage division might be: Classification 5.10—Ammunition 20 mm. and above 3%; Classification 5.20—Ammunition, small arms below 20 mm.—4%. Since both 5.10 and 5.20 are sub-classes of the Class 5.00, the two should be combined under the main Class and reported as: 5.00—7%.

3. After combining the sub-classes under any one Class, if the Class still totals less than 5%, this portion of the business should be pro-rated over the classifications which are 5% or more.

III. Purchasers' Symbols

In addition to the information required in respect to Allocation Classification symbols, the War Production Board will still have need of the information which is already being furnished as to whether the orders are placed by the Army, the Navy, etc. This will be continued and slightly extended. A series of letter symbols has been adopted to indicate the purchaser.

Purchaser	Symbol
The Army	USA
The Navy—includes Maritime Commission	USN
Lend-Lease	LL
Other Foreign Purchasers	FP
Domestic Purchasers	DP

When Orders bearing these symbols are received by a business, the business must pass them on to its suppliers even though the Allocation number may be changed.

The appropriate purchaser's symbol should in each case precede the numerical allocation symbol placed on purchase orders so that the Allocation Classification will be broken down by Army, Navy, Lend-Lease, etc. The same instructions for transmission in percentages, etc., apply to these symbols as to the Allocation symbols.

IV. Application to Existing Orders

It is essential that classification symbols and purchasers' symbols should be applied not only to all orders to be placed in the future but also to existing orders that have already been placed for delivery after July 31, 1942. To do this, it is the responsibility:

(1) Of each business that falls directly into one or more Allocation Classifications to review the orders that it has already placed and advise each of its suppliers as to what classification symbols and purchasers' symbols should be applied.

(2) Of each business that does not fall directly into one of these classifications (i.e. manufacturers of Parts or Sub-assemblies), to transmit to all its suppliers with whom purchase orders have been placed the Classification symbols and purchasers' symbols that it receives from its customers.

(3) Of the Army and Navy Procurement officers and of the Maritime Commission to advise their Prime Contractors as to what purchasers' symbols should be applied to the purchase orders that these services have already placed with them.

If any business is in doubt as to how it should classify its operations and transmit the classification symbols or purchasers' symbols to its suppliers, it should communicate with the War Production Board at the nearest Field Office or in Washington, D. C.

ALLOCATION CLASSIFICATION SYMBOLS

(NOTE: The symbol numbers have no relation to order of importance.)
Allocation Symbol

MILITARY

Class 1.00—Aircraft—Production and Maintenance (complete except for armament and ammunition—as approved by the Joint Aircraft Committee).

Class 2.00—Ships, Production and Maintenance (complete except for armament and ammunition).

2.10 Battleships.
2.20 Aircraft Carriers.
2.31 Escort Vessels (aircraft), combat, loaded transports, and combat loaded cargo ships.
2.32 Patrol Vessels.
2.33 Landing craft including the following types: APM, ATL, YTL, tank lighters, artillery lighters, landing boats, support landing boats.
2.40 Light Cruisers.
2.50 Destroyers including escort vessels.
2.60 Submarines.
2.70 All other types of naval craft.
2.80 Repairs to all naval vessels.
2.90 Ships for Maritime Commission.

Class 3.00—Vehicles—Production and Maintenance (complete except for armament and ammunition).

3.10 Tanks and armored vehicles—all types.
3.20 Vehicles, except rail—all other military types.

Class 4.00—Armament and Weapons—Production and Maintenance (complete mounts and related equipment).

4.10 Aircraft.
4.20 Anti-aircraft, Barrage Balloon Equipment, A. A. Searchlights.
4.30 Artillery including railway and seacoast.
4.40 Fire control, all types.
4.50 Machine guns—ground, hand arms.
4.60 Naval, all types.
4.70 Tanks and anti-tank.
4.90 Weapons of all other types.

Class 5.00—Ammunition — Production and Maintenance (complete items).

5.10 Ammunition 20 mm. and above.
5.20 Ammunition, small arms below 20 mm.
5.30 Bombs, depth charges, mines, and torpedoes.
5.40 Propellants, chemicals, explosives.
5.50 Pyrotechnics.

Class 6.00—War Equipment and Supplies—Production and Maintenance (complete with related equipment).

6.10 Chemical Warfare equipment and supplies.
6.20 Clothing, general supplies and subsistence.
6.30 Mapping, Map Reproduction and photographic equipment.
6.40 Medical Equipment and supplies.
6.50 Military field construction equipment.
6.60 Military radio and wire communications, and Radar or electronic equipment—all types.
6.70 Military railway including rail vehicles and bridge equipment.
6.80 Supplies and equipment—all other military types.
6.90 Supplies and equipment—all other.

Class 7.00—War Facilities—Construction and /or Maintenance.

7.10 Air Fields, Bases, Camps, Coast Defense, Depots, Forts, Navy Yards, Posts, Stations —Continental U. S. A.
7.20 Air Fields, Bases, Camps, Coast Defense, Depots, Forts, Navy Yards, Posts, Stations —outside Continental U. S. A.
7.30 Munitions manufacturing facilities and proving grounds—government owned.
7.40 Panama Canal.
7.50 Shipyards and ship repair facilities—government owned.

INDUSTRIAL AND CIVILIAN

Class 8.00—Raw Materials, Production and Processing of.

8.10 All Metals, Production (including mining) Smelting and Processing of.
8.20 All Chemicals, Production and Processing of.

8.90 All other Raw Materials, Production and Processing of.

Class 9.00—Power, Light, and Heat.

9.10 Electricity.
9.20 Petroleum.
9.30 Coal and Coke.
9.40 Gas.

Class 10.00—Transportation.

10.10 Railroad including Urban and Interurban.
10.20 Automotive.
10.30 Roads, Streets, etc., Construction and Maintenance of.
10.40 Water Transportation, including construction of privately owned shipyards.
10.50 Air Transportation.
10.90 All Other Transportation.

Class 11.00—Communication.

11.10 Telephone.
11.20 Radio.
11.30 Telegraph.
11.90 All Other Communication.

Class 12.00—Public Health and Safety.

12.10 Sanitary & Health Systems & Facilities.
12.20 Health Equipment and Supplies including Personal Care.
12.30 Public Safety Equipment and Supplies.

Class 13.00—Agricultural Equipment and Supplies.

Class 14.00—Industrial Food Processing.

Class 15.00—Wearing Apparel.

Class 16.00—Equipment and Supplies for Household Use.

Class 17.00—Education and Information.

17.10 Printing and Publishing.
17.20 Education.

18.00 **Class 18.00—Recreation and Amusement.**

19.00 **Class 19.00—Equipment and Supplies for Office Use.**

Class 20.00—Machinery and Equipment for Industrial Use.

20.10 Metalworking machinery.
20.20 All other—including Mine, Construction, Special & General Industrial.

Class 21.00—New Buildings, Construction of.

21.10 Buildings for Manufacturing and Commercial Purposes, Construction of.
21.20 All Types of Dwellings, Construction of.
21.90 All Other Types of Buildings, Construction of.

Class 22.00—Operating Supplies and Building Repair & Maintenance.

23.00 **Class 23.00—All Other End Uses**—(excludes all sub-assemblies and parts going into finished products coming with the other classes).

SPECIFIC INSTRUCTIONS

Classes 1.00 Through 7.00—Military

The responsibility for placing the proper Allocation Symbols for the military classifications rests with the Army, Navy and Maritime Commission officers who will also indicate, on all new orders, whether the order is for the Army or Navy and Maritime Commission.

Class 8.00—Raw Materials, Production and Preliminary Processing of

This Allocation Classification is to be used by industries engaged in the production and preliminary processing of raw materials. The production and preliminary processing of raw material is defined here as the operations required to convert them from the state in which they are found in nature to the condition in which thy are described in Materials List No. 1, attached to War Production Board Form PD-25A. For example, all the steps necessary for turning standing timber into accepted shapes and sizes of lumber would fall into this category. The steps to fabricate the lumber into other wood products would not be included.

In the case of agricultural products, the steps to be included in this class start after the product has been harvested and continue until it is ready for industrial use, for example, the processing of cotton only through the ginning.

These symbols should be placed on all orders for supplies, equipment, machinery and facilities necessary for the production and preliminary processing of raw materials but should not be placed on orders for materials which are processed or are incorporated in the finished raw material. All orders for materials which enter into the production of or become a part of the finished raw material will bear the symbol transmitted by the customer's orders. For example, a steel mill producing rails for a railroad company will transmit the railroad's symbol of 10.10 on all orders for iron ingots, coke and alloy metals. Orders for office machinery, metal working machinery and other operating equipment and supplies will carry the symbol of the steel mill (8.10).

Where a company processes raw materials only as an incident to its main production, it should not classify its order with any of the numbers in this classification, but should use only the number that applies to its main operation.

Construction of new buildings, and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

8.10—All Metals, Production (including Mining), Smelting and Preliminary Processing of

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies conducting such operations as:

Aluminum Plants, Brass Mills, Copper Refineries, Smelters, Steel Mills, All types of Metal Mining, etc.

8.20—All Chemicals, Production and Preliminary Processing of

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies producing and processing chemicals up to the point that they are ready for industrial use.

Chlorine, Alcohol, Sulphur, Lacquer, Paint, Plastics, Synthetic Rubber, Varnishes, etc.

8.90—All Other Raw Materials, Production and Preliminary Processing of (Exclusive of Petroleum, Coal and Coke, see Classes 9.20 and 9.30)

This Allocation Symbol should be placed on purchase orders for supplies, equipment, machinery and facilities issued by companies conducting such operations as:

Manufacture of Textiles, Glass Making, Lumbering, Production of building materials, e.g., Asphalt, Stone products, Brick, Plaster, Cement, Sand, etc.

Class 9.00—Power, Light and Heat

9.10—Electricity: All public electric generating and distributing systems should place the classification number on all purchase orders issued by them except for construction of new buildings, and building maintenance and repair which should not be included in this classification (see Classes 21.00 and 22.00).

This classification is not to be used on orders for wiring and equipment necessary to make use of electricity in a plant or in the home. The wiring and equipment for distributing electricity through a plant, home, etc., and orders for private, industrial, farm or home generating plants, should bear the proper symbol for new construction or building maintenance and repair (see Classes 21.00).

9.20—Petroleum: All companies concerned with the production of petroleum, refining, pipeline construction and operation, storage and retail distribution of petroleum, oil and gasoline, should place this Allocation Symbol on all purchase orders they issue.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

9.30—Coal and Coke: All Companies engaged in the production and distribution of coal and coke should place this Allocation Symbol on all purchase orders they issue. The construction of coke ovens should be included but the construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

9.40—Gas: All public gas companies engaged in the production and distribution of both natural and manufactured gas should place this Allocation Symbol on all purchase orders for material, equipment and supplies, etc., that they issue except for construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Orders for equipment and pipe for using gas in industrial plants and homes should not bear this number but should be classified with the proper construction symbol (see Classes 21.00 and 22.00).

Class 10.00—Transportation

10.10—Railroad including Urban and Interurban: All railroads, railways and street car companies should place this Allocation Symbol on all purchase orders that they issue except for construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Purchase orders for mine railroad equipment and privately owned intra-plant railroad equipment should not transmit this symbol but should bear the proper industry symbol.

10.20 — Automotive: All companies manufacturing automobiles, trucks, buses, trailers, taxis, automotive repair parts and accessories, tires, retreading machinery etc., should place this Allocation Symbol on the purchase orders that they issue except for the construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

10.30—Roads, Streets, etc., Construction and Maintenance of: All orders for the construction, maintenance and repair of roads, streets, automobile bridges and tunnels, storm sewers, highway signs, and fences, traffic lights and other traffic control facilities should carry this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

The responsibility for placing this classification number on the order lies with the contractor or the local, state or federal government agency which originates the order.

10.40—Water Transportation, including Construction of privately owned Shipyards: All orders for material, equipment, and supplies for the construction of ships (other than those classified under "military" which will be placed in Class 2.00 by the government department placing the order) operating supplies, repair and maintenance of the ships themselves, ship safety devices, lighthouses, docking facilities, loading and unloading equipment, shipyards, buoys, and other water traffic control devices, etc., should carry this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

The responsibility for placing the Allocation Symbol on the order rests with the shipping company, ship builder, or other agency originating the order.

10.50—Air Transportation: All orders for material, equipment and supplies necessary for the manufacture of airplanes other than those approved by the Joint Aircraft Committee, orders for repair, maintenance and operating supplies needed to maintain air transportation

and airports, airlane markers, other air traffic control and safety devices should bear this Allocation Symbol.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

The responsibility for placing the Allocation Symbol on orders rests with the airline, with the manufacturer in the case of private planes or with the government agency which originates the order.

10.90—All Other Transportation: Manufacturers of other means of transportation such as motorcycles, bicycles, wagons, etc., should place this Allocation Symbol on all orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 11.00—Communication

11.10—Telephone: Orders for all apparatus and equipment necessary to provide and maintain telephone service, and supplementary related services furnished by the telephone companies, and all orders for the repair, maintenance and operating supplies for furnishing telephone service should bear this Allocation Symbol.

Orders for material for the construction, maintenance and repair of central office and other buildings should not be given this Symbol, but should be placed in Class 21.00 and 22.00.

All orders placed by the manufacturers of telephone equipment should also carry this Allocation Symbol.

11.20—Radio: This Allocation Symbol should be placed on all orders for materials, supplies and equipment for commercial radio equipment, both by those operating radio stations and systems and those engaged in the manufacture of the equipment. Orders for materials, etc., going into home, portable and automobile radio equipment should not be given this Symbol but that for equipment and supplies for household use—Class 16.00.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

11.30—Telegraph: All public telegraph companies should place this Symbol on orders for all apparatus and equipment necessary to provide and maintain telegraph service and on orders for the repair, maintenance and operating supplies for furnishing telegraph service.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

11.90—All Other Communication: Manufacturers of all other means of communication such as loud speaker or buzzer systems, etc., should use this Allocation Symbol on all purchase orders that they issue.

Signal systems such as rockets, flares, signal flags, sirens, bells, and beacons are not included in this Classification and purchase orders in regard to them should be given the Allocation Symbol of the customer.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 12.00—Public Health and Safety

12.10—Sanitary Systems and Facilities: This Allocation Symbol should be placed on all orders for materials, equipment, supplies, etc., for water systems, sewage systems, garbage disposal plants, etc.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

12.20—Health Equipment and Supplies including Personal Care: Manufacturers of hospital and doctors' supplies, drugs and medicines, dental equipment, surgical instruments, X-Ray equipment, toilet preparations, soap, etc., should place this Allocation Symbol on all purchase orders issued.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

12.30—Public Safety Equipment and Supplies: Manufacturers of police and fire equipment, fire alarm equipment, non-military gas masks, sirens, decontamination equipment for civilian use, fire extinguishers, etc., should use this Allocation Symbol on all purchase orders that they issue. State and local police and fire authorities will also place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 13.00—Agricultural Equipment and Specialized Agricultural Supplies

Manufacturers of agricultural implements, tools, equipment, machinery, feeding stuffs, fertilizer, fungicides, insecticides, etc., used on farms and in the care of livestock, poultry, bees, nurseries should place this Allocation Symbol on all purchase orders that they issue.

This Symbol should not be applied, however, to orders for materials for the construction of new buildings or building maintenance and repair (see Classes 21.00 and 22.00).

Class 14.00—Industrial Food Processing

Industrial food processors such as bakeries, canners, candy makers, packers, soft drink makers, tobacco and cigarette companies, etc., should use this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this Classification (see Classes 21.00 and 22.00).

Class 15.00—Wearing Apparel

Manufacturers of all types of non-military wearing apparel including footwear, hats, gloves, and work clothes of all types should place this Allocation Symbol on all purchase orders that they issue

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 16.00—Equipment and Supplies for Household Use

As defined here, equipment and supplies for household use cover purchase orders for companies manufacturing all movable equipment including home, portable, and automobile radio receivers, furnishings and supplies used in homes, hotels, restaurants, laundries, dry-cleaning and pressing establishments, but not food products, health supplies, and other items specifically included in other classifications.

Manufacturers of such articles as beds, carpets, chinaware, cooking utensils, cutlery, electrical appliances for domestic use, all types of laundry equipment, silverware, stoves, glassware, etc., should place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 17.00—Education and Information

17.10—Printing and Publishing: All publishers of newspapers, magazines, and books and all establishments engaged in lithographing, photo-engraving, blueprinting, photostating, etc., should place this Allocation Symbol on all purchase orders that they issue.

The symbol does not apply, however, to such things as playing cards, etc., which should be placed in Class 18.00.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

17.20 — Education: Schools, colleges, universities and other educational institutions should place this Allocation Symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 18.00—Recreation and Amusement

Businesses engaged in the manufacture of photographic equipment and supplies, athletic and sporting goods, musical instruments, etc., and businesses which operate carnivals, amusement parks, theaters, etc., or produce motion pictures should place this symbol on all purchase orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 19.00—Equipment and Supplies for Office Use

This Allocation Symbol should be used by manufacturers of such things as adding and calculating machines, typewriters, pencils, stationery, mimeograph machines and office furniture on all their purchase orders except for the construction of new buildings and building maintenance and repair (see Classes 21.00 and 22.00).

Class 20.00—Machinery and Equipment for Industrial Use

This classification should be used on all purchase orders by makers of industrial machinery and equipment. Industrial machinery is defined as all machinery, except office machinery, customarily carried as a capital item, and used for manufacturing purposes. It does not include any equipment or machinery physically incorporated in any end product included in another heading of this Classification.

The special purpose machinery and equipment necessary to provide the essential services listed in the Classification, such as Power and Light, Transportation and Communication, are not included in this classification as they are separately listed classes but the machinery used in the manufacturing of these special purpose facilities is included. To illustrate, locomotives, trucks, generators for a light and power plant, equipment to provide telephone service, diesel engines or turbines for ships are not included in this classification but are covered by their respective listed classifications. The machinery used to manufacture the locomotive, truck, generator, telephone equipment, diesel engine or turbine is, however, included under this Symbol.

20.10—Metal Working Machinery

Manufacturers of machine tools and metal working machinery should place this classification number on all orders for materials.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

20.20—All Other Industrial Machinery Including Mining, Construction, Special and General Industrial Machinery

Manufacturers of mining machinery, construction machinery, special purpose industrial machinery such as textile machinery, and general industrial ma-

chinery such as conveyors not actually incorporated into the building itself, should place this Allocation Symbol on all orders that they issue.

Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Class 21.00—New Buildings, Construction of

The prime contractor has the responsibility for placing these Allocation Symbols on all purchase orders he issues for materials and equipment for the construction of all types of civilian and industrial buildings. These classification numbers should be placed on orders for all items which are actually incorporated into the building itself, i.e., such things as elevators, escalators, plumbing and heating systems, wiring, incinerators and air-conditioning systems where they are actually attached to and form part of the building. Portable air-conditioning units, industrial machinery, refrigerators, stoves, and other similar items should not be included under this symbol. Orders for materials for the construction of government owned war facilities should be assigned Class 7.00 symbols.

21.10—Buildings for Manufacturing and Commercial Purposes, Construction of

This Allocation Symbol should be placed by the prime contractor on all orders for materials, equipment, etc., for buildings such as:

All types of buildings for industrial plants including assembly and warehouse buildings, all types of railroad buildings, buildings for electric generating plants, hangars, commercial and private and other commercial airport buildings, mine buildings, office buildings, stores, telephone control offices and repeater stations, etc.

21.20—All Types of Dwellings, Construction of

This Allocation Symbol should be placed by the prime-contractor on all orders for materials, equipment, etc., ordered for buildings such as:

Apartment houses, civilian barracks, clubs, homes, hotels, etc.

21.90—All Other Types of Buildings, Construction of

This Allocation Symbol should be placed by the prime contractor on all orders for materials, equipment, etc., for buildings such as:

Farm outbuildings, barns, fire stations, garages, greenhouses, health centers, hospitals, jails and prisons, kennels, motion picture houses, police stations, public buildings (except dwellings, see Class 21.20).

Class 22.00—Operating Supplies and Building Repair and Maintenance

Note: This classification is intended primarily for manufacturers of articles and supplies usually designated as "operating supplies."

This classification is provided for manufacturers of operating supplies and building repair and maintenance supplies. Operating supplies are defined here as those supplies which are consumed in the manufacture of a product or are necessary for maintaining the manufacturing process, but are not physically incorporated into or are not a component part of the finished product. These operating supplies include such items as small tools, cordage and twine, electric light bulbs, grease pumps and guns, etc.

This Symbol will be transmitted by the manufacturer of operating supplies. Manufacturers falling under other classifications will not use this classification but will place on their orders for operating supplies their own Allocation Symbol. For example, a manufacturer of automobiles who orders screw drivers will use classification 10.20 on his orders. The company which manufactures the screw drivers will transmit the Symbol 22.00 on his orders.

Building repair and maintenance includes the manufacturers of such products as plumbing and heating supplies, electrical wiring, ornamental grill work, door and window sash, etc., which are not identifiable as going into new construction. In other words, orders for the above supplies not coming under classes 21.10, 21.20 or 21.90 will be listed as Class 22.00.

Any items listed in other classifications as, for example, working gloves, Class 15.00—Wearing apparel, or repair parts for items listed in other classifications, as, for example, repair parts for autos and trucks, should not be included in this classification.

Class 23.00—All Other Uses (Note: This does not include finished products listed in other classes.)

Manufacturers who do not directly fall into any other classifications as set forth above or whose products, such as subassemblies, are not incorporated into some other final product, should place this Allocation Symbol on all purchase orders that they issue.

It should not be used by manufacturers whose products can be classified as repair, maintenance and operating supplies for any construction or manufacturing operation listed here or by manufacturers or processors of subassemblies, semi-finished products or parts that enter into a finished product, or by manufacturers whose products are used in the repair and maintenance of existing buildings. Construction of new buildings and building maintenance and repair should not be included in this classification (see Classes 21.00 and 22.00).

Examples of those who should use the Allocation Symbol are manufacturers of artists' materials, jewelry, clocks, watches, luggage, novelties, etc.

Manufacturers of such things as bearings, motors, and sub-assemblies should not use this Allocation Symbol but should transmit those Symbols which are transmitted to them on the orders received from their customers.

CLASSIFIED LIST

This list is not intended to be complete but to be helpful to industry as a guide in determining a company's allocation classification.

If no allocation can be found that applies to the operations of a particular business, that business will transmit to its suppliers the allocation symbols received on its customers' orders.

The Military Allocation Classifications (1.00 to 7.00 inclusive) are applied by the military agency concerned and no product or industry list is necessary.

CLASS 8.00—RAW MATERIALS, PRODUCTION AND PRELIMINARY PROCESSING OF

8.10—All Metals, Production (Including Mining) and Preliminary Processing of: This symbol should be used by companies engaged in operations such as,

Alloying, rolling and drawing of non-ferrous metals; aluminum alloying, rolling and drawing; aluminum plants, operation of.

Blast furnace products, manufacture of; brass mills, operation of.

Cast-iron pipe and fittings, manufacture of: castings, metal, manufacture of; cold-rolled steel sheets and strip and cold-finished steel bars, manufacture of; copper mines, operation of; copper refineries, operation of.

Fencing, manufacture of; forgings, manufacture of; foundries, operation of.

Grey-iron and semi-steel castings, manufacture of.

Iron mines, operation of.

Lead and lead foils, production of.

Malleable-iron castings, manufacture of; metal bars, manufacture of; mining companies, operation of.

Non-ferrous metal foundries, operation of.

Pipes of iron, steel, and other metal, manufacture of; primary smelting and refining of all metals.

Rails and railroad spikes, manufacture of; reinforcing steel, manufacture of.

Sheet metal, manufacture of; smelters, operation of; steel castings, manufacture of; steel mills, operation of; steel works and rolling mills, operation of; structural steel, manufacture of.

Tin and other foils, manufacture of; etc. etc.

8.20—All Chemicals, Production and Preliminary Processing of: This symbol should be used by companies engaged in such operations as,

Acetone, manufacture of; acids, manufacture of; alum, manufacture of.

Bluing, manufacture of; bone black, carbon black, and lamp black, manufacture of.

Camphor, manufacture of; cellophane, manufacture of; chlorine, manufacture of; coal tar products, crude and intermediate, manufacture of; colors and pigments, manufacture of; compressing and liquifying gases other than in petroleum or gasoline plants; cottonseed oil, manufacture of.

Dextrine and dextrose, manufacture of.

Essential oils, production of; ether, manufacture of.

Fish, and marine oils, manufacture of.

Gelatine, manufacture of; glue and gelatine, manufacture of; grease and tallow (except lubricating grease), manufacture of; gum naval stores (turpentine and rosin), manufacture of.

Nitrate, production of.

Paints, varnishes and lacquers, manufacture of; phosphorous, manufacture of; plastic raw materials, manufacture of.

Salt, production of; shellac, manufacture of; sodium compounds, manufacture of; soybean oil, production of; sulfur, production of.

Tanning materials, natural dyestuffs, mordants and sizes, manufacture of.

Varnishes, manufacture of; vegetable oils, production of (except cooking).

Wood naval stores (turpentine, rosin, etc.), manufacture of; etc., etc.

8.90—All Other Raw Materials, Production and Preliminary Processing of (exclusive of Petroleum, Coal and Coke, see Classes 9.20 and 9.30): This symbol should be used by companies engaged in such operations as,

Artificial leather, manufacture of; asbestos, mining and processing of; asphalt, production of.

Batting, padding and wadding, production of; boot and shoe findings, production of; brick and hollow structural tile, manufacture of; building stone, manufacture of.

Cement, manufacture of; concrete products, manufacture of; cotton woven goods and fabrics, manufacture of; cut stone for building, manufacture of.

Dyeing and finishing cotton, rayon, silk, linen, woolen and worsted textiles.

Excelsior, manufacture of.

Flat glass, manufacture of; floor and wall tile, manufacture of; furs, dressing and dyeing.

Glass making; gypsum products, manufacture of.

Hatters fur, production of.

Insulation and mineral wool, manufacture of.

Knitted cloth, manufacture of.

Leather, tanning, curing and finishing; lime, manufacture of; linen goods, manufacture of; lumbering.

Mineral wool, manufacture of.

Natural graphite, ground and refined, manufacture of; nonclay refractories, operation of.

Oilcloth, manufacture of.

Paper and paper-board mills, operation of; planing mills, operation of; plaster, manufacture of; plywood mills, operation of; processed waste and recovered wool fibers, production of; pulp mills, operation of.

Rayon fabrics, manufacture of; rayon yarn and thread, manufacture of; roofing, asphalt, shingles, roof coating, manufacture of.

Sand, production of; sand, lime, brick, block, tile, production of; sawmills, operation of; slate, quarrying and production of.

Wallboard, and wall plaster, manufacture of; wool pulling; etc., etc.

CLASS 9.00—POWER, LIGHT AND HEAT.

9.10—Electricity: This Classification is to be used by all public electric generating and distributing systems.

9.20—Petroleum: All companies engaged in the production, refining, storage, transportation by pipe line, and the distribution of petroleum and petroleum products are included

in this Classification. Companies primarily engaged in drilling oil wells and the construction and operation of petroleum pipe lines are also covered by this Classification Symbol.

9.30—Coal and Coke: All companies engaged in mining coal, producing coke and the storage and distribution of these two products should be placed in this category.

9.40—Gas: All public gas companies engaged in the production and distribution of both natural and manufactured gas are classified under the Allocation Symbol 9.40.

CLASS 10.00—TRANSPORTATION.

10.10—Railroads, Including Urban and Interurban: All public railroads, interurban railways, and street car companies come under this Classification. Mine railroads and privately owned intra-plant railroads should not be placed in this Classification but in the Classification applicable to the industry concerned.

10.20—Automotive: This symbol should be used by companies engaged in such operations as,

Auto repair shops, operation of; automobile accessories, manufacture of; automobile bodies, manufacture of; automobile brakes and brake parts, manufacture of; automobile trailers, manufacture of; automobiles, manufacture of; automotive electrical equipment, manufacture of; automotive repair shop equipment, manufacture of.

Buses, manufacture of.

Garages and auto repair shops, operation of.

Heaters, auto, manufacture of.

Passenger automobiles, manufacture of.

Retreading machinery, operation of.

Taxis, manufacture of; tire retreading; tires and inner tubes, manufacture of; trailers, manufacture of; truck trailers, manufacture of; trucks, manufacture of.

10.30—Roads, Streets, Etc., Construction and Maintenance of: This symbol should be used by companies engaged in such operations as,

Bridges, highway, construction of.

Electric street traffic signals, manufacture of.

Highway fences, construction of; highway markers, manufacture of.

Roads, construction of; road maintenance; road oilers, manufacture of; road sweepers, manufacture of.

Snowplows (road and highway), manufacture of; sprayers and sprinklers for street and highway use, manufacture of; storm sewers, construction of.

Traffic signs, electric, manufacture of; tunnels, highway, construction of; etc., etc.

10.40—Water Transportation, including construction of privately owned shipyards, other than military: This symbol should be used by companies engaged in such operations as,

Barges, building and repair of; boat building and repairing; buoys, manufacture of.

Canals, construction and operation of; canoes, manufacture of.

Docking facilities for ships, operation of.

Ferries, operation of.

Light houses, construction and maintenance of.

Marine motors, manufacture of.

Outboard motors, manufacture of.

Rope and cable for marine use, manufacture of; rowboats, manufacture of.

Shiploading equipment, manufacture and operation of; ship safety devices, manufacture of; ships, construction of; shipyards, operation of.

Yachts, manufacture of; etc., etc.

10.50—Air Transportation: Companies engaged in the operation of airlines, companies manufacturing aircraft and aircraft parts not used for military purposes and companies manufacturing such specialized equipment as airlane markers, air traffic control and safety devices, flares, etc., are included under this Classification.

10.90—All Other Transportation: This symbol should be used by companies engaged in such operations as,

Bicycle motors and accessories, manufacture of; bicycles, manufacture of.

Carriages and other horsedrawn vehicles, manufacture of.

Motorcycle engines and accessories, manufacture of; motorcycles, manufacture of.

Sleds, manufacture of.

Wagons (except farm), manufacture of; etc., etc.

CLASS 11.00—COMMUNICATION.

11.10—Telephone: All public telephone companies and manufacturers of apparatus and equipment necessary to provide and maintain telephone service are placed under this Allocation Classification.

11.20—Radio: All companies operating commercial radio stations and systems and manufacturers of commercial radio equipment belong in this Allocation Classification. Manufacturers of home, portable, and automobile radio equipment should use Classification 16.00.

11.30—Telegraph: Public telegraph and cable companies and manufacturers of apparatus and equipment necessary to provide and maintain telegraph and cable service use this Allocation Classification.

11.90—All Other Communication: This symbol should be used by companies engaged in such operations as,

Buzzer systems, manufacture of.

Loud speaker systems, manufacture of; etc., etc.

CLASS 12.00 — PUBLIC HEALTH AND SAFETY.

12.10—Sanitary and Health Systems and Facilities: This symbol should be used by companies engaged in such operations as,

Garbage disposal plants, construction and operation of (except new buildings).

Incinerators for trash and garbage, construction and operation of (except new buildings).

Sewage systems, construction and operation of.

Water systems (Public), construction and operation of; water purification plants, construction and operation of; water reservoirs, construction and operation of; etc., etc.

12.20—Health Equipment and Supplies including Personal Care: This symbol should be used by companies engaged in such operations as,

Abdominal supports, manufacture of; abrasive points, wheels, and disks for dental use, manufacture of; aluminum ware for hospital use, manufacture of; anesthesia apparatus, manufacture of; anthropometrical, astronomical, chemical, physical and physiological apparatus, manufacture of; artificial limbs, manufacture of.

Barber chairs, manufacture of; barber shop equipment, manufacture of; barbers' clippers, manufacture of; beauty shop equipment, manufacture of; braces, manufacture of; burrs and drills for dental use, manufacture of.

Cabinets and cases for barber and beauty shops, manufacture of; compacts for cosmetics, manufacture of; cosmetics, manufacture of; crutches, manufacture of.

Dental chairs and cabinets, manufacture of; dental equipment and supplies, manufacture of; dental sterilizers, manufacture of; drugs and medicines, manufacture of; dry shavers, manufacture of.

Electrocardiographs, manufacture of; equipment cabinets for hospitals, manufacture of.

Fracture appliances, manufacture of.

Hair curlers, manufacture of; hair driers, electric, manufacture of; hair work (wigs, braids, switches, etc.), manufacture of; hand and face driers, manufacture of; hand instruments for dentists; health lamps, ultra-violet and infra-red, manufacture of; hospital, doctors' and dental equipment, manufacture of; hospital furniture, manufacture of; hospital signalling devices, manufacture of; hospital, surgical, and other "sterilizers", manufacture of; hypodermic needles, manufacture of.

Immersion sterilizing needles, manufacture of; inhalators, manufacture of.

Manicure instruments, manufacture of; medicines, manufacture of; metal beds and chairs for hospitals, manufacture of; microscopes, manufacture of.

Operating tables, manufacture of; ophthalmic goods, lenses, and fittings, manufacture of; optical instruments and lenses, manufacture of; orthodomic appliances, manufacture of.

Perfumes, cosmetics, and other toilet preparations, manufacture of; physicians' diagnostic apparatus, manufacture of; physico-therapy equipment, manufacture of.

Razors and razor blades, manufacture of; refractometers, spectrometers, spectroscopes, polariscopes and optical measuring instruments, manufacture of.

Scalpels, forceps, and similar instruments, manufacture of; spectacle and eyeglass frames, manufacture of; sphygomanometers, manufacture of; soap, manufacture of; stethographs, manufacture of; stethoscopes, manufacture of; surgeons' knives, manufacture of; surgical and medical instruments, manufacture of; surgical belts, manufacture of; surgical blades, manufacture of.

Telescopes, manufacture of; toilet preparations, manufacture of; tooth brushes, manufacture of; tooth paste, manufacture of; trusses, manufacture of.

Veterinarians' instruments, manufacture of; vibrators (health), manufacture of.

X-Ray and theropeutic apparatus and electronic tubes, manufacture of; X-Ray apparatus for dental use, manufacture of; X-Ray apparatus for medical use, manufacture of; etc., etc.

12.30—Public Safety Equipment and Supplies: This symbol should be used by companies engaged in such operations as,

Burglar alarm and hold-up apparatus, manufacture of.

Decontamination equipment for civilian use, manufacture of.

Fire and watch signal apparatus, manufacture of; fire extinguishers, manufacture of; fire stations, operation of; firearms for police authorities, manufacture of.

Gas masks for civilian use, manufacture of.

Municipal fire and police signal systems, manufacture of.

Police stations, operation of.

Radio sending and receiving sets for use by police and fire authorities, manufacture of.

Sirens for use by police and fire authorities, manufacture of; sprinklers and automatic fire detecting apparatus, manufacture of; etc., etc.

CLASS 13.00—AGRICULTURAL EQUIPMENT AND SUPPLIES.

This symbol should be used by companies engaged in such operations as,

Agricultural machinery, manufacture of; asparagus knives, manufacture of.

Barn door hangers and track, manufacture of; barn scrapers, manufacture of; baskets for fruit and vegetables, manufacture of; bookkeepers' supplies, manufacture of; beet drills, manufacture of; beet lifters, manufacture of; boning and skinning knives, manufacture of; broadcast seeders, manufacture of; brooders, manufacture of.

Calf weaners, manufacture of; cane mills, (farm size), manufacture of; cattle dehorners, manufacture of; combines, manufacture of; corn binders, manufacture of; cider mills and fruit pressers (farm), manufacture of; corn cribs, manufacture of; corn huskers, manufacture of; corn pickers, manufacture of; corn planters, manufacture of; corn shellers, manufacture of; cotton planters, manufacture of; cream separators (farm use), manufacture of; cultivators, manufacture of.

Disc plows, manufacture of.

Electric fence controllers, manufacture of; elevators (farm use), manufacture of; engines for farm use, manufacture of; ensilage cutters, manufacture of; ensilage harvesters, manufacture of.

Farm machinery, manufacture of; farm wagons, manufacture of; feed cookers, manufacture of; feed cutters, manufacture of; feeds for animals and fowl, manufacture of; feed grinders and crushers, manufacture of; fertilizers, manufacture of; fruit pickers, manufacture of; fungicides, manufacture of.

Garden planters, manufacture of; garden tractors, manufacture of; gates, farm, manufacture of; girdling knives, manufacture of; grain binders, manufacture of; grain drills, manufacture of; grain threshers, manufacture of.

Harrows, manufacture of; harness hardware, manufacture of; harvesters, manufacture of; hay carriers, manufacture of; hay forks, manufacture of; haying machinery, manufacture of; hay loaders, manufacture of; haypress combines, manufacture of; hay presses, manufacture of; hog rings, manufacture of; hog scrapers, manufacture of; hog troughs, manufacture of.

Incubators, manufacture of; insecticides, fungicides, and related chemical compounds, manufacture of; irrigation system, construction and operation of.

Land rollers (farm), manufacture of; laying batteries, manufacture of; lime spreaders, manufacture of; listers, manufacture of; livestock drinking cups, manufacture of.

Machets, manufacture of; manure spreaders, manufacture of; milking machines, manufacture of; mowers (farm) manufacture of.

Nursery knives (orchard), manufacture of.

Pea and bean harvesters, manufacture of; pea and bean threshers, manufacture of; peanut pickers, manufacture of; planters, manufacture of; potato diggers, manufacture of; potato planters, manufacture of; potato sorters and graders, manufacture of; poultry equipment, manufacture of; poultry feeders, manufacture of; poultry growing batteries, manufacture of; poultry waterers, manufacture of; prepared feeds for animals and fowl, manufacture of.

Rakes, manufacture of; rice binders, manufacture of; rod weeders, manufacture of; rotary hoes, manufacture of.

Saddlery, harness and whips, manufacture

of; shepherds' crooks, manufacture of; silos, manufacture of; soil pulverizers, manufacture of; spraying outfits (farm), manufacture of; stalk cutters, manufacture of; steel plow shapes or shares, manufacture of; stock feeders, manufacture of; stock pens, manufacture of; stock tanks, manufacture of; subsoil plows, manufacture of; syrup evaporators (maple), manufacture of.

Tank heaters (farm), manufacture of; threshing machines, manufacture of; tillers, manufacture of; track for hay carriers, manufacture of; tractors, agricultural use, manufacture of; transplanters, manufacture of.

Wagons for agricultural use, manufacture of; water pumps, (farm), manufacture of; watering troughs, manufacturing of; weeders, manufacture of; wind mills, manufacture of; etc., etc.

CLASS 14.00—INDUSTRIAL FOOD PROCESSING.

This symbol should be used by companies engaged in such operations as,

Baking powder, yeast, and other leavening compounds, manufacture of; beet sugar, manufacture of; biscuits, crackers, and pretzels, manufacture of; bread and other bakery products, manufacture of.

Candy and other confectionary products, manufacture of; cane sugar, manufacture of; canning and drying of fruits and vegetables (including canned soup); canning of fish, crustocea and mollusks; cereal preparations, manufacture of; cheese, manufacture of; chewing gum, manufacture of; chocolate and cocoa products, manufacture of; cigarettes, manufacture of; cigars, manufacture of; condensed and evaporated milk, manufacture of; cooking and other edible fats and oils, production of; corn sirup, corn sugar, corn oil, and starch, manufacture of; creamery butter, manufacture of; curing of fish; custom slaughtering.

Flavoring, extracts and sirups, manufacture of; food preparations, manufacture of; flour and other grain-mill products, milling of.

Ice cream and ices, manufacture of.

Liquors, distilled, manufacture of; liquors, rectified or blended, manufacture of.

Macaroni, spaghetti, vermiecelli, and noodles, manufacture of; malt, manufacture of; malt liquors, manufacture of; meat packing, wholesale.

Non-alcoholic beverages, manufacture of.

Oleomargarine, manufacture of.

Poultry dressing and packing; preserves, jams, jellies and fruit butter, manufacture of.

Quick-frozen food, manufacture of.

Rice cleaning and polishing.

Salad dressings, manufacture of; sausage and sausage casings, production of; soda fountains, beer-dispensing equipment and related products, manufacture of.

Tobacco and snuff, manufacture of.

Vinegar and cider, manufacture of.

Wines, manufacture of; etc., etc.

CLASS 15.00—WEARING APPAREL.

This symbol should be used by companies engaged in such operations as,

Buckles for clothes, manufacture of; buttons, manufacture of.

Children's and infant's wear, manufacture of; clothing, leather and sheep-lined, manufacture of; corsets and allied garments, manufacture of.

Dress and semi-dress gloves and mittens, manufacture of.

Embroideries.

Footwear, manufacture of; fur coats and other fur garments, accessories, and trimmings, manufacture of.

Handkerchiefs, manufacture of; hat and cap materials, trimming, etc., manufacture of; hat bodies and hats, fur and wool felt, manufacture of; hats, straw, manufacture of; hooks and eyes, manufacture of; hosiery, all types, manufacture of; house dresses, uniforms and aprons, manufacture of.

Knitted underwear, manufacture of.

Lace goods, manufacture of; leather gloves and mittens, manufacture of.

Men's and boys' hats and caps, manufacture of; men's and boys' shirts, suits, coats and overcoats, manufacture of; men's neckwear, manufacture of; millinery, manufacture of.

Needles, pins, hooks and eyes and slide and snap fasteners, manufacture of.

Pins, manufacture of.

Raincoats, and other waterproof garments, manufacture of; robes, lounging garments and dressing gowns, manufacture of; rubber boots and shoes, manufacture of.

Shoe buckles, manufacture of; shoe lace tips, manufacture of; shoes, manufacture of; slide fasteners, manufacture of; suspenders and garters, manufacture of; snap fasteners, manufacture of (and clasps).

Trimmings, stamped art goods, and art needle work, manufacture of.

Umbrellas, parasols and canes, manufacture of.

Women's and Misses' clothing, manufacture of; women's and misses' neckwear, scarfs, etc., manufacture of; women's pocketbooks, purses and handbags, manufacture of; work clothing, manufacture of; work gloves and mittens, manufacture of; work shirts, manufacture of; etc., etc.

CLASS 16.00—EQUIPMENT AND SUPPLIES FOR HOUSEHOLD USE.

This symbol should be used by companies engaged in such operations as,

Air heaters, electric, manufacture of; aluminum ware for household use, manufacture of.

Baby carriages, manufacture of; bathroom, kitchen and baby scales, manufacture of; broom racks, manufacture of; brooms, manufacture of; brushes, manufacture of.

Can openers, manufacture of; carpets, rugs, and mats made from such materials as paper fiber, jute, grass, flax, sisal, cotton, coca fiber, and rags, manufacture of; china firing and decorating; clothes racks, manufacture of; coffee pots, manufacture of; commercial laundry, dry cleaning and pressing; corn poppers, manufacture of; cups, manufacture of; curtains, draperies and bed spreads, manufacture of; cutlery, manufacture of.

Desk and reading lamps, manufacture of; dish washing machinery, manufacture of; domestic, hotel and restaurant cooking stoves, manufacture of; drainboards, tub covers, radiator covers, and table tops, manufacture of; dust pans, manufacture of.

Earphones and parts (domestic radios), manufacture of; egg beaters, manufacture of; electric broilers, manufacture of; electric logs for fireplaces, manufacture of; electric percolators, manufacture of; electric water coolers, manufacture of.

Fireplace screens and andirons, manufacture of; fish scalers, manufacture of; flashlights, manufacture of; flat irons, manufacture of; flower vases, manufacture of; food warmers, manufacture of; frying pans, manufacture of.

Garbage cans, manufacture of.

House furnishings, manufacture of; household brooms, manufacture of; household brushes, manufacture of; household utensils, manufacture of.

Knife sharpeners, manufacture of.

Lamp shades, manufacture of; Lanterns and other outdoor fixtures, manufacture of; laundry equipment, domestic, manufacture of; laundry tubs, manufacture of; lawn mowers, manufacture of.

Mattresses and bed springs, manufacture of; Metal household furniture, manufacture of; metal pot scourers and kitchen wire goods, manufacture of; milk coolers, manufacture of; mirror frames, manufacture of; mop wringer parts, manufacture of.

Nut crackers and picks, manufacture of.

Oil stoves, manufacture of.

Paint and varnish brushes, manufacture of; paring knives, manufacture of; picture frames, manufacture of; portable ovens, manufacture of; portable lamps, (table, boudoir, bridge, and floor), manufacture of.

Radio cabinet parts (domestic use), manufacture of; radio chassis bases, manufacture of; radio parts, manufacture of; radio set analyzer, manufacture of; radio tube checkers, manufacture of; radios and radio tubes (sending and receiving sets), for domestic use, manufacture of; range boilers, manufacture of; refrigerators for domestic, restaurant and hotel use, manufacture of; roasters, manufacture of.

Scissors, manufacture of; sewing machines, domestic, manufacture of; sewing machine needles, manufacture of; spoons, manufacture of; stainless steel kitchen ware, manufacture of; steam tables (food), manufacture of; stoves and ranges for cooking, manufacture of; sugar bowls, manufacture of; syphon bottles, manufacture of.

Table cutlery, manufacture of; teapots, manufacture of.

Vacuum cleaners, manufacture of.

Upholstered household furniture, manufacture of.

Wallpaper, manufacture of; wash basins, manufacture of; whisk brooms, manufacture of; etc.

CLASS 17.00—EDUCATION AND INFORMATION.

17.10—Printing and Publishing: This classification should be used by companies engaged in such operations as,

Blueprinting; bookbinding and related industries; books, printing and publishing of.

Electrotyping and stereotyping; engraving for plate printing.

General commercial printing; gravure, rotogravure and rotary photogravure plates, manufacture of.

Job printing.

Lithographing and photo-lithographing.

Newspapers, printing and publishing of.

Magazines, printing and publishing of.

Periodicals, printing and publishing of; photoengraving; photostating; printing establishments, operation of; printing ink, manufacture of; publishing establishments, operating of; etc.

17.20—Education: All schools, colleges, universities and other educational institutions should place this allocation symbol on their orders.

CLASS 18.00—RECREATION AND AMUSEMENT.

Manufacturers of recreational and amusement equipment and operators of amusement parks, carnivals, theaters, etc., are placed in this Allocation Classification. This classification includes companies engaged in such operations as,

Ammunition for private use, manufacture of; amusement park equipment, manufacture and operation of.

Cameras, manufacture of; cards, playing, manufacture of; carnival equipment, manufacture and operation of; children's vehicles (except bicycles and baby carriages), manufacture of; circus equipment, manufacture and operation of; coin operated weighing machines, manufacture of.

Dolls, manufacture of.

Fire arms for private use, manufacture of; fireworks, manufacture of; floodlights (theater and photographic use), manufacture of.

Games, manufacture of.

Motion picture reels and containers, manufacture of; moving pictures, production of; musical instruments, parts and materials, manufacture of.

Organs, manufacture of.

Phonograph needles, manufacture of; phonograph records, manufacture of; phonographs, manufacture of; photographic apparatus and materials, manufacture of; pianos and parts, manufacture of; projectors, manufacture of.

Seats for theaters, manufacture of; sporting and athletic goods, manufacture of.

Theater equipment, manufacture of; theaters, operation of; toys, manufacture of.

Vending, amusement and other coin-operated machines manufacture of.

CLASS 19.00—EQUIPMENT AND SUPPLIES FOR OFFICE USE.

This symbol should be used by companies engaged in such operations as,

Adding machines, manufacture of; addressing machines, manufacture of.

Bookkeeping machines, manufacture of.

Calculating machines, manufacture of; calendars, manufacture of; carbon paper, manufacture of; cash registers, manufacture of; ceiling fans, manufacture of; check-writing machines, manufacture of; coin counters, manufacture of; counters and tables for store use, manufacture of.

Envelope fasteners, manufacture of; envelopes, manufacture of.

File fasteners, manufacture of; filing cabinets and cases, manufacture of.

Hand stamps, stencils and brands, manufacture of.

List finders, manufacture of.

Notebooks and ledgers, manufacture of.

Office and store machines, manufacture of; office chairs, manufacture of; office desks and tables, manufacture of; office furniture, manufacture of.

Paper clips, manufacture of; paper punches, manufacture of; partitions, shelving and cabinets for office and store use, manufacture of; pencil sharpeners, manufacture of; pencils and crayons, manufacture of; pens, mechanical pencils and points, manufacture of; pin tickets, manufacture of.

Safes and vaults, manufacture of; scotch tape holder, manufacture of; signal clips, manufacture of; stationery, manufacture of; store furniture and fixtures, manufacture of.

Tape moisteners, manufacture of; typewriters, manufacture of; typewriter ribbons, manufacture of.

Wire baskets (office use), manufacture of; wire staples, manufacture of; wire tag fasteners, manufacture of; writing ink, manufacture of; etc.

CLASS 20.00—MACHINERY AND EQUIPMENT FOR INDUSTRIAL USE.

20.10—Metal Working Machinery: This symbol should be used by companies engaged in such operations as,

Balancing machines, manufacture of; bending machines, manufacture of; broaching machines, manufacture of.

Cutting-off machines, manufacture of.

Drilling machines, manufacture of.

Filing machines, manufacture of; forging equipment, manufacture of.

Gear cutting machines, manufacture of; gear-tooth grinding machines, manufacture of.

Grinding machines, manufacture of.

Housing machines, manufacture of.

Key seaters, manufacture of.

Lapping machines, manufacture of; lathes, manufacture of.

Machine tools, manufacture of; metal working machinery, manufacture of; metal working saws, manufacture of; milling machines, manufacture of.

Planers, manufacture of; pressing machines, manufacture of; punching machines, manufacture of.

Rod and wire forming machines, manufacture of; rolling mill machinery, manufacture of.

Shaping machinery, manufacture of; spring winding and forming machines, manufacture of.

Threading machinery, manufacture of.

Wire drawing machines, manufacture of; etc.

20.20—All Other Industrial Machinery and Equipment, including Mining, Construction, Special and General Industry Machinery: This symbol should be used by companies engaged in such operations as,

Bake ovens for commercial use, manufacture of; baking machinery, manufacture of; beaming machinery (textile), manufacture of; beet-sugar machinery, manufacture of; bookbinding machinery, manufacture of; bottle-making machinery, manufacture of; bottling machinery, manufacture of; box-making machinery, manufacture of; brewhouse machinery, manufacture of; bulldozers, manufacture of; butter making and butter working machines, manufacture of.

Cane sugar machinery, manufacture of; canning machinery, manufacture of; carding (textile) machinery, manufacture of; cars and car equipment for industrial and mining use (other than automotive), manufacture of; cement mixers, manufacture of; clay working machinery, manufacture of; coffee grinding machinery, manufacture of; coffee roasting machinery, manufacture of; combing machinery (textile), manufacture of; confectionery machinery, manufacture of; construction machinery, manufacture of; cotton ginning machinery, manufacture of; cranes, manufacture of; cream separators, industrial use, manufacture of.

Derricks, manufacture of; dough mixers, industrial, manufacture of; dredging machinery, manufacture of.

Electrical measuring instruments, manufacture of; excavating machinery, manufacture of.

Finishers, tampers, vibrators (construction), manufacture of; food packaging machinery, manufacture of; food products machinery, manufacture of; fiber to fabric machinery (textile), manufacture of.

Garnetting machines (textile), manufacture of.

Hat machinery, manufacture of; heaters for construction work, manufacture of; hoists and winches (construction), manufacture of.

Ice cream machinery, manufacture of; industrial machinery, manufacture of.

Knitting machinery, manufacture of.

Last and related products for making shoes, manufacture of; leather working machinery, manufacture of; locomotives and parts for industrial and mining, manufacture of; looms (textile), manufacture of.

Measuring instruments, mechanical, manufacture of; mechanical - power - transmission equipment, manufacture of; mining machinery and equipment, manufacture of.

Oil-field machinery and tools, manufacture of.

Paint making machinery, manufacture of; paper mill, pulp mill, and paper products machinery, manufacture of; pasteurizers, manufacture of; picker machines, (textile), manufacture of; photoengraving machinery, manufacture of; printing-trades machinery, and equipment, manufacture of.

Sawmill machinery, manufacture of; scales and balances, manufacture of; scrapers, manufacture of; sewing machines, industrial, manufacture of; shoe machinery, manufacture of; sheeps' foot rollers, manufacture of; special industrial machinery, manufacture of; spinning machines, manufacture of.

Textile machinery, manufacture of; tobacco machinery, manufacture of; tractors, industrial and construction use, manufacture of.

Veneer machines, manufacture of.

Wood working machinery, manufacture of; etc., etc.

CLASS 21.00—NEW BUILDINGS, CONSTRUCTION.

21.10—Buildings for Manufacturing and Commercial Purposes, Construction of: The construction of buildings such as the following are included in this Allocation Classification:

All types of railroad buildings.

Building for electric generating plants.

Hangars, commercial and private, and other airport buildings.

Industrial plants. Mine buildings. Office buildings. Stores. Telephone control offices and repeater stations. Warehouses. Etc., etc.

21.20—All Types of Dwellings, Construction of: The construction of buildings such as the following should be placed in this classification by the prime contractor:

Apartment houses; Civilian barracks; Clubs; Homes; Hotels; etc., etc.

21.90—All Other Types of Buildings, Construction of: The following types of new buildings construction should be placed in this classification by the prime contractor:

Barns; Farm outbuildings; Fire Stations; Garages; Greenhouses; Health Centers; Hospitals; Jails and Prisons; Kennels; Motion picture houses; Police Stations; Public Buildings (except dwellings, Class 14.20), etc., etc.

CLASS 22.00 — OPERATING SUPPLIES AND BUILDING REPAIR AND MAINTENANCE.

This classification is intended primarily for manufacturers of articles and supplies usually designated as "operating supplies" such as,

Abrasive wheels, stones, paper, cloth, and related products, manufacture of.

Bail ties, manufacture of; Bits (drill), manufacture of; Blow torches, manufacture of; Bolts, nuts, washers, and rivets for retail sale, manufacture of; Brick carriers, manufacture of.

Cable splicers, manufacture of; Carpenters' tools, manufacture of; Chisels, cold, manufacture of; Cleaning and polishing preparation, blackings and dressings, manufacture of; Cordage and twine, manufacture of; Cup hooks, manufacture of.

Diamond drilling bits, manufacture of.

Electric lamps (light bulbs), manufacture of; Electric line tools, manufacture of.

Files and rasps for metal and woodworking, manufacture of; Floor scrapers, manufacture of.

Gear pullers, manufacture of; Glaziers' tools, manufacture of; Grease and oil cups, manufacture of; Grease pumps and guns, manufacture of.

Hand scrapers, manufacture of; Hose clamps, manufacture of.

Industrial leather belting and packing leather, manufacture of; Iron and steel machine and wood screws, manufacture of.

Logging, tools, manufacture of; Lubricating outfits and pumps, manufacture of.

Nails, spikes, etc., manufacture of.

Oil pumps, manufacture of.

Padlocks, manufacture of; Plumbers' furnaces for soldering irons, manufacture of; Plumbers tools, manufacture of; Putty knives, manufacture of.

Railroad track tools, manufacture of; Razor blade scrapers and holders (except razors), manufacture of; Rivet sets, manufacture of; Rules, manufacture of.

Saws, for wood, steel, etc., manufacture of; Shoeknives, manufacture of; Sledges and bars, manufacture of; Small construction tools, manufacture of; Steel engraving tools, manufacture of; Stone drills, manufacture of.

Tacks and staples, manufacture of; Tape measures, manufacture of; Tools for drop forging, manufacture of; Tire spreaders, manufacture of; Tool boxes, manufacture of; Tools, small, manufacture of.

Wall scraper, manufacture of; Wire clippers, manufacture of; Wire tighteners, manufacture of, etc., etc.

CLASS 23.00—ALL OTHER END USES.

This classification is intended for manufacturers who do not come directly within any other class or whose products, such as subassemblies, are not incorporated into some other product. This symbol will be used by companies engaged in such operations as:

Artists' materials, manufacture of; Ash trays, manufacture of.

Barometers, manufacture of; Badges and key tags, manufacture of.

Candles, manufacture of; Caskets, coffins, burial cases and other morticians' goods, manufacture of; Cigarette cases and lighters, manufacture of; Clocks, watches, and materials and parts, manufacture of; Covered wire for artificial flowers, manufacture of; Costume jewelry and costume novelties, manufacture of.

Drawing instruments, manufacture of.

Fancy boxes for jewelry, combs, toilet sets, etc.; Feathers, plumes, and artificial flowers, manufacture of.

Greeting cards, manufacture of.

Hydrometers, manufacture of; Jewelers' findings and materials, manufacture of; Jewelry cases and instrument cases, manufacture of; Jewelry (precious metals), manufacture of.

Key blanks, manufacture of.

Lapidary work (cutting and polishing of precious stones); License tags, manufacture of.

Monuments, tombstones and cut stones, manufacture of.

Novelties, manufacture of.

Paper bags, manufacture of; Pipe cases, smoking, manufacture of; Pipes, smoking, manufacture of; Pulp goods (pressed and molded novelties), manufacture of.

Signs, advertising displays and novelties, manufacture of; Statuary and art goods, manufacture of; Suitcases, brief cases and other luggage, manufacture of.

Tobacco pipes and cigarette holders, manufacture of; Trunks, manufacture of.

Watchcases, manufacture of; Wrapping paper, manufacture of; etc., etc.

BUSINESSES WHICH TRANSMIT CUSTOMER'S SYMBOL

Businesses whose operations are not included in any of the listed classifications, will transmit to their suppliers the Symbols received on their customer's orders. Companies whose operations fall into the category are of such types as,

Air compressors, manufacture of.

Barrels, kegs, and drums, manufacture of; Batteries, storage and primary, manufacture of; Bearings, and all types, manufacture of; Bolts, nuts, and washers, manufacture of.

Carbon products for electrical industry, manufacture of; Carburetors, manufacture of; Collapsible tubes, manufacture of; Conduit and fittings, manufacture of; Cooperage, barrels, kegs, tubes, and other containers made of staves, manufacture of.

Diesel engines, manufacture of; Dispensing pumps, manufacture of; Door and window sash, frames, molding and trim, manufacture of; Door closers, manufacture of; Door hinges, manufacture of; Door knockers, manufacture of; Door springs, manufacture of; Dynamos, electric, manufacture of.

Electric face plates, manufacture of; Electric motors; Electric outlets, manufacture of; Electric plugs, manufacture of; Electric sockets, manufacture of; Electric switches, manufacture of; Elevators and escalators, manufacture of; Enameled iron sanitary ware, manufacture of.

Faucets, manufacture of; Fiber cans and tubes, manufacture of; Flush tanks, manufacture of; Furnaces, manufacture of; Fuses, manufacture of.

Gaskets, manufacture of; Gears and crankshafts, manufacture of; Generators, manufacture of; Glass containers, manufacture of.

Internal combustion engines, manufacture of.

Linoleum and other hardsurface floor coverings, manufacture of; Lighting fixtures, manufacture of; Lock sets, manufacture of.

Mechanical furnace stokers, manufacture of; Motors electric, manufacture of.

Oil burners, domestic and industrial, manufacture of; Ornamental grill work, manufacture of.

Power boilers, manufacture of.

Railings, manufacture of; Rivets and washers, manufacture of.

Screw machine products and wood screws, manufacture of; Sinks, manufacture of; Steam and hot water heating apparatus, manufacture of; Steam engines and turbines, manufacture of; Steel barrels, kegs, and drums, manufacture of.

Tanks and shells for water heaters, manufacture of; Tin cans, manufacture of.

Venetian blinds, manufacture of.

Water heaters, manufacture of.

Activities of Steel Users and Makers

H. A. BRASSERT & Co., 60 East Forty-second street, New York, announces exclusive license arrangement, effective June 1, with S. P. Kinney, former vice president, covering manufacture, sale and installation of all equipment previously made and distributed by Brassert. List of items includes largely accessory equipment used in blast furnace operation.

♦

In honor of C. W. Heppenstall, chairman, Heppenstall Co., Pittsburgh, on his seventieth birthday a week ago, his family and business associates presented $20,000 to Western Pennsylvania Hospital of that city, an institution used almost exclusively by company employes. They also gave $6000 to the Bridgeport Hospital, Bridgeport, Conn., site of another company plant.

♦

The Navy has accepted as an outright gift the 46-foot cabin cruiser STEPHEN-JOAN, owned by Isaac Cohen, Metal Purchasing Co., 501-555 West Thirtieth street, New York, distributor of tin mill products.

♦

Facilities of the General Printing Ink Corp., New York, have been "pooled" into one division—General Industrial Finishes, including a wide range of products for metals. John F. Devine, vice president of the corporation and general manager of Fuchs & Lang Mfg. Co. Division, will also act as general manager of the division. Walter A. McKim, previously director of industrial research, Pittsburgh Plate Glass Co., will be assistant general manager.

♦

Albra Metal Foundry Co. has leased space at 8-05 Forty-third avenue, Long Island City, N. Y. The company manufactures aluminum and brass castings.

♦

Meehanite Metal Corp., Pittsburgh, has granted manufacturing rights for Meehanite castings to Otis Fensom Elevator Co. Ltd., Hamilton, Ont.

♦

Chain Belt Co., Milwaukee, has appointed Industrial Equipment Co., 1301 Fifty-ninth street, Oakland, Calif., distributor of Rex construction machinery in that area, and has appointed Sanford Tractor & Equipment Co., Reno, Nev., distributor in Nevada.

♦

Plant of the Thomas Devlin Mfg. Co., Burlington, N. J., consisting of 40 acres of land and buildings is reported ready for early use by Aluminum Co. of America for large-scale production of aluminum. Present machinery and equipment from the castings plant will be sold at auction, with nominal value of $1,000,000.

♦

Lester Engineering Co. and Phoenix Machine Co. have formed Lester-Phoenix Inc., 2711 Church avenue, Cleveland, to co-ordinate engineering and manufacturing facilities of Lester and Phoenix. Lester-Phoenix will act as national distributor of Lester injection molding machines and Lester-Phoenix die casting machines. Fred C. Ziesenheim is sales manager of the new unit.

♦

Water Treatment Co. of America, Pittsburgh, has broadened its sales and service facilities in western Pennsylvania, West Virginia, Ohio and Indiana through a distributorship arrangement with American Radiator & Standard Sanitary Corp. branches blanketing this territory.

♦

Trade-marked "Artus Spacers", new plastic spacers made by Industrial Products Suppliers, New York, are reported to have speeded up milling machine operations on war essentials and to make possible savings of brass and steel. Available in ten thicknesses, the spacers are made from "Plastacele", a DuPont cellulose acetate plastic.

♦

Baldwin Southwark division of Baldwin Locomotive Works, Philadelphia, shipped 88 standard universal testing machines in the first four months this year, compared with 56 during the corresponding period in 1941, an increase of 57 per cent. Extent of this accomplishment is seen when compared with shipments of 65 machines in the full year 1939, which was a record at that time.

Helmets of Steel and Plastic Protect U. S. Armed Forces

THOUSANDS of lightweight plastic helmets for American armed forces are produced daily by Westinghouse Electric & Mfg. Co. The plastic hats are the inner half of the Army's new two-part, double purpose helmets. An outer steel shell is slipped over the plastic for combat duty. At left, a hydraulic press operator places several layers of resin-impregnated fabric in the bottom of the mold; upper part of the mold will come down with a force of nearly 150 tons to form the hard hat. At right, a girl worker inspects the formed plastic parts.
NEA photos

Metals Scarcity Checks Canadian War Production

TORONTO, ONT.

AS A result of the war Canadian manufacturing industry has been expanded until output of finished products has been more than doubled in three years. An entirely new group of facilities has been established. Government has paid out about $350,000,000 for this purpose. Principal attention has been given to aircraft, ships, guns, tanks, explosives and munitions.

While Canada's steelmaking capacity has been raised more than 50 per cent since the close of 1939, requirements have increased more than 150 per cent. Notwithstanding large imports of steel from the United States, there is not sufficient steel and other materials to meet demands from so-called secondary war plants. They have been unable to maintain capacity production, some doing little more than 50 per cent.

The government is curtailing further secondary plant expansion. Additional capacity, if needed, will be provided by conversion. A number of additions under construction through government financing will not be completed until year end.

In May value of Canadian exports totaled $234,180,000. After allowing for higher prices this figure represents an export trade more than double that of immediate prewar days. In May, 1939, this trade totaled only $94,000,000. In May, 1941, it was $161,639,000. The dominion's shipments to Empire countries in May totaled $140,000,000, compared with $91,611,000 in May, 1941. Exports to Russia amounted to $1,784,000 in May, in contrast with none in May, 1941. Exports to the United States were $67,940,000 in May.

LONDON: Illustrated, is the first bus equipped with a gas-producer trailer to appear in this war-tortured city. The producer burns specially treated anthracite. A bus will run 100 miles on one charge, and save about 8750 gallons of gasoline per year. Producer is known as Government's Emergency Type. Similar gas producers burning charcoal have been in use in Italy for some years. NEA photo

Increased Taxes Impose Ceiling on Corporate Income

TABULATION on the adjoining page of statistical data pertaining to 63 representative American corporations indicates the extent to which heavy taxes imposed by the revenue acts of 1941 absorbed the additional profits accruing to industry from the sharply enhanced tempo of business resulting from the war.

This 1941 survey just completed by the American Federation of Investors, Chicago, provides interesting comparisons with the previous year, showing the tremendous surge in volume of business, the sudden increase of almost 80 per cent in taxes, and a gain of only 11 per cent in earnings, after taxes. Important facts developed are:

Gross assets of the 63 corporations total 36 billion 631 million dollars.

The 63 companies listed are owned by 4,515,000 shareholders. Of these 4,048,000 are owners of common stock, with an average of 100 shares each.

More than 3 million employes were on the payrolls of these 63 companies at the end of 1941, an increase of over half a million during the year.

Net sales or operating revenue of these corporations in 1941 aggregated 21 billion 65 million dollars, an increase of 30 per cent over 1940.

Total taxes for 1941 (all kinds, federal, state, and local) of these 63 companies amounted to 2 billion 370 million dollars. an increase of 80 per cent over 1940.

Total net income, after taxes, of these corporations in 1941 was 1 billion 703 million dollars, an increase of 11 per cent over 1940.

Dividends paid to the common stockholders of 56 of these companies in 1941 exceeded 1 billion 14 million dollars. The seven other companies paid no dividends.

Taxes of these companies for 1941 amounted to 58 per cent of net income, before taxes, and to 139 per cent of net income, after taxes.

Taxes for 1941 were equal to $5.84 per common share, compared with $3.19 per share in 1940 for these same 63 companies.

Aggregate earnings per common share (after taxes) were equal in 1941 to $4.20, compared with $3.68 per share in 1940 for the same companies.

Total dividends paid on the common stock of these companies in 1941 were equal to $2.50 per share.

TAXES OF 63 REPRESENTATIVE CORPORATIONS FOR 1941 INCREASED 79% OVER 1940; EARNINGS GAINED 11%

For Fiscal Year 1941 — Name of Company	Total Assets 1941	Total Number Stockholders (Com. & Pfd.) 1941	NET SALES* or Total Operating Income 1941	NET SALES* or Total Operating Income 1940	TOTAL TAXES^ (All Kinds) 1941	TOTAL TAXES^ (All Kinds) 1940	NET INCOME (After Taxes) 1941	NET INCOME (After Taxes) 1940	TAXES per Common Share 1941	EARNINGS per Common Share (After Taxes) 1941	DIVIDENDS per Common Share 1941
Acme Steel Company	$ 19,207,329	3,696	$ 34,753,062	$ 20,690,302	$ 5,843,697	$ 1,751,856	$ 3,167,101	$ 2,110,432	$17.81	$9.65	$5.00
Allis-Chalmers Mfg. Co.	130,626,536	18,834	121,997,708	87,096,966	12,245,968	5,160,826	5,743,567	5,051,444	6.89	3.23	1.50
American Can Company	226,840,986	34,810	263,890,628	197,515,224	25,473,472	11,916,359	18,845,831	17,440,906	10.30	6.45	4.00
American Rolling Mill Co.	189,111,466	42,543	169,178,239	112,363,529	16,053,156	4,734,425	11,228,475 ③	7,642,714	5.60	3.21	1.40
Amer. Smelt. & Ref. Co.	185,452,053	29,300	35,631,088	25,381,453	18,600,000	9,900,000	15,742,662	12,735,205	8.49	5.59	3.50
American Tel. & Tel. Co.	5,893,765,919	634,151	1,298,688,896	1,174,322,517	288,493,000 ①	187,598,702	191,770,694	210,497,453	14.91	10.26	9.00
American Tobacco Company	349,439,777	64,405	336,938,665	285,752,878	23,780,626 ⑩	12,325,463	23,883,860	28,311,783	5.25	5.27	4.50
Amer. Water Wks. & Elec. Co.	425,907,579	18,854	62,866,480	57,886,456	13,231,554	10,777,911	3,808,664	4,041,182	5.62	1.11	None
Armour and Company§	303,632,777 ②	79,868 ②	851,314,000	652,787,000	12,691,875	8,940,851	11,673,626	5,870,029	3.12	1.11	None
Baldwin Locomotive Works	101,241,563	14,500 ⊙	104,385,236	51,102,729	10,715,914	4,309,717	3,975,499	1,944,073	7.55	3.70	None
Baltimore & Ohio R.R. Co.	1,265,906,720	36,656	227,503,022	179,175,465	16,213,683 ⑪	11,781,366	21,091,883	5,549,497	6.32	7.31	None
Bendix Aviation Corp.	101,615,442	23,474	156,596,198	59,342,163	27,670,104	5,426,829	13,267,988	6,474,754	13.14	6.30	3.75
Bethlehem Steel Corp.	862,608,194	74,507	961,240,737	602,202,618	94,757,899	41,345,349	34,457,796	48,677,524	31.74	9.35	6.00
Borden Company	145,085,632	48,635	259,128,515	216,795,850	8,593,518	6,477,171	8,270,572 ④	7,582,617	1.95	1.88	1.40
Butler Brothers	44,029,498	17,212	103,779,575	80,887,181	2,328,338	1,177,190	2,479,900	1,065,073	2.07	1.85	.60
Chrysler Corporation	255,302,291	53,699	888,366,410	744,561,239	39,921,380 ⑫	29,225,454	40,114,420	37,802,279	9.17	9.22	6.00
Cons. Edison Co. of N. Y.	1,403,618,197	135,228	259,786,581	256,928,608	62,965,964	58,520,682	33,920,911	36,454,864	5.49	2.00	1.80
Detroit Edison Company	373,705,589	38,890	73,795,402	66,071,985	13,223,054	10,570,687	12,443,156	10,732,734	2.08	1.95	1.35
Douglas Aircraft Company	73,029,158	8,305	180,940,110	60,970,774	24,305,216	4,221,757	18,176,690	10,831,971	40.50	30.29	5.00
Du Pont de Nemours & Co.‡	1,069,399,343	82,376	480,109,939	346,162,000	115,000,000	56,700,000	90,401,470	86,945,173	10.40	7.49	7.00
Eastman Kodak Company	234,002,679	41,928	181,831,909	130,896,780	32,898,242 ⑬	13,316,688	21,588,790 ⑤	20,076,739	13.91	8.57	6.00
General Electric Company	557,078,412	218,450	679,333,760	411,938,259	144,978,000	54,943,000	57,197,499	56,241,083	5.02	1.98	1.75
General Foods Corp.	118,765,363	67,288	180,358,903	152,924,209	14,301,445 ⑭	7,111,924	14,153,400 ④	15,244,077	2.82	2.56	2.00
General Motors Corp.	1,747,250,191	410,759	2,436,800,977	1,794,936,642	362,959,000 ⑮	170,832,000	201,652,508	195,621,721	8.38	4.44	3.75
Gillette Safety Razor Co.	27,373,839	24,556	22,792,520	19,303,541	4,653,749	3,388,175	3,123,265	2,601,094	2.33	.81	.45
Illinois Central System	765,164,752	16,113	142,438,326	114,266,410	13,466,991	10,053,207	10,557,195	1,296,619	9.92	7.77	None
Inland Steel Company	177,527,539	8,526	202,755,157	142,173,338	26,788,272	9,209,459	14,824,053	14,450,385	16.40	9.08	5.00
Jewel Tea Co., Inc.	16,729,970	6,067	41,702,980	29,231,608	1,649,993 ⑯	1,440,170	1,518,871	1,576,995	2.97	2.60	2.40
Kress (S.H.) Company	82,406,410	7,080	101,396,512	88,299,960	7,395,005	5,184,189	5,123,211	5,339,161	3.14	1.97	1.60
Lehigh Valley Coal Corp.	32,065,116	13,570	17,549,860	15,634,671	1,112,824	1,323,145	1,761,350	756,955	.92	.90	None
Loose-Wiles Biscuit Co.	32,608,290	5,090	45,228,439	41,445,694	1,730,601	1,348,019	1,110,675	1,190,805	3.39	1.97	1.25
Louis. & Nash. R. R. Co.	564,406,015	7,600	119,569,572	98,001,627	18,212,127	10,304,935	19,475,250	9,537,146	15.58	16.67	7.00
Montgomery Ward & Co.*	290,299,817	61,432	632,708,657	515,910,915	34,563,900	18,035,700	22,351,716 ⑥	23,028,017	6.63	4.01	2.00
National Biscuit Company	130,950,015	59,410	119,599,610	103,670,459	11,777,271	8,022,131	10,732,137	11,148,826	1.87	1.43	1.60
National Cash Register Co.	57,574,835	18,433	52,743,902	39,922,227	3,014,218	1,959,957	3,257,446	2,051,727	1.85	2.00	1.25
Nat'l. Dairy Products Corp.	231,189,862	68,820	431,049,646	347,410,481	15,696,000	9,984,000	12,334,734 ⑦	11,094,406	2.50	1.97	.80
National Gypsum Company	25,651,477	8,000 ⊙	24,258,348	16,509,916	2,411,795	828,362	1,533,816	1,565,196	1.82	.94	.40
N. Y. Central R.R. Co.	1,881,883,298	61,501	447,789,655	370,545,875	44,023,162	34,062,837	26,245,562	11,265,084	6.73	4.07	None
North American Company	956,125,776	70,962	144,642,640	130,274,856	29,497,471	23,640,733	20,272,991	20,316,500	3.44	1.92	†
Pacific Gas & Electric Co.	841,961,815	103,898	115,353,944	109,980,302	25,970,000	22,531,000	22,463,637	24,672,908	4.14	2.30	2.00
Pennsylvania Railroad Co.	2,452,661,536	205,012	614,041,163	477,593,408	66,311,751	44,069,641	48,414,588	36,896,665	5.04	3.68	2.00
Public Service Corp. of N. J.	720,424,886	86,350	151,158,934	140,327,251	35,755,275	28,041,529	21,062,383	23,188,425	6.49	2.04	1.95
Pullman Incorporated	233,767,468	34,100	67,040,587	60,143,649	10,973,525	7,174,865	10,918,820	7,484,126	3.32	3.31	2.50
Pure Oil Company	197,515,151	42,800	112,863,385	95,675,216	7,745,180	3,788,191	15,285,255	8,718,057	1.95	2.86	.50
Quaker Oats Company	60,312,109	8,370	72,982,669	58,987,394	2,453,558	2,298,981	4,080,444	4,141,511	3.50	5.81	4.00
Radio Corp. of America	134,479,284	238,601	158,695,722	121,439,507	19,790,850	7,580,403	10,192,716	9,113,156	1.42	.50	.20
Sears, Roebuck & Co.*	386,798,683	57,200	915,057,628	704,301,014	68,760,140	32,650,033	36,711,504	36,086,668	11.90	6.35	4.25
Servel, Inc.**	21,678,540	13,378	29,162,395	22,302,533	1,938,979 ⑰	996,103	2,737,603	2,969,976	1.09	1.53	1.00
Socony-Vacuum Oil Co.	927,900,296	114,382	535,140,583	444,003,815	37,295,397 ⑱	24,109,970	43,175,902	36,409,055	1.19	1.38	.50
So. Calif. Edison Co. Ltd.	410,052,483	93,804	48,706,199	46,467,075	11,341,292	9,263,372	12,752,788	12,368,722	3.56	2.42	1.75
Spiegel, Inc.	48,275,941	8,000 ⊙	56,738,660	53,477,324	1,241,638	982,641	1,605,677	1,791,446	1.25	.90	.60
Standard Oil Co. (Ind.)	803,481,923	97,327	427,181,564	358,849,354	37,441,089 ⑲	24,673,892	48,385,967	33,597,342	2.45	3.17	1.50
Standard Oil Co. (N. J.)	2,202,351,739	143,483	978,365,491	821,684,379	107,902,532 ⑳	74,802,329	140,572,419	123,886,346	3.95	5.15	2.50
Stewart-Warner Corp.	29,117,448	17,067	53,933,908	29,272,500	5,602,233 ㉑	1,441,350	1,656,680 ⑧	1,470,804	4.40	1.30	.50
Swift & Company ①	313,980,381	59,000	1,018,989,223	771,573,482	13,610,267	10,983,616	17,808,725	11,183,484	2.30	3.01	1.50
Texas Company	695,831,742	90,000	395,993,064	342,810,695	31,696,541 ㉒	20,423,907	51,874,681 ⑨	31,547,662	2.91	4.77	2.50
Union Pacific R.R. Co.	1,250,666,269	51,893	218,091,994	168,164,258	19,014,551	15,830,851	28,857,420	19,445,880	8.55	11.19	6.00
United Gas Improvement Co.	753,471,938	120,716 ㉔	102,109,227	96,419,973	21,411,278	20,021,948	21,776,714	28,006,353	.89	.77	.75
United States Steel Corp.	2,045,021,088	217,350	1,620,515,110	1,076,471,158	191,502,574	85,420,545	116,171,075	102,211,282	22.00	10.45	4.00
Walgreen Company‡	32,079,298	11,800	82,514,795	74,293,160	2,973,311 ㉓	2,190,172	3,334,835	3,149,541	2.30	2.25	1.60
Western Union Tel. Co.	392,359,597	27,709	114,083,764	99,704,353	7,573,000 ㉕	5,898,000	7,366,240	3,621,581	7.25	7.04	2.00
Westinghouse Air Brake Co.	65,851,850	23,561	54,938,631	32,513,454	11,385,227	4,967,079	6,058,635	5,591,606	3.59	1.91	1.75
Youngstown Sheet & Tube Co.	262,163,072	13,798	226,215,430	143,054,028	26,593,000	5,497,000	16,124,400	10,815,468	15.87	9.13	3.00
TOTAL for 63 Companies	$ 36,630,784,242	4,515,127 ⊕	$ 21,065,315,934	$ 16,190,803,687	$ 2,369,521,872	$ 1,323,388,644	$ 1,702,668,342	$ 1,530,532,307			
AVERAGE PER COMPANY . . .									$5.84	$4.20	$2.50

Note: The tabulation above includes consolidated figures for companies having subsidiaries. For fiscal year ending Dec. 31, 1941, unless otherwise indicated.

*Less returns and allowances, but before cost of sales. ^Does not include portion of Social Security taxes paid by company and deducted from wages of employes, nor excise and sales taxes paid by companies and collected from customers. *Fiscal year ending Jan. 31, 1942. **Fiscal year ending Oct. 31, 1941. ‡Fiscal year ending Sept. 30, 1941. †Dividends paid by distribution of certain securities of subsidiaries. §Domestic only. ‡For parent company and wholly-owner subsidiaries. ⊙Approximate. ⊕Includes 4,048,041 owners of common stock. ①Includes taxes of Western Electric Company and Bell Telephone Laboratories. ②As of Nov. 1, 1941. ③After deducting $1,000,000 set aside as contingency fund. ④After deducting $1,500,000 set aside as contingency reserve. ⑤After deducting $2,500,000 set aside as contingency reserve. ⑥After deducting $5,000,000 set aside for possible inventory decline. ⑦After deducting $3,600,000 set aside for possible inventory decline. ⑧After deducting $500,000 for contingencies. ⑨After deducting $7,000,000 set aside for possible losses on foreign investments. ⑩Does not include $172,711,124 sales and stamp taxes. ⑪Does not include $6,194,708 taxes paid as company's share of Federal Unemployment and Railroad Retirement taxes. ⑫Does not include $27,061,540 excise and sales taxes. ⑬Does not include $1,541,155 excise and sales taxes. ⑭Does not include $496,235 excise and sales taxes. ⑮Does not include $61,895,000 excise and sales taxes. ⑯Does not include $780,387 excise and sales taxes. ⑰Does not include $1,503,248 Federal excise taxes. ⑱Does not include $118,938,652 excise and sales taxes. ⑲Does not include $107,762,637 excise and sales taxes. ⑳Domestic only. Does not include $75,954,018 excise and sales taxes. ㉑Does not include $765,767 excise and sales taxes. ㉒Does not include $120,564,118 excise and sales taxes. ㉓Does not include $1,218,176 excise and sales taxes. ㉔For U.G.I. Company only. ㉕In addition, patrons paid $6,260,000 in Federal message taxes.

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Two-Year Expansion Equals 20% of Total Manufacturing Facilities

CAPITAL outlay for iron and steelworks and their products increased more than 300 per cent from 1939 to 1941, and still is increasing, Department of Commerce, Washington, reports.

However, it finds "we are now entering a new phase in which the urgent need for raw materials, machines and labor skills for producing finished military supplies will take greater precedence over the uses of these resources for further additions to productive facilities."

Majority of the specialized materiel which will be used by America's armed forces will be fabricated either in new plants constructed within the past two years or in plants converted from civilian goods manufacture to war work.

During 1941 and 1942 a total of probably $10,000,000,000 will have been spent for manufacturing facilities of all kinds, privately and publicly financed. The increase is about 20 per cent of the total replacement cost of all manufacturing facilities at the beginning of 1941. This is much larger than any previous increase in any similar period and is further characterized by being predominantly for military use and by being financed by the government.

For 1941, about two-thirds of the total manufacturing outlay was in industries engaged primarily in the production of munitions, or materials necessary for their manufacture.

Since World War I, steelmaking facilities have been expanded by nearly one-half, the survey recounts. At the beginning of 1919, rated capacity for the production of steel ingots and castings was 61,000,000 tons. At the beginning of the present year, the corresponding figure was 88,600,000 tons.

1940 A Turning Point

Largest increases in ironmaking capacity before 1941 was in 1917 and 1918. In 1917, 2,300,000 tons were added to capacity for producing pig iron and related ferroalloys. Another million and a half tons were added the following year. Until 1940, only slight increases were made, blast furnace capacity in 1918 being 55,200,000 tons and at the end of 1940, 57,600,000 tons. Important expenditures were made, however, in some years for remodeling of old stacks or replacing them with larger and more modern units.

In 1941, blast furnace construction resulted in a net gain of 2,800,000 tons, more than any other year on record. An even larger increase is in prospect for 1942.

Expenditures for iron and steelmaking facilities in 1917 were about $340,000,000, a figure which was not equalled until last year when $390,000,000 was spent.

The increasing use of electric furnaces for the manufacture of special alloy steel has emphasized the building of these units since 1917. By far the largest increases in electric furnace construction have occurred in the past two years.

Technological changes in steel products and in their methods of manufacture were important influences in determining the outlays from 1935 to 1937. The large outlays in 1941, however, clearly are due to war demand and not to any unusual change in technology, although demand for electric furnace steel still is increasing.

Accompanying tabulation compares expenditures for productive facilities for general classes of commodities for 1939 and 1941. Final data for 1941 is not yet available in some cases, and the figures are projections from 1939 and 1940 estimates, based upon building construction activities, floor space, and net increases in capacity, together with data on the completion of war facilities reported by the War Production Board.

(Millions of dollars)

Industry	1939	1941
Food, kindred products	240	330
Textiles, apparel, related products	130	170
Lumber and products	60	75
Pulp, paper, allied products	86	85
Printing, publishing, allied industries	58	70
Chemicals and allied products (includes explosives but not ammunition)	160	660
Products of petroleum, coal	140	190
Rubber products	33	60
Leather and products	15	20
Stone, clay, glass products	68	110
Iron, steel, products*	190	580
Nonferrous metals	45	220
Ordnance, accessories:		
Ammunition, shells, bombs	4	670
Guns, small arms	6	200
Military combat vehicles	...	60
Machinery	140	360
Automobiles and equipment	135	120
Transportation equipment except automobiles:		
Airplanes, airplane engines, parts	30	550
Shipbuilding, ship repair	35	400
Other transportation equipment	5	10
Miscellaneous	40	70
Total capital outlays all manufacturing purposes (public and private)	1,620	5,010

*Includes blast furnace, steel works, rolling mill, foundry, hardware, plumbing and other iron and steel products, but excludes guns and small arms. Blast furnaces, steel works, and rolling mills (including cold rolled) establishments accounted for approximately $110,000,000 in 1939, and $390,000,000 in 1941.

Steel Prices Up 1 Per Cent While General Market Level Advances 30

GENERAL level of prices in the United States increased 30 times as much as steel prices, from the prewar level of July, 1939, to mid-May, 1942, according to the American Iron and Steel Institute.

Average steel prices advanced only 1 per cent between July, 1939, and April, 1941. Since the latter date steel prices have been frozen by government order.

The Department of Labor's index of wholesale commodity prices advanced 30.6 per cent between July, 1939, and mid-May, 1942. Prices of many kinds of goods sold by wholesalers and manufacturers were frozen by the Office of Price Administration on May 11 at the highest levels which they had reached during March, 1942. As a result of that order, the wholesale price index on May 16, 1942, was 0.2 of a point lower than the level of two weeks earlier.

At the level of mid-May, 1942, the Department of Labor's index of farm prices was 66.6 per cent higher than it was in July, 1939. The cash which an American farmer would obtain from the sale on May 16, 1942, of a representative group of farm products would pay for approximately two-thirds more steel than it would have just before the outbreak of the war in Europe.

Similarly, the sale of a given quantity of representative textiles at the wholesale levels of May 16, 1942, would provide a sum which could purchase over two-fifths more steel than was the case in July, 1939. Textile prices rose 43.9 per cent in the labor department's index over the period of the past three years.

Steel prices have almost entirely failed to reflect higher cost of materials and of labor since the outbreak of the war. Prices of many commodities consumed by the industry have risen sharply. In addition, average hourly earnings of steel workers have risen to a new record of over $1 an hour, nearly 17 per cent more than the average in July, 1939.

Railroads Moving More Freight with Fewer Cars

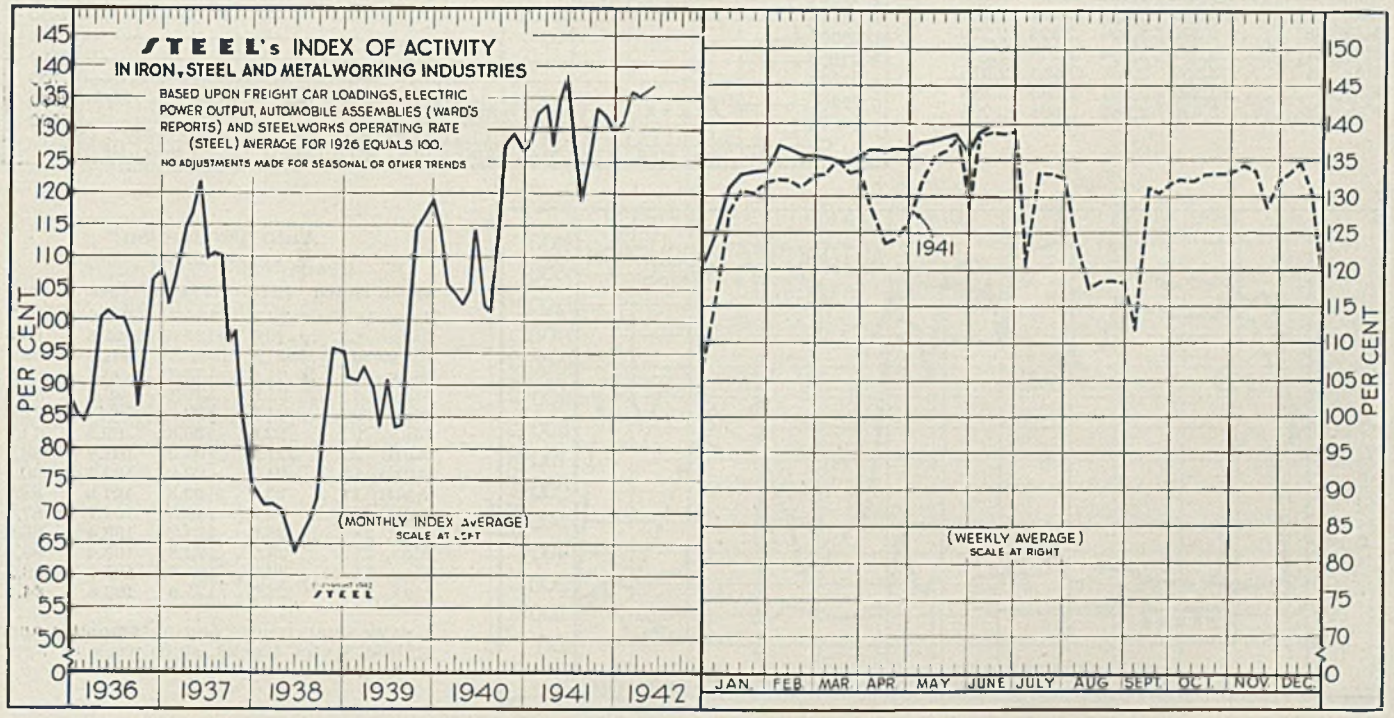
INDICATING steady progress in production of war supplies, the railroads handled 50 billion ton-miles of freight in May, in contrast with slightly less than 40 billion in May, 1941. Ton-miles of freight in first five months this year are estimated to have averaged 46.2 billion a month. Based on this, total movement for the year 1942 probably will top 550 billion ton-miles, far exceeding all prior records. Reflecting better loading of cars and longer hauls, railroads used 2 per cent less cars in May than in May, 1941—despite the greater tonnage moved last month.

Excluding a slight decline incidental to Memorial day week, STEEL's index of activity recorded the sixth consecutive advance in the period ended June 13. The index now stands at 139.5, against 138.4 in the preceding week and 138.7 in the corresponding week a year ago.

Steel production for the week of June 13 was steady at near record level. Movement of steel scrap has improved substantially and should sustain steel output at the current rate through the summer months.

Electric power consumption approached near peak volume in the latest period, totaling 3,463,528,000 kilowatts. This represents an increase of 11.7 per cent over the comparable 1941 period total.

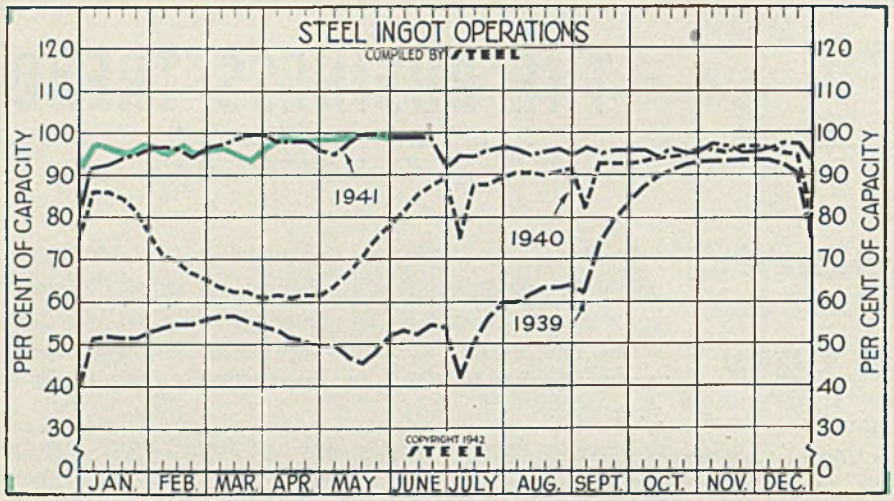
Latest figures released by F. W. Dodge Corp. show May building construction, for the 37 eastern states, at the best monthly total since August of last year.



STEEL's index of activity advanced 1.1 points to 139.5 in the week ending June 13:

Week Ended	1942	1941
April 4	136.7	128.9
April 11	136.1	123.8
April 18	136.6	124.2
April 25	136.3	126.5
May 2	137.2	132.6
May 9	137.5	135.9
May 16	137.9	136.1
May 23	138.1	138.6
May 30	136.0	128.4
June 6	138.4	138.4
June 13	139.5	138.7

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	136.3	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	135.2	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	136.6	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	137.4	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3



Steel Ingot Operations

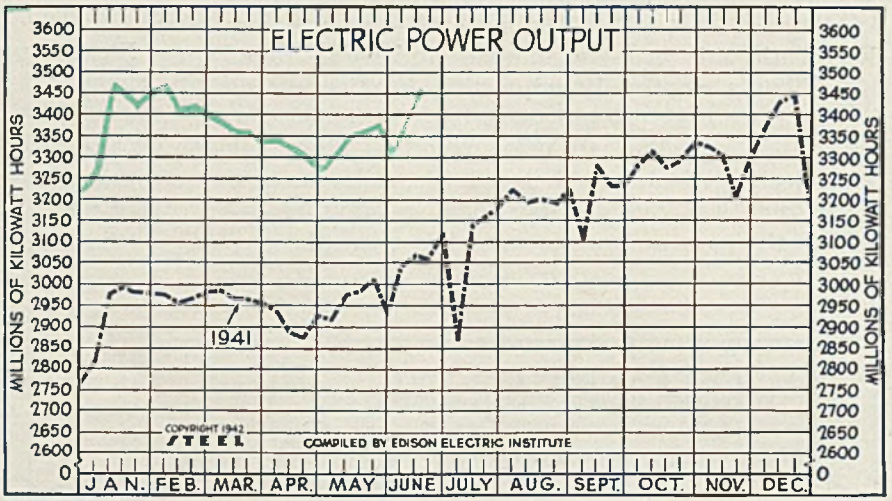
(Per Cent)

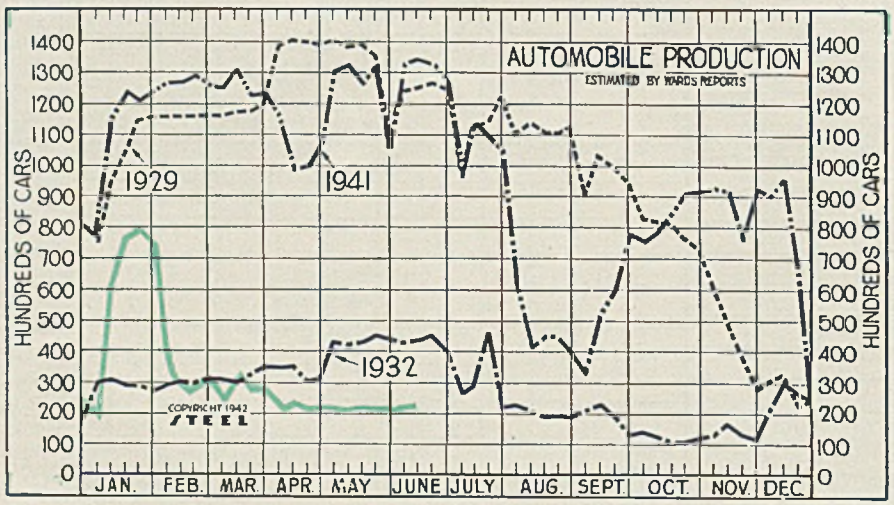
Week ended	1942	1941	1940	1939
June 13....	99.0	99.0	86.0	52.5
June 6....	99.0	99.0	81.5	53.5
May 30....	99.0	99.0	78.5	52.0
May 23....	99.0	100.0	75.0	48.0
May 16....	99.5	99.5	70.0	45.5
May 9....	99.0	97.5	66.5	47.0
May 2....	99.0	95.0	63.5	49.0
April 25...	98.5	96.0	61.5	49.0
April 18...	98.5	98.0	61.5	50.5
April 11...	98.5	98.0	61.0	51.5
April 4....	98.0	98.0	61.5	53.5
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5
Mar. 7.....	96.5	97.5	63.5	56.5
Feb. 28....	96.0	96.5	65.5	56.0

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
June 13.....	3,464	3,066	2,665	2,341
June 6.....	3,372	3,042	2,599	2,329
May 30.....	3,323	2,924	2,478	2,186
May 23.....	3,380	3,012	2,589	2,778
May 16.....	3,357	2,983	2,550	2,235
May 9.....	3,351	2,975	2,516	2,239
May 2.....	3,305	2,915	2,504	2,225
April 25.....	3,299	2,926	2,499	2,244
April 18.....	3,308	2,874	2,529	2,265
April 11.....	3,321	2,882	2,530	2,235
April 4	3,349	2,938	2,494	2,244
Mar. 28.....	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285
Feb. 28.....	3,410	2,982	2,568	2,294





Auto Production

(1000 Units)

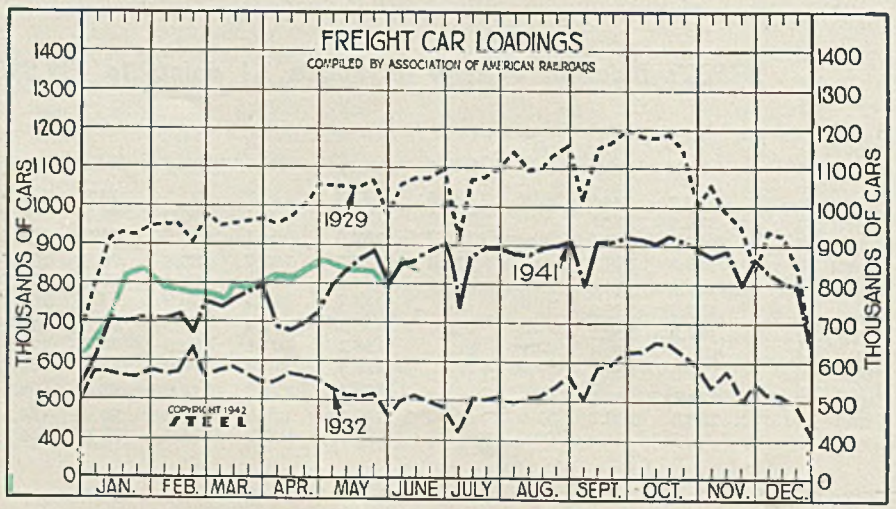
Week ended	1942	1941	1940	1939
June 13....	22.3	134.7	93.6	78.3
June 6....	22.0	133.6	95.6	65.3
May 30....	21.5	106.4	61.3	32.4
May 23....	21.6	133.6	96.8	67.7
May 16....	21.8	127.3	99.0	80.1
May 9....	21.5	132.6	98.5	72.4
May 2....	22.0	130.6	99.3	71.4
April 25...	21.9	108.2	101.4	86.6
April 18...	21.7	99.9	103.7	90.3
April 11...	23.0	99.3	101.9	88.1
April 4....	22.3	116.3	101.7	87.0
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4
Mar. 14....	30.6	131.6	105.7	86.7
Mar. 7.....	24.5	125.9	103.6	84.1

†Canadian trucks and automobiles and United States trucks, since week of Feb. 21 last.

Freight Car Loadings

(1000 Cars)

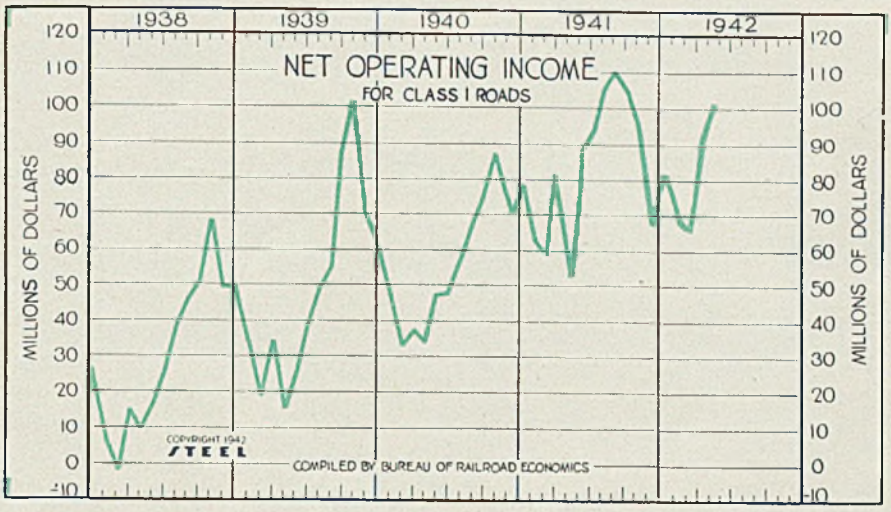
Week ended	1942	1941	1940	1939
June 13.....	833	863	712	638
June 6.....	855	853	703	635
May 30.....	796	802	639	568
May 23.....	838	866	687	628
May 16.....	839	861	679	616
May 9.....	839	837	681	555
May 2.....	859	794	666	573
April 25.....	855	722	645	586
April 18.....	847	709	628	559
April 11.....	814	680	619	548
April 4.....	829	683	603	535
Mar. 28.....	805	792	628	604
Mar. 21.....	797	769	620	605
Mar. 14.....	799	759	619	595
Mar. 7.....	771	742	621	592

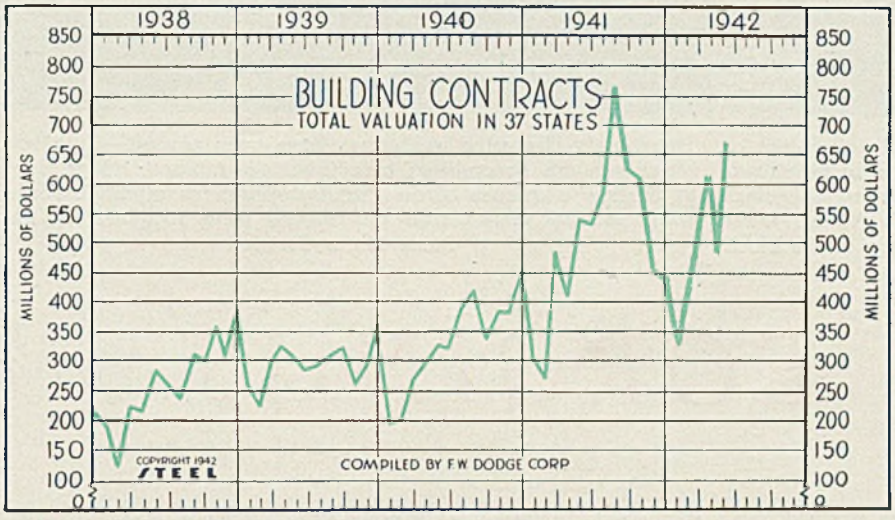


Class I Railroads
Net Operating Income
(Unit: $1,000,000)

	1942	1941	1940	1939
Jan.	$68.97	$62.02	$46.01	$32.95
Feb.	66.49	58.48	32.86	18.64
Mar.	92.36	80.63	37.03	34.38
April ...	101.99	52.57	34.12	15.32
May	.....	88.63	47.41	25.17
June	.....	93.26	48.09	39.17
July	.....	106.31	57.73	49.00
Aug.	.....	111.32	66.53	54.57
Sept. ...	.....	104.07	74.72	86.53
Oct.	.....	93.66	87.64	101.72
Nov.	.....	68.76	72.00	70.41
Dec.	.....	80.55	78.79	60.95
Average.	.....	$83.29	$56.84	$49.02

*Indicates deficit.



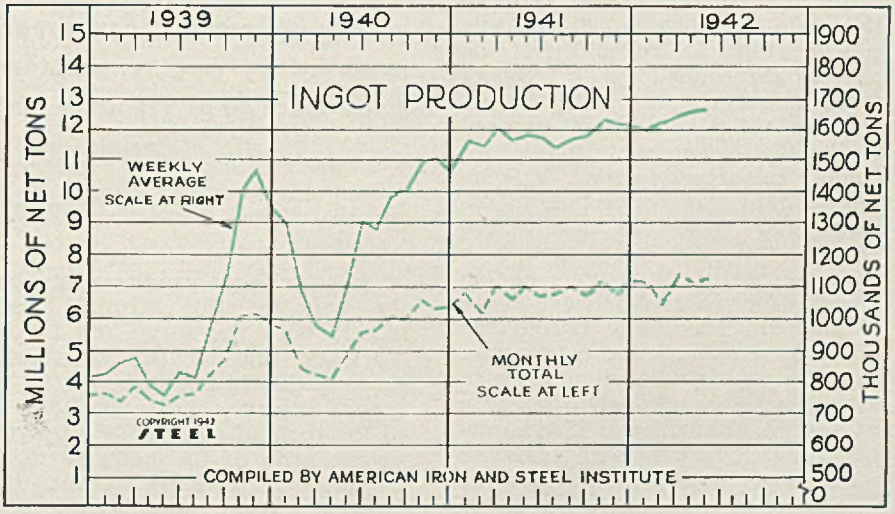


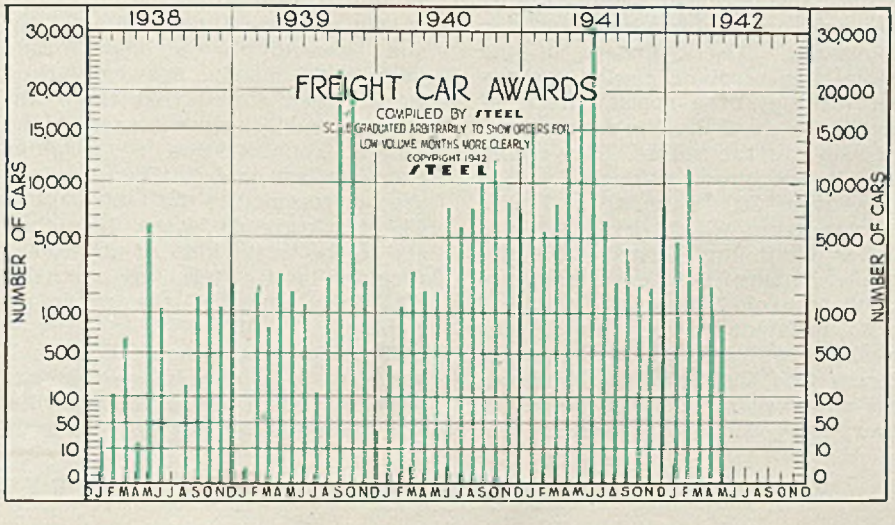
Construction Total Valuation
In 37 States
(Unit: $1,000,000)

	1942	1941	1940	1939	1938
Jan...	$316.8	$305.2	$196.2	$251.7	$192.2
Feb...	433.6	270.4	200.6	220.2	118.9
Mar...	610.8	479.9	272.2	300.7	226.6
April.	498.7	406.7	300.5	330.0	222.0
May .	673.5	548.7	328.9	308.5	283.2
June .	.....	539.1	324.7	288.3	251.0
July..	.....	577.4	398.7	299.9	239.8
Aug..	.....	760.3	414.9	312.3	313.1
Sept..	.....	623.3	347.7	323.2	300.9
Oct...	.....	606.3	383.1	261.8	357.7
Nov..	.....	458.6	380.3	299.8	301.7
Dec...	.....	431.6	456.2	354.1	389.4
Ave...	.....	$500.6	$333.7	$295.9	$266.4

Steel Ingot Production
(Unit 100 Net Tons)

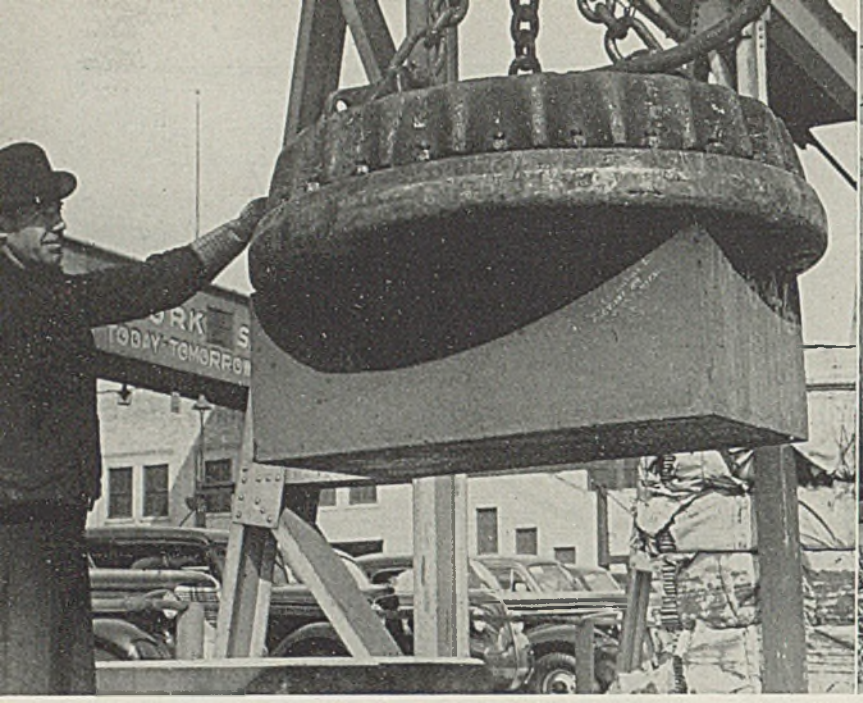
	Monthly Total		Weekly Average	
	1942	1941	1942	1941
Jan....	7,124.9	6,922.4	1,608.3	1,562.6
Feb....	6,521.1	6,230.4	1,630.3	1,557.6
March.	7,392.9	7,124.0	1,668.8	1,608.1
April..	7,122.3	6,754.2	1,660.2	1,574.4
May...	7,386.9	7,044.6	1,667.5	1,590.2
June ..	.....	6,792.8	.....	1,583.4
July...	.....	6,812.2	.....	1,541.2
Aug....	.....	6,997.5	.....	1,579.6
Sept...	.....	6,811.8	.....	1,591.5
Oct....	.....	7,236.1	.....	1,633.4
Nov....	.....	6,960.9	.....	1,622.6
Dec....	.....	7,150.3	.....	1,617.7
Total..	.....	82,836.9	.....	1,588.7





Freight Car Awards

	1942	1941	1940	1939
Jan.....	4,253	15,169	360	3
Feb.	11,725	5,508	1,147	2,259
March....	4,080	8,074	3,104	800
April	2,125	14,645	2,077	3,095
May.....	822	18,630	2,010	2,051
5 mos....	23,005	62,016	8,698	8,208
June	.....	32,749	7,475	1,324
July.....	.....	6,459	5,846	110
Aug.	.....	2,668	7,525	2,814
Sept.	.....	4,470	9,735	23,000
Oct.....	.....	2,499	12,195	19,634
Nov.	.....	2,222	8,284	2,650
Dec.....	.....	8,406	7,181	35
Total...	.....	121,499	66,889	57,775



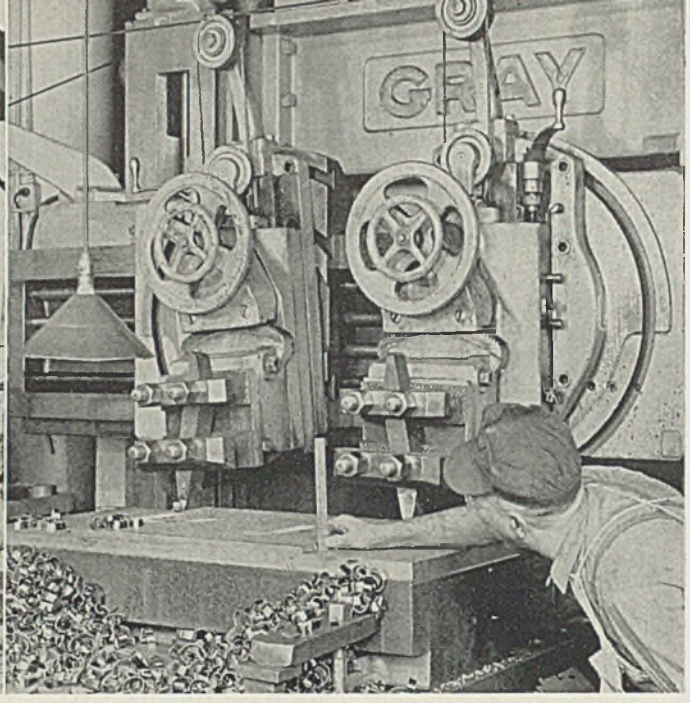


Fig. 1. (Above)—Affords some idea of the size of the block of steel required for making a forging die. The block shown is 16 x 24 x 42 inches and weighs 5465 pounds. The electromagnet lifting it is rated 10 tons. Fig. 2. (Right)—First operation in preparing dies is to plane the top of the block after the die grips and edges have been planed. Note two cutters are being used here in this big planer. Figs. 1 to 5 show sequence of die making operations at Buick Forge Plant. All photos with this article were supplied by the Buick Motor Division

FORGINGS and

Learn how modern armament and ordnance work demands a wide variety of forgings; how properties of steel and other materials are improved by forging; what means can be employed to eliminate much machining; the beginning of drop forging; requirements for die materials and major steps in die making

Section XI in a Series on Forgings, Forging Methods and Forging Equipment

JUST AS birds, which depend for their very existence on speed, have adapted their structures to secure a maximum of strength and lightness, so also man in those mechanized extensions of his faculties which lend wings to his feet has sought the same objectives.

But the strength-weight ratio of the metal or alloy is not the sole consideration, for reliability of the past as determined by its freedom from flaws, coupled with its resistance to fatigue when exposed to fluctuating stress, usually are equally important factors. It is interesting in this connection to observe how wood has disappeared from the modern plane and how certain cast parts (some engine blocks, for example) have been eliminated. Then, too, the lighter alloys of aluminum and magnesium cannot compete with alloy steels in other cases, despite the handicap of weight. Regardless of the material selected, the art and practice of forging have once more come into their own in the hectic armament race after a period of temporary eclipse during the less strenuous years of peace.

Both for combat units and perhaps to a less acute extent in machines for their manufacture, forgings supply a large and ever growing need. Whether it be the spear point of naval or military engagement, the armor piercing or high-explosive shell, the torpedo or the bomb; the guns, ships, planes or tanks which fire and transport them; or the armor offering protection against enemy fire; forgings in vast variety of shape, composition and treatment are found on the battle front. Indeed it may be affirmed without exaggeration that the issue of this struggle rests largely with the forge and in the efficiency and degree of intelligence with which it is applied.

The airplane, most sensitive of all the tools of war to the strength-weight ratio of its many parts, is a mass of forgings. Even the simplest types require over 500, while the bomber and Flying Fortress employ forgings into the thousands. The cylinders of the radial-type airplane engine are upset forgings of a special grade of steel; the crankshaft is forged, and so also are the valves. The crankcase in one type is a forging weighing over 300 pounds, and the cluster gears which drive the propeller shaft are forged with the grain looping into each separate tooth to avoid failure by fatigue.

So insistent is the demand for mobility of both air and ground forces that the tank has borrowed the power plant of the plane. With every new demand for better protection against enemy shell, the weight of the tank goes up and the space within tends to contract; and for every extra cubic foot occupied by the engine, the less the room for the crew. Nor is a tank as easy to propel as a limousine along a smooth tar macadam road. Thirty tons of tank moving at 30 miles an hour across a field absorb some 450 horsepower, so an engine of the airplane type with its light and exceedingly strong forged parts is the obvious answer. Indeed it has been stated that these air-cooled radial engines represent the largest concentration of forgings thus far assembled. But forgings are not confined to the tank engine. The track treads, exposed as they are to the worst kind of abuse, are forgings, and so also are virtually all other parts of the track assembly.

If we turn for a moment to small arms, we find once more that not only the barrel of the Garand rifle, but many other parts have been

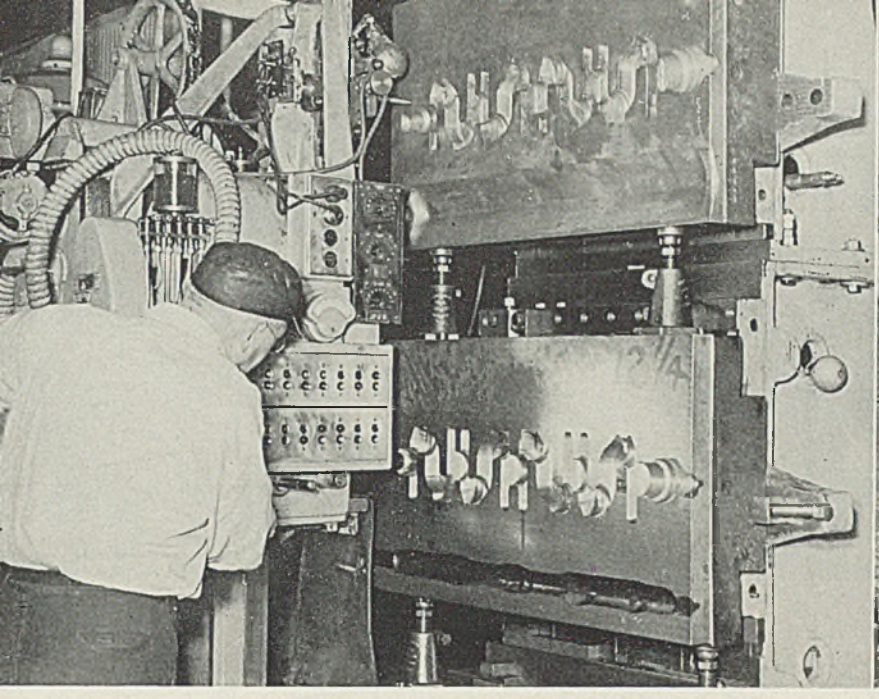


Fig. 3—Mechanical engraver automatically duplicates master die cavity of master die at top in the new die block below. Cutter below automatically follows feeler working in die cavity above. Die being made is for forging Buick crankshafts.

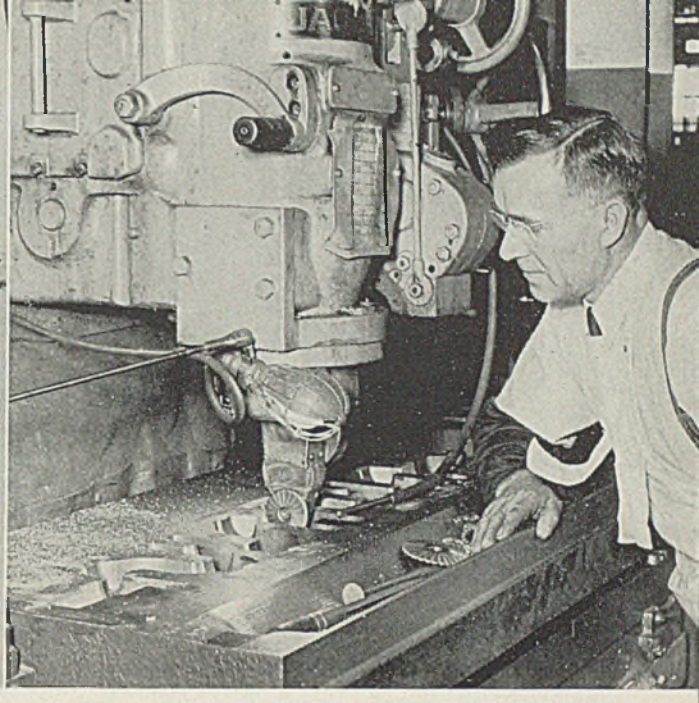


Fig. 4—This special machine is employed to perform the cherring operation in which the corners on the die cavities are rounded using the circular cutters shown in the view above

FORGING PRACTICE

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

hot worked prior to subsequent heat treatment and machining operations. So also in machine guns, anti-aircraft guns and field guns forgings supply the answer to the problem of minimum weight with maximum effectiveness. The successful centrifugal casting of gun tubes merely serves to emphasize the part that pressure—whether applied by the forge hammer or press, or induced by large centrifugal forces—plays in securing the end result.

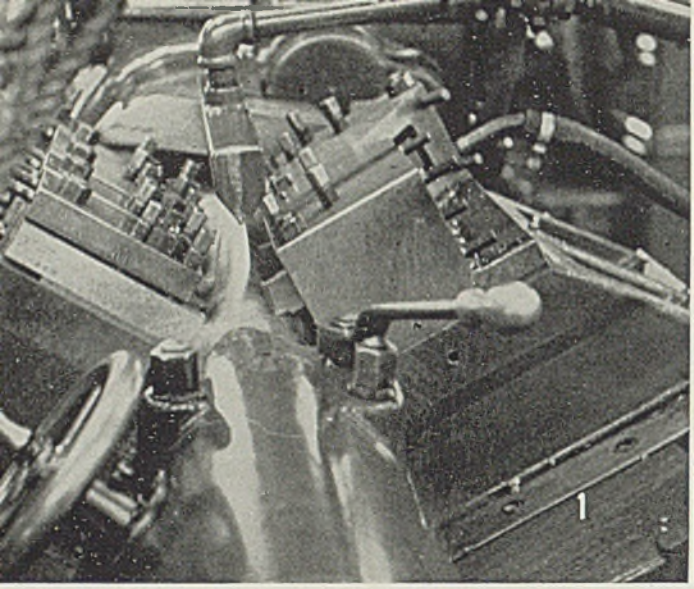
A more complete picture of the reasons for the improved characteristics of steel and other alloys when forged is still being sought. We know something of the influence forging has upon grain size and the relation of grain size to physical properties. We know, too, the advantage of securing proper grain orientation if failure is to be avoided. Greater uniformity of physical properties, we find, frequently results from the application of hot work prior to heat treatment. Greater durability from the standpoint of wear and corrosive actions is generally conceded.

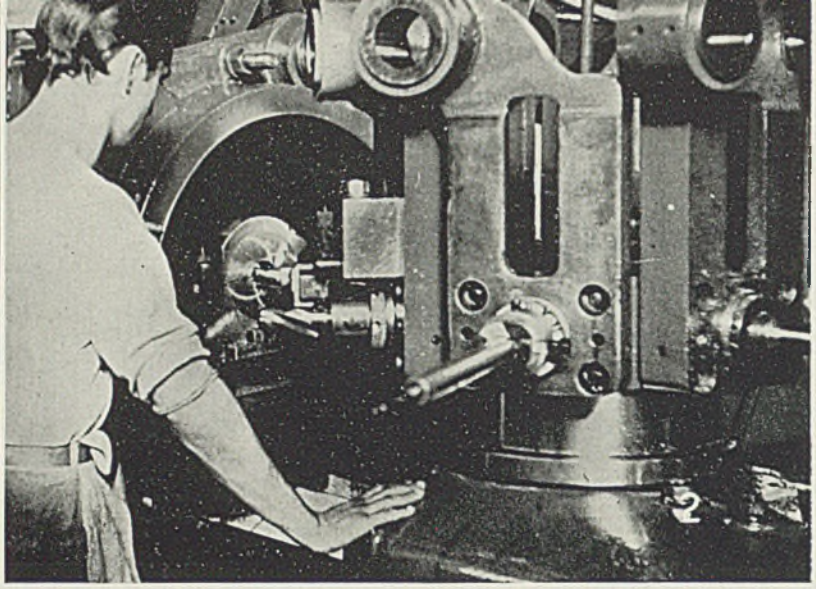
However, there are other and quite distinct aspects by which forging techniques are making valuable contributions to our battle for production. We refer especially to the elimination of excess finishing work and excess weight through a reduction in amount of flash and draft losses by employing hot punching and shearing and the coining of surfaces to eliminate machining entirely. Better furnace practice has, further, reduced or eliminated much of the decarburization formerly tolerated and which necessitated the removal of considerable quantities of stock in order that surfaces exposed to wear might be hardened successfully. However, it is undoubtedly true that much more might still be accomplished, not only in preventing decarburization but also in reducing scaling so pickling and cleaning may be avoided.

Throughout the many centuries man practiced the art of forging, including the long years from the time mechanical hammers appeared in the seventeenth century down to the time of the appearance of the steam hammer a little over 100 years ago, little or no thought appears to have been given to the possibility of producing the required shape by forming impressions in the face of the hammer and of the anvil, although the primitive beginnings of modern dies had apparently made their appearance. But with the development of mass production by the application of mass-production methods to the manufacture of firearms in this country, the need for rapid manufacture of duplicate forgings

(*Please turn to Page* 71)

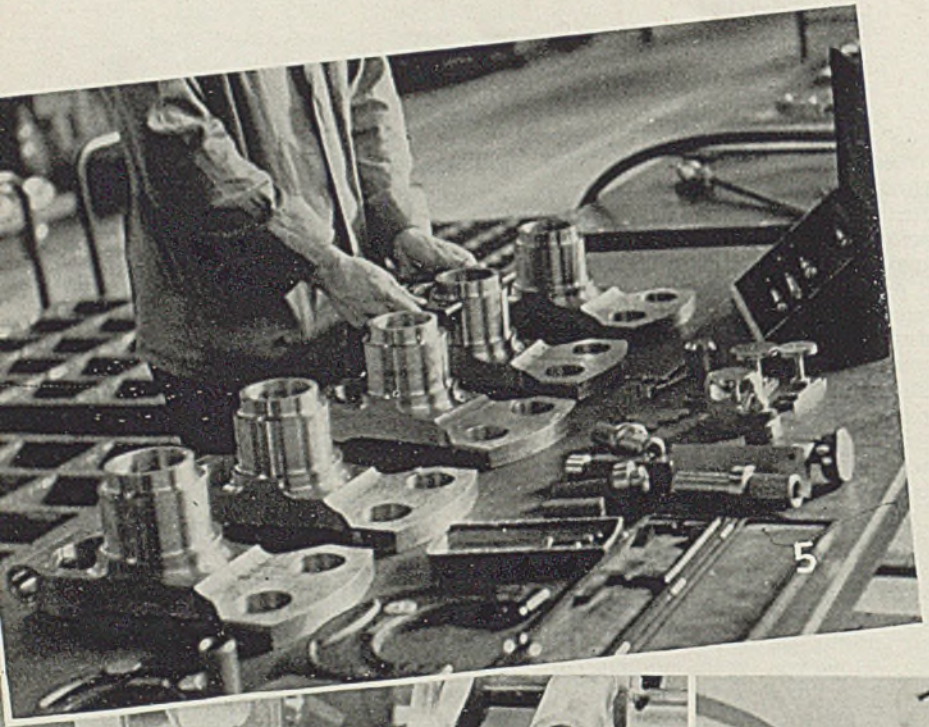
Fig. 5—Cavities are finished by hand. Here a die maker is working on a crankshaft die—highly specialized work that requires great skill



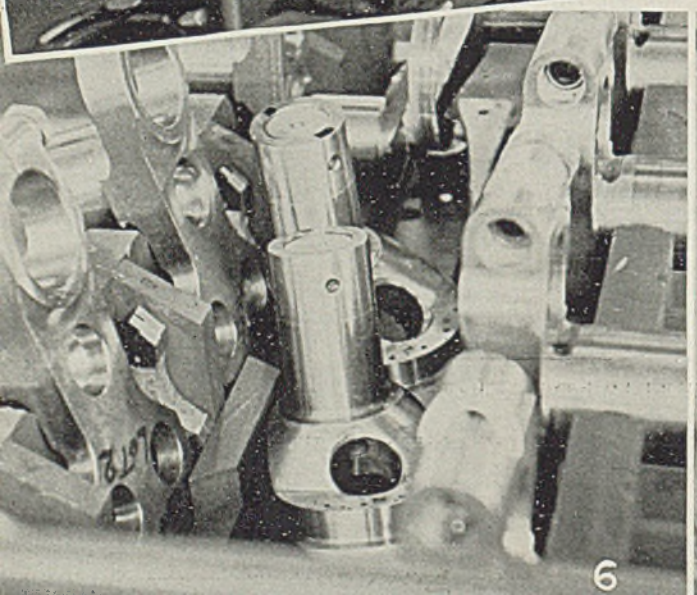


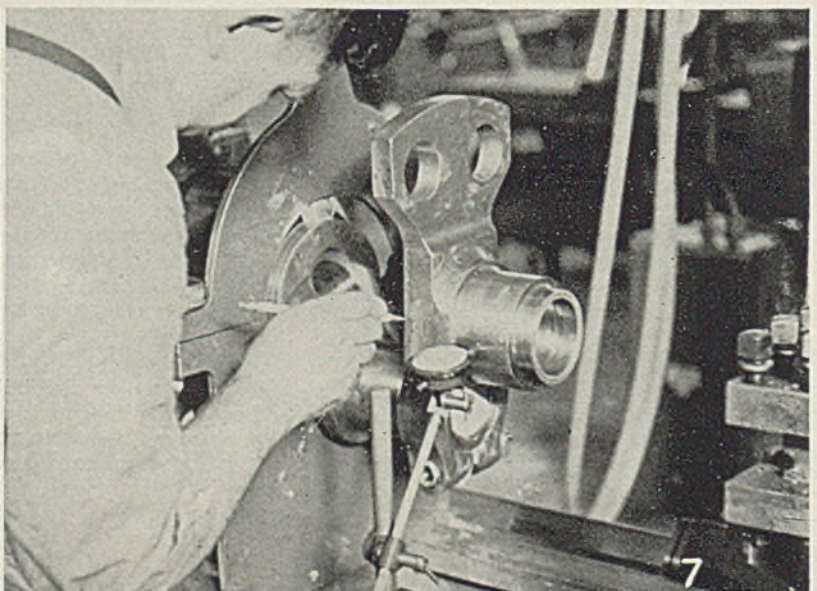
AIRCRAFT ENGINE CRANKSHAFTS

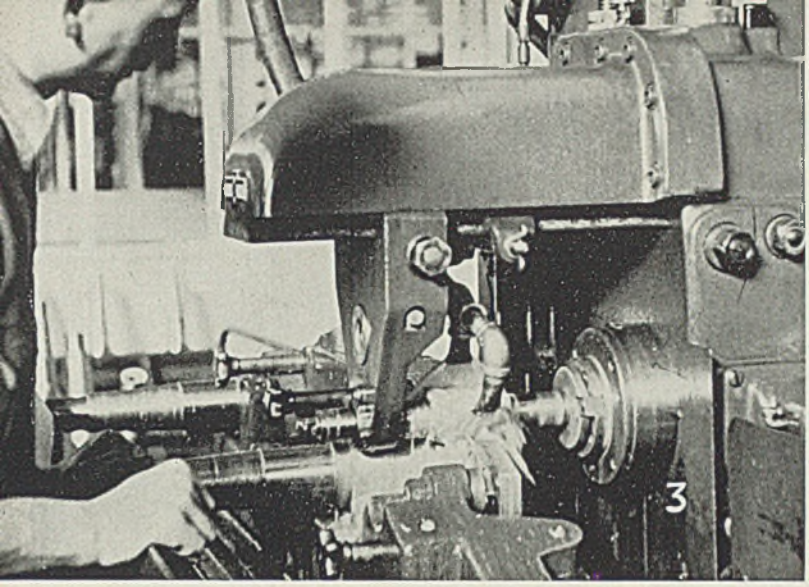
By the Thousands



ANYONE having the opportunity of visiting plant No. 4 of the Ohio Crankshaft Co. would quickly realize that the plans for a fleet of 60,000 warplanes are more than just plans for that fleet is rapidly coming into being as a result of such highly developed production facilities as those found there. This $4,500,000 plant is devoted entirely to making airplane crankshafts—a particular size and type of crankshaft, in fact, for it makes nothing but crankshafts for a particular engine used







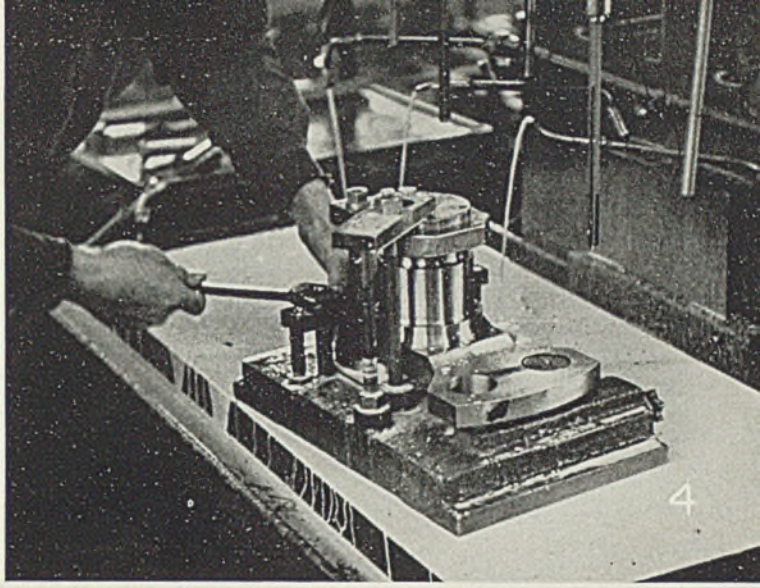


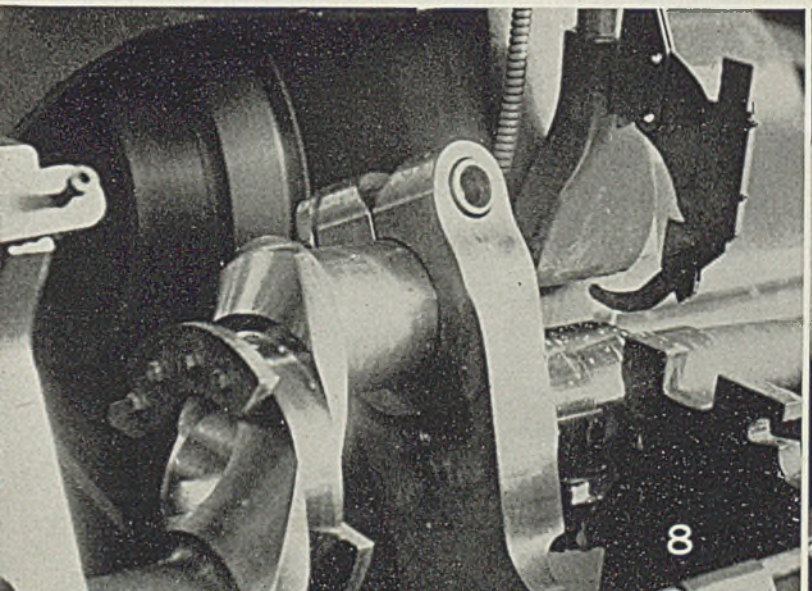
Fig. 1—Taking first or rough turn on front section of shaft. Six surfaces are turned simultaneously by the multiple tooling setup employed on this LeBlonde automatic lathe. Fig. 2—The six tools on the turret of this special Potter & Johnson automatic lathe face, bore, drill the core, form, ream and center the front section of the crankshaft in a series of fast precise operations. Note locating sleeve at top of each tool holder on the spindle to steady the tool while it is working. Fig. 3—a templet is used in milling the profile of cheek side of the front section in this Cincinnati Hydra-Matic milling machine. Fig. 4—Here the rear section is seen mounted in a jig which is moved in succession under each of the three spindles of this multiple-spindle drill press for making the oil holes. At first station, holes are drilled; reamed at second station; counterbored at third. Drill reamer and counterbore with operating levers for each can be seen. Fig. 5—Final detail inspection, rear section. Note precision gages employed, including "go-no-go" gages and various types of plug gages. Fig. 6—Groups of front, center and rear sections racked on wooden truck awaiting their turn at the assembly station. Special pockets prevent the parts from contacting each other, thus guarding the highly finished surfaces. Fig. 7—This is the first assembly operation. Crankshaft is assembled and taken down three times during its manufacture. Heavy bolts extend through fingers of front and rear sections to clamp those securely to center section. Here operator is checking the rear section for alignment after it has just been assembled. Fig. 8—The front main bearing is being finished ground here on a Landis precision grinder. Work is supported from centers out of view at each end and is steadied by a special rest just opposite the grinding wheel. Coolant was off and work backed away from wheel when this photo was taken. Fig. 9—A G & E hobbing machine is forming splines on the rear section of the crankshaft. Tolerance of 0.0002-inch on pitch diameter is held on this operation

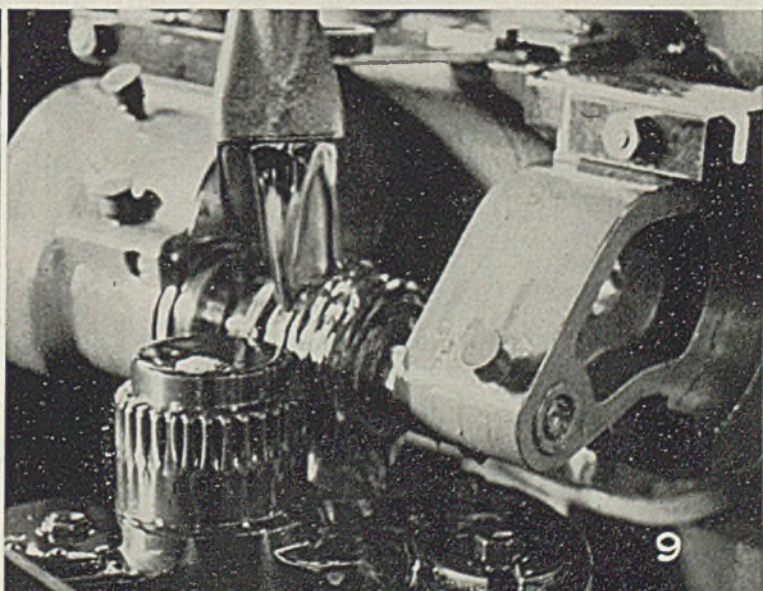
in medium bombers. As an example of specialization in war production, it ranks with the foremost in the country.

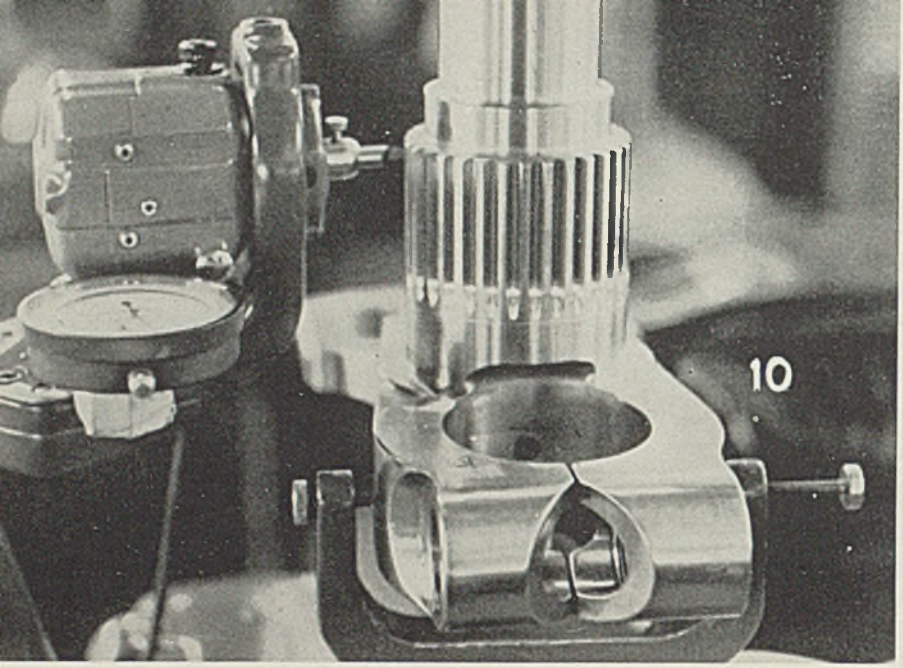
In eleven 30-foot bays, some 30 parts composing the crankshafts are machined and heat treated. The three major parts—the rear and counterweight section, center section and front section—are made from chromium-nickel-molybdenum steel forgings received in the rough forged and annealed condition. Of the 607 operations involved in producing the finished crankshafts, 135 operations change a 65-pound rough forging to the 26-pound finished center section; 240 operations change an 85-pound forging to a 46-pound finished rear section; 50 operations finish the two counterweights—one of which is reduced from 30 to 16 pounds, the other from 24 to 10 pounds; 70 other operations change the rough front section to the 52-pound finished section.

The two counterweights are loose, having 0.01-inch play more or less. They are guarded against sticking by bronze bushings and cheek plates. Probably the man who suggested this loose mass of steel on a madly spinning shaft was examined for insanity—but it permits the counterweights to adjust their position automatically to correct for slight torsional unbalance, which does wonders for dampening the vibrations otherwise set up by the extremely rapid cylinder fire.

Starting in 1920 in a 40 x 60-foot garage, the Ohio Crankshaft Co.'s four plants now cover many thou-







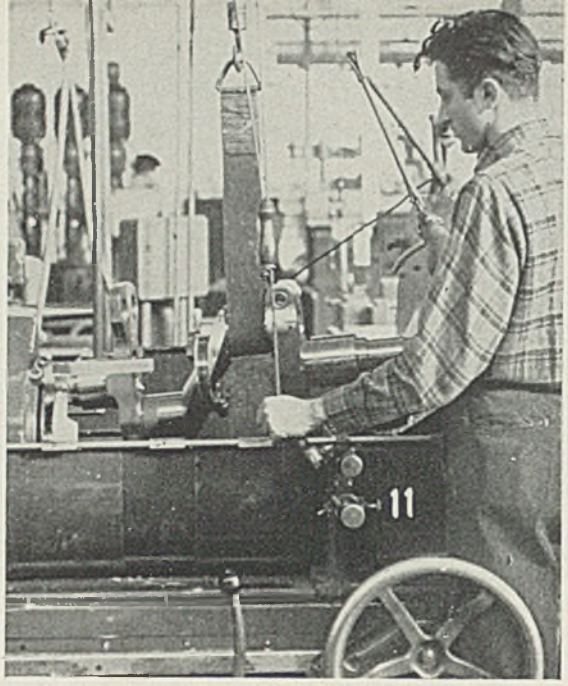


Fig. 10—In this Illinois gear checker, completed spline is being inspected after hobbing and grinding. Profile of tooth involute, being checked here, is held to 0.0002-inch

Fig. 11—Throughout the entire series of operations, every provision is made for efficient handling of the parts. Wherever the assembled crankshaft must be handled in and out of machines, a hoist is provided with a leather or fabric strap to prevent marring highly finished surfaces. Here an operator is mounting an assembled shaft into an external grinding machine where diameters will be finish ground and the overall length established. A power hoist prevents fatigue

Fig. 12—On a heavy faceplate, 100 per cent of all outside and inside diameters are checked for concentricity as inspection procedure

Fig. 13—Shaft is dynamically balanced on this Gisholt machine, being held within 1 ounce-inch of perfect balance. For an assembly weighing several hundred pounds, that is precise work

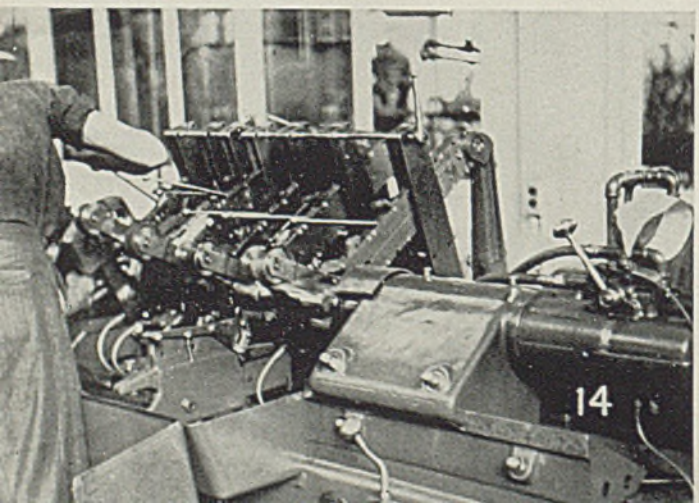
Fig. 14—Operator is adjusting the superfinishing machine, which imparts a smoothness of 4 micro-inches to pin bearings, 6 micro-inches to other bearings. All bearing diameters are superfinished.

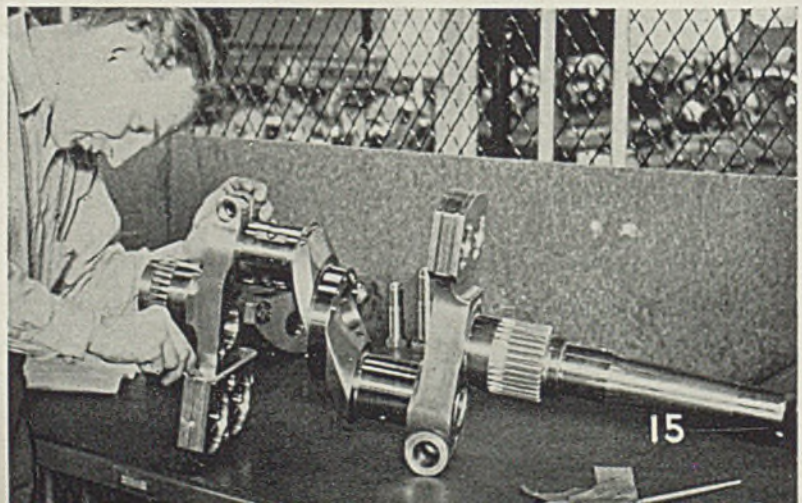
Fig. 15—Final inspection and touch-up of the finished shaft. Counterweights are not yet in place. Note highly finished main bearings

sand square feet of space, including this latest plant owned by the Defense Plant Corp. and operated by Ohio Crankshaft Inc., a subsidiary of the Ohio Crankshaft Co.

The new plant is devoted entirely to machining and heat-treating operations on the crankshaft mentioned. It includes a high-production machining line with much special equipment, some of which is shown in the accompanying illustrations.

Over 100 dimensions on the shaft are held to tolerances of 0.001-inch or less, and bearing surfaces are finish polished to a smoothness of a few micro-inches. Some of the precision machining operations on the crankshaft are shown in the accompanying illustrations. Note that the three principal sections of the crankshaft—that is, the front section, the center section and the rear or counterweight section—are bolted together to form the main section of the crankshaft as shown in Fig. 15. This view does not include the counterweights but does show the bronze bushings and face plates in position.





Peg Allen's new coffee maker is helping to bring down Stukas

"I'm rushing down right now to buy another Defense Bond and get even with Hitler and the Japs! I just found out I can't get the automatic coffee maker that I've been dying to have, because the manufacturers of household appliances are making nothing but munitions. So the coffee maker and the money I'd saved will both *be helping to win the war!"*

Nowhere else on earth have household electrical appliances been so numerous, so ingenious, so inexpensive as in America. When the manufacturers in this great industry turned all their resources to building munitions, they struck a heavy blow against the Axis.

But a conversion as drastic as theirs posed some knotty problems. New designs and specifications required many new alloys, tools and methods. In cooperation with the Revere Technical Advisory staff, a number of the leading appliance manufacturers were able to change over with gratifying speed and ease. For Revere supplies industry not only with sound copper alloys, but also with a highly experienced service in the most efficient methods of using them.

Today, every ounce of copper goes directly into the essentials of modern warfare. There is none for any other use. Fortunately Revere was prepared, with new plants, advanced processes, improved equipment, to assume an important responsibility in the production of our nation's vital copper alloys. And additional facilities are steadily being added to help make victory still surer and quicker.

The Revere Technical Advisory Service functions in (1) developing new and better Revere materials to meet active or anticipated demands; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; (3) continuously observing developments of science and engineering for their utilization in production methods and equipment; (4) helping industrial executives make use of data thus developed. This service is available to you, free.

REVERE COPPER AND BRASS INCORPORATED

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK

HEAT TREATING

Chromium-Carbon Stainless Steels

By W. C. TROY
And
W. E. MAHIN
Feeder Engineering Department
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

"CUTLERY TYPE" is a designation that has come to be applied to the 12 to 14 per cent chromium, 0.30 to 0.40 per cent carbon stainless steels because their principal usage has from the beginning been in that field. This range of chromium and carbon content produces a steel with suitable hardness for taking and holding a cutting edge and at the same time it is highly corrosion resistant.

Little industrial application of these steels has been made because of their cost and their characteristic of forming adherent oxide films during heat treatment. The latter has made it necessary to grind or polish *all* surfaces completely free of the oxide to obtain the benefits of the inherent corrosion resistance. This cleaning is an expensive operation and one not feasible with such items as many types of springs. Low-cost cleaning methods such as sand blasting and tumbling cannot be employed because the effect of the localized cold work is to greatly reduce the corrosion resistance.

This investigation was undertaken in order to provide a heat treatment for martensitic stainless steels that would enable them to be used for mechanism parts where corrosion resistance was required along with toughness and wear resistance.

Heat Treatment in Inert Atmosphere: A bright-hardening process for these steels employs a heat-treating furnace described by J. R. Gier in STEEL, Dec. 9, 1940, p. 76. A special protective atmosphere of dissociated ammonia is used with the unit, which "air hardens" the work. The high purity of the gas, together with some unique construction features of the furnace which enable the atmosphere to remain pure, combine to eliminate oxidation and decarburization. The freedom from all tarnish and scale pits represents a metallurgical advantage of great importance.

The high chromium content of these steels produces an air-hardening characteristic which results in full hardness being developed when a trayload of parts are cooled while still within the protective furnace atmosphere, using a water-cooled chamber attached to the furnace.

The S-curve for a 0.30 per cent carbon, 13.0 per cent chromium steel indicates that a minimum time abscissa of 5 minutes at 700 degrees Cent. (1292 degrees Fahr.) assures *full* hardening when the cooling rate is sufficient to cool the piece below that temperature within 5 minutes after being drawn into the cooling chamber of the hardening furnace. Since all specimens in this investigation were cooled below visible incandescence within 1½ minutes, it is apparent that there was no need for liquid quenching. Most previous investigations of this type have liquid quenching.

Hardness Control Methods—Effect of Tempering Temperature: For springs, wearing parts and highly stressed parts of various kinds the hardness and strength must be as high as possible without risking failure from impact stresses. This usually means within the range of 45 to 60 rockwell C with somewhat lower values where impact strength is important.

However martensitic stainless steels do not soften appreciably until a tempering temperature of 932 degrees Fahr. is exceeded. Above this value hardness drops off rapidly with further increase in temperature.

Tests made to show hardness relations upon tempering five different martensitic stainless steels after heating for an hour at each of the three different temperatures (1658, 1850 and 1904 degrees Fahr.) show that *tempering after quenching does not provide the flexible method of hardness control desired* and that other means must be provided.

Effect of Carbon Content: Investigations have revealed that the maximum hardness attainable in plain carbon and low alloy steels is determined directly by the carbon content. However, an unusual relation holds between the carbon content and response to heat treatment in the martensitic stainless steels. For instance, increasing the carbon content from 0.17 to 0.90 per cent (an increase of 0.73 per cent) did not cause a much greater increase in hardness than was obtained by increasing the carbon content from 0.10 to 0.34 per cent (an increase of only 0.24 per cent).

This somewhat unusual relation between carbon content and hardness developed by a given heat treatment was apparent in this investigation, also. After a certain carbon content is reached, two steels give nearly the same hardness readings after quenching despite the fact that the carbon content may differ considerably.

Fig. 1 shows the variation of the as-quenched hardness with quenching temperatures for 14 steels. Although the carbon content of 10 of these steels varied from 0.23 to 0.65 per cent, the hardness was uniform within 4½ points rockwell C for heat treatment at 1000 degrees Cent. On the other hand, in the steels having carbon contents of 0.10, 0.15 and 0.21 per cent, hardness increased appreciably with the carbon content.

It is apparent from these results that for martensitic stainless steels having carbon contents well within the hypoeutectoid range, the as-quenched hardness is determined directly by the carbon content, as with plain carbon and low alloy steels. But for carbon contents over about 0.25 per cent, the hardness is substantially independent of carbon content, so some other means must be employed to control maximum hardness.

Effect of Quenching Temperature: The data in Fig. 1 reveals that "quenching" temperature affords a means for controlling hardness in these martensitic stainless steels. For example, the 10 steels with carbon ranging from 0.23 to 0.65 per

This is Section I of a series of articles drawn from a paper presented by the authors at the National Metal Congress in Philadelphia, Oct. 23, 1941. Section II is scheduled for July 6 issue.

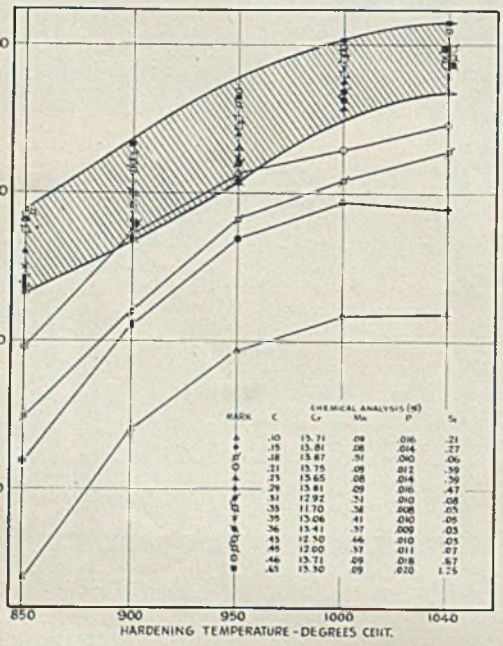
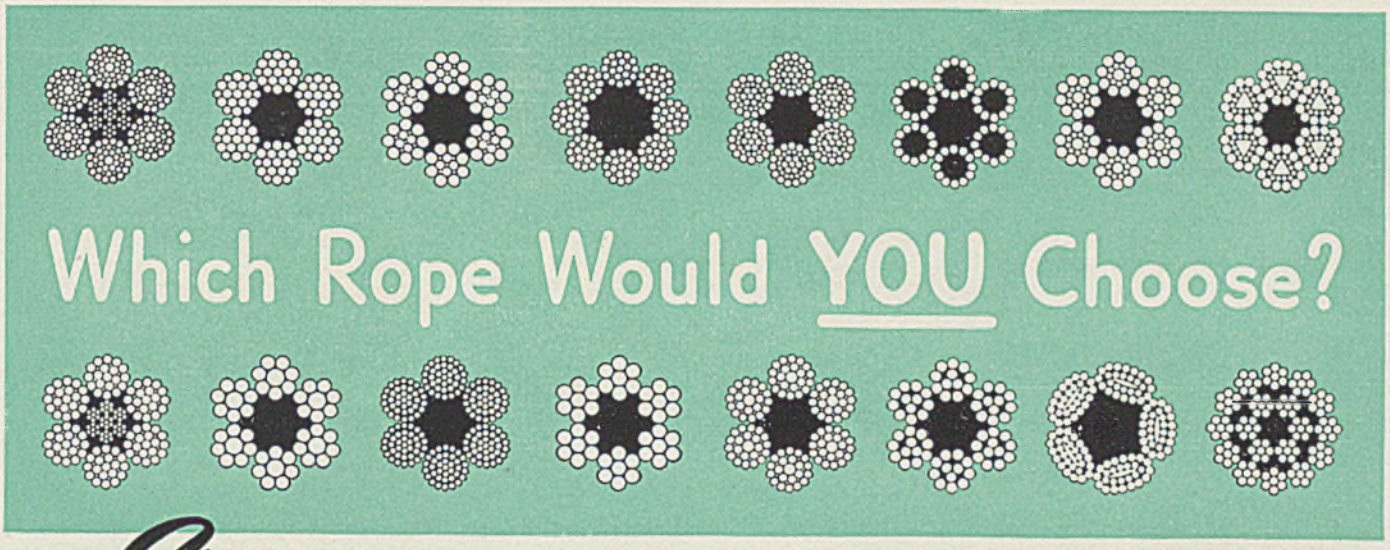


Fig. 1—Curves show variation of as-quenched hardness from various hardening temperatures for 14 different steels having the analyses given. In these tests, the specimens were held at the indicated temperature for an hour before quenching



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cent, chromium from 11.7 to 13.8 per cent, showed an average hardness increase from 46 rockwell C when quenched from 850 degrees Cent., to 58 rockwell C when quenched from 1000 degrees Cent.

For carbon contents of 0.10, 0.15 and 0.21 per cent, the hardness was found to increase with both quenching temperature and carbon content, except that the curves for steels with 0.10 to 0.15 per cent carbon tended to level off with quenching temperatures above 950 degrees Cent.

In the hypereutectoid steels, it would be expected that the carbon content of the martensite would determine the hardness of the fully hardened specimen (neglecting such factors as retained austenite and the influence of carbide spheroids upon hardness). With this as a supposed basis for variation in the as-quenched hardness, it may be assumed that the carbide phase was dissolved to a greater and greater degree with increasingly higher temperatures, thereby making more and more of the carbon from the carbide phase available for solution in the austenite with consequent higher and higher hardness upon quenching.

This analysis of the data regards the carbide phase as a reservoir containing carbon for hardening, the extent of the withdrawal of carbon being controlled by the hardening temperature.

(*Concluded in July 6 Issue*)

Illustration Credit

Illustrations on page 86 of June 15 issue of STEEL should have carried the credit line—"Keystone View Co. photos".

Alternate Specifications for TIN BRONZE

OUR SOURCES of tin have been seriously restricted, yet the demand is higher than ever. In this crossfire of supply and demand, we must trim our requirements to those needs in which tin cannot be replaced.

There are a few applications where tin bronze is a "must". But for all other applications, military or otherwise, it is common sense as well as a patriotic obligation to suggest without bias the proper materials to be substituted for tin bronze. It is practically impossible, however, to designate any one alloy as a universal substitute for the tin bronzes. A careful analysis of the possible alternate specification must be undertaken in considering any substitution.

Silicon bronze has been strongly recommended to producers and assembly plants as an alternate specification for tin bronze. On the basis of eliminating tin, silicon bronze does fulfill the requirements 100 per cent. But because silicon bronze contains 90 per cent or more copper, a neighboring stock pile of this equally strategic metal would be subjected to serious and unnecessary drain. The copper used in silicon bronzes must be virgin or high-grade remelt copper. From a conservation viewpoint and to obtain equal or superior service qualities, it is better to go to the yellow-brass alloys, the manganese-bronze alloys, or the aluminum-bronze alloys where savings in both tin and copper may be effected. These latter alloys have higher physicals in the cast state than either tin or silicon bronzes and still have the excellent resistance to atmospheric corrosion.

The silicon bronzes, requiring proprietary hardeners and special foundry technique, are more or less strangers to the average foundry. The risks involved in too hearty an endorsement of silicon bronze, plus the production delays in making a change involving radical innovations of shop practice, are not to be taken lightly. It is far better to take advantage of the knowledge and experience of the foundry industry in producing well-known standard alloys and to substitute these types of material for tin bronzes wherever possible. This factor is extremely important when every minute of production time means so much.

It is true that the yellow brasses do not have the full bearing properties of the tin bronzes. Silicon bronzes also do not have the full bearing properties of the tin bronzes. In fact, for certain few bearing applications it will be difficult to substitute for the tin bronzes. However where good lubrication is provided, other alloys can be used successfully. Where high strength, good corrosion resistance and long wear are desirable, aluminum bronze is a good choice for an alternate material. For gear service, in particular, this statement holds true, for there the aluminum bronzes have been replacing tin and nickel bronzes for industrial uses on the basis of longer wear and greater strength even when tin and nickel were readily available.

For purposes of comparison, Table I lists physical properties of the common tin bronzes and alternate materials.

From information furnished by Ampco Metal Inc., Milwaukee.

TABLE I—Nominal Composition and Physical Properties of Copper-Base Alloys

Showing Tin-Bronze Alloys and Suggested Alternates

Specification		Copper	Tin	Lead	Zinc	Aluminum	Manganese	Iron	Others	Tensile Minimum	Yield Minimum	Elongation Minimum
46B23c	QQB691a(2)	85	5	5	5	.....	....	....	.....	30,000	.....	20
46B22d(III)	QQB691a(8)	82	8	8	....	.....	....	....	(Phos.)0.3 Min.	25,000	.....	8
46M6g	QQB691a(5)	88	8	0.3 Max.	4	.....	....	....	.....	40,000	.....	20
SAE 62	AMS 4845	88	10	0.2 Max.	2	.....	....	....	.....	40,000	.....	20
46B8g	QQB691a(1)	88	6	1.5	4.5	.....	....	....	.....	34,000	.....	22
46B10f	QQB621	62.5	1	1 Max.	Bal. (36)	0.5 Max.	....	....	.....	30,000	.....	15
49B3e	QQB726b(c)	58	..	.....	Bal. (39)	1	0.5	1	.....	65,000	25,000	20
QQB726b(A) WXS-5	46B29 Modified	62.5	..	.....	Bal. (26)	5.5	3.5	2.5	.....	110,000	60,000	12
46B28	QQC59S	91.5	..	.....	4	.....	....	1.25	Si 3.25	45,000	.....	15
46B18c	QQB671a(A)	88	..	.....	....	9	....	3	.....	65,000	28,000	22
QQB671a(B)		89	..	.....	....	10	....	1	.....	80,000	40,000	12
QQB671a(C)		85	..	.....	....	10.5	....	3.5	.....	75,000	35,000	12
QQB671a(D)		85	..	.....	....	10.5	....	3.5	.....	90,000	45,000	8

(Illustration from photo by U. S. Army Signal Corps.)

WHEN THESE FELLOWS WERE RIDING *Tricycles*

● *Twenty years ago,* as little lads, these fighting men of today were pedaling tricycles down quiet streets, with no knowledge of a war just ended; no idea of a still greater war to come — a war in which they were to play so important a part.

Twenty years ago, in a world at peace, The Sisalkraft Co. began producing a reenforced waterproof wrapping paper, later named FIBREEN, with no comprehension as to the important part it, too, would play in this world war.

For twenty years, The Sisalkraft Co. has been acclaimed the leader in the development and production of reenforced papers — papers that are recognized in all parts of the world *because of their waterproof protective quality, and their almost unbelievable strength.*

As a result of these twenty years of constant development and improvement, and due to exclusive construction methods and the designing of special equipment and machines, the FIBREEN of today requires a very minimum of sisal fibres.

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The entire production of FIBREEN is now helping to solve the problem of wrapping and protecting great quantities of war material, from tanks and planes to radios, guns and repair parts.

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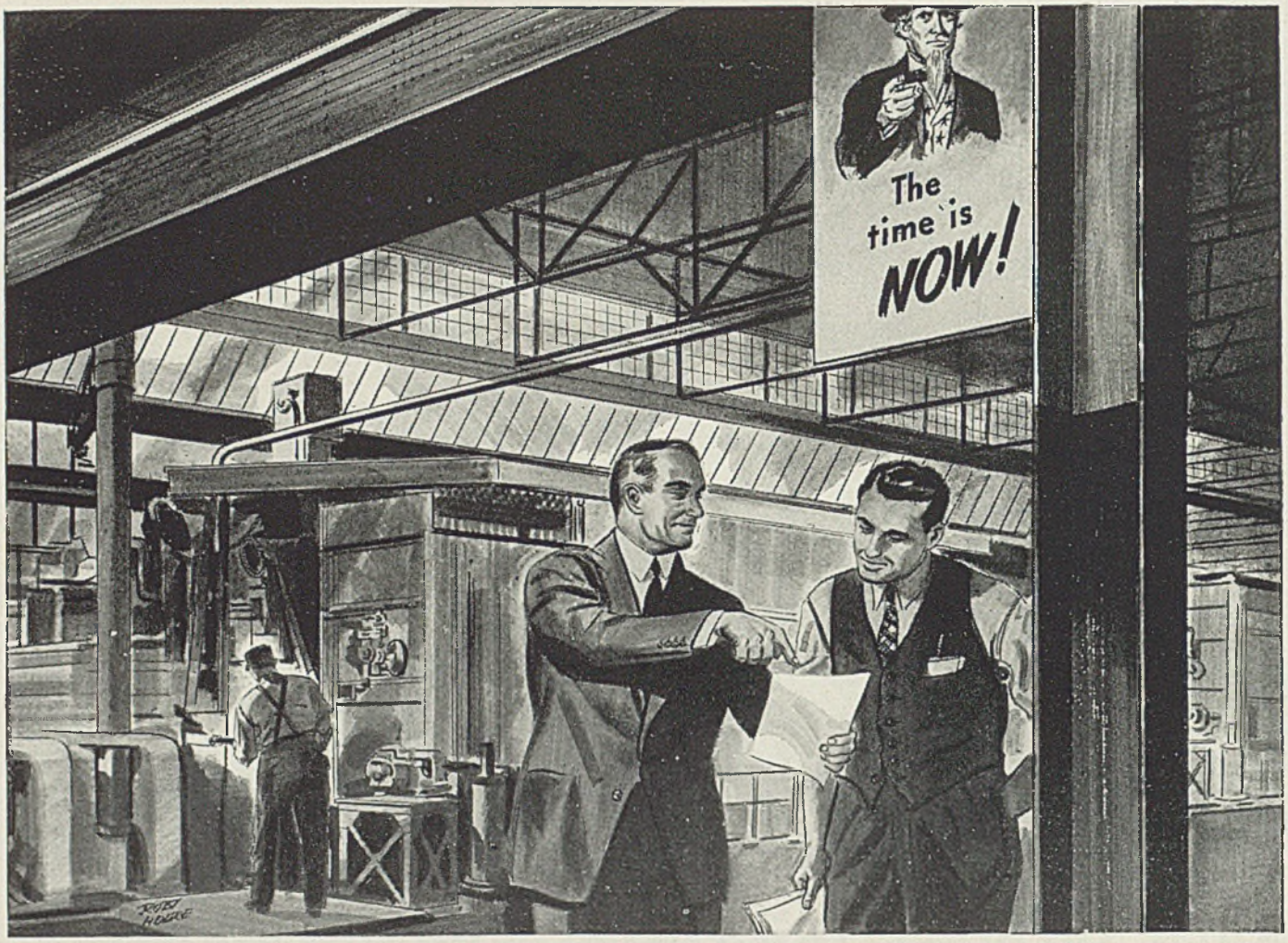

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THE TREND IS TO GAS
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Forging Practice

(*Continued from Page* 61)

established the practice of drop forging, and the same insistent demand spread it widely throughout modern industry.

This transfer of the tools of the smith to the hammer or the press in the form of dies mounted in the ram and in the anvil block has developed a highly specialized craft, involving acquaintance with types of die steel which are not only machinable but capable of taking the punishment of localized heating, abrasion and heavy blows. If any further argument were necessary to demonstrate the superiority of forgings for severe duty, it might be found in the forge itself since forged die blocks appear to be the only type that is satisfactory. Nothing will answer the purpose but the highest grades of alloy steel (and some plain carbon tool steels), carefully heat treated and forged in billet form on all six sides to avoid any tendency to split or wear more readily in one direction than another.

While it was formerly necessary in all cases to heat treat the die after the sinking operation and thus run the risk of distortion or other injury, die steels can now be obtained which possess the hardness required for the particular service demanded and which can be machined in the heat treated state. The particular alloy most satisfactory for the purpose is a chromium-nickel-molybdenum steel running around 0.50 to 0.70 per cent carbon with maybe 0.5 to 1.0 per cent chromium and 1.0 or 2.0 per cent nickel. The molybdenum varies from a fraction to close to 1.0 per cent.

The design of the impression and the subsequent sinking operations are another aspect of the specialized skills called forth by the increased speed, accuracy and complexity of the forging operations.

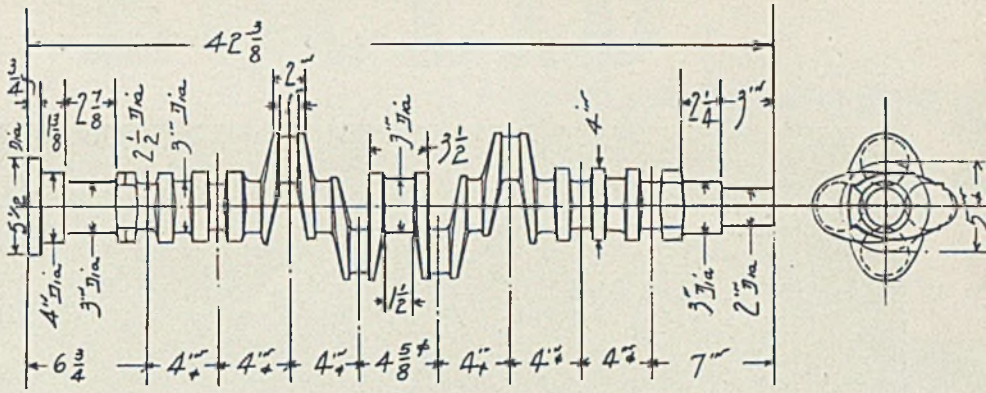

Fig. 6—This is the crankshaft forging that is made on the dies pictured in Figs. 1 to 5. It requires a 12,000-pound steam drop hammer and a 300-ton geared trimming press to make these units from 4½-inch round-cornered stock at a rate of 75 per hour

In Figs. 1 to 5 are shown the major steps in the sequence of operations on the dies used in forging crankshafts in the Buick automobile plant. Fig. 6 gives the dimensions of the finished forging after rotation of the cranks from the plane in which they are forged to the position which they occupy in service. See STEEL, Mar. 2, 1942, p. 66, for details of this crankshaft forging procedure.

In general, diemaking procedure is to lay out and prepare a series of templets from the layout drawings of the dies. First a layout templet having the profile of the forging at the parting line is made; thereafter, as many cross-sectional templets as may be necessary are prepared, care being taken, of course, to make due allowance for shrinkage as the forging cools to atmospheric temperature. This allowance is commonly of the order of 3/16-inch per foot. In marking off these templets, a thin plating of copper deposited from copper sulphate forms a handy base for the scriber.

The die block—generally of rectangular form—is first drilled for the handling holes seen in Fig. 2. Thereafter the blocks are paired and the shanks machined. The block is now turned over and the matching edges and face machined, a cut of perhaps 0.25-inch being taken in order to guarantee complete removal of any decarburized metal. The purpose of the matching edges is to enable the operator to set up the blocks in the hammer in proper register with the front match edge facing him and the side match edges on either his right or left hand. The blocks are now ready for impression machining.

Copper sulphate or a similar solution is again applied to form a surface to receive the impression drawing made by scribing around the profile of the layout templet, the final impression being always laid off first in the center of the die. The reason for this is that

Fig. 7. (Left)—Stock is die rolled at the mill to eliminate many of the preliminary gathering operations that would be necessary if forging of the part were started from square bar stock. Figs. 7, 8, 9 and 10 show sequence in forging steering knuckles at Buick from die-rolled stock shown here being fed into the heating furnace

Fig. 8. (Right)—Heated piece is discharged from the furnace at a temperature of 2250 degrees Fahr. These manganese steel pieces measure 3½-inches square at the center and weigh about 20½ pounds each. The operator is ready to pick up the work and place it between the dies of the forging press

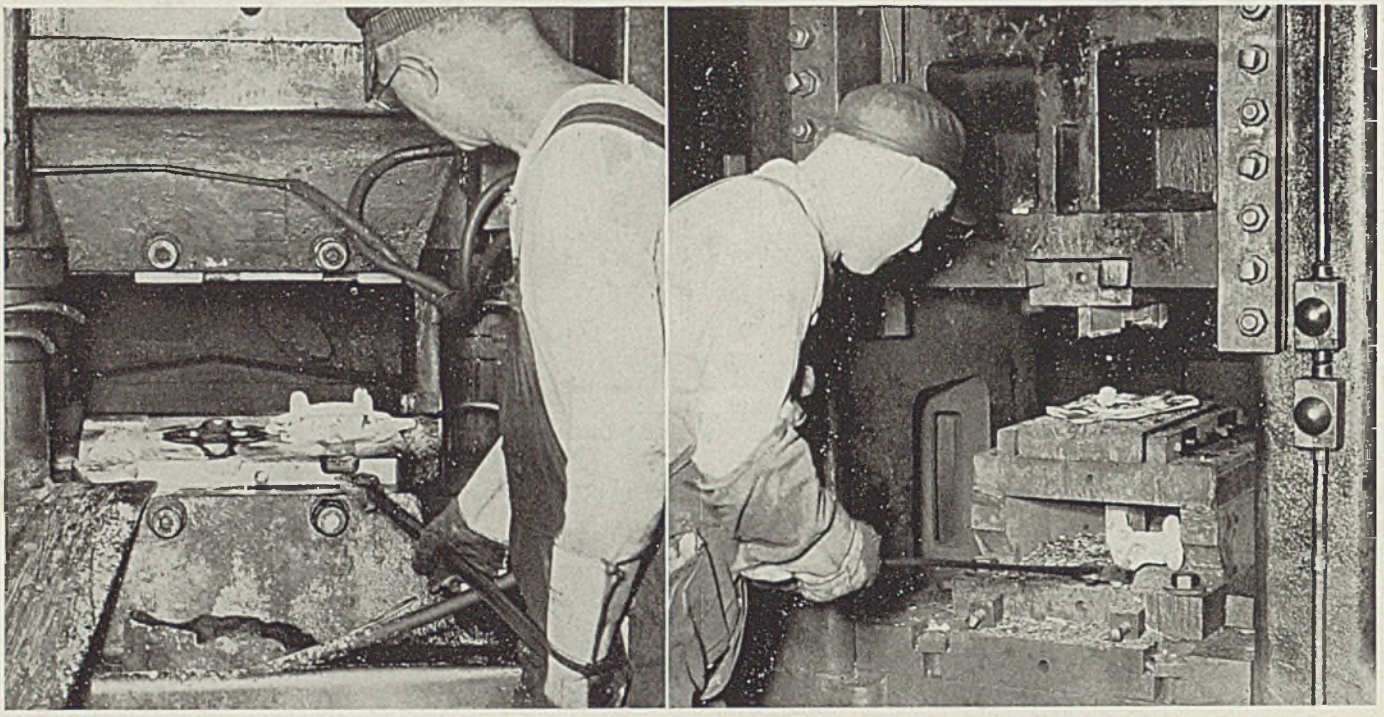

Fig. 9. (Left)—2000-ton Ajax press is used to forge two steering knuckles from each piece of stock. Dies have three working positions. First, at left, spreads the material, second rough forges to shape, third finishes shape. Fig. 10. (Right)—Flash is trimmed off and the two forgings parted in this new type press which handles both operations simultaneously

the finishing blows upon the relatively cool forging are the occasion of the severest stresses in the rod and other hammer members. Thus eccentric loading during the finishing operation when the flash is cold must be avoided as far as possible.

The actual sinking of the impression in the face of the die is commonly performed by some type of die-sinking machine like that in Fig. 3. We may either rely on the steadiness of the hand of the operator to guide the tool or a master may be used as in the example shown. Using cutters of various forms (see Fig. 4) the impression is machined within a few thousandths of the desired dimensions and the remaining stock removed in bench operations which include filing, grinding, scraping and polishing as shown in Fig. 5. While it might be considered sufficient to leave the surface produced by the file or the scraper, actually lapping and polishing are necessary in order that all tool marks and other blemishes are removed since even minor abrasions reduce the wearing qualities of the die.

As the work on the finish impression proceeds, templets are used to check dimensions, or a "type" may be employed for portions of the impression which would otherwise be difficult to deal with. The "type" is a hardened steel block, machined to the proper share and coated with Prussian blue. When driven in sharply by a hand hammer, it marks those parts in the impression upon which it bears. The high spots so indicated are then removed, and the operation repeated as often as may be necessary to secure a good bearing all over the impression. This is known as "typing the die."

The pair of dies is now clamped together with the sprue end uppermost and a lead or lead alloy casting made in them to check die dimensions. This lead cast also serves as a check on the estimated weight in those cases where no previous experience in the production of a particular forging exists. Since steel weighs about 70 per cent as much as lead, this factor is used to determine the corresponding weight of the forged parts that will be produced.

Should the finish impression prove satisfactory, it is now flashed and guttered in order that the excess metal may have room to spread. If, in addition to the finish impression, other operations such as edging and blocking are to be performed, these impressions are now machined in the positions which the custom of the shop dictates. If cutoffs have to be provided, these may be milled in a corner of the dies, or inserts may be fitted into milled slots in the block.

New Reflector Releases Steel for Other Uses

An industry-wide changeover by the fluorescent lighting fixture industry to a new reflector developed recently by the Lighting Division of Hygrade Sylvania Corp., Salem, Mass., would release for more critical war production important quantities of sheet steel currently used in reflector manufacture.

According to the corporation's announcement, fixtures utilizing the new composition reflector developed will employ only about one-third as much steel as present fixtures. Made of a specially treated composition, the reflector is considerably lighter in weight than present units. General appearance, however, remains the same. The reflecting surface consists of the same high-temperature synthetic enamel used on present fixtures and has equally high light reflectivity.

Eliminates "Lab" in Electroplating Course

For several years a correspondence course in electroplating conducted by Dr. C. B. F. Young, Box 292, Flushing, N. Y., besides 12 lessons in chemistry and 12 in electroplating, included laboratory chemicals, glassware, materials, etc. But due to the war only the lectures are now being offered. These, however, can be obtained at a greatly reduced price.

The cost is $12 for the complete lectures in chemistry, likewise for the lectures in electroplating—$24 for the complete set of 24 lectures.

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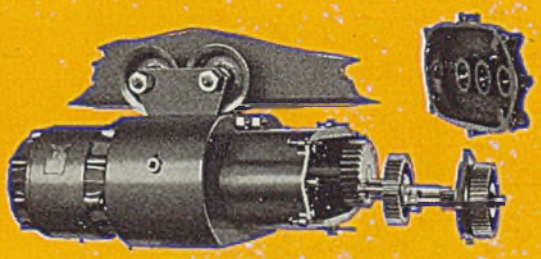

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Standardized proven units are used in the construction of cranes for special purposes or unusual conditions.

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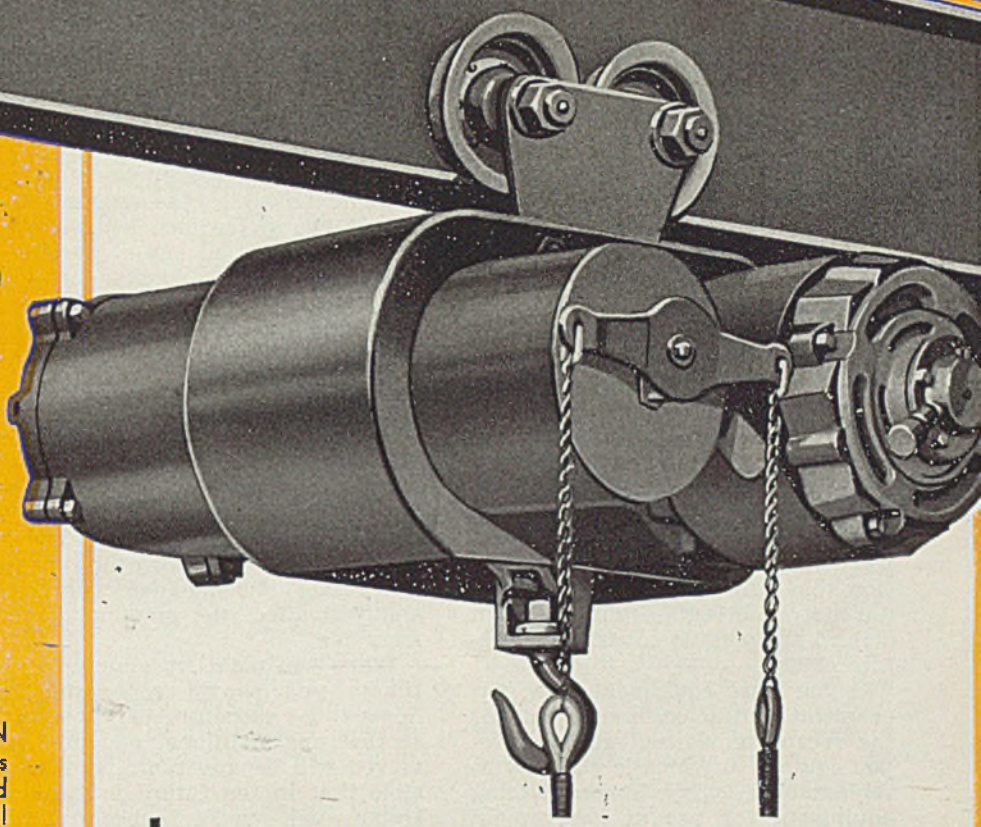

IN addition to designing EUCLID HOISTS for smooth, quiet operation and efficient performance, unusual provision is made for safety under all conditions.

Every load carrying part is made of steel including the trolley frame, wheels, main hoist frame, lifting cable and fully enclosed hook block. From hook to beam, the load is carried on steel.

Heat treated alloy steel gearing and shafts, anti-friction bearings, simple brakes and controls are all designed to embody liberal strength and assure long service. A factor of safety of at least five is maintained throughout the construction.

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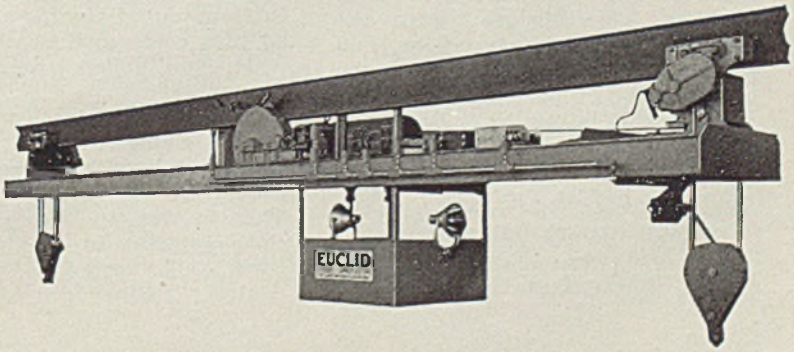


Drafting and Operating Under Government Contracts

(Section III)

BEWARE of a recapture clause when renting equipment. Formerly every contract including an equipment-rental provision contained a recapture clause. This has been deleted from the cost-plus-fixed-fee construction contract so far as rental of the contractor's equipment is concerned. However, that contract continues to contain a provision that any agreement by which the contractor rents equipment from a third party must contain a recapture clause.

If you lease equipment to a government contractor, watch out for the recapture clause. It may cost you equipment which is virtually irreplaceable. Many lessors leasing equipment for use of government projects have lost out because they did not familiarize themselves with this provision. Under this clause the government becomes the owner of the equipment when the total rental paid equals the value of the equipment plus 1 per cent per month as compensation for its use. The clause also gives the government an option to purchase the equipment at the completion of the work by paying the lessor the difference between the amount theretofore paid under the agreement and the value of the equipment plus 1 per cent per month.

Recommendation: Don't charge exorbitant rates. *Keep your equipment.* Either limit your compensation to 1 per cent per month or don't rent your equipment. If you execute an agreement containing this clause, be sure to fix definitely the value of the equipment in order to avoid a later dispute as to the amount to be paid you if, as, and when the government becomes the owner of the property.

Clauses Relating to Subcontracting: Subcontracting is becoming more and more important. In bidding on or negotiating for contracts you are required to submit a statement specifically citing the work to be farmed out. *Even though you are not the low bidder you may receive lump sum contracts if you can farm out more of the work than other bidders.* This factor is also considered in awarding negotiated cost-plus-fixed-fee contracts and will affect the amount of the fixed fee.

When you make up your cost estimate you should segregate the items to be subcontracted, however, so that any additional expenses involved will be apparent. It is possible that in the future prime contracts will make subcontracting compulsory by specific reference to the subcontractor and the work to be sublet. This is now done only in those cases where the government wants a particular specialist to do certain parts of the work requiring unusual talent.

While contracting officials consider your subcontracting statement in awarding lump sum contracts, no provision for compulsory subcontracting has as yet been included. The contract is let for a fixed sum and the government's primary interest is that the work conform to specifications and be completed or delivered on time. Subcontracting is left to you as your worry. If your subcontractor's delay causing late delivery of the finished product is inexcusable, you will be held responsible. Lack of good faith in making the subcontracting statement, as revealed by your failure to farm out the work as represented, may count against you, however, when you solicit subsequent contracts.

Cost-plus-fixed-fee contracts contain a clause that no subcontract can be made without the written approval of the contracting officer. This is due to the government's close interest in the cost of the work. The cost-plus construction contract further provides that the fixed fee is based upon the understanding that the contractor will subcontract certain specified portions of the work. This opens the door to a reduction of the fixed fee if you fail to live up to your representations.

In co-operating with the government and extending your use of subcontracting, be sure to protect yourself against subcontractor's delays which are not excusable under your prime contract. You can be held responsible for such delays. See to it that the subcontract contains a clause assuring you against such losses and demand both bid and performance bonds. If the subcontractor cannot provide these and the government wants you to farm out work to him to alleviate priorities unemployment, etc., request that your prime contract exempt you from damage or loss as a consequence of the subcontractor's delay or other default.

Subcontractors should request adequate escalator and target clauses, and prime contractors should be sure that the prime contract contains a clause to cover consequent increased costs. Both prime contractors and subcontractors should beware of so-called "reasonable" or "fair" price clauses in the subcontract. These clauses provide that the price shall be the "reasonable" or "fair" price for the product *at the time of delivery.* Sooner or later clauses of this type will involve you in litigation. Instead, set a definite price and then provide for contingencies which may cause increased cost.

While lump-sum price contractors are free to work out their own method of subcontracting, as a matter of good business they would be wise to observe, as far as applicable, the precautions a careful cost-plus contractor takes. Cost-plus contractors must heed the following:

If the subcontract is to be of the lump-sum or unit-price type, competitive bids should be taken with as wide competition as is reasonably practicable and award should be made to the lowest responsible and acceptable bidder. If award is made to other than the low bidder, a record should be made of the reasons for the rejection of the lower bid or bids. In such case, the subcontractor's profit is included in the bid price, and no part of the price is stated separately as a fee or as a profit. The subcontractor's material men and laborers should be protected by payment bonds or by a "withholding" provision in the contract.

The procedure preliminary to awarding a cost-plus-a-fixed-fee type of subcontract should be as close to the procedure followed in awarding prime contracts of this type as is practicable. This will avoid difficulty in obtaining the approval of the contracting officer.

From the booklet, *Producing for War*, published by the War Economics Division of the Research Institute of America, 292 Madison avenue, New York.

For Section I of this series, see STEEL, June 8, 1942, p. 76. For Section II, see June 15 issue, p. 92.

Negotiations should be undertaken with at least three reputable and qualified contracting concerns. The subcontract provides for payment by the general contractor to the subcontractor of the actual net cost of materials and labor plus a fixed fee. Under this type of subcontract, those furnishing materials and labor to the subcontrator are protected since the subcontractor must show receipted invoices and payrolls before payment.

Speed Your Payments: Space does not permit a detailed discussion of all the papers requisite to payment and where they must be filed. Practice varies with the contract and the government department involved. But here are some general suggestions which apply to all contracts. Follow them and you may get your money quicker.

(1) Familiarize yourself with payment clauses in your contract. Take particular note of all provisions relating to vouchers, certifications, invoices, and copies of the contract. Note to whom and where originals are to be submitted and where copies are to be filed. Note that a carbon, or duplicate, or corrected copy can be just as much cause for delay as the original. If a copy is furnished, an explanation as to the disposition of the invoice should be furnished. A memorandum copy of the voucher may not be furnished instead of the original.

There are times when the type of contract you have will determine the amount of time it takes you to get paid. For example, if you have a partial payment contract, your partial payment will not be held up, but your final payment may be. This is due to a working arrangement between the War and Navy Departments and the General Accounting Office. Since these departments have their own audit systems and submit only questions of fact or law, the General Accounting Office does not question any payment except the final one.

(2) Have a talk with your contracting officer and work out your payment procedure with him, adjusting your bookkeeping, accounting and billing practices to the requirements.

(3) If you assign the contract, be sure that all papers required such as notices and copies of the contract are filed in the required places.

(4) Provide for delivery and acceptance f. o. b. plant. Then you know quickly whether the goods are rejected or accepted. If you provide otherwise you may not hear for some time — during which payment will be delayed.

(5) Obtain bills from the railroad immediately where goods are shipped on commercial bills of lading with delivery at destination. Otherwise, the railroad may not bill you until its customary billing date. Payment will be held up until you submit your freight charges. When you are using shipping points, either freight or express, you may have difficulties. Shipping points and weight, if shipped from other than the contract f. o. b. shipping point, should be stated. Receipted freight or express bills must be furnished.

(6) If you have an extra work claim show it as a separate item and request immediate payment of the original contract price.

(7) Use care in making out invoices. Check your quantities, your unit prices and extension of your prices; that is, total price where there is more than one unit. If an error is found in the Administrative office, the voucher is returned to you and you lose time. These clerical errors can be eliminated by a good accounting system.

The following errors most frequently occur in the preparation of vouchers for payment: (a) Faulty certification; (b) inexact compliance with some of the specifications in the contract or some of the statutes involved, such as the Walsh-Healey Act; (c) improper itemization of the voucher errors in calculation occur very frequently.

(8) Explain all delays on vouchers. If there is a liquidated damage clause in your contract and you make no deduction of liquidated damages when delay occurs, you must furnish an explanation, including the date the order was given, the date received, the date of delivery and the causes for delay.

(9) Be sure that the name of the contractor on the voucher is the same as that written in the contract and that you cite your contract by number. Cite your appropriation correctly. Be sure the invoice is signed and certified properly. In this respect it is well to note that if your invoice is certified properly, your Form 1034 (public voucher, original, for purchases and services other than personal) which is standard voucher form, does not have to be certified.

(10) Watch out for labor law violations. You may have left unpaid workers. This would cause the Department of Labor to make an independent investigation for labor violations and may cost you holdup penalties for extra wages.

(11) Remember to deduct discounts. If you don't, show why payment was not made in time to take advantage of the discount offer. In such a situation, consult the Administrative Office.

(12) In purchasing foreign articles or materials or supplies be sure that the head of the department or independent establishment has determined that the purchase was in the public interest.

(13) Eliminate any misapprehension as to identical payments. If your invoice appears to be a duplicate, your payments will be held up on the ground that the payment appears to be a duplicate of the payment made on another voucher in a like amount.

(14) Where grade quality or size has been included in the contract, you should state that the grade, quality, or size of the items furnished conform with the contract items. This statement should be made on your invoice.

(15) Beware of improper certification. The Administrative certificate on the face of the voucher should be signed. A properly signed certificate identified with the voucher is necessary. A certified invoice is required and should be attached to the voucher. The payee's certificate on a separate sheet attached to the voucher should be identified with the invoice or voucher.

(16) Don't erase on your invoice. Payment may be held up if you increase the amount. There is no authority to increase the amount which has been certified as correct by the claimant, and any change on the invoice has to be shown over a signature of a responsible official.

(17) In cases where vouchers are sent to the General Accounting Office for approval before payment, certification for payment may be held up if all the records are not available. Determine whether your vouchers are going to the General Accounting Office for settlement. If so, make sure that you file copies of contracts and specifications with that office. In every respect note carefully any advice from the administrative office. The government has to be much more exact in its records than is necessary in commercial transactions. Do not get impatient. Make an honest endeavor to comply with the Administrative Office and you will get your money with reasonable promptness.

Pamphlets on Steel Utensils Available

Printed copies of a pamphlet entitled "Multiple-Coated, Porcelain-Enameled Steel Utensils, Commercial Standard CS100-42" recently accepted by the trade as its standard of practice for new production beginning Sept. 30, 1942, are now available according to the Division of Trade Standards, National Bureau of Standards, Washington.

Fig. 1. (Left)—Battery industrial trucks transport parts in tote boxes on skids between buildings

Fig. 2. (Right)—Differences in street levels result in numerous severe grades on the trucking routes. Normally-closed swinging doors are equipped with glass panes so driver of approaching truck can see if way is clear inside. If it is, he drives straight through the doors, letting the truck push the doors open. They swing shut behind the truck automatically

REMOTE-CONTROL DOOR OPERATORS

. . . . speed handling between plants

THE MATERIALS handling problem at a Milwaukee plant where motor controls and electrical equipment are made is complicated by a number of factors. The plant consists of 4 and 6-story buildings covering more than four city blocks separated by city streets. Differences in street levels have resulted in numerous severe grades in the trucking routes between buildings as shown in Figs. 1 and 2. The routes must pass through normally closed doors.

Because of the wide variety of products, the various manufacturing departments must do different kinds of work at different times, and the materials handling system must be correspondingly flexible. Many of the products are delicate and must be transported with care. The skid-lift-truck system of unitized loads has proved itself capable of coping with these various problems to achieve a highly efficient materials handling setup, according to the Edison Storage Battery Division of Thomas A. Edison Inc., West Orange, N. J., who furnish the batteries for the industrial trucks employed.

The parts entering into the construction of the control equipment made here are many and varied but are, for the most part, relatively small and hence readily collected into skid boxes, sectional bin skids or standard tote boxes mounted on skids. These loads are moved through process from operation to operation both by hand lift truck and by battery lift truck, according to the distances to be covered.

Some of the control equipment, which must be carefully handled, is assembled on panels. Larger panels are built on wooden skids so that they can be moved by lift truck as assembly proceeds. See Fig. 3. Panels too large to be lifted are mounted on flat steel sleds 4 feet wide and from 4 to 14 feet long. Grappling hooks on the ends of the sleds enable them to be pulled through the plant by the battery industrial trucks. Panels too long for the longest sleds are towed over the floors on bare wooden skids.

For the longer hauls between departments, bays and the various buildings of the main plant, power trucking is always employed. Among the grades on the routes between individual buildings of the main plant, some are more severe than the 10 per cent generally considered a rule-of-thumb maximum possible. But the battery industrial trucks have proved capable of negotiating them successfully. In fact, of the six trucks now in operation, five operate 12 hours a day on a 7-hour charge of the batteries. One truck operates 16 hours a day and is amply supplied

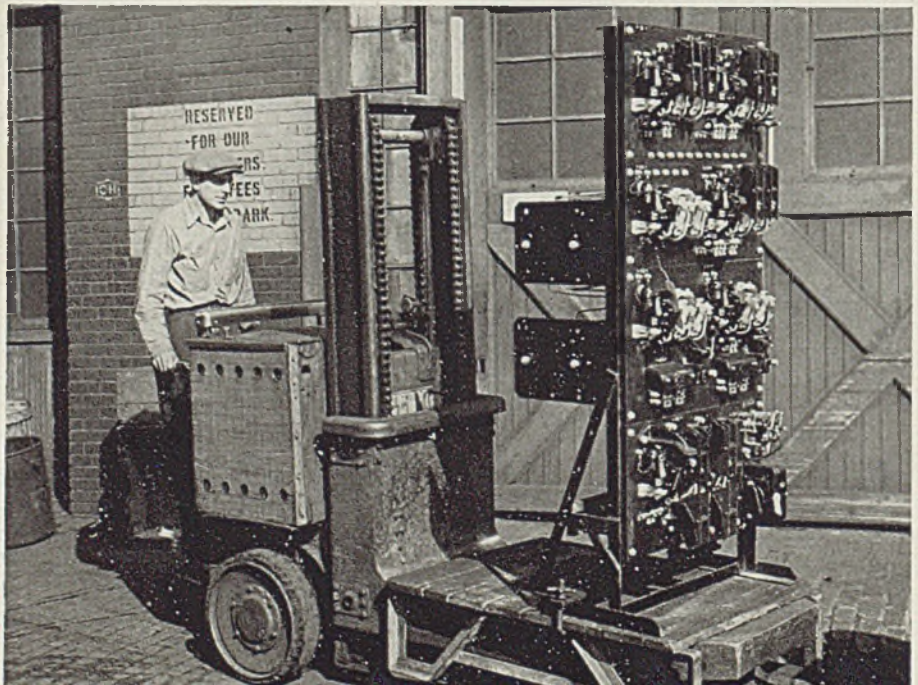


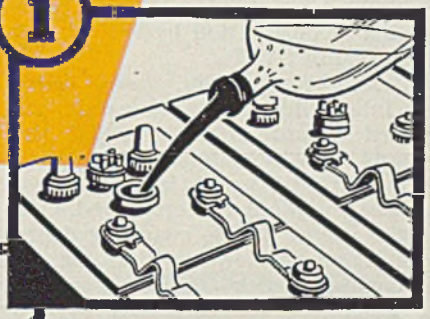
Fig. 3—Some of the large panels are assembled on skids so they can be moved about easily without danger of being damaged. Illustrations Figs. 1, 2 and 3 courtesy of Edison Storage Battery Division, Thomas A. Edison Inc., West Orange, N. J.

SAVE TO WIN

EVERY storage battery is a war weapon, containing metals vital to our fighting men. You hold these metals in a sacred trust. It's your duty to squeeze from them every ounce of use . . . by following simple rules for battery conservation.

HERE'S HOW TO MAKE YOUR BATTERIES LAST!*

1

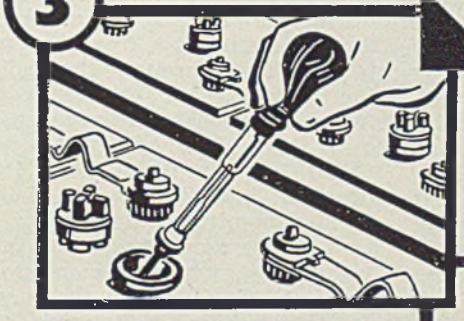


Keep adding approved water at regular intervals. Most kinds of local water are safe in an Exide Battery. Ask us if yours is safe.

2

Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner-workings.

3



Keep the battery fully charged — but avoid excessive overcharge. There's always a right-way to do any job, and a storage battery will last longer when charged at its proper voltage.

4

Keep records of water additions, voltage and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings. Know what's happening!

Exide IRONCLAD BATTERIES

*** If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.**

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

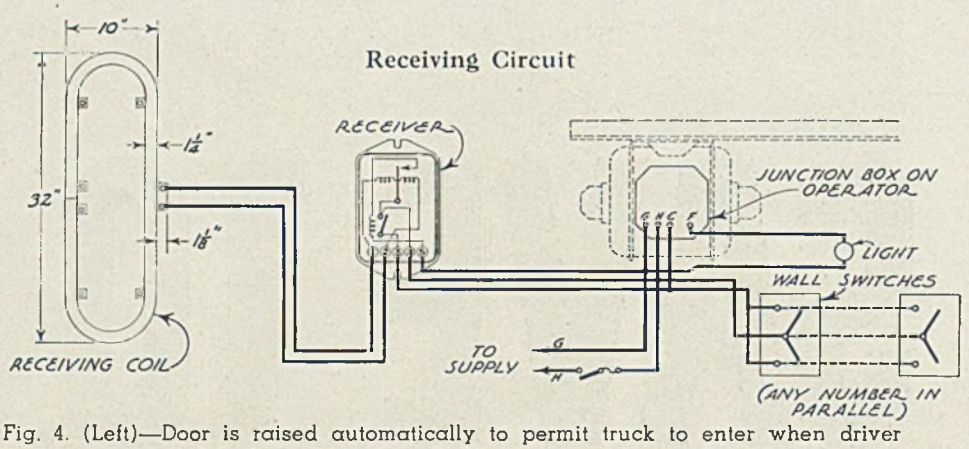


Fig. 4. (Left)—Door is raised automatically to permit truck to enter when driver presses control button on truck and drives over pickup coil in driveway

Fig. 5. (Above)—Wiring diagram of receiving circuit of "radio control" system

with power by the 7-hour charge plus a half-hour supplementary boost at noon.

Loads going to the upper floors are brought to the elevators either by hand or power truck, depending upon the distance, and on arrival at the upper floors are distributed by individual operators using hand lift trucks. Material is transported between the company's south side plant and the main plant by highway truck, and the skid units are loaded at point of origin and unloaded at destination by cranes and battery life trucks.

Delay at normally closed doors in interbuilding trucking has received careful attention, and the means by which it has been eliminated are of great interest. Two general methods are employed. One is the use of double swinging doors containing windows so that the approaching truck driver can see whether or not the way beyond is clear. If clear, he simply drives through, letting the truck itself push the doors open. They swing back into place as soon as the truck is through. See Fig. 2.

The other method, employed for doors opening upward and equipped with mechanical operators, is a "radio control" system furnished by Barber-Colman Co., Rockford, Ill. Usually such doors are opened and closed from pushbutton stations at either side, but the "radio control" supplements these so the doors can be opened by a truck driver without leaving his truck.

This auxiliary control is composed of a transmitting and a receiving set. The transmitting set consists of a self-restoring normally-open pushbutton on the steering rod of the truck, a transmitter and a transmitting coil mounted on the underside of the truck platform, where it is close to the ground. Current for the transmitter coil is supplied by tapping five cells of the truck's storage battery. The transmitter is a simple vibrating device, in principle very much like an electric bell. The vibrating armature makes and breaks contacts in the circuit from the 6-volt battery to the transmitting coil.

The receiving set consists of a pickup coil ⅝-inch thick recessed flush with the driveway or roadbed over which the truck passes to reach the door. It must be not more than 150 feet from the receiver mounted in the building. The receiver contains two electromagnetic relay coils connected in series with the pickup coil. See diagram Fig. 5.

Truck Does Not Stop

When the control button on the truck is pressed, current flows through the vibrator and coil of the transmitter. However, due to the "make and break" action of the vibrator, the current is broken up into a pulsating or intermittent direct current of a fixed frequency which flows through the coil on the underside of the truck platform. As the transmitter coil passes over the pickup coil, which is 10 to 20 feet from the door (truck does not have to stop), it induces a low-magnitude alternating current of the same frequency in the pickup coil, which is connected to the two relay coils in the receiver in the building. Between these two relay coils and subject to their alternating magnetic field is an armature which is mounted on a metal reed whose natural vibration period is accurately tuned to the frequency of the transmitter. The signal from the truck thus causes the armature to vibrate and strike a contact which actuates the mechanical door operator to open the door.

Should the frequency of the truck's signal be different from the natural frequency of the receiver armature reed, the armature will not respond and the door will not be operated. Thus the transmitters of all the trucks must be "tuned" to the receivers operating the doors. Because the required signal is relatively low in frequency —25 to 55 pulsations per second— lighting flashes and other high-frequency electrical disturbances will not operate the receiver.

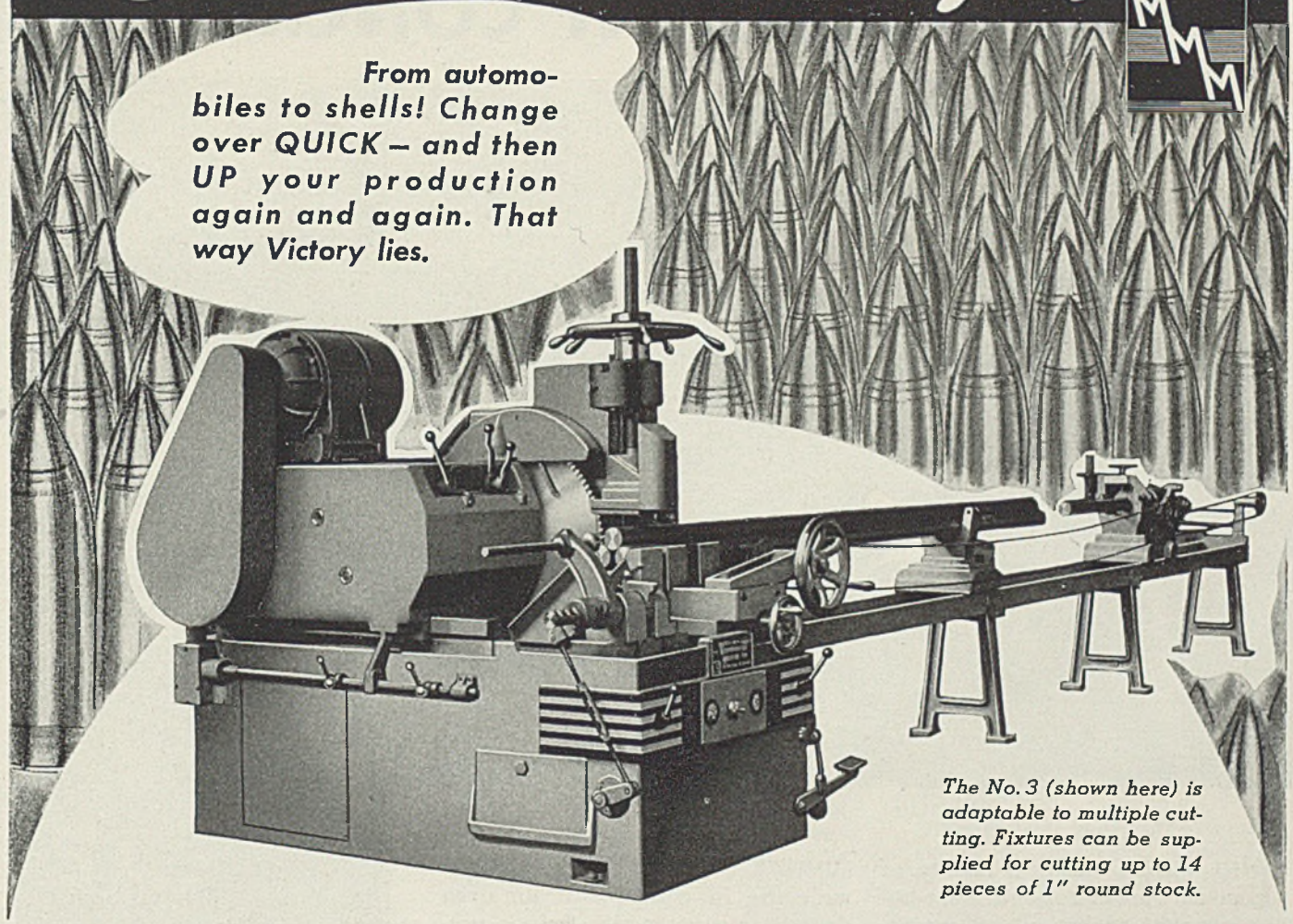
Fig. 4 shows door ascending to permit truck to enter the building. Mechanical door operator can be seen suspended from the ceiling over the door. Standard pushbutton control station is directly to the right of the door.

The closing operation is handled by a second pickup coil and receiver which actuate the same mechanical door operator to close the door. The second pickup coil is imbedded in the floor 10 to 20 feet inside the door and where the truck goes over it as it enters the building. The driver again presses the control button on the truck and the door is automatically closed and locked behind him. Locking is accomplished by the electric brake on the high-speed shaft of the door operator plus the fact that the driving link of an overhead-type door is nearly vertical when the door is closed.

This control system eliminates the need for a doorman to open and close doors for the trucks and for the truck drivers to take time to perform these operations themselves. This produces a definite saving in both time and money. Of course the system might be used not only to open and close outside doors, but also to operate normally-closed doors between plant departments and gates to storage or toolroom areas. It could summon automatic elevators to the floor desired and open the elevator doors to permit a truck to enter without the driver leaving his seat in the truck. Thus this versatile control system has many possibilities in speeding materials handling. Perhaps it could be applied to advantage in your plant!

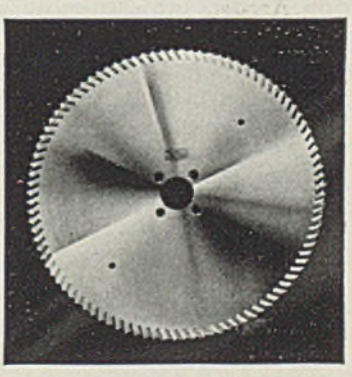
Over and Up!

From automobiles to shells! Change over QUICK — and then UP your production again and again. That way Victory lies.



The No. 3 (shown here) is adaptable to multiple cutting. Fixtures can be supplied for cutting up to 14 pieces of 1" round stock.

With the development of adequate equipment designed and refined expressly for the purpose, the cold sawing of metal figures more and more prominently in the lift that is being imparted to the nation's war effort. Motch & Merryweather Cold Sawing Machines have already cut many millions of shell slugs with uniform accuracy, with square ends, without burr or scrap, at new and tremendous top speeds. The installing of Motch & Merryweather Cold Saws has invariably brought about an exceedingly swift transition from peace-time to war-time production. Their ability to "take it" every hour in the week, month after month, has jumped the output of munitions in a degree impossible to estimate. Ask for our bulletin.



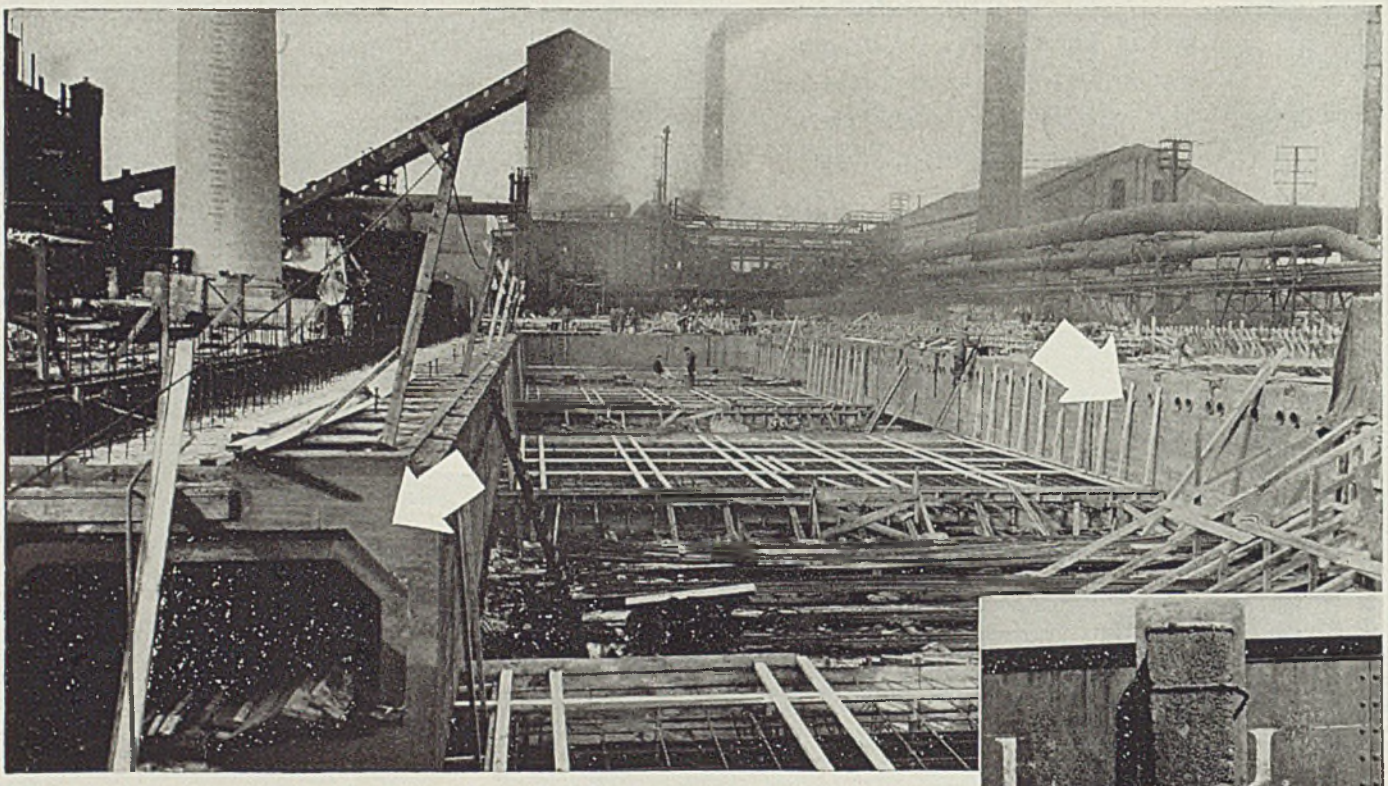
Motch & Merryweather Segmental Saw Blades have definitely set new standards of speed, precision and endurance.

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
Penton Building . . . Cleveland, Ohio

Built by **MOTCH & MERRYWEATHER**

MOTCH AND MERRYWEATHER MACHINERY CO
CLEVELAND CINCINNATI DETROIT PITTSBURGH

COKE OVEN FLUES AND BASE SLAB *BUILT WITH LUMNITE* HEAT-RESISTANT CONCRETE



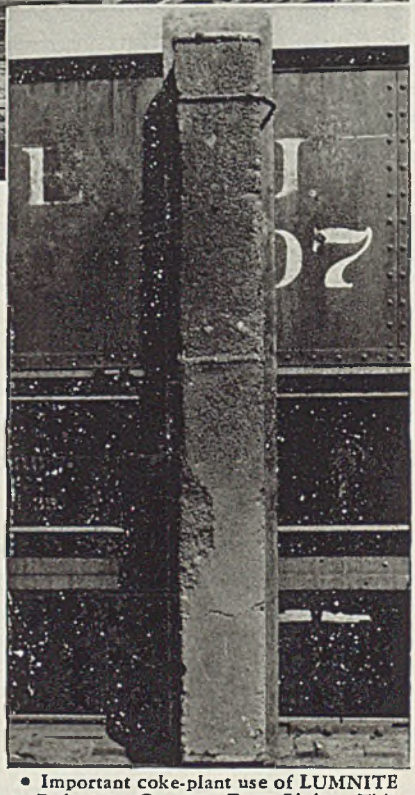
THE picture shows a battery of underburner regenerative by-product coke ovens under construction. Arrows indicate waste heat flues made with LUMNITE Heat-Resistant Concrete. The same type of LUMNITE concrete was later used for the base slab of the ovens.

In the flues of the coke plant above, LUMNITE concrete eliminated the need for a separate refractory lining. This saved one material, as well as construction time.

Other uses of LUMNITE Heat-Resistant Concrete are for top-paving of coke ovens, for furnace foundations and floors subject to continuous high temperature.

LUMNITE Refractory Concrete finds wide use in coke plants for oven door linings, riser-pipe linings, precast gun blocks and flues. Any special shape may be made at the plant as desired. Rapid hardening of LUMNITE makes casting easy, and installation is possible the day after making.

IMPORTANT TO YOU—LUMNITE is obtainable today from building supply dealers throughout the United States. Heat-Resistant and Refractory Concrete are discussed in the booklet, "LUMNITE for Refractory Concrete." Write for your copy to The Atlas Lumnite Cement Company (United States Steel Corporation Subsidiary), Dept. S, Chrysler Bldg., N. Y. C.



• Important coke-plant use of LUMNITE —Refractory Concrete Door Lining. This picture shows a Refractory Concrete Lining after more than 5 years' continuous service.

LUMNITE FOR REFRACTORY CONCRETE

SECONDARY COPPER

. . . . and how it can best be utilized in our war effort

OUR WAR effort has seriously disrupted the industries which collect, reclaim and use secondary copper. Therefore it is important to suggest ways and means whereby the maximum amount of metal can be guided into its best, quickest and most economical use, without debasement of grade.

First is a review of the statistics to get an idea of the size of the problem.

In the past, about one-fourth of all secondary copper was put back into circulation by the electrolytic and furnace refineries. This was the cream of scrap collections, both of new plant scrap and old discarded scrap copper ("demolition metal"). About 50,000 tons a year was new scrap from the industry that fabricates unalloyed copper; it represents a fairly constant load of "material in process". But *much of this high-grade metal absorbed by the refineries can better be used without refining in the manufacture of "composition ingot".*

Statistics Include Scrap

Statistics for total amount of secondary copper include sales of new plant scrap as well as demolition scrap (junk). Obviously the first category is a circulating load of metal in process; only the reclaimed junk represents a new supply of copper. It is, roughly, two thirds of the "total 2,857,100 tons secondary copper" reported for the period 1935 to 1940 inclusive. Owing to the fact that a large proportion of this 2,000,000 tons of old scrap of clean, choice grades is absorbed directly by refineries, brass mills and nonferrous foundries, the residue is increasingly hard to reclaim into usable composition ingot. *It is believed that present official regulations tend to concentrate impure metal in plants which cannot use it promptly and effectively.* Likewise, the amount of junk will decrease unless special efforts are made to encourage its collection.

Manufacture of composition ingot by remelters is doubling in volume, is now on the order of 300,000 tons of ingot annually, and the demand is primarily for analyses with low impurity limits (Army and Navy specifications) at the very time when there is no outlet for low-grade ingot into normal civilian channels, when the sources of clean, old scrap are drying up, and when good plant scrap must—by OPM order—be returned to the originator of the raw material. To meet the immediate demands, enough unalloyed copper plant scrap and No. 1 demolition copper must be made available to ingot remelters to enable them to meet the demands of high-priority castings to be made in the nonferrous foundries.

Used for Priority Materials

This 300,000 tons of alloy ingot, containing approximately 200,000 tons of copper, is now being used almost exclusively for priority materials. A recent study indicates its ultimate destination. Important fractions are contained in yellow brass ingots, in bearings and bushings, and in bronzes with low impurities.

An accumulation of at least 100,000 *tons a year of "orphan" high-zinc brass is to be expected, denied to civilian consumption and unwanted by the war industries.* To this must be added a sizable amount of even more impure metal which has been sent to smelters under the terms of "conversion contracts", now prohibited. Reclamation of high-zinc brass into alloy bronze ingot of analyses desired by the armed forces involves dilution with three times its weight of low-zinc alloy.

Another outlet is smelting and separation into its components—a difficult smelting problem. Smelting processes and available capacity should be appraised with a view toward reclaiming the copper, zinc, tin and lead in this surplus brass as separate metals of commercial purity.

Bearings and bushings are now bought by the armed services in large quantity with lead limits so low that 2½ to 4 pounds of virgin copper, tin and zinc must be melted for every pound shipped as bearings. *Ample experience in peacetime industrial machinery proves that such low lead limits are quite unnecessary,* and a competent American Society for Testing Materials committee proposes to modify them so secondary metal can be utilized. *It is recommended that the revised specifications be given careful consideration for adoption as governmental standards.*

Railroad rolling stock uses journal bearings made of a 25-pound arch casting of lead bronze, lined with 3/16-inch of babbitt. Successful and long experience with ball and roller bearings in engines and passenger cars suggests that these be so applied, up to the production capacity of the present mechanical bearing industry. *All remaining bronze railroad bearings should be made exclusively of secondary metal.*

Should Study Railroad Bearings

Since automotive experience proves steel-backed bearings lined with thin layers of anti-friction metal are superior, a committee of appropriate experts should vigorously press a program looking toward such a substitution in the railroad industry. When accomplished, this would avoid the annual consumption of about 25,000 tons of alloy ingot and would make available for reclamation a large part of the "sink" of 250,000 tons of copper, tin and lead.

Many thousands of tons of bronze castings for the Navy, Army and Air Force now require such low impurities (especially lead) that much virgin metal must be used in their compounding. It is recommended that civilian engineers and service officers intensify their work in making an immediate and joint study of existing drawings and specifications, and limit the use of low-impurity alloy strictly to those portions of present assemblies that undoubtedly require them.

Finally, at least 20,000 tons of copper will be used annually in the iron and steel industry. Most of this copper has not yet appeared in the statistics. This metal is permanently lost to nonferrous uses. Much of the low "copper bearing" irons and steels can be made without copper additions by selecting steel scrap and pig iron high in copper. *The copper alloy steels should utilize these sources plus copper shot made from demolition copper too high in iron for nonferrous foundry use.* If the emergency demands it, copper may be used to substitute for some of the scarcer alloying elements in steel and cast iron.

From a study by Ernest E. Thum, editor, *Metal Progress*, and prepared for the War Production Board as part of the work of the Metals Conservation & Substitution Group of the Advisory Committee on Metals & Minerals of the National Research Council of the National Academy of Sciences.

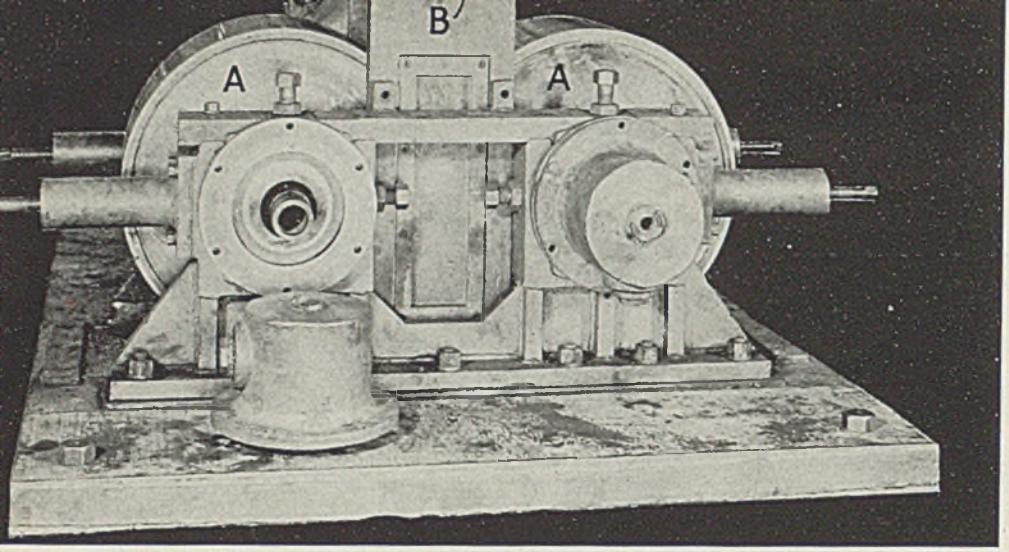


Fig. 1—Front view of 7000-pound per minute film-impact casting machine taken on shop assembly floor. Rolls are designated **A**, and top funnel, **B**

FILM-IMPACT PROCESS

For Casting Metals

By J. M. MERLE
Metallurgical Engineer
Chicago

FAST METHODS of production is one of the present urgent needs. Our country must overproduce our enemies in better instruments of destruction of all kinds and the time factor required to attain that objective is important. Shortening this time period means a saving in precious human lives not only in our armed forces and those of our Allies but also in the civilian population.

Existing producing capacity is now being used to the utmost. Billions of dollars are being spent to expand existing mills or to create new mills.

Considerable progress has been made in the production of castings. Centrifugally cast gun barrels have been developed by our arsenals. The automotive industry has developed methods, such as the Triplex process, by which refined carbon steel or alloy steel is made available quickly.

A method of making centrifugally-cast brass and copper pipes having the same properties as pierced seamless pipes was developed in 1923. Research shows that if a stream of molten metal is placed in a supercooled condition before molding, the resulting casting will have a crystal structure and physical properties like a forging instead of the usual cast structure. By "supercooling" is meant to cool below the freezing point without solidification. A supercooled liquid is in a metastable condition and solidifies spontaneously when brought in contact with even a small particle of the solid phase or under a shock. Such a metal forms a casting in a mold like an ordinary melt but with a different and new structure, as a result of the removal of all the extra heat for handling and latent heat of fusion from the molten metal to place it in a supercooled state.

In 1933, two methods were developed to produce high-speed tool steel in the form of tools cast to shape as well as billets. Instead of having properties equal to competitive steel produced by forging and rolling, the impact-cast tools would cut two or three times faster or wear two or three times longer.

It was evident from the beginning that a mass of molten metal such as the content of a steel ladle could not be supercooled and then cast. It is difficult to pour this steel when left to cool under slag to a temperature only 50 degrees Fahr. above its freezing point. Even then this cold molten steel fully contains all the latent heat of fusion which represents more than 75 per cent of the heat to be dissipated to reach solidification and whose slow elimination is the main cause of ingotism and segregation in castings. The operation to be successful had to be continuous, fast and the supercooled metal immediately molded. This led to the development of the film forming method.

The processing and working of the molten metal is effected as follows: A molten metal stream from a ladle is formed continuously and instantaneously into a thin film of controlled thickness by a moving, clean and dry metallic section which can be a rotary disk, a metallic belt or the circular rim of a drum. The material, thickness, thermal conductivity and surface condition of this moving metal section have been selected to produce the fastest possible heat removal from the molten metal film. The length or periphery of this section has been designed to allow for the continuous and complete transfer of the heat to the air by radiation or to a liquid coolant.

The molten metal film adheres to and is carried by the selected moving metal section and loses heat rapidly by thermal conductivity without any oxidation or chemical contamination modifying its composition. As it loses heat the physical condition of the molten metal film changes and when it becomes supercooled it loses its adhesion to the moving metal section. The propelled metal film, as it becomes free, retains in its unsupported travel the direction and high velocity previously acquired and so is directed continuously to impact into a mold under its high velocity. For certain molds, such as sand molds, this high velocity is reduced by reshaping the film to the form of a supercooled stream before it reaches the mold. The extremely fast removal of heat from the molten metal film prevents the well-known selective segregation of metal components and it also liberates all gases contained before

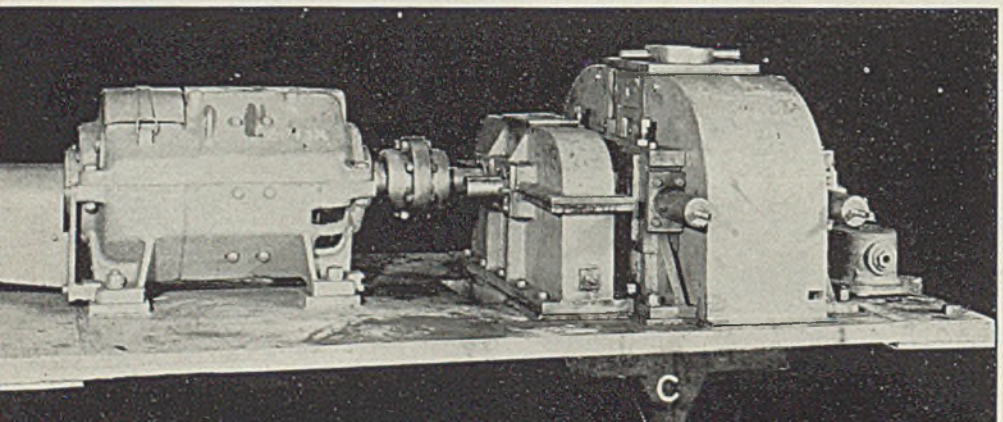


Fig. 2—Rear view of 7000-pound film-impact casting machine showing motor drive and reduction gears

Reduce CORROSION LOSSES DEPRECIATION MAINTENANCE EXPENSE

n Pickling, Plating and Other Processes Involving Electrolytic Action

Use NATIONAL and KARBATE CARBON and GRAPHITE PRODUCTS

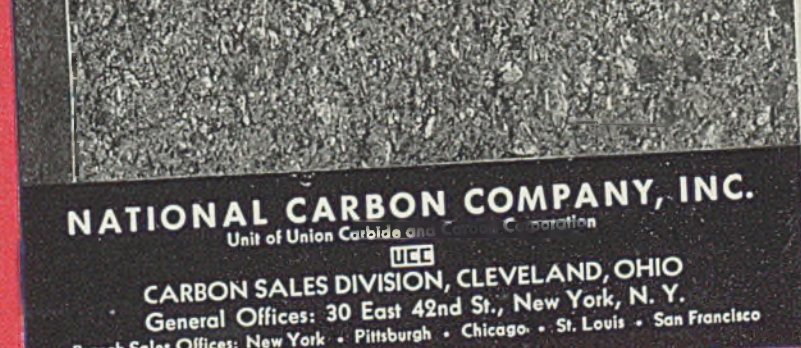
TRADE-MARK TRADE-MARK

Carbon and graphite products are adapted to a wide variety of pplications where difficulties are encountered with other materials s a result of thermal shock or reaction with process materials. hey are resistant to the action of most acids, alkalies and solvents, ossess good mechanical strength and exceptional resistance to ermal shock. Graphite and graphite base "Karbate" products ave higher thermal conductivity than most metals. "Karbate" aterials are impervious to seepage of liquids and gases. Porous rbon and graphite products, of high permeability, are also avail-ble.

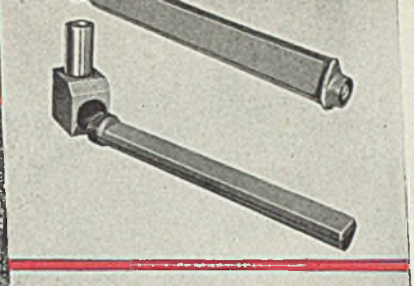
Carbon and graphite products are manufactured in a variety of rms and, being easily machined, can be fabricated meet almost any structural requirement.

Thousands of dollars are being saved in the metal nd process industries by the use of carbon and raphite elements in the construction of equipment bject to corrosive action or severe thermal shock. roducts shown at right illustrate the versatility of ese materials.

RITE NEAREST DISTRICT OFFICE FOR INFORMATION ON THESE PRODUCTS

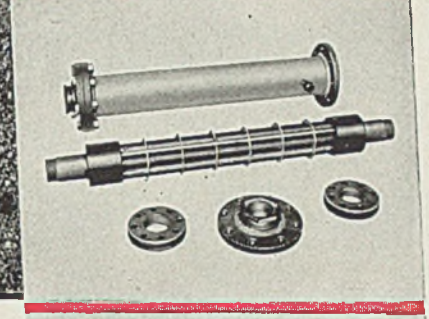


NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
CARBON SALES DIVISION, CLEVELAND, OHIO
General Offices: 30 East 42nd St., New York, N. Y.
Branch Sales Offices: New York • Pittsburgh • Chicago • St. Louis • San Francisco



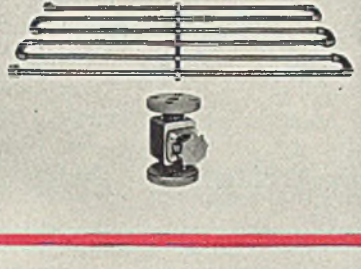
AND GRAPHITE

For agitators, steam spargers, gas diffusers and filters. Several grades, differing in degree of permeability, are available. Resistant to both corrosion and thermal shock. Can be fabricated in practically any required form.



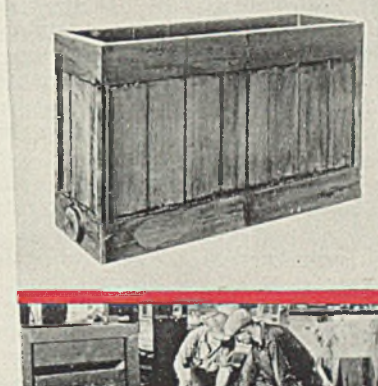
HEAT EXCHANGERS

Constructed from "Karbate" tubes and fittings. Bayonet, immersion, cascade, concentric tube, tube bundle and gas flame types. Shell and tube types with either metal or "Karbate" shell. Many installations in successful use for heating, cooling, condensation or absorption of corrosive materials.



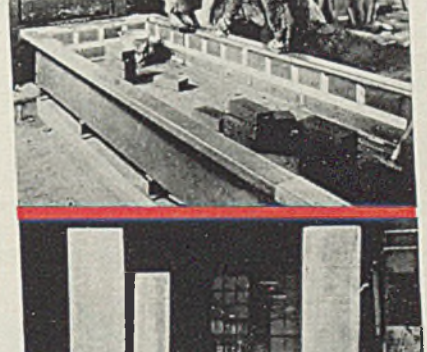
PIPE, VALVES, PUMPS AND FITTINGS

For the construction of conveying or circulating systems carrying or in contact with corrosive materials, carbon, graphite and "Karbate" pipe and accessories eliminate corrosion difficulties. Permit construction of complete circulating systems in which solution has no contact with metal.



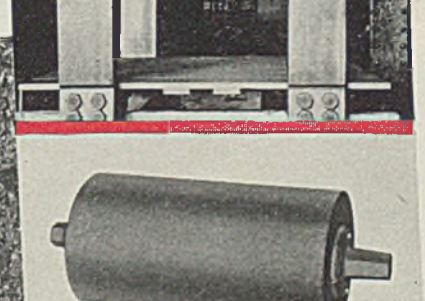
FABRICATED CONTAINERS

Tanks, vats and other containers for corrosive materials can be constructed from carbon, graphite and "Karbate" parts, providing economical and permanent construction.



TANK LININGS

Carbon and graphite brick and other special shapes provide a durable lining for pickling tanks and other containers where resistance to corrosion or thermal shock is essential.



GRAPHITE ELECTRODES

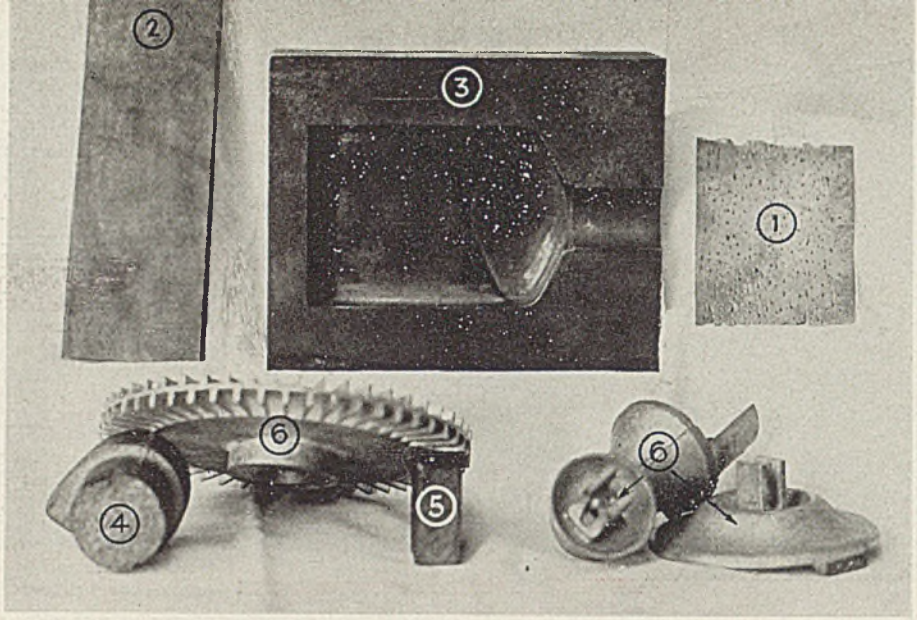
In the electrolytic pickling of strip steel, fabricated graphite electrodes provide increased life, ease of installation and freedom from reaction with pickling solution. All parts made of graphite.

CARBON ROLLS

Carbon not attacked by most plating or pickling solutions. Have demonstrated long life and improved performance.

GRAPHITE BEARINGS

Self lubricating. Can be machined to close tolerance. Bearings, bushings and rings of graphite or carbon-graphite composition are used where oilless or corrosion resistant materials



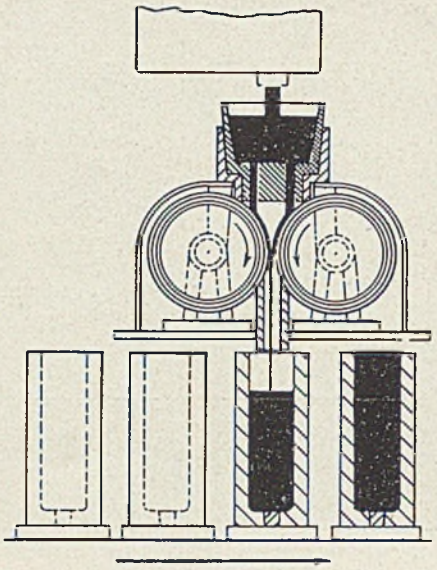


Fig. 3. (Left, above)—Chilled film (1). Direct-rolled steel strip (2). Die cast to finished shape (3). Gravity cast iron of open grain (4). Impact-cast iron of fine grain (5). Die casting (6)

Fig. 4. (Right)—Film-impact casting machine. Film propelling cylinders are water jacketed. Heat abstracted by machine, 75 per cent; by mold, 25 per cent—of total to be eliminated

the supercooled film reaches the mold.

Removal of heat from the molten metal film is so fast that it is hard to visualize. By the addition of a small surfacing roll acting at the point where the molten metal reaches the supercooled state, films formed over the rim of a rotating drum can be collected in the form of solid continuous strips. Such strips of 0.040 to 0.004-inch thickness have been obtained at speeds of from 500 to 3000 feet per minute and with various metals, from lead to steel and alloy steel.

The film-impact process can be used for the production of most metal products in sand, metal and continuous molds and for metal dies. As a result of the supercooling, degassing and propelling of the molten metal, the products molded from it have a crystal structure, density and physical properties comparing favorably with forged and rolled products of the same composition. It is a direct process requiring simple machinery and little power and specially well adapted for large tonnage and mass production. It can be carried out in compact, completely integrated plants producing finished products, independent from other plants for supply of partly worked materials. This advantage is important in the present situation.

Industrial use of the film-impact process requires co-ordination between the three following elements:

1. Source and supply of molten metal.
2. Impact-casting machinery.
3. Molding equipment.

Impact-casting machinery is entirely new equipment. Basically it is an apparatus for large and continuous operation, designed to handle from a few pounds to 3 tons of molten metal per minute. The machine is intrinsically a heat transfer and propelling unit. While a general design is applicable to most productions, the size and width of the film forming cylinders as well as the composition and thickness of the materials used are governed by the thermo-conductivity of the molten metals or alloys handled. The film velocity is affected by the volume of molten metal to be handled per minute and also by the nature and shape of the castings to be produced. In certain cases, rotary molds are necessary to properly form bimetallic products. For a limited production of small castings, the simpler and cheaper film-forming disk can be used to advantage.

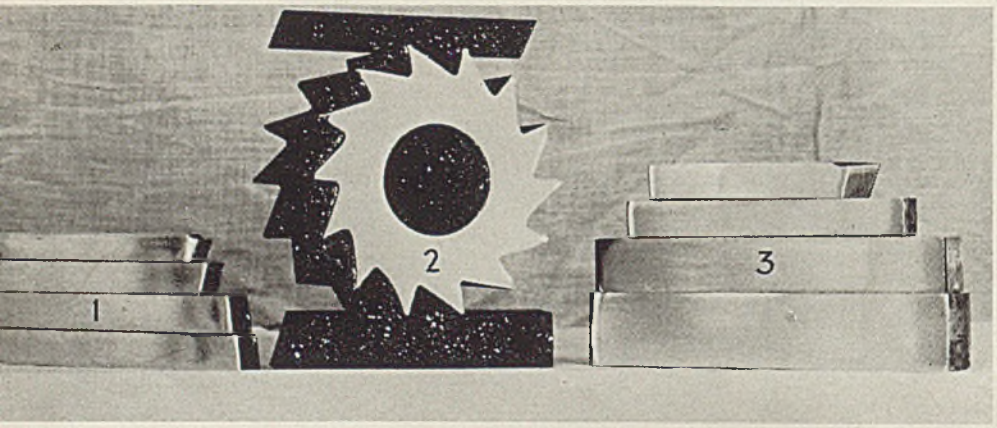
The molding equipment is determined by the number, size or shape of products to be made.

Ingots of all metals can be cast. These ingots come with a uniform structure right to the top, and free of defects. The full weight of the ingots can be turned into rolled products, thus eliminating a loss of about 30 per cent in sinkheads. In casting ingots, an impact-casting machine is interposed between the ladle and the ingot mold. The regular stream of molten steel from the ladle nozzle is poured into the machine which transforms it into a supercooled film and directs it into the mold until the mold is filled. After the stopper of the ladle interrupts the stream of molten steel, the next mold is indexed under the machine and next pouring operation started, the same as pouring ingots directly from the ladle.

Instead of making ingots of standard sizes which require many rolling operations to be transformed into commercial products of desired sizes and shapes, the impact-casting process can be used to produce these commercial products directly to finished sizes and shapes or ready to be finished by cold rolling or drawing. The equipment required in that case is as follows: An impact-casting machine directing the film of supercooled metal into a short mold, generally water-cooled. In this mold the metal film is continuously impacted to the shape of the desired product; billet, plate, strip, rod, rail, tube, wire, etc. A stand of rolls running at a synchronized speed continuously pulls the solid product out of the forming mold, giving it a reduction pass if desired. Depending on the products made, ac-

(*Please turn to Page* 102)

Fig. 5—High-speed steel tool bits (1). Tools impact cast to shape (2). Bimetal tools forged from billets (3)



2,181 shell forgings

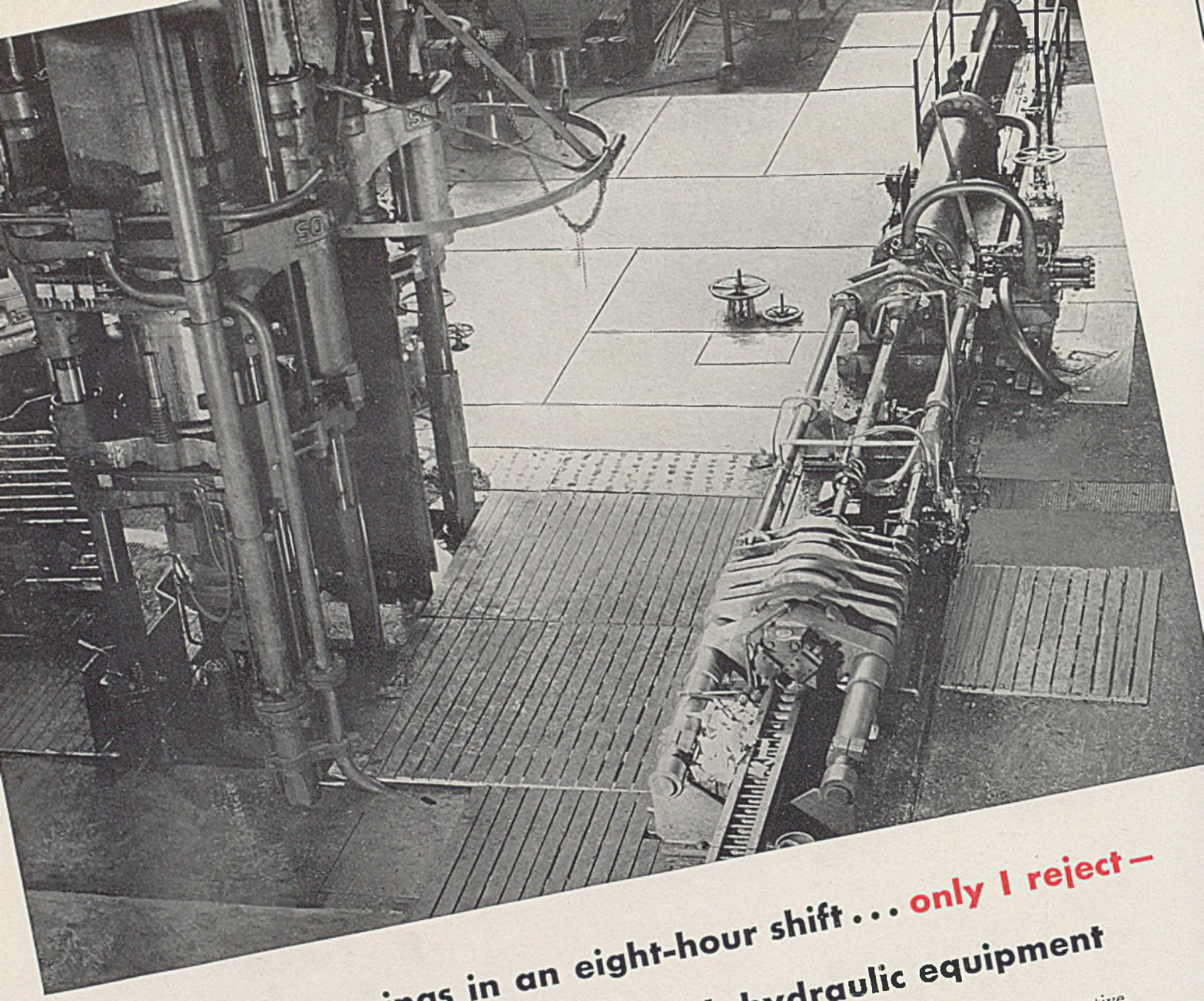
in an eight-hour shift

only **1** reject

a **record** output

on Southwark

hydraulic equipment



2,181 shell forgings in an eight-hour shift . . . only 1 reject—

a record output on Southwark hydraulic equipment

In an eight-hour shift, National Supply Company produced 2,181 medium size shell forgings on Southwark Hydraulic Forging Presses with only one forging rejected. This is a record run on a single manufacturing line for this company.

For sustained high production of forgings, 75-mm to 16-in. diameter, no shell forging process excels the hydraulic press method. The record made by National Supply Company is typical of many Southwark installations in plants from coast to coast.

Regardless of your production requirements—billet-breaking, piercing, drawing and nosing—there is a Southwark press to help you produce a greater number of forgings with a lower percentage of rejects.

Southwark also builds high pressure pumps, all types of valves and accumulators; engineers plant piping and forging plant layouts. Whether you need a complete shell forging plant or a single quick-acting operating valve, it will pay you to secure Southwark's recommendations first.

Baldwin Southwark Division of The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco, Calif.

BALDWIN

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BLW THE BALDWIN GROUP

DIVISION OF THE BALDWIN LOCOMOTIVE WORKS • PHILADELPHIA

PITTSBURGH POST-GAZETTE—MAY 7, 1942

2,181 Perfect Shells, only One Bad—A Record

Producing a record run of 2,181 shell forgings on a single manufacturing line in an eight-hour shift, this crew employed by the National Supply Company had only one forging rejected by ordnance inspectors. Foreman James O'Neill holds the one scrap shell out of the record run. Members of the crew left to right are: Front row, John Tomplack, Piercing Press Operator; James O'Neill, Plant Foreman; Frank Wargo, Loader; Arnold Goss, Cooling Bed Tender and Edwin Miles, Drawing Press Operator; Standing—Joe Rattlesdorfer, Ordnance Inspector for the Army; Howard Lutz, Cooling Bed Tender, Virgil Blosser; Furnace Discharger; John Beeler, Relief Man; Alex McClellan, Piercing Press Operator; Walter Srewnowski, Relief Man, George Ruddy, Checker; Sheridan Wilson, Tongue Man and Zeno Lazzaretti, Furnace Charger.

FLASH . . . A few days later, another crew at National Supply Co. established a new record—they produced 2,277 shell forgings in an eight-hour shift, WITHOUT A SINGLE REJECT.

Has your Testing Equipment Kept Pace with your increased production?

In building our war machine, there must be no sacrifice of quality for speed. America must have not only the most, but also the best that its industries can produce. The physical properties of materials must be known by both producer and fabricator alike—specifications must be met, there can be no compromise.

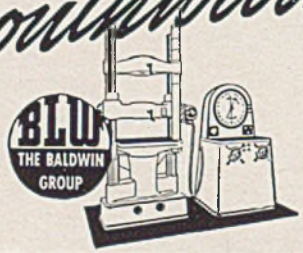
It's easy to run fast, accurate tests on a recorder-equipped Southwark-Tate-Emery testing machine. A continuous-line stress-strain curve is plotted simultaneously with each test and complete tests, including records, can be made in as little as four minutes on routine work.

A wide variety of physical testing machines and instruments for both static and dynamic strain measurement and stress analysis is available from Baldwin Southwark in addition to the universal machine.

A complete listing and brief description of our equipment is available in Bulletin K-107. Write for your copy today.

BALDWIN

Southwark



DIVISION OF THE BALDWIN LOCOMOTIVE WORKS • PHILADELPHIA

Wood Sash for Industrial Buildings

CONSERVES STEEL

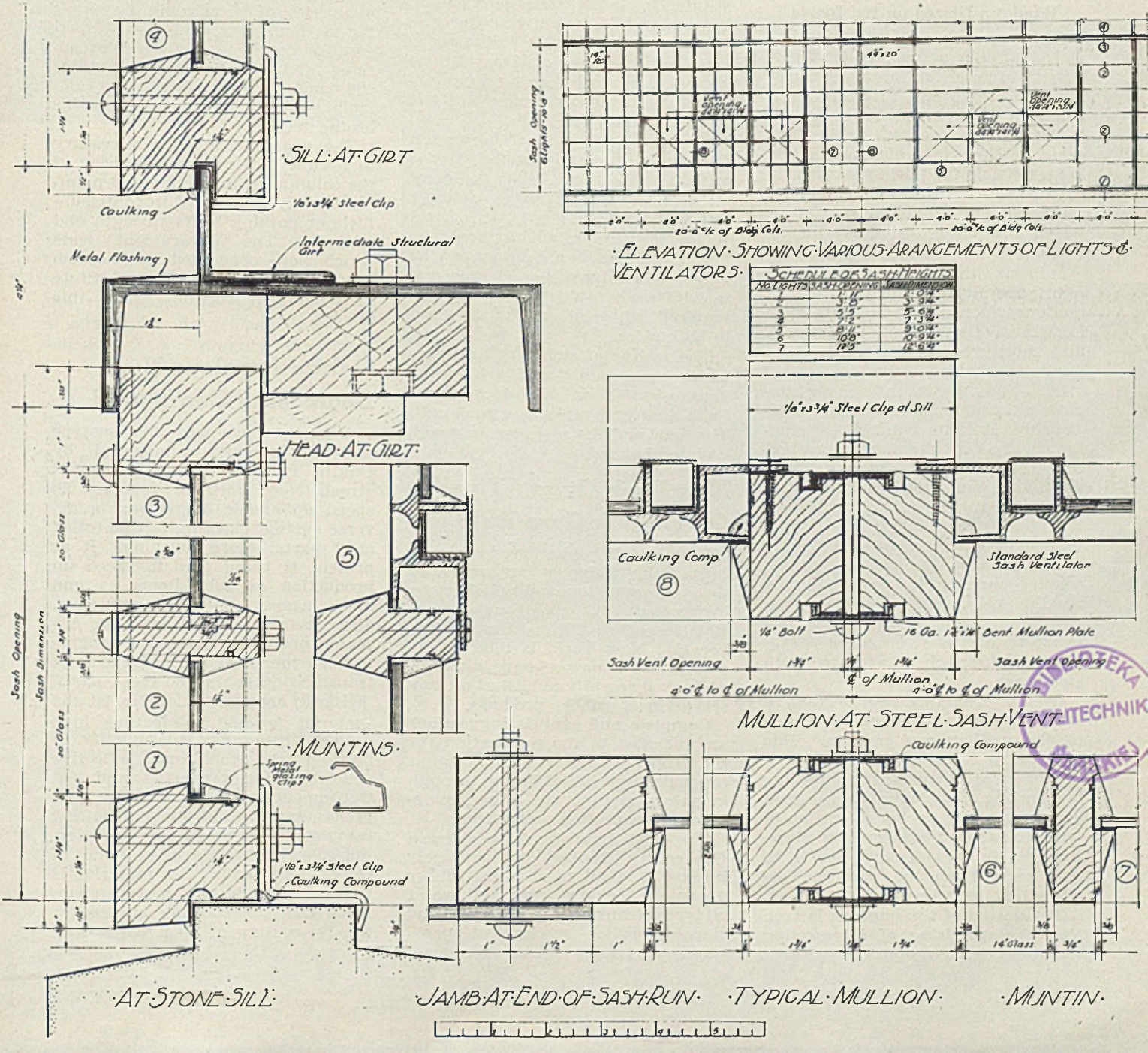
RESTRICTIONS on the use of steel lend timely importance to a new type of wood sash developed by Albert Kahn Associated Architects & Engineers Inc., Detroit, which is claimed to serve for industrial and other buildings as well as the standard steel sash hitherto employed.

In order that the new "victory" sash may be available to all architects, engineers and contractors engaged in designing and building war production plants, John Schurman, its designer, and the Kahn organization, of which he long has been a member, have waived all patent rights to the development. Blueprints describing the new sash in detail are available to the entire war production building industry.

In creating the new sash, full advantage was taken of experience gained in the development of steel sash with its simple frame and mullion construction and its simple, compact ventilators—all built up at the factory in standard units. Only two mullion supporting members, each measuring approximately 2 x 4 inches, are used in the new design. The majority of the frame members common to former wood sash are

Above, John Schurman, developer of the "victory" sash, shows his employer, Albert Kahn, (left) how sections are held together by a small metal strip, also shown in detail drawings

Below, details of the Kahn "victory" sash which employs wood instead of steel frames



eliminated. Instead of supporting complicated frames, stops and other elements, which held the sash in turn, the 2 x 4's now directly hold the glass.

Each unit is built complete in the mill and shipped to the job where it is erected between head and sill. No other frames or sills are required. The wood sash is erected in the field in the same manner as steel sash is put in place. As the units are erected, the mullions are joined by a coverplate of light pressed metal with a small intervening space for expansion and contraction. Caulking compound furnishes complete weather-proofing. At the sills, the wood sash is secured by metal clips clamped only at the mullions with regular mullion bolts. Caulking at these points provides the necessary weather protection. The sill is designed so as to eliminate crevices in which dirt and moisture might accumulate.

Windows Glazed on the Inside

Conventional wood sash is always glazed on the outside and thus is subject to deterioration as result of its exposure to sun, rain and frost. Glass is held in place by metal brads rigidly secured against its surface. This rigid glazing method is responsible for much glass breakage. Almost invariably, cracks in the glass radiate from the points at which the brad fasteners are located.

Muntins in conventional wood sash generally are made in molded sections which reduce their strength and form beads that collect dirt and moisture and are difficult to paint thoroughly.

Sash and muntins in the new window are simple in design and relationship. Molding cutouts are eliminated, and thus the maximum wood section is maintained for maximum strength. The wood is beveled to provide a run-off for any moisture that may accumulate.

Glazing is done on the inside, rather than the outside, so that the weaker part of the wood section and the putty are protected from the weather. The glass is secured on the inside by means of standard spring glazing clips such as are used with steel sash.

In the "Victory" sash section, a raised lug is provided on the inside of the mullion and muntin. This provides a "footing" for a definite thickness of putty. Next to the lug is a glazing clip groove which serves also as a putty anchor. Since putty tends to adhere more firmly to glass, there is far less chance for it to curl away from the wood surface with this arrangement.

The design of the muntins is such that the mortising of intersecting members is accomplished without impairment of their strength. Mortises are located inside the sash, away from the weather.

A steel ventilator for use in the wood sash is made complete with hinges, pivots, slides, push bar and chain pull. It can be adapted to gang, hand or motor operation. The amount of steel involved in the ventilator, by comparison with the amount of fixed wood sash in a given building, is so small that it can hardly be considered a drain on steel supply.

A decided advantage offered by this type of ventilator is that at any future time, when realignment of a manufacturing operation calls for more ventilation, this can be achieved without any difficulty at all. The light wood muntins can be removed and a standard ventilator installed without any further changes.

The new sash, it is pointed out, was developed primarily as a substitute for steel sash but should have many logical uses after the war. For one thing, it would serve well where severe acid conditions prevail. And wood, properly maintained, withstands the effects of salt air better than steel.

The new sash is ideal for use in factory or office partitions. Under ordinary conditions, it has sufficient strength to extend up to extreme ceiling heights without reinforcing. When in use as a partition, the lower portion of a section can be glazed with plywood or similar material. Or where flush partitions are required, plywood can be fastened to both sides.

The sash is of sufficient thickness to accommodate doors, with mullions serving as the door jams. Each door unit replaces a sash unit. The door and the sash can be readily interchanged.

New Book Gives "Tips" On How To Save Rubber

Because all rubber products now in use by industry are essential to war production and will become increasingly difficult if not impossible to replace, United States Rubber Co., New York, is offering industrialists a new 48-page illustrated book it recently published on conservation of rubber products.

Complete and explicit suggestions are included in the publication for the proper care of these important products from initial design through inventory and storage to use, maintenance, inspection and repair.

The book, *First Aid to Industry in Conserving Rubber*, is completely indexed and all mechanical rubber goods are included, such as hose of all types; transmission, conveyor and elevator belts; mechanical packings; electrical tapes, wires and cables; molded and extruded rubber goods; rubber lined equipment; rubber mountings, mats and matting; printing materials; and rubber-bonded grinding wheels.

Copies of the book are being mailed immediately to more than 50,000 engineers, plant managers, superintendents and others responsible for production. Other copies are available on request.

Perforated Plates Add Strength to Columns

Tests at the National Bureau of Standards show that perforated cover plates for steel columns contribute to the strength and especially to the stiffness of columns, and that holes in the plates do not weaken them unduly, according to the Department of Commerce, Washington.

This work was undertaken following suggestions that considerable quantities of steel could be saved for vital military equipment if perforated cover plates were substituted for lattice bracings or battens ordinarily used to join the two solid members of built-up columns for bridge trusses.

The open construction necessary to permit access to the interior of the column for inspection and painting usually is assumed to contribute little or nothing to its strength and stiffness. The government tests which were conducted in co-operation with the American Institute of Steel Construction, refute this theory.

Oakite Develops New Degreasing Compound

A newly developed alkaline-type material recently announced by Oakite Products Inc., 57 Thames street, New York, is reported to speed up anodic degreasing or reverse current cleaning of cold-rolled steel parts before finishing. It at present is being used to speed up production of such items as gun mechanisms, control instruments, aircraft forgings and bearings, airplane propeller hubs and engine parts, armor-piercing shell and tank transmission gears and tread parts.

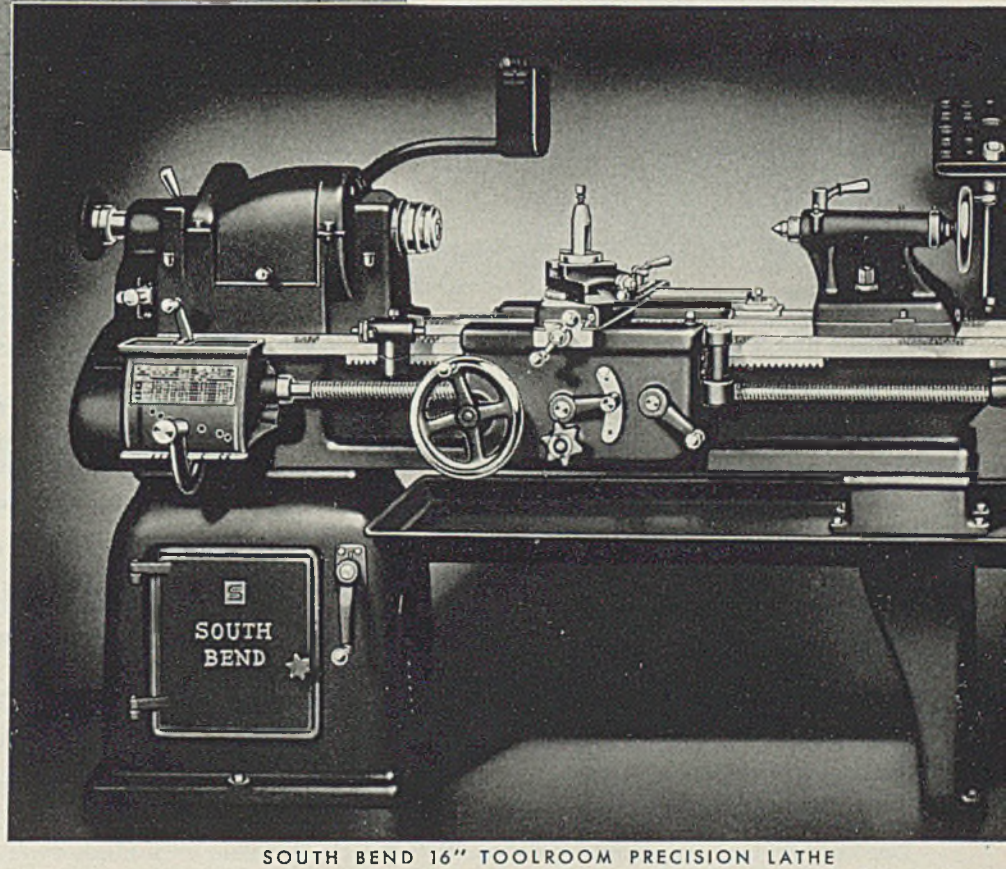
Known as composition No. 90, the material is said to feature high conductivity, ready adaptability to hard water conditions, effective smut-removing properties and fast wetting-out action, removing oil, grease, smut, polishing and buffing compounds on the speedy basis required where a large volume of work is handled. The material is particularly advantageous to shops using the Bullard-Dunn process for the tin coating of steel parts, it is reported.

They Work Together *for* YOU

Yes, these two men are working together for you, a prospective user of South Bend Lathes. Together a shop foreman and a designer are finding the answer to one of the problems that must be solved to maintain South Bend standards of quality. Their friendly cooperation is typical of the shoulder to shoulder teamwork of our employees. This coordination of effort contributes much to the service and satisfaction you will receive from a South Bend Lathe.

All of us, here at South Bend, are working together for you—and for National Defense. Production schedules have been doubled and redoubled. But no sacrifice in quality has been made—nor will there be any lowering of our standards.

South Bend Lathes are made in five sizes: 9″, 10″, 13″, 14½″ and 16″ swing, Toolroom and Manufacturing types. Each size is available in several bed lengths. Complete line of practical attachments, chucks and tools.



SOUTH BEND 16″ TOOLROOM PRECISION LATHE

SOUTH BEND LATHE DEALERS

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Lathe Builders For 35 Years

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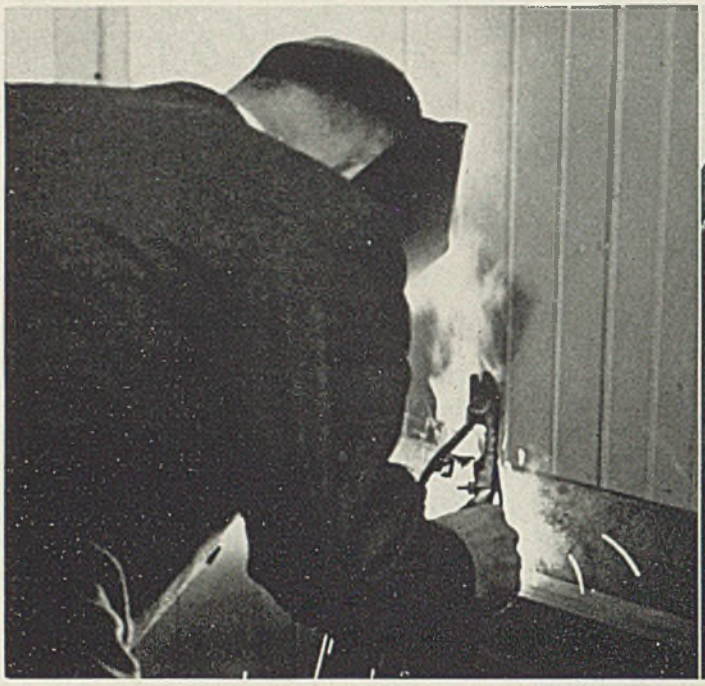
TRADE MARK SOUTH BEND TWINS ENGINE LATHES



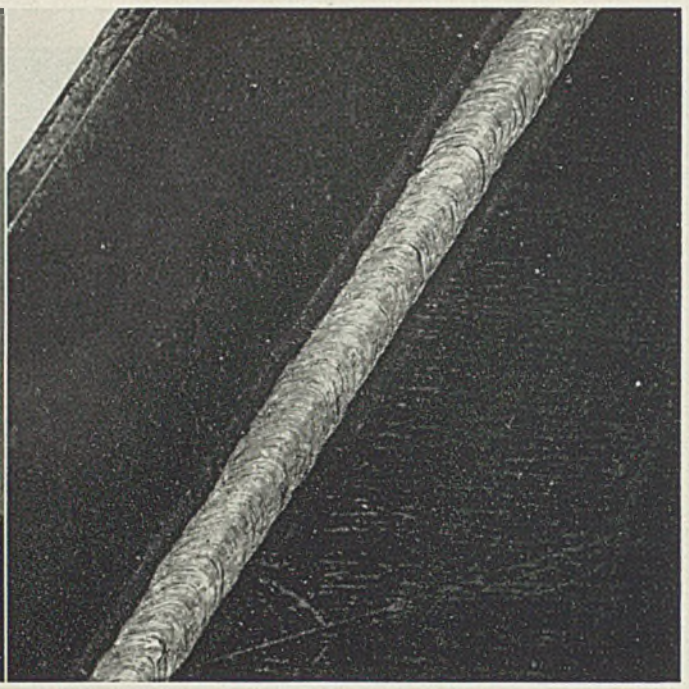


Fig. 1 (Left, above)—With no previous welding experience whatever and after practicing striking the arc only three times, a salesman lays down the bead shown in Fig. 2 (Right) with no difficulty since he merely need travel the rod down the joint at a uniform rate, arc length being held automatically by the rod coating. Note smooth, uniform, high strength weld bead in Fig. 2 deposited by green operator. This is first weld this man ever made

SEMI-AUTOMATIC WELDING ROD

—puts green operators into production welding quickly

—simplifies operation of the arc so higher speeds can be followed

—deposits uniform bead for good appearance, high strength

—has heavy coating that deposits self-removing slag, confines spatter

By DR. J. A. NEUMANN
Director of Research
American Agile Corp.
Cleveland

A NUMBER of people have seen interesting possibilities in the so-called "firecracker" welding process developed some time ago in Europe and used there with some success in a number of applications. Firecracker welding is a means for automatically making fillet welds by using a long electrode which is heavily coated with an insulating material. The method is applicable only to making fillet welds and V-butt welds.

In making fillet welds by this method, the work is positioned so the walls of the fillet form a V, open at the top. Into this trough the length of electrode is placed and connected to a welding generator. The action is started by shorting the far end of the rod to the work, thereby starting the arc at that point. As the electrode burns off, the arc travels back along with the electrode. The result is that, once started, the process proceeds to completion with no supervision. The main advantage of such a scheme is that the joint is made without further attention from the operator, once the action is begun.

One of the major applications of this type of welding appears to be in making fillet welds or V-butt welds in assembles which are inaccessible for conventional hand arc welding. It is understood that one manufacturer in the eastern part of the United States is now using this method successfully to make a fillet weld in an otherwise inaccessible location.

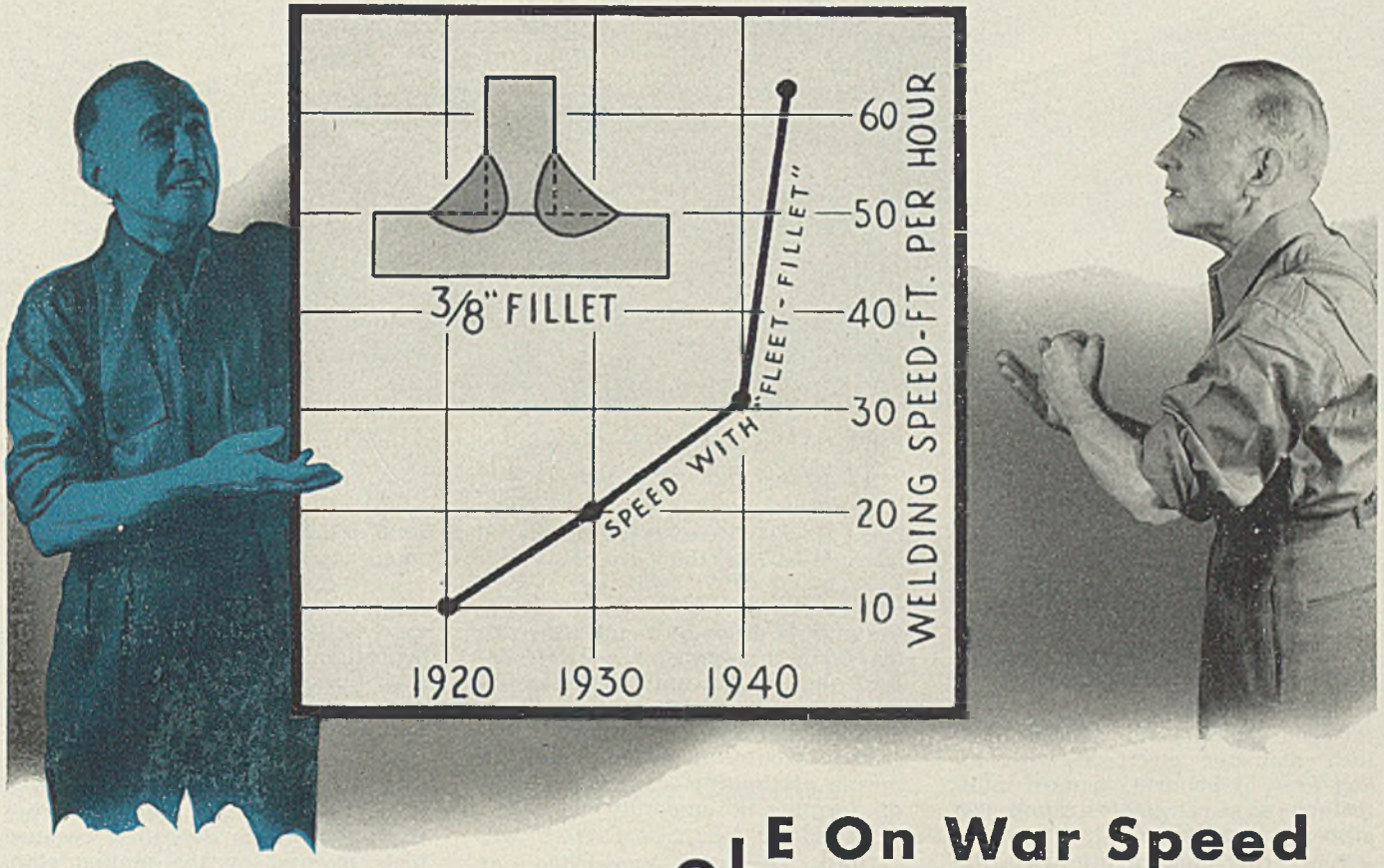
There are a number of important disadvantages, however, in the process as originally developed, for considerable difficulty was experienced in obtaining uniform burning-off action. The result was that excessive metal was deposited at some points of the joint whereas insufficient metal was deposited at other points—or the arc went out and the action stopped before the weld was completed.

Another disadvantage was that, as originally developed, the electrode material had a very slow burning rate. This resulted, of course, in low deposition rates which seriously hampered the production capacity of the process. At the present time, the eastern manufacturer mentioned above is the only one who has been able to employ firecracker welding successfully in this country so far as is known. However, considerable work is being done on this proposition, and undoubtedly sooner or later such an electrode material will be developed that will operate satisfactorily for a wide range of work.

In the meantime, development has been completed on a semi-automatic type of electrode whose operation is quite similar. The resultant product is already widely employed in this country. With this type of welding rod, it is possible for a green welder to lay down a good weld in his first attempt. To understand how this is possible, let us examine the principles involved in the operation of this electrode.

A study of the electric arc shows

then I said to myself—



Here's a NEW ANGLE On War Speed

Look how war industries can step up welding output with the new "Fleet-Fillet" Technique!

ALTER EGO: Looks like arc speeds of 30 feet per hour have been increased to 65 feet per hour for a 3/8" fillet overnight. That's more than 100 percent. How could it be possible?

According to Lincoln it's simply a matter of selecting the right electrode, using the new "Fleet-Fillet" Technique and going like blazes.

ALTER EGO: But isn't that speed tough on the "Man Behind the Mask"?

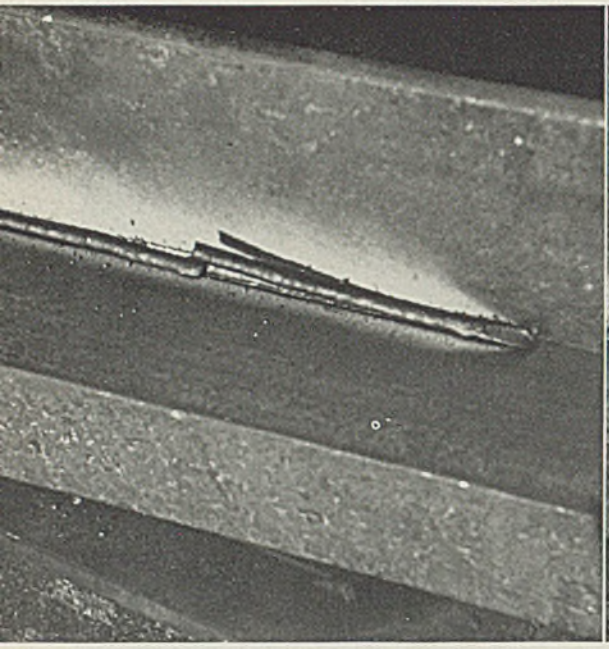
Not at all. In fact, many welders who have tried this new technique say it actually is easier — causes less fatigue than the old way!

ALTER EGO: Then every American—from the welder to the president—should go for it! Let's see the details in Lincoln's new bulletin "The Fleet-Fillet Technique For Speeding War Production and Cutting Costs." And let's put it to work for Uncle Sam without delay.

"Fleet-Fillet" Bulletin 432 free on request.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.



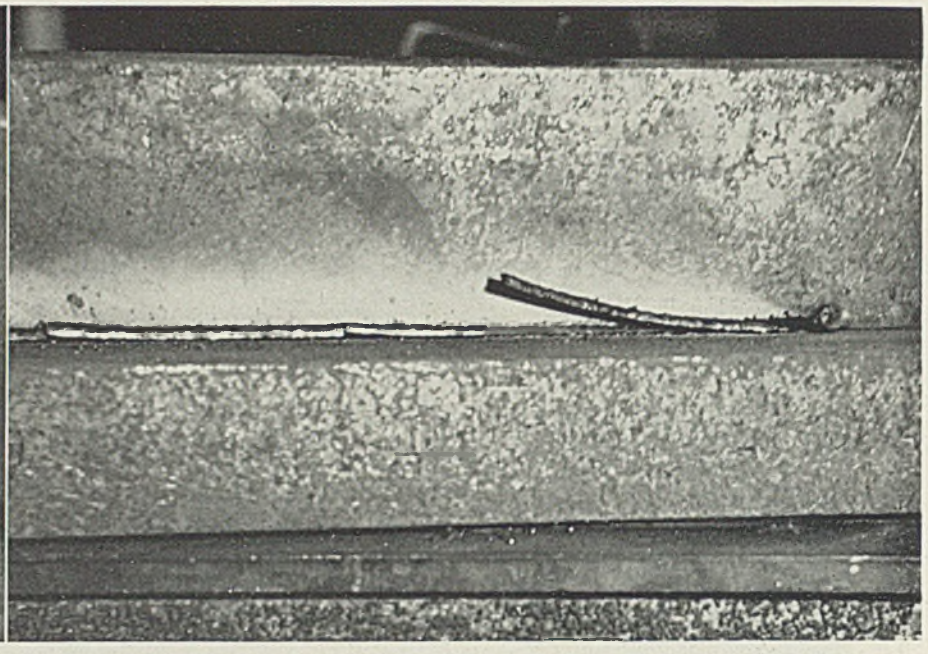


Fig. 3 (Left, above)—Demonstrating self-removing slag, this photo was taken just a few minutes after completion of weld. Note slag is breaking into pieces and is rising from bead

Fig. 4 (Right)—Taken a few minutes after Fig. 3, this shows how slag has almost completely removed itself from weld. A mere touch of a tool cleans bead

that as the melting proceeds, the arc tends to waver from one surface point to another. This is especially true when the electrode has not sufficient current density on the end surface. A density of some 15 to 20 amperes per square millimeter appears to be required on the end of the electrode in order to maintain a steady arc on the rod end. Thus with a 5/32-inch diameter electrode with an end area of about 12 square millimeters, a current of around 200 amperes is necessary.

When that amperage is used, the arc appears evenly distributed on the surface of the electrode. Since the surface of the parent metal is much larger, however, there is a tendency for the work end of the arc to jump around as it tries to cover a much wider area than the end of the electrode.

Thus it is desirable to provide some sort of control on that end of the arc which touches the work in order to produce a smoothly operating arc which can be controlled easily. Since it is the arc that transports the material from the end of the electrode to the work, controlling the arc automatically controls the deposition of weld metal, also. It has been found that the proper coating on the electrode will provide the control desired.

The confining tendency of the coating is determined not only by the thickness of the coating applied but also by its melting point. By gradually increasing the melting point of the coating, it has been found that it is possible to produce a coating which will form a tube very much like the barrel of a gun. As the electrode burns off, the coating extends past the end of the electrode for a short distance, thus forming a tube. As the minute drops of metal are emitted from the end of the electrode, the tube of coating material directs them into the fillet. It is obvious that such an action, if perfected, would form an effective means of limiting spatter loss and of forming a smoothly deposited bead.

Until recently, knowledge of these facts had not been fully exploited. In order to make full use of them, the following requirements are essential: First, the thickness of the coating should be uniform and of such a nature that drops from the melting electrode cannot cause a short circuit between the rod and the work, which would result in explosive spatter. Second, the relation between melting points of the coating and of the iron should be such that distance A in Fig. 5 between the electrode and the work remains constant at the desired value. This is done by providing a coating which has a melting point higher than that of iron—approximately 1450 degrees Cent.

Fig. 5 illustrates some features of the operation of such an electrode. As the end of the electrode burns off, the end of the coating also burns off at the same rate but with a time lag sufficient to keep the dimension A a constant at the value best suited for arc operation. Small drops, indicated by lines in the tubes, are shooting off like bullets under a certain pressure and subsequently are deposited in the fillet. The molten iron, shut off from the air, is extremely liquid. This results in deposition of a smooth, uniform bead. See Fig. 2.

At the same time, the molten metal is protected from the air during the time it is passing from the electrode to the work. Too, it continues to be shut off from the air as it is deposited because it is covered by the molten slag. This results in weld metal that is exposed to neither oxygen nor nitrogen from the surrounding air, producing weld metal which has higher elongation values and greater resiliency. Thus physical characteristics of the deposited metal are high.

Properties of weld metal include an ultimate strength of 60,000 pounds per square inch, a yield point of 45,000 pounds per square inch, an elongation of 25 per cent in 2 inches and a hardness of 130 brinell. These figures are taken from specimens prepared by unskilled welders. Among 50 such specimens, the above values varied by not more than 5 per cent, although different operators used the rod and both alternating and direct current was employed.

It is highly desirable to form a slag that can be removed completely. This means that the electrode coating, when melted, must not only be extremely liquid but must have a lower specific gravity than the molten iron so it will rise quickly to the top and none of it be trapped in the solidifying weld metal. It is not difficult to design a coating to do this.

When the slag cools and hardens,

it must be of such a nature that it can be removed from the weld metal easily. It is not so simple a matter to do this. However, one way is to incorporate ingredients in the coating which will form a slag having an exceptionally high coefficient of contraction. Then when the temperature drops and the slag turns from a liquid into a solid, considerable tension is developed in the slag. This tends to draw the upper surfaces together. The direct result is that the slag breaks into sections and raises itself from the weld as it cools.

Figs. 3 and 4 illustrate this action. Fig. 3, taken a few moments after the bead had been deposited, shows a piece of slag broken several inches from the righthand end of the bead and starting to rise from the weld. Fig. 4, taken a few minutes after Fig. 3, shows how the slag has broken into other sections and how the first section has raised itself almost completely from the weld. The other two sections immediately to the left of the raised one have loosened themselves at both ends and need only a touch of the cleaning tool to remove them completely.

Such a slag deposit is quite brittle and breaks away from the weld easily. This means that removing slag from the weld bead is quickly and easily accomplished.

When semi-automatic welding rods were first developed, one of the difficulties was in making them burn off fast enough to get a reasonable rate of deposition. This difficulty, however, has now been overcome, for 16 inches of the 18-inch length of a 5/32-inch diameter rod can now be laid down in 80 seconds, a welding rate of 60 feet per hour.

This same 16-inch length of welding rod will produce 18 inches or more of fillet bead with a 5/32-inch face of the concave type shown in Fig. 2. And by thinning out the deposit slightly, it is possible to get a 26-inch deposit from this same 16-inch length of rod (which allows for a 2-inch stub from a standard 18-inch rod).

The total metal lost from rod to weld is about 17 per cent. This loss includes the stub loss, loss by vaporization, and all other losses. The resulting deposition efficiency is some 83 per cent. This exceptionally high value is due to the action of the coating in protecting the metal so effectively during deposition. Examination of Fig. 2 will show that spatter loss is practically eliminated. This illustration, incidentally, is approximately full size and unretouched.

Since the 1/16-inch thick coating of inorganic material applied to a 5/32-inch diameter rod automatically maintains an arc length of approximately 1/16 to 3/32-inch, the

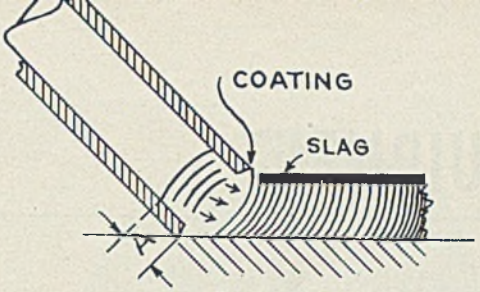


Fig. 5—Diagram illustrating how coating maintains correct arc length automatically. Weld metal is protected by coating during deposition, by slag after deposition

electrode should contact the parent metal to be welded. Thus the operator simply draws the electrode along the line of juncture to be welded and does not have to hold the arc to any certain length as the electrode coating establishes and automatically holds the correct arc length. Designed for making fillets and V-butt welds in mild steel from 1/16-inch thick sheets (with 3/32-inch rod) to ¼-inch plates (with ¼-inch rod) in one pass, it is easy to see how an entirely green operator can quickly learn to produce good welds with this type of electrode.

Recently a test was made with a man who never before had held an electrode. For a green operator, starting the weld is one of the trickiest operations, yet at the third start after depositing only some 2½ inches of bead, this man succeeded in laying down a continuous 18-inch bead of good weld metal with no apparent difficulty whatever. The resulting smooth, uniform bead is shown in Fig. 2. Fig. 1 shows the test under way.

It is estimated that after an hour's practice in starting the electrode, it is possible for an unskilled operator to produce good welds with this type of electrode. This is an extremely important feature today when it is necessary to start many new welding operators since it entirely eliminates the usual difficulties encountered in maintaining proper arc length. By simply allowing the end of the electrode to contact the work along the line of juncture and drawing it along at a uniform rate, a good bead is deposited. Obviously, this greatly reduces welding costs as well. Since arc length is automatically controlled by the insulated coating of the rod, extremely high speeds are possible, too.

Normal current values for the different size electrodes are: 95 to 125 amperes for 3/32-inch diameter electrodes; 120 to 145 for ⅛-inch diameter; 155 to 190 for 5/32-inch; 200 to 245 for 3/16-inch; 240 to 300 for ¼-inch. Higher welding speeds can be obtained by increasing these current values slightly.

Apply Silver Coatings By Vapor Condensation

American Silver Producers' Research Project, under direction of Handy & Harman, New York, reports that new applications of silver coatings applied by vaporization methods have been found recently, and appear likely to increase when their properties and relatively low cost become more widely known.

According to the research unit, a coating only 5 millionths of an inch in thickness is substantially opaque and has the characteristic appearance of silver, as well as other properties such as high reflective ability.

Application on transparent plastic sheeting has possibilities, and such coatings have brilliant luster when viewed through the plastic, making the sheeting applicable in place of tin and aluminum foils, for example, at least for some purposes.

Transparent molded plastic coated on the under side or inside with a thin silver film can be given the appearance of silver and yet be light in weight and have the other properties of plastic. The same is true of glass parts, so far as appearance is concerned, and the brilliance of a mirror is secured.

Reflectors, especially those of glass, are now being coated with silver in large quantities, especially where the surface is later subject to and kept under high vacuum, as in lamp bulbs of certain types and in vacuum bottles. Under such conditions, silver is displacing aluminum, needed for other purposes, and provides higher reflecting properties. Silver also can be coated upon refractories having di-electric properties to form condensers, many of which are needed in radio and related applications, according to the report.

Adopt Standards for Extinguishing Systems

Revision of standards for foam and carbon dioxide extinguishing systems was adopted recently by the National Fire Protection Association upon presentation of a report from its committee on special extinguishing systems at its forty-sixth annual meeting in Atlantic City, N. J.

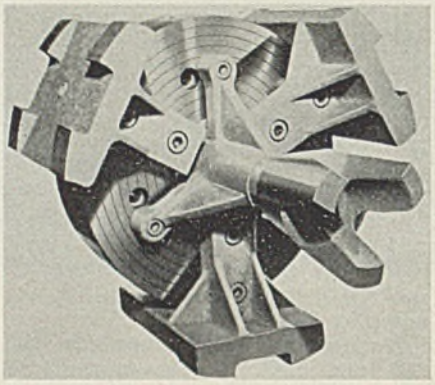
Systems acted upon were those installed in industrial plants to protect special hazards such as dip tanks and spray booths, and for outdoor hazards such as oil tanks and containers of other flammable liquids.

The standards adopted regulate details of supply, mixing, discharge outlets, automatic release devices and maintenance.

INDUSTRIAL EQUIPMENT

Air Chuck

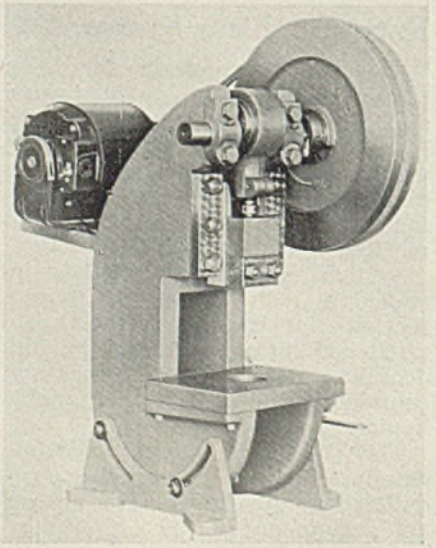
Anker-Holth Mfg. Co., 333 South Michigan avenue, Chicago, has introduced a special Airgrip chuck instrumental in machining to 0.010-



inch tolerance the outside diameter of forged steel flasks, 21 inches in diameter and with walls ⅜-inch thick. The chuck, which weighs 464 pounds, is equipped with 12 pads which prevent distortion of the flask wall. Its 24-inch locator is mounted on a 15-inch 3-jaw universal chuck. The jaws have a 1-inch stroke, and they expand 1 inch in the flask. A special feature of the chuck is the matched false jaws that are balanced to within ¼ ounce.

Punch Presses

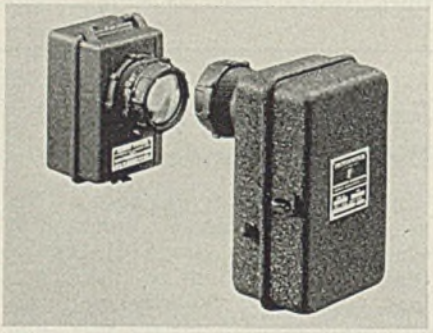
Duro Mfg. Co., 800 East Sixty-first street, Los Angeles, is offering a new line of punch presses which features a heat-treated alloy steel driving shaft which eliminates danger of shearing or twisting. Available in 1 and 4-ton models, the



presses in the line are equipped with bronze bearings at all wear points to assure long life at top production speeds. In each the directional change or punch force is transmitted by an eccentric press fit to the driving shaft and held securely by keys. The ram of the press rides in semisteel guides, slotted for lubricant distribution, and adjustable for wear.

Burglar Alarm Control

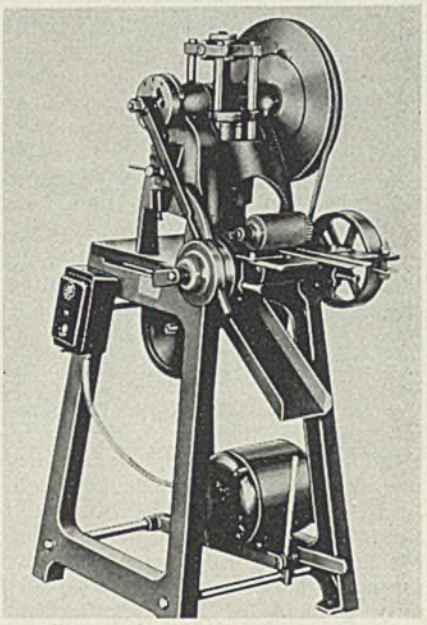
Photoswitch Inc., 21 Chestnut street, Cambridge, Mass., announces a new type A28L long range photoelectric burglar alarm control for protection against intruders and saboteurs. It is suitable for use either in or outdoors. The light source of the unit projects a practically invisible light beam for distances of 350 to 700 feet and it is possible to completely surround power plants, factories and other vital areas. If the light beam is



broken by intruders the photoelectric control contacts close, thereby sounding alarms, operating a central station system, turning on flood lights or closing gates. The control is provided with a latching unit including a push-button station which may be located in the gate house, office or other convenient point. This serves to latch the alarm in operation once the light beam has been momentarily broken until the reset button is operated. The control is unaffected by changes in local light and is designed to operate 24 hours a day. Its relay contacts are pure silver and will handle 15 amperes alternating current and 8 amperes direct current.

Stamping Press

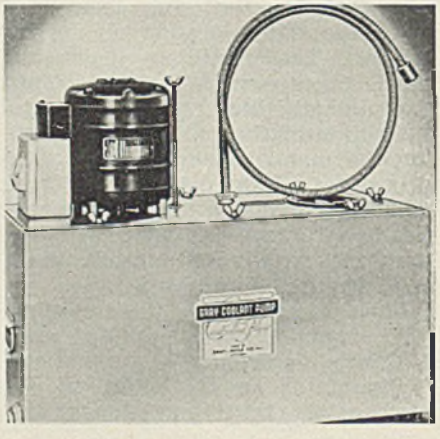
Di Machine Corp., Division of Diebel Die & Mfg. Co., 3654 Lincoln avenue, Chicago, announces a new Hi-Speed stamping press which produces automatically small stamp-



ings of metal, fiber, plastic and other materials at adjustable high speeds of 180, 370 and 500 strokes per minute. Featuring a built-in feed, the press also handles strip or coil stock. The feed can be shut off without stopping the press. The machine has generous die space facilitating setting up of dies. According to the manufacturer, one unskilled man or woman may direct a battery of these presses or one or two presses along with other duties because of its simplicity of design and operation.

Portable Coolant Pumps

Gray-Mills Co., 213 West Ontario street, Chicago, announces three new larger capacity portable coolant pumps for automatic application of coolants to cutting tools. They are designated as heavy duty A series pumps G-2A, G-3A and G-4A. Features of these pumps are complete



portability, controlled flow from a few drops to full stream, baffle plate construction and forced settling fixture to keep coolant fluids clean at all times, larger tank capacity (10 and 12½ gallons) to eliminate frequent coolant changes, ball bearing type motors easily replaced driving gears hardened for long wear, cleanout plug for quick and easy access to all working parts of the pumps.

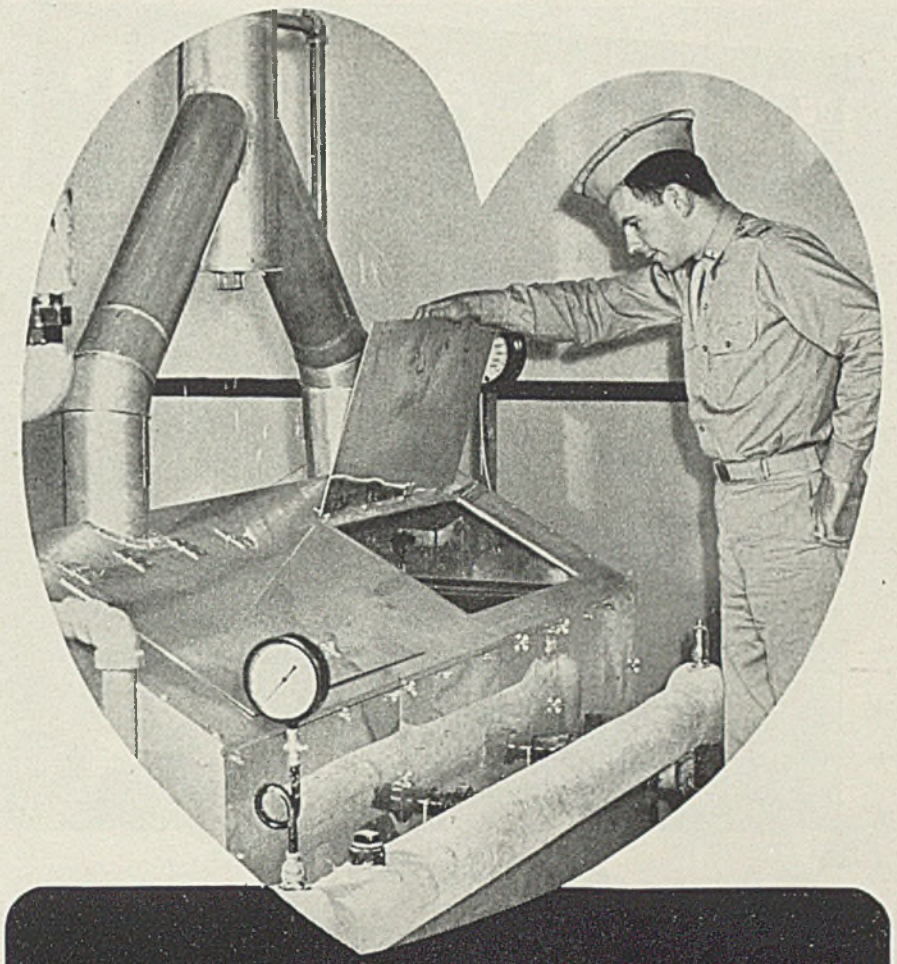
Air Conditioner

Niagara Blower Co., 6 East Fifth street, New York, is offering a new No Frost method and cold room air conditioner for providing constant temperature as low as —50 to —80 degrees Fahr. required to test or normalize parts, materials and machinery at such temperatures, and for experimental laboratories. This equipment using No Frost liquid (no brine) gives constant operation without interruption or loss of capacity by reason of ice or frost

forming on cooler coils or because of corrosion of the equipment from contact with brine or calcium. It consists of coolers operated in stages, the first stage reducing to temperature just above the freezing point of water and removing humidity; the second stage using the No Frost method to remove the balance of the moisture, and the third stage producing and holding the required final temperature. Moisture is removed from the air below 32 degrees Fahr. without causing formation of ice on coolers by the No Frost method which employs a special non-freezing liquid continuously re-concentrated in a concentrator designed especially for this duty.

Wiring Devices

General Electric Co., Bridgeport, Conn., has introduced a line of Moncor surface wiring devices for use in wiring cantonments, warehouses, temporary industrial buildings, war housing, etc. These plastic devices can be end-connected or side-connected for surface wiring and back-connected for concealed wiring. Accord-



T. N. T.
IS A "SOFTY" AT HEART!

This is not recommended for setting-up exercises; yet T.N.T. is no nightmare to careful ordnance men. Ordinarily before it gets tough and lets go T.N.T. must be prodded with a primer and a fuse.

The carefree stance of this officer is no stage prop. He's accustomed to watching a T.N.T. melt unit change the explosive mixture from granular to liquid form. And in this important war job ARMCO Stainless Steel has a big role.

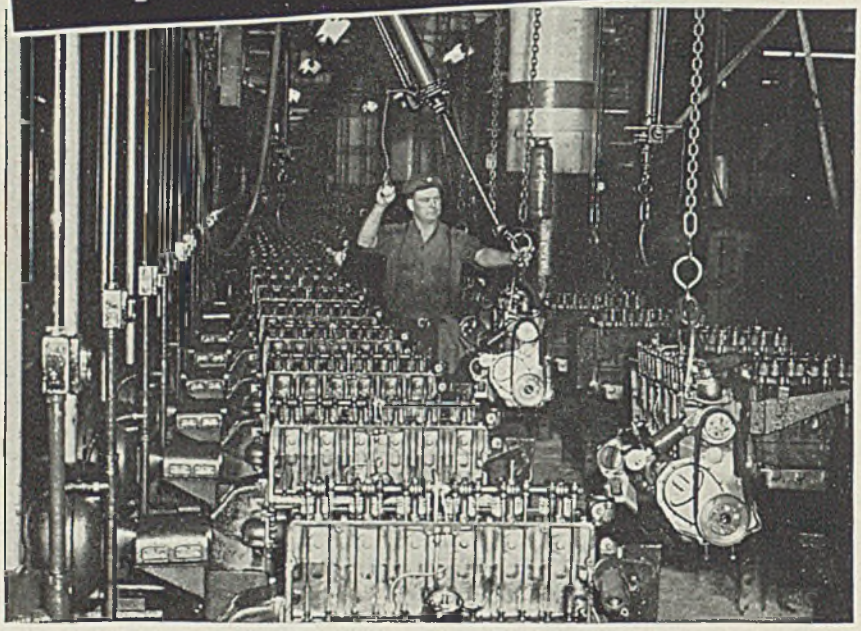
Many melt units and vent pipes like this are made of ARMCO Stainless. The giant vat "babies" T.N.T. — cradles it in a gentle rocking motion before the liquid is poured into deadly shells to solidify.

ARMCO Stainless Steel is used in T.N.T. melt units for the same reason it was used in many peace-time products. It assures *complete corrosion resistance.* T.N.T. comes out uniformly pure. No rust or impurities mar its explosive power. The American Rolling Mill Company, 1921 Curtis St., Middletown, Ohio.

TO KEY MEN: Ask Us for Sheet Metal Working Data on War Products and Post-War Products

MADE OF ARMCO STAINLESS STEEL

CURTIS Air Hoists
For More Production



Assure Faster, More Efficient Lifting Save Labor, Increase Plant Capacity

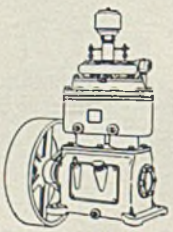
Here's the solution for many a plant faced with today's demand for increased output and a shortage of skilled labor. Curtis One-Man Air-Power Hoists make lifting easier, faster, more efficient—release men for other jobs and reduce man-power fatigue.

Curtis all steel Air Hoists cost no more than a chain block, are smooth in action, speedy, and efficient. They provide extreme accuracy of control and can handle the most delicate hoisting operations. Any workman can operate a Curtis Air Hoist — releasing skilled labor for other duties — for the hoist does the work by air power. Capacities up to 10 tons.

For complete information as to how you can step up production and lower costs in *your* plant, write for free Curtis booklet, "How Air Is Being Used in Your Industry."

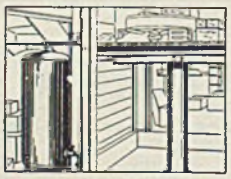
CURTIS ESTABLISHED 1854 ST. LOUIS

Curtis Pneumatic Machinery Division
of Curtis Manufacturing Company
1996 Kienlen Avenue St. Louis, Missouri



Lower your Costs for Air with Curtis Model "C" Compressors (Timken Bearing Equipped)

Reduce Handling Costs with Curtis Hydraulic Lifting Cylinders



ing to the company, the line includes a duplex convenience outlet, a single-pole T-rated switch, a 3-way T-rated switch, a keyless lampholder, a pull chain lampholder and a junction box and rosette. Two accessories facilitate wiring—a back-connecting strap for use when cables are concealed and a combination clamp and continued ground strap for use with BX. These can be wired easily and quickly and are of brown Textolite. They accommodate either No. 12 or 14 two or three-conductor metallic or nonmetallic cable for surface wiring or 12/2 and 14/2 nonmetallic cable for concealed wiring. The switches in the line are T rated. The convenience outlets have contacts that bear on both sides of standard attachment plug blades. The pull chain outlets have Textolite insulating links and tassels. The lampholders accommodate shade-holders both UNO and clamp type. Knockouts in the devices can be removed with a screw driver. The end knockouts make devices either "through run" or "end run". Knockouts in each side of the devices permit open wiring or extensions, end run or through run. Four knockouts are provided on the backs of these devices for use when concealed wiring is installed. Extra terminals for splicing in the devices make each device a junction box also.

Wheel Guard

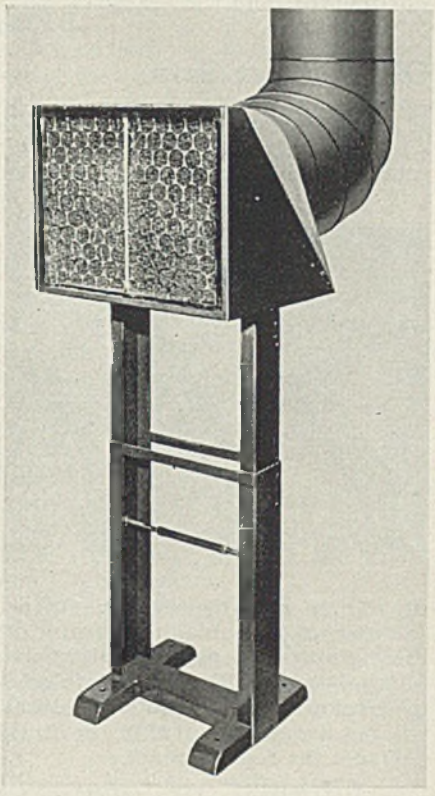
Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., announces a newly designed wheel guard for its new 10 and 14-inch model carbide tool grinders. These, known as No-

Spray-No-Splash, and a coolant flow control keep the operator and floor dry during wet grinding operations, it is said. The guards when in place are concealed and are close to the wheels. Each guard is easily rotated from one side of the wheel to the other by a handle. As an integral unit, the hood (which encloses the guards) and the table mechanism, protected from ingress of dust and grit, is mounted on enclosed shaftways and is moved in or out from the wheel by a crank. The hood is easily removed by two socket-head cap screws on either

side of hood section. Water connections inside the hood are flexible hose. The tables are mechanically controlled by a crank and worm tilting mechanism adjustable to any point between 15 degrees above and 30 degrees below horizontal.

Dust Collector

Edward Blake Co., 634 Commonwealth avenue, Newton Centre, Mass., announces a new portable Filtaire dust collector for use with grinding and polishing machines where no central dust collecting system is available. A self-contained unit, it can be carried from one machine to another being ready for action upon being plugged into the nearest 110-volt outlet. The motor and fan of the collector are located behind a replaceable filter. The latter is large enough so that in certain cases it may be inverted and the other half used when the first half becomes filled. It consists of spun glass measuring 2 x 16 x 20 inches. The top of the unit is adjustable 7 inches horizontally and 20 inches vertically so that it may be positioned for any machine, wheel or work.

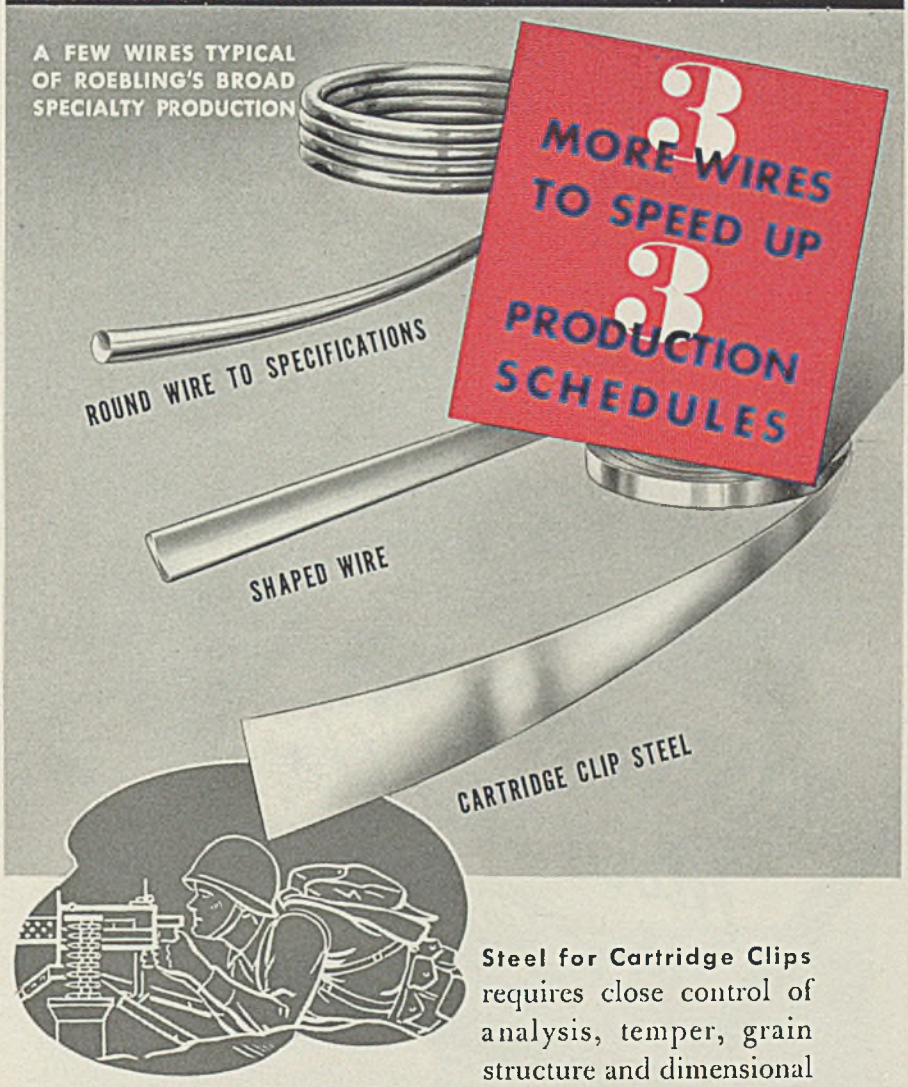


Diameter Gage

Federal Products Corp., Providence, R. I., announces a model 247 B-69 and 247 B-63 diameter and roundness gage. The former checks the concentricity of spinning rings from 1 to 7 inches in diameter. It

ROEBLING *Wires*

ROUND . . . FLAT . . . SHAPED



Steel for Cartridge Clips requires close control of analysis, temper, grain structure and dimensional tolerances. It is typical of the many round, flat and shaped wires that help speed Victory.

Roebling supplies them in long lengths, ready to fit right into your production schedule. These are only a few of hundreds of Roebling rounds, flats, and shapes...excellent examples of the kind of work that has built a reputation for Roebling.

If you require exacting steel analyses, dimensions within close limits, special finish...it will pay you to call on Roebling. Through years of just this kind of work, we've acquired the skill and facilities to produce it...to meet your standards.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY • Branches and Warehouses in Principal Cities

ANDREWS Steel has gone to war! And into these ingot molds go the molten steel that soon will be a part of the tanks, guns, planes, ships and other materials essential to the successful prosecution of the war.

But users may rest assured that through it all, the Andrews tradition of high grade steel is being zealously guarded. Quality has not and never will be sacrificed on the altar of speed. For more than thirty years the name Andrews has been synonymous with quality. Today, it's the same high grade steel from the same dependable source of supply.

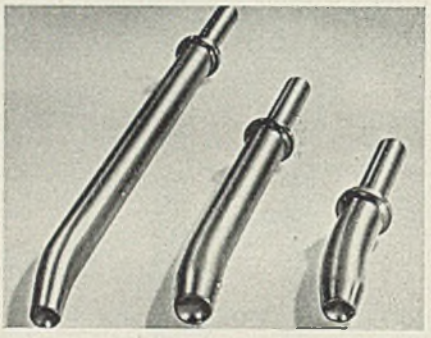
THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

Basic Open-Hearth Alloy Steel Billets and Slabs

can be modified to suit larger or smaller diameters. After its two hardened steel-faced guides are set in correct position, the workpiece is rotated in contact with the guides, and body diameter and roundness are checked simultaneously. The indicator does not make direct contact with the ring, but through a floating pantograph unit which increases the sensitivity of the gage, and protects the indicator spindle. The other model is universal and is readily adapted to inspection of work of various diameters and thicknesses. It can be easily modified to inspect even smaller or larger work than it is designed for. It is provided with a fine adjustment longitudinally. Both stops, as well as the indicator, are adjustable both horizontally and vertically.

Offset Rivet Sets

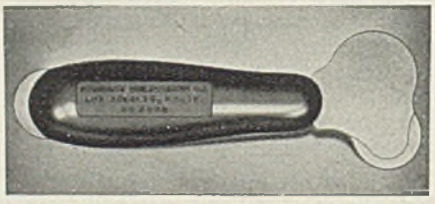
Aero Tool Co., Burbank, Calif., announces a new line of offset rivet sets designed with angular offsets



of 7½, 10 and 15 degrees. Incorporated in the manufacturing of these units is a process known as Microglass polishing, which is said to develop a glass-smooth face that will not harm aircraft skins or other surfaces the tools contact.

Fastener Driver

Products Engineering Co., 700 East Florence avenue, Los Angeles, is offering a new driver designed so it will operate three sizes of Dzus fasteners. Being adaptable to large, medium and small fasteners through



a novel arrangement of varying body thicknesses, the driver is said to replace three special drivers. Body of the tool is cadmium-plated heat-treated chrome-moly steel and handle is of shock-resisting plastic.

Steel Manuals Give Shipping Instructions

Two steel products manuals embodying information concerning the packaging, loading and shipping methods for sending steel products abroad are announced by the American Iron and Steel Institute, 350 Fifth avenue, New York.

Entitled "Packaging, Loading and Shipping Methods for the Soviet Government Purchasing Commission in the U. S. A." and "Packaging, Loading and Shipping Methods for China Defense Supplies Inc." respectively, these were prepared by the institute's committee on packaging with the co-operation of the War Production Board and representatives of the respective countries concerned.

Instructions included, according to the institute, have been approved as standards for use in the steel industry by the United States Treasury Department, Procurement Division.

Distributes Machine Tool Slot Cleaners

An improved handy machine-tool slot cleaner for removing chips and other foreign material in the average planer milling machine and other machine tool slots is being offered for free distribution by Dayton Rogers Mfg. Co., 2835 Twelfth avenue South, Minneapolis. It has both a small and large cleaner on each end that will take care of a large percentage of both the small and large planer slots.

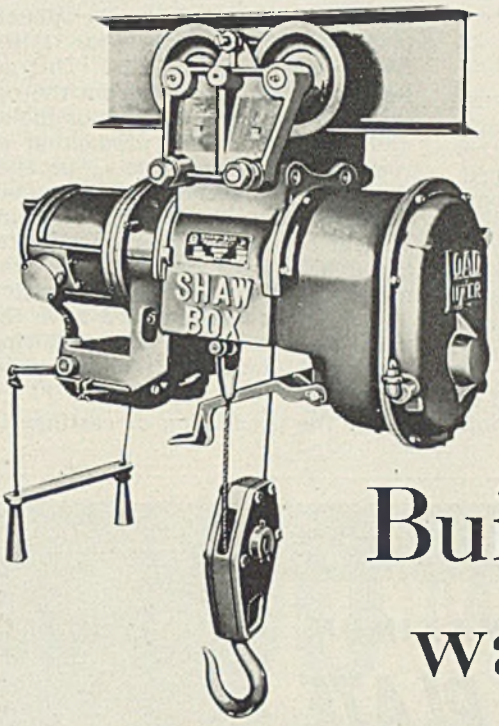
Made of 0.165-inch thick high quality flat steel, the slot cleaner is approximately 6 inches long and has a hole to hang up conveniently. It is available on receipt of request addressed on a company letterhead.

Practical Arc Welding

Lessons in Practical Arc Welding, paper, 188 pages, 5½ x 8 inches; published by Hobart Trade School Inc., Troy, O., for 25 cents, special prices to schools.

This book contains the complete series of 41 arc welding lessons offered at the Hobart trade school. Chapter headings include, preliminary instructions, starting and manipulating the arc, welding common joints with bare electrodes, welding light-gage sheets with coated electrodes, general welding with coated electrodes in flat, horizontal, vertical and overhead positions, pipe welding, cast iron welding, special practice and tests. The text also contains a suggested classroom procedure and ready reference index.

The book consists of pages from Part II of the larger and more complete Hobart textbook, *Practical Arc Welding,* and is designed for use in trade schools.

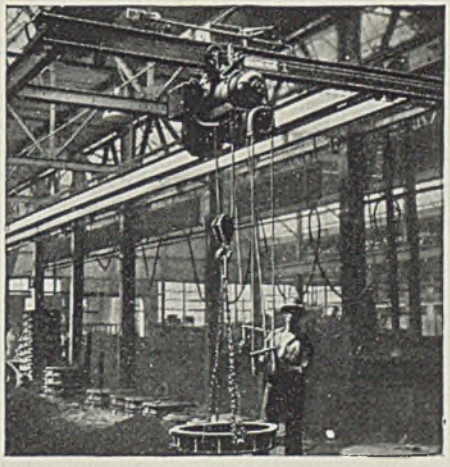


Built for war work

A SHAW-BOX 'Load Lifter' electric hoist was designed for tough, grueling work, long working days and indefinite years of hard service. This versatile hoist now takes on the extra burdens of all-out war production. It lifts most at the least cost due to its special features:

1. "One-point" lubrication.
2. Hyatt Roller Bearings and Ball Bearing Motor.
3. Safety upper stop; lower blocks; sure brakes.
4. Two-gear reduction drive; sealed against oil leaks; steel interchangeable suspension.

'Load Lifter' electric hoists are built with lifting capacities of 500 lbs. to 40,000 lbs. in all combinations required for industrial lifting necessities. They are adaptable to almost every working condition within their capacities. Send for Bulletin 350.



MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'LOAD LIFTER' *Hoists*

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load-Lifter' Hoists and other lifting specialties. Makers of Ashcroft Gauges, Hancock Valves. Consolidated Safety and Relief Valves and 'American' industrial instruments.

Film-Impact Process

(*Continued from Page 84*)

cessory equipment such as coilers, flying shears, cooling tables, etc., are also synchronized with the above equipment. The supercooled metal solidifies spontaneously upon impact without creating a liquid core in the formed product. As the major part of the heat content has been eliminated by the impact-casting machine, the mold has little heat to absorb and consequently does not erode, burn or check and can be short. The function of this mold is similar to a forging or extrusion die as it only shapes the plastic metal product while the latter travels to the pinch rolls. This action is much different from the operation of the few continuous molds used in commercial production of round or square billets, because these molds receive molten metal. The removal of the large amount of heat content in the molten metal through the copper walls of the mold is a difficult and slow operation and the products obtained have the usual weak cast structure requiring the usual amount of rolling to be improved.

For the production of castings in sand molds, conveyor or turntable equipment, as now in use, is necessary to carry and index the successive molds under the impact casting machine. Otherwise, the pouring is much the same, as pouring directly into the molds. With supercooled metal no risers are needed and most of the molten metal used can be turned out into good and sound castings.

Castings produced in metal dies or permanent molds require a fast mechanical operation such as used in die-casting machines for closing and opening of the molds and ejecting the castings. The supercooled metal does not erode or burn or check the dies whose life is considerably extended. Shells of ordinary steel or tool steel can be cast in metal molds with less machining required than forgings and at a rate of production many times faster than the fastest forging equipment now in use. For instance, with properly designed casting equipment, a continuous stream of molten steel of 2000 pounds per minute could be turned into shells ready to be machined with the physical properties easily meeting present specifications.

Two Installations in Brazil

Both the impact-casting machinery and the molding equipment either for continuous rolled shapes or castings made in molds, are well adapted for continuous production. As a result, most efficient use of the process also requires a continuous source or supply of molten metal.

This condition industrially exists only to a limited extent. Melting furnaces for white metals such as aluminum, magnesium, zinc, lead and their alloys are capable of supplying molten metal continuously.

A continuous supply of molten iron is also available from so-called continuous cupolas and also from mixers used with blast furnaces. Most of the other melting furnaces are of the batch type. Some of these furnaces, such as induction furnaces used for brass melting, and high-frequency furnaces used for melting steel and alloy steel, also copper and nickel alloys, can easily be coordinated to supply molten metal to an impact-casting machine.

Two of the largest steel producers in Brazil are installing impacting casting machines for operating under this process. Views of a machine recently shipped to one of these concerns are shown in Figs. 1 and 2. These units are operated as follows: The stream of molten steel from the nozzle of the pouring ladle is directed continuously between the rolls, *A*, through the top funnel, *B*. The stream of molten metal is formed continuously into a film, propelled, supercooled and degassed by the action of the rolls

FOR THE MAXIMUM
in TIN PLATE PRODUCTION
. . . look to the modern tin stacks. They are equipped with Kemp Immersion Melting.
For Speed — Minimum Dross Formation—and Top Quality in tin plate manufacture, write **The C. M. Kemp Manufacturing Co., 405 East Oliver St., Baltimore, Maryland.**
KEMP of BALTIMORE

and directed into the clamshell projector, *C*, shown beneath the base plate. From this projector it comes out in the form of a circular stream of supercooled metal and is projected at high velocity into the receiving ingot mold. When the mold is filled the stopper is closed. Another mold is indexed beneath the machine and pouring continued. Capacity of this particular machine is 7000 pounds of molten steel a minute which is adequate for ingots of the largest size.

Open-hearth, bessemer and arc furnaces can be co-ordinated with a properly designed impact-casting machine, such as already built for Brazil, to impact-cast regular size ingots under usual schedule of operation. Heavy castings, such as rolls, housings, gears, big gun barrels, gun carriages, etc., also can be impact-cast to obtain the improved uniform crystal structure and physical properties. The output of these furnaces can be used to feed an impact-casting machine synchronized with continuous mold and pulling rolls to make continuous slabs, plates, billets or shapes such as rails. Furthermore the film forming method can be used to advantage to speed up the production and refining of steel and other metals.

Refines Steel Quickly

When used for the production of steel, molten iron from the mixers or from a continuous cupola and high enough in silicon is run through a film refining machine. This machine forms the molten pig iron into a thin continuous film in intimate contact with a film of molten slag (separately fused iron ore, or iron oxide with lime and flux) and insures complete diffusion by forcing the lighter molten slag through the molten iron. This operation reduces and removes some phosphorus, all the silicon and manganese and all or some of the carbon of the pig iron under the controlled temperatures of operation. This operation is continuous and machines can be designed to handle 1 to 3 tons per minute. The material treated is immediately fed into a second similar machine which forms it into a thin film in intimate contact with another film of molten slag of the proper composition (calcium or other slag) which removes the remaining sulphur and phosphorus. Centrifugal action is used to separate the refined metal from the film of used slag and to prevent reversible action.

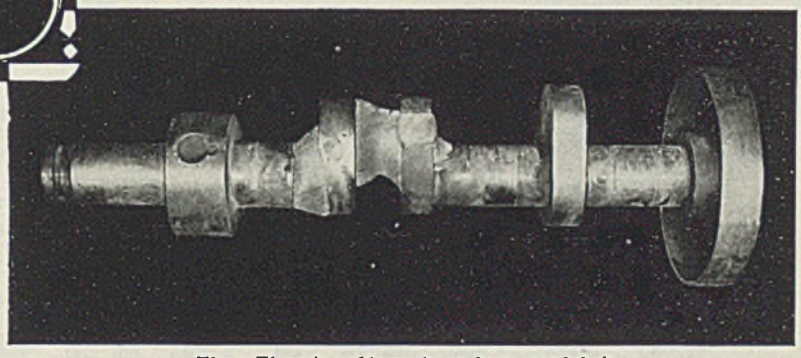
The refined steel is so clean that it can be run directly into an impact-casting machine or collected into a ladle. Its composition can be adjusted by the addition of ferroalloys either in lump or molten form. The chemistry is the same as in open-hearth practice.

The speed-up of the refining operations is due to the tremendous surfaces of reactions created under the process at controlled temperatures. Under these conditions the chemical reactions are instantaneous and being mostly exothermic no fuel is needed during the operation. This operation has all the advantages of the bessemer process in rapidity, economy of fuel and lack of human element in its control and will not advertise its presence by large flames illuminating our sky. Furthermore and in contrast to the bessemer operation, the weight of steel obtained is greater than the weight of pig iron used, due to the incorporation of the Fe from the molten ore used in the reduction. Besides the steel obtained is clean and the reduction of metalloids can be carried out much further than by present methods to secure pure iron. This pure iron can be used as a perfect base to make improved steel alloys such as silicon steel for electrical uses, stainless steel, heat resisting steel, etc., with a lower carbon content and freer from impurities.

This procedure can be used to refine steel after it is melted in present open-hearth or electric furnaces and applied to the refining of most other metals.

90 DAYS SAVED

BY THERMIT WELDING CRANKSHAFT . .



Three Thermit welds made on large crankshaft.

IN 1941, a crankshaft broke in the plant of a prominent western machine manufacturer. It was repaired by Thermit welding in a few days at an estimated saving of three months over replacement time. The manufacturer also states that, compared with other welding methods, much time and about $500.00 in cost were saved.

Today, the repair of large parts by the Thermit process is a "natural." Aside from reducing, to a minimum, the shutdown period of broken equipment, the permanence of a Thermit weld and the fact that no positioning or stress relieving are needed are further important advantages.

Send for booklet "Thermit Welding" which describes the process in detail, including its use in the fabrication of heavy equipment.

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

THERMIT WELDING

METAL & THERMIT CORPORATION

120 BROADWAY • NEW YORK, N.Y.

Albany • Chicago • Pittsburgh • So. San Francisco • Toronto

How Boeing Produces "Flying Fortresses"

(*Concluded from Page* 50)

made at low pressure with high volume. The actual working stroke, in which the punch pierces the dural circumferential, is performed at high pressure with low volume.

Setting up the machine for any type of circumferential requires only from an hour and a half to two hours. Only two men are needed to run the machine—one to operate it and one to feed the circumferentials into it. It has proved so successful that it already has been licensed for use in several other aircraft plants to speed production.

An ingenious accessory is the cut-off die, which lops the ends off the circumferentials. The cut-off blade must travel in two directions, thus performing two operations in one. There are two of these dies, one at each end of the semicircle.

For "skinning" the wings of the Flying Fortress, another interesting machine has been designed. The skin is made of Alclad sheet, which comes to the plant in long lengths. These sheets must be spot welded together to form a panel for one whole inboard wing section, and this is where the new machine goes to work.

It is an automatic spot or stitch welder, shown in Fig. 3. Below it a slat work table moves on wheels across a platform, and on this the Alclad sheets are laid, held by four electromagnetic clamps. As the tables moves, an arm extending from the machine automatically spot welds the metal. The table moves a half-inch each 0.3-second, pausing 0.8-second for a spot weld at each interval. The interval of spacing between welds is set automatically. Thus neat rows of spot welds are produced, permanently fastening several sheets of aluminum together, and swiftly doing a job once done by hand-operated welding guns.

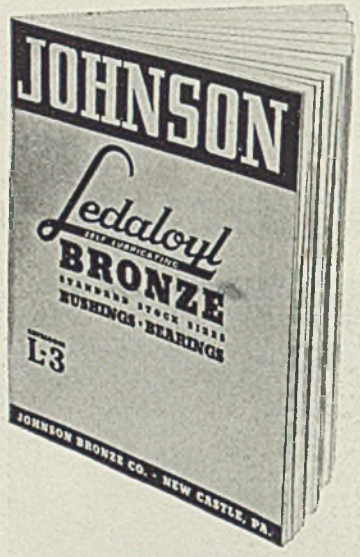
Illustrating how important advances in production speed can develop from a simple idea suggested by a shop foreman, is a small aluminum eyelet used to fasten the skin while it is being fitted over the stiffeners which form the fuselage of a Flying Fortress.

The eyelets are simply hollow aluminum tubes which pierce the aluminum skin and clip it neatly to each point where circumferential and longitudinal stiffeners cross one another. Attached easily, the eyelets save both money and time. Their cost is only 65 cents per thousand, in contrast to a price of several cents apiece for pin fasteners formerly used. The eyelets, unlike the former pins, need not be removed. When rivets are driven, they pass right through the eyelet, virtually forging it into the aluminum skin of the plane. Subassembly time is literally sliced in two by use of the new fasteners.

Aside from the actual mechanical side of production, Boeing has facilitated aircraft manufacture also by formation of a production illustration department. A combination of the best that the engineering and art schools could offer, this department's job is to translate difficult blueprints into three-dimensional drawings that can be understood easily by unschooled workmen.

True perspective drawings made in this department show just how an installation or assembly will look when complete. With airplanes getting more complicated each year and with labor inexperienced in aircraft production being increasingly used, officials see great promise for the future of the illustration department, especially with women workers coming into the organization in increasing numbers.

A "MacArthur Month" campaign at Bausch & Lomb, Rochester, N. Y., for ideas to improve manufacturing processes paid employes $8934. Suggestions were given practical tests.



Write for this

NEW Catalogue

Self Lubricating

BRONZE BEARINGS

● This new book will save you time, trouble and money when ordering self-lubricating bushings or bearings. Thirty-six pages filled with useful, informative data will help you to accurately determine your needs. A complete listing of over 2000 individual sizes . . . including plain, flanged and spherical bearings . . . will help you design to standards thereby eliminating delay and die expense.

Competitive tests in practically every type of industry have definitely proven the superiority of Johnson Bronze LEDALOYL. Our exclusive process of PRE-ALLOYING the basic materials provides bearing qualities not obtainable by any other method.

Write for your free copy of this new book today. It will help you get better bearings—quicker. It is your first step toward improved bearing performance.

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JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

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Men of Industry

(*Concluded from Page 32*)

ton Publishing Co., have been re-elected treasurer and secretary, respectively.

New directors include: **V. A. Crosby,** Climax Molybdenum Co.; **Harvey Miller,** Walker Metal Products Co., Windsor, Ont.; **C. E. Silver,** Michigan Steel Casting Co.; **F. A. Jensen,** National Engineering Co.; **Glenn Coley,** Detroit Edison Co.; **Carl F. Joseph,** Saginaw Malleable Iron Division; **O. E. Sundstedt,** General Foundry & Mfg. Co., Flint, Mich.; **E. C. Hoenicke,** Eaton Mfg. Co.; **O. F. Carpenter,** Packard Motor Car Co.; **O. E. Goudy,** Kelsey-Hayes Wheel Co.; **E. L. Morrison,** Budd Wheel Co., and **H. W. Dietert,** H. W. Dietert Co.

♦

Charles L. Franklin, superintendent, Rock Island lines, Rock Island, Ill., has been named assistant to chief operating officer, with headquarters in Chicago. He will be succeeded at Rock Island by **B. F. Wells.**

♦

Samuel A. Woodruff has been named a research engineer, Battelle Memorial Institute, Columbus, O., and has been assigned to the division of organic chemistry. He formerly was associated with North American Rayon Corp., Elizabethton, Tenn.

♦

L. H. Chenoweth, manager, manufacturers' sales, Industrial Products Sales Division, B. F. Goodrich Co., Akron, O., has been granted leave of absence to serve with the Rubber Products Division, War Production Board. His duties are being handled by **I. N. Kimsey,** Akron district manager.

Robert T. Kain, sales engineer in the belting department, Industrial Products Sales Division, has resigned to enter service of the United States Navy where he has been commissioned a lieutenant, junior grade.

♦

Herbert Farrell Sr., president, Farrell Cheek Steel Co., Sandusky, O., was the recipient of an honorary degree at the commencement exercises of Bowling Green State University, Bowling Green, O.

♦

Robert L. Hoover, formerly art director and production manager, MacDonald Potter Inc., Chicago, has been named assistant to advertising manager, Cardox Corp., Chicago.

♦

Clyde A. Sanders, ceramic engineer, formerly general manager, Lawrence Clay Co., Jackson, O., has been made sales manager, American Colloid Co., Chicago.

♦

J. A. Claussen has become affiliated with the Pig iron unit, War Production Board, Washington. He formerly was with the New York office of Rogers Brown & Lavino Inc., with which organization he had been associated since 1905.

♦

A. A. Derse has been appointed manufacturing manager for the main division of Murray Corp. of America, Detroit, succeeding **L. C. Hill,** factory manager and executive vice president, who has resigned. Associated with Murray since 1924, Mr. Derse has recently been production manager for two of the corporation's plants.

♦

William F. Temple, consulting analyst of the Priorities Division, Cleveland field office, War Production Board, has resigned to take up new duties with Cleveland Worm & Gear Co. and its subsidiary, Farval Corp. He was associated with SKF Industries from 1920 to 1932, serving as Cleveland district sales manager, after which he became sales manager for Towmotor Co.

♦

Charles W. Test, Youngstown Sheet & Tube Co., has been elected president, Steel Club of Baltimore Inc., succeeding **R. Walter Dietrich,** Rustless Iron & Steel Co. **Joseph L. Hagger,** Charles T. Brandt Inc., formerly secretary and treasurer, has been elected vice president to succeed **James A. Aldridge,** Koppers Co.; and **John A. Malloy,** Joseph T. Ryerson & Son Inc., has become secretary-treasurer.

Directors are: **Jesse A. Davis,** Bethlehem Steel Co.; **H. Buckley Dietrich,** Dietrich Bros. Inc.; **John S. McKenzie,** John McKenzie Co. Inc.; **S. R. Machen,** Baltimore Steel Co.; and **R. Walter Dietrich.**

♦

George D. Anderson Jr., Commonwealth Products Co., Birmingham, Ala., has been appointed representative for the Mahr Mfg. Co., Minneapolis, in Alabama, Florida, Georgia and Mississippi.

♦

Robert A. Weaver, president, Ferro Enamel Corp., Cleveland, received an honorary degree of doctor of science from Alfred University, Alfred, N. Y., June 1, in recognition of his work as a leader in the porcelain enamel on metal branch of the ceramic industry.

♦

Frank G. Luth has been named mechanical superintendent, Iron & Steel Products Inc., Chicago. Until recently he was assistant mechanical superintendent, Fruit Growers Express Co. and its associated companies.

♦

Herschel E. Post has been appointed general sales manager, industrial finishes, Pittsburgh Plate Glass Co., with headquarters at Pittsburgh. Mr Post previously was manager of the company's Houston, Tex., paint factory. **John A. Hanley,** production manager, temporarily will manage the Houston plant.

DIED

Charles Meirs Denise, 69, former general manager of sales, fabricated steel construction, Bethlehem Steel Co., Bethlehem, Pa., in that city, June 12. He resigned last October because of ill health. Mr. Denise had been associated with the fabricated steel construction industry many years. In 1903 he joined McClintic-Marshall Co. and when that company was acquired by Bethlehem in 1931 he was named vice president in charge of sales.

♦

Thomas P. Adler, 74, retired vice president, treasurer and a director, United States Steel Products Co., a subsidiary of United States Steel Corp., New York, recently at his home in Montclair, N. J. He was identified with United States Steel Corp. and subsidiaries 54 years before his retirement in 1937.

♦

C. A. Hamilton, president, Alabama Pipe Co., Anniston, Ala., June 12, in that city.

♦

Norman S. Slee, 59, New York district sales manager, Babcock & Wilcox Co., New York, June 11, in Newark, N. J.

♦

Thomas G. Dougall, Chicago district sales manager, Columbia Tool Steel Co., Chicago Heights, Ill., June 9.

♦

Harry S. Lloyd, 62, president, Eagle Grinding Wheel Co., Chicago, at his home in River Forest, Ill., June 15.

♦

Maj. Pierre G. Jenks, 66, president, Pullman-Standard Car Export Co., and a director of Pullman-Standard Car Mfg. Co., in Mount Vernon, N. Y., June 14.

♦

Colin B. Kennedy, 56, a production engineer employed by the Production Division, War Production Board, Chicago, in that city, June 16. He had been assigned to the Army Signal Corps as a civilian advisor.

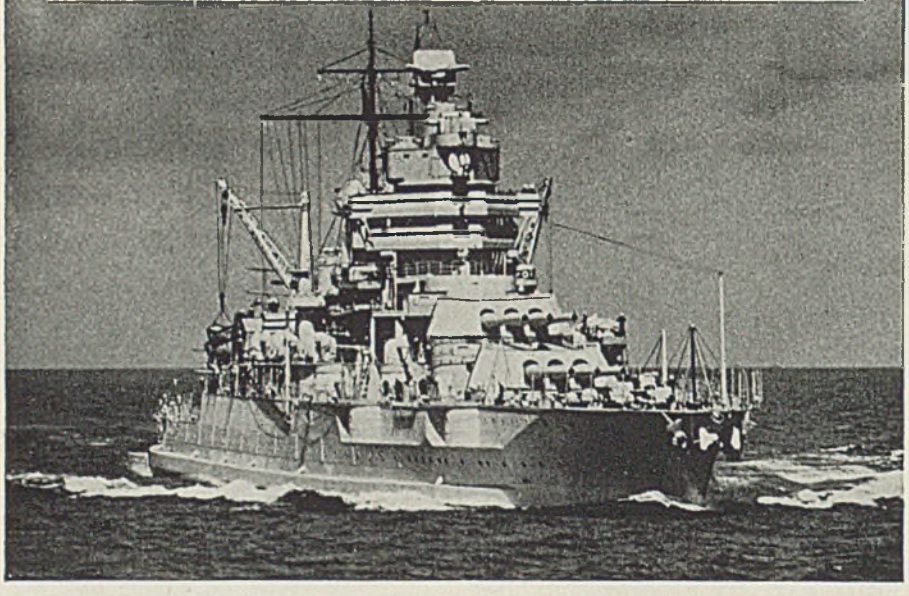
♦

Charles C. Gilchrest, 67, who retired in 1933 as assistant superintendent of factories of Western Electric Co. in Berlin, Antwerp, London and Paris, at his summer home in big Rapids, Mich., June 11.

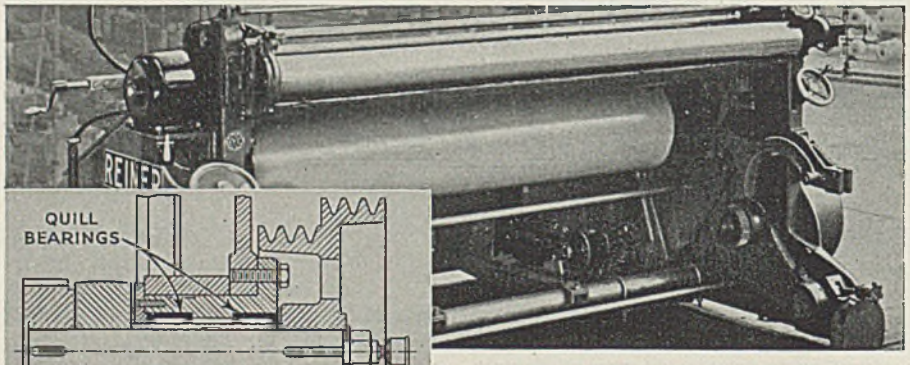
♦

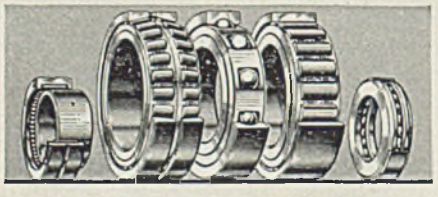
Edward B. Wickes, 52, formerly vice president, Wickes Boiler Co. and Wickes Bros., Saginaw, Mich., founded by his father, recently at his summer home near Grayling, Mich. He retired from active business three years ago, but retained his posts in an advisory capacity.

IN THE NEWS
WITH BANTAM BEARINGS



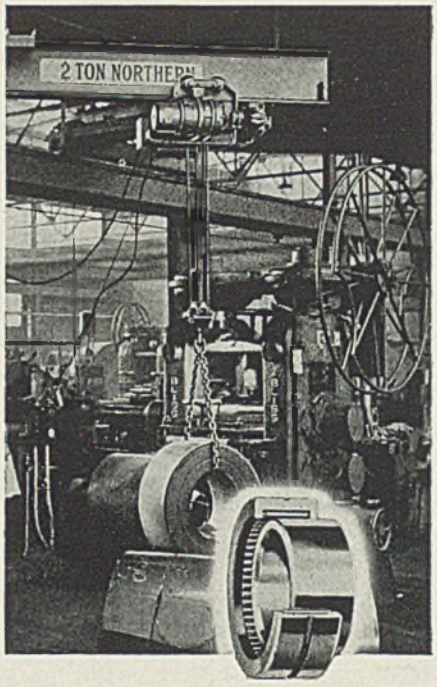
HUNDREDS OF ANTI-FRICTION BEARINGS—from tiny, jewel-like parts for delicate instruments to bearings of huge dimensions which support revolving gun turrets weighing many tons—are needed to complete a modern ship of our growing battle fleet. Speeding production of the country's wartime shipping program is Bantam's delivery of many of these bearings *months ahead of schedule*. For Bantam is tooled-up to meet the new and unusual in bearing design. Whether you need a special bearing or one of many standard types, TURN TO BANTAM.



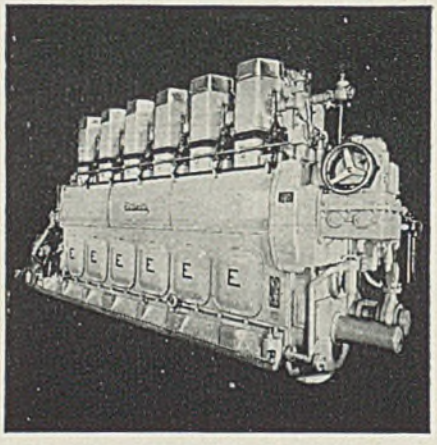


IN TEXTILE MACHINERY, efficient, economical operation is assured through the use of Bantam Bearings. In this high-speed warping machine, built by Robert Reiner, Inc., Bantam's Quill Bearings are employed on the drive shaft—a typical application of this high capacity anti-friction unit. Note also the simplified design permitted by its use as illustrated in the cross-sectional drawing. Other features of the Quill Bearing include ease of installation, efficient lubrication, low unit cost.

PROMPT DELIVERY OF SPECIAL BEARINGS is part of Bantam's contribution to America's war effort. Tooled-up to handle new and unusual requirements with a minimum of delay, Bantam can often make delivery of special bearings in less time than standard units can be obtained under today's conditions. In addition, Bantam makes many standard sizes of anti-friction bearings—straight roller, tapered roller, needle, and ball. For fast deliveries and skilled counsel on the selection of *your* bearings, TURN TO BANTAM.



TO SUBSTANTIALLY REDUCE POWER REQUIREMENTS AND INCREASE SPEED OF OPERATION, Bantam Quill Bearings are used on the bridge truck wheels of this electric hoist crane. Made by Northern Engineering Works, these hoists are built in sizes capable of handling up to 15-ton loads. The small size, high capacity, and efficient lubrication of the Quill Bearings contribute to their compact design, efficiency and long service life.



GIANT DIESELS—**16" x 20"** bore and stroke marine engines—supply the motive power for our growing wartime merchant marine—and constant, reliable service is a must. In the tappet roller assemblies of these huge giants of power, built by Enterprise Engine & Foundry Co., hundreds of precision Bantam needle rollers serve to reduce friction and wear—another example of Bantam's service in supplying bearings for specialized applications.

MARKET SUMMARY

DEMAND

New orders slacken but specifications continue at high level.

PRODUCTION

Unchanged at 99 per cent for fifth consecutive week.

PRICES

Amendment to scrap schedule removes some inequalities.

Only War Requirements on Steel Mill Books

Cancellations removing other tonnage as delivery chances fade . . . Mill commitments being held to reasonable level . . . Manufacture of civilian articles stopped . . . Scrap supply maintained

WHILE specifications for steel continue heavy, new orders are relatively light, though some steelmakers note an increase from earlier in June. Much tonnage now going through is against orders placed in the spring, mainly large tonnages.

Duration of the present lull in new business is difficult to prophesy. In the experience of some mills new orders do not greatly exceed cancellations, which indicates that important cancellations still are being made. Allocations and special directives are still forcing back tonnage on books to an extent that possible delivery is too indefinite to warrant further interest by the buyer. This tonnage is in the lower brackets although some bear ratings which appeared high as late as a month ago. It is apparent that most cancellations have been made.

Due to this weeding out of orders not having a chance of delivery under war conditions, tonnage now being produced is nearly all for war needs, with a small quantity for most essential civilian requirements. There is a growing disposition to limit mill commitments as much as possible.

Some mills have orders scheduled for delivery months ahead and in certain alloy steels can not promise delivery even tentatively before 20 to 25 weeks. In some products, due to the nature of the work for which they are required, tonnage is on schedule running well into next year. This does not preclude possibility of deliveries on other orders being made sooner. As a rule the effort is being made to keep delivery promises within a more reasonable range than heretofore.

Full application of the Production Requirements Plan, beginning with third quarter, is expected to broaden control of supply for war and most essential civilian requirements, having in view the end use of materials. It is believed this will supplant priorities and allocations and give a better distribution for most essential needs. It is realized the change will require time to attain smooth working and some estimates have been made that full benefits will not be obtained until the beginning of next year. One difficulty is foreseen in supply to small consumers whose total use falls below the $5000 worth in a single quarter, who are not placed under PRP and who normally obtain their supply from warehouses.

Friday, June 19, marked the end of manufacture of parts for more than 400 civilian articles banned in order M-126. Last date for receiving material for their manufacture was May 20. A further period of 45 days, until Aug. 3, is allowed for assembly of parts produced before June 19. Articles completely assembled by Aug. 3 may be sold at any time thereafter. Manufacturers of the articles mentioned in this order must cease all manufacturing except where they have converted their facilities to war production.

For the fifth week steel production remained at 99 per cent of capacity, paralleling the rate in June last year, but representing a much larger tonnage, as capacity is greater. Scrap shortage has practically faded from the picture as a deterrent, supply in most cases being sufficient, and necessity for open hearth repairs now is the limiting factor. Detroit gained 9 points to 95 per cent, New England 5 points to 100 and Wheeling 3½ points to 81½ per cent. Chicago receded another ½-point to 103½ and Cleveland lost 2 points to 92 per cent. Rates were unchanged at the following centers: St. Louis 95½, eastern Pennsylvania 96, Cincinnati 95, Buffalo 90½, Youngstown 95, Pittsburgh 95½, Birmingham 95.

Office of Price Administration has amended the schedule of prices on steel and iron scrap to remove some inequalities. Several new grades are established at differentials above and below No. 1 steel, a flat price on No. 1 steel at New York and Brooklyn is established and definite switching charge deductions are set up for a number of shipping points. The main price structure is not altered.

Consumption of Lake Superior iron ore in United States stacks in May set an all-time record at 7,015,408 gross tons, compared with 6,806,529 tons in April. Cumulative consumption for the year to June 1 was 33,904,490 tons, compared with 29,831,003 tons in the same months last year.

Composite steel and iron prices hold at established ceilings, finished steel at $56.73, semifinished steel at $36, steelmaking pig iron at $23.05 and steelmaking scrap at $19.17.

COMPOSITE MARKET AVERAGES

	June 20	June 13	June 6	One Month Ago May, 1942	Three Months Ago Mar., 1942	One Year Ago June, 1941	Five Years Ago June, 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.05

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	June 20, 1942	May 1942	Mar. 1942	June 1941
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	2.49	2.48	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.2175	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to 5/16-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	June 20, 1942	May 1942	Mar. 1942	June 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.365	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.265	26.24	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.34	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	125.39	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	17.75
Heavy melting steel, Chicago	18.75	18.85	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	21.50

Coke

Connellsville, furnace, ovens	$6.00	$6.00	$6.00	$6.25
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

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. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base.)

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. 2.82c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr	0.15
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3300	3.80	9200 Spr. rounds, squares	0.40
3400	3.20	T 1300, Mn, mean 1.51-2.00	0.10
4100 .15-25 Mo. 46.00 .20-.30 Mo. 1.50-2.00; Ni	0.55 1.20	Do., carbon under 0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(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, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c Pacific ports 2.65c.
(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. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c Phila. del. 3.68c; Pacific ports 4.05c.
(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; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage,

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field 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. 2.22c; 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. 2.92c; Worcester base 3.00c.
Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; 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.
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.
Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.
Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c.
(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)
Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.
Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c.
(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)
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):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c
Wire Products to the Trade:	
Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads 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
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.
Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.
*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.
Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*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.
High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
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

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†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
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
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. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.
Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.
Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.
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. Domestic or export extras may be used in case of Lease-Lend tonnage.

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 ⅞ 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.
7/16-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

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	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

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	$29.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §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.

High Silicon, Silvery

6.00-6.50 per cent (base) $29.50

6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

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 irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

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. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

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%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton 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 resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and 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, effective April 20, 1942.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $23.00-25.00
Do., barge 23.00-25.00
No. 2 lump 23.00-25.00
(OPA May 11 established maximum at Jan. 2, 1942, level.)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36.

Manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.50c; packed 5.75c; ton lots 6.00c; less-ton lots 6.25c; less 200-lb. lots 6.50c. Spot prices ¼-cent higher.

Electrolytic manganese: 99.9% plus, less carlots, per lb. 42.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

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.

Ferrophosphorus: 23-26%, based on 24% 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 Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers' plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $128; ton lots $140.50. Spot $5 per ton higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. 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 destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producer's plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, 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. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Soft Bars	Hot-rolled Strip Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	...
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	...	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	..
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	...
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore: 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia: 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	L	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		L	s	d
Foundry No. 3 Pig Iron, Silicon 2.50-3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.56	1	17	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough. 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi bessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.30

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk)	
No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian (nominal)	
2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	70.00-75.00
Indian, 50%	75.00
Brazilian, 48%	
Chilean, 48%	75.00
Cuban, 51%, duty free	85.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	Heavy Structural, Plate 2 ft. and less	Heavy Structural, Plate 1 ft. and less	Cut Auto Scrap 3 ft. and less	Cut Auto Scrap 2 ft. and less	Cut Auto Scrap 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, tube scrap $3 over, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, provided most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

Sheets, Strip

Sheet & Strip Prices, Page 108

The sheet situation has become so tight that most sellers refuse delivery promises even on A-1-a ratings. Special allocations apparently provide the consumer the only assurance of specific delivery and even allocations are being shifted to meet circumstances. Principal difficulty lies in increasing diversion of sheet capacity to plates and in shortage of semifinished steel. Allocations of the latter are being increased, particularly for export under lend-lease. This affects rolling schedules of both integrated and nonintegrated producers, especially the latter.

Substitution of narrow cold-rolled steel strip for brass in many armament products is reflected in demand for the former, with large supplemental orders placed for rifle clips and machine gun links, the latter two being largely in high carbon steel.

Orders with most rerollers are slightly ahead of shipments this month, though fewer in number and less widely distributed. Shops taking prime contracts for war goods several months ago, for which they had to equip, are now getting into capacity production, with specifications tending to increase on a monthly basis.

Hot-rolled replacements are keyed to cold-rolled operations on a priority schedule, with melting against A-2 ratings disappearing, most new business being A-1-c or higher. Control of primary melt of alloys has tightened with end use closely scanned. Rerollers are estimating requirements for melting practically 90 days in advance.

Little new black sheet tonnage is available below A-1-a rating and one producer until recently taking orders on A-1-c now can make no delivery promises below A-1-a.

Sheet mills continue to lose capacity and semifinished supply to plate production is narrowing the range of priorities on which sheet deliveries can be made. Some rolling equipment, especially for cold-rolled, is not fully engaged because of lack of semifinished steel.

Continued increase in demand for plates is making it difficult for sheet producers to make definite promises for delivery.

Plates

Plate Prices, Page 109

Plate consumers are being advised by Washington to specify only definite needs in submitting monthly requests for tonnage. The disposition of many buyers has been to itemize all needs, apparently in the hope they will fare better by doing so. Not even the heavy rejections many of them experienced has discouraged them.

May plate production of more than 1,000,000 tons is expected to be exceeded in June, in spite of one less working day. Present aim of the War Production Board is said to be about 1,400,000 tons per month. While primary emphasis is still on ship work, an increasing tonnage of plates is going into construction of synthetic rubber plants and high-octane refineries.

Plates are being supplied eastern fabricators, including shipyards, by mid-west mills in heavier volume than normal. Steady progress is being made in balancing inventories to not more than 45 days supply, which in the case of some shipbuilders means somewhat smaller reserves. First deliveries are likely next quarter to two yards now under construction at Providence, R. I., and Hingham, Mass., and total consumption during the last half of the year will be higher than the first.

Tightest spots in plates now are in alloy specialties involving relatively small lots for specialized fabrication; a die-maker canvassed the entire east for a few alloy plates, 3½-inch thick, without success, and was forced to appeal to Washington with an A-1-a rating for a directive, the dies being highly important in a war contract.

Bars

Bar Prices, Page 108

Heavy inroads on supply of semifinished steel for bar producers, caused by increasing allocations for lend-lease, is tightening the situation. Further allocations of shell rounds are adding to the stringency. Deliveries on plain carbon bars now average ten weeks with some

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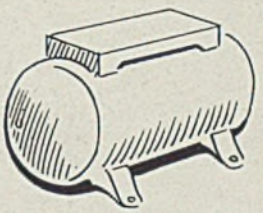

2 Augment your own facilities by sub-contracting to Scaife the making of cylindrical or welded products, or any manufacturing operations involving the following:

- ✓ Arc Welding—hand, automatic or semi-automatic.
- ✓ Brazing—Spot Welding.
- ✓ Drilling and Tapping.
- ✓ Hot-dip galvanizing.
- ✓ Pressure Testing.
- ✓ Drawing and Stamping.
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For 100% War Production—put SCAIFE in your production line!

SCAIFE COMPANY
General Offices and Works:
OAKMONT, PA.
(Pittsburgh District)
Representatives in Principal Cities

sellers, even on top ratings. Some producers are accepting orders on ratings down to A-1-c, with tentative delivery promises of about 12 weeks, while others will not consider anything below A-1-a.

Cold-finished delivery promises average one to two weeks longer than hot-rolled. Alloy bars, both hot and cold-rolled, with A-1-a rating, the only one which producers will consider, now average about 25 weeks.

Some consumers of hot-rolled bars meet increased difficulty in obtaining their requirements, due to their suppliers having received further allocations for shell steel. This has a tendency to restrict activity of bar consumers in many lines.

Some bar producers are able to book orders for smaller rounds, ⅝-inch and under, on A-1-c ratings but larger diameters of hot-rolled can be promised by most producers at eight or nine weeks on A-1-a ratings, with no definite delivery promise under that priority.

Current buying is confined mainly to supplemental war requirements, restricted to high ratings and is less active, although well sustained for screw machine needs, notably in alloys. Specifications against old orders are heavy and on some will be maintained indefinitely.

Alloy stock for all machining and fabricating operations, including forging, is tighter, with monthly specifications and releases geared to primary melting schedules. Larger forging shops, engaged on aircraft, are operating on forward contracts, with requirements maintained on a monthly basis. With forging capacity operating at 100 per cent any changes in steady specifications usually are upward slightly. Forgers' backlogs continue to mount in spite of capacity production.

Pipe

Pipe Prices, Page 109

Third quarter quotas of merchant steel pipe, arbitrarily reduced to 50 per cent of sales in the corresponding period in 1940, will be accompanied by a decline in demand for butt-weld pipe, due to restrictions in private construction. Production of lap-weld is being sustained by some substantial direct mill shipments, but curtailment in industrial and engineering projects will also be more in evidence in this grade of pipe during third quarter.

National Tube Co., Pittsburgh, has been awarded 125,000 tons of 24-inch seamless tubing for the 550-mile pipe line from Longview, Tex., to Salem, Ill., to transport petroleum and gasoline to the East. Capacity of the line will be 300,000 barrels daily. Delivery schedule calls for 140 miles in July, 170 miles in August, 130 in September, and 110 miles in October.

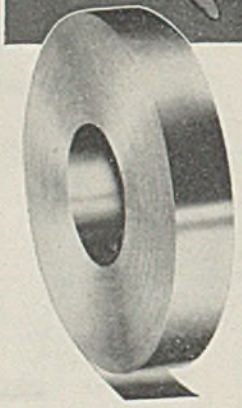
Wire

Wire Prices, Page 109

To meet demand for top-rated orders wire finishing mills are being supplied with rods on directives but deliveries on ratings below A-1-j are further extended and uncertain. Fully 80 per cent of bookings are better than A-1-j and fully half are in the A-1 group. Many war orders extend over substantial periods for deliveries of the same sizes and grades and on these items mills are attaining high production, while lagging on some others. Bookings tend to run heavily toward high-carbon rounds and for specialties. Revised specifications are being substituted in many cases where alloy analysis is needed.

Heavier specifications for alloy wires for aircraft construction are developing each month, notably in chromium-vanadium and other material subject to high stresses at widely variable temperatures. Extensive heat treating and inspection is required for much of the specialty tonnage entering into war products. A large part of volume being placed for specialties calls for forward deliveries over an extended period, releases for some being on a fixed basis each month, with provision for increases in others. Individual orders are fewer.

Finishing operations continue tied to rod supplies and heat-treating capacity. Demand for wire rope is heavy, mills in some instances being forced to refuse some tonnage for lack of capacity. Screw manu-



WITH THOMAS COLD ROLLED STRIP STEEL

The manufacturing of war products in America's factories calls for production strategy as it applies to mechanical operation as well as to the selection of materials. On this basis, Thomastrip has many practical applications for war products. Thomas cold rolled strip steel meets the requirements for lightweight precision parts. Our engineers will gladly apply their wide experience and knowledge to the solving of your problems. Write today.

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BRIGHT FINISH NOT COATED, HOT TIN COATED, ELECTRO COATED WITH NICKEL, ZINC, COPPER, BRASS

SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL

facturers are asking large tonnages of wire and rods.

Rails, Cars

Track Material Prices, Page 109

Buying of rolling stock is limited to projects obtaining permission from WPB. The Reading Co. has placed ten diesel-electric switch engines with two builders and the Missouri Pacific has obtained court authorization for four diesel-electric freight locomotives.

Republic Steel Corp. is inquiring for 20 fifty-ton twin hoppers and 15 seventy-ton triple hoppers. The Western Maryland is seeking a number of second-hand pneumatic dump cars.

Manufacturers of railroad accessories in some cases have been able recently to obtain priority assistance from the Office of Defense Transportation. In at least one instance where an A-1-a rating was provided it was not high enough to provide the quick action deemed necessary and an appeal is being made for a directive that will expedite some of the most urgent requirements.

Construction of 18,000 freight cars has been approved by Washington. Practically all were placed last year and include 2000 ore cars, 500 covered hoppers, 5016 gondolas, 2500 flats, 5006 hoppers and 2978 tank cars and cars of special types. With the release of these cars the construction by SPAB earlier in the year on 36,000 placed previously and the 8000 delivered in January, prior to the announcement by SPAB, it appears that freight car deliveries this year will total about 62,000 cars.

Structural Shapes

Structural Shape Prices, Page 109

Structural shape supply is becoming as tight as that in plates, in spite of the curtailment in building construction. Shipyards are taking a heavy tonnage and numerous directives have been issued to provide deliveries sufficient to avoid delays in ship construction.

Steel supply to structural mills is limited to an extent that some trade interests believe that relief must be provided soon to keep up shape production, even at the expense of some other product.

Demand for steel piling has increased to the point where shipment of some A-1-a orders cannot be promised before August or September.

The structural market is dull as it relates to building construction and numerous redesigns are under way to substitute plain or reinforced concrete or timber construction. A case in point is a plant addition for F. C. Castelli, Philadelphia, originally designed for steel, now changed to reinforced concrete, requiring 250 tons of bars. Structural steel fabricators are concerned over the future effect of this trend on their operations late this year when orders now on books are completed. In some cases business in hand is sufficient for only two to three months operations.

At the present rate of curtailment unshipped backlogs of some fabricating shops will be substantially lowered by the end of third quarter, though some is tied in heavily with miscellaneous war contracts and will not be materially affected.

Pig Iron

Pig Iron Prices, Page 110

Pig iron supply for foundries is sufficient in most instances and in cases of those whose output has been reduced by cutting off of manufacture of civilian goods some iron has been accumulated. Those fortunate enough to have obtained war orders are operating at a high rate. This includes those making castings for machine tools, demand for which continues high. On the whole, it appears that foundry melt is diminishing somewhat, casting demand being greater for steel than for gray iron. Some stove foundries which have not obtained orders for government stoves are operating at a low rate.

Reinforcing Bars

Reinforcing Bar Prices, Page 109

Priority requirements for reinforcing steel have tightened re-

YOU GET THESE *Extra* VALUES in KENNAMETAL tools *at No Greater Cost*

HIGHER MACHINING SPEEDS

KENNAMETAL machines hardened steels (up to 550 Brinell) at speeds 2 to 6 times faster than are possible with high speed steel tools.

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The superior hardness of KENNAMETAL often permits roughing and finishing in one cut, thus reducing costs and speeding production.

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KENNAMETAL tools remove 3 to 10 times more metal between regrinds than high speed steel. Machines are kept productive for longer periods of time.

KENNAMETAL is harder, stronger and more crater-resistant than other steel-cutting carbides. If you turn, bore or face steel parts up to 550 Brinell, KENNAMETAL can help you get out *more* work in any given time.

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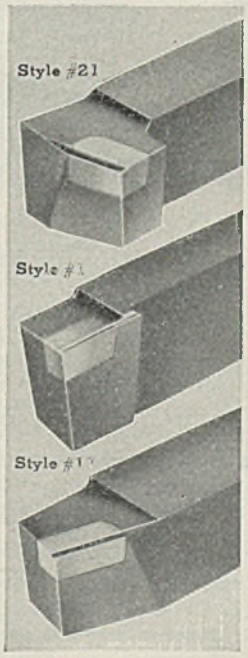
Examples of Widely Used KENNAMETAL Tools



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cently and only highest ratings can be booked. In some instances nothing under A-1-a is being considered. To obtain assurance of delivery priorities have been raised on some contracts where shipments have lagged.

Volume of tonnage coming out in current inquiries is considerably less than recently and relatively little new business is in sight. An engineering project on Long Island, N. Y., is being bid, requiring 1600 tons.

Some confusion over ceiling prices on fabricated bars has prevailed in the East, accompanied by some scattered shading under the 2.40c base and the effort is being made to improve understanding.

Scrap

Scrap Prices, Page 112

Little change has taken place in scrap supply, sufficient being received by steelmakers to sustain the high rate of steel output and in some cases to allow accumulation of reserves. The latter, however, is not sufficient to assure good operation conditions when supply is shortened by fall and winter conditions. In no case are stocks comparable to usual tonnage at this season.

While every effort is being made by government and other agencies to continue collections from industrial, agricultural and automobile wrecking sources tonnage from these show some falling off in various districts. County scrap, especially, has been in smaller volume recently as farmers become busier on their regular work. Considerable tonnage is said to remain in automobile wrecking yards and this is slow to reach hands of dealers to be prepared for market.

Recent order by OPA increasing maximum of phosphorus from 0.04 to 0.05 is stimulating flow to acid and electric furnaces and may improve this situation permanently. Another amendment by OPA simplifies classifications and makes several changes in regulations governing dealings.

A feature of the scrap salvage drive in the Buffalo district is the sale of about 1000 tons by the Pierce-Arrow Buffalo Parts Co., consisting of all available parts for Pierce-Arrow cars, thus writing the final chapter of that once-famous automobile. Melters in that district are making little progress in building reserves, though supply is sufficient for current steel production.

Unusual rains in territory serving the St. Louis district have interrupted scrap flow and if this is long continued some recession in steelmaking will result. Automobile wrecking yards in that area produced 15,529 tons of scrap in May, compared with 5546 tons in April.

Office of Price Administration has set a maximum price of $51.82 per gross ton on the solid grade and $44.04 per ton for borings and turnings of a grade of chrome-vanadium tool steel scrap produced by Tennessee Coal, Iron & Railroad Co. No scrap of this analysis was sold by any company during March, 1942, thus no base being provided. The scrap contains 8 to 10 per cent chrome, 1.20 to 1.30 per cent molybdenum and 0.65 to 0.75 per cent vanadium.

Based on the most favorable de-

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

HERE is how you barricade a blaze so it can't spread into other parts of a factory. In open-end booths or drying ovens, in spaces not equipped with fire-proof doors, you spray fire-killing gas across the openings. The gas is carbon dioxide . . . and fire can't pierce this screen.

This is extra fire protection that may be combined with Kidde Built-in extinguishing Systems. The Kidde *screening nozzles* aren't meant for extinguishing. They simply provide a fire-stop. Actual fire extinguishing is handled by Kidde Shielded Nozzles within the enclosure. These totally flood the space with Kidde carbon dioxide gas, creating an atmosphere in which fire can't live.

If you have an "open-end" fire hazard in your plant, you can use Kidde screening nozzles to knock flames back. Then, in a front-and-rear pincers, quickly overwhelm the blaze in a blast of carbon dioxide snow-and-gas.

ENGINEERING FACTS—Kidde Screening Nozzles are used in pairs, opposed in position, laterally. One set of nozzles aims carbon dioxide gas directly across opening, cuts off inrush of air. Second set aims at an inward angle, to dilute oxygen which may penetrate the first screen.

SNUFFS OUT FIRE

Kidde Walter Kidde & Company Incorporated
632 West Street Bloomfield, N. J.

livery point No. 1 heavy melting steel is moving from northern New Jersey at $16.22 per ton, in accordance with the revised price schedule, while Brooklyn and New York have a base price of $15.33. The change is expected to clear up much of the confusion which has prevailed as to some grades.

Bids will be taken in about a month for demolition of the Second avenue elevated in New York, involving about 26,000 tons, largely heavy melting steel and rails.

Scrap Price Revisions Set up New Grades

Numerous changes in OPA schedule No. 4 on iron and steel scrap have been made in amendment No. 6, effective June 17. A number of new grades are established at differentials above or below No. 1 heavy melting steel in the various districts. Galvanized bundles are established at $2 below the heavy melting steel base; bar crops, plate scrap and cast steel $2.50 above base; tube scrap $3 above base; automotive springs and crankshafts $1 above base.

Chemical borings are divided into two grades, No. 1, containing not more than 1 per cent oil, at $1 below the base grade, and No. 2, not more than 1.5 per cent oil, at $2 below the base grade. Additional charge of 75 cents per ton is provided where loaded into box cars.

Specifications generally have been simplified and No. 2 busheling now may be 16-gage instead of 12-gage. No. 2 melting steel now may be 18 inches wide as well as 5 feet long. Maximum phosphorus and sulphur content of low phosphorus grades has been increased to 0.05 per cent.

Basic open hearths may no longer purchase alloy-free low phosphorus and sulphur turnings at a price in excess of the maximum for open-hearth turnings and these turnings must come to the consumer direct from the industrial producer.

A flat price of $15.33 is made on No. 1 steel in New York City or Brooklyn, f.o.b. cars or trucks or f.a.s. vessels, plus 50 cents per ton for loading on deck scow or railroad lighter. Brokerage provisions are revised to prohibit steel mills using expediters. Permission is granted consumers to purchase unprepared railroad scrap and have it prepared by a dealer at $2.50 per ton.

Definite switching charge deductions for shipping points with basing points have been established. Deduction at Pittsburgh and Brackenridge is 55 cents per gross ton; Canton, St. Louis, Harrisburg, Butler, Monessen, Bethlehem, Kokomo, Duluth, 28 cents; Youngstown, Warren, Weirton, Cleveland, Sharon, Johnstown, Toledo, San Francisco, Los Angeles, 42 cents; Buffalo, 36 cents; Detroit, 53 cents; Atlanta, Birmingham, 32 cents; Seattle 38 cents.

Portland, Oreg., has been removed from the list of basing points. Louisiana has been made a "remote" state, enabling distant consumers to absorb a higher freight charge from that state.

Warehouse

Warehouse Prices, Page 111

Warehouse distributors meet increasing difficulty in obtaining replacements of all major products and June promises to be the slowest month this year for many, with little prospect of improvement.

Alloy steel replacements are more extended, including those required for aircraft assembly. Some alloys are earmarked for aircraft distribution only. One distributor has been designated to supply chromium-molybdenum tubing and another for chromium-molybdenum sheets. Bars of X4130 and 2330 steel for aircraft use must be definitely a part of the assembled unit.

Several hot-rolled products have been stepped up to A-1-a rating to assure delivery on re-extended orders. Galvanized sheets have been raised to A-1-a, some distributors recently supplying at A-1-e. Full quotas of plates have been delivered to some warehouses and are easier to obtain at the moment.

Marked activity in coal mining has brought unusual demand for steel in some areas, which has been met to an extent that avoids curtailment in coal production.

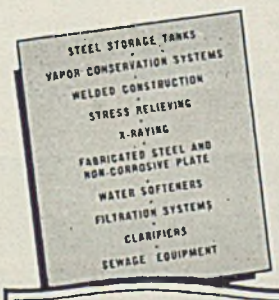
Pacific Coast

San Francisco — Demand for plates leads, by far, that for any other form of steel products. Ma-

CALLING on Graver for the construction of steel plate equipment of all types is a custom of long standing. And this is particularly true when there's a real problem involved, for Graver has a reputation for solving the tough ones.

Since 1862 Graver has served American Industry and hundreds of Graver installations in many of the most important plants in the country are playing an essential part in the tremendous program which will ultimately result in Victory. And insofar as steel plate equipment can contribute to efficiency and economy in production, these companies are securing maximum benefits.

For the duration, our efforts are directed mainly toward supplying our Government's needs. But we are already anticipating the day when Victory will make it possible for us to again serve industry as we have for the past eighty years.



GRAVER

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CABLE ADDRESS — GRATANK

12-15-S

terial for four of the sixty-five C-2 type cargo vessels recently awarded by the United States Maritime Commission to Moore Drydock Co., Oakland, Calif., has been placed and calls for 7920 tons of plates and 5280 tons of shapes. The balance of the material, 120,780 tons of plates and 80,520 tons of shapes will be purchased in the latter part of this year and in 1943 and 1944.

It is understood that a pipe line for transporting gas from the Kettleman Hills district in California to the San Francisco bay area, to be built by the Pacific Gas & Electric Co., calling for more than 5000 tons of plates for a 24-inch welded steel line is to be constructed of seamless pipe due to the inability of securing a priority on plates.

Utah Construction Co., San Francisco, is low bidder at $18,996,392 for the Davis Dam Project, Arizona, involving 7000 tons of reinforcing bars and 4023 tons of shapes for gates, hoists, trash racks, power house, crane and crane runways and 812 tons of plates for a penstock. Structural awards included 15,000 tons for a three-high plate mill, a soaking pit, four open-hearth furnaces and a shipping and storage building for a steel mill for Kaiser Co. Inc., Division of Iron and Steel, Oakland, Calif., to be erected at Fontana, Calif., booked by Bethlehem Steel Co. This company also secured 4500 tons for an aluminum plant for the Defense Plant Corp. to be erected in California. Star Iron & Steel Co. secured over 125 tons for a 125-ton gantry crane for the Shasta dam, California.

Cast iron pipe bookings are almost entirely for government defense projects and no private awards of size were reported.

Reinforcing bar mills continue to operate on heavy backlogs and numerous government projects involving good sized lots have recently been placed, though no information has been released regarding the tonnages or projects involved.

Semifinished Steel

Semifinished Prices, Page 108

Shipments of semifinished steel abroad this month under the lend-lease program are by far the heaviest this year and are expected to be maintained throughout next quarter. It is estimated in some trade quarters that the movement of semifinished next quarter will be almost four times as much as will be moved in the current quarter, principally this month.

Little steel is moving to South America, apart from certain distress lots produced to foreign specifications but not shipped to original destinations because of the exigencies of war. As a matter of fact, it is understood that most of this steel is still lying at seaboard points.

Steel in Europe

Foreign Steel Prices, Page 111

London—(*By Cable*)—Steady flow of materials to war industries in Great Britain continues but little tonnage is released for commercial users. Foundries making heavy castings are taking large tonnages of high phosphorus pig iron. Builders of railroad tank cars are seeking larger allocations of steel plates.

Canada

Toronto, Ont.—Orders for iron and steel are on the decline. However, there is no falling off in production and consumption, the slump in buying being due to government regulations stopping practically all non-essential use of steel. Only top priority ratings are being supplied, the latter mostly covered by running contracts. Canadian mills are maintaining production at virtual capacity, to the limit of raw material supply. While some departments are exceeding rated capacity others have been sharply curtailed through lack of steel.

According to local mill representatives, wire and wire products are creating the problems of today and mills have withdrawn from the market as far as deliveries over the next few months are concerned. On the other hand, plate supply has increased and deliveries are catching up with demand. Local warehouse operators report shortage of plates and are having trouble meeting customers' demands. Mills are making special efforts to meet plate requirements for shipbuilding, tank construction and other essential war

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In this "all-out" war effort Monarch Steel is co-operating 100%. We're helping to "keep 'em rolling" with Speed Case Steel.

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MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

needs and as a consequence are depriving other departments of semi-finished.

Orders continue in large volume for bars and practically all deliveries to civilian manufacturers have stopped. War industries are taking all available supplies and even these are not obtaining sufficient for their entire needs. Alloy and carbon bars have specially heavy call and output, chiefly from electric furnaces, falls short of meeting requirements, resulting in little better than 70 per cent production in some war plants. Large additions to electric furnace capacity are under way or projected, which will practically double output from these plants early next year.

Canadian sheet producers have withdrawn from the market and are accepting only orders directly approved by the steel controller for essential war work, with principal deliveries for ship and war vehicles production. Sheet mills are maintaining capacity production with all output under control of the government. Occasional shipments are being made to warehouse operators but any orders filled must prove essential war priorities.

Movement of iron and steel scrap continues brisk, with local dealers' yards heavily loaded with supplies, which exceed present handling facilities. Offerings from automobile wreckers have started to fall off, following the rush to clean yards during the past two or three weeks, but increased tonnages of steel grades are appearing from war plants, must of which are going direct to mills or electric furnaces. Demand for steel scrap is absorbing all offerings, the tendency of consumers being to accumulate as much scrap as possible during the present flood of offerings. For the first time in months supply of iron scrap material exceeds current demands, with the result that foundries and other consumers have made some progress recently in rebuilding stocks. Supplies, however, have not yet reached sufficient volume to provide much reserve.

Metallurgical Coke

Coke Prices, Page 109

Beehive coke producers are continuing their fight to obtain relief from the $6 ceiling on furnace coke. Granting of exceptions to the ceiling has been limited thus far to two producers, the most recent being Lincoln Coal & Coke Co., permitted to sell at $6.40.

There has been no slackening in demand for furnace coke. Foundry coke is slower, because many foundries using beehive coke have partially suspended operations. This is a result of limitation orders primarily, but also due to pig iron shortage in part.

Iron Ore

Iron Ore Prices, Page 111

May consumption of Lake Superior iron ore set an all-time record at 7,015,408 gross tons, compared with 6,806,529 tons in April and 6,089,538 tons in May, 1941. Cumulative consumption to June 1 was 33,904,490 tons, compared with 29,831,003 tons in the comparable period last year.

Ore on hand at docks and furnaces June 1 totaled 25,199,177 tons, compared with 20,064,744 tons May 1 and 21,816,898 tons a year ago. Active blast furnaces June 1 were 170 in the United States and eight in Canada, compared with 180 a month previous, a loss of two stacks in the United States and a gain of one in Canada. A year ago 169 stacks were in blast.

Lake Superior Iron Ore Association has revised its figures on iron ore on hand at furnaces and Lake Erie docks, as of May 1, to include Canadian figures not previously available. Canadian stocks at that date were 598,535 gross tons, bringing total stocks to 20,064,744 tons, compared with 20,189,991 tons as of April 1.

American Great Lakes vessels in the iron ore trade June 15 numbered 297, with trip capacity of 2,719,140 gross tons, compared with 291 bottoms, with trip capacity of 2,691,440 tons, as of May 15, as compiled by C. C. Lindeman, statistician for the M. A. Hanna Co., Cleveland. All fleets were 100 per cent active except the Nicholson Universal, which has one ship not yet in the ore trade. As of June 15, 1941, 292 ships were in the ore trade, with trip capacity of 2,688,040 tons.

The success of AMERICAN Roller Bearings in heavy-duty applications results from the uncomprising policy of relating *engineering design* to *requirements of service.* The type, the style, the size . . . all these, and other engineering considerations, vitally affect the performance of roller bearings under the terrific strains and impacts of today's 24-hour-a-day operation. To select just the *right* bearing for the *right* purpose is as important as the selection of the *right* manufacturer. When you specify AMERICANS you accomplish both objectives! AMERICAN engineers will advise you well; in the *complete* AMERICAN line are heavy-duty bearings *exactly* suited to your needs. Send your blueprints for analysis and recommendations.

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AMERICAN
Heavy-Duty ROLLER BEARINGS

Nonferrous Metal Prices

June	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-19	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.75- 9.50
Yellow brass castings	6.25- 7.25
Auto radiators	6.75- 7.25
Red Brass, borings & turnings	8.50- 9.25

Zinc

Old	5.00- 5.75
New clippings	6.50- 7.25

Aluminum

Clippings	10.00-11.00
Cast	8.75-10.00
Pistons	8.75-10.00
Sheet	9.00-10.50

Lead

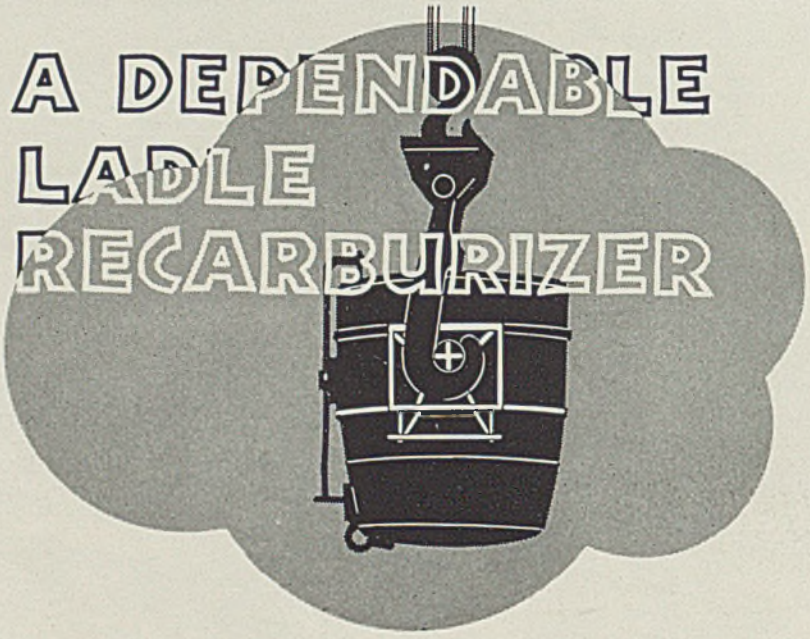
Heavy	5.00- 5.85
Mixed babbitt	4.50- 6.75
Electrotype shells	5.00- 6.25
Stereotype, Linotype	6.25- 7.50

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-38.00
Solder joints	7.75-10.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	13.25
Standard No. 12 aluminum	14.50



Open hearth shops called upon to work within close carbon ranges appreciate the special effectiveness and efficiency obtained when recarburizing with No. 8 Mexican Graphite.

Quiet and dependable . . . containing no sulphur or harmful impurities . . . No. 8 Mexican Graphite keeps steel hotter and reduces oxidation losses. Absolute 80% carbon recovery insures steel quality . . . quiet action insures safety against fire hazards. Conveniently packaged, clean to store and easy to use . . . write for prices and particulars.

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO.8 MEXALOY GRAPHITE

Nonferrous Metals

New York—Rate at which WPB issues new conservation orders and tightens up those now in effect indicates that shortage of raw materials remains our chief production problem. Our capacity to fabricate some time ago passed production of raw materials.

Copper—Reflecting record production, operating costs are at a new low. During May primary mines turned out nearly 95,000 tons and scrap accounted for another 6000 tons, for a new all-time record of 101,000 tons in a 31-day period. Capacity to produce electrolytic copper, fire refined copper, casting copper and alloy ingots apparently is ample to handle the increase in ore production and scrap recovery, including frozen stocks of new semifinished material. High grade material will be refined before low grade. Thus a decline in the price and lack of a market probably will soon confront holders of copper material.

Zinc—Lack of copper and other component parts has "run interference" as the WPB terms the situation, for zinc. It now appears that some time this summer the WPB will issue a conservation order specifically in several items. Some believe that restrictions on high grade zinc may be more severe than on other grades. May zinc metal production came to nearly 80,000 tons. Of this 37,000 tons was high grade and special high grade. The balance of 43,000 tons consisted of intermediate, brass special, select and nearly 30,000 tons of prime western.

Lead—For producers and consumers the demand-supply situation is unchanged. The MRC foreign refined lead continues to go into stockpile upon orders of WPB. Fifteen per cent of the domestic output is still being allocated by WPB. Imports continue uninterrupted.

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES . . .

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Cleveland office Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

2-S-1: Subcontractor with hand screw machine or turret lathe of 1¼-inch diameter bar capacity. Operations, first form, finish form, thread and cutoff. Minimum tolerance, .006. Material, 1¼-inch diameter SAE 1034 steel bar. Quantity 1000 to 10,000 pieces. Blueprints on file.

6-S-5: Subcontractor to machine welded cases, 78 x 126 x 70 inches. Equipment indicated, 96-inch planer, 7-foot radial drill, vertical travel 72 inches, crossfeed 165 inches, 96-inch outboard table support. Limits close. Delivery indefinite. Prints on file at Youngstown, O., office. Welded cases furnished.

6-S-6: Facilities to machine complete welded crank cases, smallest case 35 x 105 x 44 inches high, largest 52 x 165 x 54 inches high. Equipment indicated, 60-inch planer; 7-foot radial drill; boring mill 72-inch vertical travel, crossfeed 165 inches, 84-inch table. Welded cases furnished. Prints on file at Youngstown, O., office.

6-S-11: Subcontractor to machine crossrail for vertical boring mill. Cross rail is 30 x 30½ inches x 13 feet 4 inches. Equipment indicated is 6-foot outside planer, horizontal boring mill and 4-foot radial drill. Prints on file at Youngstown, O., office.

7-S-6: Subcontractor to fabricate 15 items, consisting of small gears, nuts and special parts. Equipment required, gear shaper to cut teeth, pieces 3-inches in diameter, turret lathes, drills, mills and horizontal broach, centerless grinder to ⅞-inch. Material Enduro AA, SAE 1335, 3135, 3140, 1112; nitralloy G 1020 forgings; 1020 SS tubing. Quantities 500 to 90,000 each part. Forgings furnished by prime contractors. Blueprints on file at Canton, O., office.

7-S-7: Subcontractor with open capacity on automatic screw machines from ¾ to 1-inch, to machine studs. Twelve items in quantities from 1200 to 240,000. Material SAE 3140; drill rod; SAE 1112 steel. Material to be furnished by subcontractor. A-1-a to A-1-f priority. Blue prints on file at Canton, O., office.

7-S-8: Subcontractor to machine flywheels at rate of 300 per month. Flywheels measure 18 x 4 inches, requiring turret lathes and drilling and tapping operations. Forgings to be furnished by prime contractor. Total requirements 1900 pieces. A-1-a priority. Blueprints on file at Canton, O., office.

8-S-7: Subcontractor with screw machine or turret lathe to furnish trunnion pins. Operations, first form, finish form and cutoff. Minimum tolerance, .005. Material, 1¼-inch diameter, SAE 1112 steel bar. Quantity, 50,000 pieces by August 1. Blueprints on file.

10-S-1: Subcontractor having hand screw machine to furnish two parts. Operations, first form, finish form, thread, drill and ream. Material CR steel. Minimum tolerance .001. Quantity, 5000 to 10,000 of each part. Blueprints on file.

D-56 and D-51: Subcontractor with multiple spindle automatic to furnish fuze part. Minimum tolerance .001. Material, 2 7/15-inch diameter WD X 1314 steel bar. Quantity up to 50,000 per week. Sample on display at Cleveland office.

D-63: Subcontractor with multiple spindle automatics and/or turret lathes for bar stock to furnish two fuze can parts. Hand mill and small drill press also required. Minimum tolerance .002. Material, 3.328-inch OD SAE 52.100 steel tubing and 2⅛-inch diameter CR steel bar. Quantity, up to 500 daily of each part. Samples on display at Cleveland office.

D-64: Subcontractor with multiple spindle automatics and turret lathes to furnish two parts, also tapping equipment to furnish one part. Minimum tolerance .006. Material 2⅛-inch diameter, WD X 1314 steel bar. Quantity 400,000 pieces of each part. Sample on display at Cleveland office.

D-65: Subcontractor with single spindle screw machine, ⅛-inch diameter bar and ¾-inch hex bar capicities; turret lathe, 2⅜-inch diameter capacity; centerless grinder, ⅜-inch diameter capacity; hand mill; broach to furnish four parts. Material, stainless steel. Minimum grinding tolerance .0005. Quantity, 15,000 to 25,000 pieces. Samples on display at Cleveland office.

New York office, Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-139: An upstate New York firm is seeking a subcontractor having certain planing facilities for production of cast iron engine bases and frames. Subcontractor must be an upstate firm. Six months work is available to acceptable applicant. Machines needed are planers with tables 8 x 15 feet with 15-foot travel. Should have one or two side heads and one or two rail heads. Height under rail at least 75 inches. Also needed is planer of same length with 5-foot width, one rail and one side head for single setup. Plant must have railroad siding and at least one 20-ton traveling crane.

S-140: New Jersey manufacturer seeks a subcontractor who can furnish planing work on cast iron columns, 51-inch bottom, 30-inch top, 1 foot wide by 9½ feet high. Set of five columns to be machined as follows: First operation, machine bottom top and side; second operation, reverse column, machine other side; third operation, vertical setting to machine bearing support. Machine needed, 10-foot planer with 10-foot clearance under crossarm. Blueprints at Newark office, 20 Washington place.

D-27: Brooklyn manufacturer holding marine contracts is seeking subcontracting facilities for production of a large number of gear blanks of various sizes and shapes. Materials: Aluminum, naval brass, steel and phosphorus bronze, will be furnished by prime contractor. Tolerances range from plus .0000 to minus .0003 I.D. Machines needed are turret lathes up to 5½-inch collet capacity, to face, drill, bore, ream, turn O.D., cut off, rechuck and face other end to length. Quantities average 200 of each type of gear. Gear teeth will be machined by prime contractor. Blueprints and samples are available at the New York City subcontracting exhibit.

S-141: New Jersey manufacturer holding army contracts is seeking subcontractor with light screw machine facilities, as well as screw machines with capacity up to 1½ inches. Materials will be furnished by prime contractor. Blueprints available at Newark contract office, 20 Washington place.

S-142: New York City concern working on Navy orders is seeking subcontractors who can carry out boring and milling operations on 50 aluminum castings 22 x 26 x 36 inches. Tolerances, plus or minus .001 to .005. Machines needed, No. 41 Lucas horizontal boring mill or equivalent. Operations to be performed at one setting. There are several holes to be bored, the largest 9¾ inches in diameter by ⅝-inch long. Castings will be furnished by prime contractor. Blueprints available at New York office, 122 East Forty-second street.

D-28: New York City instrument maker is seeking rough casting and sand blasting facilities for manufacture of 11 stuffing box castings weighing ¾ to two pounds. Material, soft steel, Navy specification 49 S1, grade B. Quantity, 200 to 300 of each.

S-143: New Jersey aircraft manufacturer requires a number of shops capable of rebuilding tools, jigs and fixtures. Large and medium sized equipment is necessary. Shops in northern New Jersey are preferred to facilitate supervision. Materials will be furnished by prime contractor. Blueprints are available at Newark, N. J., office, 20 Washington place.

S-144: Long Island aircraft concern is seeking a subcontractor having facilities for heat treating 100 landing gear struts. Struts are X 413 C.M. steel and vertical height is 64 inches. Furnaces must be capable of holding

pieces vertically at 1700 degrees F.

S-146: New Jersey manufacturer is seeking subcontractors with No. 00 to No. 2 B & S automatic screw machines and small amount of drilling and milling equipment. Materials furnished by prime contractor. Blueprints available at Newark, N. J., office, 20 Washington place.

S-147: New Jersey manufacturer needs subcontractor having a planer-miller over 30 inches, equipped with vertical and two side heads. Materials to be furnished by prime contractor. Blueprints at Newark, N. J., office, 20 Washington place.

S-148: A government procurement agency is seeking a contractor with facilities for forging, heat treating and machining bulkheads, 21 inches in diameter, by 8 inches, steel, alloy CM. Tolerances are close. Quantity 500 to 6000 pieces per month.

S-149: New Jersey concern requires one or more subcontractors with automatic screw machines, B & S No. 00 to No. 2 or equivalent for machining stainless steel terminals. Finish is of prime importance. Some milling and drill press work is needed on some items. Different sizes are required in various quantities in lots up to 40,000 each at a time for the duration. Materials will be furnished by prime contractor. Blueprints at Newark, N. J., office, 20 Washington place.

S-150: Prime contractor in New York area seeks subcontractor with facilities for machining control boxes, approximately 22 inches square, with a cover, all of cast steel, with numerous projections, lugs and holes through sides for small shafting. Exact dimensions 25 x 21 x 18 inches. Required tolerances .0005. Quantity 1500 or more. Machines needed, combined knee-type Ingersoll No. 5 planer-type millers with horizontal and vertical head spindle, circular table capacity minimum 26 inches diameter, or Gray combination planer mill, open side, capacity 26 inches minimum. Sensitive type. Buffalo radial drills or equivalent.

D-30: A Brooklyn machine manufacturing firm is seeking machine shop facilities for machining of large quantities of Navy brass forgings. Item, socket. Material, Navy brass, 2½ x 6 inches. Tolerances, plus .002, minus .000. Machines needed, turret lathes, No. 3 Barton & Oliver, No. 4 Warner & Swasey or 1¼-inch Jones & Lamson. Forgings and inside drilling tools will be furnished.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station Building, reports the following subcontract opportunities:

Roystuart-34-1: Government is seeking facilities to machine and profile right and left-hand marine propellers, diameter 6 feet 4 inches A. O., manganese bronze, specification 49-B.3. Hubs bored to taper ⅝-inch to foot, bore 13½ inches long, shaft 5½ inches diameter, finished weight 1220 pounds. Tolerances close. Contract by negotiation. Prints, specifications and information at Philadelphia office.

Roystuart-33-1: Government urgently requires subcontracting facilities for metal sheave blocks. Requirements, 3000 snatch blocks with swivel eyes and phosphor bronze sheaves; 3000 double blocks with solid eyes and mild steel sheaves; 8000 clump blocks with swivel eyes and mild steel sheaves; 3000 double blocks with free hooks and mild steel sheaves. Specifications call for forgings, alternate material, malleable iron castings. Contract by negotiation. Prints, specifications and information at Philadelphia office.

Chase-33-1: Michigan manufacturer urgently requires subcontracting for aviation motor components. Plain and stepped studs, square and hex head bolts, castle and sleeve nuts, taper and special pins, special screws and bushings, washers, plugs, caps, nipples, rocker shafts, camshaft rocker tappets, etc. Quantities, varying, 14,000 each of more than 100 different items. Material mostly AMS 6310 and 5024 steel bar. Minimum tolerance .001. Following tools or equivalent required: Screw machines, light milling machines, drilling, facilities for precision grinding, heat treating, hardness testing, cadmium plating. Prints, specifications and information at Philadelphia office.

Barr-32-1: Pennsylvania manufacturer seeks subcontracting facilities for fuze bodies, base plugs and firing pins. Material cold-drawn steel WDX 1314 or WDX 1315. Smallest tolerance plus or minus .002. Quantity, 300,000 fuze bodies per month, 100,000 base plugs per month and 250,000 firing pins per month. Equipment required, 1⅝-inch multi-spindle automatic screw machine, small-type precision drill press, 1¾-inch automatic multi-spindle screw machine, small precision drill and tapping machine, ½-inch multi-spindle screw machine, cadmium and zinc plating facilities. Prints and specifications at Philadelphia office.

Chase-32-1: Maryland firm seeks subcontracting facilities for propeller hubs, forged and machined. Material, forging specification BH 101 SAEX4340 steel. Quantity, 30 to 100 per month. Equipment, No. 4718 size 7 x 7-inch lathe, drill press, broaching, threading and tapping, boring 3.5-inch. Prints and specifications at Philadelphia office.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

5-N-602: A prime contractor requires the production of 6630 retaining nuts made of 3140 steel and in six sizes from 2⅛ to 5½-inch in diameter. Gisholt or Warner & Swasey (or equivalent) turret lathes required. Blueprints and specifications at Chicago office.

12-AN-605: Mid-western prime contractor is seeking 37,000 hours labor for production of tools, gages, jigs and fixtures. Is critical item and need is urgent. Work will be distributed wherever facilities can be found and will be let on time and material basis.

21-AN-609: Chicago prime contractor wishes to place promptly 10,000 pieces for 1¼-inch single-spindle automatic screw machine. Part is made of 1⅛-inch round No. 1532 steel. A-1-f priority. Material furnished by prime contractor, tools by subcontractor. Urgent requirement and quick action necessary.

22-A-609: Open capacity on No. 00 Brown & Sharpe automatic screw machines required at once for large Air Corps contract which will last for the duration.

26-A-610: Herringbone gears and pinions, 30 sets per month, starting at once or any time before August. Size 24½-inch diameter x 5-inch face and 7½-inch diameter x 5-inch face. Steel forgings, either blanks or machined, ready for cutting of teeth, will be furnished by prime contractor. Blueprints at Chicago office.

35-N-612: Maritime Commission has asked this office to find facilities for production of about 3,000,000 forged steel pipe flanges, ranging from ½-inch I.P.S. to 10½-inch I.P.S. Flanges to be both threaded and slip-on types. About 80 per cent are for 6-inch and under and large numbers of each size are required.

80-AN-529: Chicago manufacturer requires dies for forming small aluminum parts for aircraft work.

36-N-613: Two Gulf shipyards urgently require ten forged steel rudder stocks. Will consider forgings only or finished complete. Largest diameter of shaft 11¼-inch; flange 23½-inch diameter, forged integral with shaft; extreme length 10 feet. Steel SAE 1030; A-1-a priority.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-15: Concern urgently requires facilities on multiple spindle and automatic screw machines, capacity 3 to 3½-inch diameter for bar stock; long run. Tolerances, .001 to .005.

SC-16: Manufacturers needed capable of making worm and worm gear sets, spiral bevel pinions and gear sets for winches, carrying AA priority. Contractor desires to obtain 350 sets of worm gears and 350 sets of spiral bevel pinions and gears. Delivery desired, 80 sets per month, beginning the middle of July. Contact War Production Board office at Montpelier, Vt.

SC-17: Concern desires to find machine tool facilities able to handle surface planing on cast steel frames about 24 inches x 7 x 9 feet, weighing about four tons.

SC-18: Subcontractors wanted with capacity on turret lathes and hand screw machines capable of machining cold-rolled steel, brass and phosphor bronze bar stock up to 1-inch diameter. Lots are less than 100 to maximum of 2000 pieces with tolerances from .001 to .005. Deliveries required within 30 days. Prime contractor would prefer to have subcontractor provide materials on A-1-a priority but will consider anyone having equipment capable of handling.

SC-19: Connecticut manufacturer is seeking subcontractors who have Brown & Sharpe No. 00 multiple spindle screw machines to work on free-turning brass. All material must be furnished by the subcontractor but the work carries an A-1-a priority. Total quantity will probably range from 20,000 to 50,000 pieces, 10 per cent by July 5 and 5 per cent per week until completion. Possibility of further orders.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

No. 964 through 1004: Screw machine parts ¼ to 1⅝-inch diameter. Quantities 10,000 to 80,000 on each item. Most are stainless with a few of other steel alloys and several are dural. Many have second operations consisting of drilling, milling, tapping, centerless or surface grinding, hardening, cadmium plating and anodizing. Subcontractor must furnish material. A-1-a priority.

No. 1005 through 1014: Screw machine parts from 1-inch hex to 2¼-inch square. One part is X1315, balance are SW1532 steel. Second operations are drilling, tapping, swaging, keyseating, hardening or plating. Material is furnished on A-1-a priority. Quantities 10,000 to 60,000.

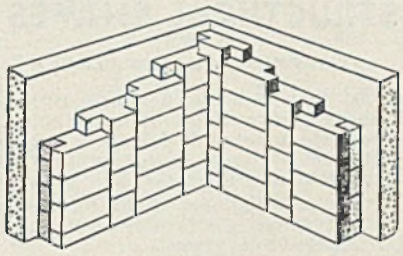
No. 1015: Phosphor bronze worm gear, 24 teeth, 10 pitch p.d. 2400-inch, left hand. Hub has set screw hole and keyway. Blanks are furnished by prime; 10,000 required as soon as possible.

No. 1016: Steel coupling 3½-inch diameter by 1⅝-inch long; turning, drilling and keyseating required. Material furnished on A-1-a priority; 10,000 required as soon as possible.

No. 1017: Cast iron oil seal retainer 2⅜ x 2⅛ x ⅝-inch; turning, drilling,

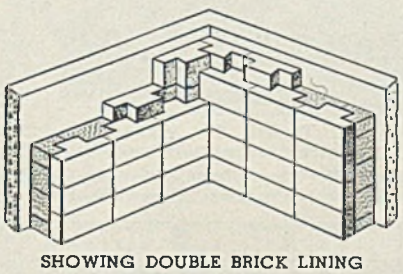
Keagler-Nukem

MONOLITHIC ACID PROOF CONSTRUCTION BRICK SHAPES



SHOWING SINGLE BRICK LINING
(PATENT APPLIED FOR)

Here is a new brick shape, manufactured of fire clay by the deairated method, and highly resistant to acid. It guarantees maximum strength of acid proof wall, and is particularly adapted for high temperature pickling tank construction. The bricks are so shaped that walls may be made 5" or 8" without using additional brick. The type shown above is especially adapted as a sheathing for steel rubber-lined tanks, concrete shell tanks, acid pits or wooden tanks. Samples and catalogs sent on request.



SHOWING DOUBLE BRICK LINING
(PATENT APPLIED FOR)

KEAGLER BRICK CO.

★

STEUBENVILLE, OHIO

reaming and painting required. Castings are furnished. A-1-a priority on 10,000, as soon as possible.

No. 1043: Bearing cup, 1.65-inch O.D. by .94-inch long; X112 steel, requiring multiple screw machines with milling and drilling second operations; 100,000 per month required at once on A-1-a priority with material furnished.

WPB Clarifies New PRP Regulations

(*Continued from Page* 35)

which will be consumed in processing material to fill the rated order, up to 10 per cent of such operating supplies may be in the form of metals on the Metals List of Priority Regulation No. 11.

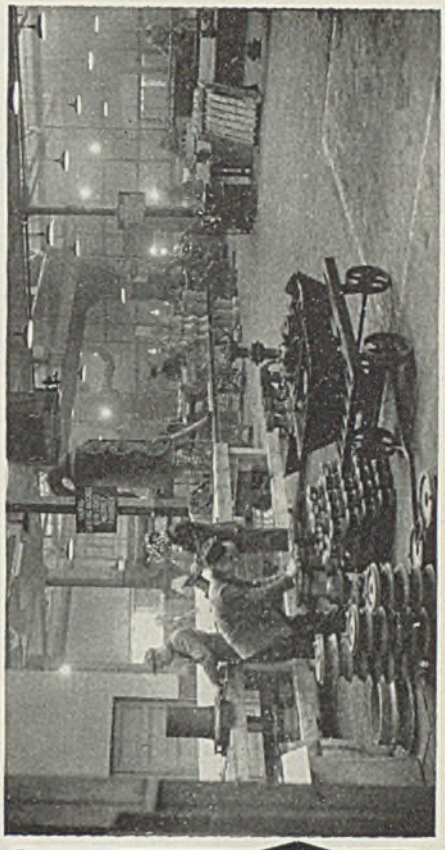
Several important priority instruments will continue to be used:

The "P" orders, which eventually will be greatly reduced in number. In the immediate future, however, certain orders will continue in effect for the users of less than $5000 worth of metal a quarter and for the special groups. For instance, P-46 for the public utilities, and broad orders such as P-148, the export order, and P-100 as it applies to concerns not covered by PRP will continue.

PD-1A's may still be issued for capital equipment for all classes of producers, and for all requirements of the industries not operating under PRP. A PD-1A certificate may be used to obtain a finished item from a company covered by PRP, but the rating cannot be extended by such a producer to get necessary materials for manufacture since he will be required by the terms of PRP to obtain his basic materials through that plan. Where a rating assigned on a PD-1A is served on a manufacturer outside the terms of PRP (for example, the manufacturer who uses less than $5000 worth of metal for the quarter), the rating can be extended for the necessary materials.

PD-3A's will be used for military requirements in almost exactly the same way as PD-1A is used. Officers of the Army and Navy will continue to assign the PD-3A certificate for the delivery of finished items. The rating then serves as a directive of delivery—the manufacturer will be required to deliver the finished item in accordance with the degree of preference rating assigned. But if the manufacturer is operating under PRP he cannot get materials for production by extending the rating. Instead, he will rely on PRP. (The degree of preference rating and the end use code assigned to the finished items will show up in the manufacturer's application under PRP for the next quarter.)

Project Ratings (P-19 Series) will continue to be used for practically all building or construction activities with the usual exceptions of a



—and Thorough Inspection

This is an inspection station in our Peerless Plant where castings are carefully inspected before shipment. Quality materials, skilled workmen and thorough inspection—such are the ingredients of satisfactory casting performance.

Castings in brass, bronze, aluminum and magnesium (Dowmetal).

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CLEVELAND, OHIO

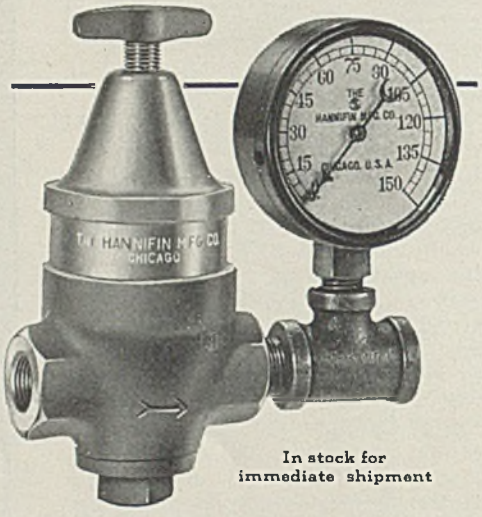
limited amount of military construction and certain classes of housing.

Limitation (L) and Conservation (M) Orders will continue to govern the things a manufacturer cannot make even though he may be able to get the material.

A Simple Way to *stretch* Air Power

Many jobs on arbor presses, air chucks, riveters, air vises, cylinders and other pneumatic machinery can be handled better at reduced pressures instead of full line pressure. With a pressure regulating valve for each machine you not only make the most of air compressor capacity, but have available the correct and most efficient working pressure for each job. Hannifin Pressure Regulating Valves, with exclusive piston type design, provide large volumetric capacity and sensitive, accurate control of working pressures. Adjustment can be made over the entire working range to deliver any reduced operating pressure needed. Construction is simple for long, dependable life without maintenance.

Three standard sizes, ⅜, ½, and ¾ inch, for use on initial pressures up to 150 lbs. Furnished complete with pressure gauge. Write for Bulletin 56-S.



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SHAPE AWARDS COMPARED

	Tons
Week ended June 20	19,625
Week ended June 13	12,861
Week ended June 6	11,691
This week, 1941	37,195
Weekly average, 1942	27,617
Weekly average, 1941	27,284
Weekly average, May, 1942	15,336
Total to date, 1941	755,633
Total to date, 1942	654,828

Includes awards of 100 tons or more.

STRUCTURAL SHAPES . .

SHAPE CONTRACTS PLACED

15,000 tons, four open-hearth furnaces, one soaking pit, plate mill and shipping and storage building, Kaiser Co. Inc., division of Iron & Steel, Fontana, Calif., to Bethlehem Steel Co., San Francisco.

4500 tons, aluminum plant for Defense Plant Corp., California, to Bethlehem Steel Co., San Francisco.

125 tons or more, 125-ton gantry crane for Shasta Dam, California, to Star Iron & Steel Co., Tacoma, Wash., at $153,700.

SHAPES CONTRACTS PENDING

2000 tons, new phenol plant, Durez Plastics & Chemicals Inc., North Tonawanda, N. Y.

REINFORCING BARS . .

REINFORCING STEEL AWARDS

1400 tons, manufacturing plant, War Department, Wisconsin, to W. H. Pipkorn Co., Milwaukee; Massman Construction Co. and Associates, Kansas City, Mo., contractors.

300 tons, construction, Bureau of Yards & Docks, Navy Department, contract NOy-5192, supplemental agreement 1, additional facilities, Virginia, to Ceco Steel Products Corp., Jersey City, N. J.; Harwood-Nebel Construction Co., Washington, contractor; project being redesigned for wood and concrete to replace structural steel.

REINFORCING STEEL PENDING

1500 tons, Bureau of Reclamation, Invitation B-33,200-A, Coram, Calif.; David Smith Steel Co., Brooklyn, only bidder.

RAILS, CARS . . .

CAR ORDERS PENDING

Capital Transit Co., Washington, D. C., 100 street cars, bids asked.

Republic Steel Corp., 20 fifty-ton twin-hopper cars and 15 seventy-ton triple-

CONCRETE BARS COMPARED

	Tons
Week ended June 20	1,700
Week ended June 13	16,392
Week ended June 6	1,962
This week, 1941	14,915
Weekly average, 1942	9,497
Weekly average, 1941	13,609
Weekly average, May, 1942	6,010
Total to date, 1941	289,513
Total to date, 1942	227,986

Includes awards of 100 tons or more.

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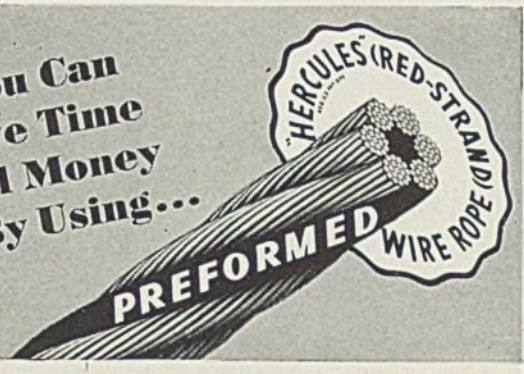

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When you buy Preformed "HERCULES" (Red-Strand) Wire Rope, you get a Preformed wire rope of the very highest quality . . . not only as to quality of material, but fabrication as well. As it is furnished in both Round Strand and Flattened Strand construction, there is a right rope for every heavy-duty purpose.

Why not take advantage of the time and money saving possibilities of Preformed "HERCULES"? Try it, then compare its performance record with that of any other rope you have ever used.

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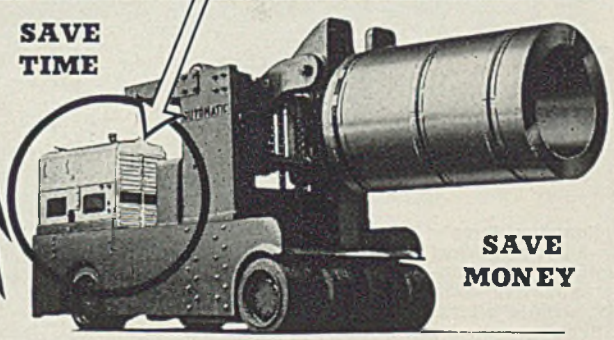

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For new or existing electric trucks we manufacture a complete line of Gas-Electric Power Units—not complete trucks. Write for information mentioning type of new trucks contemplated or make and type now operated.

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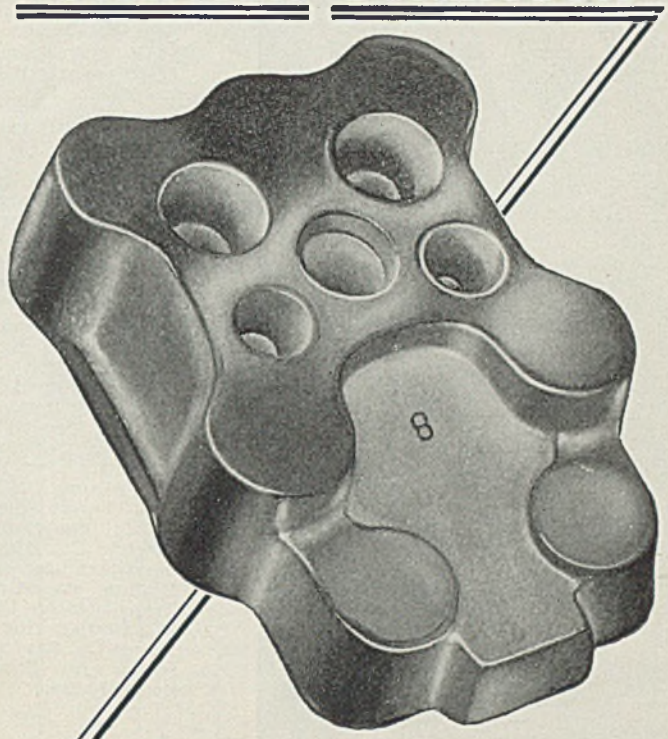

with LESS WEIGHT

Produced as a casting, this valve chamber was not only overweight, but required considerable machining.

Though difficult to forge, due to the deep impressions both on top and bottom, Phoenix engineers worked it out on a production basis, with the result that its weight was greatly reduced and its strength materially increased. Furthermore, a considerable amount of machining was eliminated because of our ability to hold it to a much closer tolerance than the original casting.

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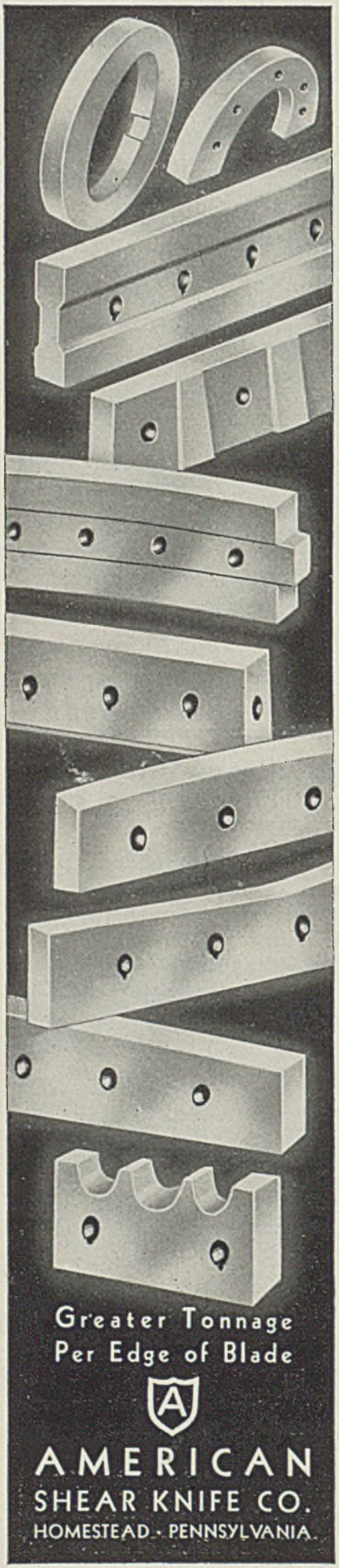


hopper cars; bids asked.

LOCOMOTIVES PLACED

Reading Railroad, 10 diesel-electric switching locomotives; four 1000-horsepower and three 600-horsepower to Baldwin Locomotive Works, Philadelphia; three 1000-horsepower to Electro Motive Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Missouri Pacific, four 5400-horsepower diesel-electric locomotives; authorization to purchase granted by district court.

BUSES BOOKED

Twin Coach Co., Kent, O.: Fourteen 34-passenger for San Antonio Public Service Co., San Antonio, Tex.; nine 29-passenger for Westchester Street Transportation Co., White Plains, N. Y.; eight 41-passenger for Seattle Transit System, Seattle; eight 41-passenger for Railway Equipment & Realty Co., Oakland, Calif.; five 35-passenger for Akron Transportation Co., Akron, O.; five 31-passenger for Mill Power Supply Co., Charlotte, N. C.; four 41-passenger for Houston Electric Co., Houston, Tex.; four 32-passenger for Buffalo Transit Co., Buffalo; six 44-passenger for Surface Transportation Corp., New York; three 31-passenger for Savannah Electric & Power Co., Savannah, Ga.; two 31-passenger for Superior Products Inc., Boise, Idaho.

PIPE . . .

STEEL PIPE PLACED

250 tons, 42-inch, for ordnance works in Minnesota, to Bethlehem Steel Co., Bethlehem, Pa.

CAST PIPE PENDING

840 tons, 4 to 8-inch, King County Water District No. 61, Seattle; Valley Construction Co., Seattle, only bidder on cast iron pipe basis, no bids submitted for welded steel pipe.

237 tons, 6 to 10-inch, Pittsburg, Calif.; bids postponed from June 1 to July 6.

CONSTRUCTION and ENTERPRISE

Ohio

CLEVELAND—Federal Foundry Supply Co., 4600 East Seventy-first street, has plans for foundry building in Pennsylvania to cost approximately $25,000. H. M. Morse Co., 1500 Superior ave., Cleveland, architect.

CLEVELAND—Locke Machine Co. is building an addition to its plant at 976 East Sixty-fourth street costing $12,000 and containing 5000 square feet of space. E. H. Baker Jr. is president.

CLEVELAND—Monarch Cap Screw & Mfg. Co., 5906 Park avenue, has plans for monitor addition. F. J. Andel is vice president.

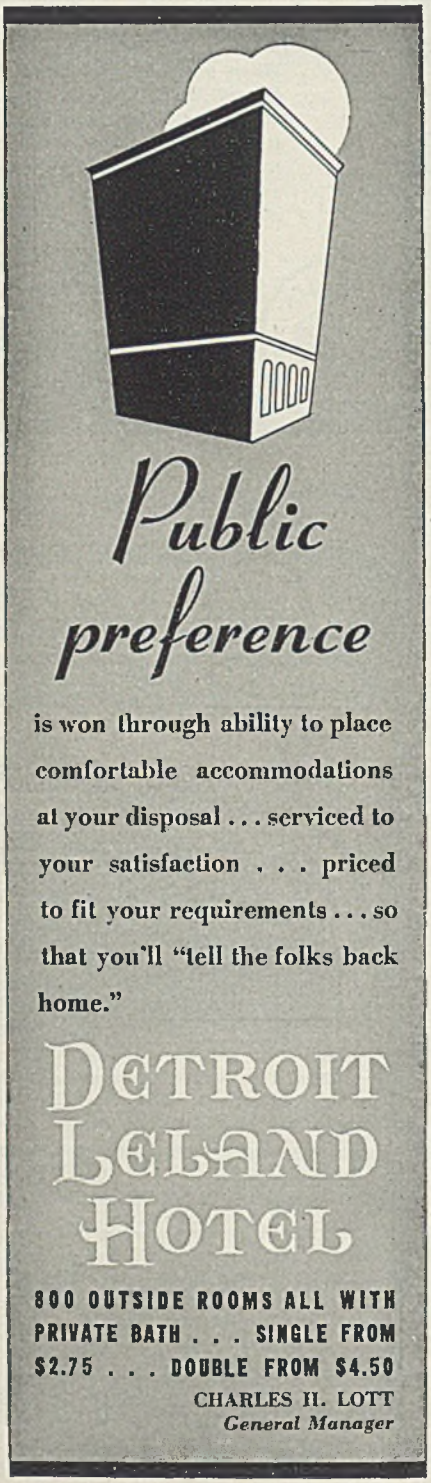
CLEVELAND—Modern Tool & Die Co., 5389 Settlement road, has acquired tract of land adjoining present property for future expansion.

CLEVELAND—Clark Controller Co., 1146 East 152nd street, Prentice C. Clark, president, has leased a building at 14401 Euclid avenue and will convert it to war production.

CLEVELAND—Magnesium Reduction Co. has filed charter for incorporation. C. T. Corp. Systems, D. M. Donley and Robert C. Freedly, Union Commerce building, are local representatives for Alexander & Green, attorneys, 120 Broadway, New York.

CLEVELAND—National Aluminum Cylinder Head Co., affiliate of National Bronze & Aluminum Co., John L. Schmeller, vice president, Union Commerce building, will be operator of $3,000,000 foundry and office building to be financed by Defense Plant Corp. Work will start June 22 on expansion which will cover 200,000 square feet. In addition, National Bronze & Aluminum will build heat treating plant to cover 5500 square feet.

CLEVELAND—Wellman Bronze & Aluminum Co., 6017 Superior avenue, plans



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prevents spattered particles of metal from sticking to the surface around the weld. Remove them in a jiffy with a hand wirebrush and water. Turco Weldmask cuts after-welding cleanup time 50%. Can be applied any time in advance of the welding operation. Does not evaporate. Non-toxic. Non-inflammable. Can be used on steel, stainless steel, aluminum or magnesium. Write for Turco Bulletin No. A-22, or phone your local Turco Service Specialist.

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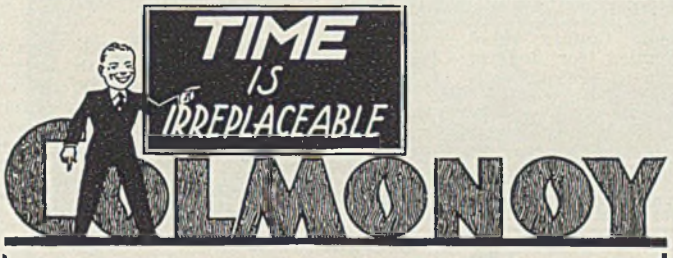

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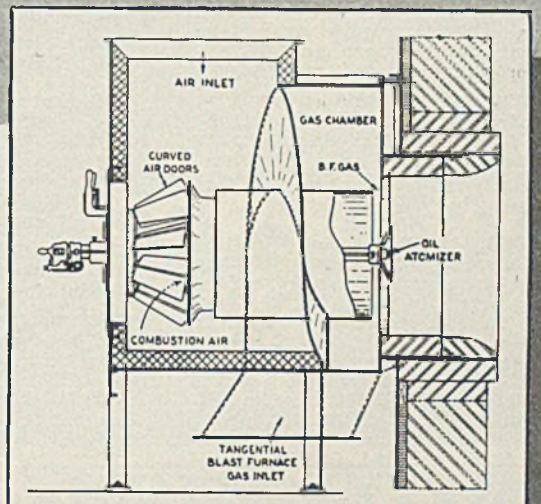

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In common with all Peabody Burners, it is available also as a combined burner to burn either blast furnace gas, oil or pulverized coal. The advantages of a combined burner are apparent; requiring only a single set of burner openings in the furnace wall, as well as the consequent simplification of combustion control equipment, resulting from the common air supply for all fuels.

Peabody Combined Blast Furnace Gas Burners are in commercial operation and performance data will be supplied on request.

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OFFICES IN PRINCIPAL CITIES

further expansion to plant. Machine shop of 3000 square feet is planned.

CLEVELAND—Pal-Vin Machine & Mfg. Co., 1419 East Fortieth street, has awarded contract for factory addition to Mitzel Co., 1836 Euclid avenue. (Noted April 20).

COLUMBIANA, O.—National Rubber Machinery Co., 917 Sweitzer avenue, plans to complete plant addition here by August. A. L. Heston is vice president.

ELYRIA, O.—Location of newly formed Elyria Automatic Screw Machine Co. Inc. is 116 East Bridge street. (Noted June 15).

KENT, O.—Black & Decker Electric Co. plans plant expansion adding 8600 square feet at cost of $30,000. Richard J. Lamb is president.

MASSILLON, O.—Tyson Roller Bearing Co., Oberlin avenue, continues program of expansion with 20,000-square foot addition to factory, for which bids are being taken.

RAVENNA, O.—City, C. P. Likens, service director, will start work on sewage treatment plant as soon as WPB approves project. Estimated cost $290,000.

YOUNGSTOWN, O.—Addition of 1200 square feet to boiler plant of Commercial Shearing & Stamping Co., 1775 Logan avenue, will be under way soon.

Massachusetts

WORCESTER, MASS. — Reed-Prentice Corp., Cambridge, Mass., has let contract for one-story 125 x 365-foot factory and assembly unit to E. J. Cross Co., 150 Prescott street. Cost $226,400.

Connecticut

BRIGEPORT, CONN.—Public works department, P. Brewster, director, plans sewage disposal plant costing $1,000,000. H. L. Bowland, City hall, engineer.

New York

DEPEW, N. Y.—United States Engineer, 120 Wall street, New York, plans power plant here costing $1,400,000, including equipment. Backus, Crane & Love, 360 Delaware avenue, Buffalo, engineer.

GREENPORT, N. Y.—Federal works agency, 2 Lafayette street, New York, plans 250,000-gallon elevated storage tank and pumping plant here costing $98,000.

JAMESTOWN, N. Y.—Jamestown Iron Works, T. Maher, president, 20 Taylor street, received low bid from J. J. Guinnane Construction Co., 15 West Eighteenth street, for machine shop addition. (Noted April 13).

New Jersey

ELIZABETH, N. J.—C. Godfrey Poggi, 287 Morris avenue, Elizabeth, is preparing plans for an industrial plant costing over $40,000.

NORTH BERGEN, N. J.—Esco High Frequency Corp., 120 West Twentieth street, New York, has let contract for one-story 160 x 162-foot factory to Bonanno Construction Co. Inc., 8533 Tonnelli avenue. Estimated cost $60,000. J. Rothstein, 220 Hutton street, Jersey City, N. J., architect and engineer. (Noted May 25).

Michigan

DEARBORN, MICH.—City has applied for federal funds for extension to sewage treatment plant estimated to cost $442,000. Hubbell, Roth & Clark, Detroit, engineers.

DETROIT—W. J. C. Kaufmann, Detroit, has contract for $25,000 factory in Detroit for National Stamping Co.

DETROIT—J. A. Utley, Royal Oak, Mich., has general contract for vulcanizing plant here for United States Rubber Co. Giffels & Vallet Inc., Detroit, architect.

DETROIT—Austin Co., Detroit, has contract for addition to plant of Holley Carburetor Co. Estimated cost $34,000.

WAYNE, MICH.—Wayne County Road Commission has applied for federal funds for waterworks in Wayne, estimated to cost $2,298,400, and for sewers at Wayne and Inkster, estimated to cost $2,819,250.

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For 27 years

The world's most efficient inhibitor at all pickling ranges. It will resist heat and time exposures. A chemically clean product which leaves the steel with a clear, bright finish. Costs less per ton of steel—having a lasting efficiency.

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Pennsylvania

CORRY, PA.—Aero Supply & Mfg. Co., 611 West Main street, is taking bids for an addition and alterations to factory. Meyers & Johnson, Commerce building, Erie, Pa., architects.

MONACA, PA.—Superior Steel Products Corp. is revising plans for plant costing $1,000,000. Defense Plant Corp. will finance.

PITTSBURGH—Thomas Machine Co. is constructing a $200,000 addition to its plant, increasing capacity about 25 per cent.

PITTSBURGH—Steel City Electric Co., W. L. Patterson, president, 1207 Columbus avenue, has awarded contract to W. F. Trimble & Sons Co., 1719 Pennsylvania avenue, for one-story factory costing about $40,000.

PITTSBURGH—Acme Stamping & Mfg. Co., Corliss street, has taken bids for office and factory building. Braziell & Farrell, 323 Fourth avenue, architect.

Illinois

CHICAGO—American Gear & Mfg. Co., which has been leasing a plant at 6645 West Sixty-fifth street, in the Clearing industrial district, has purchased the property, and at the same time has acquired more land on which it is understood an addition will be erected.

CHICAGO—Defense Plant Corp. has purchased a tract of land 115 x 408 feet in the Clearing industrial district for expansion to plant of Clearing Machine Corp., 6499 West Sixty-fifth street.

SENECA, ILL.—Chicago Bridge & Iron Co., 332 South Michigan avenue, Chicago, has asked bids for factory building.

Indiana

RICHMOND, IND. — Richmond Screw Products Inc., 14 North Tenth street, has been incorporated with 200 shares of no par value to manufacture and deal in screw and woodworking machines, machine tools, etc., by H. Joseph Howey, Frederick H. Smith, C. Burnell Abel and William B. Rea. Mr. Howey, 14 North Tenth street, agent.

Georgia

ATLANTA, GA.—War Department has let contract to Robert & Co., Atlanta, for architectural-engineering-construction-management services in connection with a manufacturing plant in Georgia, to cost over $3,000,000. Construction will be supervised by Atlanta district office of Corps of Engineers.

Mississippi

NATCHEZ, MISS.—Armstrong Tire & Rubber Co. will soon let contract for two-story tire factory. J. T. Canizaro, Capital National Bank building, Jackson, Miss., architect.

Louisiana

SHREVEPORT, LA.—Werner Construction Co. has contract for addition to machine shop of J. B. Beaird Corp., St. Vincent avenue. Cost over $20,000.

West Virginia

CHARLESTON, W. VA.—McJunkin Supply Co. has let contract to H. B. Agsten Sons, 417 Washington street East, for $20,000 welding shop.

Missouri

SEDALIA, MO.—Universal Concrete Pipe Co., Columbus, O., has awarded con-

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New York Office—114 Liberty St.

tract to C. G. Schrader and W. C. Cramer, Sedalia, for plant to house machinery valued at $100,000.

Wisconsin

OSHKOSH, WIS.—Wisconsin Axle Division, Timken-Detroit Axle Co., has let general contract for one-story 80 x 160-foot factory addition to Ben B. Ganther Co., 78 State street.

California

LOS ANGELES—Southern California Airports Inc. has been organized with $350,000 capital, by S. M. Jarvis and Betty C. Jarvis, of North Hollywood, Calif., and K. M. Paul, Los Angeles. The new firm is represented by Laurence B. Martin, Security Title Insurance building, Los Angeles.

LOS ANGELES—Apex Steel Co., 6147 Eastern avenue, is building an addition to machine shop.

LOS ANGELES—A machine shop is being erected at 6829 Avalon boulevard for Cutler Milligan Co., 350 West Slauson avenue.

Oregon

PORTLAND, OREG.—Electric Steel Rolling Mills, M. Schmitzer, 3330 Northwest Yeon street, plans electric steel rolling mill costing $100,000. Defense Plant Corp. will finance.

SALEM, OREG.—Bonneville Power Administration, P. O. Box 3537, Portland, plans substation additions costing $183,000.

Canada

EDMONTON, ALTA.—Canada Packers Ltd., 2300 St. Clair avenue West, Toronto, will start work soon on plant here to cost about $225,000 with equipment.

WINNIPEG, MAN.—Vulcan Iron Works Ltd., Sutherland and Maples avenues, has given general contract to Winnipeg Supply & Fuel Co. Ltd., 812 Boyd building, for plant addition to cost about $30,000.

CHAPLEAU, ONT. — Canadian Pacific Railway Co., Windsor Station, Montreal, S. B. McConnell, district engineer, North Bay, Ont., has given general contract to Carrington Construction Co. Ltd., Wittaker street, Sudbury, for addition to railway shop and engine house here to cost about $40,000 with equipment.

NEW TORONTO, ONT.—Anaconda American Brass Ltd., Eighth street, has extended contract to Carter-Halls-Aldinger Co. Ltd., 419 Cherry street, Toronto, to include further addition to plant to cost about $20,000. Ross & Macdonald, 1010 St. Catharine street West, Montreal, architects.

OSHAWA, ONT.—Dubiner brothers of Ford Machinery & Supply Co., 169 King street East, Toronto, have purchased a building at 161 King street West, and plan construction of addition and installation of equipment for manufacturing purposes to cost about $50,000. Plans being prepared by J. Sugarman, architect, 600 Bay street, Toronto.

OTTAWA, ONT.—Laurentian Air Services Ltd., P. O. Box 71, having plans prepared and will let contracts soon for plant addition and installation of machinery to cost about $40,000.

SCARBORO JUNCTION, ONT.—Burlee Ltd. has given general contract to Stowe & Gould, 29 Kelso street, for plant addition costing $15,000. (Noted June 15).

TORONTO, ONT.—Modern Tool Works Ltd., Montcalm avenue, York township, is having plans prepared by Allward & Gouinlock, architects, 57 Bloor street West, for plant addition to cost about $75,000, including extensions to existing bay, crane runway, heat treat building, etc.

TORONTO, ONT.—Gray Forgings & Stampings Ltd., 710 St. Clarens avenue, is considering plans for plant addition to cost about $95,000 with equipment.

TORONTO, ONT.—Anchor Cap & Closure Corp. of Canada Ltd., 275 Wallace avenue, is having plans prepared by Mathers & Haldenby, architects, 96 Bloor street West, for plant addition to cost about $25,000.

TORONTO, ONT.—International Aeronautical Corp. Ltd., 289 Sumach street, has plans by J. Hunt Stanford & Son, 57 Queen street, for plant to cost about $60,000 with equipment.

TORONTO, ONT.—Silverware Products (Canada) Ltd., 100 Munro street, is taking bids through B. Brown, 21 Dundas square, for plant addition costing $20,000.

WELLAND, ONT.—Haun Drop Forge Co. Ltd., P. O. Box 123, has plans and will let contracts soon for plant addition and equipment to include die-sinking machine, drop hammer with motor and furnace, to cost about $40,000.

GRANBY, QUE.—W. H. Miner Rubber Co. Ltd., Mountain street, is considering plans for plant addition to cost about $125,000, in which equipment to cost about $250,000 will be installed.

KILMAR, QUE.—Canadian Refractories Ltd., 1050 Canada Cement building, Montreal, is having plans prepared for plant addition to cost about $75,000.

LACHINE, QUE.—Dominion Engineering Works Ltd., First avenue, is calling bids for plant addition at the Longueuil works to cost about $40,000.

LA TUQUE, QUE.—Aluminum Co. of America Ltd., Sun Life building, Montreal, has given general contract to Fraser-Brace Engineering Co. Ltd., 360 St. James street West, Montreal, for two pot rooms to cost about $1,000,000.

LAUZON, QUE.—George T. Davie & Sons, 27 Davie street, will start work at once on plate shop at shipbuilding yards here to cost about $75,000 with equipment.

LONGUEUIL, QUE.—City council, in association with Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has given general contract to J. S. Hewson, 660 St. Catharine street West, Montreal, and equipment contract to Francis Hankin & Co. Ltd., 2028 Union avenue, for filtration and pumping plant to cost about $140,000. Adrien Plamondon, 369 Mount Royal avenue West, consulting engineer.

MONTREAL, QUE.—Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, is considering plans for war plant near here to cost several million dollars.

MONTREAL, QUE.—Canadian Allis-Chalmers Ltd., 212 King street West, Toronto, is having plans prepared by T. Pringle & Son Ltd., 485 McGill street, for addition to plant to cost about $300,000 with equipment.

MONTREAL, QUE.—Canada Strip Mill Co. Ltd., in association with Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has given general contract to Carter-Halls-Aldinger Co. Ltd., 419 Cherry street, Toronto, for castings shop to cost $350,000.

MONTREAL, QUE. — Reynold-Coventry Ltd., 1006 Mountain street, has given general contract to Richard & E. J. Ryan Ltd., 1808 William street, for plant addition to cost about $10,000. Lawson & Little, 660 St. Catharine street West, architects.

MONTREAL, QUE.—Lord et Cie Ltee, 4700 Iberville street, will start work at once on addition to iron and steelworks to cost about $35,000 with equipment.

MONTREAL, QUE.—Montreal Foundry Ltd., 1260 Conde street, has given general contract to J. P. Desrochers Co. Ltd., 59 Strathearn avenue, for plant addition to cost about $15,000 with equipment.

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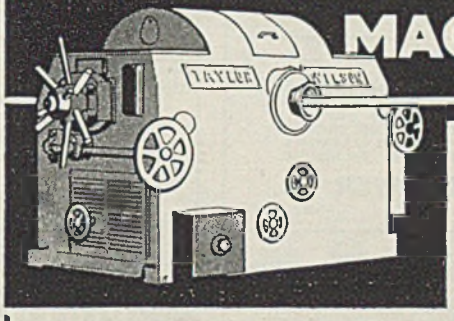

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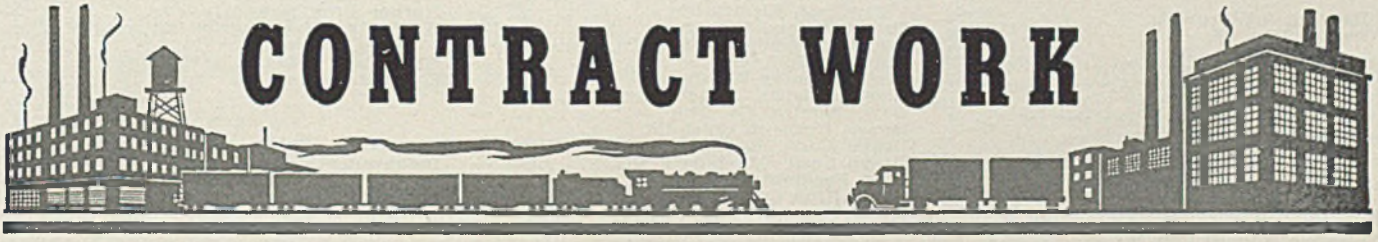

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